House of Commons

Innovation, Universities, Science and Skills Committee

Putting Science and Engineering at the Heart of Government Policy

Eighth Report of Session 2008–09

Volume I

HC 168-I

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Report, together with formal minutes

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The Innovation, Universities, Science & Skills Committee

The Innovation, Universities, Science & Skills Committee is appointed by the House of Commons to examine the expenditure, administration and policy of the Department for Innovation, Universities and Skills.

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Summary

The topic of this inquiry is of long standing interest to us and our predecessor committee, the Science and Technology Committee. But it is also timely: Lord Drayson, the Science Minister, has started a debate on the strategic priorities of research funding and there have recently been machinery of Government changes that have impacted on the science and engineering advisory system.

This is a constructive report that reflects on some of the good work that has already taken place to put science and engineering at the heart of government policy. It builds on these achievements and makes recommendations that we believe will help to improve the use of science and engineering advice further.

It revisits recommendations that we made in our recent engineering report, *Engineering: turning ideas into reality*. Although we were pleased with much of the Government's response, we were disappointed that some key recommendations were not accepted. For example, the Government will not be calling departmental engineering advisers 'Chief Engineering Advisers', nor will it move the Government Chief Scientific Adviser and his Government Office for Science into the heart of Government, the Cabinet Office.

We urge the Government to safeguard the independence of all Science Advisory Committees and make a number of recommendations on how this might be achieved. For example, we suggest that transparency could be improved and that setting up a press office in GO-Science would give SACs an independent voice.

We provide a critique of the Science Minister's debate on strategic funding priorities, and on Government consultations more generally, concluding that more should be done to clarify the aims and context of consultations. For example, what is at stake in the strategic priorities debate? If there will be winners, will there also be losers? Additionally, debates on strategic research priorities should be put in the broader context of the future of UK plc.

The principles that govern UK science funding decisions are discussed. We conclude that the Haldane Principle is useful as a basis for discussion, but should be replaced with a principle that can accommodate regional science policy, the full range of research funding streams, mission driven research, and the rationalisation of detailed and strategic funding decisions.

Finally, we welcome changes to the Government's internal science scrutiny programme, and the House's decision to reinstate the Science and Technology Committee. We suggest some ways in which the future Science and Technology Committee could operate after the general election.

1 Introduction

Background

1. This inquiry brought together several policy strands that have been of longstanding interest to this Committee and the former Science and Technology Committee. It follows, in particular, a number of issues that were raised in the following reports:

— *Engineering: turning ideas into reality* (IUSS Cttee, Fourth Report of Session 2008–09, HC 50-I), on the Government's capacity for sourcing and using engineering advice;

— *Science Budget Allocations* (IUSS Cttee, Fourth Report of Session 2007–08, HC 215-I), on regional science policy and the Haldane Principle; and

— *Scientific Advice, Risk and Evidence Based Policy Making* (S&T Cttee, Seventh Report of Session 2005–06, HC 900-I), on the Government's capacity for sourcing and using science advice.

2. It also proved to be timely in two respects. First, at our January 2009 Science Question Time, the Science Minster, the Rt Hon Lord Drayson, launched a debate about strategic priorities in science funding. He noted that other countries were making "strategic choices" regarding their economic priorities and he argued that the UK needs to have a "hard-nosed look at where we have real strategic advantage".[1] The nature of this debate, its content and purpose, has caused a stir in the science and engineering community. We seized on the opportunity to contribute to that debate in this report.

3. Second, just prior to the publication of this report the Department for Innovation, Universities and Skills (DIUS), the home of science and engineering for two years, was closed down. It was merged with the Department for Business, Enterprise and Regulatory Reform (BERR) to create a super-department, the Department for Business, Innovation and Skills (BIS). The potential implications of these changes to the machinery of Government, and the concomitant reinstatement of the Science and Technology Committee, make the timing of this report all the more important as we make our case for putting science and engineering at the heart of government policy.

The inquiry

The Committee invited evidence on the following issues:

— whether the Cabinet Sub-Committee on Science and Innovation and the Council for Science and Technology put science and engineering at the heart of policy-making and whether there should be a Department for Science;

— how Government formulates science and engineering policy (strengths and weaknesses of the current system);

1 Oral evidence taken on 26 January 2009, HC (2008–09) 169-i, Q 2

— whether the views of the science and engineering community are, or should be, central to the formulation of government policy, and how the success of any consultation is assessed;

— the case for a regional science policy (versus national science policy) and whether the Haldane principle needs updating;

— engaging the public and increasing public confidence in science and engineering policy;

— the role of GO-Science, DIUS and other Government departments, charities, learned societies, Regional Development Agencies, industry and other stakeholders in determining UK science and engineering policy; and

— how government science and engineering policy should be scrutinised.

4. We received more than 80 written submissions and held five oral evidence sessions. Unusually, we opened our inquiry by taking evidence from the Science Minister, Lord Drayson. We went on to hear from the Royal Society, the British Academy, the Government Office for Science, the Council for Science and Technology, a number of charities and other organisations promoting science, the Food Standards Agency, two science advisory councils, and a number of individuals. Our final session was with the Government Chief Scientific Adviser, Professor John Beddington, and the Science Minister.

5. We would like to thank everyone who contributed to the inquiry through written submissions and oral evidence. In particular, we would like to thank our specialist adviser, Professor Sir Brian Heap, whose deep understanding of the science landscape and keen insight into the key issues were invaluable.

Structure of the report

6. The report considers a broad issue—why science and engineering are important and why they should be at the heart of Government policy—and three more specific issues—the debate on strategic priorities, the principles that inform science funding decisions and the scrutiny of science and engineering across Government.

2 Science and engineering at the heart of Government policy?

Background

7. We approached this question—is science and engineering at the heart of Government policy?—from two connected, but distinct angles. First, the use of science and engineering advice in policy making: does the Government have effective mechanisms at its disposal for feeding science and engineering advice into policy? And second, science and engineering's place in Government policy: what role do science and engineering play in the Government's vision for UK plc?[2] On both of these points, the Government has a good record. Regarding science and engineering advice, the former Government Chief Scientific Adviser, Sir David King, maintained a close relationship with the Prime Minister, providing crucial expert advice during the foot and mouth crisis and successfully raising climate change to the top of the political agenda. He also gained traction in his campaign for every department to have a Chief Scientific Adviser, something that the current post-holder, Professor John Beddington, is continuing to push.

8. Regarding the role of science and engineering in UK plc, the Government's reports on *Science and innovation investment framework 2004–2014*[3] and *Manufacturing: New Challenges, New Opportunities*[4] have demonstrated a long-term vision. And funding has matched the promises: research funding has doubled in real terms over the last 10 years.[5] The science budget is ring-fenced and is set to increase to more than £6 billion per year by 2010–11. That commitment remains in place, with fresh enthusiasm from both the Science Minister, the Rt Hon Lord Drayson,[6] and the Secretary of State for Business, Innovation and Skills, the Rt Hon Lord Mandelson.[7]

The machinery of Government

9. When we began this inquiry, the organisational arrangements were somewhat different. DIUS existed as a discrete department for innovation, universities and skills, and it provided a home for GO-Science. In between the completion of evidence-taking and drafting the report there were machinery of Government changes. These resulted in the merger of the Department for Innovation, Universities and Skills and the Department for

2 The reader may detect more focus on science than engineering. There are two aspects to this. First, we recently produced a report on engineering that covered some of the topics in this report in detail. We therefore put more emphasis on science in some passages of this report. Second, when we talk about funding for science and engineering, we specifically are talking about those aspects that fall within the Committee's remit. For example, funding for engineering that falls within our remit includes research funding and FE/HE teaching, but excludes financial support for manufacturing. A larger part of the science policy area falls to this Committee.

3 HM Treasury, Department of Trade and Industry and Department for Education and Skills, *Science and innovation investment framework 2004–2014*, July 2004

4 Department for Business, Enterprise and Regulatory Reform and Department for Innovation, Universities and Skills, *Manufacturing: New Challenges, New Opportunities*, September 2008

5 DIUS, *The Allocations of the Science Budget 2008/09 to 2010/11*, December 2007

6 For example, Q 377 and oral evidence taken on 26 January 2009, HC (2008–09) 169-i, Q 19

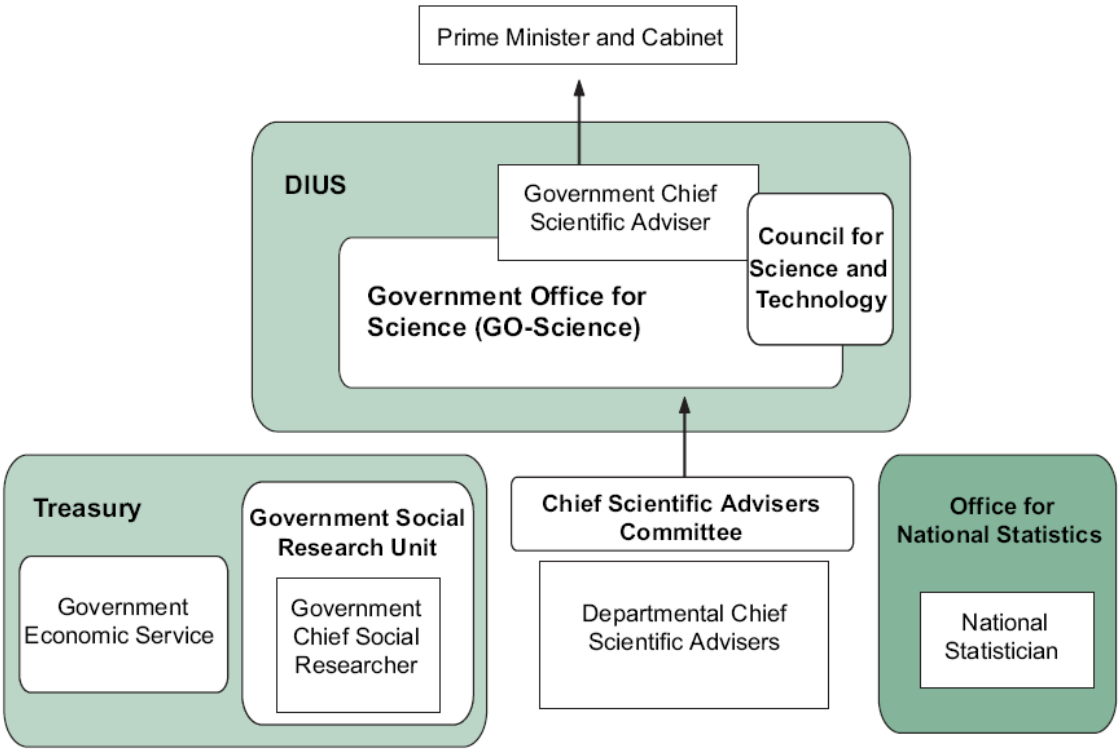
7 Speech given at the Science Museum, 9 June 2009, 'Science at the centre of Britain's future prosperity' (www.berr.gov.uk/aboutus/ministerialteam/Speeches/page51775.html)

Business, Enterprise and Regulatory Reform. The resulting super-department, the Department for Business, Innovation and Skills (BIS), has subsumed the science aspects of DIUS wholesale, with no changes to the structure (yet). The figure below describes the structural arrangements as they were before the merger (Figure 1).

10. The **Government Chief Scientific Adviser** (GCSA), currently Professor John Beddington, oversees science and engineering advice across Government and is also head of profession for scientists and engineers in the civil service. The GCSA heads up the **Government Office for Science**, which has cross-departmental responsibility for science and engineering advice. The GCSA and GO-Science are situated within the Department for Business, Innovation and Skills (BIS)—formerly DIUS—rather than the Cabinet Office as both we and the former Science and Technology Committee have suggested.[8]

11. Each Government Department, except the Treasury, has a **Departmental Chief Scientific Adviser** (DCSA). DCSAs are responsible for science and engineering advice in their departments. Not all DCSAs are necessarily scientists; for example, the DCSA for Ministry of Defence is an engineer (Professor Mark Welland), the DCSA for the Home Office is a social scientist (Professor Paul Wiles), and the DCSA for Department for Culture, Media and Sport is an economist (Anita Charlesworth).

Figure 1. The structure of science and engineering advice prior to the machinery of Government changes of June 2009. Taken from our Fourth Report of Session 2008–09, *Engineering: turning ideas into reality*, HC 50-I, p 72.



8 Innovation, Universities, Science and Skills Committee, Fourth Report of Session 2008–09, *Engineering: turning ideas into reality*, HC 50-I, para 313 (referred to in as the 'engineering report'); House of Commons Science and Technology Committee, *Scientific Advice, Risk and Evidence Based Policy Making*, HC 900-I, para 25

12. The DCSAs, along with the Health and Safety Executive Chief Scientist, the head of the Government Economic Service, a Treasury representative, the Director General of Science and Research, and the CSAs to the Devolved Administrations, all sit on the **Chief Scientific Advisers Committee** (CSAC). It meets quarterly to advise the GCSA (who chairs CSAC) on cross-departmental science and engineering matters.

13. There are also dozens of science advisory councils and committees that assist Government in collating and assessing scientific information and input independent advice into policy-making. The highest of these councils is the **Council for Science and Technology**, which advises the Prime Minister on science and technology issues. It is co-chaired by the GCSA and Professor Dame Janet Finch, Vice-Chancellor of Keele University.

14. Also working under the broad heading of 'specialist advice' to Government are the **National Statistician** (Dame Karen Dunnell), the **Government Chief Social Scientist** (Professor Paul Wiles), and the joint heads of the **Government Economic Service** (Vicky Pryce, BIS, and Dave Ramsden, HM Treasury).

15. The **Minister for Science and Innovation**, Lord Drayson, is the first Science Minister to attend Cabinet. In addition, he is in charge of research and procurement in the MoD and he chairs the **Cabinet sub-Committee on Science and Innovation**, which was established in 2008 "to consider issues relating to science and innovation; and report as necessary to the Committee on Economic Development".[9] The sub-Committee has been welcomed by the science and engineering communities.[10]

16. Working alongside the Minister for Science and Innovation is the **Director General for Science and Research**, Professor Adrian Smith, who is responsible for science and research policy, including the science budget allocations and public engagement on key scientific issues.

Why science and engineering are important

17. Before we consider the importance of science and engineering advice to Government policy, it is worth putting science and engineering in context. First, science and engineering contribute substantially to the UK's increasingly knowledge-based economy. We learnt during our engineering inquiry that nearly 30% of the UK's GDP is produced by the "SET-intensive sectors".[11] Given the importance of these sectors, the Government invests a great deal of money in supporting them. And for good reason:

> Research confirms that engagement between innovators and the science base creates real welfare benefit. An important recent study by the OECD found that 1% growth in public R&D leads to a 0.17% increase in total factor productivity in the long run. Moreover, this effect increases with the share of public science conducted in

9 www.cabinetoffice.gov.uk/secretariats/committees/edsi.aspx

10 For example, Ev 151 (Royal Society); Ev 177 (Campaign for Science and Engineering); Ev 182 (Biosciences Federation)

11 IUSS Committee, *Engineering: turning ideas into reality*, para 7

universities. Other studies confirm the positive contribution of academic research to economic growth.[12]

18. These facts have not been lost on other countries. In 2002, the European Council called for EU R&D investment to reach 3% of GDP by 2010. Among OECD countries, this has already been reached by Finland, Sweden, Korea and Japan (see Table 1). The UK has set a softer target of 2.5% by 2014.[13] It is currently spending 1.8%.

Table 1. 2006 Gross domestic expenditure on R&D (GERD)

	% of GDP	% financed by		Target	
		Government	Industry	Percentage	By…
Australia	1.8	40.5	53.0		
Brazil	1.0	57.9	39.4		
China	1.4	24.7	69.1	2.0 of GDP	2010
Finland	3.5	25.1	66.6	4.0 of GDP	2011
France	2.1	38.4	52.2	3.0 of GDP	2012
Germany	2.5	28.4	67.6	3.0 of GDP	2010
India	0.7	80.8	16.1		
Ireland	1.3	30.1	59.3	2.5 of GNP	2013
Italy	1.1	50.7	39.7		
Japan	3.4	16.2	77.1	1.0 of GDP for the public sector	2010
Korea	3.2	23.1	75.5	5.0 of GDP	2012
Russia	1.1	61.1	28.8	2.0 of GDP	2010
South Africa	0.9	38.2	43.9		
Spain	1.2	42.5	47.1	2.2 of GDP	2011
Sweden	3.7	23.5	65.7	4.0 of GDP	2010
Switzerland	2.9	22.7	69.7		
United Kingdom	1.8	31.9	45.2	2.5 of GDP	2014
United States	2.6	29.3	64.9	3.0 of GDP	

OECD in figures 2008,[14] and *OECD Science, Technology and Industry Outlook 2008, p 72*

12 HMT, DTI & DfES, *Science and Innovation Framework 2004–2014*, July 2004, p 149

13 OECD, *OECD Science, Technology and Industry Outlook 2008*, November 2008, p 72

14 www.oecd.org/document/32/0,3343,en_2649_37417_41722336_1_1_1_1,00.html

19. Related to but separate from the economics are the social benefits that science and engineering provide. Our lives have been improved immeasurably because of science and engineering. Together, they have provided populations around the world with fast transport and communications, safe and comfortable accommodation, effective medical care, abundant energy, reliable and clean water and food, and infrastructures to support all these necessities. Science has helped us gain an understanding of how human activity is warming the climate, and what impact that will have on food and water security, and, crucially, what needs to be done to slow or reverse the warming trend. Engineering offers humanity hope to meet these challenges by developing clean energy sources and transforming our ageing buildings and transport technologies so that they are efficient and sustainable.

20. Science and engineering have combined to deliver modern medicine, which in the past few decades has—as in all other fields—surpassed expectations. Professor Raymond Tallis, the physician and philosopher, described the meteoric improvements in healthcare in his impassioned analysis of modern medicine, *Hippocratic Oaths*:

> The most direct measure of success is postponement of death, and on this medicine has delivered handsomely. Global life expectancy has more than doubled over the last 140 years. Nearly two thirds of the increase in longevity in the entire history of the human race has occurred since 1900. If we narrow our gaze for a while and look simply at the data for England and Wales in the first fifty years of the NHS, the news remains pretty extraordinary. Infant mortality fell from 39/1000 to 7/1000 for girls and 30/1000 to 5/1000 for boys; and the proportion of people dying before reaching 64 from 40% to 7%. Life expectancy at birth increased by nearly a decade—from 66 to 74.5 for men and from 70.5 to just under 80 for women—during the second half of the twentieth century. If we look at the last century as a whole, the changes are even more amazing. Whereas the proportion of deaths that occurred between 0 and 4 years of age was 37% in 1901, it was 0.8% in 1999; and while only 12% of deaths in 1901 were in people above 75, 64% of all deaths in England and Wales in 1999 were among people over the age of 75.[15]

21. He goes on to quell the implication that just science-based medicine is responsible for this change by acknowledging that "Increasing prosperity, better nutrition, education, public hygiene, housing, health and safety at work, the emergence of liberal democracies protecting individuals against exploitation and abuse, and social welfare policies have all played their part".[16] Science and engineering—and, crucially, public policies that have made use of scientific and engineering advice—have played a key role in all of these developments.

22. We are content that the Government is both aware of what science and engineering has to offer, and also eager to make the most of it. When we questioned Lord Drayson, the Minister for Science and Innovation, he told us:

15 Raymond Tallis, *Hippocratic Oaths: Medicine and its Discontents* (Atlantic Books, 2004), p 22

16 Raymond Tallis, *Hippocratic Oaths: Medicine and its Discontents* (Atlantic Books, 2004), p 22

> I think that we have made real progress over the last year in putting science and engineering more at the heart of government policy, and I think we can point to specific achievements which have helped to deliver that, but I do think that there is more that we need to do.[17]

23. We found this forward-looking perspective reassuring and were pleased to hear it echoed by Professor Beddington, the Government Chief Scientific Adviser, who identified engineering as "an issue where we really need to work harder".[18] It is in this spirit of recognition of the past successes of science and engineering, the Government's efforts to bring specialist advice into the policy-making process and a forward-facing view to improve the process further that we undertook this inquiry.

24. **We were impressed by the Science Minister and Government Chief Scientific Adviser's frank assessment of how science and engineering advice is used in Government. We were pleased to hear that they have taken up those concerns we raised in the engineering report and that they have an appetite to improve the use of evidence in policy-making.**

Previous recommendations

25. In our recent report *Engineering: turning ideas into reality*,[19] we made a number of recommendations that were pertinent to this inquiry. The Government has responded and is generally in agreement with our conclusions. We welcome the Government's response, and were pleased to receive a detailed account of the work that is underway to increase the number and recognition of scientists and engineers in the Civil Service. The Government did not agree with all of our recommendations, in particular to do with the structure of scientific and engineering advice (see Figure 2). We discuss two of these rejected recommendations.

