HOUSE OF COMMONS

Science and Technology Committee

Oral evidence: Science communication, HC 162

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Watch the meeting

Members present: Stephen Metcalfe (Chair); Victoria Borwick; Jim Dowd; Chris Green; Dr Tania Mathias; Carol Monaghan; Derek Thomas; and Matt Warman

Questions 219 - 299

Witnesses

I: Dr Melanie Smallman, Department of Science and Technology Studies, University College London, and Professor Robert Evans, School of Social Sciences, Cardiff University.

II: Jo Johnson MP, Minister of State for Universities, Science, Research and Innovation, Department for Business, Energy and Industrial Strategy, and Professor Sir Mark Walport, Government Chief Scientific Adviser, Government Office for Science.

Written evidence from witnesses:

- UCL, Department of Science and Technology Studies
- Professor Robert Evans
- Department for Business, Innovation and Skills

Examination of witnesses

Dr Melanie Smallman and Professor Robert Evans.

Q219 **Chair:** Good afternoon, everyone, and welcome. Thank you for joining us this afternoon. For the record, could you state who you are and who you are representing today, please?

Dr Smallman: I am Melanie Smallman and I am a research and teaching associate in science and technology studies at UCL.

Professor Evans: I am Robert Evans. I am from the Cardiff school of social sciences.

Q220 **Chair:** Fantastic. Welcome and thank you for joining us. Science communication is quite a broad subject and covers a lot of territory. In your view, should science communication include more than just public understanding and interest? Should there be public engagement in that process, and, if so, what form should that public engagement take?

Dr Smallman: It is quite confusing to use the same term for both. There are really important arguments for doing both. As science and technology is increasingly affecting our lives, we need to be able to help people understand what the technologies are and how they affect their lives, which would be what we would historically call science communication or public understanding of science, but alongside that it is important that people have a say in how those technologies are developed and how they are used, as they affect their lives. That is much more how people use the term public engagement. I prefer to use public participation or dialogue simply because I think engagement is a very unclear term, but I am in the minority with that view.

Professor Evans: I broadly agree. Communication implies a two-way exchange of information, so, as with a lot of these things, it is important to be clear about what you are trying to do. The more traditional science communication, when you are trying to convey some established understanding, is the right thing to do in some cases, and will achieve what you want to achieve under those circumstances, but there will be other cases, as Melanie says, where what you are interested in and what you need to do is to find out what other people are concerned about. In those situations, public engagement and public participation—deliberative processes—are ways of bringing that information into either the scientific community or the policy community, so it has to have a two-way element as well.

Q221 **Chair:** What form should the two-way element take?

Professor Evans: You are going to hate us for saying this, but it depends. One of the difficulties I have had when thinking about this is that I feel quite often we are pushed to give you a one-size-fits-all answer, and a lot of the research evidence we want to draw on would say that that is exactly not what happens; there is not really a

one-size-fits-all answer. A review article on public engagement mechanisms, published in about 1999-2000, surveyed different types of public engagement and came up with 50 or 60—maybe more—different types of public engagement, mechanism or process that have been used. The argument in response to that is that what is missing is systematic evaluation of them. I would not want to say that there is a single best method for doing it. We might articulate some principles that would be worth while, but a single method would depend on your audience, your science, where you were in the policy process, why it was controversial and all those kinds of things.

Q222 **Chair:** That means I have probably fallen into the trap of wanting a straightforward and simple answer, which is what people are endlessly pursuing, but of course science is more about, at times, probabilities and explaining those. To what extent does the desire for clear and simple statements, whether it is politicians, the media or whatever, lead at times to misrepresentation of science, and how could we be better at communicating the uncertainty, that probability aspect of what is being discussed?

Dr Smallman: To add to what Rob said about the processes, in the UK we are considered to be leading the way in developing participatory techniques. With things like Sciencewise we have developed a number of approaches that are incredibly valuable, and we have learned some important lessons. For me, it is about perhaps broadening some of those debates to incorporate wider civic society debates. On uncertainty and probability, the question I always come back to is why we expect science to produce certainty, because it does not. That is not what it is like.

I worked as a communication adviser to the chief scientist in DEFRA prior to being an academic, and one of the things we struggled with was trying to explain that uncertain science is not problematic science. When you are making policy, it is often with new and emerging science, and in those situations it is uncertain. Communicating that should not be an embarrassment or something we are uncomfortable with. Alongside that, it is worth flagging up that, while science often is uncertain, there also are instances when uncertainty is manufactured for very clear reasons, to try to undermine. Just because science is uncertain, it does not mean that it does not provide enough certainty to act on, yet we have to be conscious that there are instances when there is manufactured uncertainty in order to undermine the ability to act on the science.

Q223 **Chair:** While the uncertainty itself is not necessarily a bad thing, do you think that is widely understood by a non-scientific audience? Do we need to do more to educate them, therefore, to accept uncertainty, and that it is not a bad thing, as you said? It is just the nature of what it is.

Dr Smallman: That is a difficult question to answer, and my instinct is to say yes and no. In my work, I have been looking at how the public talk about science and technology, and there seems to be a bit of a conflict there. In one sense, the public discussions that I have been looking at—

focusing on things that have happened in Sciencewise—appear to be much more able to cope with uncertainty than the scientific discussions or the policy discussions. They understand that it is about balancing—deciding whether you can cope with the level of uncertainty and what the right thing is. At the same time, there are examples of discourses where people say they want it to be safe, so it depends on what science they are talking about. Uncertainty about biomedical science seems to be a bit more comfortable, because there could be big benefits, while for things like environmental applications or GM foods in the wild, people seem to be seeking more certainty. It depends on the science and the public.

Professor Evans: To pick up where Melanie started her answer, it is not so much the probability as such that is the issue; it is trying to be clear about what the cause and source of the uncertainty is. In some cases, it might be that there is uncertainty because it is new science, everybody involved agrees that things are at a very early stage and it is difficult to draw firm conclusions. That is one kind of uncertainty that you would want to communicate fully, draw out and make sure that everybody was aware of, but there are other kinds of uncertainty—the MMR debate is a good example—where there is no dissent or controversy within the scientific community as such, but nevertheless there is a perception that things are uncertain. There is clear evidence in survey research around that which shows that the public understanding of MMR science was clearly influenced by the media's reporting of it, and a significant proportion of people thought that the science was evenly imbalanced when it was not. Then there are the more problematic cases, which Melanie alluded to, where it is actively manufactured. What is important to convey somehow is both the content of the consensus, where it exists, and some measure of its strength.

As Melanie said—we both get to this point in slightly different ways—just because science is uncertain or controversial does not mean that there is no reason to act on it. When you, as policy makers, are acting on it, I would like you to tell me how certain or uncertain the science is, so that it is clear to me which parts of your policy are driven by the science and which parts of the policy or decision are your political judgments about how to act given the state of affairs.

Q224 **Chair:** You brought up the MMR case, where the science, from where we are now, is absolutely crystal clear that it is a safe immunisation programme, but it still prevails in the public's mind that there is some uncertainty around that. I suppose the point is how you educate the public to be able to understand that there can be two sides and that the argument can change over time, and that just because it is in the media does not make it the final word on a particular subject. Do scientists and researchers have a role in engaging with the public and helping to better educate the public in the understanding of probabilities, uncertainties and likelihoods?

