Berlin-Brandenburgische Akademie der Wissenschaften

AKADEMIE-DEBATTEN

# Standards and »Best Practices« of Scientific Policy Advice

*A Round Table Discussion with Sir David King, Chief Scientific Adviser to the British Government*

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# *Standards and „Best Practices“ of Scientific Policy Advice*

*A Round Table Discussion with Sir David King, Chief Scientific Adviser to the British Government*

*Peter Weingart and Justus Lentsch (Eds.)*

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# *Preface by Günter Stock*

*President of the Berlin-Brandenburg Academy of Sciences and Humanities*

What is the proper role of science in relation to policy making? How should scientific advice to policy makers be institutionalised in government? Few politicians deny the crucial function of scientific and technical expertise for the management of complex modern societies. But in spite of the agreement in principle, different countries answer these questions very differently. In the United Kingdom (and also in the USA) science has a prominent voice in the position of the Chief Scientific Adviser. In the German political system there is no such position. Instead, the landscape of scientific policy advice is fragmented, often lacks transparency as well as mechanisms of quality control.

Public controversies about public policy issues such as BSE or GMOs show that the legitimacy of experts and of the policy makers whom they advise strongly depends on the reliability and transparency of science advice. The legitimacy of both policy makers and advisers can be easily compromised if these criteria are not honoured. Controlling and assuring the quality of scientific expert advice is thus of vital importance not only for policy making proper but also for the academic community.

However, this endeavour faces several difficulties: Firstly, events such as the BSE crisis have diminished the level of public trust in science's credibility. Therefore, we need to involve the public in discussion of these issues in order to increase confidence in what science can offer in aid of public policy making. A necessary condition would be to follow certain norms of professional conduct in assembling and using scientific advice. Instructive examples of such an effort are the *Code of Conduct for Scientific Committees* and the *Ethical Code: Rigour, Respect and Responsibility* that Sir David King, the Chief Scientific Adviser to the UK Government, has published recently (cf. below).

Secondly, practices and evaluative criteria in basic science differ from those in policy-oriented science. A scientific judgement published in a scientific journal differs essentially from an expert opinion on a public policy issue. Moreover, there is a great variety of standards among different institutions. The (revised) *Chief Scientific Adviser's Guidelines* on scientific analysis in policy making, published by Sir David King in October 2005, address the way in which Government departments should use scientific advice in policy making. These guidelines demonstrate the high-level of reflection on the interaction between science and policy making in the UK.

Responding to the increasing need for reliable and credible expert advice is also of highest priority to the Berlin-Brandenburg Academy of Sciences and Humanities. To this end, the Academy has established the interdisciplinary research group "Scientific Advice to Policy in Democracy". Its mandate is to devise guidelines for advising policy in a way more accountable to both academic science and to public concerns. The following round table discussion with Sir David King, which took place on January 12, 2006, at the Berlin-Brandenburg Academy of Sciences and Humanities, presents the prologue to the expert symposium "Quality Control and Assurance to Scientific Policy Advice" organised by the Academy's interdisciplinary research group. I look forward to the group's results, and I appreciate the opportunity to learn more about the British experience that is discussed with Sir David King in the following round table discussion.



# *Foreword by Sir Peter Torry*

*Her Majesty's Ambassador to Germany*

Today knowledge is produced at ever increasing speed, presenting politicians and society at large with new opportunities and challenges. It is in this complex and ever changing environment that governments are required to make decisions. It is therefore essential that policy makers have access to expert advice.

The UK has a tradition of providing scientific advice to policy makers. Sir David King has been Chief Scientific Adviser since 2000. He is responsible for ensuring there is an effective evidence-based advisory system. In 2005, he updated the UK's guidelines on scientific advice in policy making. These reflect recent experience that underlined the need for high-quality advice to enable government to make informed decisions.

The Chief Scientific Adviser's guidelines seek to ensure that decision makers have access to robust evidence that withstands challenges of credibility, reliability and objectivity. The guidelines also highlight the need for policy makers to demonstrate their ability to make informed decisions in a transparent way. This is key to safeguarding public confidence.

The interest in Sir David's keynote lecture at the Berlin-Brandenburg Academy of Sciences and Humanities in January 2006 illustrated the importance of science in informing government. The lecture provided a clear insight into the UK scientific advisory system. Sir David gave examples of how scientific advice has enabled the UK government to respond effectively to crises. And, referring to the December 2004 Tsunami disaster, he set out what can happen when scientific advice does not reach governments in time.

The UK's advisory system is one example of how scientific advice can be given. Other countries may have a different system reflecting their traditions, structures and needs. I hope this publication is a contribution to the ongoing debate on how best to deliver expert advice to policy makers.

# *Assuring High Quality Scientific Advice to Government –*

*The Position and Role of the British Chief Scientific Adviser: Round Table Discussion with Sir David King, Chief Scientific Adviser to the British Government*

Participants:

- Sir David King, Chief Scientific Adviser to the British Government
- Günter Stock, President of the Berlin-Brandenburg Academy of Sciences and Humanities
- Martin Spiewak, Journalist DIE ZEIT
- Peter Weingart, Director of the Institute for Science and Technology Studies (IWT), Bielefeld University, and Spokesperson of the Interdisciplinary Research Group "Scientific Advice to Policy in Democracy", Berlin-Brandenburg Academy of Sciences and Humanities
- Justus Lentsch, Researcher, Institute for Science and Technology Studies (IWT), Interdisciplinary Research Group "Scientific Advice to Policy in Democracy" (Scientific Coordination), Berlin-Brandenburg Academy of Sciences and Humanities

**Günter Stock:** If you compare the British system with the German system, would it be advisable for us to have a science adviser in the German government? Would this weaken or strengthen the position of our current Minister of Education and Research?

**Sir David King:** The position of a science adviser is essentially different from the position of the minister, precisely because the minister is responsible for making the decisions and the adviser produces the advice with which decisions are made. That is a very very important distinction. Secondly, the minister is unlikely to be a scientist. Historically the British system has always revolved around the appointment of a chief scientific adviser who is a highly visible, productive scientist. So he is plucked out of the academic world and put into government. This post was invented by Churchill and the first appointment was Frederick Lindemann who was head of physics in Oxford. It has always been a high profile scientist in this post. Why? The scientist's job is to understand scientific issues in a way that, I would argue, only a scientist can understand them: understanding the challenges, understanding the nuances of how science operates, where we can predict

some things with remarkable accuracy. With many things in government we also have to deal with probabilities, we have to deal with risk and we have to analyse risk. That's quite a challenging problem. So what the science adviser brings is within government a quality control, if you like, of the advice that is given to government. The minister would be dealing with issues around economics, the evaluation of the need for investment in science as distinct from keeping taxes low to generate the innovation and wealth creation arising from this. That is the ministerial decision-making process. The second thing is that the post has a clear single line responsibility to the Prime Minister. I stress this because it means that unlike a minister, I can rove into different departments. So if I take a current topical issue, avian flu, we have a department that deals with animal health and a department that deals with human health. I am the only person who can see that we have a coordinative animal-human approach to avian flu. So I pull together a working group of people drawn from those departments, but also experts drawn from the scientific community, and in this case also experts drawn from outside Britain. Then we work out a policy for dealing with avian flu. When I say we work out a policy, we work out policy advice which then goes to cabinet for decision.

