CHAPTER 3
SCIENCE IN PUBLIC POLICY

Good decisions are based on a combination of good information and an appreciation of the imperfections in whatever information is available.

Governments must take many thousands of decisions every month, and it is unreasonable to suppose that all of these will be informed by a thorough examination of all of the most up-to-date research results. However, it is reasonable to expect governments to put in place mechanisms for identifying when science or engineering is likely to be important, and systems for ensuring that the best advice is available efficiently on a suitable timescale.

3.1 Major Government priorities

As an example of the importance of various aspects of the scientific system, in feeding into any Government's policy agenda, Figure 3.1 gives some indication of the various aspects of science and engineering needed to inform and deliver effective policies on global climate change, one of the major areas that the UK highlighted as its priorities while holding the Presidencies of the G8 group of industrialised nations and the European Union at the same time.

Global climate change and the problems of Africa, particularly HIV and AIDS topped the Prime Minister's agenda[1] because Africa is 'a scar on the conscience of the world'[2] and climate change is, in the words of the Chief Scientific Adviser 'the most severe problem that we are facing today, more serious than terrorism'[3].

3.2 The current system of scientific advice

Formally, the UK's system of providing scientific advice to government is enshrined in a set of guidelines originally issued in 1997[4] and updated in 2000[5]. Those guidelines form a wholly admirable framework, which in an ideal world would ensure that the issues requiring scientific advice were effectively identified, and that the widest range of expertise was brought to bear on them.

In practice, their operation is hampered because of a lack of scientific culture within government departments. No doubt this is partly a reflection of the fact that most people, including most civil servants and ministers, are not scientists[6].

Among the more serious problems of the system of scientific advice is its impenetrable complexity. There is a huge number of committees, groups and laboratories with apparently overlapping responsibility. Some have been privatised, others remain in the government sector, yet more are shared between the science base and the government sector.

To a large degree, this elaborate structure is unavoidable. A great many issues in a wide range of departments require scientific and engineering advice, and

