



Science and Technology Committee

Oral evidence: [Government horizon scanning](#), HC 703

Wednesday 23 October 2013

Ordered by the House of Commons to be published on 23 October 2013

Written evidence from witnesses:

- [Royal Academy of Engineering](#)
- [Academy of Social Sciences](#)

[Watch the meeting](#)

Members present: Andrew Miller (Chair); Stephen Metcalfe; Stephen Mosley; Pamela Nash; Sarah Newton; Graham Stringer; David Tredinnick; Roger Williams

Questions 1-67

Witnesses: **Alun Huw Williams**, Principal, SAMI Consulting, **Doug McKay**, Vice-President International Organisations, Shell International Ltd, and **Natalie Day**, Head of Policy, Oxford Martin School, University of Oxford, gave evidence.

Q1 Chair: Good morning. May I welcome you to this morning's session? We are just embarking on a short exercise on horizon scanning, and we have a few very basic questions to try to get a better understanding. Would you be kind enough, just for the record, to introduce yourselves?

Natalie Day: My name is Natalie Day, and I am head of policy at the Oxford Martin School at the University of Oxford. I have just led the secretariat for the Oxford Martin Commission for Future Generations, which produced a report last week on these issues.

Doug McKay: Good morning. I am Doug McKay from Shell, and I am vice-president international organisations.

Huw Williams: Good morning. My name is Huw Williams from SAMI Consulting, a futures and strategy consulting firm. One of my colleagues provides training on futures issues to Civil Service Learning.

Q2 Chair: Let us start with the basics. There are a lot of definitions, it appears, as to what horizon scanning is, across Government and elsewhere. Jon Day's review used the following: "A systematic examination of information to identify potential threats, risks, emerging issues

and opportunities, beyond the Parliamentary term.” Does that capture it, or is there some other definition that you would choose to use?

Huw Williams: That is a pretty good definition. To my mind, the key word in that is “systematic”, in that it should be a structured and organised process rather than one that is just ad hoc.

Natalie Day: The definition seems quite fine. One thing that I think is important is to not look at these trends in isolation. It is very important to be able to consider the inter-connections among the trends when you are considering horizon scanning. That is possibly worth highlighting within the definition.

Doug McKay: I recognise the definition, which is very familiar to what we do in Shell.

Q3 Chair: So it does fit in with the private sector view.

Doug McKay: It does. I pick up on the comment on my left that “systemic” or “systematic” is a key element. For us, it is part of a process of doing strategy better. I substitute the word “strategy” for policy, but it is the same thing.

Q4 Chair: There is a certain amount of confusion between the phrase “horizon scanning” and “foresight and futures analysis”. Do you see a clear distinction in your own mind?

Huw Williams: I regard horizon scanning as one part of a wider foresight process. I did some work for the EU last year; it has a four-stage foresight process, the first of which it calls strategic intelligence, but it is effectively horizon scanning. You start with that and then you do a sense-making process from there, before moving on to selecting priorities and so forth.

Doug McKay: For us, the process is one of trying to understand the future better in order to make better decisions, so whether you call it horizon scanning, or foresight and futures, we do not use that.

Q5 Chair: You do not draw any distinction.

Doug McKay: We do not draw the distinction. There are a number of different tools to help you think about the future better, but this is fundamentally about thinking long term.

Natalie Day: It is also important to stress that it is not a static thing. I would not see horizon scanning as something that happens; it is a constantly evolving process. Whether you call it futures, strategic thinking or horizon scanning, I would argue that it is an ongoing part of policy development.

Q6 David Tredinnick: What types of activities do you consider horizon scanning to entail?

Doug McKay: Let me describe the process done at Shell. One of the key things that we do is something called scenario planning or the development of scenarios, which is a long-term exploration of fundamentally different ways in which the world might develop. That

becomes a frame for us to think about long-term decisions. That is then used for more detailed work on specific questions, specific countries and specific technologies, but there is an overall frame for that thinking long term.

We also do specific outlooks on technology, and that may come about through a forecasting exercise, participation in venture funds or even running prizes. There are a number of different ways in which we can bring in future ideas about technology, but all that fits within an overall frame of what we call scenarios to think about the long term.

Q7 David Tredinnick: What makes good horizon scanning different from poor horizon scanning?

Doug McKay: For me, good horizon scanning is something that has engaged an organisation to make better decisions. You can have a brilliant forecast or a brilliant set of horizon scans, but if they are not used in enriching the discussion in the organisation and making better decisions then I would argue that it has not really been effective.

Huw Williams: I would agree with that, but there is also a tension inherent in it, in that you also want horizon scanning to look at unconventional ideas, things that are not on the mainstream path of base-case thinking. You need horizon scanning to look far and wide and to be quite diverse in its approach, and perhaps diverse in the people who are actually engaged in it. There is an inherent tension.

Natalie Day: With horizon scanning, it is obviously very important to be thinking about the longer-term issues that are going to shape our future, which need to be the bedrock of the policy decisions that we are making. It is important to think about the potential risks and opportunities, but, also, part of the process is accepting that we are naturally going to be wrong. Much of what we think about the future will inevitably be wrong, and part of the key process of horizon scanning is how you embed flexibility within systems in order to adapt to unexpected or unanticipated events, or different future scenarios that perhaps we have not anticipated.

Part of the process is imagining what the future might be like, but it is also building flexibility and resilience within our Government systems to deal with the unexpected, in a future that we will inevitably get wrong in our predictions.

Q8 David Tredinnick: Have any of you used Foresight's horizon scanning toolkit?

Natalie Day: I cannot say that I have directly used the toolkit, but many of the horizons in the Foresight reports have certainly been instrumental. A number of our academics have been very involved in a number of those Foresight reports and have certainly found them useful.

Q9 David Tredinnick: At a meeting in the House last night, the new chief medical officer, Dame Sally Davies, was explaining that she is going to make dealing with antibiotic resistance a top priority, because there are no new antibiotics coming on to the market. What advice would you have for her?

Huw Williams: You need to be doing a comprehensive literature search; you need to be tied in to the latest developments in most of the research outlets; and you probably need to be connected to some of the social media groups that have an interest in the topic.

Natalie Day: I would certainly endorse that recommendation. For effective horizon scanning, you really need a diversity of viewpoints. Obviously, Dame Sally Davies is very well regarded in this field. There is also a lot of academic research, and information and research coming from civil society and other groups, which can provide some useful insights into how some of these trends, in terms of antibiotic resistance, might play around and how they might be dealt with, and also building on much of the research that is happening internationally as well as here in the UK.

Doug McKay: In thinking through some of these challenges, we have found that you need to think broadly about the institutional structure within which they play out, because that will be one of the fundamental drivers, and not just focus on the technology or a health care issue but what is the institutional governance structure underneath that.

Q10 Chair: Does it follow that the situation that we are facing in terms of antibiotics reflects bad horizon scanning in the past?

Huw Williams: Arguably, yes, but, as was said earlier, we can never make the forecasts entirely right in the first place. Yes, one might have been aware of it. The issue of antibiotics no longer being effective has been on the radar for a number of years, and I am sure that considerable research has already been done in that area that one can use.

Q11 Chair: That is not necessarily a failure of horizon scanning. It is a failure to take any action, is it not?

Doug McKay: That is my observation too. There has been a debate for a long time, so the question is why it has not been dealt with in one way or another. That is often an institutional question.

Natalie Day: Building on that institutional question, part of the challenge is how you embed longer-term thinking and information and analysis on trends across the decision-making structure of policy making, so that it does not become compartmentalised into a horizon scanning team or committee. There are important tools and places for those sorts of conversations, but, ultimately, many of the policy decisions that Governments and others make every day require that longer-term vision and input, which is absolutely critical across the system, whether it is dealing with antibiotic resistance in the Department of Health or elsewhere.

Q12 Stephen Metcalfe: Good morning. The problem with Governments and politicians is that they tend to think in five-year chunks, funnily enough. I do not know why it is, but they do. As a result, they are not fleet of foot when it comes to adapting to things beyond their own horizon. We therefore have to lead Governments towards making longer-term decisions. Have any of your organisations been involved with advising or helping the Government in

their horizon scanning? Have you found there to be a five-year barrier—one that is difficult to get people to think beyond?

Natalie Day: At the Oxford Martin School, we are constantly frustrated by what we perceive to be increasing short-termism within Governments on policy making and business structures; this is not unique in the UK but is elsewhere. That is why, last week, we produced a report—I bought a copy for bedtime reading—called “Now for the Long Term”. It is the product of the Oxford Martin Commission for Future Generations, chaired by Pascal Lamy. It is all about how we try to overcome gridlock on many of the big, longer-term issues that we are worried about, and how to overcome this short-termism and try to embed longer-term thinking into our Governments and policy processes.

