



HOUSE OF LORDS

Revised transcript of evidence taken before

The Select Committee on Science and Technology

Inquiry on

THE RELATIONSHIP BETWEEN EU MEMBERSHIP AND THE EFFECTIVENESS OF SCIENCE, RESEARCH AND INNOVATION IN THE UK

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Questions 90 - 106

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Witnesses: Professor Siegfried Russwurm and Juergen Maier

USE OF THE TRANSCRIPT

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

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

Examination of Witnesses

Professor Siegfried Russwurm, Chief Technology Officer & Member of the Managing Board of Siemens AG, and **Juergen Maier**, Chief Executive Officer, Siemens UK

Q90 The Chairman: Good morning.

Juergen Maier: Apologies for my colleague being a little bit late.

The Chairman: Welcome, Mr Maier. We are delighted that we can make a start. We know that there is a tight time constraint for your colleague at least, and perhaps for you as well. We thought we would start on time. Professor Russwurm can join us and catch up. We are being broadcast, so I alert you to that. Would you like to introduce yourself formally for the record? If you would like to make an opening statement, please feel free to do so, otherwise we will go straight into the questions.

Juergen Maier: Thank you very much. I am Juergen Maier, chief executive of Siemens in the UK. I should declare that I am also a non-executive director in BIS, so I am obviously engaged there from a science point of view. I am also a visiting professor at the University of Manchester, so I have close links with that university. As Siemens in the UK, we have strong partner relationships with a number of our UK universities.

By very quick introduction, I will keep to our UK activities, especially in relation to research and development. We are an organisation of about £5 billion revenue in the UK. To give you a measure of where that fits within Siemens globally, Siemens globally is about €80 billion, so we are a significant part of it. We employ 14,000 people. We have 13 factories in the UK, and are just building the 14th, which you will no doubt know about, which will produce blades for wind turbines in Hull. A lot of our research activities in the UK happen around the activities of those factories. We do research to the tune of about £100 million in the UK. That is about 2% of our revenue. You will recognise that that is quite low, because for Siemens globally the amount of research we do is over 5% of our revenue. I am sure as you start

asking questions, I will respond by informing you that we have been increasing the amount of research that we do in the UK over recent years. To give you a little flavour as an introduction, in 2008 we had 50 collaborative R&D projects in the UK. By “collaborative”, I mean that these projects are not just happening in one of our factories on our own but are research in partnership with a university or a research centre. Last year, there were 160. That increase is predominantly because we have been encouraged by Great Britain’s move to reindustrialise and to create an industrial strategy, and by institutions such as the catapults, which have allowed us to engage in more collaborative R&D. I will leave it there. I am sure we will talk about the EU linkage of some of that as you ask me some questions.

Q91 The Chairman: Thank you very much. That is a very helpful introduction. Following straight on from that, you have described how you are increasing your research in the United Kingdom. What features would encourage such an investment in research and development in this country? Specifically, what influence does our membership of the European Union have in such a decision?

Juergen Maier: The features that we look for above all are best in class: lots of good citations and knowledge of the research topic. That is one area. However, also key are universities or institutions that are already or are willing to collaborate. We see British universities as particularly strong at that, and they have got stronger over recent decades. That is where we are able to link up either universities across the UK or sometimes universities to other universities in the USA or Germany.

Increasingly, the EU angle comes into the research programmes that we are looking at, which are very large scale. We are heavily involved with an initiative called Industry 4.0, otherwise called the fourth Industrial Revolution or digital manufacturing. There are all sorts of different names for it. That programme is hugely complex in terms of the future automation of factories. No one university, country or organisation will be able to carry out all the facets of the research that need to take place, so we are actively looking to work with different partners to piece together the innovation and R&D that we, and indeed many other organisations, will be driving. Germany is quite centric to this research, but it is in our interest as Siemens in the UK to make sure that we link British universities into that, because ultimately that will help us to grow our R&D and manufacturing capabilities here rather than if we left it to Siemens in Germany and German universities to drive this research. That is where it is important for us in this collaboration across the borders on these big programmes.

The Chairman: Clearly, Siemens is very interested in a successful outcome to the research and development projects. You have explained that the quality of science is one of the prime drivers in determining where you make your R&D investment. You are collaborating with universities around the world, and have mentioned the United States. Which is significant in wanting to have further investment in Britain as opposed to Germany: the fact that we are part of the European Union or that we are a European neighbour?

Juergen Maier: The answer is both, obviously. In other words, we are a neighbour and a part of the European Union, so proximity plays into that to some extent. When you are part of the European Union, you are able not only to participate in the research programmes but to shape the future look of those research programmes. We in the UK can be part of it and say, “Let’s pick another area of autonomous vehicles”, which is one of the research fields in which I believe, and Siemens believes, that the UK could be leading. Being part of the

European Union means that we are able to exert significant influence on what these research programmes are going to look like over the next five years and the next decade. We would not be able to do that outside the European Union.