**Günter Stock:** Do you play a role in discussions about structural issues of the British science system as well or is your role restricted to science related questions only?

**Sir David King:** No. My interpretation of science is very broad. I go back to *scientia* that science is knowledge and that scientific research is the generation of new knowledge. And I say this because, and this is important, the Office of Science and Technology which I am the head of has 150 civil servants and an apparently extremely large budget. The 3 billion pound budget for our research activity in Britain comes through my office. This means that all of the research in Britain is funded through the Office of Science and Technology including arts, humanities all the way to particle physics and astronomy. But when I say the funds come through, they are divided between the research councils and the Office of Science and Technology. Their operation is at arm's length from us. But just to interpret your question in this way: I advise the cabinet on what is the right level of funding for science, and I have to do this in relation to economic issues as well. So my advice isn't just contained within the science box, but is given in relation to the need for innovation and wealth creation from the science base. And to be honest, it has been my platform to take science out of the box. We can interpret it this way: if the subcommittee of the cabinet is formed and I am not there, they can say when we need science advice, we will call you in. My argument is: how do you know when you need science advice?



So now I also sit on eight cabinet subcommittees, so that I can be there to bump in with advice when it's needed.

**Günter Stock:** How important is the advice you get from the Royal Society in your job? Would your job be easier or more difficult if you did not have the Royal Society? As you know we don't have one in Germany. How important is that institution for you to be successful?

**Sir David King:** In several different ways, I would say it's critically important. Let's suppose I have to advise on an issue. I'm a chemical physicist and I have to advise on avian flu. How do I get my knowledge up to scratch? My first call would be to the Royal Society. Who are the experts within this area? They will put me in touch with the appropriate people and within a short period of time my office has got the experts in there discussing with me and so I can then sit and challenge and be challenged in this area effectively. I have a personal seminar until I feel I have grasped the issues. So that's the first thing – it is just an unofficial means of tapping into the expertise in the country – because obviously the Royal Society has the function to keep tabs on who the experts are in this country. But secondly, because I am close to government, we have situations where it is critically important that we are seen to go outside government for top-level advice and that advice is then published in the public domain. In all of those situations we would go to the Royal Society.

**Peter Weingart:** You mentioned Lindemann. The criticism that was levelled against him and Churchill was that their relationship was too close, becoming private, and that Lindemann's influence was illegitimate because of his direct access to the Prime Minister. The same issue arose with the science advisers to the US President in different phases. The question that is being raised with respect to science advisers is: are they not having too much influence thereby becoming advocates of science, of the interests of science. My question is, how do you guard against that? Does that suspicion exist in Great Britain on the part of policy makers?

**Sir David King:** I would like to interpret your question in the following way. If the closeness to the Prime Minister means that the advice I appear to give him, by which I mean that is in the public domain, may be politically driven, then there is a real problem. The problem is not only that the advice is being bent by political will, but it also means that the public trust in the science advisory system collapses. This has happened, and to be honest, this is happening at the moment in the United States. So the balancing act I

have to achieve is to demonstrate to the public that I am an independent scientist within government, and to demonstrate to the Prime Minister that I have a loyalty to the Prime Minister.

**Peter Weingart:** Regardless of his party affiliation […]

**Sir David King:** Exactly. And, by the way, this is essential: if there is a general election and a new Prime Minister comes in, I serve the new Prime Minister. So the post is not a post of appointment by the Prime Minister.

**Günter Stock:** So you are not appointed by the Prime Minister?

**Sir David King:** No, I am appointed by the head of the civil service. By tradition, the head of the civil service appoints the chief scientific adviser. A short list goes to the Prime Minister and the Prime Minister can say, no, I don't like number one, but then he has to take number two. But once appointed, I have to serve the next Prime Minister. So I think this is an important part of the answer. My own position was very difficult – because we have the BSE crisis. During the crisis, there was clearly a problem where the scientists within the Ministry for Agriculture had appeared to be giving advice that was politically determined. So when I arrived, I made it absolutely clear that whatever advice I am giving to the Prime Minister today I will put into the public domain regardless whether the Prime Minister takes that advice or not. That is a difficult position for a Prime Minister, but it's also a difficult position for me. I have to be very very careful how I operate.

**Peter Weingart:** And the Prime Minister has accepted that situation? I ask, because that would almost be unheard of in Germany.

**Sir David King:** I believe the Prime Minister accepted that for the good reason that he could see that it was in the interest of the governance of the country.

**Peter Weingart:** Is it actually one of the results of the BSE crisis that in bringing all that information into the public domain, it is better in creating trust than keeping it secret?

**Sir David King:** Yes. Openness, honesty, transparency, that's my mantra.

**Peter Weingart:** So one can say that in a sense re-establishing the trust which was damaged during the crisis has had effects both on the scientific community and on the politicians.

**Günter Stock:** I think the heads of the Deutsche Forschungsgemeinschaft or the Max-Planck-Gesellschaft can go public without asking anyone in the government […]



**Sir David King:** It's the same in the Royal Society.

**Günter Stock:** […] but there must also exist subtle mechanisms in Britain which somehow influence when and how you go public. Are you completely free of those subtle elements?

**Sir David King:** Yes, you are quite right. There are issues that I don't go into the public domain with. I advise the government on intelligence issues, I advise the government on post 9/11, I formed a working group to look into the defences of the United Kingdom against potential attacks from suicide people, and we still operate, but of course, none of that goes into the public domain. So the simple rule is: if it is an intelligence issue, in other words, if it is labelled 'secret', it doesn't go into the public domain.

**Günter Stock:** That is the only exception?

**Sir David King:** Yes, that is the only exception. But this means, when I give my advice, I have to bear in mind that this advice is going into the public domain.

**Günter Stock:** Have you ever experienced that the Royal Society and you proposed different opinions to the public or are you always in agreement? Do you even try to be of the same opinion?

**Sir David King:** No. I think that there is another way of looking at this. If you collect scientific evidence for policy making in the way that I set out in my Chief Scientific Adviser's Guidelines, and of course I follow the guidelines myself, if I take advice following the guidelines, it means that I have to draw in advice from the whole spectrum of opinion and on the basis of that, draw my conclusions and advice. Not surprisingly, the Royal Society comes to much the same conclusions as I come to. There are occasions where the Royal Society might come out with a different position, but in general it is the same.

**Peter Weingart:** I would like to come back to the guidelines. If one reads them critically, it's almost like an analysis of all the things that could go wrong?

**Sir David King:** Read those guidelines bearing in mind what I said about the BSE crisis.

**Peter Weingart:** It is sort of a wish-list put to politicians. In other words, how they should behave in using knowledge. Very little is said about how the scientists should behave.

**Sir David King:** Right.

**Peter Weingart:** The question is: what do you think should be the principles that scientists should follow when they give advice?