Professor Evans: Yes. I am not sure that the MMR case was ever that controversial within the scientific community, but for the sake of the argument, yes, scientists have a role. The only thing I would say against that is that communicating science is not necessarily something that every scientist will want to do, and it is not necessarily something that every scientist will be particularly good at. There may be a legitimate role in all this business for trained professional science communicators to work with scientists, because being a medical scientist or a social scientist is quite a specialised and peculiar job. The reason we are good at it is that we are good at unusual things. It does not necessarily make us fantastic communicators or good engagers with ordinary people; in some ways, quite the opposite. Yes, scientists and researchers have a role to play, but you cannot assume that they are all going to be good at it and you cannot necessarily assume that they are going to be able do it on their own.

Dr Smallman: It is important to add that there is not much evidence that more information changes people's minds. There are some instances, and perhaps there are examples within those, but it is worth remembering that people decide whether to take scientific advice or other advice based on very wide cultural and personal values and visions of how they want the world to be.

Q225 **Chair:** Do scientists and researchers have a role in changing that? As science and technology is used more and more in society—it is more and more mainstream—do we have a responsibility to help to train the public in better understanding of those principles?

Dr Smallman: There are two roles for scientists in that. In a functioning democracy, yes, there is a role for some to communicate, but there is a role for most to listen and be open about their own visions and values that they bring to science, so that we can all be a lot more transparent about the kind of world we are building in science and technology.

Q226 **Matt Warman:** We have touched on this already, but I think MMR is the obvious big case where inaccurate reporting certainly changed public behaviour. Do you think it changed Government policy in any sense?

Professor Evans: Government policy with respect to what?

Q227 **Matt Warman:** With respect to the way we talk about science, because it is the single biggest scandal, and I am assuming that it did not change it on MMR vaccines, obviously.

Dr Smallman: I don't know is the honest answer.

Q228 **Matt Warman:** Should it have done? Is there a Government policy response to the kind of situation when we know that there has been real public harm that has not happened?

Professor Evans: I am not sure is the honest answer. I don't know. I would not like to say.

Dr Smallman: There are probably others who are better placed to answer questions about that. I genuinely do not know.

Q229 **Matt Warman:** The question really is how you devise a system that puts a sensible amount of weight on the scientific consensus rather than trying to say that there is a debate, and the fact that someone is in a minority of one should not guarantee that we assume they are wrong. We need a systemic solution rather than just complaining about examples of bad behaviour, don't we?

Dr Smallman: Yes, but that is a question of evidence and how you manage the evidence base. The Government have changed the way they handle evidence, particularly in the aftermath of BSE and onwards. My experience of working on emergencies in DEFRA is that there are relatively robust processes in place for checking the evidence. The only thing I would say is that the wider and more open the evidence base is, the more subject to challenge and scrutiny it can be, and ultimately that will have to strengthen it. The only word of warning I would offer is that there is a risk. There was a series of disasters in the early 2000s, and a lot of change and a lot of things were put in place. I no longer work in the Department so I do not know what is happening, but there is always the possibility that, when emergencies seem to be in the distant past, you become relaxed and less vigilant about the evidence base, so it is about constantly looking at it and asking if we have it right.

Professor Evans: There are two levels of answer to your question. On how you find ways of communicating or conveying consensus, I agree with Melanie that the issue is to find more inclusive ways of determining who has relevant expertise. The evidence in problems like BSE and so on was that the net of experts was not cast widely enough, so you need to cast it more widely, and then you get the new boundary problem of how wide is wide enough.

The change I would like to see would be a shift away from purely natural science-orientated expert advisory groups to something that includes a social science perspective. That is not just because I am a social scientist; it is because one of the things that social scientists are trained to do is to step back, and look at and consider other forms of expertise more symmetrically. If you are a practising scientist, you are very much in the debate, in the argument, and it is harder to step back from it and see the broader contours of the debate. Certainly lots of the arguments for more participatory and more inclusive forms of decision making have come from social scientists, and I do not think that is a coincidence; it is part of the way in which social science understands the world operating. If you wanted to find a way of characterising consensus and, as Melanie says, subjecting it to a broader range of scrutiny, having some social science input would be a good way of broadening the frame of experts who are included. The second level is a much harder, much more difficult, one; you then have to find a way of promoting and supporting the value of expertise as something that is in and of itself worth listening to, which

is something that policy makers and others have to demonstrate in their practice, I suppose.

Q230 **Matt Warman:** One area where the media is often its own worst enemy—whether it is Brexit, climate change or whatever—is that the attempt to appear balanced sometimes undermines the attempt to say that actually the consensus is 90% one way and 10% the other. It is the "Here is one from either side," kind of thing. Do you think that is something that has had a particularly detrimental impact either on policy or on public debate in any particular area? Don't say MMR again.

Professor Evans: Yes, I think it is the case that, in a sense, the values driving news reporting are more towards, or include, elements of entertainment and sales. There is a whole set of other considerations that matter for newspapers, over and above simply telling the news. That is bound to colour what they do and the way information is presented. There is no problem with saying that.

Dr Smallman: We have talked about this ourselves in our department, and Steve Jones—I think it was Steve Jones—did a review in 2011 and made comments about exactly this. Our view was that he made a sensible series of recommendations. The other thing that is worth thinking about is that first of all the media is not the only place people get information from, so its influence is sometimes limited. There is also a generational thing; younger people are getting their information and opinion from social media and online sources, so focusing solely on the mainstream media is not the future.

Q231 **Matt Warman:** That is part of the answer. Is there anything we should be doing to encourage greater education about who and who not to trust? Other than social media campaigns, educating the media and that sort of thing, what sorts of recommendations would you like to see?

Dr Smallman: I am not sure I would make recommendations on that. Perhaps others might have something to say.

Professor Evans: In the evidence we submitted we talked about a series of principles that Government could use to guide their own use of experts in policy, and in that sense to lead by example. It is the kind of thing I was saying at the beginning: be clear about what the strength and content of expert advice is and when you are making a bold decision on the basis of contested evidence, say so; if you are making a decision that follows from very consensual advice, say so; if you are overturning strong consensus or ignoring it, say that is what you are doing. In that sense, be clear about things. As to the media, it is tricky. I suspect the answer is that you need more specialist journalists.

Q232 **Matt Warman:** That is not the direction of travel.

Professor Evans: No, it is not.

Q233 **Matt Warman:** In your view, finally, are there examples where the

Government have been unduly influenced by media reporting rather than by scientific consensus? Can you think of an example where, ultimately, in your view, they might have come to a conclusion that would have been different were it not for the media story? If the answer is no, that is a good thing.

Dr Smallman: I can give a more positive example of uncertain science when the Government worked extremely hard to make sure that the media coverage was accurate. That was the work around the climate change projection. I did not do it; it was colleagues at DEFRA. It was a big piece of research that was very probabilistic based, and a lot of time and thought was put into both finding the right language to communicate the uncertainty and probabilities and sitting down with journalists to talk them through it. The coverage was extremely accurate and reflected what the scientists were hoping would be got across. That was simply down to time and effort being put into getting it right.

Q234 **Matt Warman:** That would itself be made harder in a world where there were fewer dedicated science correspondents or whatever.

Dr Smallman: Yes. I am not sure it was necessarily science correspondents. The prompt to put that work in was the recognition that it would be political correspondents, so they sat down with the political correspondents, explained it to them and spent time doing that, because they knew they would probably get it wrong—or they might get it wrong, perhaps I should say.

Q235 **Jim Dowd:** You have covered a lot of the ground I was going to cover, specifically looking at the role of public consultation in the formulation of scientific policy. On the question that Matt raised about the response of politicians, of Government Ministers, surely people generally do not want the uncertainties pointed out to them. They want reassurance. In an attempt to do this, you get Ministers saying that all the eggs in the country are full of salmonella or you get them force-feeding their children burgers at the height of the BSE CJD issue in a genuine attempt, but a wholly erroneous one, to reassure people. One of the other big problems these days with communicating science is the so-called precautionary principle, particularly as it applies to mobile phone masts and pylons and all the issues around them. The precautionary principle really is the enemy of information, isn't it? Basically it is saying, "Don't do anything until you know everything." No?