One of our substantial recommendations—accepting naturally, particularly in democracies, that it is increasingly difficult to take that longer view—is that we are looking at things such as how it could be useful for Governments, particularly in democracies, to invest in independent innovative institutions that, potentially, sit aside from the day-to-day pressures of daily politics but are able to provide longer-term analysis and input into Government decision-making processes without being constantly buffeted around by whatever the issues of the day may be.

Having independent institutions that are accountable and transparent and able to provide the sort of much-needed longer-term analysis that is required is, we think, certainly a helpful step. We can think of things like Infrastructure Australia, or even here in the UK things like NICE or the Office for Budget Responsibility, which are useful examples of where we have tried to step in and take some of the devolved responsibility away from the day-to-day politics in order to help overcome this short-termism.

Huw Williams: We have certainly worked with a number of Government Departments in the past, including the horizon scanning centre in BIS. As I said earlier, one of my colleagues is working with Civil Service Learning in training civil servants. That is the other side of the coin of what you are saying. As well as having independent tangential organisations improving the capabilities of the civil service itself, to be able to look forward and advise Ministers in that way would be very helpful.

Doug McKay: We have been involved with a number of foresight activities—and, vice versa, we bring foresight folks into some of our exercises. I have not been directly involved with how the Government then uses that foresight, but one observation that I would make when watching a number of people trying to make longer-term decisions is that, even if the focus appears to be short term, they are still making long-term assumptions; they are still making assumptions about the long term. One of the key benefits of horizon scanning is that it surfaces what those assumptions are. People then have to confront the decision they are making based on those assumptions. In effect, they are doing longer-term work without recognising it.

Q13 Stephen Metcalfe: On the point that you are making about having independent bodies, the Day review suggested that outsourcing of horizon scanning may mean that there is too great a distance between the Departments responsible for a particular issue and the organisation doing the scanning. Do you agree with that? Is that a concern?

If I can just give an example, you talked about NICE. One example that I thought about when we were coming up with our terms of reference was the changes in the way that artificial limbs are being developed. They are now more complex and more aware of where they are on the body and so on, but the problem is that they are much more expensive. NICE has yet to work out a way of approving them on the NHS because of the expense, so we need a different model that makes the finance work. Consequently, nothing is happening. It is not moving. Have you experienced that? Have you come across there being too great a distance between Departments and advisers?

Huw Williams: The distance between the departmental decision maker and the quasi-external bodies is an essential tension, and you should encourage it. There will be elements on the outside that you need to bring in. The model that the EU was looking at was something that Oxford Analytica came up with, which is called node and network. You have a node of dedicated people within the Department or the centre of Government, but an extensive network of outside inputs into that whole process.

Doug McKay: In our view, the real benefit of doing horizon scanning or futures work is in the process, not in the final product. To outsource a piece of work on horizon scanning necessarily means that it is disconnected from what the policy makers are really after. Our experience with effective horizon scanning is that the people developing it have a deep interaction with the senior executives or senior policy makers. They understand the issues that matter, and they understand the key questions. They are also part of the process of developing the horizon scan—not through the whole process but at steps along the way. Simply to bring a product in from the outside and expect it to resonate or work with the policy makers is not likely.

Natalie Day: I would agree with that. It is important, within the civil service and the broader policy-making process, that we develop the skills and capacity to think longer term throughout the whole system. That said, there is a whole wealth of information out there as well, in terms of academia, civil society and other players—this diversity of views that I was talking about earlier. It is really important to bring that in. Perhaps there are ways of doing that more systematically than currently occurs, but it is a critical part of the process, particularly now with the way the REF and other things are moving. Part of my role at the university—it is an unusual role—is trying to get academics and others to understand how their research can play into the critical policy decisions that are happening, and trying to make that exchange and flow of information much more robust and rigorous.

Q14 Chair: You started by saying that the horizon scanning process should not be too far away from the institution organising it, and we are interested in Government, obviously, but then you moved slightly back from that, saying that organisations need to suck in information. Have your three organisations got a useful role to play in Government horizon scanning, and have you been involved?

Huw Williams: SAMI has done some work for DEFRA and BIS in the past. We would clearly be very happy to assist in any way. The distinction that we were making was between trying to make sure that you had a wide enough grasp of information coming in, yet a focused-enough approach on what the decision-making issue is.

Doug McKay: That is absolutely right. In doing effective horizon scanning, you must bring in an extensive amount of external information. If it is all internal, you will be saying the same thing as you said before. However, you have to be close enough to the policy makers or decisions makers to understand what they want. We have been involved with some of the Foresight programmes, and, as I said, we have brought Government staff into some of our workshops and exercises, and that was highly valuable. You are exchanging ideas and different ways in which you see the world.

Natalie Day: At the Oxford Martin School it is quite complicated, but we fund about 35 different programmes and institutions across the university, all doing interdisciplinary research on long-term global challenges—from geo-engineering to food security, climate change, pandemics and a whole range of things. Across that network of about 300 academics, many are very engaged with Government Departments and agencies, helping them to think about these longer-term issues. As I mentioned earlier, many of our academics have been quite involved in the Foresight reports, such as Charles Godfray on the future of food and farming, and Ian Goldin and Tim Palmer on the migration and environmental studies Foresight report.

We have also tried to work with different Government Departments and agencies to help them think about some of the longer-term issues that we are worried about. Next month, we are holding a workshop with the MOD on their global strategic trends documents. We have also been talking with the Government risk group on how they might be able to get more academic input into the risk registry. Certainly, our group on geo-engineering, for example, has been working closely with DECC and the research councils on NETs, and I know that is something this Committee is interested in.

We are always very keen to find ways of connecting our academic research, because we are so worried about these longer-term issues. It is difficult to get Governments and others to think beyond the electoral term, as you know, so we are always trying to find new ways of helping to connect some of the research that we are doing and make it more practical to policy makers, so any advice from the Committee would be very welcome in this regard.

Q15 Chair: We are after your advice. How would you improve the situation? Do you think there is a way that you could finesse what happens now, in terms of your engagement with Government Departments, in order to get better outcomes?

Natalie Day: These sorts of conversations are very helpful. It is useful to have more opportunities for robust exchange between the academic community and Government policy makers on particular issues, and to have space within policy discussions to challenge some of these longer-term horizons as opposed to whatever the key critical issues are of the day.

Huw Williams: Some of the work that I and other colleagues were doing for the EU on the more general establishment of foresight processes may be of interest to your colleagues and the civil service. We would be happy to talk that through, trying to help people understand that.

Q16 Sarah Newton: To help the conversation move on, I can think of an example where there was a good use of foresight data, and that was around demographic change and agreements to introduce auto-enrolment of the workplace pension. It was a big long-term decision made in this Parliament but supported by all parties. Civil society played a hugely important role in that; it was not only academics who wanted the change but the financial services industry, working across political parties.

We have not mentioned political parties so far; you have been very focused on working with policy makers. The policy makers you are working with are in Government for a particular period of time. It may be for a short period of time or 15 years. To what extent have any of you worked with political parties, because for long-term decisions it requires cross-party consensus?

Huw Williams: I am not aware that SAMI has done any work with political parties, I am afraid.

Doug McKay: Likewise.

Natalie Day: We have not. At the Oxford Martin School we often try to hold big events, workshops and dinners, and provide forums in which to have conversations. Obviously, in those sorts of scenarios we invite people from across political parties to come and join in. We recently did a series of events closer to Whitehall, inviting a number of speakers from different parties to try to get engagement on things like geo-engineering, food security and a number of other things. We often try to do it through networking and events, and public debates and forums, to try to get a sense of and also influence thinking within the political parties.

Q17 Sarah Newton: Maybe that is something to think about, in terms of engaging with the policy formulation process of the different political parties and trying to influence them to come up with a consensus around longer-term issues of change.

As we have identified, there is a bit of a gap in how you are working with policy makers. Can you think of something in all the work that you have done as professionals where there has really been an issue that the Government should have been focusing on, and working together to tackle, that has really harmed the UK because of inaction to take decisions based on the horizon and not the short term?

Doug McKay: I am not sure that I can come up with an example of where something should have happened, but I know there are a number of very difficult issues facing the UK and other countries that also affect Shell. We have been involved with the Government on exercises through Monitor—and climate change is one that springs to mind. We have gone through a number of exercises to think through the policy implications, the physical implications and the business implications of that.