**Sir David King:** There are three things we have. We have the Chief Scientific Adviser's Guidelines, we have the Code of Conduct for Scientific Committees and we have the Ethical Code. I don't know if you have seen our Ethical Code *Rigour, Respect, Responsibility*. This is an ethical code for all scientific practice. If you are developing new knowledge, then we expect that you should follow this code. The code is our most recent output, and all government scientists are now required to follow the code. Once we have seen how it operates with government scientists, we want to pass this to the Royal Society and see if we can propagate it amongst all scientists in Britain, in the private sector and in universities. But we are first trying this code out within government science.

**Peter Weingart:** One of the issues that arises with respect to scientific advice is whether scientists should actually broaden the options for policy makers, in other words, demonstrate which other options are available or, conversely, whether they should narrow them down. Policy makers are interested in fewer options. What would be your policy?

**Sir David King:** If you are handling a risk situation such as avian flu, my belief is that all of the options need to be dealt with within the scientific group, and then, when the advice is taken to ministers under this situation, then I believe it is right to settle on the best option. The risk analysis is best done within the scientific group but to indicate to the politicians what range of views were emerging from the scientific analysis. I have given a radio interview in which it was said, you are giving the government no choice. You are making the decision. That is one interpretation. I guess the alternative is: if I duck the issue and simply say: here is the range of options, then the decision quite potentially could be made on the basis of a poor risk analysis.

**Peter Weingart:** The obvious danger is that, as you say yourself, criticism could be levelled: 'Well, then you're not giving the government options'. Therefore, you are already in the position to decide yourself, i.e. you're overdrawing your position. How can you guard against that as a science adviser?

**Sir David King:** I think, if you ask me if I'm guarding against that, I am not. I think that governments need clear firm advice where risk is involved. If I take the big issue, global warming, then again I think I have given very clear advice to government on what the risks are as understood by the scientific community now and what actions are required to be taken. So, in that case I set up a group of about 100 scientists, engineers, social scientists to work with us. It took two and a half years to report to the government on what actions are required to deal with the risks to the British population from climate change. That then went into government, and now the actions have been taken. The decisions on which actions and how much money to spend on them are all made within government, but the analysis is entirely from the scientific community.

**Günter Stock:** Related to this timing, this is an important issue because science needs longer time than afforded by political pressure. There must have been situations where your first response was different from your later, more considered response. How do you cope with this? Is it an issue at all?

**Sir David King:** I was appointed in October 2000, and while I was still figuring how I should work – and for me this was a very important step – the government set up a commission to look into the BSE crisis. The Commission Report landed on my desk a few weeks after my appointment – 12 volumes. The Phillips Commission Report put it down to the politics determining science policy rather than science policy determining political decision. So there I had it as my first big challenge. Two months later we had an outbreak of foot-and-mouth disease. Now the Minister of Agriculture was trying to contain the outbreak. But now I was already using the new guidelines to set in process a group of scientists to talk to me – virologists, epidemiologists who talked to me about the epidemic. Out of this, in real time, we started modelling the epidemic, and from the models I clearly understood that the way the ministry was operating, this epidemic would continue out of control. In other words, we needed new control procedures. So immediately I contacted the Prime Minister, and within one day he called a meeting of all government departments. I had to explain what was happening, why it was getting out of control and what was needed. Now I never want to be in that situation again. For six weeks I was living and breathing nothing but foot-and-mouth disease. I was flying in a helicopter around the UK, not only giving science advice but seeing the implementation of the advice on the ground was actually happening, talking to farmers, explaining what we were doing, on television and radio. Immediately I was very high profile. This is a government saying here is the scientist, let him explain to the public. We shouldn't have a politician explain it, let him explain. My neck was on the block very firmly, because I had advised the policy, and I had told the Prime Minister if you adopt this policy within two days, we can switch an exponential growth into an exponential decay. It followed. The analysis was correct. And so my traction within government rose very substantially. The lesson I learned from that is that we need to horizon scan, we need to look into the future.

So, right now don't be surprised if we, I believe, have got the first epidemiological model for avian flu. We're preparing ourselves rather better than we were prepared at that time. I think the answer is that I run the government's foresight programme and the foresight process I just described to you in terms of climate change. We now continue on a whole range of topics. In addition, the government has decided to ask us to set up a Centre of Excellence for Horizon Scanning. So we are now training people from all government departments on the process of looking for opportunities and risks on the horizon. It's a very challenging process, and it's also quite exciting because it's a new kind of development.

**Martin Spiewak:** I would like to ask about your relations to the Science Minister. Is there any kind of competition? It's hard to believe there is no competition between your role and the role of Science Minister.

**Sir David King:** The Science Minister in Britain is in a different position from the research ministry here. The Science Minister operates within the Department of Trade and Industry and reports to the Secretary of State in Trade and Industry. What's the equivalent here, the top minister?

**Peter Weingart:** Well, there is actually no such thing in Germany.

**Sir David King:** We have a cabinet, and each member of the cabinet runs a department. The Science Ministry is not in the cabinet, but reports to a Secretary of State, and he is in the cabinet. So the Science Minister operates within a department. I operate across departments and I report directly to the Prime Minister. That doesn't mean that there is no potential conflict. Of course I work very hard with my relationship with the Science Minister. We see each other on a weekly basis. I see him more frequently than anyone else. It may be because of my personal relationship with Lord Sainsbury, but I think if you asked him, he would say, he is an extremely enthusiastic proponent of the position of Chief Scientific Adviser. He would say it doubles his strength to have a Chief Scientific Adviser in government. But that's not to say that your question isn't a good one. We have to work on that relationship.

**Günter Stock:** But you could also say, let me sit at the table and let him sit in the department.

**Sir David King:** You see, Lord Sainsbury would never say I should be advising the Prime Minister on a scientific issue. He will give policy decisions, but not the kind of thing we've now been discussing. It's not Sainsbury who can challenge the scientists and determine advice. For example, there is a G-8 science group which meets twice a year and I am the British representative on that. As a matter of fact, when I was in China, I signed a Memorandum of Understanding with the Chinese government in December. So I can operate in the same way as Sainsbury. It effectively saves him a lot of travel.

**Martin Spiewak:** Does the British public consider your role more important or more powerful than Sainsbury's role in general?

**Sir David King:** I would think that for one reason or another, my visibility is greater in the public domain, but Sainsbury has a very important job because he makes the real decisions.

**Peter Weingart:** What do you spend most of your time on?

**Sir David King:** I think it would be fair to say that this depends. The British government has just emerged from the G-8 Presidency and the EU Presidency and so we have all been heavily focused around that. The Prime Minister asked me to act as an unofficial ambassador on climate change. We have two issues: climate change and Africa and I am also part of the African issue. Last year we were giving a large number of public lectures explaining why the British government is taking the position it is on climate change and within the African issue why we are taking the position of the importance of skills development in science, medicine, agriculture and technology in Africa. So I become not only an adviser, but this is the Prime Minister saying get out and explain our policy. When I went to Brazil I had to explain to the Brazilian President why the Prime Minister had invited him to the G-8 meeting. So I'm also used in that way by government.