Chief Engineering Advisers

26. We argued that Chief Scientific Advisers who were engineers and spent most of their time offering engineering advice should be called Chief Engineering Advisers. We offered eight reasons why this would be a good idea. These can be found in detail in pages 92–94 of the engineering report, but briefly they were:

a) because engineering advice is distinct from other kinds of advice;

b) because engineers are best qualified to set best practice in engineering advice;

c) because the Government should recognise the importance of engineers and the appointment of Chief Engineering Advisers would be one simple way of doing this;

17 Q 319

18 Q 320

19 Innovation, Universities, Science and Skills Committee, Fourth Report of Session 2008–09, *Engineering: turning ideas into reality*, HC 50-I

d) because having Chief Scientific Advisers and Chief Engineering Advisers has proved successful in other organisations;

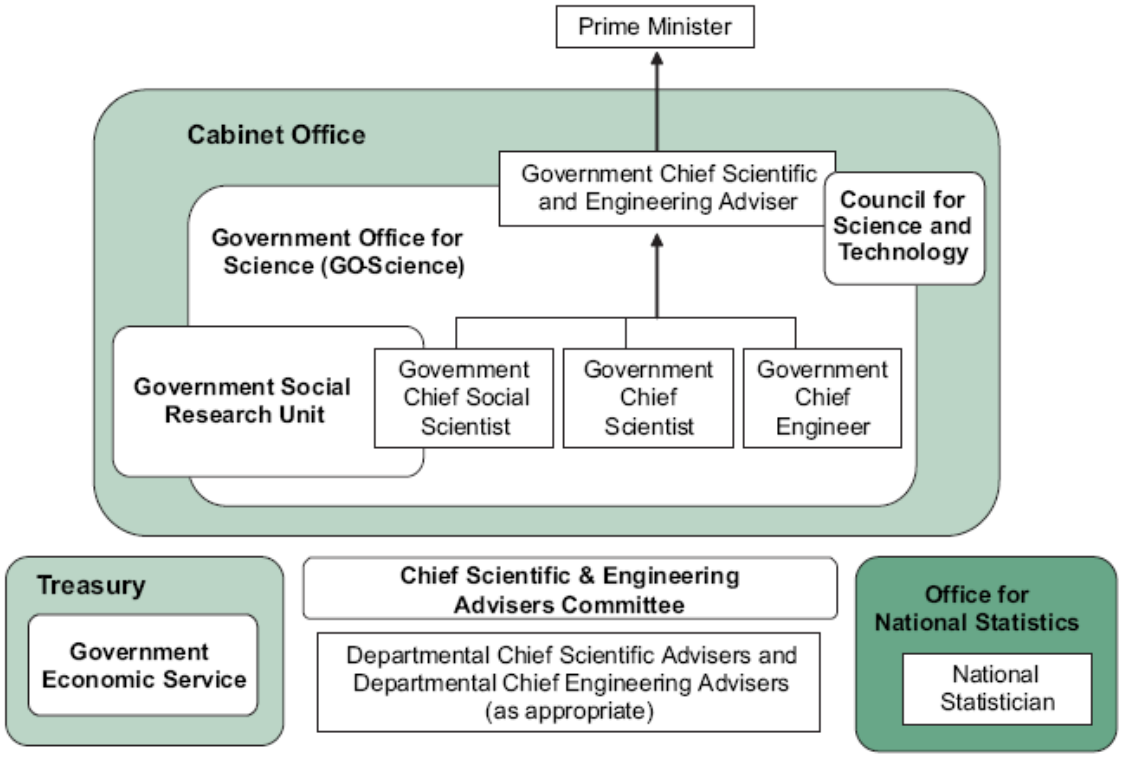
e) three examples—(i) intra-departmental, (ii) cross-departmental, (iii) external communications—where it would be simpler to call engineering advisers Chief Engineering Advisers; and

f) because the Government already recognises other specialists' expertise that it puts under the broad heading of 'science'.[20]

27. In its response, the Government does not answer these points in detail and explain, in the context of each point, why the status quo is preferable to giving accurate job descriptions. Nor does the Government separate out this recommendation from the next one, which is presumably why its argument for rejecting this recommendation makes no sense:

> The Government does not therefore accept the case for separate Chief Engineering Advisers at […] departmental levels. The Committee's proposals would involve additional management layers and complication which would likely be counter-productive and confusing.[21]

Figure 2. Our engineering report recommendations for the organisation of science and engineering advice.



20 IUSS Committee, *Engineering: turning ideas into reality*, pp 92–94

21 IUSS Committee, Fifth Special Report of Session 2008–09, *Engineering: turning ideas into reality: Government Response to the Committee's Fourth Report*, HC 759, p 22

28. To be clear, our recommendation was that "Some departments should have Departmental Chief Engineering Advisers (DCEAs), some Departmental Chief Scientific Advisers (DCSAs), and some should have both".[22] It is hard to imagine how changing the title of staff to more accurately reflect the work they do would "involve additional management layers and complication" or be in any way "counterproductive" or "confusing". If the Government intended to dismiss only the part of the recommendation that some departments should have both a DCEA and a DCSA, it should have been clear that that was what it was doing. It should have also provided examples, if they exist, to counter the comments we received from Professor Christopher Snowden, Vice-Chancellor and Chief Executive of the University of Surrey who was representing the Royal Academy of Engineering and the engineering institutions, who told us that in business, chief engineers and chief scientists can work very well together.[23]

29. **We regret that the Government failed to answer the core reasons for having Departmental Chief Engineering Advisers. We urge the Government to give fuller consideration to our recommendation that "Some departments should have Departmental Chief Engineering Advisers (DCEAs), some Departmental Chief Scientific Advisers (DCSAs), and some should have both."**

GO-Science in the heart of Government

30. We recommended a small change to the machinery of Government. We observed that the Government Chief Scientific Adviser has three main roles:

a) he advises the Prime Minister on science and engineering matters;

b) he oversees science and engineering advice across Government; and

c) he is responsible for identifying emerging issues in science and engineering policy (foresight).

31. He fulfils these takes with the support of the Government Office for Science, which was based in DIUS and now has been moved to BIS. We suggested that these core tasks could be performed more effectively from the centre of Central Government: the Cabinet Office.

32. Our position is, we believe, logical. We note that there is another unit in Government which has almost identical roles to GO-Science; these are listed on its website as:

a) to provide strategy and policy advice to the Prime Minister;

b) to support government departments in developing effective strategies and policies; and

c) to identify and effectively disseminate emerging issues and policy challenges.[24]

33. It is the Cabinet Office's Strategy Unit.

22 IUSS Committee, *Engineering: turning ideas into reality*, para 307

23 IUSS Committee, *Engineering: turning ideas into reality*, para 303

24 www.cabinetoffice.gov.uk/strategy.aspx

34. When we asked Professor Beddington where GO-Science would be best situated, DIUS (as it was then, now BIS) or the Cabinet Office he told us:

> I think there are merits on both sides, but I think the key one is the link with both the Science Minister and the Secretary of State for DIUS, but also with the Director General for Research Councils, Adrian Smith, and that whole team, which are responsible for so much of science funding. The fact that I can walk up a floor and find Adrian Smith and his team and talk on a day-to-day basis makes a tremendous difference, whereas if I was down in Whitehall, that would be rather more difficult to do.[25]

35. This is an interesting response. It supports our basic premise on two counts. First, location matters because it puts individuals in regular contact. In his current situation he is in contact with the people responsible for science. Second, location matters because it can put distance between individuals and groups, which makes it 'rather more difficult' for them to 'talk on a day-to-day basis'. While it is important that the GCSA has close working relationships with the Secretary of State and Minister responsible for science and the DG for Science, his relationship with the Prime Minister is even more important. If location can make a "tremendous difference", as Professor Beddington contends, it would be better for him to be based in the Cabinet Office. We note that the GCSA has seen the Prime Minister four times in the past year.[26] This level of access is woefully inadequate and supports our case.

36. We were told by Lord Drayson that "geography is not everything".[27] However, we note that the Government's response to our engineering report was prepared by "the Department for Business, Innovation and Skills (BIS) with a major contribution from the Department of Energy and Climate Change (DECC)".[28] No mention of GO-Science. We also note that GO-Science did not produce its own annual report, but was covered in three pages of DIUS's annual report.[29] The location of GO-Science has resulted in an apparent merger with the then DIUS, now BIS.

37. **The Government had an opportunity at the last reshuffle to move GO-Science as per our recommendation in the engineering report. That it did not, was a missed opportunity. As the Government Chief Scientific Adviser explained, location matters because it affords daily face-to-face interaction between colleagues in the same building; and as he further pointed out, he has only seen the Prime Minster four times in the past year. We therefore appeal directly to the Prime Minster, who is responsible for GO-Science, to bring it into the Cabinet Office alongside the Strategy Unit.**

25 Q 355

26 Q 343

27 Q 354

28 IUSS Committee, *Engineering: turning ideas into reality: Government Response to the Committee's Fourth Report*

29 Department for Innovation, Universities and Skills, *Departmental Report 2009*, July 2009, pp 22–24

Policy examples

38. During the course of this inquiry, several examples were raised that highlighted different aspects of the importance of a competent and active scientific advisory service. (We dealt with the importance of engineering advice in our engineering report.) Here we briefly consider two such examples: the licensing of homeopathy by the MHRA; and literacy and numeracy interventions.

The licensing of homeopathy by the MHRA

39. The Medicines and Healthcare products Regulatory Agency (MHRA) is the government agency responsible for ensuring that medicines and medical devices are both safe and effective. In 2006, it started licensing alternative medicines under the Traditional Herbal Medicines Registration Scheme. The first such product registration was for an arnica gel, which has been traditionally used for the symptomatic relief of muscular aches and pains, stiffness, sprains, bruises and swelling.

40. In May 2009, the MHRA granted its first licence to a homeopathic medicine, for arnica 30c pilules. The product has been licensed under the National Rules Scheme, which means that it can make medicinal claims. The label will read: "A homeopathic medicinal product used within the homeopathic tradition for symptomatic relief of sprains, muscular aches and bruising or swelling after contusions".[30]

41. We asked Professor Beddington what he thought about the MHRA licensing products for which the best scientific evidence does not show an effect beyond placebo.[31] He was unable to comment on the specifics since he was not aware of this particular instance, but he did comment of the purchasing of homeopathy by the NHS:

> I did write to the Chief Medical Officer about this indicating […] that I had real concerns that homeopathy which had no scientific justification of mechanisms was being used. [… And] in terms of a cost to the National Health Service […] it is £390,000 in £8.4 billion or something of that sort. Subsequent to that I have taken this issue up with the Director General who is dealing with these matters, Professor Harper, to say can we explore this further, and we have had one meeting on this issue. If we had not then had swine flu arrive we would be continuing to follow this through.[32]

He also went on to say that he would "look at" both the purchasing of homeopathy by the NHS and the MHRA's decision to license homeopathic products.[33]

42. **We are reassured to hear that Professor Beddington will take steps to look at the MHRA's decision to licence homeopathic products as well as the wider issue of the**

30 'Arnica pill the first homeopathic remedy to get MHRA licence', *Pulse*, 12 May 2009

31 Enrst E & Pittler MH 'Efficacy of homeopathic arnica: a systematic review of placebo-controlled clinical trials', *Arch Surg*, vol 133 (1998), pp 1187–90

32 Q 389

33 Qq 389–390

purchasing of homeopathy by the NHS. We hope that he will be able to bring scientific evidence to the centre of this complex policy issue.

Literacy and numeracy interventions

43. Since 2005, the Government has supported a number of reading schemes. The Every Child a Reader (ECAR) pilot programme cost the Government £5 million (it was matched with charitable funding). The Every Child Counts (ECC) and Every Child a Writer (ECAW) national programmes cost £169 million over three years. Every Child a Talker (ECAT) cost an additional £40 million. (ECAR and ECC are controlled by the Every Child a Chance Trust; ECAW and ECAT are separate Government-run programmes.)[34]

44. In 2006, the then Chancellor, Gordon Brown, announced the nationwide rollout of ECAR, only a year into the three-year pilot. This is problematic from an 'evidence-based policy' point of view, but even if the Government had waited for the pilot to finish it would have had little evidence to go on: the pilot only demonstrated that the ECAR interventions were better than doing nothing, because they did not include control groups conducting other kinds of reading interventions. As for the other projects, a recent Policy Exchange report commented:

> At least with ECAR, there was a developed programme ready to use, even if the evidence base was shakier than acknowledged. The Government's commitment to Every Child Counts (ECC) and Every Child a Writer is based on nothing at all […] It is little more than common sense that children who received extra support for at least three days a week for several weeks in a row from a trained numeracy specialist would show significant gains in their performance [… but] this does not demonstrate the superiority of ECC over any other programme nor does it tell us anything about the costs or benefits of the programme.[35]

45. We raised this issue with Professor Beddington, who was not familiar with it. He therefore answered in general terms:

> I think that where science appears to be done badly, it is important that I should draw the attention in this case to the chief scientific adviser in the appropriate department and say, 'This looks to be rather poor'. [… But] I do not have a mechanism for looking at all science developed in government, I see that as devolving to the responsibilities of the individual chief scientific advisers.[36]

46. Therefore, in our example, it was the responsibility of the Department for Children, Schools and Families DCSA, Carole Willis, to notice that these pilots were not designed to determine the most cost effective or best way to improve literacy and numeracy. We have previously lamented the lack of scientifically trained civil servants in DCSF,[37] and this example provides justification for our concern. Either the DCSA did not recognise that

34 *Rising Marks, Falling Standards*, Policy Exchange, 2009, pp 37–38

35 *Rising Marks, Falling Standards*, Policy Exchange, 2009, pp 40–41

36 Qq 383–384

37 IUSS Committee, *Engineering: turning ideas into reality*, para 278

these pilots were inadequate or she was not aware of their existence; neither situation is acceptable.

47. **We call on the DCSF Chief Scientific Adviser to explain what advice she provided, if any, on the Every Child literacy and numeracy programmes and report it to the House.**

48. **We agree with Professor Beddington that Departmental Chief Scientific Advisers should have devolved responsibility for the quality of scientific advice in each department. On that basis, it is crucial that each DCSA has a tight grip on their departmental remits and have sufficient support so that problem policy areas can be identified and dealt with. The DCSA must challenge policy-makers to demonstrate clear evidence to support policy or to acknowledge that no such evidence exists. The GCSA needs to be advised by DCSAs of those instances where DCSAs have been overruled on such matters; and we further recommend that he publishes these in his annual report.**

Science Advisory Councils/Committees

49. Scientific Advisory Councils/Committees (SACs; the terms 'council' and 'committee' are used interchangeably) assist Government by collating, assessing and making judgements about scientific information and providing expert advice to policy makers. The Council for Science and Technology's report on *How academia and government can work together* (October 2008) describes Science Advisory Councils as follows:

> SA Councils are independent bodies that support senior departmental policy-makers by providing a broad range of expertise within one body. They are recognised as wholly independent, which inspires public confidence, accountability and increases the efficiency of the use of academic input to a department as they can potentially respond rapidly to urgent enquiries as well as identifying issues themselves that need investigation.[38]

50. There are currently 75 SACs, ranging from the Administration of Radioactive Substances Advisory Committee to the Zoos Forum.[39] A number of departments have established Departmental Science Advisory Councils (DSACs), which reflect the needs of their parent departments and can comprise expert scientists (including social scientists), economists and technologists.

51. We took oral evidence from three advisory groups:

- a SAC, the Advisory Council on the Misuse of Drugs (ACMD), which is one of the specialist Home Office advisory committees—although it directly advises ministers, it also advises the Home Office Science Advisory Committee;
- a DSAC, Defra's Science Advisory Council, which is the main advisory council to that department. It advises Defra's Chief Scientific Adviser, Professor Bob Watson, and has a number of subject specific advisory committees feeding into it; and

38 Council for Science and Technology, *How academia and government can work together*, October 2008, p 16

39 www.berr.gov.uk/dius/science/science-in-govt/advice-policy-making/codeofpractice/page27719.html

- a non-ministerial government department, the Food Standards Agency, which feeds into Department of Health (DH) policy and is itself advised by a number of advisory councils.

Departmental Science Advisory Councils

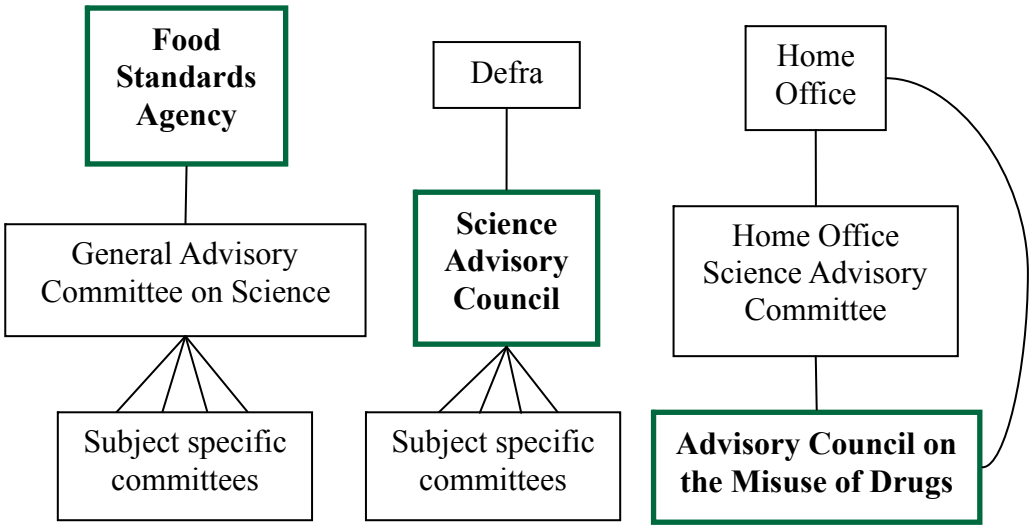
52. Judy Britton, Deputy Director of the Government Office for Science, outlined the role of DSACs in relation to policy scrutiny:

> On the scrutiny side of things John Beddington, before he was Government Chief Scientific Advisor, […] is championing the idea that there should be these kinds of councils throughout government departments—the Home Office has one which learned societies sit on as well as the chairs of their scientific advisory committees. The idea is that they take a view across the department at a strategic level and can see what is going on, critique it and challenge it. He thinks these are a very valuable form of more internal scrutiny than a select committee.[40]

53. GO-Science is working with other government departments to determine whether additional departmental Science Advisory Councils (SACs) might be usefully created.[41] Currently only the Ministry of Defence, Defra, the Home Office and the Food Standards Agency have departmental SACs. The Council for Science and Technology is in effect the Prime Minister's SAC.

54. We agree that departmental science advisory councils can provide a valuable form of internal scrutiny (a subject we return to in Chapter 5). **Strong consideration should be given to increasing the number of departments that have Science Advisory Councils with a departmental remit. The Department of Health, the Department of Energy and Climate Change and the Department for Transport are obvious 'top-of-the-list' candidates, with the latter two in particular needing high quality engineering advice.**

Figure 3. The advisory bodies from which we took evidence.



40 Q 132

41 Ev 69

ACMD and the Home Office

55. A policy issue arose in relation to Science Advisory Councils during the course of our inquiry. It concerned a disagreement between the Chairman of the Advisory Council on the Misuse of Drugs (ACMD)—which makes recommendations to Government on the control of dangerous or otherwise harmful drugs, including classification and scheduling[42]—and the Home Secretary.

56. The ACMD is one of the better known Advisory Councils, because its advice to Government appears in the media from time to time, particularly when the Government is reconsidering reclassifying drugs. It has also received Parliamentary scrutiny in the past. The former Science and Technology Committee conducted a case study inquiry into drug classification as part of its overarching inquiry into scientific advice, risk and evidence in policy making.