The Chairman: In your experience, have associate members of the European Union ever been able to exert influence on the determination of programmes?

Juergen Maier: It would be good to ask Siegfried that question, because he looks after the global research programmes more than I do. My knowledge is that we can do it a lot more significantly as part of the European Union. You will probably come to some of the Switzerland questions. Obviously Switzerland participates in these research programmes, but my understanding and knowledge is that they are significantly less influential in shaping them. I would not go as far as saying that it has no influence at all, but it has significantly less. Siegfried might like to express a view on that when he arrives.

Another point worth making is that it is not just about the research itself. As you develop this innovation and the R&D for such programmes, it is also very much about the standards that you are setting for those programmes. I would definitely say that it is only the people who are actively involved in setting the future direction of these research programmes who ultimately are at best advantage in defining the standards, which ultimately, of course, gives manufacturers and companies in your country the potential competitive advantage of being involved in those discussions and that influencing early on.

Q92 Lord Cameron of Dillington: You were recently quoted as saying that you are “very sure we can better grow our business in the UK as part of the European Union”, and you go on to talk about “thriving rather than surviving”. Do you want to expand on that and explain why you think that?

Juergen Maier: This builds on the last point that I made. I have commented a number of times that I am definitely not one of the scaremongers, and should a Brexit happen it is clear that we as Siemens would continue to serve the British market as best we could and that the UK will remain an attractive market for us. However, as I have said, we have 13 factories, soon to be 14. My personal ambition is that as we drive forward we do more R&D and manufacturing here. Manufacturing often follows R&D. Outside the EU it would be more difficult for me to influence Siegfried, who will hopefully join us in a moment, and other colleagues in Siemens to persuade them that the UK is a good place to start some of those R&D programmes. Be aware that some of that will be logical, rational thought, but some of it will be psychological, such as, “It will probably be more difficult to partner with these organisations, because they are ultimately not part of the European Union”. Hello, Siegfried. We are in mid-flow.

Professor Siegfried Russwurm: Good morning. I am sorry. I hope it is not Siemens technology that has caused my late arrival.

The Chairman: I am sure we owe you an apology for being challenged by the transport system. I explained to Mr Maier that we are being broadcast. Would you like to take this opportunity to introduce yourself for the record, and then we will continue with the questioning? I know that your colleague has reserved some questions for you.

Professor Siegfried Russwurm: Thank you so much. My name is Siegfried Russwurm. I have the pleasure to serve on the board of Siemens, the parent company. I am a corporate technology officer for Siemens, and I have been with the company for 24 years.

The Chairman: Thank you very much. Lord Cameron, did you want to continue?

Lord Cameron of Dillington: I rather think I have finished.

Juergen Maier: Is it useful if I continue on that question? It will allow Siegfried to pick up from where we are. We were just talking about my comment about us thriving better within the EU and that with these large research programmes and, indeed, with new research programmes that we might drive in the future such as energy storage, where we are quite active in the UK, I am pretty certain that in the event of a Brexit it would be more difficult for me to persuade Siegfried and other colleagues within Siemens who are making these decisions to invest in further R&D here, and even to create some more manufacturing for these types of activities. I also said that part of that will be for rational reasons: we will probably find it more difficult to create the sorts of collaborations that we currently drive. But sometimes there are also psychological factors: i.e. if we are not part of the EU family, it may be better to keep some of this research back home or with other EU members. That is what we were just discussing.

Lord Cameron of Dillington: You said that manufacturing follows R&D, which is a pretty significant statement to make. Can you expand on that? Why would that be? Surely research is international.

Juergen Maier: That is not always the case. I can give you the history of the factory in which I started work nearly 30 years ago, which is still in Congleton in Cheshire today. It manufactures variable-speed drives, or inverters. The technology behind that started with a programme with the University of Manchester, which had particular knowledge of the technology that is required to manufacture those in smaller scale. It was that initial kernel of R&D that allowed us to develop that product. You are right: a separate decision is taken on where we now manufacture it, but obviously the fact that the knowledge is in Congleton, Cheshire, and in Manchester is a factor that, should other factors also be suitable such as the availability of skills et cetera at cost position, makes it easier to leap to the next decision and to say, "Maybe we could build a factory and produce this stuff here".

Q93 Lord Maxton: You have been talking about British universities, but of course the Scottish universities come under the Scottish Parliament and the Scottish Executive, not the British Parliament and the British Executive. Does this make any difference? If we were involved in Brexit—I agree that this is asking you to speculate—the Scottish Executive has said that it would leave Britain. Does that make a difference to you?