Q18 Sarah Newton: Is that something that you have worked with for a long time that you feel is an unresolved issue, and the foresight and expertise that you are bringing to these longer-term decisions that need to be made is not sufficient support for that?

Doug McKay: My sense of it is that many of these topics are very difficult, if not intractable, and conditions change over time so they need to be revisited continuously. We move on, we make decisions, we take action, and then further things need to be done. It is not a question of nothing happening; it is just that some of these things require continuous review and relooking at the horizon scanning, because of the constraints and the opportunity to shift over time.

Q19 Sarah Newton: That is continuous dialogue based on information as it is coming in. Does anybody else want to comment on areas of missed opportunity?

Huw Williams: I'm afraid not, no; nothing springs to mind from my experience with SAMI inter-Government.

Natalie Day: I agree. There is some frustration in the Oxford Martin School community around some of the big longer-term issues, such as climate change and growing inequality—many of those challenges that we identify in the report as critical. I know that quite a lot of work has been done in the area of pandemic preparedness, but there is certainly the potential to do quite a lot more across-party because it is such a huge risk, which requires, perhaps, a lot more attention than it is currently receiving.

Q20 Sarah Newton: Would the panel agree that there is frustration about climate change, pandemic preparedness, and growing inequalities? Can you think of any other particular areas where the Government need to be more engaged with the work that you do to address these longer-term issues?

Huw Williams: One of the key areas of change that SAMI has been identifying recently is more the change from the dominance of the west to the dominance of the east, and the consequent change in culture and behaviour. We did some work with a global law firm that had identified this as one of the major factors affecting its business, and as a consequence it set up a whole new Sharia law division in order to become more established in that area, because it realised that the world was moving on without it. There may be similar issues affecting Government that need to be thought out as well.

Doug McKay: I would echo that. That ongoing tension will be with us for some time, with shifting politics and power structures. Coming back to climate change, I would add that in the last few years we have been doing a fair amount of work on understanding linkages among energy, water and food, pointing to the fact that we often deal with some of these issues in somewhat of a silo. Being able to understand that holistically and on an integrated basis is both difficult for us and for Governments. Tackling that on a joint basis helps all sides understand the nature of the problem.

Natalie Day: If I had all the directors of my 35 programmes in the Oxford Martin School, they would all be arguing for various longer-term challenges that require a more holistic approach from Government policy makers to think about. I certainly would not limit it to climate change and pandemics. There are issues about non-communicable diseases or how you foster longer-term growth, and that is certainly a challenge not only for the UK but for many economies. There are also questions about growing inequality and other governance structures, and how you improve transparency within governance arrangements. That is

what we are worried about. That is why in our report we have tried to highlight some of the challenges that we think need to be grappled with, but they are just a sample in the broader question that applies across all these issues, which is how you embed the longer-term thinking, whether on pandemics or non-communicable diseases. As mentioned earlier, we are not going to be able to predict all of these bigger challenges, but our capacity to be much more flexible and to build systems around them to adapt is also extremely critical.

Q21 Graham Stringer: I am sceptical. Do you go back and look at the accuracy of your reports? Is there academic literature on that, and how accurate do you find you have been?

Doug McKay: One of the things that we learned many years ago was that trying to predict the future is inherently unproductive. It is very difficult. We found that we made better decisions by recognising that inherent uncertainty and, in a sense, thinking about various different ways the world could play out.

When we do scenarios, horizon scanning or laying the framework for making decisions, we do not set out to make better predictions. We set out to create a framework to have a richer dialogue about the different ways the world could play out, and therefore make better decisions. Every once in a while there will be predictions that come from that; we always say that having a good prediction does help your credibility, but that is not the intent. The real intent is that, after people have engaged and worked with this material, they feel a deeper understanding and can make a better long-term decision. If you look at two fundamentally different ways in which the world could play out, one of them is going to be wrong by definition—or both will be wrong by definition. It is not so much about predictive powers.

Huw Williams: I would agree with that. It is also very much about the process of doing it. You are engaging the decision makers in considering the range of issues and concerns so that they are conscious of where they are going and the risks associated with it. Clearly, we can look back and see that there were risks that one had not anticipated and that one ought to have been aware of—9/11 or something like that, which probably was not on anyone's scenario plans. None the less, it is the process of making sure that you have a rich enough decision-making environment that is critical.

Natalie Day: Just to follow on from that, I think scenarios are a very useful tool in helping to think about the future. They are one process, and they can often be quite helpful in thinking about the different scenarios, but perhaps for policy makers it can be unclear what to do with that information once it has happened.

I guess that the other challenge often with scenario-based horizon scanning is that it can often lead people to think about the worst-case scenarios. It is also useful when thinking about horizon scanning from a Government point of view that it is about predicting some of these risks, or trying to think about how you would manage them. It is also an incredible potential power for Governments and policy makers to be able to shape the future—that any decisions that they make today on migration or immigration, or transport or infrastructure decisions, have implications for the longer term—so it is also a great opportunity in trying to think about the longer-term vision that we might have for the UK through these processes.

Huw Williams: Timing is another key aspect of it. If you are looking at the time period over which something may evolve or emerge, you need to be comparing that with the time frame with which the organisation can react to things. If you can build an organisation that reacts to things faster, then your need to look further into the future is diminished because you can cope. Conversely, if you have an organisation that you are not able to make more agile, then the need to have a good perspective on the alternative futures becomes ever more important.

Q22 Graham Stringer: Some of the cleverest people out of our universities go into the Foreign Office and the Cabinet Office. None of them predicted the Arab Spring. None of them predicted the collapse of the Soviet empire. More precisely, one of the events that damaged much of the European economy for a short period three years ago—the unpronounceable volcano that went off in Iceland—was not even on the risk register in the Cabinet Office. What lessons should we take from that? Putting the question the other way round, how do you look for black swans as opposed to just extrapolating?

Huw Williams: You will find in each of the examples that you gave that someone somewhere would have predicted it. I am sure that the geologists would have predicted the volcano as a possibility; the fact that it did not get to the Cabinet risk register is the challenge. A lot of what we would call early warning signals or very weak signals of what might happen in the future are out there; the hard part is picking them out of the noise. When you have a focused decision-making unit, it is concentrating on getting the decisions right in the short term, and it probably necessarily needs to put aside some of the weaker signals that are out there. That takes us back to the tension that we were talking about earlier, about being able to look widely enough yet still be focused on the decision.

Doug McKay: Taking the Arab Spring as an example, I know from work that we have done over many years that the possibility of that outcome has always been there as part of discussions of how the middle east might play out. One of the challenges through a certain policy cycle or strategy cycle is that if things do not happen then people say, “It didn’t happen, so let’s forget it.” Part of the challenge is keeping the signal that the fundamentals are there pushing towards that, keeping it alive in the discussion that is occurring within the organisation.

Natalie Day: I would reiterate the point that much of what we predict may happen will inevitably be wrong, and there will always be these unanticipated events. Things will happen that should have got more attention when they were raised in particular circles, as happened with the debt crisis; things like the volcano, which some may have known about, just came from nowhere. The real challenge for horizon scanning within Government is how you build greater flexibility in order to deal with these unanticipated events.

Q23 Chair: The Government response to our report on the handling of emergencies made the whole process of input into the risk register more transparent. Effectively, it encouraged the next generation of volcanologists to feed in information. That is obviously a better way of doing things. Does it apply to horizon scanning in general that the more transparent the input process, the better the outcomes will be?

Huw Williams: One would tend towards that view. Certainly, you tend towards that view as long as the process is open, in the sense of being prepared to listen. I can imagine that there are some circumstances where you might want to limit transparency, perhaps because you were in what you might call a game against another party and you needed to limit the extent of your lack of knowledge. You can see that around security issues, for example. Otherwise, it would be a leaning towards openness—let me put it that way.

Q24 Graham Stringer: What ideally should a Government horizon scanning report look like? Is there a case for it being confidential? This is Andrew's question the other way round. Is it better to be transparent or are there reasons for confidentiality?

Huw Williams: I am sure that there will be some reasons for confidentiality, but limiting them will be preferable, if you can, because then you are inherently going to be more open to other world views coming in. It probably comes to the point where you are moving from the initial general information-gathering state of horizon scanning, and when you start to put a policy spin on it I imagine that confidentiality will become more important.

Doug McKay: I would agree with that. We find that taking the horizon scan work that we do into external environments is a very good platform, both for engaging in debate with people and also in pulling in more information.