**Peter Weingart:** Would it be fair to say that the Science Adviser gives a much higher profile to science in policy making than if that position didn't exist?

**Sir David King:** The real answer to your question what do I spend most of my time on: to see that advice given to all government ministers and the Prime Minister is based on the best evidence-based analysis, seeing that when government ministers receive advice, that it is based on scientific analysis. Now that's a big battle, because I think that although civil servants are actually wonderful people, they don't have that kind of training. That can only be obtained from a lifetime in science.

**Justus Lentsch:** What measures are at hand to ensure that the guidelines are implemented, or that science advice is really based on the best evidence available?

**Sir David King:** I have introduced four specific measures. First of all, and this is the most important, I review the quality of science and the fitness to the purpose of science at each government department every three years. Each review process involves taking experts drawn from the broader community into each of the government departments to analyse how they are using science in the advice system, and what the quality of that process is and whether ministers are taking note of that. Why does that have clout? I publish the report, so immediately it is in the public domain. The select committees in Parliament pick up that report and use it to examine the members of the department. Where criticisms are made, they are always made constructively so as to improve the process. Secondly, each department has to develop a science and innovation agenda each year, has to refresh it each year and I oversee the process. So, in my office we have the means of spreading best practice from one government department to another. And thirdly, the budget for scientific research in the UK for universities is 3 billion pounds, for government departments it is about the same sum. The budget for individual departments is determined by the Treasury after discussions with myself. This is a new process that I introduced. The fourth thing is: I have been appointing Chief Scientific Advisers into each government department. So we are parachuting academics or industrialists into each governmental department who are responsible to their Secretary of State for all of this and to me so that I can report to the Prime Minister. I said to the Prime Minister that I can't keep tabs on everything, so I need a cadre of chief scientific advisers. Now there are nine Chief Scientific Advisers.

**Peter Weingart:** In a sense it's a cabinet of science that is operating.

**Sir David King:** So the answer to your question, I think science is now very much at the heart of the UK government.

**Günter Stock:** When it comes to new technologies in Great Britain, you are more directed towards benefit evaluation and therefore on certain issues you are faster than we are to implement new technologies. Could this be due to the fact that in the initial discussions at the level of government there is already a prominent voice which speaks for science? It must have something to do with how the discussion is structured. Is the fact that the scientist is getting the first discrete signs of something also beneficial for the level of risk benefit discussion and analysis?

**Sir David King:** I'm not sure that I go along with your view that the British public might be better informed on these issues than the German. Let me give you an issue where I



think that we have major problems. It is a trans-European issue: genetically modified foods. I think we can claim that it was probably the British public that first reacted against GM Foods and then that spread around Europe. Now I believe the reason for that is because following the BSE crisis, the trust in the science system was not there. People were saying we could not eat that beef and now you're telling us the genetically modified foods are ok. We do not believe you. So there were massive problems for us economically because we are strong in molecular biology, biotechnology and within that strength we had produced two companies with massive investments in GM foodstuffs, I would say third generation of GM foods. That is gone. Those laboratories have been shut down completely. It was something like a multi-billion pound investment that has been terminated because of the public position.

The Prime Minister asked me to set up a GM science review to put in the public domain. I held the review process in public – I think it was something like 100 hours of meetings in the public domain with 24 scientists and, again, a wide range of scientific opinion represented. We published our review and the results of the publication were: that the regulatory process in Europe was absolutely firm and good, and that the four GM food crops that had been given the green light through Brussels were all safe for human consumption. We also advised that farmers should be allowed to grow them. Today none of those are on sale in our supermarkets and none of the crops are grown by the farmers. The reason is that the consumer determines what the policy is rather than the government. We also had what we called a GM public debate rolling alongside my science review. The public debate moved to about 60 different public destinations around the UK. What happened there was that a group of people who were against GM attended every meeting. So what we managed to do was we arranged a travelling platform for them. The net result was it came out very negative. We learned from that: it is critically important to get ahead of the game. For example now, nanotechnology: Germany and Britain are very strong in developing nanotechnology. We decided, and this comes back to your earlier question, to ask the Royal Society to issue a report on any potential risks arising from nanotechnology. Their report has now come to government and government has responded to the report which is now in the public domain. We have also set up a programme called Science Wise. This programme travels around the country. We go into a city and take out the telephone directory and randomly invite people to come and attend a meeting to discuss nanotechnology. Actually we have experts who can answer questions, but the experts don't give information, they wait for the public to ask. So it's a public jury system. And the Science Wise Programme travels around the country. They

first of all take the views of the group before and after the questions. After the questions, people don't just say yes, we are for nanotechnology. But as a result of the questions, people say if you introduce these regulations, then we would be satisfied. So it becomes a two-way discussion process. We're trying to get ahead of the game.

**Peter Weingart:** Much more intelligent than having an "Einstein Year".

**Martin Spiewak:** I have one more question having to do more with politics than with science, the Korean scandal. What was the impact of this scandal in your country? And do you think this is a very special Korean case or does it have more to do with science in general?

**Sir David King:** I think it's got more to do with science in general. I don't see it as a specific South Korean case. We can all give examples where scientists have behaved badly, the case of AT&T laboratories, for example, was highly publicised, and I think rightly. In each case I think everyone around this table who is a practicing scientist would join in the public outcry against such behaviour. So I think it's not specifically South Korean. I think that there are extreme pressures on scientists to perform. Most of that pressure comes from within: I want to show that I am the best scientist in the world and that can lead to shortcuts. And I think that's what we're seeing here. One of the reasons we have produced this Ethical Code is to have a code practice which will enable us to say where the code has been broken. So, if you go through the Ethical Code (it has only seven points), you can see where someone broke the code.

**Peter Weingart:** Thank you very much, Sir David, for your time.



*Justus Lentsch and Peter Weingart*

# *Standards and "Best Practices" of Scientific Policy Advice*

How can scientific policy advice be organised in a way more accountable to academic science and public concerns alike? Science is the major institution for producing knowledge pertaining to political decision making and regulation. As such it remains irreplaceable for approaching the urgent societal, environmental and economic problems our societies currently face. This round table discussion with Sir David King demonstrates the upbeat tone of the expert symposium "Quality Control and Assurance in Scientific Policy Advice" organised by the interdisciplinary research group "Scientific Advice to Policy in Democracy" of the Berlin-Brandenburg Academy of Sciences and Humanities. We are grateful to Sir David King for sharing his experience as Chief Scientific Adviser to the British Government with us.

Attempts to develop procedures and organisations of responsible and scientifically based policy advice have been of central concern during recent decades in the Federal Republic of Germany also. And today there is a tight network of different scientific advisory bodies to the government and the parliament in Germany: besides numerous blue-ribbon commissions, this includes for instance the famous Federal Research Institutes, that have a long standing history dating back to the first half of the 19$^{th}$ century, the Office of Technology Assessment at the German Parliament, or standing high-level advisory councils like the German Councils of Economic and Environmental Advisers, the German Science Council or the German Advisory Council on Global Change. Moreover, surveys like the Eurobarometer show that science as well as individual scientists generally enjoy high public esteem. Scientific expertise thus has become commonplace in political decision making.