Juergen Maier: To be honest with you, I had not particularly thought about it. You could think of a scenario where Scotland was part of the European Union and England was not. I could well see a scenario where we would engage with more programmes through Strathclyde University, where we already have joint research programmes today, and that might be an easier way for us to engage.

Q94 Lord Vallance of Tummel: I should declare a former interest as a former member of the supervisory board of Siemens, albeit some years ago. Perhaps I could address my question to Professor Russwurm. It is clear that large companies in the UK when it comes to EU funded research are very much underrepresented in comparison with Germany or France. Could you explain that to us? Is there anything that the UK could learn from Germany about that?

Professor Siegfried Russwurm: We have no in-depth analysis for that pattern. However, I would like to offer some theories. Whilst typically the UK industrial strongholds are specialists and not the big companies, leaving aside aerospace and automotive for a moment, for smaller companies the bureaucracies around these funding programmes can be a distraction. There is no doubt that we need significant improvement in the Brussels apparatus to deal with that. There are different ways to deal with that bureaucracy. What we see in Britain, and which Juergen helps me to understand, is this bureaucracy—dealing with rules and regulations—being outsourced quite often to the universities. This explains why British universities have a significant share of this funding, whereas British companies do not.

A second string of explanation is that typically the Anglo-Saxon tradition argues for more self-sustaining companies, whereas the middle-European tradition I would not say enjoys interacting with Governments and intergovernmental institutions but has made peace with that. If I take the German example, we have some experts who can deal with this kind of endeavour and industrial associations that support that. Whereas in Germany it is more of a governmental or association lead and companies then join in, the Anglo-Saxon tradition is to do our own thing.

Taking the most recent example, you may have heard about the internet of things as the next big thing in digitalisation. You see the Anglo-Saxon approach in the Industrial Internet Consortium, which is purely driven by companies, whereas its counterpart in Germany, the famous fourth Industrial Revolution, originally started between government and industrial associations, and only recently have companies tried to get into the driver's seat when it is closer to an offer to customers. There is a different tradition.

On the other hand, if I add the universities plus the companies' total share, both for Germany and Great Britain, there is not much difference.

Lord Maxton: Where would you put the USA in that?

The Chairman: Lord Fox is next.

Q95 Lord Fox: This is on the same theme of intellectual property. In entering into some of these joint ventures, is there some reluctance or suspicion from an Anglo-Saxon point of view about the ownership of intellectual property, or is that not a relevant concern?

Professor Siegfried Russwurm: I would concur with Juergen's statement that decision-making in companies is not always completely rational. Whereas the rational answer to your question is that it depends on the subject, the contract, the fund that you are applying to, and there are significant differences between universities as to how they deal with that, there is this emotional caution: "Am I too close to governmental organisations? Will somebody else have a say in my intellectual property, which should be the basis of my economic success in the future?" From an emotional point of view, I could not agree more, but from a rational perspective there are zillions of different solutions. Frankly, with very few exceptions, we have always found terms and conditions that created a win-win between the different participants, especially between universities and private companies.

Q96 Lord Hunt of Chesterton: I would like to pursue the differences between the UK and Germany in industry and government. The UK used to have many more large government labs, which have disappeared. You have Jülich and Karlsruhe. Similarly, you have the

Fraunhofer system, which has been going for a long time. I know companies in Britain that regularly contact the Fraunhofer to get information that is no longer available in any comparable way in the UK. How important is it for a very big company like you that these government science operations in Germany affect you? Do you have comments on the UK?

Professor Siegfried Russwurm: These research associations are our traditional partners. I had the privilege to visit two of the catapult centres in the UK. Frankly, while it was explained to me that it followed the example of Fraunhofer in Germany, if I compared both of them to our Fraunhofer institutes our German professors would be jealous of the environment, the structure and set-up. I truly believe that the concept of the catapults is a strong lever to revitalise the industrial strength of Great Britain, which has obviously suffered in past decades. The challenge that I see in the catapult concept is the people. Quite frankly, you see elderly people like me and young students, but you rarely see a 40 year-old engineer. Whether this knowledge transfer between people can be revitalised is the biggest challenge for me. From the framework and the conditions to the options for companies, the catapult concept is highly intriguing, and we have taken advantage of this concept in our international research portfolio.

Q97 Baroness Morgan of Huyton: It is very good that you have been able to join us, Professor Russwurm. We have waited to ask you about Switzerland, which is a topic of endless fascination to us. You employ a lot of people and have a relatively small operation in Switzerland. We are trying to bottom out the reality of non-EU membership for industry. You are obviously in a good position to help us to work that out. We want to understand what impact EU membership has on business interactions and particularly on decisions relating to R&D. How much does it play a part in your decision-making, and how does it play a part in your decision-making?