57. In early 2009, a paper written some months previously by Professor David Nutt, before he was appointed Chairman of the ACMD, was published in the *Journal of Psychopharmacology*. The controversial lines were:

> Drug harm can be equal to harms in other parts of life. There is not much difference between horse-riding and ecstasy. […] This attitude raises the critical question of why society tolerates—indeed encourages—certain forms of potentially harmful behaviour but not others such as drug use.[43,]

58. On the weekend prior to the publiction of the ACMD ecstasy report, Professor Nutt was attacked in the media. A spokesman for ACMD quickly commented:

> The recent article by Professor David Nutt published in the Journal of Psychopharmacology was done in respect of his academic work and not as chair of the ACMD. Professor Nutt's academic work does not prejudice that which he conducts as chair of the ACMD.[44]

59. The then Home Secretary, Jacqui Smith, also criticised Professor Nutt. She told the House:

> I spoke to Professor Nutt about his comments this morning [9 February 2009]. I told him that I was surprised and profoundly disappointed by the article. I am sure that most people would simply not accept the link that he makes up in his article between horse riding and illegal drug-taking. That makes light of a serious problem, trivialises the dangers of drugs, shows insensitivity to the families of victims of ecstasy, and sends the wrong message to young people about the dangers of drugs. I made it clear to Professor Nutt that I felt that his comments went beyond the scientific advice that

42 http://drugs.homeoffice.gov.uk/drugs-laws/acmd

43 DJ Nutt, 'Equasy—An overlooked addiction with implications for the current debate on drug harms' *Journal of Psychopharmacology*, vol 23 (2009), pp 3–5

44 http://news.bbc.co.uk/1/hi/uk/7876425.stm

> I expect from him as chair of the ACMD. He apologised to me for his comments, and I have asked him to apologise to the families of the victims of ecstasy, too.[45]

60. We asked Professor Sir Michael Rawlins, former Chairman of the ACMD, what he thought about Professor Nutt's comments and whether he should have been criticised for them. He defended Professor Nutt robustly:

> Risk comparisons are widely made for all sorts of purposes. The ACMD does risk comparisons in shoe-horning substances into A, B and C. The public is often given risk comparisons: the numbers of people dying from tobacco consumption are equivalent to a jet airliner crashing once a week—this sort of thing—and the sort of thing that Professor Nutt was saying in that article is just one example of a widely-used technique of revealed preference […] If David Nutt had written an article saying he thought that heroin and morphine should be legalised, then his position as Chairman of the ACMD would probably be impossible, whatever his personal views might have been. On this particular occasion I do not think it was appropriate for him to be criticised. What he did and the sort of comparisons he made were widely used in social sciences.[46]

61. We identified support for Professor Nutt from other witnesses. Professor Lord Krebs told us that he thought it "quite wrong that the Government should criticise independent scientific advisors for publishing scientific work in the peer review literature".[47] And Professor Beddington wrote to the Home Secretary:

> indicating that I had real concerns that this affair had the potential of being used both widely and in the media more widely as a discouragement for people wishing to become members of science advisory committees. She responded to me in indicating that she felt that she supported the idea of independent advisory committees, and she felt this had been evidenced by her support of a number of individual recommendations of Professor Nutt's ACMD committee. I still feel that we need to be exploring this, because I think that where you have a publication which is in an independent peer reviewed journal, I think it is unfortunate for government to actually criticise that in Parliament. So I would concur with, for example, the comments that Lord Krebs gave you when you asked him about the same subject.[48]

62. The correspondence between Professor Beddington and Jacqui Smith is provided in the written evidence.[49]

63. We asked Professor Beddington whether he had provided public or private support to Professor Nutt. He told us:

> I did not write to or contact Professor Nutt, and I think perhaps in retrospect I perhaps should have done. I did not. So to that extent, I am more than happy to

45 HC Deb, 9 Feb 2009, Cols 1093–94

46 Qq 313–314

47 Q 71

48 Q 331

49 Ev 293–295

> share my concerns with this committee. I think that it is important that people are allowed to publish in peer reviewed journals without being criticised.[50]

64. We agree with Lord Krebs and Professor Beddington: **SAC members should not be criticised for publishing scientific papers or making statements as professionals, independent of their role as Government advisers.**

65. The independence of scientific advisers is crucial. The most important aspect of any scientific or engineering advice is that it is politically and ideologically neutral; it must take into consideration all the relevant evidence and be presented fairly and impartially. Independence from Government is essential for advisers so that they are free to present the evidence without fear of prejudice or attack from those they advise. That is why independence is important.

66. But there is an additional consideration. After the Home Secretary criticised the ACMD Chairman, Professor Beddington noted that her actions against Professor Nutt might discourage people from serving on Scientific Advisory Committees. We received evidence that suggests his concern was not without merit. Tracey Brown, Managing Director of Sense About Science, told us:

> There is a serious issue in terms of the knock-on effect of this as well. […] We [Sense About Science] have over 3,000 scientists working with us […] and we are already picking up a really negative reaction to that. There was already frustration about the number of people who feel that their time is misused.[51]

67. **It is important to safeguard the independence of the advisory system. In situations where the independence of a SAC chairman or member is or might be threatened for political reasons, support should be offered by the DCSA and/or the GCSA.**

68. **We welcome the steps taken by the GCSA to deal with one incident that occurred between the Chairman of the ACMD and the Home Secretary. Further steps that should have been taken are: (1) the GSCA should have written or spoken to the Chairman of the ACMD, letting him know that support was being provided; (2) the correspondence between the GCSA and the Home Secretary should have been published immediately so that other SAC Chairmen and the public (including the science community) could see that support was being offered; and (3) the GCSA should have provided public support for the Chairman of the ACMD and for his right to publish.**

69. **The Government should seek specialist advice prior to making policy decisions, early in the policy-making process. Clearly the Government should be free to reject the advice of its SACs, since scientific evidence is only one factor—albeit a very important one—in policy decisions: Advisers advise, Ministers decide. However, when the Government does take a different policy decision to that recommended by a SAC, it should make clear its reasons for doing so.**

50 Q 338

51 Q 216

The Code of Practice for Scientific Advisory Committees

70. All SACs are expected—although not required—to adhere to the Code of Practice for Scientific Advisory Committees. The Code of Practice "promotes good practice in the operation of Scientific Advisory Committees (SACs) and their relationship with Government".[52] The code was last updated at the end of 2007 in response to recommendations in the Science and Technology Committee's *Scientific Advice, Risk and Evidence Based Policy Making* report.[53] The 2007 updates, for which explanations are given in the *Consultation on the update to the Code of Practice for Scientific Advisory Committees*[54] document, include changes such as dropping the term 'lay' and encouraging Chairmen and secretariats to maintain clear records to assist scrutiny.

71. We are supportive of the Code of Practice for Scientific Advisory Committees and below make a number of suggestions that we hope might improve both the Code of Practice and the operation of SACs across Government. We appreciate that the Government has just updated the Code, and suggest that our recommendations, which amount to relatively minor alterations, should be considered at the same time as the Government Chief Scientific Adviser considers his Guidelines on Scientific Analysis in Policy Making.[55]

Independence

72. Throughout the Code of Practice, the concept of 'independence' is key. We also received many submissions that put an emphasis on the independence of science and the importance of independent advice and advisers.[56] However, 'independent' is a slippery term. Most of the professional and learned societies offer 'independent' advice, but what does that mean? Independent from whom or what? What is clear is that 'independent', in this context, should not be confused with 'objective': professional and learned societies serve the interests of their membership or fellowship. (That of course does not detract from the fact that scientific or engineering knowledge has a special kind of independence that other kinds of knowledge do not possess.)

73. **We conclude that there would be value in being clear in the Code of Practice as to what 'independence' means. Members of Science Advisory Committees are likely to represent the views of their constituencies; what is important is that they have no conflict of interest with Government. Therefore, in the case of Science Advisory Committees, 'independence' should mean 'independence from Government'.**

52 Government Office for Science, *Consultation on the update to the Code of Practice for Scientific Advisory Committees: Summary of Responses and Government Response to consultation*, December 2007, p 2

53 House of Commons Science and Technology Committee, *Scientific Advice, Risk and Evidence Based Policy Making*, HC 900-I, para 70

54 Government Office for Science, December 2007

55 IUSS Committee, *Engineering: turning ideas into reality: Government Response to the Committee's Fourth Report*, p 16

56 For example, Ev 152 (Royal Society); Ev 225 (Food Standards Agency)

Membership

74. Different SACs require different membership structures in order to maximise their effectiveness. This is well recognised and is manifested in the wide range of SAC memberships across Government. For example, the ACMD has 35 members and Defra's DSAC has 13 members. The ACMD is made up of people from academia, the police, social work, psychiatrists and so on. Defra's DSAC is mostly made up of academics.

75. When we spoke to Dame Deidre Hutton, Chair of the Food Standards Agency, she explained that the FSA has lay people on the board, on advisory councils and throughout the agency. She regarded them as "extraordinarily important" because they could highlight "what the real issues are for the public in terms of their acceptance of risk" and they could also "frame the questions that the scientists look at right at the beginning of the process".[57]

76. Professor Gaskell, Chairman of Defra's DSAC, framed the issue of lay membership in a different light. He was concerned that the term 'lay' "can be used pejoratively", but felt that instead it should be used to suggest "another skill set which is of value to the committee".[58] Although he argued that "they do have a role to play; they do bring a different perspective" and that "lay members often bring […] a capacity to ask the awkward and inconvenient question", he clearly felt uneasy with the term 'lay', preferring to focus on individual expertise:

> In our committee, […] in many senses many of the people there are lay for 80/90% of the time because it is the main issue of the day which somebody else has got the FRS in and they have not […] We have a number of social scientists on our Science Advisory Council and, of course, they will bring a different perspective from the natural scientist. So I think the term 'lay' is encompassed by a range of inputs across the council, and we are very clear that we are expecting council members to contribute to the business of the Council even when it is not their specialty area and in that sense act as a lay member.[59]

77. The Government shares Professor Gaskell's view. In its summary of the consultation responses on the Code of Practice, it stated:

> The Government supports the revision of the Code to drop the term 'lay' in favour of SACs developing a competence-based approach to accessing the required skills for each SAC through person specifications […] SACs can thereby retain some flexibility in shaping their membership and that of the secretariat in consultation with their sponsoring department to meet changes in circumstance.[60]

78. **We agree that SACs should recruit members based on competencies. However, we are concerned that dropping the term 'lay' removes an expectation that specialist advisory councils should have non-specialist members. Additionally, we are not**

57 Q 275

58 Q 279

59 Q 279

60 Government Office for Science, *Consultation on the update to the Code of Practice for Scientific Advisory Committees: Summary of Responses and Government Response to consultation*, December 2007, p 6

convinced by the argument that scientists from one subject are necessarily a 'lay' person in another scientific area. Whether or not they are called 'lay members', non-specialists do have a lot to offer specialist committees. The presumption should be that SACs have lay/non-specialist members.

Transparency

79. The Code of Practice is very clear on the importance of transparency, stating that "Scientific advisory committees should operate from a presumption of openness".[61] This applies to both documentation—publication of agendas, minutes, programmes of work, final advice and annual reports—and the meetings themselves.

80. We found widespread support for transparency. Openness about the advice offered to Government is the best way to guard the independence of SACs, and to be seen to be independent, which is also important.[62] Open meetings were seen as both a way to communicate the work of the SACs and also to gain important feedback on their work.[63] SACs routinely publish their documentation online, and many hold open meetings. We noted Professor Rawlins suggestion that SAC meetings should be open "by default", adding that if meetings are closed there should be "very special reasons".[64]

81. Given the enthusiasm for open meetings, and the obvious benefits that are derived from improved transparency—particularly in terms of communication with the public and maintaining independence from Government—we are attracted to the idea of holding meetings in public as a matter of course. New media, such as webcasting, could also be used to extend further the reach of the advisory committees.[65]

82. **We support the Code of Practice's emphasis on the importance of publishing documents relating to the work of science advisory committees. We would prefer a slightly different emphasis on open meetings. Rather than recommending that SACs "should aim to hold open meetings on a regular basis", we suggest that SACs "should aim to hold the majority of their meetings in public, making use of new media wherever possible".**

83. One area in which transparency is important is the process of SACs presenting their advice to Ministers. A spectrum of options can be imagined where, at one end, SAC advice is published to the media at the same time as it is presented to Ministers: complete transparency. At the other end, SAC advice might be given to Ministers in confidence, several weeks in advance of publication, so that lengthy consideration can be given to the evidence, its policy implications and a communication strategy, and changes made to the evidence if necessary: no transparency (or independence). Neither of these options are desirable, and current practice lies in between. Professor Rawlins told us:

61 Government Office for Science, *Code of Practice for Scientific Advisory Committees*, December 2007, p 14

62 Qq 307 [Dame Deirdre Hutton], 330 [Lord Drayson]

63 Qq 293, 295

64 Q 295

65 Q 293 [Dame Deirdre Hutton]

> The ACMD has part-closed meetings, because ministers have asked that the decisions should be made in closed meetings so that they are provided to ministers before they get into the public domain. That is an argument you can have with ministers, but that was their request.[66]

84. **We can see the logic and agree that it is important that SAC advice should be presented to Ministers in advance of publication, giving them sufficient time to consider a response. However, it is also clear that SAC advice should, when it is given to Ministers, be final advice, and not a launching pad for debate. On this basis, we recommend that the process of SACs providing evidence to Ministers should be as transparent as possible. SAC evidence that is presented to Ministers should subsequently be published in unaltered form, along with the date on which the evidence was presented to Ministers and the details of any requests for alterations or clarifications of the evidence.**

Communication with the media

85. Connected to this is a problem about the way in which SAC advice is communicated to the media. SACs typically use their home department's press office. We received evidence that indicates that this sometimes causes problems. Using the example of the ACMD and Home Office, the Science Media Centre told us that:

> In both the cannabis and ecstasy cases the Home Office decided that the media launch of the evidence and recommendations from the expert group would coincide with the official reaction to those recommendations by the Home Secretary. This immediately transformed the media story from one about scientific evidence likely to be covered by science reporters, into a political story about a row between advisors and ministers covered by home affairs and political reporters. Even if there had been no disagreement, merging these two distinct events had the effect of doing the following:
>
> a) the scientists were denied the opportunity to brief specialist science reporters and focus on communicating the substantial scientific evidence which had informed their recommendations;
>
> b) the wider public and policy makers were also denied the opportunity to read the evidence as presented by the independent advisers, and so a key opportunity to inform this contentious debate with some scientific evidence was lost.
>
> Because the press officers for the ACMD work for the Home Office press office there was an immediate conflict of interest when key recommendations of that independent committee conflicted with government policy.[67]

86. When conflict between advice and policy occurs, there should be an opportunity for informed public debate about the reasons for disregarding or downgrading the importance of scientific advice. The Government may have very good reasons for disregarding

66 Q 295

67 Ev 290

scientific evidence, and it is entitled to use its press office to make its case. However, this should not impede the quality of press office service that SACs receive. Therefore, it is important that SACs have access to an independent press office. The obvious place for a small press office serving all the SACs is within the Government Office for Science. We note that GO-Science until recently shared a press office with DIUS, and presumably will now share with BIS. This raises similar concerns and we believe that it should have its own press capabilities in any case. **We recommend that a small press office be set up within the Government Office for Science, to serve the press needs of GO-Science and all the Science Advisory Committees across Government.**

Conclusion

87. In this chapter we have discussed a number of specific aspects of the science and engineering advisory system, from its structure to a detailed look at the Science Advisory Councils. To conclude this chapter we return to the broader issue of the place of science and engineering advice in Government. The latest changes to the machinery of Government have brought this issue to the fore and we welcome the opportunity to comment on them here.

88. **Shuffling the body responsible for providing cross-departmental science and engineering advice from one department to another and then back again within the space of two years is the opposite of 'putting science and engineering at the heart of Government policy'. It reduces science and engineering advice to, at best, a peripheral policy concern, and, at worst, a political bargaining chip. If science and engineering are to be successfully placed at the heart of policy, as the Government is keen to do, two things need to happen. First, the Government Office for Science (and Engineering, as we would have it) should have a stable home. We believe that this should be the Cabinet Office: the heart of Government. Second, there needs to be a Government Chief Engineer and a Government Chief Scientist, who are responsible for cross-departmental advice and coordination, freeing up the Government Chief Scientific (and Engineering) Adviser to advise the Prime Minister more closely and to act as a public figurehead for science and engineering in the United Kingdom.**

3 Debating strategic priorities

Background

89. On 26 January 2009, the Committee held its first Science Question Time with the Minister for Science and Innovation, Lord Drayson. During this session, the Minister suggested that the UK should identify, and concentrate support on, areas of research in which the UK could: (a) be world leading; and (b) have the potential to provide significant economic returns on any investment:

> I am calling for a serious debate about the areas of focus for this country in the future. […] That is a debate which I know will cause some interest, but I do think it is one which we need to have because it is the reality of the environment in which we operate as a country.[68]
>
> I think it would be actually good for the country to get a clear sense of what it is we think we can lead the world in over the next ten years.[69]

90. Asked by the Chairman whether he had "the bottle to lead this debate", Lord Drayson replied "Yes"[70] and added "It is a bit late now if I have not!"[71]

91. Following our session with the Science Minister, a number of speeches and public comments were made about this debate. (Hereafter, it is called the 'strategic priorities debate'.)

92. On 4 February 2009, Lord Drayson gave a speech at the Foundation for Science and Technology, in which he outlined further the context:

> This evening I want to stimulate a debate on our national science and innovation strategy, and whether it is adequately geared up to cope with the future. Since day one in this job, the global economic downturn has dominated. With its origins firmly linked to systemic problems in the global financial system, the current downturn has been more severe and more rapid than anything we've seen in recent memory.
>
> I can relate personally to the impact of recession on businesses and on people. As an undergraduate apprentice sponsored by British Leyland in 1979, I well remember Red Robbo's picket lines ranged in front of K Gate at Longbridge and saw a once-great business collapsing before my eyes.
>
> As a science entrepreneur, during the difficult period of the early '90s, I had to make colleagues redundant, and I had the bank manager threaten to put my company into receivership unless I came up with the money to pay off the business overdraft.

68 Oral evidence taken on 26 January 2009, HC (2008–09) 169-i, Q6

69 Oral evidence taken on 26 January 2009, HC (2008–09) 169-i, Q 16

70 Oral evidence taken on 26 January 2009, HC (2008–09) 169-i, Q 10

71 Oral evidence taken on 26 January 2009, HC (2008–09) 169-i, Q 11

> I got through those tough times, but those experiences taught me some lessons. Like the importance of having a broad portfolio of products and services; not relying too much on one area which can expose you to sudden risk; of knowing what your strengths are – and playing to them. And being aware of limited resources – and investing them wisely.
>
> I mention these lessons because I believe we should ask ourselves—in the midst of this global downturn—are we applying these lessons well enough to our science and innovation policy?
>
> […] What are the future growth areas? Where will future jobs and wealth come from? Where does the UK really have the potential to take world-class science and build world-class business from it? What is government's role in facilitating this transition?
>
> Peter Mandelson has argued for a new industrial activism, where government sets out a strategic framework as a bridge to the future, where business and investors have confidence in the long-term direction.
>
> What is the role of science policy here?
>
> […] Has the time come for the UK—as part of a clear economic strategy—to make choices about the balance of investment in science and innovation to favour those areas in which the UK has clear competitive advantage? [72]

93. These are serious questions, which instinctively cause unease because they raise questions about whether the Government is planning a return—albeit more strategically—to the policy of picking winners, the British Leyland mention acting as an uncomfortable reminder. We return to this question later.

94. It also raises questions about the Government's vision for UK science. The Science Minister, the then Secretary of State for Innovation, Universities and Skills, the Secretary of State for Business, Innovation and Skills and the Prime Minister have all made strong commitments to 'pure', curiosity-driven research.[73] As the Royal Academy of Engineering put it: "All political speeches to date on the subject have stressed that this vision is about reaping the benefits of research already funded and that the commitment to curiosity-driven research funding remains unaffected".[74]

95. Despite this, there have been concerns in the academic community that an increased focus on translation will amount to decreased focus, and possibly reduced funding, on basic science. These concerns have centred on: the changes to the Research Council funding application process so that each funding application—including basic research with no immediate or obvious application—must be accompanied by impact plans that should demonstrate the contribution that the research will make to society and the

72 www.dius.gov.uk/news_and_speeches/speeches/lord_drayson/fst

73 Lord Drayson: www.dius.gov.uk/news_and_speeches/speeches/lord_drayson/fst;
John Denham MP: www.dius.gov.uk/news_and_speeches/speeches/john_denham/science_funding;
Lord Mandelson: www.berr.gov.uk/aboutus/ministerialteam/Speeches/page51775.html; and
Gordon Brown MP: oral evidence taken before the Liaison Committee on 12 February 2009, HC (2008–09) 257-i, Q 46

74 Ev 275

economy; the forthcoming Research Excellence Framework, which will include an assessment of the economic and social impact of research;[75] and steps that have been taken to refocus research funding on priority areas supporting "key areas of economic potential".[76]

What is the debate about?

96. Putting these concerns to one side for a moment, we should first ask what this debate is about. Our initial question was whether Lord Drayson was calling for a debate about *whether* the UK should be more strategic in its approach to funding science, or a debate about *how* the UK should be more strategic. We asked several players and received a mixture of responses.

97. Lord Drayson, the initiator of the debate, told us that he intended this to be a debate about *whether* the UK needs to be more strategic:

> My point in raising the topic as a debate was to stimulate a serious debate about whether or not the science community felt that we should apply more focus to decision-making around research priorities […][77]

And after agreement to discuss *how*:

> and also to encourage them, should they come to that conclusion, as to make recommendations as to how that should be done.[78]

98. However, when he launched the debate at the January 2009 Science Question Time, he said that he believed that there would need to be "more concentrations" in the UK's research spend,[79] as if the debate would be about *how* to determine the strategic focus.