Dr Smallman: No. The precautionary principle is saying that you take precautions unless it is proved to be safe. The idea is that uncertainty does not give you a reason not to act. BSE is an old example now, but the uncertainty of the evidence allowed inaction when actually, under the precautionary principle, the infected material would have been taken out of the human food chain much quicker. It is not necessarily a halt to action; it sometimes enables a path of action. It is a way of making sure that scientific uncertainty does not paralyse you.

Q236 **Jim Dowd:** On the mobile phone mast issue, there was a report by Professor Stewart. He cited the precautionary principle and a lot of people—the public, not the science community—took that to mean that, although at the moment you have not found evidence that there is a link, we are certain it is out there, so we cannot do anything until we find it. How can you prove a negative in that fashion?

Professor Evans: You can't. It is true that the logic of the precautionary principle is that absence of evidence is not evidence of absence, and that is the case. In a way, it is like many rules; if you have a mechanical applications rule and you apply the same rule over and over again, sometimes it works and sometimes it does not. It comes back to the question of having to make a judgment about whether or not such evidence as is available at the point in time is enough. It could be a scientific judgment, but to some extent it has to be a policy judgment as well, for you to, as it were, take the risk. The scientific evidence about mobile phone masts, as I understand it, is fairly clear, in the sense that there is not a massive danger to public health. I suppose, as a policy decision, you have to make a judgment about whether the evidence is strong enough to justify taking the small residual risk that remains, and to some extent that involves understanding where the objections come from, who is making them, what kind of evidence they are based on, what kind of research is being done and what kind of standing those people have.

In a sense, it is the same answer as to the MMR question about how you draw the boundaries around the expert advisory group that provides evidence to you. It is clearly the case in controversial things like that that not everybody will be happy with the decision you make, but that is a fact of life in politics, isn't it? You are never going to make a decision that everybody is happy with. You have to make a decision that you think is the right and best one based on the evidence available at the moment, and the crucial thing is whether you have accurately and fairly considered all the available evidence and not some partial subset of it. Your due diligence in searching for the evidence is the key to it all.

Q237 **Jim Dowd:** Should public consultation—the formal model advanced by the Government—be part of the compilation of scientific evidence, or should it be kept until a later stage when the scientific evidence is to hand?

Professor Evans: I am not sure I would want to partition it. To some extent, it depends on what you want a public consultation to do.

Q238 **Jim Dowd:** Is there a danger of its muddying the waters? That is what I am saying.

Professor Evans: No, I think it could clarify the waters in some ways. If you can get a sense of what people need reassuring about or what their concerns are, it allows you to address them very directly. In some ways, there is nothing less reassuring than a false reassurance that is seen as

denying the truth. If you have managed to have some kind of what we would call upstream consultation that sets the agenda for your expert advice-giving, that might be very helpful, but it is not necessarily the case that the public you invite to articulate what they are worried about are necessarily the same people who would be experts on the correct or best answer to those concerns.

Dr Smallman: The consultation process at the moment does not really reach the public. My understanding is that it tends to reach stakeholders, so there are almost two approaches to it: there is the end-of-pipe consultation, when you ask people, "Is this what you want us to do?"; then there is the work that people like Sciencewise are doing, which asks much wider questions much earlier in the process. I have been interviewing both politicians and civil servants about how they found the process, and the feedback I have been getting is that certainly the upstream engagement strengthens the decision-making process, because it often shows alternative paths and challenges the evidence to make sure that you are going in the right direction. I understand that in many cases consultation is a statutory duty and legally required, but the other form of consultation alongside it can be quite useful in shaping thinking.

Q239 **Jim Dowd:** Could you envisage a position where you arrive at the scientific conclusion, but the Government basically say, "This is the information we have; this is the action we need to take," and then leave it to public consultation to decide how that can best be implemented?

Professor Evans: Yes, you could do that. We have done referendums recently on those sorts of things, haven't we? You could do a referendum on it, you could—

Jim Dowd: That has been all beer and skittles.

Professor Evans: As a representative democracy, you could, as the House of Commons, take that decision. There are lots of different ways of deciding what to do as a result of determining what the scientific consensus is. The only one I probably would not be in favour of is just handing it over to the scientists themselves to decide. The policy choice is a political choice and it should be made through some recognisably political mechanism. I am reasonably agnostic about what that political mechanism should be.

Dr Smallman: It is not really how things work. On the idea that there would be a scientific view on what policy should do, I have yet to come across any science that tells you what to do.

Professor Evans: You could ask scientists.

Dr Smallman: There are scientists who would like to tell you what to do, but the science and opinion is all interconnected, so widening that must be a sensible thing to do. If you look at examples of really great reports that are coming out of places like the Royal Society, and Mark Walport's

latest report, they have intertwined the social science and the public evidence with the science because that is how it works most effectively.

Q240 **Jim Dowd:** But there are people out there masquerading as political scientists, are there not—rightly or wrongly?

Dr Smallman: I am a political scientist, yes.

Q241 **Jim Dowd:** You are not masquerading, though. I was going to ask the final question on methodology—consultation methodology—but I noticed that you mentioned, Professor Evans, that you think we would benefit from more social science input to the process. What form would that take?

Professor Evans: It is partly in terms of conceptualising what expertise is. To the extent that we see the scientific community as a community rather than a body of knowledge, it allows you to see other communities as also being experts. Patients are the easy example, so you have expert patient groups and so on. Local residents, user groups and so on might also be seen as having expertise that is complementary to more formally recognised scientific expertise. That is the kind of contribution that social science methods would make to broadening out the expert advice-seeking agenda—opening up the question a little bit more of who counts as an expert on a topic and whose views matter as expertise. I would draw a distinction between stakeholders who have a contribution to make by virtue of having a stake in the matter but not necessarily any experience or expertise, and experts who have a contribution to make by virtue of having studied or experienced the topic in depth and in detail over a prolonged period of time. It is that kind of idea I have in mind, if that is helpful.

Q242 **Chris Green:** There are all kinds of different consultations that all different kinds of organisations organise and participate in. Is the current approach in policy consultations of simply asking for opinions the right approach, or should we perhaps have more dialogue events, more events where people can have that interaction?

Professor Evans: I am going to say that it depends what you want to do.

Dr Smallman: I was trying to resist saying that, but yes, it depends what you want to do. As I said, statutory consultations exist for particular reasons and serve a particular purpose, but they are not necessarily the best way of genuinely involving people in setting the agenda or changing its shape and direction. I was involved with some of the Sciencewise projects, and we felt quite strongly that getting policy right first time is the cheapest way of delivering policy, and engaging with people properly throughout the process is probably the best way of getting policy right first time, which, therefore, makes sense.

Q243 **Chris Green:** Certainly an aspect of it would be the level of transparency you get. Whether it is interested parties or members of the general

public, you are in a room together and can hear one another's opinions, whereas in a consultation process run from an organisation, you can pick and choose the different results or the quotation that you perhaps want to use that lends itself to already having made a decision. You just gather evidence to support that, and that is what you present. Would having more citizen science projects be a good route to go down, perhaps using events such as Science Week or having more engagement with universities and other bodies up and down the country—the Government driving far greater engagement through structures that already exist?