Professor Siegfried Russwurm: Let me start with the example of Switzerland, which is extreme because it is not a member of the EU and it is a small market with its peculiar rules and regulations. Had this business called Building Technologies, which is headquartered in Switzerland, not stemmed from an acquisition decades ago from a Swiss company, we would not have that operation. It is a small market. We have some people there who try to serve our customers. We have to make up our minds whether special Swiss regulations are worth the buck to implement them for such a small market. Siemens does not want to wipe out this Swiss industrial tradition, so we keep this traditional headquarter up and running, with all the emotions that surround that, but frankly we have been reducing our R&D in this location constantly over the last 15 years. Even when it comes to university collaboration, which is with ETH Zurich, the renowned engineering hub, when I tried to find allies in the rest of Siemens to forge a more strategic relationship with the university in Zurich, I was not successful. Our very few Swiss colleagues interact with their local university just around the corner, but otherwise Switzerland is merely a small market for us with interesting currency behaviour. All our efforts there are costly and becoming even more so. Even Swiss managers who have a global view have decided to relocate certain activities out of Switzerland to the EU.

Baroness Morgan of Huyton: Is that because Switzerland is a small and unusual market, or because it is not in the EU?

Professor Siegfried Russwurm: Yes.

Baroness Morgan of Huyton: Do you operate in any other non-EU countries where you can draw some conclusions?

Professor Siegfried Russwurm: It is both. The big difference is that the UK is a highly attractive market, so obviously whatever British decision is taken about being a member of the EU, we would be active here. However, all other things being equal in the decision-making, there are many small details, sometimes down to the fact that you send a sample from one lab to the other, and while the value of that sample is small you still have to go through all the paperwork for sending it cross-border. These are the small emotional things. It is not a big fact or a big rational argument, but, still, if there is any cross-border travel, if any sending of samples back and forth ends up in piles of papers, all things being equal you would rather do that somewhere in Scandinavia, Belgium or the Netherlands—I exclude France for mysterious reasons (I am joking)—than in a non-EU country.

Baroness Morgan of Huyton: Perfect. Thank you. That is very helpful.

Q98 Lord Fox: You touched on standards earlier, which I took to mean regulatory standards. Can we go into that more explicitly? We have heard from other evidence that, on balance, regulatory harmonisation through the EU is of benefit to the UK, despite some of those regulations being a problem. Obviously some are good regulations and some less good. How does that compare with your experience? Do harmonisation rules put firms outside the EU at a disadvantage versus those inside?

Juergen Maier: When you take it all on balance, it is most definitely an advantage to a company like Siemens operating in the UK. Of course, regulation and trying to get 28 countries to achieve a common standard, whether in electromagnetic field regulation or whatever it might be, is going to be difficult, but when you have achieved it it makes processes in design and manufacture a lot simpler.

I managed the factory that I talked about in Congleton nearly 30 years ago, and I remember the days when we used to have to put a different widget on every component that we shipped: a different one to Italy, a different one to France, a different one to Germany. The British one was more different than most. No, maybe it was the French actually. Now, coming out of that factory is one product for 28 countries. You can imagine that that is a massive enhancement in design and manufacturing productivity, but that is history: if you look ahead—Siegfried has talked about the internet of things and digitalisation—you can imagine how important it is going to be for the interoperability of components to communicate with one another. If that is not properly standardised and a country is not involved, you will definitely put yourself and your market at a disadvantage.

Q99 The Chairman: Sometimes standardisation could be incompetently or inappropriately determined. We had evidence from Syngenta operating in a completely different field from yours in plant sciences, where they reported that their biotechnology enterprises have moved out of Europe in effect, not so much because the Commission but because the European Parliament had interfered in a way they found unhelpful to their business plan. Is there any experience in the field that you are operating in, which is obviously different, where you have found the European Union regulation inappropriate?

Professor Siegfried Russwurm: There are examples. The European Union is far from perfect in its regulations, do not get me wrong. However, if we move into the future, our innovation will be more digital, and in the digital space scale is everything, because customer N plus one

does not carry any additional cost; it just gets another licence, which is the same. To get those two ends to meet, we are heavily engaged in this regulation and, frankly, it is a matter of whom you meet in Brussels as to whether you can make your argument. Not because he is a German but because he is making great efforts to understand the needs of industry, the Commissioner for Digital Affairs, Mr Oettinger, has held numerous round-table discussions asking us what we need and verifying their proposals for regulation and whether they would meet our needs in a common market. So there is light on the horizon.