99. Professor Adrian Smith, Director General for Science and Research, argued that this is about *whether* there should be more focussed research funding.[80] Iain Gray, Chief Executive of the Technology Strategy Board, disagreed: "My belief is it is how we are going to do it. It is about focus, identifying areas that we are going to make a big difference in."[81]

100. John Denham, the then Secretary of State for Innovation, Universities and Skills, was not clear. On balance, his comments seem to suggest that the debate is about how to be more strategic with funding:

> We believe that we should have that discussion about how they organise research to ensure that we maintain fundamental research and get the maximum economic benefit from the substantial investment that we make in research. That is under way.

75 www.hefce.ac.uk/Research/ref

76 HM Treasury, *Budget 2009*, April 2009, p 130

77 Q 366

78 Q 366

79 Oral evidence taken on 26 January 2009, HC (2008–09) 169-i, Qq 8–9

80 Q 140

81 Oral evidence taken on 1 April 2009, HC (2008–09) 384-i, Q 22

> It is not an 'if'—we are doing it. It is a discussion that the research councils are having.[82]

101. Nick Dusic from the Campaign for Science and Engineering was, like us, confused: "We have had Lord Drayson's, John Denham's and the Prime Minister's speech, and each has a different focus on this issue".[83]

102. The second area of confusion was raised by both the Institute of Physics and the Medical Research Council (MRC). They pointed out that key to the debate was what Lord Drayson meant by 'competitive advantage': "Should we infer that advantage is used here in an industrial, financial, or intellectual sense?"[84] If he means scientifically competitive, the MRC argued, "the Research Councils already do this in supporting excellence through peer review".[85] If he meant economically competitive "any policy would need to recognise that the UK needs to grow new strengths as well as building on existing ones".[86]

103. The third and most significant misunderstanding was that the debate would probably result in a major shift of policy towards science funding. This was certainly our understanding: when he launched the debate at Science Question Time, Lord Drayson indicated that there would need to be concentration in science funding.[87] This apparently is not the case. When we later asked him if there would be a government policy announcement as a result of the debate, he succinctly replied: "No".[88]

104. We have since, however, heard that Lord Mandelson has indicated that a decision has been taken to push ahead with prioritising applied research. In a speech in which he talked about his "commitment to maintaining the support and standards of scientific research", he declared: "and I don't mean only applied research, *which will obviously receive greater emphasis*, but fundamental science as well" (emphasis added).[89]

105. **We are left wondering what this strategic priorities debate was about and whether it has led to a major shift in Government policy. We are in favour of a discussion about how best to focus research funds so that the UK gets maximum reward from its investment, but the lesson to be learned is that the Government should be clear in its own mind about the format and goals of a debate before launching it.** (This recommendation is expanded later in the chapter.)

Picking winners?

106. Some aspects of this debate seemed to us to share characteristics with the 'picking winners' policy of the 1970s. Lord Drayson did not launch this debate in isolation. It

82 HC Deb, 27 April 2009, col 603

83 Q 148

84 Ev 248

85 Ev 244

86 Ev 244

87 Oral evidence taken on 26 January 2009, HC (2008–09) 169-i, Qq 8–9

88 Q 372

89 www.timesonline.co.uk/tol/news/uk/science/article6471800.ece

followed an announcement by the Business Secretary, Lord Mandelson, that the government would support industry through the recession in what he described as "market-based industrial activism".[90]

107. This new industrial activism, the Prime Minister told the Liaison Committee, is not the old picking winners philosophy of, as he put it, "taking one company or a second company and saying that we were going to back this single company to the hilt".[91] Rather it is about backing the development of skills and research in successful *sectors* in the UK economy.[92] But this raises the same problem that bedevilled the policies of the 1970s when decisions were made about which companies to back. Now it seems the Government will have to make decisions about which sectors to back. The Chairman asked the Prime Minister how he intended to do this during a Liaison Committee session in February 2009. The Prime Minister replied that "they pick themselves".[93]

108. Do they? During our major inquiry into engineering, we conducted a case study inquiry into plastic electronics. We discovered during the course of that inquiry that the plastic electronics industry "is likely to grow substantially over the next few years" and that "the UK's research base puts it in a unique position to capitalise on this growth".[94] However, during the course of the inquiry we witnessed potentially successful UK start-ups folding or moving overseas. It was clear that the UK was missing out "on the opportunity to exploit the economic potential offered by the commercialisation of innovative technologies".[95] Industries do not 'pick themselves'. In the case of plastic electronics, the USA, Germany and Japan were picking the UK's start-ups and turning them into winners; the UK was losing out.

109. **Past experience of failing to accurately 'pick winners' has led to a risk-averse executive. The belief that 'sectors will pick themselves' is misplaced and when proactive interventions by Government are not forthcoming, potentially successful industries that germinate in the UK, blossom elsewhere. Choosing to support one sector over another will be difficult. The Government should develop clear and agreed methodologies for determining priorities and acceptability of risk.**

110. There is another side to this point: with a finite budget, if one is to pick winners and give them extra funding, money must be withdrawn from something else, the losers. We saw the detrimental impact that shifting priorities can cause when we looked at one Research Council, the Science and Technology Facilities Council, as part of our *Science Budget Allocations* inquiry.[96] The impact of increasing the focus of the whole research budget on, say, energy security or biotech, would be larger and could cause irreparable

90 The RSA Lecture, 'A new industrial activism', 17 December 2008 www.berr.gov.uk/aboutus/ministerialteam/Speeches/page49416.html

91 Oral evidence taken before the Liaison Committee on 12 February 2009, HC (2008–09) 257-i, Q 40

92 Oral evidence taken before the Liaison Committee on 12 February 2009, HC (2008–09) 257-i, Q 40

93 Oral evidence taken before the Liaison Committee on 12 February 2009, HC (2008–09) 257-i, Q 41

94 IUSS Committee, *Engineering: turning ideas into reality*, p 41

95 IUSS Committee, *Engineering: turning ideas into reality*, p 52

96 IUSS Committee, Fourth Report of Session 2007–2008, *Science Budget Allocations*, HC 215-I

damage to many research sectors. We have pushed the Science Minister on this point, but have been unable to elicit a clear answer. For example:

> **Chairman:** […] you would be arguing within the cabinet that in research terms, we should in fact be putting greater resources into these areas like medicine and life sciences, and in so doing at the expense of what? […]
>
> ***Lord Drayson:*** Firstly I would say that the very nature of science means that you need to have the underpinning science across the piece, so for example to do good life science research you still need to have good statisticians, you still need to have good physics.[97]

111. **If the Government is to develop clear and agreed methodologies for identifying areas of high priority, these must also be effective in identifying areas of low priority. Further, the Government should not prevaricate on this issue: if it decides to prioritise some areas of research it should come clean about which areas of research will see reduced investment.**

International partnerships

112. The UK's science and engineering industries are among the strongest in the world. The three 'Bs', BP, BA and BT are, for example, some of the largest multinationals in their respective sectors, and the UK's pharmaceutical sector continues to do well. Similarly, the UK's science and engineering research base is very strong and attracts the world's best researchers, both to work in British universities and also to engage in international collaboration. The UK has played a lead or key role in several high profile international research projects, such as the human genome project, the Large Hadron Collider and building the ITER fusion reactor.

113. We noted in our engineering report, however, that the UK was absent in some important nuclear engineering research projects. While this should not distract from the UK's considerable strength in this area, it was clear to us that a relatively small amount of funding would facilitate a large amount of collaborative international research activity, from which the UK would likely draw significant economic benefits in the decades to come. We suggested to the Government that it should commission the National Nuclear Laboratory to conduct a cost-benefit analysis on international R&D.[98] The Government rejected this in favour of a more hands-off approach, allowing the NNL to take the lead in assessing the UK's options should it choose to do so.[99]

114. **The Department for Business, Innovation and Skills should consider long-term investment returns when it considers strategic priorities in international partnerships.**

97 Oral evidence taken on 26 January 2009, HC (2008–09) 169-i, Q 4

98 IUSS Committee, *Engineering: turning ideas into reality*, pp 25–26

99 IUSS Committee, *Engineering: turning ideas into reality: Government Response to the Committee's Fourth Report*

Directed and non-directed research

115. Before moving to the final part of this chapter, it is important, having stated our support for having a debate about strategic science funding, to restate the importance of basic research. The late Lord Porter, the former President of the Royal Society, famously once said that there are two kinds of science: applied and not yet applied. We asked Professor Lord Krebs about the balance between 'applied and not yet applied' research. He gave us an illustrative example of the effectiveness of basic science, which is worth reproducing in full:

> Last night I happened to bump into one of our Nobel Prize winners, Tim Hunt, who won a Nobel Prize a few years ago for his discoveries relating to cancer research. I asked him the question that you are putting to us, should the Government focus on key areas of priority and he said absolutely not. If you want to foster the kind of innovative research that led to him winning a Nobel Prize you should allow great freedom for scientists to propose research and judge it on excellence. He made the point to me that the greater the originality of research the less predictable the outcomes are likely to be. [...] I pointed to a very nice study that was described by Sir William Paten a few years ago in his book Man and Mouse in which he looked at ten key advances in cardiovascular medicine and he traced back where those key advances came from and he identified about 600 papers in the literature that led to these key medical developments. Over 40% of them had nothing to do with cardiovascular medicine at all and many of them were not carried out in medical departments or medical faculties; they were carried out in departments of chemistry, engineering, physics, botany, agriculture, zoology, et cetera. I think the difficulty with prioritisation is the inherent unpredictability of where the key advances are going to come from. If I could just add one more point, it is not that I am totally against having key themes—indeed, when I was chief executive of NERC we did have certain key themes broadly defined and the research councils have that mechanism today—but I do think that the key themes and the priorities should be presented in a broad way so that the scientists can be innovative within those themes and not be too prescriptive. I agree with Lord Rees that we do not want to see a shift in the balance between strategically directed research and responsive mode.[100]

116. Professor Fisk added:

> I am reminded of Karl Popper's observation that if you were going to predict the wheel essentially you would have just invented it. It is very hard to talk about picking winners in science. I do contend—I do not know if this is a consensus with my colleagues—that it is a jolly sight easier to spot losers.[101]

117. **Curiosity-driven research is a key component of a successful knowledge-economy. We strongly endorse the view that increased focus in applied research and industrial follow-through should not be at the expense of blue-skies research, which is one of the UK's greatest strengths.**

100 Qq 40–41

101 Q 44

Consultation

118. The final part of this chapter explores consultation. The Government is committed to using consultation to make better policy:

> This Government is committed to effective consultation; consultation which is targeted at, and easily accessible to, those with a clear interest in the policy in question. Effective consultation brings to light valuable information which the Government can use to design effective solutions. Put simply, effective consultation allows the Government to make informed decisions on matters of policy, to improve the delivery of public services, and to improve the accountability of public bodies.[102]

119. There are two kinds of consultation that the Government uses: formal and informal. We have received submissions on both kinds and here we briefly comment on each. We consider both the formal Science and Society consultation that DIUS launched in July 2008, and the informal strategic priorities debate.

Formal consultation: Science and Society

120. The Science and Society consultation was launched by the then Science Minister, Ian Pearson MP. It was presented as a "consultation on developing a new strategy for the UK".[103] In particular, the Minister said:

> I believe we need a society that is excited by science; values its importance to our social and economic wellbeing; feels confident in its use; and supports a representative well-qualified scientific workforce. […] I believe we now need a more mature relationship between science, policy and society, with each group working to better understand the needs, concerns, aspirations and ways of working of the others.[104]

121. The consultation attracted 3,200 question responses from more than 400 individuals, organisations and umbrella groups from across business, education, media, policy, science and the third sector.[105] A summary of responses was collated; the key messages were:

a) the UK should aim to have a science-literate population that is critically engaged and a skilled, representative scientific workforce; this will best be achieved by:

   i. joining up science and society activities, with an enhanced role for the Government as co-ordinator and enabler of science and society activities;

   ii. recognising school and college science education as the underpinning of national STEM (science, technology, engineering and mathematics) skills;

   iii. increasing the connectivity between the science community, the media, education and industry; and

102 John Hutton (then Business Secretary): HM Government, *Code of Practice on Consultation*, July 2008

103 Department for Innovation, Universities and Skills, *A vision for Science and Society*, July 2008

104 Department for Innovation, Universities and Skills, *A vision for Science and Society*, July 2008

105 Department for Innovation, Universities and Skills, *Science and Society: Summary of Consultation Responses*, p 2

iv. improving the equality and diversity amongst those studying and working in science and engineering disciplines;

b) more use needs to be made of social science in public engagement and STEM issues.[106]

122. Running through this list, it is not clear how useful this consultation was. The Government was already committed to improving the STEM qualifications of the population as part of its drive towards a knowledge economy; school was already identified as a key vehicle to meet those aims and the Government has taken a number of steps to improve STEM teaching and participation; many initiatives that link the science community to the wider world already receive Government support; and equality and diversity are core values in just about every part of what the Government does. The notion that the Government should play an enhanced role as a co-ordinator and enabler of science and society activities is tantamount to the science and society community asking for more money and co-ordination, which was fairly predictable. And the charge that the Government could make better use of social science has been well made previously.[107]

123. We asked Tracey Brown, Managing Director of Sense About Science, what she thought about the consultation. She commented:

> It is such an enormous range of subjects that were covered that it did just re-pose the questions in the end and I think they found themselves with something perhaps rather overwhelming because it was not very focused. One of my frustrations is that there is very little being invited in the way of true evaluation of what had gone before, which I suspect might be because there is a lot of incentive to talk about the fact that money was well-spent, and therefore nobody wants to ask the really difficult questions about where it might not have been so well-spent. Surely, actually, that is where you are going to develop quite a useful set of insights into what should be developed in the future. It is only a summary that has been produced and they are now looking to evaluate that summary, but the hands-off almost no comment feel to it is quite strong.[108]

124. Sir Roland Jackson, Chief Executive of the British Science Association, added:

> I would say that what the consultation, as far as I have seen it so far, has shown—perhaps not surprisingly—is how diverse and complex what we call public engagement is. [… T]rying to capture it all under one heading is a bit too difficult.[109]

125. On 26 May 2009, the Government announced the formation of five Expert Groups that will engage the science community, media, public, business and policy makers "to help change cultural attitudes to science in the UK".[110] Lord Drayson explained that "a significant outcome from the consultation is that respondents want us—Government—to

106 Department for Innovation, Universities and Skills, *Science and Society: Summary of Consultation Responses*

107 For example, *'That full complement of riches': the contributions of the arts, humanities and social sciences to the nation's wealth*, British Academy, January 2004; and *Maximizing the social, policy and economic impacts of research in the humanities and social sciences*, PPG LSE Public Policy Group, a report to the British Academy, July 2008.

108 Q 237

109 Q 238

110 www.dius.gov.uk/news_and_speeches/press_releases/science_society_expert_groups

take a more active role".[111] Therefore, these groups have been set up to look at: how to demonstrate the relevance of science to everyday life; partnerships between the media and scientists; science and learning; science careers; and how science and engineering can be socially responsible and ethical.

126. **It is unlikely that the Science and Society consultation will contribute substantially to "a new strategy for the UK": most of what has been said was either predictable or already government policy. However, we will watch the work of the Expert Groups with interest.**

Informal consultation: strategic science funding

127. We have discussed the debate on strategic science funding in terms of content, and we have made clear our support for the notion of a debate on whether science funding should be more strategic. Now we consider it as an example of informal consultation.

128. The first problem that faced this consultation is that nobody really knew what was being discussed. As we highlighted above, the Government has not even managed to make it clear whether this was a debate about *whether* science funding should be more focussed or about *how* to focus science funding. We asked Lord Drayson if, in hindsight, following the confusion, it would have been better to conduct a more formal consultation, perhaps publishing a Green Paper on strategic science funding as a basis for discussion. Lord Drayson replied:

> I have thought about this, and in retrospect, no, I do not. I think that the way in which the debate was able to be initiated as quickly as it was by the method which I took, the way in which it was very effective, I must say, in stimulating response, so there was no shortage of response to the debate, in fact it had a useful by-product, I believe, in contributing to the raising of the overall profile of the importance of science as part of the debate about our response to the economic downturn.[112]

129. The points about starting the debate quickly and raising science into discussions about economic recovery are well made. But the point about the lack of clarity in the debate was not satisfactorily answered. We discovered that the clarity issue was not isolated to this debate. Sense About Science told us: "There seems to be a tendency in science and policy engagement to be coy about the existence of debates and misconceptions, making only euphemistic reference to them".[113] Tracey Brown later gave an example:

> For example […] the recent consultation that started two years ago on the Human Fertilisation and Embryology Act update made reference to things being controversial, for instance, and did not explain why they are controversial or actually on what basis the Government assumed them to be controversial.[114]

111 www.dius.gov.uk/news_and_speeches/press_releases/science_society_expert_groups

112 Q 369

113 Ev 224

114 Q 220

130. But it is not just clarity about the content of consultations that is the problem. Another issue is clarity about what is at stake in a consultation.

> One of the biggest problems is not knowing what is at stake. [… S]ometimes what is at stake only becomes clear at some later stage of implementation, and then the scientists get told off for the fact that they did not realise quickly enough that this was going to wipe out their use of a particular procedure, for example. We had this with the Tissue Bill, we had it with the Physical Agents Directive[115] and so forth.[116]

131. The problem of what is at stake is something that has plagued the informal consultation on strategic science funding. Much of the agitation in the science community has come about over concern that the Government is going to take money away from basic science to do more applied science. If the Government had made it clear from the outset whether this debate was about (a) if a more strategic approach to all science funding was required, or (b) how to be more strategic in terms of focussing just the *applied* research, the resulting responses may have been more constructive. Whether or not the Government feels that it has been clear on this matter, the extent of the confusion among respondents demonstrates that more could have been done to make it clear what was at stake. For example, the production of a single document to which the Government could point—or even a single speech, rather than the several public speeches that were made on the issue—would have been useful.

132. **We welcome the Government's commitment to consultation. It would be helpful if the Government was clearer about the reasons for each consultation and what was at stake. This would make the process more worthwhile for all concerned and would remove the feeling of 'box-ticking' that so often accompanies consultations.**

133. **In the case of the strategic-priorities debate, the benefits of a fast-moving process have been countered by a lack of coherence. Launching the debate with a Green Paper or something similar would have given a focus to the debate that was sorely lacking. We acknowledge that this would have elongated the timeframe for the debate, but since the intention was always for an on-going debate, this should not have been seen as a problem.**

Conclusion

134. In some senses this debate on strategic priorities has been a distraction. At the outset, our plan was to examine whether the Government places science and engineering at the heart of policy, and if not, how it should do so. This debate has narrowed our focus somewhat into a number of smaller, but important, questions. If we step back a moment from the issue of whether or not the UK needs to make choices about "the balance of investment in science and innovation to favour those areas in which the UK has clear competitive advantage",[117] there are a number of broader questions into which this fits. The most important may be: what role will science and engineering play in the future UK

115 see Science and Technology Committee, *Watching the Directives: Scientific Advice on the EU Physical Agents (Electromagnetic Fields) Directive*, HC 1030

116 Q 234

117 www.dius.gov.uk/news_and_speeches/speeches/lord_drayson/fst

economy? From it run a series of questions about science, engineering, education, academia, industry, international competition and co-operation, and—the subject of this chapter—strategic investment in R&D. It seems important that in asking the question about strategic science funding, the broader picture about the future role of science and engineering in the UK economy should be revisited.