Conversely, we find the relationship between science and politics becoming increasingly uneasy in several respects: Firstly, the role of scientific advice in managing public policy problems such as the BSE crisis, nuclear power or genetically engineered food has given reason for widespread disappointment. At least partly, this might be due to significant failures and weaknesses in articulating and communicating scientific advice at the outset of the policy process. Secondly, financial or partisan political interests seriously undermine the role of academic scientists in advising policy. For instance, in many fields

of science pertaining to public policy or regulation such as toxicology or pharmacy, it is nearly impossible to recruit leading experts in their field who do not have financial interests in their research. Finally, scientific advisers themselves often act in partisan or in other ways that politicise science. All this has led to a rapid decline in public trust in the credibility and legitimacy of the ways in which scientific advice is sought, used and interpreted in the policy process. Politicisation, it seems, is on the verge of becoming endemic to scientific expert advising itself.

Concerns about the quality of scientific expert advice to policy makers have been raised for years in the UK and by the EU. But only lately have they attained media attention in Germany. Past experience with public debates such as the BSE case or the controversy about genetically engineered food show that the legitimacy of experts and of the policy makers whom they advise depends on the reliability and transparency of science advice. This has highlighted the absence of clear rules to follow as well as a legal framework and structures for obtaining institutionalised advice from academics. Unlike other European countries such as Great Britain, in Germany there is neither a National Academy like the Royal Society nor the institution of a Chief Scientific Adviser which might compensate for the lack of legally approved procedures. Instead, the institutional landscape of policy advice in Germany is fragmented, and often lacks transparency and clear lines of responsibility. Thus, the issue of quality control and assurance in scientific expert advising is of vital importance for both decision makers and the academic community.

With these problems in mind, the Berlin-Brandenburg Academy of Sciences and Humanities in 2004 has set up the interdisciplinary research group "Scientific Advice to Policy in Democracy". The group inquires into the mechanisms which provide scientific advice to the German government. The analysis focuses on the relationship between the organisational form of political counselling, its function and its effectiveness. The group has mandate of the Academy to devise guidelines and criteria for good scientific consultancy as well as concrete proposals for statutary regulations.

The basic questions which guide this endeavour are: How can the institutions of organised science help improve the effectiveness as well as the accountability of scientific advice and thus help it regain its credibility and legitimacy? What are the norms that should guide a scientifically and politically responsible practice of scientific advising?

The production of scientific expertise for advising policy making differs in many respects from basic science. The fundamental commitment of regulatory or policy oriented science and scientific policy advice is quality – its control and assurance. Therefore, the issue of quality is the pivotal point for determining the proper role of science in relation to policy



making. The norm is not only scientific robustness but also to achieve results that are 'fit for function'. But results that work, may not be easy to accomplish, however, as the production and provision of science advice takes place in particular institutional arrangements and under particular constraints (like uncertainty and emergent time frames). In particular, when the methodological challenges of providing sound advice intersect with politically sensitive issues and entail high stakes, it becomes difficult to design and implement procedures of quality control and assurance in the policy domain.

As a first step, the interdisciplinary research group "Scientific Advice to Policy in Democracy" has organised this round table discussion with Sir David King and the subsequent expert symposium "Quality Control and Assurance in Scientific Policy Advice". For the first time, this expert symposium assembles the perspectives and experiences of advisory organisations that have been functioning as "model organisations" for the institutional implementation of science advice across Europe and the United States. One of the most instructive examples is the British institution of the Chief Scientific Adviser to the Government.

However, for several reasons controlling and assuring the quality of scientific advice for public policy making is neither a uniform nor even a well-defined procedure:

Firstly, the very notion of quality itself will have to be scrutinised: If scientific advice is expected to fulfil its function, there will be different conceptions and definitions of what is considered "good advice" according to the different needs as well as to the different contexts of use. That means that the assessment criteria will also vary with the different needs and requirements the advice is expected to satisfy.

Secondly, there is a great variety of different procedures of quality control and different institutional arrangements for putting these procedures into practice. This encompasses informal as well as formalised procedures such as different forms of peer review or scientific committees. In general, the quality of scientific expertise and regulatory information will be improved by coupling procedures of scientific analysis and deliberation as has been argued in the 1996 report of the American National Research Council *Understanding Risk: Informing Decisions in a Democratic Society*.

Finally, the quality of scientific policy advice has become a controversial issue in the public debate. Therefore, we will have to look carefully at the factors triggering the controversies. This holds in particular for questions like how and on what basis the pertinent expertise as well as the relevant peers can best be identified and selected or how uncertainties, indeterminacies and risk can best be communicated and dealt with. In this

sense, determining the quality of scientific policy advice cannot be detached from public and political discourse.

Where do we go from here? The round table discussion reveals several obstacles and lacunae that need to be dealt with on the way to creating a responsible practice of scientific policy advice:

*Credibility and Public Engagement*

Firstly, the responsiveness of organised science to public concerns about contentious issues will have to be increased. In order to restore and enhance the credibility of its advice, organised science will have to engage with the public in an open and transparent discourse over these issues. This is not only a question of enlightening and improving the public understanding of science but one of taking science's role as a dialogue partner seriously and making this process really become a two-way discussion process.

*Professional Conduct in Providing Scientific Advice*

Secondly, we have to become clear about what norms could and should guide professional conduct in scientific expert advising. This includes, first, ethical norms such as rigour, respect and responsibility that are at the very core of the Ethical Code for Scientists[1] proposed by Sir David King. But this also entails professional norms of conduct, such as openness and transparency, as codified in the British Code of Practice for Scientific Committees[2] and the Chief Scientific Adviser's Guidelines[3]. Moreover, it implies the commitment of organised science to be aware of the gaps in its own knowledge base.

*Finding the Right Place for Science in Policy Development*

Thirdly, the difference between policy advice and political advice has to be observed: Policy Advice is about using science to broaden the range of choices available to decision makers. In order to fulfil this task, „horizon-scanning", mitigating the effects of departmentalisation of scientific expert advising as well as first identifying and articulating effectively the need for scientific advice in policy development will be important measures.

1 http://www.cst.gov.uk/cst/business/files/ethical-code-letter.pdf
2 http://www.ost.gov.uk/policy/advice/copsac/copsac.pdf
3 http://www.ost.gov.uk/policy/advice/guidelines_2005.pdf



Political advice, on the contrary, goes along with a reduction of choices in favour of a single option. However, often both aspects are related to one another: abstaining from settling on one „best option" in advising policy sometimes means taking the risk that political decision or regulation about scientifically or technologically complex issues will be made on the basis of a poor risk analysis. Moreover, in order to improve the quality and amount of appropriate and responsible policy advice, organised science should engage in an open dialogue and effective cooperation with government, industry and, last but not least, with society and non-governmental organisations.