Natalie Day: It goes without saying that we would call for greater involvement from external agencies, if that impacts in a more transparent way, but, where appropriate, academics and others are also available to give confidential advice on some of the long-term research and trends that we are thinking about.

In terms of your question about what is an ideal horizon scanning output, it is useful to think about this not only in terms of—

Q25 Graham Stringer: It was not just the output. It was what the report should look like. Day criticises Governments reports and other reports as being too lengthy and complicated. What do you think they should look like?

Natalie Day: There is a combination of things that are required. Lengthy reports have some merit in particular debates. In other scenarios, it is more useful to have shorter and more immediate reports that do not take two years to complete.

Looking beyond formal reports and written processes, there are also the tools and trying to get the skill base within horizon scanning teams, and the Government and civil service more broadly, to help with horizon scanning. Perhaps independent institutions are able to do the longer-term analysis. It is about physical outputs such as reports, but it is also about providing the tools and skills necessary across the service to be able to help Governments.

Q26 David Tredinnick: I want to ask about cost planning. How do you factor perceived costs in your horizon scanning calculations? I am thinking in particular of something that was said last night about antibiotic resistance by the CMO, when she said that there are very poor returns for companies investing in new antibiotics because they will not sell enough to cover

their costs. One of the issues is where the money comes from for that research. That is my question.

Doug McKay: I am not sure I understand the question.

Q27 David Tredinnick: The question is, when you are looking forward, when you are trying to do horizon scanning, to what extent do you consider the costs of particular avenues?

Doug McKay: Always, always.

Q28 David Tredinnick: Is there a model?

Doug McKay: No. You can quantify things to a certain degree; in the example that you are raising it is hard to see the economic return, yet you anticipate that society will want to do it. That leads you into a discussion about how it will happen and what is the mechanism by which it will happen—whether it is publicly funded, or whatever—so the implicit costs are being factored into the discussion.

Natalie Day: It is a critical part of the conversation, obviously, to think about the cost. Much of the potential cost of climate change may be borne today but the benefits may not be seen for some time in the future, and that is part of the tension with longer-term work. The Oxford Martin School is asking Governments to make quite difficult policy decisions that might have quite severe complications in the short term, but in the longer term they will provide a much more sustainable and resilient environment for future generations.

The longer-term pay-off for those may be beyond the electoral term, and that is the tension that we are worried about, but, because of so many of the big global challenges today, it is really important that we find a way to balance the dual responsibilities of Government. They are the immediate day-to-day pressures, but, equally, the responsibility to future generations and others to leave the world with a much more sustainable and equitable, inclusive society.

Q29 Stephen Mosley: Following on from that, all three of you discussed some of the problems with horizon scanning and some of the challenges, and you have also put forward some recommendations. Last year, the Government commissioned the Day review to put forward their own recommendations. From your personal experience, what do you think of the Day recommendations? Do they deliver what you think they should?

Huw Williams: The focus of the Day review seemed to be very much on an organisational structure, which is vital to get right; so that was a good area to address initially. The fact that you have a number of central groups as well as departmental ones is valuable. What did not come through, which I would have liked to see, was a greater appeal to drawing in a much wider range of external input.

Doug McKay: Two things I would pull out that struck me. One was the organisational question of whether you centralise horizon scanning and where you put it. That certainly resonated with the way that we look at it. We have a central group that sits very close to the senior executives, and their job is to ensure that horizon scanning is done on a

professional and consistent basis across the organisation. They are the holders of that, and they make sure that it is done around the organisation.

The other comment that was made, which certainly resonated, was the issue of communication, which perhaps speaks back to your question as well. You need to invest a substantial amount of time in the communication of the results of horizon scanning so that people can engage on them. You cannot assume that a report will land and be used immediately.

Q30 Stephen Mosley: You have given two positive things there. Are there any negatives that you can give us? Is there anything missing from the report?

Doug McKay: No. I have to admit that nothing jumped out at me that I would point to that felt negative.

Natalie Day: I would reiterate Huw's point that the Day review—we are not related—is an extremely useful one.

Chair: I was going to ask that.

Natalie Day: No, definitely not, but there may be something in the name that makes us interested in horizon scanning.

It is really important that the Day review enables much more external input into the Government processes. The other point that I would make is that it is very important and it has raised the importance of horizon scanning at the Cabinet secretariat level, and it is great to see new investment in teams and processes within Government structures to enable and empower horizon scanning conversations. But, as I suggested earlier, the risk is that it may be seen that horizon scanning happens over here in this committee or that subgroup, when it needs to be embedded across the whole system.

Q31 Stephen Mosley: Finally, what are the successful outcomes of horizon scanning? How will you know whether the report has been successful?

Doug McKay: I would characterise it as the fact you can see that the decisions that are made have been informed by thinking about the longer term, that there is a much better sense of robustness in those decisions, and that they may lead you to shift into being more flexible to respond or to put mitigation in place. You have taken actions around your decisions linked to the work that has been done, but you will not know how effective it is until many years down the road.

Q32 Chair: You will never get to the horizon, will you?

Doug McKay: Perhaps not.

Chair: I thank the panel for their attendance this morning. It has been very helpful.

Examination of Witnesses

Witnesses: **Dr Martyn Thomas**, Royal Academy of Engineering, **Professor Ann Buchanan**, Academy of Social Sciences, and **Jonathan Cowie**, former Head of Science Policy and Books, Institute of Biology, gave evidence.

Q33 Chair: Good morning, and thank you, Dr Thomas, for attending two days in a row; we were in the City together last night. It would be helpful if the three of you would kindly introduce yourselves.

Professor Buchanan: I am Professor Ann Buchanan. I am a council member of the Academy of Social Sciences. I previously spent six years on the council of the ESRC, and at Oxford I was previously a director of the parenting and children centre. I am currently on the Oxford University research committee. I am here to represent the Academy of Social Sciences, but I will draw on my wider experience.

Dr Thomas: I am Martyn Thomas. I am vice-president of the Royal Academy of Engineering.

Jonathan Cowie: I am Jonathan Cowie, and I was former head of science policy and books at the Institute of Biology. I am still loosely involved in horizon scanning-type issues.

Q34 Chair: How do national academies and learned societies contribute to Government horizon scanning?

Professor Buchanan: The Academy of Social Sciences is the national academy for academics, learned societies and practitioners of social science. Its mission is to promote social sciences in the United Kingdom for the public benefit. It is quite a major resource because it can draw on the membership of nearly 1,000 leading peer-reviewed social scientists and 46 learned societies. It is funded by learned societies, publishers and universities. A number of its members have so far been involved in Foresight reviews, so we have been very heavily involved among our members.

Dr Thomas: As the UK's national academy for engineering, the Royal Academy of Engineering is able to provide expert, independent, unbiased advice to Government. That, very largely, is our role. It is that independence and expertise that is most important, because it means that we can provide advice that is not tainted, for example, by commercial motives. We are not lobbying for anything other than that engineering is regarded in its rightful place at the heart of so many decisions. That is because engineers create the future. Engineers build the society that we are going to live in. Engineers design the society that we end up living in, to a large extent.

Engineering is where science turns into wealth creation, so engineering is very much at the heart of the growth agenda, and we engage with the Government right across that spectrum.

Jonathan Cowie: Learned scientific bodies and societies come in a variety of flavours. The academies that my colleagues alluded to, such as the Royal Society, represent

independent scientific advice, but it is independent scientific advice from the research end. Bodies such as the Institute of Physics, the Royal Society of Chemistry and now the Society of Biology, but what was the Institute of Biology, are professional bodies, and they include not only researchers but people who teach, people who go out and monitor those who work for local councils and so forth. It is a far broader sweep, yet they do have their independence. These bodies all tend to be royal chartered.

In addition to that, however, there is a plethora of specialist learned bodies that are not royal chartered, which mainly promote their own specialism and mainly get their income from scientific publishing. The Institute of Biology, which was set up in 1954 after world war two, was set up by the Biological Council, which was an affiliation of about 40 or 50 specialist learned bodies. Indeed, in my time at the Institute, we had something like 65 or 75—I gave up keeping track—specialist bodies from the Freshwater Biological Association through to the Biochemical Society and the rest. Only a handful of those were royal chartered.

Q35 Chair: Interestingly, last week Stephen Metcalfe and I sponsored an event in the House for national biology week, so we met a significant number of the smaller players covered by the umbrella group. Do those smaller players have a significant voice in this, or is there a problem here? Be careful not to tread on the internal politics of the Society of Biology.