Professor Evans: I am not quite sure how citizen science projects would necessarily address the very legitimate concern that you are raising. In general, any kind of engagement that involves deliberation of one sort or another is going to be preferable to one that is simply opinion seeking, in the sense that informed opinions would generally be preferable to gut reactions, I guess, so engagement is generally a good thing. You are certainly right that there is the perception that some engagement events are already captured by their organisers, and are therefore seen as simply collating the evidence that will be used to justify a decision that has already been made, so how they are presented, managed and run has to not just seem to be independent and impartial but has to be independent and impartial. I do not think anybody would disagree with that.

I am not sure about citizen science, because in my understanding citizen science does one of two things, neither of which would really address the concern that you raise. Sometimes citizen science is about outsourcing parts of the research process to citizens through data collection, such as ornithology studies where you count the birds or the bugs in your garden. I have heard that the CAPTCHA thing you do when you type in letters when you are doing online forms is part of a citizen science project aimed at recognising characters in scanned documents. That is one kind of citizen science, but most of the time people are not really engaging with the science as such. The other ones are much more confrontational actually; people are engaging in generating their own data to challenge established bodies of expertise. That is clearly a worthwhile activity, but I am not sure it would solve the problem that you are concerned with. It would certainly bring it to a head, which might be a step on the way to a solution.

Q244 **Chris Green:** More broadly, on the question of communication of science, there are concerns about scientists' ability to communicate. That was raised earlier. Dr Smallman, as a former science communicator, do you think it would be a good idea perhaps to have accredited courses where you can be approved for communicating?

Dr Smallman: There are a number of courses that are well regarded, and I think there are a number of institutions. As part of the doctoral training programme for the research councils, it tends to be the case that people are asked to go through one of those trainings. As Rob said earlier, not everyone is cut out to be a communicator, so perhaps it is

harsh to demand that everybody does it. There is evidence that courses are of value and use. There is also quite a lot of work happening to make science communication training courses even more evidence based, which I think is interesting and persuasive for the scientist. There was something else I was going to say, but I have forgotten it.

Q245 **Chris Green:** I have a final point. Would any concerns be raised if, before you were a communicator in this area, you had to have a Government-approved certification or accreditation? Would that raise any particular concerns, or would it not be a problem?

Dr Smallman: It would seem a bit odd really, wouldn't it?

Professor Evans: It would seem a bit unnecessary. Again, what is at stake in a lot of these issues is the content of what is communicated, so whether or not you had a kitemark—"I am a Government-approved science communicator"—seems a bit unnecessary.

Q246 **Chair:** Before I pass over to Derek Thomas, Professor Evans, you said that engagement is generally a good thing. Does that mean there are times when it is not a good thing?

Professor Evans: I suppose it must do, mustn't it? To the extent that we are saying that a controversy is manufactured or not current, and past its sell-by date in some ways, and you carry on engaging with it and giving it credibility and life, you are not achieving the outcome you want. In those kinds of circumstances, having another round of consultation about something that is effectively settled is not a good use of anybody's time. I can see that there would be cases, yes.

Q247 **Derek Thomas:** My introduction to what a scientist might look like was probably formed from Tintin, and Getafix from Asterix and Obelix. I have obviously moved on a little since then. What do you think is the public's perception today of a social scientist?

Professor Evans: It does not look anything like what happens when you give people a "draw a scientist" test, which is a guy in a white coat with a test tube and Albert Einstein hair. It is not as good as a natural scientist or a medical scientist, I would guess. Economists, political scientists and pollsters are probably not held in particularly high regard at the moment, and sociologists are probably not held in particularly high regard, I suspect.

Dr Smallman: I emailed a colleague at LSE, Martin Bauer, who has also submitted evidence, who knows everything about survey data and asked him exactly that question yesterday. He sent a very long email back saying that we do not know: "Nobody has ever asked," he said.

Q248 **Derek Thomas:** Is there a need to encourage greater understanding and acceptance of the role of the social scientist and the humanities, and have you any idea how we might do that? Clearly, if we want to engage the public more, there is a challenge around perception. Do you have an

answer to that?

Dr Smallman: It is interesting, because a lot of the work around the perception of science and scientists has come from a perceived problem—people not wanting to be scientists, not liking science in school. I suspect that the social sciences do not suffer from the same problem, or the same anxiety perhaps. I do not know the answer, though, I am afraid.

Professor Evans: I suspect in part it is that what the social sciences are is relatively invisible to most people. There are things that people would think of as good and useful, but they would not necessarily recognise them as social science per se. People would recognise that things like the gender pay gap, recidivism rates and unemployment data and those kinds of things are important to know, but they would not necessarily make the connection with the people who work out how you might establish whether or not there is a gender pay gap, what social mobility is or what is the consequence of net migration. Those are all typical social science questions. There is a kind of invisibility to what social science consists of.

It is doubly invisible in the policy debate. I am standing on the outside, but it seems to me that the kinds of social sciences that have high visibility and high status within policy debates tend to be the ones that promise some kind of prediction and control capacity. It is macroeconomics, in terms of the Treasury; economic projections are essential for lots of things. Behavioural economics and nudge teams seem to be quite accepted, and political polling and focus groups seem to be quite accepted. The kinds of social sciences that mimic the natural science promise of prediction and control seem quite well accepted. Social sciences like sociology that seem to offer less positive help, and whose contribution mainly seems to be opening up the problem and saying it is worse than you ever imagined, seem to be less well integrated into policy processes.

Q249 **Derek Thomas:** In a previous inquiry we did about the Ebola crisis and how well and quickly we responded, the social scientists who came to speak to us talked about the work they did that really started to help to clamp down on the spread of the disease. Do you think that kind of experience and the kind of lessons we learned from it has helped to include social scientists in policy making more? That is just an example.

Professor Evans: I do not know whether it actually has, but I hope that it has. It is certainly the case, if you look at how science and engineering are done, both in universities and in industry, that multidisciplinary teams that involve some kind of social science input are increasingly the norm. I am involved in a project at Cardiff University that is looking at a machine to analyse breath, to distinguish bacterial and viral pneumonia. The people working on it are medical scientists and the engineering people who are making the thing itself, and then there is a social science component, because it is for use in lower middle-income countries and part of understanding what kind of technology is needed is understanding

the health infrastructure and the beliefs of the patient groups where it will be used. You could not do the project properly without having all those different teams together. Policy should be the same, and I would like to think that it is.

Q250 **Derek Thomas:** Thank you. Dr Smallman, do you have anything to add?

Dr Smallman: I was thinking about the experience at DEFRA. When I started, there was one social scientist in the organisation and by the time I left there was a team of them, because it was understood that they were necessary to have a proper evidence base. The officials I have spoken to more recently talk about landing policies; understanding how policies are received is as important as the technical detail—really getting a sense that we need to understand the world these things sit in.

Q251 **Dr Mathias:** Can I ask you about the term "responsible research and innovation"? It is mentioned as a cross-cutting issue in Horizon 2020. Can you tell me what it is and how it might improve science communication among different groups?

Dr Smallman: It is not really a tool for communicating science. The distinction would be that in science communication the public have tended to be seen as the recipients who need to change, but in responsible research and innovation we are looking at the whole process and trying to think about how everything can change to be more socially responsible, which does not sound very nice.

Q252 **Dr Mathias:** Everything rather than everybody.

Dr Smallman: Every aspect of research and innovation and all the people in it; it is about collective responsibility throughout the life of the work. It is difficult to explain, because it is still quite an academic concept that we are trying to operationalise. The clearest explanation I have been able to come up with is that we are not talking about just doing the best science in the world, which is a really usual thing—"In the UK, we want to do the best science in the world"; our aspiration should be to do the best science for the world.

Q253 **Dr Mathias:** Do you have metrics for it?