*Appropriate Sources and Institutional Structure of Scientific Advice*

Finally, it has become clear that the institutional arrangements of scientific counselling are of major importance for the organisation of an effective and responsible system of scientific policy advice. Often this amounts to a balancing act between preserving science's autonomy and making it accountable to public concerns. In order to succeed in establishing an effective and responsible system of scientific policy advice, it will be crucial how the different lines of responsibility and accountability to both academic science and politics are organised and institutionalised.

In many respects the British efforts and Sir David King's innovative proposals for bringing science to the very heart of governmental decision making provide an excellent benchmark by which "best practices" of scientific policy advice can be identified.

# *The Chief Scientific Adviser to the British Government and the Head of the Office of Science and Innovation*

## *Appointment and key responsibilities*

The Chief Scientific Adviser (CSA) is appointed by the Prime Minister following an open recruitment process, which is run by the Cabinet Office under the guidelines set out by the Office of the Commissioner for Public Appointments (OCPA).

The CSA is responsible to the Prime Minister and Cabinet for quality of scientific advice within Government. He is also responsible for the Government's guidelines and policy making on Science and Technology and for their implementation.

The CSA provides advice on scientific issues directly to the Prime Minister on issues of a strategic and reactive nature. He is also invited to attend Cabinet Committees to input scientific advice and evidence to discussion. His advice is independent.

The CSA is expected to ensure that scientific activity across government is well directed and soundly based on good science, it is expected that the CSA will have experience at the cutting edge of science to ensure credibility both within government and more widely with the scientific, public and business communities.

The appointment is for fixed term of five years, which may be extended by mutual agreement.

## *The Office of Science and Innovation*

The CSA is also the Head of the Office of Science and Innovation[1] (OSI). There are two distinct elements to OSI: the Transdepartmental Science and Technology (TDST) Group and the Science and Innovation Group (S&IG).

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[1] In April 2006 the Office of Science and Technology (OST) became the Office of Science and Innovation (OSI), please see http://www.dti.gov.uk/science. The UK Office of Science and Technology (OST) was established in 1992 as part of the Office of Public Service and Science under the auspices of the Chancellor of the Duchy of Lancaster. After changes in the organisation of Government in July 1995, it was absorbed into the Department of Trade and Industry (DTI).

The Science and Innovation Group fall under the remit of the Director General of Science and Innovation and is responsible for the allocation of the Science budget.

*Ensuring high quality scientific advice gets into government*

The Transdepartmental Science and Technology (TDST) co-ordinates and develops policy on how Government seeks and uses scientific advice in policy making, the presentation of that advice and decisions based on it.

These policies are outlined in two key documents: Guidelines 2005 and the Code of Practice for Scientific Advisory Committees, which draw on key principles enunciated by Lord Phillips in his BSE Inquiry Report and covered in the Government's Response.

A key element in the development and delivery of high quality scientific advice across government has been the appointment of departmental chief scientific advisers in departments with a significant requirement for science and scientific advice. Again, departmental CSAs are expected to have experience at the cutting edge of science to ensure their widespread credibility.

The departmental CSAs meet on a regular basis to discuss operational and strategic issues under the auspices of the Chief Scientific Advisers' Committee (CSAC), in addition a number of other committees and forums exist to provide scientific input to Government. These include the Council for Science and Technology (CST), which is the UK government's top-level advisory body on science and technology policy issues on strategic issues that cut across the responsibilities of individual government departments and Global Science and Innovation Forum (GSIF), which brings together all Government and Government related players in the international science, technology and innovation sphere.



# *Appendix: The Guidelines*

# *Appendix I*
# *The Chief Scientific Adviser's Guidelines 2005*

## *Guidelines On Scientific Analysis In Policy Making, October 2005*

*Introduction by the Government Chief Scientific Adviser*

*The context*

1. The environment in which Ministers must make decisions is continually changing. In recent years we have seen the level of public interest in evidence-based issues increase. These guidelines were first published in 1997 and updated in 2000 to take on board the anticipated findings of the Phillips Report into the BSE Crisis. During these past eight years, I believe the level of public confidence in government's ability to make sound decisions in this area is now beginning to recover. It is essential that we continue to build on the lessons learned from this and embed them across all areas of government policy.

2. It is also essential that an effective advisory process exists which allows decision makers access to a high quality and wide ranging evidence base. This will enable them to make informed decisions, to deal effectively with crises and to ensure that all opportunities are explored to their full potential. In short, we must ensure that:

- key decision makers can be confident that evidence is robust and stands up to challenges of credibility, reliability and objectivity
- key decision makers can be confident that the advice derived from the analysis of the evidence also stands up to these challenges
- the public are aware, and are in turn confident, that such steps are being taken.

3. The principles laid out within these guidelines are consistent with the current better policy making guidelines to which policy makers adhere. They aim to further highlight the importance of the role of evidence in policy making, and to increase the awareness of policy makers on how best to seek good quality evidence from the most credible sources at the most appropriate time. They also aim to support the Professional Skills in Government (PSG) agenda by facilitating the understanding of the analytical and policy making environments for all those involved in the process.

*The guidelines*

4. The guidelines address how evidence should be sought and applied to enhance the ability of government decision makers to make better informed decisions. The key messages are that departments, and the individual policy makers within them, should:

- think ahead and identify early the issues on which they need scientific advice and early public engagement, and where the current evidence base is weak and should be strengthened
- get a wide range of advice from the best sources, particularly when there is uncertainty
- publish the evidence and analysis and all relevant papers.

5. This updated version of the guidelines replaces the second edition issued in July 2000. It builds on input from, and policy making experience gained, inside government and views from a wide range of stakeholders who responded to the public consultation held between June and August 2005.

*Which areas of evidence do the guidelines cover?*

6. The guidelines cover all disciplines from which policy makers may need to seek advice when formulating long-term policy objectives (including international agreements) or when reacting to another piece of established or emerging evidence.

7. These include natural and physical sciences, social sciences, economics and statistics and the arts and humanities[1]. The balance of disciplines required will obviously depend on the issue in question, but the potential for advice to be strengthened by harnessing evidence from all disciplines should not be discounted, particularly in areas of public concern. This is covered in more depth later.

8. The balance of research methods used to generate the data will also depend upon the issue in question. Research methods include experimental and theoretical/computational, survey and administrative, qualitative, economic evaluation, philosophical and wider social research[2].

[1] Further disciplines covered include medicine, dentistry and all allied subjects; engineering and technology; agriculture, fisheries, forestry and veterinary science; biological, environmental, mathematical sciences; psychology; and geography.



*Identification of issues needing specialist advice*

*Early identification and horizon scanning*

9. Individual departments should ensure that adequate horizon scanning procedures are in place, sourcing data across all evidential areas, to provide early indications of trends, issues, or other emerging phenomena that may create significant impacts that departments need to take account of[3]. Departments should ensure that their horizon scanning evidence is appropriately considered and, where necessary, acted upon. Departments should be able to draw on the information included in their Science and Innovation Strategies or their wider Evidence and Innovation Strategies.