135. AstraZenca told us:

> If the UK is to remain globally competitive it must create and enact a robust, long-term national science and engineering strategy that stretches from fundamental science through to applied and translational activities that will ensure economic impact and rapid exploitation.[118]

136. We could not agree more.

137. **Any debate on strategic science funding should be put in the wider context of the role of science and engineering in the economic and social wellbeing of the UK. The 2004 ten-year science and innovation framework was successful in focussing attention on the importance of science and innovation. We now suggest that the UK needs a 'national science and engineering strategy'. The Government should spend the last two-years of the ten-year framework (2012 and 2013) reviewing the science and innovation framework and consulting on a new strategy that will set out the direction of travel for science and engineering within UK plc from 2014 until 2024.**

118 Ev 93

4 The Haldane Principle

History of the Haldane Principle

138. The Haldane Principle is popularly used to describe the notion that "decisions about what to spend research funds on should be made by researchers rather than politicians".[119] It is supposedly derived from Lord Haldane's 1918 report on the machinery of Government (hereafter called the Haldane Report), which was written against the backdrop of the First World War. In relation to research funding, which had for several years being focused very strongly on the war effort, the key recommendation was to separate out departmental research from 'intelligence and research for general use'. The general research, it was proposed, should be carried out by 'Advisory Councils' (today's Research Councils), which would be overseen by a "Minister specifically appointed on the ground of his suitability to preside over a separate Department of Intelligence and Research, which would no longer act under a Committee of the Privy Council, and would take its place among the most important Departments of Government".[120]

139. Lord Haldane's recommendations were largely based on the practice of a Committee that impressed him: the Committee of the Privy Council for Scientific and Industrial Research.[121] Some of them sound familiar to us today; for example, that research proposals were presented to an Advisory Council, "consisting of a small number of eminent men of science".[122] However, some do not fit too neatly with today's interpretation; for example, that "all proposals for expenditure are referred for sanction" to the Minister.[123]

140. Although Lord Haldane was clearly supportive of a light touch approach from a Minister who was free of normal departmental duties,[124] nowhere in the report does he explicitly lay out a principle akin to the one bearing his name today. As Professor David Edgerton, from the Imperial College Centre for the History of Science, Technology and Medicine, put it: "There is no Haldane Principle and never has been".[125]

141. According to Professor Edgerton, what we now consider to be the Haldane Principle actually derives from the early 1960s when the then Rt Hon Quintin Hogg MP (later Lord Hailsham), who was concerned about the Labour Opposition's plans to increase the central control of research through the then Department of Scientific and Industrial Research, argued:

> Ever since 1915 it has been considered axiomatic that responsibility for industrial research and development is better exercised in conjunction with research in the

119 http://en.wikipedia.org/wiki/Haldane_principle

120 Ministry of Reconstruction, *Report of Machinery of Government Committee*, December 1918, Cd 9230, p 35

121 Ministry of Reconstruction, *Report of Machinery of Government Committee*, December 1918, Cd 9230, p 34

122 Ministry of Reconstruction, *Report of Machinery of Government Committee*, December 1918, Cd 9230, p 30

123 Ministry of Reconstruction, *Report of Machinery of Government Committee*, December 1918, Cd 9230, p 30

124 That is "immune from any suspicion of being biased by administrative considerations against the application of the results of research", Ministry of Reconstruction, *Report of Machinery of Government Committee*, December 1918, Cd 9230, p 34

125 Q 168

> medical, agricultural and other fields on what I have called the Haldane principle through an independent council of industrialists, scientists and other eminent persons and not directly by a Government Department itself.[126]

142. In 1972, Lord Rothschild provided an alternative to the Haldane Principle, the customer-contractor principle. In his report *A Framework for Government Research and Development*, he stated "The concepts of scientific independence used in the Haldane Report are not relevant to contemporary discussion of government research".[127] Rothschild's principle made the Government Department or Government Chief Scientist the 'customer' who commissioned 'contractors', the Research Councils and Universities, to do research. This was a move away from investigator-led research on the grounds that:

> However distinguished, intelligent and practical scientists may be, they cannot decide what the needs of the nation are, and their priorities, as those responsible for ensuring those needs are met.[128]

143. The customer-contractor principle brought with it a "greater scrutiny of the activities of scientists, a need for scientists to justify more clearly their demands upon public resources, and a generally tougher financial environment".[129]

144. Government involvement in science research priorities continued to grow throughout the 1970s and 1980s. In response to the House of Lords Science and Technology Select Committee's report on *Civil R&D*,[130] the Government:

- placed strategic priorities for research under the consideration of Ministers and the PM during the public expenditure round;
- set up the Science and Technology Assessment Office within the Cabinet Office and established "clear objectives for expenditure and developed systematic criteria for assessing and managing research";[131] and
- asked research bodies to consider the national benefits of their work, including the economic impact and commercial exploitation of their work.

145. In 1992, the science portfolio was moved to a Cabinet Minister, the Chancellor of the Duchy of Lancaster, and the Office of Science and Technology (OST) was set up as a non-Ministerial department, headed by the Government Chief Scientific Adviser. In addition to having responsibility for the UK's science budget, the OST was charged with developing the Government's science policy nationally and internationally.

146. In 1993, the OST White Paper *Realising Our Potential* declared that:

126 HC Deb, 9 December 1964, vol 703 cols 1553–1686

127 Cabinet Office, *A framework for Government Research and Development*, November 1971, para 54

128 Cabinet Office, *A framework for Government Research and Development*, November 1971, para 8

129 Memorandum to the BSE Inquiry by the Office of Science and Technology, para 6 www.bseinquiry.gov.uk/files/db/do01/tab01.pdf

130 House of Lords Science and Technology Committee, 3rd Report of Session 1988–89, *Civil R&D*, HL 24

131 Memorandum to the BSE Inquiry by the Office of Science and Technology, para 15 www.bseinquiry.gov.uk/files/db/do01/tab01.pdf

> […] day to day decisions for Research Councils on the scientific merits of different strategies and projects should be taken by the Research Councils without Government involvement. There is, however, a preceding level of broad priority setting between general classes of activity where a range of criteria must be brought to bear.[132]

147. This was a modern rendition of the Haldane Principle in all but name.

The Haldane Principle today

148. The then Secretary of State for Innovation, Universities and Skills put his mark on the Haldane Principle in April 2008:

> For many years, the British government has been guided by the Haldane principle—that detailed decisions on how research money is spent are for the science community to make through the research councils.
>
> Our basis for funding research is also enshrined in the Science and Technology Act of 1965, which gives the Secretary of State power to direct the research councils—and, in practice, respects the spirit of the Haldane principle.
>
> In practice, of course, Haldane has been interpreted to a greater or lesser extent over the years, not least when Ted Heath transferred a quarter of research council funding to government departments—a move undone by Margaret Thatcher.
>
> But in the 21st century, I think three fundamental elements remain entirely valid.
>
> — That researchers are best placed to determine detailed priorities.
>
> — That the government's role is to set the over-arching strategy; and
>
> — That the research councils are 'guardians of the independence of science'.[133]

149. We will briefly discuss each of these threads.

Researchers are best placed to determine detailed priorities

150. We received many submissions in support of this concept. Professor Lord Krebs reminded us that key advances are often heavily dependent on basic science that has nothing to do with the innovation in question.[134] He used the example of cardiovascular medicine, but one could similarly use MRI scanning:

> [T]he use of Magnetic Resonance Imaging in diagnostics was a product of decades of fundamental physics and chemistry research into the properties of atomic nuclei.[135]

132 Department of Trade and Industry, *Realising Our Potential: A Strategy for Science, Engineering and Technology*, May 1993, Cm 2250

133 Speech given at Royal Academy of Engineering on 29 April 2008: www.dius.gov.uk/news_and_speeches/speeches/john_denham/science_funding

134 Qq 40–41

135 Ev 258

151. Or penicillin,[136] or Teflon,[137] or superconductivity,[138] and so on.[139] As the British Academy put it: "Applied research relies on the foundations that have been developed by basic research."[140] The University of Oxford similarly commented:

> The fundamental character of research is evolutionary. That is, ideas are generated, explored and categorised. Some turn out to be fruitful but many don't. This means that a sufficiently broad research base is needed both to generate the ideas and to recognise and exploit them. In most cases these two functions are not coterminal and do not arise from the same persons or groups. Therefore there is an inherent danger in 'focusing' that risks the functioning of the enterprise as a whole.[141]

Government's role is to set the over-arching strategy

152. The issue of whether the Government should set the over-arching strategy is similarly simple to support. The Government provides the money; it seems only reasonable that is should be able to set broad themes for areas of research. Professor Lord Krebs, who is strongly opposed to a prescriptive role for Government in research decisions, nonetheless commented:

> [I]t is not that I am totally against having key themes—indeed, when I was chief executive of NERC we did have certain key themes broadly defined and the research councils have that mechanism today—but I do think that the key themes and the priorities should be presented in a broad way so that the scientists can be innovative within those themes and not be too prescriptive.[142]

153. Rather, the difficulty is defining the relationship between an 'over-arching strategy' and 'detailed decisions'. If one views the research that is funded by the Research Councils as static there is no obvious conflict: the Government suggests topics that it considers important and the Research Councils fund research in those areas through open competition. However, matters are complicated when the funding regime changes: the Government changes the priority of a strategic area of research and the Research Councils stop funding research in one area and start funding it in another. In this situation it is clear how the over-arching strategy at a given point in time can have a discrete and predictable impact on detailed funding decisions.

154. The most recent example of this took place in the 2009 Budget, which provided that the Research Councils were to make £224 million of savings[143] "by reducing administration

136 Ligon B, 'Penicillin: its discovery and early development', *Seminars in Pediatric Infectious Diseases*, vol 15 (2004), pp 52–57

137 Anne Cooper Funderburg, 'Making Teflon stick', *Invention & Technology* (American Heritage), Summer 2000

138 Kantorovich A & Ne'eman Y, 'Serendipity as a source of evolutionary progress in science', *Studies in the History and Philosophy of Science*, vol 20 (1989), pp 505–530

139 For a long list of serendipitous discoveries, see http://en.wikipedia.org/wiki/Serendipity

140 Ev 240

141 Ev 251

142 Q 41

143 £118 million of savings were agreed in CSR07. £106 million of savings were announced in the Budget.

costs" and—this is the key point—"refocusing spend on new research priorities".[144] Although the Government has said that the Research Councils will decide how the money will be spent, the rules about how the money can be spent have been set by Treasury. In this case, the Treasury has allowed "refocusing spend on new research priorities" to count as value for money savings.[145] In other words, when old grants run out in low-priority areas and they are replaced by grants in high-priority areas, that counts as a saving. This funding rule means that Research Councils must concentrate more of their funding into specific research areas, which are known in advance by Government.

155. **The 2009 Budget Research Council savings have had an impact on the way that Research Councils allocate their funds. While this cannot be regarded as dictating 'detailed decisions', it is not 'over-arching strategy' either; it is somewhere in between.**

156. We have another problem with this decision. It was announced that the Research Councils are the only Government bodies to have their value for money savings reinvested internally.[146] This is hardly surprising given that much of these 'savings' are in fact a cost neutral refocusing of the budget; the 'savings' have not freed up any cash that could be spent elsewhere. **These 'savings' are in reality a strategic influencing of research funding streams. Whether or not it is the right thing to do is open to debate. But, either way, the Government should communicate clearly what it is doing and not label them as something they are not.**

157. **To conclude, we are in favour of the idea that researchers are best placed to make detailed funding decisions on the one hand and, in principle, we support the Government to set the over-arching strategic direction on the other. However, it is necessary for the Government to spell out the relationship between these two notions for a broader funding principle to be of any use.**

Research Councils are 'guardians of the independence of science'

158. We were surprised to see this being said at all, let alone as part of the Haldane Principle. As Professor Edgerton put it:

> I do not think anyone has ever thought of the research councils as the defenders of the independence of science—that is a very odd definition indeed and I hope we have not actually got that. Learned societies, universities and individual academics are the custodians of the independence of science.[147]

159. **Research Councils are not, and never have been, the 'guardians of the independence of science'. That responsibility has historically lain, and should remain, with the learned societies, universities and individual academics.**

144 HM Treasury, *Budget 2009*, April 2009, p 130

145 HM Treasury, *Budget 2009*, April 2009, p 130

146 'State demands £106 million research refocus', *Times Higher Education*, 30 April 2009

147 Q 170

Science Budget Allocation letters

160. During our inquiry on the CSR07 Science Budget Allocations we encountered concern over the level of control that the Government exercised over the research budget.[148] To clarify the issue, we asked to see the letters that the Government sent to each of the Research Councils laying out the details of their allocations.

161. The fact that the letters are not published causes us concern on two counts. First, there is the principle of transparency. The basis for decisions on how public money is spent is the public's business; and these are not small sums of money: many billions of pounds will be handed over to the Research Councils in the coming years.

162. Second, the letters should throw some light on how much control the Government had over how the Research Councils were to spend the money they were given. The allocation letters to the Higher Education Funding Council for England (HEFCE) and the Learning and Skills Council (LSC) are published as a matter of course, and although Professor Adrian Smith, Director General of Science and Research, told us that the equivalent to the HEFCE and LSC letters would be the Allocations Booklet, which is published,[149] Nick Dusic, Director of the Campaign for Science and Engineering, told us that "the science budget allocation booklet gives us the high-level commitments for the different research councils [… but] not the rationale".[150]

163. Freedom of Information requests to see the allocation letters from the Campaign for Science and Engineering and us were turned down. We then asked the Government to see the letters in confidence, but we were refused again. Most recently, we asked the then Secretary of State for Innovation, Universities and Skills, the Rt Hon John Denham MP, why he was refusing to hand over the letters:

> **Chairman**: We accept that you are not going to publish [the science budget allocation letters], but the reason we want to see them is that there is a suggestion that the Government is taking an overly prescriptive role in determining the way the Research Councils spend their money. Given the fact that the Osmotherly Rules state, July 2005, that the Government is committed to being as open and as helpful as possible with select committees and that, indeed, during your time as a select committee chairman you received from Charles Clarke, the then Home Secretary, papers which were very sensitive but were relevant to a committee inquiry, could you give us an explanation as to why you are digging your heels in and not allowing the committee to have those on a confidential, not to publish, basis, and will you reconsider?
>
> ***Mr Denham***: Chairman, I would never refuse a request from you to reconsider, so I promise you I will go away and look at it again. The view that I have taken up to now is that it does raise a precedent for the release of papers which were intended to be confidential which I am concerned about. I would say two things. I will go and consider it again, because you have raised it with me quite fairly. I would also say to

148 IUSS Committee, *Science Budget Allocations*, pp 12–14

149 Q 183

150 Qq 193–195

> you, Chairman, this may come as a surprise to my officials, but as we look forward to the next allocation process, which we have already discussed with you as to ways in which we can make that more consultative, perhaps we can find a way which avoids this situation happening again.[151]

164. We are sorry to report that we still have not seen these letters.

165. **The Government's refusal to give us confidential access to papers relevant to this inquiry is unacceptable. Without seeing the Science Budget Allocation letters, we are forced to speculate that the Government has exerted inappropriate influence over the Research Councils. However, we have been unable to confirm or deny this suspicion because of the Government's contempt for Parliamentary scrutiny.**

Regional science policy

166. The Haldane Principle has a close associate called the Excellence Principle which stipulates that decisions about what science to fund should be made principally on the excellence of the science. To put it simply, the Excellence Principle guides the Research Councils in spending their research funds; the Haldane Principle guides the Government, encouraging it to leave the Research Councils free to apply the Excellence Principle.

167. The Government defines the Excellence Principle as follows:

> Public funding of research at a national level, through the Research Councils and funding bodies, is dedicated to supporting excellent research, irrespective of its UK location. The 'excellence principle' is fundamental to safeguarding the international standing and scientific credibility of UK science and research and supporting an excellent, diverse, expanding and dynamic science base, providing value for money for public investment.[152]

168. One potential difficulty with the Excellence Principle, as noted in the 10-year framework, is that it "results in geographical disparities in research funding".[153] It is easy to see why this might happen: once a critical mass of excellence is reached in a particular location, it attracts a high percentage of the available research funds and research in that area grows further. This presumably accounts in no small way to the large quantities of research funding that are won in the 'golden triangle' (London, Oxford and Cambridge), leaving an apparent lower level of funding in other parts of the UK. It is worth noting, however, that if one normalises the amount of funding won by each region by either population or the number of research institutes, the variance in regional funding is less extreme.[154]

169. On the face of it, the Excellence Principle is a good thing because it keeps science competitive and sends the money where it is most likely to produce the best results. However, there is a clash with another very important concept. The Government views

151 Oral evidence taken on 20 May 2009, HC (2008–09) 530-ii, Q 283

152 HMT, DTI and DfES, *Science and innovation investment framework 2004–2014*, July 2004, p 146

153 HMT, DTI and DfES, *Science and innovation investment framework 2004–2014*, July 2004, p 147

154 Ev 284

science and innovation as key factors in economic development. This is a long-standing position that has been reaffirmed many times since the current economic crisis started.[155] When one combines the view that science and engineering are important for the economic health of a region, on the one hand, with Government's responsibility for the economic health of the region, on the other, one logically arrives at a policy whereby the Government makes strategic decisions regarding the economic health of regions by influencing where research money is spent.

170. To paraphrase: there is a fundamental clash between the Government's commitment to the Excellence Principle as currently stated on the one hand, and its responsibility for ensuring the economic health of the regions on the other. We explored this problem during our inquiry into the Science Budget Allocations and made the point that the Government was not being clear about how decisions are made about regional science funding.[156]

171. The Government responded by saying that it was "committed to excellent science and research, wherever this may be in the United Kingdom",[157] and argued that in order to maximise the role of research and innovation in economic performance in the regions, "regional and national bodies need to co-ordinate their funding and strategies".[158] The response does not include a list of regional and national bodies that need to work together. And the document to which the response points (*Science and innovation investment framework 2004–2014*) only gives one example: the Science Research Investment Fund, which includes a capital stream "that can help universities improve their capacity to compete on the basis of excellence".[159] It is a good example of how Government can support both the Excellence Principle *and* encourage strategic science funding for the regions, but why did the Government not use it, or others—if there are any—in its response? It comes back to our original point, which was not that the Excellence Principle and the notion that science and engineering are important for the economic health of the regions are impossibly incompatible, but that the Government is not being clear about how it rationalises the two concepts.

172. Lord Drayson has already accepted that while excellence is the primary driver for decisions about funding major science facilities, there is a regional dimension too.[160] And according to the Regional Studies Association, it is a relatively simple fix:

> The Haldane principle is generally only applied to research in the research councils sector, and whilst there has been some shift towards politically determined

155 Lord Drayson: www.dius.gov.uk/news_and_speeches/speeches/lord_drayson/fst;
John Denham MP: www.dius.gov.uk/news_and_speeches/speeches/john_denham/science_funding;
Lord Mandelson: www.berr.gov.uk/aboutus/ministerialteam/Speeches/page51775.html; and
Prime Minister: oral evidence taken before the Liaison Committee on 12 February 2009, HC (2008–09) 257-i, Q 46

156 IUSS Committee, *Science Budget Allocations*, para 77

157 IUSS Committee, Seventh Special Report of Session 2007–08, *Science Budget Allocations: Government Response to the Committee's Fourth Report of Session 2007-08*, HC 639, para 71

158 IUSS Committee, *Science Budget Allocations: Government Response to the Committee's Fourth Report of Session 2007-08*, para 72

159 HM Treasury, Department of Trade and Industry and Department for Education and Skills, Science and innovation investment framework 2004–2014, July 2004, p 147

160 Qq 33–34

> programmes in selected areas the principle of academics deciding on the award of funds still holds. This principle need not be altered dramatically to achieve a rebalancing of research between regions as much of the emphasis needs to be placed on creating new centres and facilities outside of the research council remit.[161]

173. **Logically, the Government cannot support both the Excellence and Haldane Principles in their current form *and* be responsible for promoting science and engineering as a means of economic recovery and growth in the regions. The time is ripe for an unambiguous rationalisation of the two concepts. Researchers, industry, regional and national policy makers and the public have a right to know on what basis research funding is distributed both nationally and regionally; the rationale for funding decisions should be transparent and rigorous. The Government should adjust the framework for research funding and regional development so that it does not contain internal contradictions.**

174. An additional beneficiary of this recommendation would be the Government. During the Science Budget Allocations inquiry, the Government got itself in a muddle about whether or not it had a regional science policy:

> The Minister told us that "We want to develop Daresbury as a world-class centre for science and innovation", but went on to say that the Government does not want to "get to a situation where [we are] dictating to research councils that a certain percentage of their budget has to be spent in a certain region". However, the Minister has subsequently said that "individual delivery plans [of Research Councils] should be in accordance with the strategic priorities of the government, which includes a clear regional element, because we want to see Daresbury developed as a world-class centre for science and innovation".[162]

175. When we visited the USA, we learnt about a well established regional science policy called the Experimental Programme to Stimulate Competitive Research (EPSCoR).[163] The programme's aim is to strengthen research and education in science and engineering *and* to avoid undue concentration. Most of the top research in the US is concentrated in facilities in states along the east and west coasts, and EPSCoR allocates resources to inland states that do not have top-level facilities. We were told that the programme was both long-standing and controversial, but that it was yielding results; for example, one inland state was on the point where it would soon graduate above the threshold for EPSCoR support.

176. **Science and engineering are crucial to the economic wellbeing of every region in the UK, and development strategies that have supported and made use of science and engineering have proven successful. In the consideration of UK science policy, it is essential that the regional dimension is clearly and publicly set out. It is important that the Government is able to communicate its role in regional development and in science policy, and especially the relationship between the two. It will only be able to do this if it resolves the conflict between its regional policies and the Haldane Principle.**

161 Ev 181

162 IUSS Committee, *Science Budget Allocations*, para 75

163 www.nsf.gov/od/oia/programs/epscor/about.jsp

A multitude of funding relationships

177. So far we have identified two major problems with the Haldane Principle. The first is the false dichotomy of 'detailed decisions' made by the Research Councils on the one hand, and the 'over-arching strategy' set by Government on the other. The second is that the Haldane Principle (and its close relation the Excellence Principle) clashes with the Government's responsibility for ensuring that the regions have access to science and engineering excellence so that their economies can benefit.