But you are absolutely right: there are stupid regulations where, frankly, the line of defence is to go to your national parliament and try to influence implementation in the country.

Q100 Lord Maxton: What changes would you want to see in the European regulations? Let us say we stay in Europe. What changes would you like to see in Europe?

Professor Siegfried Russwurm: Following good practice from industry and what we have found to be helpful, at least looking to balance the opportunities of innovation and risk is something that Brussels could improve. It is strongly risk-based, and there is nothing bad in that, but balancing risk and opportunities needs improvement. If we agree that in the 21st century data is the new oil that is fuelling the economy, we have to balance data privacy, albeit taken on our own behalf as every individual, and the opportunity to create business and value out of data. Frankly, it is a constant struggle to convince people in Brussels that you can have both if you apply technology.

Lord Maxton: Is that because there are 28 countries? Would it make a difference if there was a more combined effort?

Professor Siegfried Russwurm: Yes, for sure. The fact that we are still talking to 28 constituencies mentally makes it more difficult. On the other hand, I plead guilty in that I use the same defence of one country to avoid nonsense. Please forgive me for being blunt. We are living in a global world and competition is global. The only chance that we in Europe have to compete against Asia or North America is to get our act together in a business where scale does matter. It does not make sense that Estonia, Portugal, Germany or the UK do their own thing if we believe that competition in the 21st century is global.

Q101 Lord Peston: From an economic point of view, it seems obvious, as you are saying, that standardisation yields enormous economic benefits. One of the first papers I ever wrote was on the single currency, and again I argued at the same microeconomic level that not having to judge all the different exchange rates was massively beneficial. The trouble is that everybody thought of it as macro. Is it part of Siemens' philosophy and policy actively to encourage and even campaign for standardisation in all relevant areas? I felt that you were leading us in that direction. Everybody gains. It is a no-loss game if you do not have everybody "doing their own thing". Would that be a fair view of Siemens' position?

Professor Siegfried Russwurm: That is an excellent description of what we are doing. We are trying to use opportunities as they occur from real business cases. We have been doing so in talking about the railway system in Europe. I love the opportunity to go to London by rail, but if I do that from Germany I have to cross three different jurisdictions. As a passenger I do not notice that, but being in the railway business I know how cumbersome it is to equip rolling stock with security mechanisms that all fulfil the same purpose. If you analysed them from a technical perspective, one is as good as the other, but the sheer fact that you need

five of them in any locomotive is nonsense in the 21st century. We try to use such an example in arguing for that.

Going forward, when I cross the Channel—I am a frequent tourist to the UK; I come every year—with my own car, it is great that Newcastle offers me five minutes to become adjusted to driving on the correct side of the street, and then I am fine. If we extrapolate that to autonomous driving, if the rules in Britain are different from the rules on the continent or wherever around the globe, this is a massive hindrance to expanding technology. Things are getting more complicated. While the arguments that you mentioned were true and have proven to be true, we will see that exaggerated in the coming years and decades.

Viscount Ridley: Can I pick up on this point of standardisation? By the way, I hope you are not suggesting we all start driving on the right very soon. We will come back to that perhaps. I am interested in the degree to which standards are now being set at a global rather than a European level. Mr Maier mentioned the internet of things. Surely that is an example where there is likely to be a common standard between North America and Europe. We know that in the automotive sector, some parts of the food sector and many parts of financial services, the EU is effectively a transmitter of global standards to its member states.

Professor Siegfried Russwurm: You could call it the transmitter. I would prefer to call it an aggregator. I am involved in the discussions about the standards on the internet of things. If any country or standard association of any European country sat in that round in the United States, they would be polite but they would do their thing. If it is Europe, this is what we have achieved—

Viscount Ridley: Is it true for Japan too?

Professor Siegfried Russwurm: It is very much so.

Viscount Ridley: They are ignored compared with the European Union?

Professor Siegfried Russwurm: It is a special market. They have been special all the time and we have somehow accepted that as industries. Frankly, it kept many of the Japanese companies restricted to their own market. Okay, that is fair.

I give the example of dealing with associations in the US or the NAFTA area versus Europe. The difference is whether you are taken seriously at that table, speaking for Europe, or you are just speaking for a market where from a multinational perspective, as I argued about Switzerland, somebody argues, “If you don’t like our standard, get out of here and do something else”. It does not matter that much. Whether my product is accepted in Switzerland or not would have a miniscule effect on our P&L.

Viscount Ridley: Do you accept that in the case of the internet of things, there will be a standard that will be much larger than the European Union?