Dr Smallman: Yes. There are about two or three projects that are funded through Europe at the moment that are trying to develop metrics to understand how we judge it. It literally is a hot off the press kind of idea, even though the Commission has embraced it quite passionately.

Q254 **Dr Mathias:** That is tricky, though, because you are talking about something that is difficult to communicate by communication people, and that is difficult to measure.

Dr Smallman: It is not difficult to measure. We just have not answered that question yet. The idea of doing the best science for the world rather than the best science in the world is an effective way of communicating it.

Q255 **Dr Mathias:** Is there an example of where it has helped policy?

Dr Smallman: Yes. The best examples, interestingly, come from industry. What appears to be happening is that adopting this approach allows businesses to find new markets and new products, for which, rather than having to create a market, there is a ready market. One organisation that we work with at UCL, which has been nominated for an award, is a business called Hao2. They sell a virtual reality meeting platform. It is an IT company. I do not know if you know this, but a lot of people on the autistic spectrum work in the IT business. The woman who owns the company found that it had quite a high number of people on the autistic spectrum who were struggling to interact in the office space, and they together created a virtual space in order for them to function as a company. That product is what the company sells. In the process of thinking about the needs of excluded groups and how they could do their innovation and function differently, they created a product that they are selling in China and all around the world.

Q256 **Dr Mathias:** That is responsible innovation.

Dr Smallman: Yes. It is one example.

Q257 **Dr Mathias:** Professor, do you have any comment?

Professor Evans: It is not really my field. It is probably best that I stick to what I know.

Q258 **Dr Mathias:** I guess with more examples, it might be clearer, and then the metrics will happen.

Dr Smallman: Yes.

Chair: Thank you very much indeed, Professor Evans and Dr Smallman, for your assistance with our inquiry this afternoon. We will move on to our next panel.

Examination of witnesses

Jo Johnson MP and Professor Sir Mark Walport.

Q259 **Chair:** Good afternoon and welcome to you both, Sir Mark and Jo Johnson, Minister. Thank you very much for joining us for the last panel in our inquiry into science communication. For the record, could you state who you are and what your role is, please?

Professor Sir Mark Walport: My name is Mark Walport. I am chief scientific adviser to the Government.

Jo Johnson: I am Jo Johnson, Minister for universities and science.

Q260 **Chair:** Thank you very much. When policy is being developed across Government and it involves science and technology, what role do the Government see for public engagement in forming those policies?

Jo Johnson: Thank you, Mr Chairman. It is good to be before your Committee. Public engagement in the development of science policy is exceptionally important, and in the areas in which I have been involved it has been a big feature of our policy development process. For example, in the preparations for the Higher Education and Research Bill we consulted on numerous occasions with stakeholders and interested parties in the various sectors, and opened up the process for consultation to the general public through those mechanisms. The consultation process is absolutely integral to the way in which Government policy has been developed.

Professor Sir Mark Walport: I will look at it through two lenses. First, there is the role of chief scientists themselves. Our role is to collect the best evidence to help Ministers to make policy. When we do that, it is important that we collect the best evidence, and that involves public engagement, so we work widely, particularly with the scientific publics but with other publics as well. For example, when we were doing work on the future of cities, we conducted seminars in over a dozen cities around the whole of the UK. When we were working on ageing, we had seminars with ageing populations in cities around the UK. There is a separate issue around the role of the scientific adviser in how we provide advice, and that we do not do that through a megaphone. In other words, we do not provide a running commentary on the advice that we are providing to Ministers through public engagement; but as a part of collecting the evidence that we can then transmit to Ministers, we do a great deal of public engagement.

Q261 **Chair:** You see it as part of your role?

Professor Sir Mark Walport: It is definitely part of the role to engage with the public, but, as I say, there is sometimes a tendency for people to think that as chief scientists we ought to be commentating with the public on the work we do inside Government, and that is not our role.

Q262 **Chair:** How do you make sure that you have as broad a cross-section as possible of the public you are communicating with? That applies to both of you. If you are dealing with a self-selecting audience, it could, presumably, potentially be the usual suspects, so how do you reach beyond that?

Jo Johnson: Through our work to engage the public, we try to reach out to groups that have previously had low levels of what we call science capital, which I think probably featured extensively in your previous hearing. We try to ensure that the public engagement reaches out to groups that have not previously engaged extensively with the world of science. Reaching those kinds of groups is how we want to measure the success of our science engagement work.

Professor Sir Mark Walport: Alongside the role of providing advice to Ministers and the Government, there is also a role for the chief scientist and the chief scientific advisers in individual Departments to engage more

broadly with the public on science. To give you some examples of things that I have been involved in, I did two public lecture tours between 2014 and 2016 when we worked with the Association for Science and Discovery Centres in science centres around the UK. The first was on the science of climate change, and part of the feedback we got from that was that people were interested in those talks but wanted to know what we might do about it. The second set of public tours, which again was right around the country, was about energy and power, because, of course, all the policy decisions around climate are energy policies. Those were completely open audiences; they were very broad indeed. Genomics England has recently done some work on genome data privacy, and I sat on a panel at a public event. I and other CSAs go out of our way to engage with very broad publics. I spend a lot of my time, inevitably, in universities. A couple of weeks ago, I gave the Eldon lecture at the University of Northumbria on forensic science, picking up on the annual report on forensics. The range of topics is actually slightly breathtaking.

Q263 **Chair:** As you say, there is quite a range. Changing tack slightly, the anti-lobbying clause, which has been discussed quite regularly, now has to be included in research grant agreements. I believe that is correct. Can you tell us what discussions you have had with the science community of the potential effect of that clause?

Jo Johnson: When the proposition was first raised that we would have this clause, back in February, it raised concerns in the academic world, particularly among the learned societies. We had extensive discussions—Sir Mark did, I did and across the Cabinet Office discussions were held as well—in which concerns were raised that it would limit the ability of the academic community to communicate effectively the findings of their research to Government. The clause was subsequently put into pause mode, which is where it is at the moment, to give the Government time to ensure that when it is finally brought forward it fully addresses the concerns of the likes of the British Academy and other organisations, which wanted to ensure it would not be a brake on freedom of expression for the academic community.

Professor Sir Mark Walport: A key part of my role is acting as part of the transmission mechanism between the outside world of science, engineering, technology and social science and the inside world of Government. I confirm absolutely what the Minister has just said, which is that I have been talking to the academies and the universities and have had the opportunity to bring back some of the messages to the Minister.

Q264 **Chair:** You say it is a pause. When is it likely to be off pause, or back on play, and will it be different from when it was put on pause? Will there be amendments to it?

Jo Johnson: It was put on pause mode by the Cabinet Office and they are now reviewing their proposals. Once they are happy with them, and once we too are happy that they will not have unintended consequences,

I guess they will be ready to bring them forward again. I cannot give you a precise timing on that, but I stress the word "unintended." It was never the intention that the clause would have the kind of effect that the learned societies and other institutions thought it might have, and we are now just going back—the Cabinet Office is going back—to ensure that the proposals they eventually bring forward are fit for purpose in that respect.

Q265 **Chair:** Are there any similar restrictions on civil service scientists and researchers who want to communicate their research?

Jo Johnson: This is possibly a civil service matter, which Mark is better placed to comment on.