Jonathan Cowie: No, no, don't worry. I am so well past it and out of the stream that it really does not matter.

You have raised a very fascinating point, because when I was at the institute, when we first started, the Biological Council was a separate entity. Then we brought in this affiliation, and the reaction from parliamentarians was one of, "Oh, this is absolutely fantastic, because we can now only deal with one body—we have one coherent view. This is marvellous." It is not marvellous for me if I want to get my message across to you. I am far better off having 75 specialist societies all bombarding you with a message, and we come in and say, "This is the collective view," rather than just giving you one view. It is very easy for you guys to ignore one view than it is to ignore 75 of them from different places. So there is a real tension. I know that in science we are all meant to be evidence-based this and that, and blah-di-blah, but there is human psychology involved in all of this, and it plays a major part.

Professor Buchanan: This is what I am here to support: the people factor is enormous. The academy groups together something like 44 smaller learned societies. What is interesting is that they all have an independent voice, but they also have a collective voice.

Sometimes, however, it is very important to have an overview. For instance, in demography, population studies may give you the trends of what is happening to births, deaths and whatever, but sociology and psychology will tell you why people are having fewer babies, why families are getting divorced, and the factors that might be involved in earlier death rates. You need a total picture, not necessarily a single picture, and within the social sciences the academy has a role, and it has its own methods of putting information abroad.

Q36 Chair: Dr Thomas, in the world of engineering, the Royal Academy clearly is a very significant voice, and some of the other societies also are significant voices, but are there some that do not get heard because they are either too small or because the Government do not recognise them as such?

Dr Thomas: No, I do not think that there are any that do not get heard. I am certainly not aware of that, and we do not get complaints from societies saying that they feel they are being marginalised. The fellows of the Royal Academy of Engineering are fellows of other chartered societies, so there is that inevitable feed-in. We have been told by Government many times, and have found ourselves, that the Government welcome having a single point of contact in order to be able to engage with the engineering institutions, because there are, I think, 36 professional engineering institutions—

Chair: I have 34.

Dr Thomas: It is very difficult for a Department to cope with interacting with all of them. We lead the Engineering the Future alliance, which brings the major engineering institutions together under one banner, and we collaborate with the other societies and institutions, and individual institutions will take a lead in an area where they have particular expertise. The IET, for example, has been doing a lot of work with DECC under that banner, on the smart metering programme.

Q37 Chair: Moving back from the structure of societies to the process of horizon scanning, I think that all three of you heard the previous witnesses describe externally driven horizon scanning. Does that have the same purpose, in your view, as Government horizon scanning? Clearly, the gentleman from Shell was talking about things that have a significant impact on the long-term value of their shares. Nevertheless, does their work have an impact on Governments, and should it?

Dr Thomas: Absolutely. Government policies are inevitably forward-looking, because they take a while to implement, and they are intended to change the way in which the country will be operating at some point in the future. The Government are quite rightly keen that their policies should be evidence-based where that is possible. That means that you need appropriate evidence about what the future is likely to be like, with all the caveats, probabilities and conditionalities that are necessary.

In formulating the kind of evidence base that the Government need, the Royal Academy of Engineering draws on an awful lot of the horizon scanning that goes on in industry. Many of our fellows are in extremely senior positions in the major engineering companies in the world; we are, therefore, able to pull that in, in order to provide the evidence base that the Government need.

Q38 Chair: Does that apply to the other disciplines represented here?

Professor Buchanan: One of the dilemmas at a lower level is that the research excellence framework has made impact hugely important. Academics, as you are aware, now get a proportion of their funding from the extent of impact. In a sense, that makes academics

lobbyists for their individual piece of research, and this is a dilemma because they are pushing their research.

At Oxford, as you heard earlier, and in written evidence from the Russell Group, most academics have links to specific members of Government, so they create these links and develop them. In my time, David Willetts was marvellous; he would ask me, “What is more important for children—divorce, problem families, or whatever?” I could do some analysis and tell him immediately, but I am aware that I was just one voice. Impact is a dilemma. So when it comes to the learned societies and the larger bodies, it is important that they pull some of that evidence together and have not just one voice but can see the whole picture.

A few years ago I gave evidence to a Select Committee on the importance of fathers. It was on the Human Fertilisation and Embryology Bill—a highly controversial area. I had done a lot of research on fathers, and I knew that I could prove empirically that fathers were very useful and very important. However, I was also aware of the wider picture, and that it was not just fathers—it was two parents. It was highly controversial at the time, but I said that two parents were more important than fathers.

There is a need for a higher body to bring the research together. At Oxford, we have the evidence base centre and Cochrane reviews, and we are very familiar with medical research. Indeed, Cochrane discovered that one report may say one thing and a second report may say another, but you need some means of bringing it all together to get a true picture.

Jonathan Cowie: There are instances of winners, in that the horizon scanning exercises worked, but also losers. I gave one example of a classic loser case in my written evidence to you. Back in 2000, Lord Sainsbury had a meeting with Peter Caligari, vice-president of science policy at the Institute of Biology, and me. Among the exchanges, one was, “Oh yes, by the way, do horizon scan,” blah-di-blah-di-blah. This went back to our committees, the vice-chair tasked them with horizon scanning, and the biomedical science committee came up with antibiotic resistance as being a concern. I raise that because it came up in this morning’s evidence, and I take my colleagues’ point of view.

We assembled some of our affiliated societies—the Society for General Microbiology and the Society for Applied Microbiology, the Association of the British Pharmaceutical Industry, the Royal Pharmaceutical Society of Great Britain and so on. We brought in some others, such as the MRC, and we also went to industry because we wanted some cash to lay on a glass of wine or two for policy makers later on in the day, parliamentarians and so forth, so we went to AstraZeneca and ISBEIA. We held a two-day symposium, and we had a dinner in between so that the speakers could chat about the papers that they were giving, about the policy implications, and notes were taken and so forth. We then had an internal workshop, and we really worked up a solution. We came up with a seven or eight-point plan, but only one of the items was about more money for scientific research, because that was a refrain that you guys hear all the time. I am sure that you are fed up with it, so we made sure that all the other points had no drain on the public purse.

We had a reception down in the Cholmondeley Room in the House of Lords. We invited parliamentarians, and some of your predecessors turned up, which was excellent. When I

say predecessors, I mean from both Houses. Obviously the learned societies were there and industry was there, but sadly no one from the Department of Health came along, despite it kindly lending us its logo for the symposium and the venture. After that, we held a dinner; it was invite only, but again no one from the Department of Health turned up. That was a great shame, because we had what we thought were some rather good ideas.

As part of this exercise, we wanted to bring in the World Health Organisation, but their guy would not come. Having told me that, no, he would not come, I felt that I could put on a bit of pressure, so I dug up his CV from his job application, which was online even back in those early days of the internet. I found that part of his job description was attending functions such as ours, but he said, “No, the reason I can’t come is that I am attending a similar function at Congress in the States.” I thought that that was a good excuse, but, okay, let’s build on this. How about us carrying their material and them carrying ours? They therefore had our conclusions. To cut a long story short, about five years later two of the conclusions materialised in a similar action plan States-wise. Between our event and theirs, a number of British pharmaceutical companies shut down their antibiotic research in the UK.

Coming to this year, the chief medical officer said something along the lines that the threat of antibiotic resistance was greater than that of terrorism. One wonders. We went to all this work and effort. We thought that we had done quite a good job back then, and, with the benefit of hindsight, I still think that we did a good job; but as a horizon scanning exercise it fell completely flat. We did all the right things.

Q39 Chair: The exercise was fine. It was the lack of application.

Jonathan Cowie: Yes.

Q40 Stephen Metcalfe: You have kind of answered my question, which is how effectively Government use horizon scanning reports, and, by the sound of it, not very effectively at all.

Jonathan Cowie: That was just one example.

Q41 Stephen Metcalfe: You have access, but you do not have a way of getting them to engage back. What can we do to improve that?

Jonathan Cowie: I gave a couple of suggestions. I read the Day report, which was mercifully very short. Now that I am semi-retired, I do not want to get bogged down in a huge amount of paper. Personally, I do not mind you cutting spending on horizon scanning, providing you cut the number of horizon scan exercises and increase funding for horizon scanning so that it is done well. That is one thing.

The second thing is that it is important that you listen to certain stakeholders. There are many, many stakeholders. That is why, at the very beginning, in answer to your first question, I pointed out the difference between learned societies per se and those that are royal chartered, because that does narrow down your focus. If you are giving a body a royal charter that says, “We give you the right to speak out for a profession or certain group,” and this right has a certain constitutional value because it is a royal charter granted

by the Privy Council, and all the rest of it, there should be some real power going with that.