*Cross-departmental issues*

10. Many issues are likely to require evidence that cuts across departments and will therefore require close communication and collaboration between departments. Departments should ensure they have the mechanisms in place for early identification of issues which affect more than one department or agency or have an international dimension. Adequate procedures should also be in place for early provision and exchange of information.

*Robust evidence and robust advice*

11. Once issues have been identified on which scientific advice is needed, departments should ensure their procedures for obtaining advice are consistent with the steps outlined below. The various stages in the process are not concurrent, and may have to be applied iteratively.

[2] Please see http://www.policyhub.gov.uk/ for more details.

[3] There are many ways of carrying out horizon scanning. The Office of Science and Technology Horizon Scanning Centre can provide advice, examples and, in some cases, further support. Please see http://www.foresight.gov.uk/horizonscanning for further details.

*Obtaining specialist advice*

12. Departments should draw on a sufficiently wide range of the best expert sources, both within and outside government, ensuring that existing evidence is drawn upon. There is an extensive list of external sources that departments can engage. These include academics, eminent individuals, learned societies, advisory committees, consultants, professional bodies, public sector research establishments (including the Research Councils), lay members of advisory groups, consumer groups and other stakeholder bodies. Where appropriate, consideration should also be given to inviting experts from outside the UK, for example those from European or international advisory mechanisms, particularly in cases where the other countries have experience of, or are likely to be affected by, the issue under consideration.

*Which experts?*

13. Departments should ensure that their selection of advisers matches the nature of the issue and the breadth of judgment required and is sufficiently balanced to reflect the diversity of opinion amongst experts. When deciding which external sources to seek advice from, departments should encourage those responsible for individual issues to cast their net wider than their traditional contacts and continually establish new networks in order to capture the full diversity of good evidence-based advice. The potential networks of organisations such as learned societies should not be underestimated. Many professional bodies have access to a wide range of specialists whose experience could usefully be brought to bear on relevant issues.

14. Departments should ask prospective experts to follow the seven principles of public life[4] as set out by the Committee on Standards in Public Life, which include the obligation to declare any private interests relating to their public duties. Departments should judge whether these interests could undermine the credibility or independence of the advice.

15. Where departments conclude that the potential conflicts of interest are not likely to undermine the credibility or independence of the advice, the relevant declarations of interest should, as a minimum, be made available to anyone who might rely on that advice. Departments will also need to consider whether it is appropriate to make the declarations more widely available.

[4] Please see http://www.public-standards.gov.uk/about_us/seven_principles.htm for further details.



*When?*

16. While advice from external and international sources should be sought regularly, departments should absolutely ensure that such advice is sought when:

- the issue raises questions that exceed the expertise of in-house staff
- responsibility for a particular issue cuts across government departments (e.g. sustainable development)
- there is considerable uncertainty and a wide range of expert opinion exists
- there are potentially significant implications for sensitive areas of public policy
- independent analyses could potentially strengthen public confidence in scientific advice from government.

17. Where the issue falls within European Community competence, or is likely to affect intra-community trade, particular attention should be paid to encouraging an evidence-based approach for Community decision making. This may involve contributing to Community level scientific committees, briefing the Commission on developing expert opinion, and exchange visits by scientific experts from other Member States.

*Asking the right questions and involving the right people*

18. Departments should consider how best to frame the particular questions which the experts will be asked to address. Making the question too narrow may prejudice the result. Where issues may be sensitive, departments must ensure that questions are framed to cover the concerns of all relevant stakeholder groups, including consumers and the general public. On these occasions, public dialogue should begin as early as possible. Ideally, the public should be involved in framing the questions that experts and policy makers need to address in order to make Ministers aware of the most important issues before taking a decision. The Council for Science and Technology's recent report on public dialogue[5] listed a helpful set of criteria for consideration in selecting priorities for public dialogue. Although specifically aimed at science and technology, the criteria are relevant for all policy areas:

[5] 'Policy through dialogue: informing policies based on science and technology' by the Council for Science and Technology can be found at http://www2.cst.gov.uk/cst/reports/#8.

*Proposed criteria for consideration in selecting priorities for public dialogue in science and technology.*

*Core criteria*

- The envisaged development in science or technology is feasible OR there is a significant societal issue that could be addressed using potentially controversial existing technology.
- Potentially controversial ethical issues arise around the conduct of the scientific research, the use of the technology and/or the wider impacts on society. For example: the benefits and risks to different parties (e.g. individuals, society, government, industry) are inequitable; the benefits to individuals are unclear; individuals may have limited or no choice over their use of the technology; risks fall to particularly vulnerable groups.
- The timetable for the development of policy allows for a dialogue process to inform developments.

*Additional criteria*

- There is significant uncertainty over the risks to human health or the environment.
- Interested parties from science, industry and civil society hold polarised, and apparently fixed, views in the area.
- New regulatory or governance procedures may be needed.
- There are questions over the desirability of the new technology.

19. The way in which public dialogue will affect policy and decision making will be specific to each department involved in the dialogue process and each issue under consideration. It is therefore essential that departments involved in dialogue look at their own consultative arrangements and working practices to ensure public engagement is effective. For example, links into departmental horizon scanning processes are essential to ensure early identification of and preparation for issues that may be priorities for public dialogue[6].

[6] Public engagement in SET guidelines is at annex b of Government response to nanotechnology report. This can be found at http://www.ost.gov.uk/policy/issues/nanotech_final.pdf.



*Risk*

20. When assessing the levels of risk or establishing risk management strategies in relation to a specific policy, the use of evidence is essential. Analysts and policy makers must ensure that they include evidence of any differing perspectives of risk (including perspectives from the public) as well as scientific risk assessments as part of any decision making process[7]. Early public engagement is vital to ensure this happens.

21. Evidence in public policy making contains varying levels of uncertainty that must be assessed, communicated and managed. Departments should not press experts to come to firm conclusions that cannot be justified by the evidence available. Departments should ensure that levels of uncertainty are explicitly identified and communicated directly in plain language to decision makers. They should also be made aware of the degree to which they are critical to the analysis, and what new and emerging information might cause them to revisit their advice. There will inevitably be occasions where advice is required within a few days, or even within hours. Decision makers should therefore also be made aware of the period of notice which policy makers and specialists have had to prepare advice, and that appropriate guidance and confidence caveats are given where quality of evidence, analysis and advice is deemed to have been time limited.

22. When asking experts to identify or comment on potential policy options, it is essential that departments and decision makers distinguish between the responsibility of experts to provide advice, and the responsibility of decision makers for actions taken as a result of that advice. Experts should not be expected to take into account potential political reaction to their findings before presenting them.

## *Handling the advice*

23. The effective and efficient handling of advice is essential, particularly in a crisis. Each responsible department should have clear guidelines on how scientific advice is provided in a crisis. These should include clear designation of responsibility, the processes to be

[7] Please see HM Treasury's 'Managing risks to the public: appraisal guidance' for further details on risk management. Please also see http://www.hse.gov.uk/aboutus/meetings/ilgra/.

employed and the sources of advice. Those responsible for departmental and ministerial communication with the public should ensure that the evidence on which any decisions were based are included as part of any press release or communication strategy. Where decisions taken were not based on the evidence, this should also be explained.