Professor Sir Mark Walport: Obviously, Government scientists, as employees, are subject to the civil service code and it is very important that we have the trust of the policy makers we work with. You need to look at this through three different lenses. First, many Government scientists are engaged in what one might call routine, usually quite applied, research, and they publish their research in the normal way. It is quite uncontentious and they communicate with the public the results of their research. There is a second category of work where Government scientists are communicating and involved in policy decisions and policy advice. In that context, they are covered by the provisions of the Freedom of Information Act that allow for a safe space in relation to policy discussions and advice to Government. That work would typically not be published and would not take the form of academic publications anyway. That is a space in which they would not normally communicate. Then there is the third area, which is in the heat of an emergency. There I think the risk is that one does not want too much of a running commentary from all sorts of different voices. We are very clear that in the context of the SAGE—the Scientific Advisory Group for Emergencies—when we have external experts we encourage them to communicate, but not to use confidential information that they have acquired during the context of the national emergency. One needs to be practical and pragmatic during an emergency. You want sensible voices, you want people to be able to communicate but not to be managing an emergency through a megaphone.

Q266 **Chair:** That three-tier system—three different types—has up until now worked well.

Professor Sir Mark Walport: I believe so.

Q267 **Chair:** The civil service operates a fast-stream graduate scheme. Does it do that for scientists and engineers specifically? Does it have a scheme? If it does, how do you go about promoting it?

Professor Sir Mark Walport: There is indeed a science and engineering graduate fast stream. It has been running for a little while, but in fact we have re-energised it in the last few years. It is for individuals with a postgraduate qualification in science, engineering or mathematics. It has

a selection board process that places great emphasis on communication ability in science issues, both verbally and in writing. We have been marketing it very actively. During 2014, I gave talks at the universities of Newcastle, Glasgow, Reading and Manchester and at UCL and Imperial, so I really got out there and talked to universities. The outside scientific community, I think, is quite unaware of the extraordinary opportunities there are for science in Government—for scientists.

The role of the science and engineering fast stream is not to train deep specialists, but to train scientists who can act as good customers and advisers for science within Government, where there are many opportunities. This year my team in GO-Science has given talks at eight universities—York, Leeds, Durham, Edinburgh, Sheffield, Bristol, Bath and Southampton. Each of those is not exclusive to those universities, so people are invited to come from the region. It is managed as part of the civil service fast stream, and, as of 8 November, last week, there have been just over 25,000 applications to the fast stream as a whole; 2,243 selected the science and engineering fast stream and, of those, 1,137 selected the science and engineering fast stream as their first choice. That shows that a lot of people out there are interested in it. On the other side of the coin, it is a new scheme and growing in its present form, so we have 18 bids from Departments, compared with the fast stream as a whole, which has had 1,200 bids. There is room for expansion of the scheme, but we have serious applicants and, unfortunately, only a small number of them will be successful.

Q268 **Chair:** Yes. Our rough maths says you have a one in 100 chance. Is that right?

Professor Sir Mark Walport: Yes, but a number of those will get on to other parts of the fast stream. My team and I take a very active role in mentoring those individuals. I meet them all at their induction and they each spend a day shadowing me. We think it is a very important scheme, and I hope that my successor coming back here in 10 years might be able to answer that there are 10 times as many fast streamers, but we will see.

Q269 **Chair:** Did you say that figure of 243 is in a year?

Jo Johnson: It was 2,243.

Q270 **Chair:** That makes it one in 10.

Jo Johnson: There are 18 places, but 2,243 in all.

Q271 **Chair:** What is the drop-out rate?

Professor Sir Mark Walport: When you say the drop-out rate, do you mean those who do not progress their application?

Chair: Yes.

Professor Sir Mark Walport: I do not know is the short answer, but I can tell you that we have plenty of good applicants.

Q272 **Chair:** Yes, but do they all make it through the programme? That is the question.

Professor Sir Mark Walport: I do not know the final figure. The answer is that there are 1,200 bids in all, so for the scheme as a whole we are talking about a one in 25 success rate.

Q273 **Chair:** You gave a very impressive list of universities at which you have spoken. There are two parts to this question. First, do you go into schools to encourage schools to talk about this as something that people might do post going to university; and, secondly, how do you ensure that that list of universities—I know you said it takes invitees from a wider range, a wider area, not just from those universities—is reaching into all parts of the community to make sure there can be some social—

Professor Sir Mark Walport: We are looking for people who have science masters or PhDs. That is the entry qualification. As to schools, I have taken part in the Speakers for Schools series for a number of years, the scheme that Robert Peston set up, so I and other colleagues spend time talking in schools. Frankly, in the context of this scheme, the market really is people who have gone to university. The issue in schools is to persuade people that STEM broadly provides important career opportunities, and that really is important, but it is less relevant in terms of the fast-stream entry.

Q274 **Matt Warman:** In formal policy consultations, what is the role of Government scientists in practice? We hear a lot of the theory behind it, but could you talk us through a little bit what the actual consultation looks like? At what stage do you start talking to scientists and engaging, rather than simply talking to the chief scientist, if you see what I mean? What is the role for the scientific community versus chief scientists?

Jo Johnson: It is very deep and ongoing, and it happens both in and outside formal consultation periods. The dialogue between the Department—in this case the new Department for Business, Energy and Industrial Strategy—and the science community is continual, I would say, and we have exceptionally deep and strong relationships with the community at all levels, from the presence of the learned societies all the way down to individual academics and researchers.

Q275 **Matt Warman:** Dialogue is the key word, isn't it, in the sense that it has to be about Government understanding that science does not give black and white answers all the time, and being prepared to communicate that when we are talking about the kind of policies that perhaps politicians are routinely asked to defend? What do you do when the politics says one thing and the science says another?

Jo Johnson: We are assisted in understanding the balance of opinion. Science itself tends not to be monolithic in the answers it generates for

policy makers—sometimes it is, sometimes it isn't. We are given significant assistance by the Government chief scientific adviser in understanding where the balance of scientific opinion lies on any question. Then it is up to us as Ministers in the Department to weigh up those important scientific interests against other factors that always come into play—deliverability and particular policy recommendations within fiscal constraints, affordability generally and how the public will react to decisions that might flow from the scientific evidence.

Professor Sir Mark Walport: This is something I talk publicly about, and it is part of my public engagement role: I always make the point that policy makers have to look through three lenses. The first lens is, "What do I know about X or Y?"—the science evidence lens. The second lens is whether a policy is deliverable; in other words, people come up with great ideas for policies, but, ultimately, if they cannot be delivered, they are no use at all. The third lens is the lens of values—political, personal and social values and the values of the electorate. Policy making, ultimately, is an integral of all three of those things, and science is a more or less important part of it, depending on what it is. If it is whether you can fly an aeroplane through an ash cloud coming out of Eyjafjallajökull, the science is likely to trump the rest. When it comes to mitochondrial disease and possible preventive strategies for that, there is a classical area where science meets values. It is a classical area where the UK is in a world-leading position because we have very sophisticated regulation. The HFEA is an example of an organisation that scrutinises the science and itself does public engagement, and then Ministers and, in that case, both Houses of Parliament voted.

Q276 **Matt Warman:** Do you think the Government are good enough at articulating the fact that sometimes a decision that is made is as much about politics as it is about science, or do you think the temptation is very often to try to say, "Well, the science is very much in one direction and therefore science says we should do this, so that is what Government are doing"? Is that a battle that you feel consciously, or are we sufficiently nuanced when we communicate this stuff?

Professor Sir Mark Walport: I will give you an example of a good protocol that has worked very well. The ACMD—the Advisory Committee on the Misuse of Drugs—recently gave advice on khat. The Advisory Committee on the Misuse of Drugs set out its view that there were only minimal health implications of khat, but the Home Secretary took the view, due to other issues, such as the broader societal impacts and the international comparators, that khat should be made a controlled substance—it is an example of the broader lens of the policy maker—and she wrote a letter to the ACMD setting out her reasons for not taking the advice. That was one example where the policy took into account the advice but decided to take a different route. That is one model. It may be a counsel of perfection to expect that to happen for every single policy decision.