Just as you guys expect—and, I think, have the right—to have the Government reply to your reports, it is only fair that, if a royal-chartered learned body contributes to a horizon scanning exercise, there is some follow-up going back to the learned society, because all too often nothing happens, and you wonder what is going on. There should be a reply. If something comes up from a royal-chartered body, perhaps the relevant Government Department should be obliged to say what it thinks at the very least, so at least you would know that it has been noted and taken care of.

Q42 Stephen Metcalfe: That is a very good point.

Professor Buchanan: Only this week, I was at a meeting of the Thomas Coram research unit for its 40th anniversary, where I met Professor Philip Graham. He asked me what I was doing, and when I said that I was coming here today he said, “Oh, gosh! Way back in the ’80s, I remember Baroness Thatcher, then Margaret Thatcher PM,” because Lucy Faithfull had said that Departments were not talking to each other, so we really needed to get together and have a way of Departments talking to each other. That is the point that I was making about having individual contact with one Department or one Minister, but it does not necessarily go right across.

A few years ago, I had to give a talk on how to prepare children—children are my speciality—for the 21st century. I was impressed, because we had the Cabinet strategy unit there, and representatives from all the Departments. Some 200 people were there at this series of seminars. Thinking about the Day report, they do say that it should be the Cabinet. I am not an expert in Government, but it makes sense to me that the main focus or the centre of it should be at Cabinet level.

Dr Thomas: We know that we have significant impact, because we see it and we are told that we do. Sometimes that is because we are doing work that has been directly commissioned by a Government Department, and when it is taken into their evidence base we see aspects of the work that we have put in turning up. For example, we have been engaged with the Treasury in doing some planning on the time scales for all the different infrastructure developments that are going on and the way that they can interact. We have been doing work on adaptation to climate change in the same sort of environment.

Sometimes it is horizon scanning that we have initiated. One example of that was the growing dependency on satellite navigation systems for positioning, navigation and timing, and the way that it was becoming pervasive in society and creating a potential single point of failure. We can see the results of that report in various Government policies that have come out, and again people have told us about that. Space weather is another example, where we can see the impact. In general, it is not our business to try to claim credit for impact; it is not important to us to be seen to be having that impact. Government Departments do not like external bodies claiming credit for their policies, for obvious reasons; it is not the right relationship.

Chair: That applies when they agree with us as well.

Q43 Stephen Metcalfe: Why do some reports have more impact than others?

Dr Thomas: You have to follow them through. Reports only have an impact if they land on the desk of the people who are making decisions about policy in the very narrow window when those decisions are being taken. The Government have a lot going on. There is a whole programme of work, and if a report turns up a year too soon or a year too late it might as well not have been written.

Q44 Stephen Metcalfe: So it's, "Right time, right place."

Dr Thomas: There is a right time and a right place. You need to engage with the policy makers to know what issues are actually being addressed, so that you can put the evidence base in front of them at a time when they can really use it. You also need to talk them through the draft that you are producing, particularly to make sure that any sensitivities are handled properly, so that they do not get in the way of recommendations that are being put forward being adopted.

For example, on the GNSS report, the space navigation report, we were asked by CPNI to take out a numeric appendix, which gave a lot of detail—we had taken it from publicly available sources—on just how sensitive particular applications were to the disruption of those systems. It said that it would not be helpful if we put all that information together in one place, so we took it out and made it less clear what we were saying; but the message had got across to the right place.

Following up, working through and helping people to build the policies on the basis of the reports that you produce is very important in order to achieve that impact.

Professor Buchanan: Recently, the chair of the ESRC evaluation committee commissioned a large report to try to understand impact. I have written a paper, to which I can give you a reference, on the work that we have done. Certainly, tracking back from policies, we try to see whether our research had impacted.

Yes, just as my colleagues were saying, some got picked up, but it was very hard to identify a specific piece of research. On poverty, for instance, Jonathan Bradshaw became a key figure. There is quite a lot of knowledge about how to have impact, and certainly it is making relationships, starting early and linking with practitioners from the very beginning. There is a whole toolkit that the ESRC developed on impact—but that is from its point of view because it wants to have impact. Of course, you need to think about it from your point of view. Certainly, you are getting from ESRC on social sciences high-quality impact, high-quality research, but you need to look at the whole picture, which is a rather different perspective.

Jonathan Cowie: I should point out very quickly that my colleague makes excellent points from an academy perspective and I can see them being very relevant, but smaller learned bodies do not have the time and the staffing to ensure that a report goes to the right person at the right time, to the right place with a following wind, in the best company and with a nice cup of tea in their hands. We just don't have that time, and it is not our job to do that either. We are not meant to be making policy for Britain. We are there to demonstrate that

our science is relevant and that it is important, and to put our members' views forward. That is about it.

Q45 Stephen Metcalfe: What would improve the situation from the smaller societies' perspective?

Jonathan Cowie: This is why I mentioned the royal charter business. The smaller societies can link in with the royal-chartered bodies, as can the Society of Biology. If a group of the smaller specialist societies felt that they had a really important flag that they wanted to wave vigorously, they could go to the Society of Biology and the society would then run it up the flagpole and so on.

Q46 Stephen Metcalfe: I have one final question. It is about the role of the chief scientific adviser in all of this. Do you see that the chief scientific adviser has a role? Is that role functioning correctly, or could more be done to help the CSA act as a bridge between some of this information coming forward, making sure that it gets disseminated across Government and that it is in front of the right person at the right time?

Dr Thomas: The GCSA and GO-Science are vitally important in this. In particular, the network of departmental CSAs led by the GCSA is extremely important. They have the reach into the Departments and the trust within the Departments to make sure that the messages are communicated effectively. They are the conduit, in both directions, that enables the academy to provide advice in a timely way, and to get it to the right people. If there is one thing that I would want to add to the Day report, it is that the role of GO-Science, the work of the Government chief scientific adviser, and in particular the network of departmental CSAs, are not stressed anything like enough.

Professor Buchanan: Speaking for the academy, we have noted for some time now that, in addition to our chief scientist, we should have a chief social scientist. We come to think of so many things. I was looking at driverless cars. There was a lovely bit at the end of the report on driverless cars that said it involves so many people conceding control to an external operator. Would car drivers be reluctant to give away control? Would drivers have a different attitude to a centralised system? I am shaking my head and thinking, "Do I trust my sat-nav?"—and a lot of the time I do not. I think this demonstrates that even in something wonderful like the driverless car, whether it works and whether it is taken on board, there is a people factor. We need to have a chief social scientist to pick up the possible people factor. I do agree that it is important that this person should be in the GO Office.

We need a chief social scientist. Ian Diamond, the head of ESRC, used to say that social science is not everything, but certainly there is a people factor in most things. We may be missing out on technologies, and we may be missing out if we ignore the people factor. We are a democracy, and we need the people factor.

Chair: That was a very interesting response. You could not have done it more neatly, because it is not an autonomous vehicle but it segues neatly into David's next question.

Q47 David Tredinnick: Professor Buchanan, you have given me a lovely lead. I wanted to ask about the autonomous road vehicles which are driverless cars. My question is addressed first to Dr Thomas.

In your 2009 report on autonomous systems, you highlighted several potential barriers—I think they were safety, liability, regulation, privacy and public acceptance—to the adoption of autonomous road vehicles. To what extent do you think these problems have been addressed?

Dr Thomas: The technology is moving forward, but those barriers still remain, and they are of the same scale. The liability issue is particularly difficult to handle, I think—getting the right level of assurance and making sure that the right people are liable when things go wrong, because things will go wrong. When I say the right people, I mean people who will be motivated to reduce the rate at which things go wrong by having that liability; they are the right people to be liable.

There are a number of engineering issues around any sort of widespread adoption. By engineering issues, I include the people issues, because people are part of the system—key components in the system, you might say—and getting the interfaces with people, and getting the behaviour of the people right, and being able to understand how people are going to interact with those systems is vitally important.

Q48 David Tredinnick: Looking down the list, regulation is clearly a Government issue, and safety too. To what extent have the Government responded to the challenge? Has the Government's response to the challenge been useful? Have they done well—I suppose that we will have to go back to the previous Government too—or not? Do you think more could be done?

Dr Thomas: I do not think the Government have really responded to the challenge of autonomous road vehicles yet. It seems to me that the issues that will come from widespread take-up, if it is permitted, have not yet been faced or addressed by regulation.