178. There is a third problem. The Haldane Principle only applies, in practice, to the Research Councils. That is fine, as far as it goes, but the research landscape is far more complicated than just a binary relationship between Government and the Research Councils. There are also related institutions such as the Technology Strategy Board (ca £1 billion over CSR07) and the Energy Technologies Institute (ca £550 million over ten years), which are supported by a range of different funding streams. The Department for Business, Innovation and Skills (formerly DIUS) awards annual grants to three National Academies that fund research (the Royal Society, the Royal Academy of Engineering and the British Academy, at £247 million over CSR07). There are the Large Science Facilities Fund (£508 million over CSR07), University Research Capital Investment (£740 million from the science budget and £824 million from HEFCE over CSR07), the Higher Education Innovation Fund (£297 million from the science budget and £99 million from HEFCE), and the Public Sector Research Establishments Exploitation Fund (£37.5 million over CSR07), which in turn funds a number of Research Council Institutes, cultural institutions, NHS regions and departmental research bodies.[164] And that is just DIUS (as it was).

179. Several other departments have research budgets, including the Ministry of Defence, the Department of Health, and Defra, and there is also a regional dimension to funding:

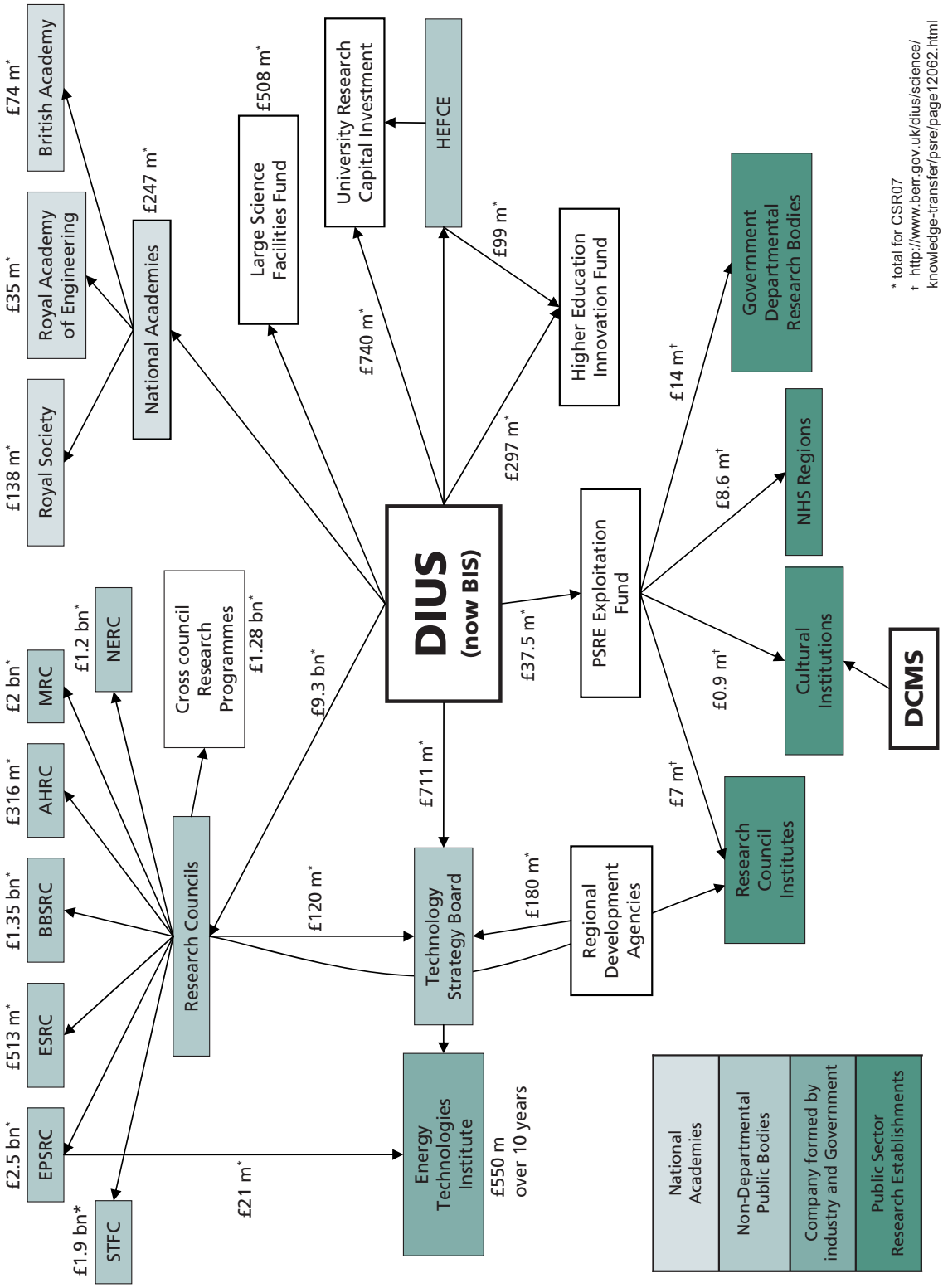
> There is a strong case for expanding on the Haldane Principle in light of the money and authority now held by the devolved governments and the Regional Development Agencies (RDAs). It is almost universally embraced that university research funding should be driven by the quality of the science and coordinated through the research councils. However, we believe that there is currently a question mark over the effectiveness of the Haldane Principle in insulating this funding from government directions, and particularly the role of the RDAs in this area.[165]

180. We have created four broad-brush maps that go some way towards demonstrating the multifaceted relationship between Government and all the research that it funds. It does so through a multitude of organisations. It would be inappropriate for the same relationship to exist between each of these organisations and Government.

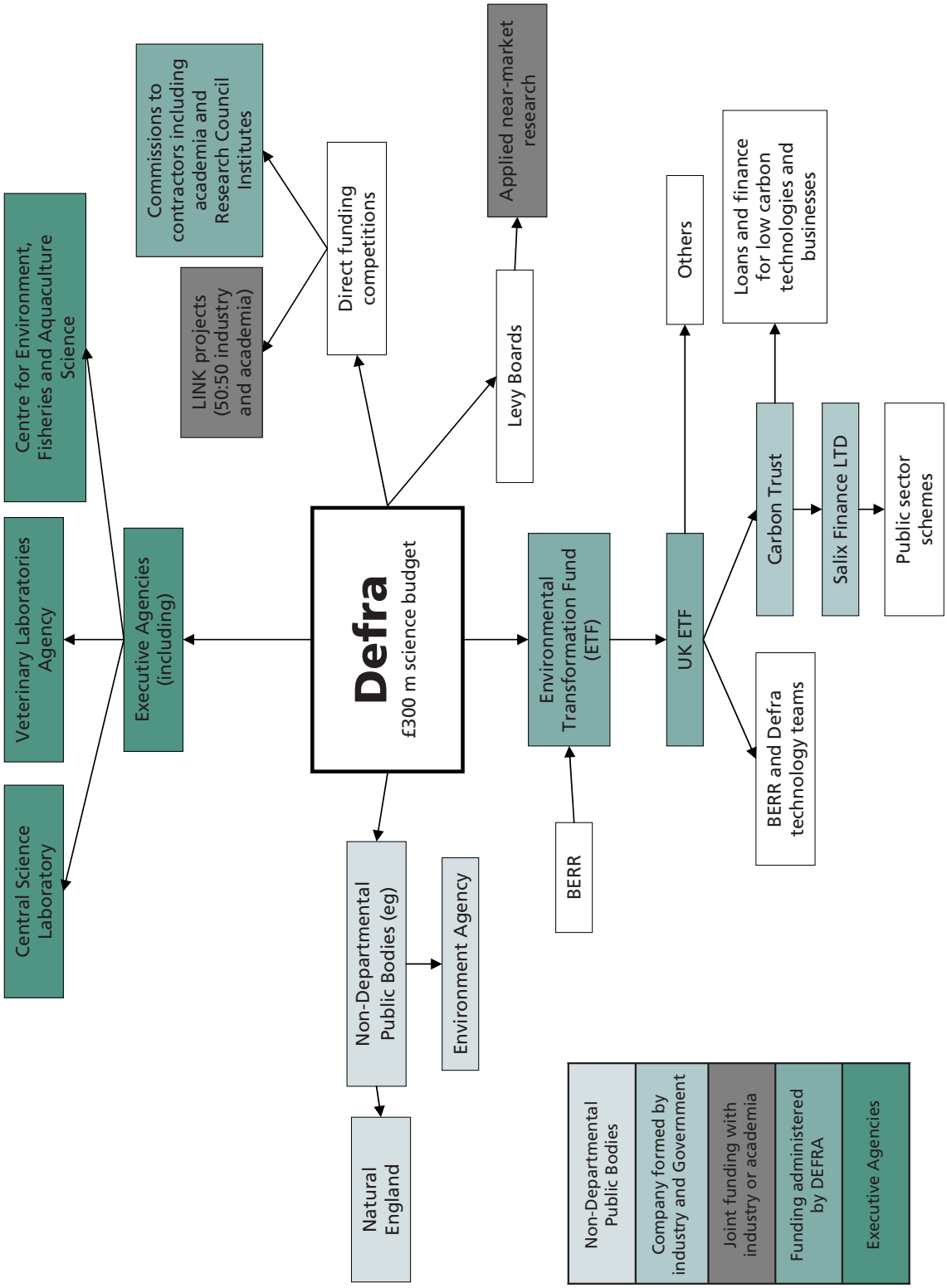
181. **The relationships between the Government and the research bodies that it funds should be both explicit and transparent. We recommend that the different streams of research funding are mapped and the nature of the contract between Government and the research bodies described.**

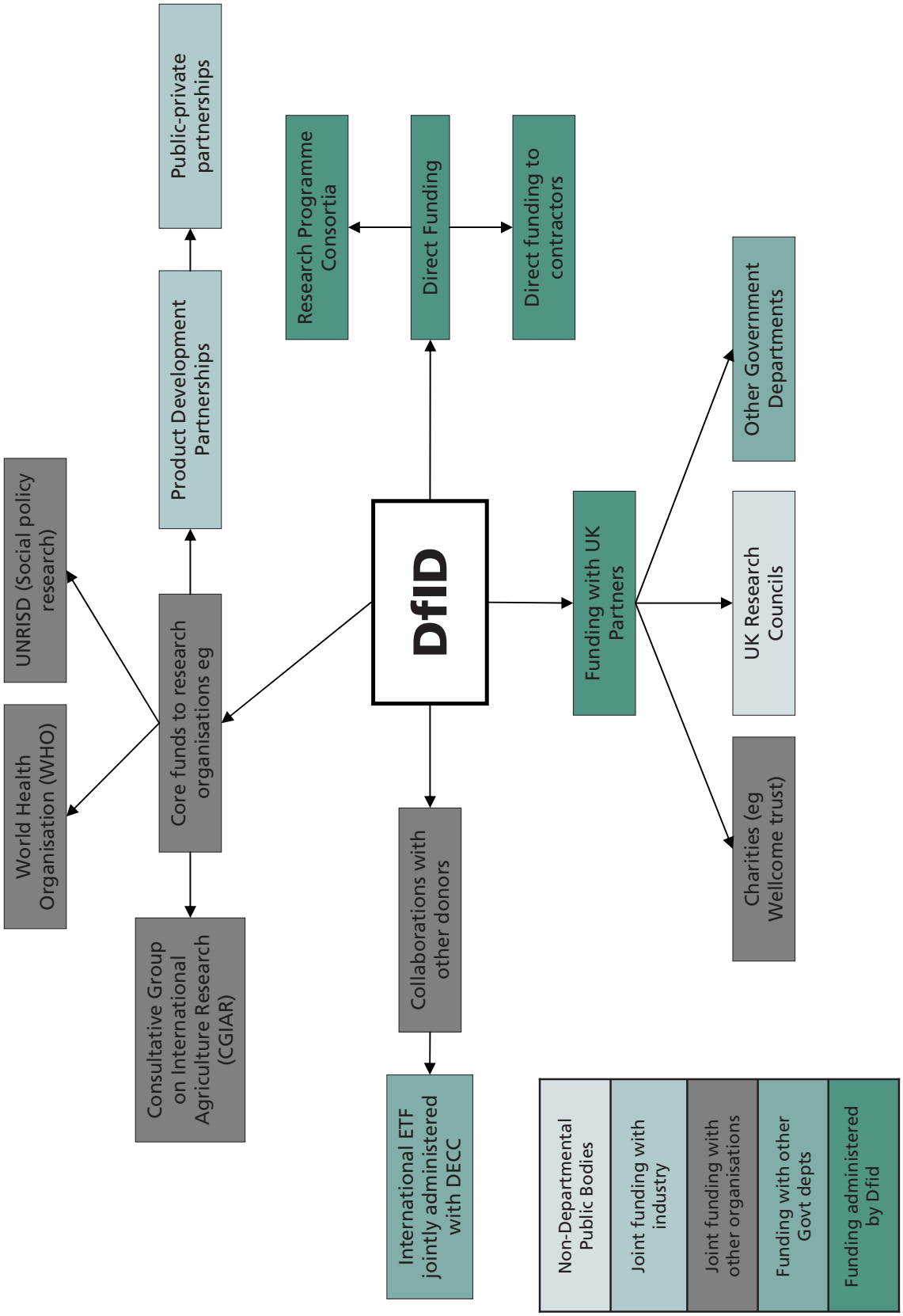
164 See *The Allocations of the Science Budget 2008/09 to 2010/11*, DIUS, December 2007, for the full science budget figures.

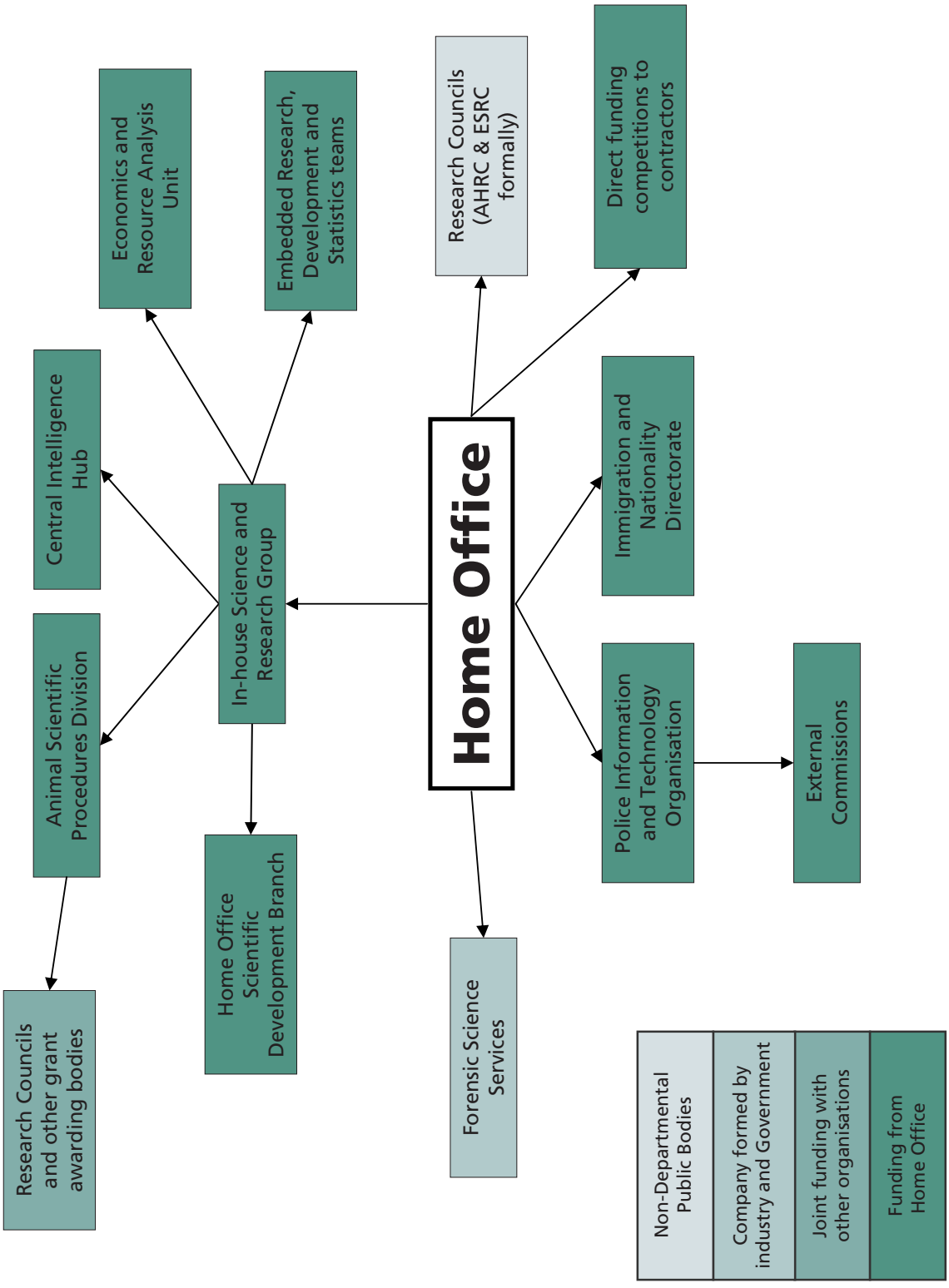
165 Ev 111 (Institute of Physics)



* total for CSR07
† http://www.berr.gov.uk/dius/science/knowledge-transfer/psre/page12062.html


Defra
£300 m science budget
Executive Agencies (including)
Centre for Environment, Fisheries and Aquaculture Science
Veterinary Laboratories Agency
Central Science Laboratory
Commissions to contractors including academia and Research Council Institutes
LINK projects (50:50 industry and academia)
Direct funding competitions
Levy Boards
Applied near-market research
Non-Departmental Public Bodies (eg)
Natural England
Environment Agency
BERR
Environmental Transformation Fund (ETF)
UK ETF
Others
Loans and finance for low carbon technologies and businesses
Carbon Trust
Salix Finance LTD
Public sector schemes
BERR and Defra technology teams
Non-Departmental Public Bodies
Company formed by industry and Government
Joint funding with industry or academia
Funding administered by DEFRA
Executive Agencies


DfID
Core funds to research organisations eg
UNRISD (Social policy research)
World Health Organisation (WHO)
Consultative Group on International Agriculture Research (CGIAR)
Product Development Partnerships
Public-private partnerships
Research Programme Consortia
Direct Funding
Direct funding to contractors
Funding with UK Partners
Other Government Departments
UK Research Councils
Charities (eg Wellcome trust)
Collaborations with other donors
International ETF jointly administered with DECC
Non-Departmental Public Bodies
Joint funding with industry
Joint funding with other organisations
Funding with other Govt depts
Funding administered by Dfid


Home Office
In-house Science and Research Group
Economics and Resource Analysis Unit
Embedded Research, Development and Statistics teams
Central Intelligence Hub
Animal Scientific Procedures Division
Research Councils and other grant awarding bodies
Home Office Scientific Development Branch
Research Councils (AHRC & ESRC formally)
Direct funding competitions to contractors
Immigration and Nationality Directorate
Police Information and Technology Organisation
External Commissions
Forensic Science Services
Non-Departmental Public Bodies
Company formed by industry and Government
Joint funding with other organisations
Funding from Home Office

Mission driven research

182. A fourth criticism we have heard of the Haldane Principle is that it has perpetuated "the situation whereby the application of research funding fails to match the challenges facing the economy, industry and society at large".[166] To put it another way, it has bolstered curiosity-driven research, but done little to support mission-driven research and development. We have already discussed at length strategic focus of research funds and this is a connected theme. It is worth pursuing in this context, because we received several calls for a *dual* approach to research in the UK. The Royal Society of Edinburgh, for example, is a strong supporter of the dual approach:

> It is the solution that emerged post-war in the United States and that has been so successful. It has created a diverse and adaptable basic research enterprise, coupled with sustained, long term investment in 'platform' technologies that ultimately provide perennial spin-off that can be exploited by companies that pull strongly on the research base for technological solutions, and has been further stimulated in recent decades by the power of public procurement through the SBIR scheme. For example, a mission-driven component of national strategy might have been more effective, ten years ago, in ensuring that the UK exploited its early lead in stem-cell technologies in the period when stem-cell research in the USA was restricted. We need to see initiatives actively designed to create new global winners in the UK economy. This should involve initiatives from the NHS, MOD, Local and National Government, HMRC etc. It should also involve bodies from the wider public sector such as OfCom. All public agencies should expect congratulation if they help one or more British companies to build commercial success.[167]

183. The Royal Academy of Engineering put it in a different light:

> The Haldane Principle […] has different meanings when applied to the direction of science and engineering research. For pure science, it seems reasonable that researchers themselves should be best placed to understand what direction their research should proceed in and they should not be constrained in their academic endeavours. For engineering, on the other hand, it seems reasonable that Government should express requirements in terms of general challenges that can be met through directed research and expect researchers to be able to contribute to the development of solutions to wider policy deployment problems.[168]

184. However one thinks of the issue, it is well-known that the UK's immense strength in basic science is not matched by its follow-through into economic benefits. According to the CBI: "the UK still lacks the mission-driven ethos that is prevalent in competitor countries such as the US, where DARPA, NASA and other agencies lead the way in engaging business and universities to find solutions to real world problems".[169] While the creation of the Technology Strategy Board has resulted in a marked increase in support and focus on

166 Ev 205 (BAE Systems)

167 Ev 254

168 Ev 200

169 Ev 103

user-defined and challenge-led research, some have argued that it has not gone far enough. The Royal Academy of Engineering suggests that "the TSB's budget should arguably be of the same order of magnitude as the Research Councils' as a whole".[170]

185. **We have already given our support for a more strategic approach to setting priorities in science funding, specifically at the applied end of the spectrum. Considering this issue in the context of the Haldane Principle highlights the need for a new approach to science funding that incorporates the good elements of Haldane in relation to basic science, but does not hinder a more mission-driven approach to get the full benefits of applied science and engineering.**

A new research funding principle

186. Although there is support in the science community for the Haldane Principle insofar as it provides for the independence of researchers,[171] we also received a number of submissions that called for a new or updated Haldane Principle.[172] Professor Fisk told us that:

> It is my impression that the Haldane Principle was dead in the early 1980s. It is a 1918 principle. Apart from Magna Carta I cannot think of any other principle that ancient that clutters around in public life and I think actually its term is positively unhelpful for the end point you want to have. […] In most other countries there is an analogous principle but it is one about the freedom of the academic community in public life to contribute to the quality of public life. […] My own feeling is that we ought to be much clearer on what we think is the value of independent research in a world which is always changing.[173]

187. The Royal Society agreed: "Rather than a debate about what Haldane meant in 1918, we need a better understanding about the way in which the Government now interprets the Haldane Principle".[174] And the UK Deans of Science made an intriguing suggestion, the later part of which we discuss in the next chapter: "We believe that the time has come for a serious discussion about the Haldane Principle, something that could be one of the first inquiries carried out by a re-formed Science and Technology Select Committee".[175]

188. **The time has come for a new framework to replace the Haldane Principle (however it is understood) that adds transparency and rigour to the relationship between Government and the research community. It is important that the diversity of relationships between Government and the various bodies it funds to do research are included under a broad set of principles. We recommend that the Council for Science and Technology be commissioned to carry out this work.**

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170 Ev 277

171 Ev 75 (Unite the Union); Ev 83 (Natural History Museum); Ev 94 (AstraZeneca); Ev 111 (Institute of Physics); Ev 137 (Imperial College London); Ev 149 (John Innes Centre & Institute for Food Research); Ev 258 (Royal Society of Chemistry)

172 Ev 106 (BRE Global); Ev 181 (Regional Studies Association)

173 Q 62

174 Ev 151

175 Ev 118

5 Science and engineering scrutiny

Introduction

189. There are guidelines on the use of science, a Government Office for Science, several Chief Scientific Advisers, and hundreds of scientists and engineers throughout the civil service, and yet—inevitably—mistakes happen. The former Science and Technology Committee's inquiry on evidence-based policy and our own inquiry on engineering each highlighted several examples where science and engineering were not at the heart of Government policy.