Q277 **Matt Warman:** Is there, leading on from that, in a sense an argument for having different kinds of consultations with people who are experts in the field versus the public, a sort of consultation that looks through each lens separately, if you like?

Jo Johnson: Yes, a horses for courses approach might be advisable.

Q278 **Matt Warman:** Can you think of an example where that would actively help in the future or has helped in the past?

Jo Johnson: No, not off the top of my head.

Q279 **Matt Warman:** We have talked about getting conflicting views through different—your three—lenses. Finally, do you think that policy makers tend to, ultimately, get the right balance between conflicting views within expert communities?

Professor Sir Mark Walport: There are two things. First, a lot of our job is communicating uncertainty, and, of course, when there are conflicting views the likely explanation is that, in truth, there is a fair amount of uncertainty. One of the jobs of chief scientific advisers in general is to engage with expert communities and use their scientific skills to determine where the balance of the expertise lies. There is another really important point, which is that sometimes publics are confused when apparently equal experts say equal and opposite things. One of the challenges is that, as a chief scientist, I am rarely interested in what the latest paper says; I am interested in what the cumulative evidence shows. The things that are often most valuable are evidence reviews. For example, climate has been relatively easy to deal with for someone who came into it straight from medical school, as it were, because there was an incredible meta-analysis done by the Intergovernmental Panel on Climate Change. I highlight in particular some of the work that has been done on the difficult issues around the evidence on bovine tuberculosis and around the use of pesticides such as neonicotinoids, where Professors Charles Godfray and Angela McLean of the University of Oxford, working with Ian Boyd, who is my colleague chief scientific adviser at DEFRA, did excellent evidence reviews. That is what is really important and what we depend on: what does the body of scientific research show? As I say, it is very rare for a policy to be determined by a single scientific paper.

The challenge is to persuade the scientific community to spend more effort working on what I would call meta-analysis, which in the world of medicine is highly developed. Evidence-based medicine follows things like Cochrane reviews and the work of NICE, which basically reviews all the evidence in order to say what the balance of evidence shows. One also has to recognise that, as science changes, our knowledge evolves. One area of recent work where there was uncertainty that has been gradually resolved over time is on the latest epidemic of Zika. It was first described in the late 1940s in Uganda at the Uganda Virus Research Institute—VRI—but people had not really seen it until the outbreaks in the Pacific.

That was an area where we were providing advice, but it was contingent, because new things were being discovered all the time. One has to recognise that science evolves, and the advice will change as the science changes.

Q280 **Victoria Borwick:** I want to ask about the care.data initiative. Personally, I am somebody who thinks it is of tremendous benefit if we can only overcome public concerns, and other people's concerns, so I put my cards on the table in that respect. Despite your efforts, there has still been public concern about how people's health records are going to be used. What lessons have we learned from that about how we could communicate and engage with the public, and in fact take projects forward?

Jo Johnson: The main overall lesson was that securing public trust is absolutely essential if we are to exploit all the benefits and advantages that can be secured from data science. The key lesson is that you have to work with the public to build understanding. That is why the dialogues that we hold on difficult issues through Sciencewise can be part of that process, but that is the obvious lesson.

Q281 **Victoria Borwick:** We are going to talk about Sciencewise shortly, and one of my colleagues is going to take that question on. Going back to communicating transparency or avoiding suspicion, how do you balance that with setting out the scientific knowledge, something you talked about a bit earlier? How do you ensure transparency and avoid suspicion? What are the guidelines?

Jo Johnson: Transparency is important, so it is about having consultations, asking questions, publishing your responses, as Sir Mark said earlier, making sure that Government research is generally published where it can be, and having all regulatory steps taken by Government accompanied by appropriate impact assessments so that the public have a good sense of how changes Government propose will affect them in terms of job creation, economic cost, environmental changes and so on. Publishing information where it is available is a big part of securing transparency.

Q282 **Victoria Borwick:** Absolutely. One question that we are constantly asked, and one that has interested the Committee, is about algorithms, which I think we are going to return to at some future session. Can we go back to your vision of how we think by using data sensibly we could improve care? The advantage of something like today is that people will be watching you speak before us, so are there words of comfort that you could give us as to the future possibilities of integrating care better, with better primary-level care and making sure that fewer mistakes happen? If I may say so, in my previous existence I would often hear people talk to us about how mistakes could be avoided if there was better data and if information was shared. If you could talk to us a bit about that, I am sure it would be most welcome.

Jo Johnson: Clearly, those are the big lessons from the care.data experience: ensuring that patient privacy is wholly protected and that people believe it will be protected and there are no risks to it; ensuring that data will not be misused in any way, and that data shared is only used for the purposes patients have consented that it can be used for; and that sharing of data is carefully regulated and controlled. Those are the main principles that we want to see enforced.

Q283 **Victoria Borwick:** It has been suggested to us that, for some people who are vulnerable, the fact that other people are able to contribute to care packages and generally share data could be helpful to people's survival.

Jo Johnson: Certainly, against those concerns, we have to weigh the huge benefits that can come from the use of big data, particularly in healthcare—the patient benefits that can be derived from more targeted treatments that move away from the one-size-fits-all block-buster medicine approach, and courses that can deliver much greater benefit to individual patients at potentially lower cost to the system as a whole, and might also provide opportunities for companies to develop interesting, new, innovative therapies and treatments.

Q284 **Victoria Borwick:** Thank you. Professor Walport, do you want to add to any of that?

Professor Sir Mark Walport: Having spent 25 years working in the NHS providing clinical care, I could not agree more with where you started, which is that the use of data is absolutely needed if we are to provide the best care. It is nonsensical in this day and age that we have different sets of records in different places. If we are to integrate clinical care with social care, we need to be able to share the records. The other side of the coin, as it were, is that, if you are a patient in the system, you need to be sure that your data will not be lost and that your privacy will be respected, and the systems need to show themselves to be trustworthy. The corollary of trust is trustworthiness and that is what the system needs to demonstrate. One of the actions following care.data was of course that Dame Fiona Caldicott, who was asked to do, I think, her third report on data standards for patients, made several recommendations and the Department is working to take forward her recommendations. I think the medical profession as a whole has to be more articulate about it, essentially, but there is no question that, if you want the best care and if you want to be able to hold the system to account properly, it can be done only with the power of data.

Q285 **Victoria Borwick:** I have a couple of other questions on citizen science projects, which are increasingly, I gather, being used to collect observational data, engaging with large groups of the public. It is not a term I have heard before, but could you tell us a bit more about what you are collecting with those science centres and citizen science projects?

Jo Johnson: It is a way of widening the range of resources that the community has available to it and bringing more people into the process of gathering data that is of value. There have been good citizen science projects. British science week, which BEIS supports, has been running something called the bat detective project, to enrol public support in counting and measuring the bat population across parts of the country, and there was a similar initiative to help capture a broader set of data around the butterfly population. Those are good examples of how engaging the public in citizen science can widen the pool of resources we have.

Q286 **Victoria Borwick:** Excellent. That is very interesting. I have a final question and then colleagues have some supplementary questions. Is there any systematic mechanism for the public to feed into the Government any science or technology issues they have, without having to wait to be consulted? Is there any sort of portal?

Jo Johnson: All the research councils have public-facing websites which have sections on them that I believe invite the public to contact them. Public engagement is a big part of how the research councils see their roles, quite rightly. As a Government Department, we are contactable. We are perhaps not the most friendly facing, but Government Departments are contactable; they have websites that provide information about their activities and a means of communicating with them, and of course GO-Science and the Government chief scientific adviser network is open and available to the public.