24. In public presentations, departments should wherever possible consider giving experts (internal or external) a leading role in explaining their advice on a particular issue, with Ministers or policy officials describing how the government's policies have been framed in the light of advice received. Early communication with key interest groups should also be considered. Consideration should also be given to providing early warning of significant policy announcements to other government departments and international organisations, where there are likely to be implications for other countries. Where possible, experts from such countries or organisations should be involved in the process of consultation and advice[8].

### *Openness and transparency*

25. In line with the Freedom of Information Act, there should be a presumption at every stage towards openness and transparency in the publication of expert advice[9]. Departments should also ensure their procedures for obtaining advice are open and transparent. It is good practice to publish the underpinning evidence for a new policy decision, particularly as part of an accompanying press release. Where issues fall under the remit of the Environmental Information Regulations[10], publication will usually be obligatory rather than just good practice. When publishing the evidence, the analysis and judgment that went into it, and any important omissions in the data, should be clearly documented and identified as such. This should be done in a way that is meaningful to the non-expert.

[8] Please see http://www.policyhub.gov.uk/ for further details.

[9] This is covered in Section 35/6 of the Act. Full guidance on the Act can be found at: http://www. dca.gov.uk/foi/guidance/index.htm.

[10] The Environmental Information Regulations establish an access regime, which allows people to request environmental information from public authorities and those bodies carrying out a public function. Please see http://www.informationcommissioner.gov.uk/eventual.aspx?id=36 for further details.



### *Timing of publication*

26. Departments should ensure that data relating to an issue is made available as early as possible to the scientific community, and more widely, to enable a wide range of research groups to provide a check on advice going to government.

### *Peer review and quality assurance*

27. Quality assurance provides confidence in the evidence gathering process whilst peer review provides expert evaluation of the evidence itself. Both are important tools in ensuring advice is as up to date and robust as possible. Methods of peer review and the applicability of quality assurance processes are likely to differ according to the discipline and research method they relate to. For example, a more formal review process is likely to be suitable for scientific and technical issues. However, departments should ensure that the appropriate peer review and quality assurance processes are carried out unless there are exceptional circumstances. Such circumstances might include evidence and analysis obtained during an on-going crisis.

28. In the case of the natural and physical sciences in particular, departments should ensure where they intend to use evidence which has not previously been peer reviewed appropriate steps are taken to ensure that it is. It may be possible to ask scientific advisory committees to comment on the findings. As stated previously, academics, learned societies and other expert contacts will also be useful here.

### *Emerging findings*

29. There will be occasions when new findings emerge suddenly, and sometimes with considerable publicity. It is often the case that research relating to controversial issues is leaked or sent directly to the press without being peer reviewed. In some circumstances, the results of this kind of exposure may well generate public concern. In these circumstances, it is important that the views of experts are sought without delay (see previous sections on who to contact).

30. When responding to public concerns over emerging findings, it is important that departments state clearly the level of peer review and/or quality assurance which has or has not already been carried out, whether they intend to subject the work to any further peer review processes and when this is likely to be available.

31. The level of peer review and quality assurance should be made clear by departments in any response they make to the emerging findings. In doing so it is important to explain the levels of uncertainty and corroboration of the original evidence. In circumstances where new research appears to challenge current thinking, but where the balance of evidence remains with that current thinking, it is also important for this to be stated clearly.

*Implementation and evaluation*

32. As the guidelines are largely principle based, we would encourage departments to ensure they are woven into departmental guidance on better policy making. Chief Scientific Advisers will work in partnership with policy makers to ensure the guideline's principles are fully embedded into departmental policy procedures and to ensure appropriate scientific input into policy decisions. Although how this is done will differ from department to department in order to work with the grain of existing evaluation activity, Chief Scientific Adviser's findings will inform part of the periodic progress reports on the implementation of the Science and Innovation Framework.

Source:
Department of Trade and Industry,
Office of Science and Innovation



# *Appendix II*
# *Rigour, Respect and Responsibility: A Universal Ethical Code for Scientists*

This is a public statement of the values and responsibilities of scientists.[1] It aims to foster ethical research, to encourage active reflection among scientists on the wider implications and impacts of their work, and to support constructive communication between scientists and the public on complex and challenging issues.

Individuals and institutions are encouraged to adopt and promote this code. It is meant to capture a small number of broad principles that are shared across disciplinary and institutional boundaries. It is not intended to replace codes of conduct or ethics relating to specific professions or areas of research.

## *Rigour, respect and responsibility: a universal ethical code for scientists*

*Rigour, honesty and integrity*

- Act with skill and care in all scientific work. Maintain up to date skills and assist their development in others.
- Take steps to prevent corrupt practices and professional misconduct. Declare conflicts of interest.
- Be alert to the ways in which research derives from and affects the work of other people, and respect the rights and reputations of others.

*Respect for life, the law and the public good*

- Ensure that your work is lawful and justified.
- Minimise and justify any adverse effect your work may have on people, animals and the natural environment.

[1] In this context, the code is intended to include anyone whose work uses scientific methods, including social, natural, medical and veterinary sciences, engineering and mathematics.

*Responsible communication: listening and informing*

- Seek to discuss the issues that science raises for society. Listen to the aspirations and concerns of others.
- Do not knowingly mislead, or allow others to be misled, about scientific matters. Present and review scientific evidence, theory or interpretation honestly and accurately.

Source:
Department of Trade and Industry,
Office of Science and Innovation

## *The Participants of the Round Table Discussion*

*Sir David King* is Chief Scientific Adviser (CSA) to the British Government and Head of the British Office of Science and Innovation. Prior to this appointment, he was head of the Department of Chemistry and Master of Downing College, and continues as Professor of Physical Chemistry at the University of Cambridge. He was made a Fellow of the Royal Society in 1991, Foreign Fellow of the American Academy of Arts and Sciences in 2002 and a Knight Bachelor in 2003. Sir David King has given over 200 invited lectures at international conferences and has published over 440 papers in scientific journals, including twenty in the past year. In 2002 he delivered the Ninth Zuckerman Lecture, on "The Science of Climate Change: Adapt, Mitigate or Ignore?", at the Royal Society.

*Günter Stock* took up the presidency of the Berlin-Brandenburg Academy of Sciences and Humanities in 2006. Before he was Member of the Board of Executive Directors, Schering AG, in charge of Corporate Function Research. Prior to that he had been Professor for Physiology at the University of Heidelberg. Moreover, he is vice-president of the Max Planck Society, senator and member of the German Research Foundation and a member of the German Science Council. He is member of the Berlin-Brandenburg Academy of Sciences and Humanities since 1995, senator of the *Leopoldina* since 1999, member of the German Council of Technical Sciences of the Union of German Academies of Sciences and Humanities (acatech) and member of the European Academy for Sciences and Arts.

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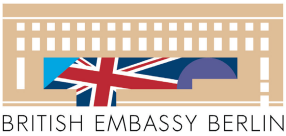


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