Professor Siegfried Russwurm: Absolutely, but it will strongly involve the European school of thinking when it comes to engineering. To bring that together with a kind of North American Silicon Valley broad-based internet success is the consensus that we have reached between those two parties: that we are approaching that matter from two different directions. It would be great—we are moving towards this—if we could bring the best of those two worlds together: the engineering know-how about the real world of the Europeans, and the internet know-how from their business-to-customer experience of the North Americans. There are clear conclusions for joint approaches and joint testbeds where this common

standard will be tested both in North America and in Europe. We are meeting at eye level now as Europeans and not as Germans, so to speak.

Lord Hunt of Chesterton: Could you comment on how it has worked? There have been examples where the European Parliament has been quite influential in standards for cold chemicals and other issues. One of the differences between Europe and the United States is that industry and business in the United States take a tremendously strong role, through campaigning and so on, in who gets elected. Could industry do more somehow to make these institutions more effective? There are signs of effectiveness, and the point made by Lord Ridley is that European standards often have a global reach. Does industry underplay its role? You made the strong statement that if it is carried across Europe it could be very beneficial.

Professor Siegfried Russwurm: We need to do more and learn lessons. The fourth Industrial Revolution campaign is an example of where we have said that now is the time for industry to take over and drive that forward as we approach customer benefits. Frankly, we know more about customer benefits than politicians in Brussels may do.

On the other hand, coming back to your example about a different testimonial, there is a limitation that we as engineers, as researchers, have to accept in more and more societies around the globe that the limiting factor is no longer technology but social acceptance, especially when we talk about big infrastructures. Frankly, the fact that gene technology, pharmaceuticals and the like have taken a tough stand and have more or less left at least central Europe is more attributable to the fact that there was no longer any societal consensus to push that forward. The most recent research in the UK and the concerns raised in the continental press are simply more proof of that. The more straightforward infrastructure business that we are in, such as trains, mobility and energy transmission—we have our struggles with protest groups and NIMBY has made it into the German language and into German dictionaries—by and large in those areas our voice is heard, because it is less societal discussion and more the law of physics that we argue. We say, “If you have generation of wind power here and your industrial centres there, the law of physics tells you that there should be some kind of cable in between to balance that”, and there is not much you can argue against there. If you talk about genetically manipulated drugs, for example, there may be other levels where we in central Europe have our struggles.

Frankly, from an engineering perspective we have been able to influence legislation and standardisation on a European level. We can do more, and doing more is well received and accepted in Brussels. That is my experience. Whenever I hang around there—it is not my favourite occupation but every now and then I have to do that—I confess that the voice of industry is heard. The more companies liaise and give a common view across competition, the more the regulator accepts, “There seems to be a kernel of truth if even these competing companies argue the same way”.

Q102 Lord Hunt of Chesterton: Does the free movement of people within the EU provide all the R&D talent that you need, or do you have to recruit actively from other parts of the world?

Professor Siegfried Russwurm: Let me start with some facts. If we look at our total population of applicants this year in the UK, about 7% have no British passport, and of those a good half are people who we are moving deliberately to the UK—and, by the way, vice

versa—in order to link this global network of things. Among those people, for sure, are scientists and chief engineers if we want to spread out technology and make it available here. If we start building windmills in Hull, for sure we will have some engineers from Denmark, for example, coming to the UK. When we talk about hard-core research, which we typically do with the universities, we find the international crème de la crème at that university, so it is not us triggering people to come to that place much, although there may be exceptions, but typically, in order to get the best of the brains at the university, it has to be international and global in its thinking and its population if it wants to be successful on a global scale.

In a nutshell, the answer is that we can well cope with that. Would it be a killer criterion? It would not. If a country were to decide to block the inflow of talented experts, this would have a significant effect on our activities there, the latest example being South Africa. The South African Government have greatly tightened the inflow of qualified workers, with the result that as this expertise is not available on the labour market in South Africa, we have reduced our activities and refrained from offering some of our Siemens systems because, frankly, we do not have the qualified experts. We are far from that discussion in Europe, be it in the EU or with friends or family, irrespective of the legal situation. That is less important than the free flow of experts again in a global world.

Lord Hunt of Chesterton: The EU is important in that respect.

Professor Siegfried Russwurm: It makes it easier, frankly. Travelling here, being here for some months, as an EU citizen, is easy. As a non-EU citizen, again it is doable but it adds to that pile of bureaucracy and to that emotional resistance that I talked about where, all things being equal, we would rather not do it. This free movement of experts is extremely helpful.

Lord Maxton: Do you need that free flow with modern technology? Does the internet not allow that, or will it not allow it?