190. In the absence of a perfect system, when guidelines and good intentions are not enough, scrutiny becomes a key player. Our starting point for this chapter is that good scrutiny of science and engineering issues across Government is important. We consider two broad types of scrutiny: internal and external.

Internal scrutiny

191. Internal scrutiny is that provided by the Government looking in on itself. Following a recommendation made in *Investing in Innovation: A strategy for science, engineering and technology*,[176] Sir David King, the then Government Chief Scientific Adviser, set up a Science Review Team in what is now the Government Office for Science. The reviews were "to independently scrutinise and benchmark the quality and use of science in government departments".[177] Since 2005, six departments have been reviewed: the Food Standards Agency; the Department of Health; the Home Office/Ministry of Justice; the Department for Culture Media and Sport; Communities and Local Government; the Health and Safety Executive and Defra. Each review took about a year, although some took longer.

192. We asked Professor Beddington about the Science Reviews. He told us that the time the reviews took was "ludicrous",[178] and that when he was involved in the Defra review "it seemed to be going on forever"[179] (18 months, to be precise). Therefore, soon after taking up his post as GCSA, he commissioned "a review of reviews",[180] which led to a decision that:

> The new reviews will be significantly shorter, maximum three months; they will be conducted in a completely different way from other reviews. They will be jointly owned by the Permanent Secretary of the department concerned and myself, and they will be driven at a very high level. There will be an immediate going in to look and see what are the key issue and if some things worry us, then we would start to look at those in more detail. […] The pattern of reviews which we would then plan to start early in 2009 should mean that we will be able to get a lot more done; we will be

176 HM Treasury, July 2002

177 www.dius.gov.uk/partner_organisations/office_for_science/science_in_government/science_and_engineering_assurance/background

178 IUSS Committee, Third Report of Session 2008–09, *DIUS's Departmental Report 2008*, HC 51-II, Q 243

179 IUSS Committee, *DIUS's Departmental Report 2008*, Q 243

180 IUSS Committee, *DIUS's Departmental Report 2008*, Q 243

> using consultants to help us and we will be using a much higher level of professional input into these reviews.[181]

193. This new programme is called 'Science and Engineering Assurance'. The objectives of the new assurance exercise are to: "Provide departments with assurance that their policy and practice properly reflects the [natural and physical] scientific evidence [… and] Ensure that departments have in place the capability, systems and culture to access, quality assure and use science effectively".[182] We have since been updated on the progress of Science and Engineering Assurance by Professor Beddington:

> [W]e reached agreement about two weeks ago that these would be mandatory for any department or institution that has not actually already had a review. For those that have […] we are in the process of ongoing assessment of how they are performing against a particular review […]. The aim is to complete this exercise of having done a science and engineering review of all departments by March 2011, so it is a relatively quick timescale to get them, and this includes things of very different sizes, it includes the Ministry of Defence and the Treasury.[183]

194. **Changes to the science and engineering scrutiny programme to make reviews shorter and mandatory are welcome. We recommend that there should be regular and constructive liaison between the newly formed Science and Technology Committee and the Science and Engineering Assurance team.**

External scrutiny

195. We turn now to external science and engineering scrutiny. External scrutiny comes in many forms. The media provides a key role, both the mainstream media and increasingly through the work of bloggers. The professional and learned societies, industry, unions and charities also provide scrutiny on science and engineering issues in a variety of ways. Enough could be said about external science and engineering scrutiny to fill several reports, but we shall take up here only one aspect: the scrutiny role played by Parliament through the work of select committees.

196. Science and engineering issues transcend departmental boundaries and therefore have been covered in one way or another by many different select committees in dozens of reports. For example, the Environmental Audit Committee often considers scientific issues associated with climate change and engineering issues associated with reducing carbon emissions (this will similarly be a challenge for the relatively new Energy and Climate Change Committee). Scientific and engineering challenges are pertinent to much of the work of the Transport Committee, the International Development Committee, the Environment, Food and Rural Affairs Committee, the Health Committee and the Defence Committee, to name a few. However, in terms of focus on science and engineering issues, the most relevant Committees are the former House of Commons Science and Technology

181 IUSS Committee, *DIUS's Departmental Report 2008*, Q 243

182 www.dius.gov.uk/partner_organisations/office_for_science/science_in_government/science_and_engineering_assurance

183 Q 324

Committee, the House of Lords Science and Technology Committee, this Committee and the future reinstated Science and Technology Committee.

A brief history of science scrutiny in the House of Commons

197. The House of Commons first established a Science and Technology (S&T) Select Committee in 1966. It existed for the duration of the 1966–1971 Parliament and was re-appointed in 1971 and 1974. The Committee was abolished in 1979 when the departmental select committee structure was established. In 1992, a new S&T Committee was established to scrutinise the newly formed Office for Science and Technology (OST). Since the OST (later the Office for Science and Innovation) had a cross-departmental remit, so in practice did the S&T Committee.[184]

198. The Committee came to an end in November 2007 following the Prime Minister's announced changes to the machinery of Government in July of that year. DTI and DfES were divided into three departments: BERR, DCSF and DIUS. The responsibilities of the Office for Science and Innovation were taken over by the DIUS Science and Innovation Group and the Government Office for Science, which sat within DIUS.

199. The S&T Committee existed under Standing Order No 152 to scrutinise the work of the OSI. The abolition of the OSI meant that the Standing Order had to be amended. On 25 July 2007, the House agreed a motion to amend the Standing Order to replace the Science and Technology Committee with a departmental select committee, which would scrutinise the work of DIUS. Originally the Innovation, Universities and Skills Committee, the later addition of 'science' into its title—which ran contrary to the normal practice of committee names reflecting the name of the department that they scrutinised—reflected the particular importance we attached to scrutinising the work of the Government Office for Science.

200. As well as our duty to scrutinise all of the work of DIUS, across the important and broad universities and skills agendas, we have also conducted some science and engineering scrutiny. In the 2007–08 session, we had the third busiest schedule of all the departmental select committees:

> During the 2007–08 Session we held 50 Committee meetings and 12 Sub-Committee meetings and took oral evidence on 46 occasions. We published seven Reports and over and above the evidence for these inquiries also held 11 separate oral evidence hearings.[185]

201. We have conducted several inquiries on science and engineering issues. In reverse order these were: two pre-appointment hearings with the Chair-elects of the Biotechnology and Biological Sciences Research Council and the Economic and Social Research Council; a major inquiry into engineering; biosecurity in UK research laboratories; renewable electricity-generation technologies; and the Science Budget Allocations. We also reinstated Science Question Time with the Science Minister.

184 House of Commons Science and Technology Committee, Thirteenth Report of Session 2006–07, *The Last Report*, HC 1108, p 5

185 IUSS Committee, Second Report of Session 2008-09, *The Work of the Committee in 2007–08*, HC 49, para 7

202. Our work has been appreciated by a wide range of individuals and organisations.[186] Lord Drayson told us that "scrutiny of science and engineering and technology within Government is incredibly important and becoming only more important in the future",[187] and that our focus on "putting science and engineering more at the heart of government policy" has been "helpful".[188]

203. However, we received evidence of frustration at the Committee's wide remit and the implications for science scrutiny. Professor Ian Haines, from the UK Deans of Science, told us:

> In our evidence we suggested there should be [a science and technology committee re-established]; it is not the suggestion that the Chairman is not doing his job, nor is it the suggestion that the members are not doing their job, it is just that we feel that the Committee is too broad. From innovation—and that is economic innovation—on the one hand, right the way through to skills of all kinds of an undescribed nature, it is too big.[189]

204. The Royal Society expressed its concern about "the extent to which the current (IUSS) Committee can scrutinise policies that fall at the boundaries of, or cut across, Departments".[190] This view was also expressed by the Institute of Physics,[191] the Biosciences Federation,[192] the Science Council,[193] the Royal Academy of Engineering[194] and the Royal Society of Chemistry.[195]

205. Recent changes to the machinery of Government added urgency to the debate: DIUS and BERR were dissolved and all their responsibilities passed to a new department, the Department for Business, Innovation and Skills. This affects select committees that have been established under Standing Order No 152, as ours is, because they mirror government departments. That means that both the IUSS and Business and Enterprise Committees were set to be replaced by a single Business, Innovation and Skills Committee. In our report on *The future of science scrutiny following the merger of DIUS and BERR*, we argued strongly that the BIS Committee would be in a worse position than the IUSS Committee to scrutinise science and engineering given all the other areas it will have to cover.[196] We therefore recommended the re-forming of a Science and Technology Committee.[197]

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186 Ev 83 (Natural History Museum); Ev 87 (UK Computing Research Committee); Ev 138 (Research Strategy Office, Imperial College London); Ev 148 (Arts and Humanities Research Council); Ev 158 (SSC Science Cluster); Ev 168 (Research Councils UK); Ev 224 (Sense About Science)

187 Q 392

188 Q 319

189 Q 215

190 Ev 155

191 Ev 113

192 Ev 183

193 Ev 199

194 Ev 203

195 Ev 219

196 IUSS Committee, Fourth Special Report of Session 2008–09, *The future of science scrutiny following the merger of DIUS and BERR*, HC 662, para 7

197 IUSS Committee, *The future of science scrutiny following the merger of DIUS and BERR*, para 10

206. On 25 June 2009 the House agreed with us and the many other voices from the science and engineering community who felt that science and technology needed dedicated Parliamentary scrutiny. Standing Order No 152 was duly amended and on 1 October 2009 the IUSS Committee will cease to exist and the Science and Technology Committee will come to life.

207. **We would like to thank all those who made strong representation to the Leader of the House on our behalf. We also recognise the responsibility that derives from a consensus in Parliament and the science and engineering community that science and technology scrutiny matters. We will strive to make the work of the new Committee—which is essential for the democratic scrutiny of science, engineering and technology—relevant, rigorous and transparent.**

The future Science and Technology Committee

208. The decision to create a Science and Technology Committee was right, but the way in which the Committee was formed was related to machinery of Government changes and the speed with which the changes had to be made. In this final section of the chapter we make three suggestions for the future committee.

209. Our first suggestion is related to our engineering report. We concluded, among other things, that engineering advice differs from science advice, that engineering advice is lacking in many policy areas across Government and that cross-departmental co-ordination of engineering programmes is weak. We also suggested that the Government Chief Scientific Adviser, who is already Head of Profession for Science and Engineering, should be re-titled Government Chief Scientific and Engineering Adviser and that he should be supported by the Government Office for Science and Engineering. It is therefore logical that the Committee that is responsible for this policy area should have 'engineering' in its title.

210. **The current arrangement for the future Science and Technology Committee is the best that could be achieved following the machinery of Government changes. We suggest that following the general election the committee responsible for science, engineering and technology policy should be called the Science, Engineering and Technology Committee.**

211. Our second suggestion has to do with membership. This Committee was, unusually for a departmental committee, set up with a membership of 14, rather than 11. The rationale for the larger membership was that this would allow us to run a main committee on higher education, further education and skills, with a quorum of four, and a permanent sub-committee on science and technology, with a quorum of three, although we did not choose this arrangement. We had an effective membership of nine, but still with a quorum of four. We recognise that all select committees have been under tremendous pressures in terms of membership; over the years an increase in the number of government departments has increased the number of departmental select committees, and the establishment of the regional committees has exacerbated the problem further. However, it is essential that for effective scrutiny all political parties fill their places on select committees.

212. **We suggest that the Science, Engineering and Technology Committee should revert to its original 11 members with a quorum of three.**

213. Our final suggestion is to do with our remit, namely, to scrutinise the Government Office for Science. This means that the Committee remains a departmental committee. It also means that the science budget, Research Councils and publicly funded science-related bodies, such as the academies, NESTA, TSB and so on, fall within the remit of the future BIS Committee. These concerns were raised with the Deputy Leader of the House on 25 June 2009. She replied:

> Let me re-emphasise that it is up to Committees to take a wide-ranging approach to their remit, and to examine the full scope of science policy and related matters across government. Earlier this week, a Hansard Society conference considered the role of departmental Select Committees. We have now moved beyond Departments turning around and saying to Select Committees, "We don't want to answer that," or, "You can't look at that." That should no longer occur in Select Committees. In the new spirit of reform, if a Select Committee decides that it wants to scrutinise research budgets, for example, it should be able to do so.[198]

214. We welcome her acknowledgement that select committees should be free to conduct inquiries that extend beyond their official remit. However, that is different from saying that the future Science, Engineering and Technology Committee should have *responsibility* for the science budget. **To avoid complications related to the lines of departmental responsibility and future machinery of Government changes, we suggest that following the next general election the Science, Engineering and Technology Committee should be installed as a free-standing committee with a cross-departmental remit for science and engineering including research budgets across Government.**

198 HC Deb, 25 June 2009, col 1016

6 Conclusions

215. There are lot of positives to take from our inquiry. We have been impressed by the seriousness with which the Government takes the issue of specialist advice from scientists and engineers. Significant strides have already been taken—for example, the increasing use of Chief Scientific Advisers and the growth of a scientific and engineering community in the civil service—and we were pleased to hear that the Government is planning to make further improvements, such as install a Chief Scientific Adviser in the Treasury.[199] The recommendations we have made in the report will hopefully go some way to enhancing the good work that has already taken place.

216. During the course of the inquiry, we have considered a number of important issues: the structures that deliver science and engineering advice; strategic priorities of research funding; consultation; funding principles; accountability and scrutiny. What we believe is missing is a broad vision for science and engineering in the UK; a vision for how science and engineering fits into the Government's strategic plans for UK plc. **We close this inquiry by urging the Government to raise its game. When it turns its attention to updating the Science Framework, we recommend that the Government consult widely with a view to producing a successor ten-year science and engineering strategy that is both tangible and ambitious. We suggest that built into this strategy—in the spirit of scientific and engineering endeavour—should be an assessment of what benefits, if any, are delivered by putting science and engineering at the heart of Government policy.**

199 Q 324

Conclusions and recommendations

Science and engineering at the heart of Government policy?

1. We were impressed by the Science Minister and Government Chief Scientific Adviser's frank assessment of how science and engineering advice is used in Government. We were pleased to hear that they have taken up those concerns we raised in the engineering report and that they have an appetite to improve the use of evidence in policy-making. (Paragraph 24)

Previous recommendations and policy examples

2. We regret that the Government failed to answer the core reasons for having Departmental Chief Engineering Advisers. We urge the Government to give fuller consideration to our recommendation that "Some departments should have Departmental Chief Engineering Advisers (DCEAs), some Departmental Chief Scientific Advisers (DCSAs), and some should have both." (Paragraph 29)

3. The Government had an opportunity at the last reshuffle to move GO-Science as per our recommendation in the engineering report. That it did not, was a missed opportunity. As the Government Chief Scientific Adviser explained, location matters because it affords daily face-to-face interaction between colleagues in the same building; and as he further pointed out, he has only seen the Prime Minster four times in the past year. We therefore appeal directly to the Prime Minster, who is responsible for GO-Science, to bring it into the Cabinet Office alongside the Strategy Unit. (Paragraph 37)

4. We are reassured to hear that Professor Beddington will take steps to look at the MHRA's decision to licence homeopathic products as well as the wider issue of the purchasing of homeopathy by the NHS. We hope that he will be able to bring scientific evidence to the centre of this complex policy issue. (Paragraph 42)

5. We call on the DCSF Chief Scientific Adviser to explain what advice she provided, if any, on the Every Child literacy and numeracy programmes and report it to the House. (Paragraph 47)

Science Advisory Councils/Committees

6. We agree with Professor Beddington that Departmental Chief Scientific Advisers should have devolved responsibility for the quality of scientific advice in each department. On that basis, it is crucial that each DCSA has a tight grip on their departmental remits and have sufficient support so that problem policy areas can be identified and dealt with. The DCSA must challenge policy-makers to demonstrate clear evidence to support policy or to acknowledge that no such evidence exists. The GCSA needs to be advised by DCSAs of those instances where DCSAs have been overruled on such matters; and we further recommend that he publishes these in his annual report. (Paragraph 48)

7. Strong consideration should be given to increasing the number of departments that have Science Advisory Councils with a departmental remit. The Department of Health, the Department of Energy and Climate Change and the Department for Transport are obvious 'top-of-the-list' candidates, with the latter two in particular needing high quality engineering advice. (Paragraph 54)

8. SAC members should not be criticised for publishing scientific papers or making statements as professionals, independent of their role as Government advisers. (Paragraph 64)

9. It is important to safeguard the independence of the advisory system. In situations where the independence of a SAC chairman or member is or might be threatened for political reasons, support should be offered by the DCSA and/or the GCSA. (Paragraph 67)

10. We welcome the steps taken by the GCSA to deal with one incident that occurred between the Chairman of the ACMD and the Home Secretary. Further steps that should have been taken are: (1) the GSCA should have written or spoken to the Chairman of the ACMD, letting him know that support was being provided; (2) the correspondence between the GCSA and the Home Secretary should have been published immediately so that other SAC Chairmen and the public (including the science community) could see that support was being offered; and (3) the GCSA should have provided public support for the Chairman of the ACMD and for his right to publish. (Paragraph 68)

11. The Government should seek specialist advice prior to making policy decisions, early in the policy-making process. Clearly the Government should be free to reject the advice of its SACs, since scientific evidence is only one factor—albeit a very important one—in policy decisions: Advisers advise, Ministers decide. However, when the Government does take a different policy decision to that recommended by a SAC, it should make clear its reasons for doing so. (Paragraph 69)

12. We conclude that there would be value in being clear in the Code of Practice as to what 'independence' means. Members of Science Advisory Committees are likely to represent the views of their constituencies; what is important is that they have no conflict of interest with Government. Therefore, in the case of Science Advisory Committees, 'independence' should mean 'independence from Government'. (Paragraph 73)

13. We agree that SACs should recruit members based on competencies. However, we are concerned that dropping the term 'lay' removes an expectation that specialist advisory councils should have non-specialist members. Additionally, we are not convinced by the argument that scientists from one subject are necessarily a 'lay' person in another scientific area. Whether or not they are called 'lay members', non-specialists do have a lot to offer specialist committees. The presumption should be that SACs have lay/non-specialist members. (Paragraph 78)