Q49 David Tredinnick: How accepting are the public of the technology? I know that Professor Buchanan has touched on this. How important is that in terms of driving Government policy on the safety issue?

Dr Thomas: There is not a single public: the person who is an early adopter of an autonomous vehicle, who is pleased to sit there reading their copy of the *Financial Times* or whatever and let the vehicle take them somewhere, is a completely different person from the person driving a completely manual vehicle with these autonomous vehicles going past them on the road.

Q50 David Tredinnick: We are spending an absolute fortune on certain changes to the motorways, particularly the gantry system on the M25—I am thinking of a set of junctions to the south—and on the M1 going north, where they are bringing in the use of the hard shoulder at peak periods. If investment can be made to put in these gantries, with all the electronic signage, I suggest that it would not be very difficult to put in an electronic system

that cars could respond to so that a lane on a major motorway could be dedicated to the autonomous car. It would be comparatively cheap to do that, I suggest, on a long stretch of road like the M1.

Dr Thomas: Yes, and it may be possible to separate them sufficiently from other traffic by sufficiently strong barriers so that, if something went wrong, it would be only the autonomous vehicles involved in the subsequent accident. You need to view the adoption of something like autonomous vehicles as a system—not just as technology for individual vehicles but as a large-scale system with social implications. The digital divide will appear under yet another guise, with implications for who should be paying for investment, and implications for the road network structure. These vehicles will not only be going around the M25—at some point they will have to leave it to get to their destination.

You have a range of issues there, and you certainly need to look at the vulnerabilities that will be created in that system and the ways in which somebody malicious might choose to disrupt it.

Q51 David Tredinnick: My point is simply this. You have to start somewhere, and the best route to do it would be the M1 motorway, on which people travel on a regular basis. It would be perfectly possible, I would have thought, at relatively limited cost, to get the system working on that particular road as a start.

Dr Thomas: It is not clear what value it would have. Why would you buy an autonomous vehicle if the only thing that it enabled you to do would be to go over some part of the M1 with your eyes off the road?

David Tredinnick: I am saying that we have to start somewhere. I shall leave it at that.

Q52 Chair: It seems to me, Dr Thomas, that you implicitly agree with Professor Buchanan that, because people are part of the system, the expertise that behavioural scientists can bring in would be valuable in horizon scanning topics like this.

Dr Thomas: It would be more than invaluable—absolutely essential, yes.

Chair: It struck me as very disconcerting when I first drove a drive-by-wire car, yet—hang on—every plane that I fly on works like that these days. It is a curious mental process if you are an experienced driver to switch to something like that. That was not exactly the topic of conversation, but we shall have to see.

Q53 Stephen Mosley: Again, it follows on. Professor Buchanan, you were talking about having a chief social scientist in an earlier response, and it is social sciences that I want to talk about. How well do you think that evidence from social scientists is incorporated within horizon scanning? I know that you have addressed it individually in answering previous questions.

Professor Buchanan: I am aware from the ESRC where we did benchmarking reviews that British social science is world-leading. We are either one or two in all the areas that we looked at in our benchmarking reports.

Certainly, there is a willingness to be open to social sciences, but there is a problem. I was talking about this plethora of difference evidence, but we need a key social scientist. It needs to be a senior person in GO-Science to bring this together, and he needs to be independent. The academy has a lesser role, because we are in a sense also independent. We are lobbying for social science, but we are not lobbying for specific research as individual researchers will do. Yes, we really need a chief social scientist, and without one we will miss out on our driverless cars.

Dr Thomas: It is worth recognising the role of the science advisory committees that exist in many Departments. For example, the Defence Scientific Advisory Committee—DSAC—has social scientists on it, and they provide valuable input to policy formation in the horizon scanning that happens in the Ministry of Defence. You might want to look specifically at the rise in scanning that goes on there. Defence intelligence activity does a lot of long-term scenario-planning for the defence environment, and it does it extremely professionally in my view. Of course, it has to do it secretly because it is looking at scenarios that would alarm some of our allies if it was publicised. They have to do that because that is the business that they are in, but it is inevitably a confidential process and it is peer-reviewed only by people who have the appropriate security clearances, which the people on DSAC have.

Q54 Stephen Mosley: You mentioned a Department that is doing well. Are there any Departments that are not so effective in using social sciences information?

Dr Thomas: I defer to Professor Buchanan.

Professor Buchanan: We know the ones that do well, and David Willetts is wonderful because he is interested. I would not want to say more.

Q55 Stephen Mosley: Can we assume that those that you do not list are not doing so well?

Professor Buchanan: Yes. There is another issue that we have not touched on but which is important in horizon scanning. I have many links with China. They are constantly looking at what we are doing in our research, and we go and talk about our research. I was talking about how badly we have done with children in care, and I got an e-mail back from Professor Jun Jin following the Sichuan earthquake saying, “We have listened to what you said and we have put all the children not in institutions but with parents who have lost children.” They are listening; there is a lot of listening going on, and that is just a very small example.

We need to do it in two ways. We need to listen to what they are doing in horizon scanning, because we are a global world now. We are quite well linked in with the States, but I am not sure how well linked in we are with research going on in China.

Q56 Stephen Mosley: Mr Cowie, do you have anything to add on social sciences?

Jonathan Cowie: Not on social sciences, other than the fact that on the previous question some interesting points were made. Chief scientific advisers are very important, but I would really hate for them to be constrained by having to micromanage or whatever. They

should be free. I would like to see the Government Office for Science being more involved with horizon scanning but don't tie up the chief scientific advisers, who are very important people, and they need to have the freedom to think and manoeuvre and all the rest of it, and not be tied down.

Q57 Roger Williams: In your opinion and assessment, do you think that the recommendations of the Day inquiry overcome the shortcomings of horizon scanning in Government at the moment?

Dr Thomas: They would be very helpful because they would connect the horizon scanning activities more closely into policy formation. It would also provide the academy with a better way of reaching into that policy process with the appropriate evidence base at the appropriate time. We would find it very helpful if those recommendations were indeed implemented.

Professor Buchanan: Governments need two things. They need a rapid response to things like the Iceland volcano, which they may not have predicted. The Academy of Social Sciences arranged a conference within two months of the August 2011 riots, which had not been anticipated, so the academy has an important role in responding nimbly and quickly. We can do horizon scanning, but we also need a rapid response to things that we had not expected. So there are two levels.

The dilemma with some of the Foresight reports is that they are at one moment in time. As was said by the earlier group, because things change so quickly, we need an ongoing process. The Foresight report in 2006 or whatever may not be relevant today.

Jonathan Cowie: The report was good as far as it went, but it could have gone a lot further. I was worried by the omission of one word under the assumption of benefits, where the report says that horizon scanning would be useful when used to add value to strategic decision making. I disagree with that intensely. Horizon scanning has value to strategic decision concerns, but the policy arising out of addressing those concerns is down to you folk. We raised antibiotic resistance decades ago. That needs more investment, but whether it should come from industry or the taxpayer, or whether the industrial environment or marketing should be improved to facilitate matters, are all political issues. You should not have the tail wagging the dog. That is one concern.

When did the Government last systematically go round all the royal-chartered learned bodies and say, "Right, in the next six months could you please come back to us with your top five horizon scanning concerns?" When did that exercise last take place? That is one question.

Another question is on the Foresight initiative, which is probably one of the biggest horizon scanning initiatives that took place in the 1990s. Don't ask the people who participated, because they are going to say that it was very good; and don't ask the civil servants, because they will say that it was very good. Go to industry and the people who run the economics of the country, because we want to see if it had an effect. I remember the biology. They said that the pharmaceutical industry was important to Britain, blah-di-blah. Let's go to the pharmaceutical industry and see what they thought. Has the Foresight

exercise impacted upon its work in any measurable way? That would be an interesting exercise to conduct.

Q58 Roger Williams: You lead me on to another question. In terms of the Cabinet Secretary's advisory group, do you think that there are enough skills in science and technology in the composition of that group, or should it link more closely with the Foresight approach?

Dr Thomas: I think that it should link more closely with all the national academies, because the place where it is going to get the real science, engineering and social science knowledge is from the experts, who are steeped in that and who have all the contacts, their own networks and their own outreach to specialists, and are therefore able to provide the right level of information, with the right contextualisation at the right time.

Q59 Roger Williams: That assumes that you have the right governance structures in order for the external bodies and learned societies to feed in. Do you think that the Day review will contribute to setting up those governance structures?