Professor Siegfried Russwurm: The strong answer is that the internet, email and the like, will never wipe away face-mail, direct interaction and the creativity of people meeting and discussing, wandering around, standing at the white board and discussing. All modern media is great once you are familiar with each other and know each other and want to exchange ideas, but true creativity does not happen in bits and bytes; it happens between individuals. Maybe I am old-fashioned and maybe my child would tell you something different, but I am convinced that true creativity in science and technology happens between individuals.

Juergen Maier: It is always nice to talk about examples. If we take the new factory we are building in Hull at the moment, we have just recruited the first 120 people, all of whom are from the locality of Humberside, and maybe Lincolnshire and Yorkshire. All those 120 people will initially receive their training in Denmark, because that is where our expertise currently is. In the same way, there will be many Danish engineers, as Siegfried has already said, who will help us set up that site. In three or four years' time, all that knowledge will be embedded here and we will have 1,000 people, largely British, with that knowledge. And not just that—we will be helping to grow our local supply chain and we will be helping to grow an industry. However, the kernel of it was all about moving knowledge and people across European borders, and if you put a barrier up to that, it would not make it impossible, but it would make it a lot more difficult.

Q103 Lord Fox: A slight rewind, if you will allow me, Chairman. Before you came, Professor, we heard from Mr Maier that the investment level in the UK was 2% of UK sales in R&D, which is less than half your average. First, why is it so low, and what do we need to do to get it at least to your average, if not beyond, given the quality that we believe we have around the science and technology institutions that we have here?

Professor Siegfried Russwurm: First, there is a broad spread within the conglomerate of Siemens when you look at the percentage of sales of the R&D effort. If we take the windmills in Hull, for example, the percentage is much lower, because, frankly, you are moving a lot of steel, iron and concrete to build such windmills, whereas the technology kernel is in the blades and, in that, the cell, so globally it is lower.

One effect is the mix of businesses. On the other hand, we are trying to increase that, and Juergen is the best ambassador for the UK in doing that. I came this morning from a discussion with the University of Cambridge on what we could do on our more basic research, because that is currently strongly focused on Germany and the US, but I believe that one percentage point to the average could be added here as there are splendid opportunities in the universities in the UK. So yes, we will grow. Will we make the average? I am not sure. We should not forget about consolidation, because you will see the revenue that we make with end customers here in the consolidation of the company several times, so we have to balance that. The way we steer our R&D is not about percentages but about competence. Where do I get competent partners? Research happens in networks. The times are over when research happened in the Siemens labs somewhere close by. It does not happen in the GE lab either. It happens in networks, so that is where the UK plays a strong hand. Then, if we account for research and development, the development part, the bigger part of the money, should correlate in our business with the manufacturing side, and the reason is quite simple: Siemens is a business-to-business company, so we do not sell anything any more to consumers. Since we got out of the home appliances business, not a single product from Siemens goes to consumers. The consequence is that our quantities are rather low compared with a car manufacturer that builds millions of cars for millions of consumers. If you manufacture small quantities, your process is never as stable as it is in this high series, so the interaction between R&D, the more development-type engineers and manufacturing engineers has to be pretty close. If you have a supplier who has a little change to a component, you need to talk to the engineer in deciding whether this can be done or not. This is why, as a Siemens rule, we try to co-locate not necessarily research but development and manufacturing, so it depends on the footprint of our manufacturing sites in the UK how much of the D in the R&D gets spent here. It is content-driven, not driven by percentages or any KPIs like that.

Q104 Baroness Manningham-Buller: Professor Russwurm, when we were talking about regulation, you talked a bit about the fact that the European Union is pretty focused on risk and not necessarily on innovation. To what extent has the EU research funding helped, hindered or affected what you are trying to do with your business?

Professor Siegfried Russwurm: The good news is that EU research funding can be strongly influenced by industry, both by individual companies and associations, so with these big research programmes we try, and we are pretty successful, to target the opportunity while not neglecting the risk. We have learnt the lesson that we should involve non-governmental organisations early in order to take that blurring risk out of uncertainty, but again these

programmes are not invented by some bureaucrats in Brussels; they are jointly collaborated on, which by the way is one of the major advantages of being a member of the family. For sure, a university from Switzerland, to go back to that example, can apply to sign into that programme, but they will not be able to influence it during its set-up. That is the difference. The influential power that we have, both individually as companies, especially when they are I would not necessarily say big but renowned, and as associations, is significant. We have to confess that while we joke about Brussels bureaucrats when it comes to the research programmes, there is a strong influence there and we can raise topics and they find their way into bigger programmes. Horizon 2020 is a broad programme, but it has focal spots that we in the industry have introduced into it.

Baroness Manningham-Buller: Is the effort and the energy that you as a company put into steering those programmes worth it, from your perspective, and does it deliver the results that you think are valuable?