14. We support the Code of Practice's emphasis on the importance of publishing documents relating to the work of science advisory committees. We would prefer a slightly different emphasis on open meetings. Rather than recommending that SACs

"should aim to hold open meetings on a regular basis", we suggest that SACs "should aim to hold the majority of their meetings in public, making use of new media wherever possible". (Paragraph 82)

15. We can see the logic and agree that it is important that SAC advice should be presented to Ministers in advance of publication, giving them sufficient time to consider a response. However, it is also clear that SAC advice should, when it is given to Ministers, be final advice, and not a launching pad for debate. On this basis, we recommend that the process of SACs providing evidence to Ministers should be as transparent as possible. SAC evidence that is presented to Ministers should subsequently be published in unaltered form, along with the date on which the evidence was presented to Ministers and the details of any requests for alterations or clarifications of the evidence. (Paragraph 84)

16. We recommend that a small press office be set up within the Government Office for Science, to serve the press needs of GO-Science and all the Science Advisory Committees across Government. (Paragraph 86)

Conclusion

17. Shuffling the body responsible for providing cross-departmental science and engineering advice from one department to another and then back again within the space of two years is the opposite of 'putting science and engineering at the heart of Government policy'. It reduces science and engineering advice to, at best, a peripheral policy concern, and, at worst, a political bargaining chip. If science and engineering are to be successfully placed at the heart of policy, as the Government is keen to do, two things need to happen. First, the Government Office for Science (and Engineering, as we would have it) should have a stable home. We believe that this should be the Cabinet Office: the heart of Government. Second, there needs to be a Government Chief Engineer and a Government Chief Scientist, who are responsible for cross-departmental advice and coordination, freeing up the Government Chief Scientific (and Engineering) Adviser to advise the Prime Minister more closely and to act as a public figurehead for science and engineering in the United Kingdom. (Paragraph 88)

Debating strategic priorities

18. We are left wondering what this strategic priorities debate was about and whether it has led to a major shift in Government policy. We are in favour of a discussion about how best to focus research funds so that the UK gets maximum reward from its investment, but the lesson to be learned is that the Government should be clear in its own mind about the format and goals of a debate before launching it. (Paragraph 105)

19. Past experience of failing to accurately 'pick winners' has led to a risk-averse executive. The belief that 'sectors will pick themselves' is misplaced and when proactive interventions by Government are not forthcoming, potentially successful industries that germinate in the UK, blossom elsewhere. Choosing to support one sector over another will be difficult. The Government should develop clear and agreed methodologies for determining priorities and acceptability of risk. (Paragraph 109)

20. If the Government is to develop clear and agreed methodologies for identifying areas of high priority, these must also be effective in identifying areas of low priority. Further, the Government should not prevaricate on this issue: if it decides to prioritise some areas of research it should come clean about which areas of research will see reduced investment. (Paragraph 111)

21. The Department for Business, Innovation and Skills should consider long-term investment returns when it considers strategic priorities in international partnerships. (Paragraph 114)

22. Curiosity-driven research is a key component of a successful knowledge-economy. We strongly endorse the view that increased focus in applied research and industrial follow-through should not be at the expense of blue-skies research, which is one of the UK's greatest strengths. (Paragraph 117)

23. It is unlikely that the Science and Society consultation will contribute substantially to "a new strategy for the UK": most of what has been said was either predictable or already government policy. However, we will watch the work of the Expert Groups with interest. (Paragraph 126)

24. We welcome the Government's commitment to consultation. It would be helpful if the Government was clearer about the reasons for each consultation and what was at stake. This would make the process more worthwhile for all concerned and would remove the feeling of 'box-ticking' that so often accompanies consultations.(Paragraph 132)

25. In the case of the strategic-priorities debate, the benefits of a fast-moving process have been countered by a lack of coherence. Launching the debate with a Green Paper or something similar would have given a focus to the debate that was sorely lacking. We acknowledge that this would have elongated the timeframe for the debate, but since the intention was always for an on-going debate, this should not have been seen as a problem. (Paragraph 133)

26. Any debate on strategic science funding should be put in the wider context of the role of science and engineering in the economic and social wellbeing of the UK. The 2004 ten-year science and innovation framework was successful in focussing attention on the importance of science and innovation. We now suggest that the UK needs a 'national science and engineering strategy'. The Government should spend the last two-years of the ten-year framework (2012 and 2013) reviewing the science and innovation framework and consulting on a new strategy that will set out the direction of travel for science and engineering within UK plc from 2014 until 2024. (Paragraph 137)

The Haldane Principle

27. The 2009 Budget Research Council savings have had an impact on the way that Research Councils allocate their funds. While this cannot be regarded as dictating 'detailed decisions', it is not 'over-arching strategy' either; it is somewhere in between. (Paragraph 155)

28. These 'savings' are in reality a strategic influencing of research funding streams. Whether or not it is the right thing to do is open to debate. But, either way, the

Government should communicate clearly what it is doing and not label them as something they are not. (Paragraph 156)

29. To conclude, we are in favour of the idea that researchers are best placed to make detailed funding decisions on the one hand and, in principle, we support the Government to set the over-arching strategic direction on the other. However, it is necessary for the Government to spell out the relationship between these two notions for a broader funding principle to be of any use. (Paragraph 157)

30. Research Councils are not, and never have been, the 'guardians of the independence of science'. That responsibility has historically lain, and should remain, with the learned societies, universities and individual academics. (Paragraph 159)

31. The Government's refusal to give us confidential access to papers relevant to this inquiry is unacceptable. Without seeing the Science Budget Allocation letters, we are forced to speculate that the Government has exerted inappropriate influence over the Research Councils. However, we have been unable to confirm or deny this suspicion because of the Government's contempt for Parliamentary scrutiny. (Paragraph 165)

32. Logically, the Government cannot support both the Excellence and Haldane Principles in their current form *and* be responsible for promoting science and engineering as a means of economic recovery and growth in the regions. The time is ripe for an unambiguous rationalisation of the two concepts. Researchers, industry, regional and national policy makers and the public have a right to know on what basis research funding is distributed both nationally and regionally; the rationale for funding decisions should be transparent and rigorous. The Government should adjust the framework for research funding and regional development so that it does not contain internal contradictions. (Paragraph 173)

33. Science and engineering are crucial to the economic wellbeing of every region in the UK, and development strategies that have supported and made use of science and engineering have proven successful. In the consideration of UK science policy, it is essential that the regional dimension is clearly and publicly set out. It is important that the Government is able to communicate its role in regional development and in science policy, and especially the relationship between the two. It will only be able to do this if it resolves the conflict between its regional policies and the Haldane Principle. (Paragraph 176)

34. The relationships between the Government and the research bodies that it funds should be both explicit and transparent. We recommend that the different streams of research funding are mapped and the nature of the contract between Government and the research bodies described. (Paragraph 181)

35. We have already given our support for a more strategic approach to setting priorities in science funding, specifically at the applied end of the spectrum. Considering this issue in the context of the Haldane Principle highlights the need for a new approach to science funding that incorporates the good elements of Haldane in relation to basic science, but does not hinder a more mission-driven approach to get the full benefits of applied science and engineering. (Paragraph 185)

Science and engineering scrutiny

36. The time has come for a new framework to replace the Haldane Principle (however it is understood) that adds transparency and rigour to the relationship between Government and the research community. It is important that the diversity of relationships between Government and the various bodies it funds to do research are included under a broad set of principles. We recommend that the Council for Science and Technology be commissioned to carry out this work. (Paragraph 188)

37. Changes to the science and engineering scrutiny programme to make reviews shorter and mandatory are welcome. We recommend that there should be regular and constructive liaison between the newly formed Science and Technology Committee and the Science and Engineering Assurance team. (Paragraph 194)

38. We would like to thank all those who made strong representation to the Leader of the House on our behalf. We also recognise the responsibility that derives from a consensus in Parliament and the science and engineering community that science and technology scrutiny matters. We will strive to make the work of the new Committee—which is essential for the democratic scrutiny of science, engineering and technology—relevant, rigorous and transparent. (Paragraph 207)

39. The current arrangement for the future Science and Technology Committee is the best that could be achieved following the machinery of Government changes. We suggest that following the general election the committee responsible for science, engineering and technology policy should be called the Science, Engineering and Technology Committee. (Paragraph 210)

40. We suggest that the Science, Engineering and Technology Committee should revert to its original 11 members with a quorum of three. (Paragraph 212)

41. To avoid complications related to the lines of departmental responsibility and future machinery of Government changes, we suggest that following the next general election the Science, Engineering and Technology Committee should be installed as a free-standing committee with a cross-departmental remit for science and engineering including research budgets across Government. (Paragraph 214)

Conclusions

42. We close this inquiry by urging the Government to raise its game. When it turns its attention to updating the Science Framework, we recommend that the Government consult widely with a view to producing a successor ten-year science and engineering strategy that is both tangible and ambitious. We suggest that built into this strategy—in the spirit of scientific and engineering endeavour—should be an assessment of what benefits, if any, are delivered by putting science and engineering at the heart of Government policy. (Paragraph 216)

Appendix: correspondence regarding the Science Budget Allocations letters

Letter dated 23 February 2009 from the Department for Innovation, Universities and Skills to Mr Phil Willis MP, Chairman of the Committee

Thank you for your letter of 27 January to Andrew Shaw, requesting copies of the Allocation Letters from the Department for Innovation, Universities and Skills to the Research Councils with respect to the Science Budget Allocations 2008/09–2010/11 for the seven UK Research Councils. I am replying as Andrew Shaw has now left the Department.

Upon receipt of a written request for information the Freedom of Information Act 2000 ("the Act") obliges this Department to (a) say whether we hold the information requested and if we do (b) to disclose it. However, these obligations are subject to exemptions which, where applicable, permit us to withhold information. If an absolute exemption applies then we can simply withhold the information. If a qualified exemption applies then we can only withhold the information if the public interest in maintaining the exemption outweighs the public interest its disclosure.

While I can confirm that we hold the information you have requested we are not prepared to disclose it because it is exempt from disclosure under sections 35, and 43 of the Act as explained below.

Section 35—This exempts information held by a government department if it relates to the formulation or development of government policy. Section 35 is a qualified exemption. We have considered carefully whether the public interest in disclosing the information overrides the public interest in maintaining the exemption and withholding the information. We recognise there is a general public interest in the disclosure of information as greater transparency makes Government more accountable and we also recognise there is a public interest in being able to assess the quality of information which is used in policy formulation.

However, against this good government depends on good decision making and there is a clear public interest in ensuring that decisions are made based on the best advice available and a full consideration of all the options. Not only is it important that Research Councils provide us with full and detailed information but it is also essential that policy officials are able to have a full and frank dialogue with them on budgetary issues. If details of these communications were made public we consider that the Councils might be less open with us and policy officials would not have the space to discuss such issues freely.

We have also taken into account that details of the overall strategic priorities for the research base and related funding decisions (including the rationale behind them) are set out in the "Science Budget" allocations booklet which is published after the outcome of each spending review. There follows a link to this at
http://www.dius.gov.uk/publications/URN07114.pdf.

Simultaneously Research Councils published their delivery plans 2008-2001 at
http://www.rcuk.ac.uk/aboutrcuk/deliveryplan.

These delivery plans set out each Council's approach to research priorities, sustainability, economic impact, international, specific financial commitment information and targets for efficiency and effectiveness.

In our view, therefore, the balance of the public interest clearly lies in withholding the information you have requested.

Section 43—this exempts information if disclosure would, or would be likely to, prejudice the commercial interests of any person. This is a qualified exemption. You will understand that, in budgetary discussions, Research Councils share with us a good deal of information relating to development plans that they have which by its very nature is not in the public domain, is commercially sensitive and the disclosure of which would, or would be likely to, prejudice their commercial interests.

While we recognise that there is a general public interest in disclosure of information relating to how budgets are agreed, for largely the same reasons as articulated above regarding the exemption in section 35 we consider the balance of the public interest in this case falls in favour of withholding the information. In particular, we consider that good decision making depends upon the quality of the information on which it is based and we are concerned that if Research Councils felt we might disclose information that they regard as commercially sensitive then they will be less frank with us in the future and that would damage the decision making process.

Accompanying this letter are details of our appeals procedure if you are unhappy with the result of your request for information. Please quote the reference number above in any future communications.

Letter dated 24 February 2009 from Mr Phil Willis MP, Chairman of the Committee, to the Rt Hon John Denham MP, Secretary of State for Innovation, Universities and Skills

I am writing to ask that you provide the Committee with copies of the Allocation Letters sent to the seven UK Research Councils with respect to the Science Budget Allocations 2008/09–2010/11.

The reasons for this request are two-fold. First, concerns over the extent to which the Government influenced the formulation of the Research Councils' Delivery plans continue to be raised with the Committee. An examination of the Allocation letters would allow us to lay this matter to rest. Second, the Allocation letters sent to HEFCE and the Learning and Skills Council are published as a matter of course. It therefore seems anomalous that the Research Councils' letters are not made public, and in the interests of transparency we believe they should be placed in the public domain.

I would also like to point out that I have written to the Department previously asking that the Allocation letters be made available to the Committee under the Freedom of Information Act 2000 (letter dated 27 January 2009). I am disappointed to say that despite more than 28 days elapsing since this request I have had no reply.

As an interim measure, I would ask for the letters to be supplied to us in confidence. As you will know it is well precedented for Committees to be supplied with information on this basis.

Letter dated 20 March 1009 from The Rt Hon John Denham MP, Secretary of State for Innovation, Universities and Skills, to Mr Phil Willis MP, Chairman of the Committee

Thank you for your letter of 24 February, in which you requested copies of the allocation letters sent to the seven Research Councils be provided to your Committee.

The Government explained in its response to the Innovation, Universities, Science and Skills Select Committee in June 2008 that it did not intend to publish its specific interactions with Councils on the allocations process and that remains our position.

As you are aware the Department has published the booklet on Science Allocations (which is the equivalent of the published Allocation letters sent to the Higher Education Funding Council for England and the Learning and Skills Council) and at the same time the Councils produced their own delivery plans.

A letter was sent to you on 23 February in response to your Freedom of Information request and this clearly outlined why it would be inappropriate to release these letters.

I hope the above information is helpful.

Letter dated 2 April 2009 From Mr Phil Willis MP, Chairman of the Committee, to the Rt Hon John Denham MP, Secretary of State for Innovation, Universities & Skills

I have received your letter of 20 March 2009.

I am disappointed by the Department's continued refusal to supply us with copies of the allocation letters sent to the Research Councils. The Committee will discuss what action to take after Easter.

In the meantime I repeat the request, made in my letter to you dated 24 February, that "As an interim measure, I would ask for the letters to be supplied to us in confidence. As you will know it is well precedented for Committees to be supplied with information on this basis."

E-mail dated 29 April 2009 from Secretary of State's Private Office, Department of Innovation, Universities and Skills, to the Clerk of the Committee

I understand that you were asking for a response to Phil Willis' letter of 2 April to the Secretary of State, John Denham, regarding science budget allocation letters.

The Secretary of State has confirmed that his position has not changed since his letter of 20th March to Phil Willis. Please see correspondence attached for ease of reference.

E-mail dated 5 May 2009 from the Clerk of the Committee to the Secretary of State's Private Office, Department of Innovation, Universities and Skills

Thank you for your email.

I wonder if this has been sent to me in error. It is not normal practice for a reply to a letter from a Chairman of a Select Committee to a Secretary of State to be received in the form of an official-to-official email. In addition I'd point out that the email does not address the specific question in the Chairman's letter.

The Chairman looks forward to receiving the Secretary of State's reply.

E-mail dated 8 May 2009 from Secretary of State's Private Office, Department of Innovation, Universities and Skills, to the Clerk of the Committee

The Secretary of State asked me to convey his response to you, which I did. As far as we are concerned no further response is needed.

Formal Minutes

Wednesday 8 July 2009

Members present:

Mr Phil Willis, in the Chair

Mr Tim Boswell	Dr Brian Iddon
Dr Evan Harris	Ian Stewart
Mr Gordon Marsden	Graham Stringer

The Committee deliberated.

Draft Report (*Putting Science and Engineering at the Heart of Government Policy*), proposed by the Chairman, brought up and read.

Ordered, That the draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 77 read and agreed to.

Paragraph 78 read.

Amendment proposed, in line 6, leave out from "committees" to the end of the paragraph.—(*Dr Evan Harris.*)

Question put, That the Amendment be made.

The Committee divided.

Ayes, 1	Noes, 5
Dr Evan Harris	Mr Tim Boswell Dr Brian Iddon Mr Gordon Marsden Ian Stewart Graham Stringer

Amendment disagreed to.

Paragraph agreed to.

Paragraphs 79 to 217 read and agreed to.

Summary agreed to.

Resolved, That the Report be the Eighth Report of the Committee to the House.

Ordered, That the Chairman make the Report to the House.

Ordered, That embargoed copies of the Report be made available, in accordance with the provisions of Standing Order No. 134.

Written evidence was ordered to be reported to the House for printing with the Report.

[Adjourned till Monday 13 July at 4.00pm

Witnesses

Monday 26 January 2009

Page

Rt Hon Lord Drayson, a Member of the House of Lords, Minister of State for Science and Innovation, **Mr Graeme Reid**, Head of Economic Impact, Science & Research Group, and **Mr Jeremy Clayton**, Deputy Head, Government Office for Science, Department for Innovation, Universities and Skills. Ev 1

Wednesday 25 February 2009

Professor David Fisk, Imperial College London, **Professor Lord John Krebs**, a Member of the House of Lords, University of Oxford, **Professor Julia King**, Aston University, **Professor Lord Martin Rees**, a Member of the House of Lords, President of the Royal Society. Ev 10

Dr Tim Bradshaw, Confederation of British Industry, **Professor Dame Janet Finch,** Council for Science and Technology, **Baroness O'Neill of Bengarve**, a Member of the House of Lords, British Academy and **Ms Judy Britton**, Government Office for Science. Ev 18

Monday 16 March 2009

Professor Adrian Smith, Director General for Science and Research, DIUS, **Nick Dusic**, Campaign for Science and Engineering, **Professor David Edgerton**, Imperial College London, and **Professor David Charles**, Regional Studies Association. Ev 28

Sir Roland Jackson, British Science Association**, Professor Ian Haines**, UK Deans of Science, and **Tracey Brown**, Sense about Science. Ev 36

Wednesday 1 April 2009

Professor Chris Gaskell, Chair, Defra Science Advisory Council, **Dame Deirdre Hutton,** Chair, Food Standards Agency, and **Professor Sir Michael Rawlins**, Former Chairman of the Advisory Council on the Misuse of Drugs. Ev 44

Monday 18 May 2009

Rt Hon Lord Drayson, a Member of the House of Lords, Minister of State for Science and Innovation, Department for Innovation, Universities and Skills and **Professor John Beddington**, Government Chief Scientific Adviser. Ev 55

List of written evidence

List of Reports from the Committee during the current Parliament

The reference number of the Government's response to each Report is printed in brackets after the HC printing number.

Session 2008–09

First Report	Re-skilling for recovery: After Leitch, implementing skills and training policies	HC 48–I (HC 365)
Second Report	The Work of the Committee 2007-08	HC 49
Third Report	DIUS's Departmental Report 2008	HC 51–I (HC 383)
Fourth Report	Engineering: turning ideas into reality	HC 50–I (HC 759)
Fifth Report	Pre-appointment hearing with the Chair-elect of the Economic and Social Research Council, Dr Alan Gillespie CBE	HC 505
Sixth Report	Pre-appointment hearing with the Chair-elect of the Biotechnology and Biological Sciences Research Council, Professor Tom Blundell	HC 506
Seventh Report	Spend, spend, spend? –the mismanagement of the Learning and Skills Council's capital programme in further education colleges	HC 530

Session 2007-08

First Report	UK Centre for Medical Research and Innovation	HC 185 (HC 459)
Second Report	The work and operation of the Copyright Tribunal	HC 245 (HC 637)
Third Report	Withdrawal of funding for equivalent or lower level qualifications (ELQs)	HC 187–I (HC 638)
Fourth Report	Science Budget Allocations	HC 215 (HC 639)
Fifth Report	Renewable electricity-generation technologies	HC 216–I (HC 1063)
Sixth Report	Biosecurity in UK research laboratories	HC 360–I (HC 1111)
Seventh Report	Pre-legislative Scrutiny of the Draft Apprenticeships Bill	HC 1062–I (HC (2008–09)262)
First Special Report	The Funding of Science and Discovery Centres: Government Response to the Eleventh Report from the Science and Technology Committee, Session 2006–07	HC 214
Second Special Report	The Last Report: Government Response to the Thirteenth Report from the Science and Technology Committee, Session 2006–07	HC 244
Fourth Special Report	Investigating the Oceans: Government Response to the Science and Technology Committee's Tenth Report of Session 2006–07	HC 506 [incorporating HC 469–i]