Q287 **Victoria Borwick:** Are there any other points you want to add to that, Professor?

Professor Sir Mark Walport: No. I agree with the Minister entirely. I guess there is a question as to whether it is a special case. In almost every walk of life, citizens want to be able to get in touch, and of course many of them do it by writing to you, and not infrequently those letters get referred to us if there are specific scientific questions. People write directly to me as well. As I say, I am not sure that it is a special case in terms of citizens in relation to all aspects of the life of the country.

Q288 **Dr Mathias:** This is really for the Minister about citizen science. You mentioned the butterfly watch, which some of us did, but on other matters of citizen science, are you prepared for the role that citizen scientists will play, probably in the future, when there will be pollution monitors that are accurate? We already have them for the phone, but there will be ones that will be accurate and cheap enough for every household and every school, not just for nitrogen dioxide but also for decibel levels. Is your Department ready for the push that citizen science will have on policy making?

Jo Johnson: It is a good question. It speaks directly to enforcement questions about where environmental pollution levels are potentially in breach of regulated norms. The relevant enforcement body would not

necessarily be, in the first instance, the Department for Business, Energy and Industrial Strategy. It could be Communities and Local Government. In the examples you mentioned about air pollution, the relevant enforcement body would be DEFRA. Are we ready to encourage a more engaged citizen science community? Yes, and we want to support it.

Q289 **Dr Mathias:** It is not about encouragement; it is about being prepared for the onslaught. Don't worry—the citizens are encouraged; they do not need encouragement. What will happen when you get data that is accurate and is being accumulated?

Jo Johnson: I think we are not yet at that stage. We need to get further citizen science engagement so that we can prepare for the sorts of pressures you speak of. It is actually something that the Government chief scientific adviser network is probably thinking about—how we harness citizen science and make sure we are ready for the pressures that it may generate.

Q290 **Derek Thomas:** Can I bring your attention to Sciencewise? Can you explain for us how Sciencewise builds public engagement, if it does?

Jo Johnson: Yes. The general philosophy behind it is that it facilitates dialogues on complex issues where the science is in danger of being misunderstood among the general public. It is an attempt to foster greater understanding of issues; for example, the public health ramifications of policies. There are good examples of those dialogues helping to foster greater understanding of complex issues, such as some of the ones Mark has already mentioned, like mitochondrial DNA replacement, the health risks around fracking, and the risks around big data, stratified medicine and nuclear waste storage. Those are the kinds of issues where dialogue with the public, facilitated through the Sciencewise process, can make a really useful contribution, because, in the absence of it, you might risk seeing situations where public distrust develops and stops Ministers and Governments feeling able to move ahead with policies that might otherwise have great benefits to the country as a whole.

Q291 **Derek Thomas:** Is it a two-way stream? Does dialogue come back and does Sciencewise feed into providing advice to Governments when they set policy?

Jo Johnson: It certainly indicates where there is further work of information to be undertaken to ensure that you have a well-informed public debate.

Q292 **Derek Thomas:** Finally, Sciencewise has been funded by what was BIS, but, as far as we are aware, the contract ended in March 2016. Has that been extended or is there some other competitive tendering going on?

Jo Johnson: You are right. It was brought back in-house in 2016. There is an intention to re-let the contract shortly, so that they can continue the

good work, but for the time being it has been undertaken in-house in the Department of Business, Energy and Industrial Strategy.

Q293 **Derek Thomas:** Do you have any idea about what the progress is?

Jo Johnson: Imminent re-letting of the contract.

Q294 **Jim Dowd:** Briefly, the Chair in his opening question asked about the scientists and engineers improvement programme, and you, Professor Walport, in response to Victoria Borwick, mentioned how we can use data in healthcare in particular. I remember being on the Health Select Committee when we looked at the debacle that was the patient record IT system. Is not the truth that the reason why the public sector generally—Government and local government right across the piece—do so badly at IT schemes is that all the smartest people in the IT and communication world are earning far more in the private sector?

Professor Sir Mark Walport: I am not sure that is a scientific question as such; it is an observation really. The one thing I would say is that the technology of delivering records at the scale of a population of about 65 million people when Connecting for Health first started was probably quite ambitious. It is now achievable, and I think these questions are more about procurement than for a chief scientific adviser, with respect.

Jo Johnson: Your comments reflect the NAO criticisms that for a long time one of the chief weaknesses of policy making was the absence, or lack, of IT and project management skills—a long-standing complaint in NAO reports and Public Accounts Committee reports.

Q295 **Jim Dowd:** But then any Government get it both ways, because when they have to buy in sufficient expertise and deal with contractors, it comes at such an enormous cost that the tabloids have fits of the vapours and are very cross about it.

Jo Johnson: Yes. It is obviously difficult to get that capability in a very competitive market. It speaks to the need to develop more of a cadre of skilled IT professionals within the country as a whole, so that we do not have those shortages. That is what we are trying to do in other parts of our skills reforms.

Q296 **Chair:** Can I go back briefly to the role of Sciencewise? When engaging with them and setting the framework in which they operate, do the Government give them specific guidance on how to engage with the public? I am trying to get at how we reach the parts of society who form views very quickly based on scant evidence, as opposed to those who might read into and explore issues more thoroughly, to make sure that we do not end up with a two-tier understanding of science.

Professor Sir Mark Walport: I am going to go back to my time at the Wellcome Trust when I was director there. The trust has been involved in public engagement for a very long time. The first thing, of course, is that there is no single public; there are many different publics, and there is no

single way to do public engagement with the whole of the public, so many different approaches need to be taken. For example, one approach that we used was through theatre, and a company called Y Touring. It developed plays on controversial issues and took them into schools, and the actors would remain in part afterwards and debate them. The main point is that people access their scientific information through a variety of channels. The opportunity is to engage the public in many different ways, and it is very difficult to evaluate which way is right. No way is right, because different people have different tastes; some people like theatre, some like exhibitions and some people read things.

In GO-Science we have worked with Sciencewise, and I will give you a very specific example. We were doing work on and around food technologies, and we were interested to understand how people thought about food technologies, so we formed a partnership with *Which?*, facilitated by Sciencewise, and held a number of focus groups around the country with representative groups—Sciencewise helped us to find people—to explore how people thought about food. It was quite an intensive process. There were not many people involved, but the people who were involved were taken through quite a deep process. They had explanations of the science and we looked at their views before and after. That has been helpful, because we have fed it through to the Food Standards Agency, to DEFRA and the agri-food technology council. That is just one example of where Sciencewise was very helpful in a piece of work that GO-Science was doing to inform policy makers about food technologies, but it is not the single right answer. There are many ways of doing it.

Q297 **Chair:** I get that, but is there a specific requirement for Sciencewise, for your office, to try to reach the harder-to-reach groups? If there is not, should there be?

Professor Sir Mark Walport: A very specific part of that was that it did reach hard-to-reach groups. They were groups that were actively sought out, as opposed to applying to turn up at a meeting.

Q298 **Chair:** Finally, do you think there could be a greater role for the BBC as a public broadcaster—I suppose Channel 4 as well—in engaging the public in science more generally? We all accept that they make some excellent science programmes, but is there a greater role for them?

Jo Johnson: It is not for us to command the BBC to produce more or less of one or any particular kind of content for obvious reasons, but—

Q299 **Chair:** But you can have a view.

Jo Johnson: It is great that the BBC has been doing such strong science-related programming in recent years. I have enjoyed watching "Forces of Nature" by Brian Cox over the last few months, one of the rare times that I and my children have managed to watch the same television programme.

Chair: Very good. On that positive note, we will draw this afternoon's session to a conclusion. Thank you very much indeed for your attendance, and thank you, members.