Professor Siegfried Russwurm: Yes, exactly, and we will increase our efforts, because, frankly, you get what you invest. That is what we have learnt.

Baroness Manningham-Buller: Do you see other companies, in particular British companies, approaching this aspect of EU funding in the same way that you do? Are you better at it than British companies?

Professor Siegfried Russwurm: Now we come back to the harder question of why, from a statistics perspective, it is less the case with UK companies. The only humble advice that I could offer would be to synchronise national science funding with these programmes. Frankly, if it is our tax money that is spent via these programmes, then let us come to the conclusion that our national programmes should help companies and universities to make their way into these European programmes. Over the course of recent years, we have managed national programmes to help companies and universities to get their act together and be more successful in European programmes. We do not put that into the headlines, but it is a matter of fact, and I am not shy about testifying that to this Committee.

The Chairman: I have Lords Peston, Cameron and Hunt, who all want to ask questions and we have just a short amount of time left.

Lord Peston: My question relates to the previous question, so I think you ought to forget about me.

The Chairman: All right. We will go on to Lord Cameron.

Q105 Lord Cameron of Dillington: Is the threat of Brexit affecting your current investment decisions?

Professor Siegfried Russwurm: From an emotional perspective, there is this little animal that crawls up and says, "Can we be sure that Britain is part of the family?" It is less from the sheer legal perspective. Again, it is this emotional uncertainty. Will we be able to deal with that decision? I have no doubts, but it leaves that strange feeling: is Brexit just the first step to a fortress Britain that is different from the rest of Europe? There are actually no big investment decisions to make, and if it is market-driven, like this wind turbine factory in Hull, whether Brexit happens or not will not make a difference. If we are talking about components that are made here for a global market, there is more than £1 billion of exports from British Siemens' factories. If such an extension were on the table, frankly we would try

to wait until a referendum was done, always all things being equal, but that is the emotional aspect that exists.

Lord Hunt of Chesterton: I am a professor at Cambridge, so I was pleased that you discuss with them. One of the things that you commented on, which indeed is a difficulty, is that you have these networks in Europe—I helped to set up one that involves aerodynamics, wings and so on—but it is quite difficult to get sufficient British involvement in these networks and to get the science and research councils, as you comment, to connect their programmes to the European programmes. Currently there is a discussion going on about that, but your point about anything you can do to help to produce that is important, I think.

Juergen Maier: Obviously I also advise government on this issue, and it is a fundamental issue that we in Britain are having this Brexit discussion even before we have got to the referendum. If anything, we are removing ourselves from some of these more co-ordinated and strategic discussions. It would definitely be more beneficial for British companies to be able to participate in these European programmes if, as Siegfried said, we co-ordinated the key focus areas better. If we then developed ecosystems of companies interested in those areas and there was a sort of British ecosystem of companies whereby we could help to support them to get access to these European-funded programmes, that would serve British industry overall. I am not talking now on behalf of Siemens specifically; it would serve us better here in the UK.

The Chairman: A final word from Lord Hennessey.

Q106 Lord Hennessey of Nympsfield: Forgive me for being late. It was an infrastructure failure, and I am pretty sure it was not a Siemens' bit of infrastructure. I may have misunderstood you, Professor Russwurm, but the emotional geography that you are describing is fascinating. Were you implying that Brexit just might be the start of an emotional detachment, or did I mishear you?

Professor Siegfried Russwurm: Again, the interpretation might be that. We are in that emotional sphere, you are absolutely right, so how would I read, as a German citizen, the debate in Britain and an outcome that moves Britain away from Europe? Is this just a first step? Are there more to come? We have accepted that the United Kingdom is different in some of the approaches, and we deal with that. The question is about the distance. Is that distance widening? Yes, Brexit would widen it. Is it just a first step and what is the next, or is there more consensus that, with all the cultural differences that we have, there is a common belief that European culture is a pillar and a force in the global dispute? This is why, although I appreciate all your analysis in the United Kingdom to count the rational arguments, on top of that is this emotional question of whether we have more Europe than a global world or whether we believe that it is country by country or region by region that makes us successful. This is my final plea to all the British voters and the decision-makers: not only do this as an exercise in counting British pounds, but keep in mind the greater idea of having true diversity in Europe, which we prove to be possible, and, on the other hand, understand the global rules of the game.

The Chairman: Professor Russwurm and Mr Maier, you have been extremely frank and very helpful. You have given us a lot of very helpful information which we will follow up, I suspect, particularly with the further evidence that we are about to take. Thank you very much, both

of you. You have taught me one thing that I was not expecting to learn today, and that is that NIMBY is now in the German language. Thank you very much.