Dr Thomas: I think they are largely there. The Royal Society and the Royal Academy of Engineering were able to respond very quickly to a request for a report on shale gas, for example, at a time when that suddenly became a serious political concern and it was necessary to have an authoritative understanding of the impact. In the same way, the academy responded extremely quickly to a request from the CST, the Prime Minister's Council for Science and Technology, for a study into the risks that faced electricity generation over the short and medium term. We published that last week, but the Government have had it since July.

The mechanisms are there for tasking to be done to provide information, and we can produce it in the short term because we are doing the horizon scanning in the longer term ourselves. We therefore already have much of the information that is needed.

Q60 Sarah Newton: I would like to know about our engagement at the European level. I was interested in what Professor Buchanan was saying about our close historic links with America, and perhaps more emphasis needs to be put on links with China now, but let us look at the horizon scanning that is done in the EU. A considerable amount of work is done at the EU level. To what extent do you think the UK is sufficiently engaged in horizon scanning or foresight work undertaken at the EU level?

Professor Buchanan: I am not an expert, but I make regular visits to Brussels on our research proposals. We are a global world, and the EU and its challenges on the horizon are very important, but there are two sides to that. You can be very focused on research on the challenges, but the research committee at Oxford found that the way to get innovation is to give people the freedom to develop their own ideas. The dilemma is that, on the one hand, you have a very focused area, like the challenges on the horizon, and on the other you give researchers more freedom. It is a constant dilemma, and we are very aware of it on the ESRC, but with demand management people were being very cautious and the

novel ideas were actually getting dampened down. It is listening to other worlds and seeing what is happening there, but perhaps not being too prescriptive.

Dr Thomas: The Royal Academy of Engineering, like all national academies, has good links with the national academies in other countries around the world. Of course, that includes the major European countries. We are therefore able to draw on their horizon scanning and they are able to draw on ours, and we can make specific requests to them for information that is needed. It is clearly important that the UK influences things like Horizon 2020, and that we are able to shape the agenda that is going to lead to substantial amounts of money being put into particular areas for industrial and academic research and development. The UK usually achieves and perhaps overachieves on those programmes. That is good but we can always do better.

It is not clear to us or to industry that the Government are really engaging as best they can with that programme, and drawing on the resources of industry and the academies in that process, to the point where, if you went round major industrialists and asked them who was taking a lead in that area on behalf of the Government, they would not know.

Jonathan Cowie: I have been out of the swim for 10 years, so I am not really the best person to ask, but I watch the news and it is interesting to see how that relates to my past experiences.

For example, back in 2000-and-whatever we held a DTI-sponsored workshop on biofuels. It was part of a series; the Royal Society of Chemistry did one on electricity cells, and the Institute of Physics did one on nuclear power, which seems to have come full circle also recently. We brought together all the stakeholders and did a calculation as to how much biofuel Britain could use, and it worked out at something like a third of the amount that we expected to have to produce under subsequent EU targets. Clearly, our message had not percolated through to the right people. If I remember correctly, the EU had to backtrack because it was threatening food production. We should have been listened to in the first place. So that is that.

Similarly with climate change, which you mentioned briefly in the earlier session, we know that habitats are going to shift in future—it is a virtual fact—so that species now living quite happily in parts of France will be quite happy living in Britain. One benefit, of course, is that we should have a very good Analog champagne industry in the future, which will be quite fantastic for some parts of Britain. But we do not seem to have a network of nature reserves talking to each other across European boundaries, going to the south, with managed translocation of species. For example, to grow an oak ash forest takes decades, let alone getting the appropriate mix of animals in there, so you need to plan ahead. Decades is the sort of time frame that we are talking of for climate change taking place.

I have been able to look at this issue for a separate project, and we do not seem to have a formal dialogue taking place. I talked to some colleagues recently across the road in the House of Commons, and they said, “Oh, we don’t need to do it formally because we are already doing it informally.” If it is needed—we know it is going to happen—and we are doing it informally, we should start to formalise it. If we start to formalise it, we can talk to nature reserves across nations, and access EU research funding and this and that, so there should be benefits.

This sort of concern is not going to put a burden on the taxpayer, because the nature reserves and the ecologists are already in place. We just need them talking to each other better. That would require a European dimension. This is an issue of horizon scanning that so far seems to have been largely ignored.

Q61 Sarah Newton: I know we have only a little time left, and I want to talk about the chief scientific advisers. Do you think that our chief scientific adviser is working closely with European chief scientific advisers? This question is particularly for Professor Buchanan. Your idea that we have a chief social scientist is spot-on. Do they have chief social scientists in European countries? Those are two questions in one.

Professor Buchanan: I am not aware that they do but I certainly don't know for sure.

Q62 Sarah Newton: We could be trail blazers.

Professor Buchanan: Certainly as a social scientist, I am heavily involved in lots of EU proposals and I go to Brussels quite regularly, but I am not aware that they do.

Q63 Sarah Newton: On the second question about the linkages between our chief scientific advisers and European ones, as far as you are aware, are there good linkages?

Dr Thomas: Paul Boyle, head of the ESRC, is head of Science Europe—I cannot remember what the organisation is called—so there are important links. Paul is well linked in to the European scene—but I am not aware, no.

Dr Thomas: The European CSA is a personal appointment by Barroso, but it is not clear that that post will survive a change of president. It would be good if you could find a way of encouraging that to happen, because the European CSA is doing an excellent job as far as we can tell. She is encouraging the development of chief scientific advisers across European countries and in the different directorates within Brussels. She is well connected to the network of scientific advisers in the UK Government, and we believe that it is an excellent development and one that really ought to carry forward.

Jonathan Cowie: If Europe is really seeking, as a strategic long-term goal, to become an assemblage of nations that are high technology and have knowledge-based economies, then they need access to good scientific advice. It is really as simple as that. For Europe to lose their chief scientific advisers would be really terrible. Yes, we do desperately need them.

Q64 Chair: I have a final question. The Government are currently consulting on the future of the census. I presume, Professor Buchanan, that many of your social scientists who will be making inputs to work that Dr Thomas and Mr Cowie regard as important would rely significantly on historical data as well as modelling from that to help plan the future. Are there any opinions that you want to express about the two approaches that are being consulted on? One is to replace the census with purely admin data; the other is to move towards an online census using broadly the same model as the current one.

Professor Buchanan: Certainly in my department at Oxford we make extensive use of administrative data. There are a lot of issues about security, so the whole department is locked up in order to get in. An enormous amount of administrative data—as you say, it is retrospective—is available, but it is not used as much as it might be.

On the census, there are two opinions. A lot of people are worried about losing the census. We also have concerns about online data, because using it in research often has a lot of problems. That depends on how many people have access to it. There is certainly a lot of big data out there that is not used as well as it could be.

One of the dilemmas for the social scientist, which we have highlighted at the ESRC in our many reports, is that we need to have a lot of quantitative scientists in social science to make use of this data. That is a dilemma, as we may not be training enough quantitative scientists to make use of it. There is certainly a lot of use of administrative data. If the census goes, some of my colleagues would say, “Well, it is not too bad a thing,” because it has its own faults. I think that you would need to speak to a specialist about that.

Q65 Chair: In the areas in which you are interested, Dr Thomas, organisations like the RAC Foundation are looking at future planning for the automotive sector, and they argue that the absence of the census will make it almost impossible because the admin datasets are not adequate to meet their needs. Is that a problem that the Government need to think about? How do you horizon scan without historical data?

Dr Thomas: You clearly need good data in order to be able to make good policies. There are a number of issues with using the available big data that need to be addressed by people who really understand the statistical basis on which the data has been gathered, the purposes for which it is intended to be used, the hidden assumptions that are being made about the provenance of that data and so on. There is always a danger that, because it looks cheap to use data that already exists and because it is so expensive to carry out properly controlled longitudinal studies, the gold-standard longitudinal studies will suffer as a result of people moving to using data that perhaps does not give them the same strength of evidence.

Online data, for example, systematically ignores the quarter of the population who simply do not use the internet. You can correct for that in some ways if you have appropriate other data to be able to make suitable modifications to the data that you have, but it is a very complicated process and it does require the right expertise.

Q66 Chair: Admin datasets will be collected online anyway.

Dr Thomas: And it will systematically exclude people who are not able, therefore, to go online.

Q67 Chair: Yes, it is dealing with the exclusion issue.

Dr Thomas: Yes.

Chair: That is very interesting. Can I thank the three of you very much for your presentations this morning? This is a very complicated topic, and if you have any further thoughts you would like to write in about we would be delighted. Thank you very much for your attendance.