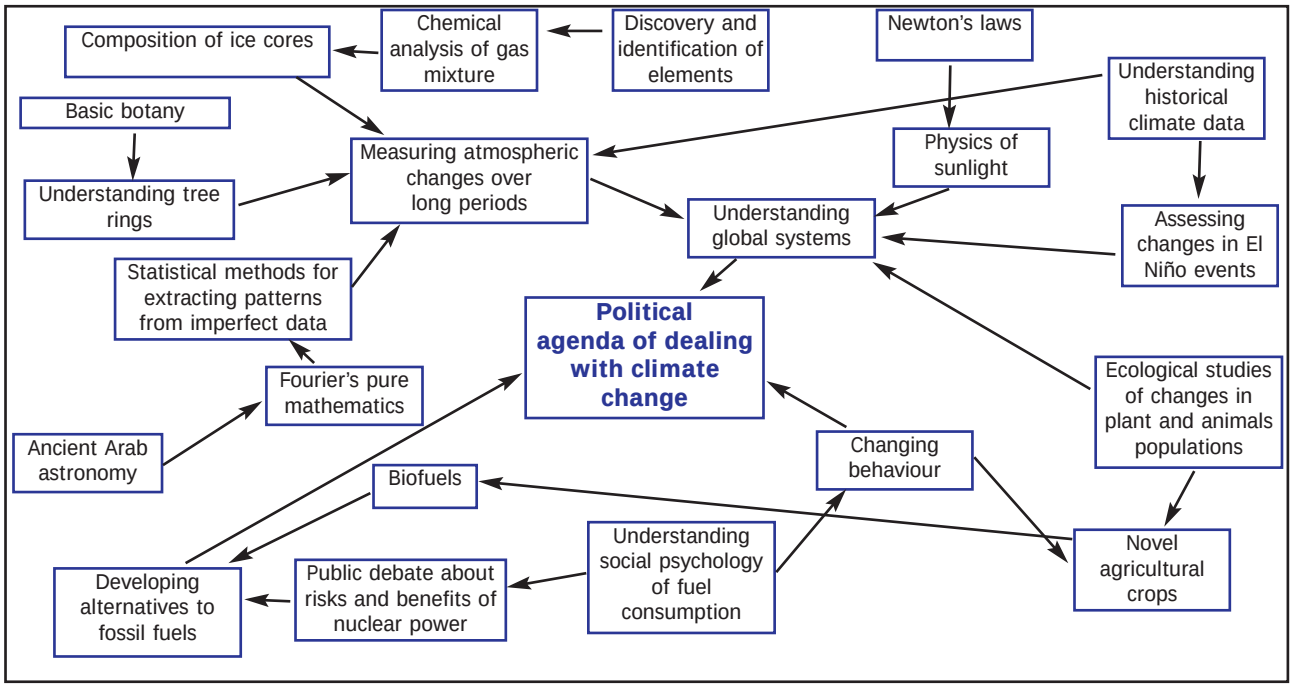

Figure 3.1. Scheme linking a handful of the science and engineering elements that are important in informing government policy on a single issue of major political importance. The diagram is not a comprehensive overview, but is intended to convey some idea of the range of scientific and engineering information needed to inform public policies, from cutting-edge science and technology to the fundamental research on which they are based.

a simple, inflexible system would inevitably fail in a large number of instances.

However, the current complexity requires a significant level of communication and coordination in order to function properly. At present the system is in a fragmented state. Even within a single department, separate laboratories and committees are disjointed, and there is an even greater degree of disjunction among departments.

Within each ministry, it is the departmental Chief Scientific Adviser that has the job of drawing together disparate scientific strands. In 2002, the Government announced that all departments with an 'appreciable' scientific element would appoint such an Adviser, although no indication was given of the intended definition of the word 'appreciable'[7]. The Ministry of Defence has had such a post for many decades, but among the civil ministries, the Department of Environment, Food and Rural Affairs has subsequently led the way in using the newly-created post of Departmental Chief Scientific Adviser to co-ordinate its scientific presence[8]. It has set up a scientific advisory council, made up of external experts, who are free to speak publicly about their work without being subject to the supervision by the Department's press office.

However, in other departments, the words of the Government's official strategy have not been matched by action. The Department for International Development, which invests about £150 million a year in science, engineering and technology[9], made no effort to appoint a Chief Scientific Adviser until more than two years after the policy was announced, and only after the Science Committee of the House of Commons began inquiring into the Department's manifestly unsatisfactory use of science[10].

The Department of Culture, Media and Sport (DCMS) certainly has a substantial scientific presence. It funds some £13 million worth of research and development a year, and it sponsors major scientific facilities such as the Science Museum, the Natural History Museum and the British Library[11]. But two and a half years after the Government announced the policy of appointing Departmental Scientific Advisers, DCMS had shown no sign of bothering to implement the policy.

Advisers should be distinguished researchers from academia or industry, who command the respect of the scientific community, and who have the confidence to give uncompromising, impartial advice to ministers.

All Departments that have not done so should immediately appoint Chief Scientific Advisers, chosen from outside the civil service.

The lack of a scientific culture in government
The failure of major departments to appoint scientific advisers is illustrative of the lack of scientific culture within large parts of the Government machine.

This failure was highlighted by the Council for Science and Technology in 1999[12]. One of the recommendations of the Council was that departments of state could increase their scientific potential by bringing in more scientists from the university or business sector on short-term secondments. This idea was ignored in the Government response[13] and as Table 3.1 shows, departments have made almost no attempt to take action over subsequent years.

Department of State	Response to the questions 'how many people from science and technology backgrounds have been seconded into your department in each of the past five years?'
Trade & Industry	*We do not hold central records on the background of secondees*
Education & Skills	*There have been no people with a specific science and technology background seconded*
Environment, Food & Rural Affairs	*55 people over a 29-month period*
Culture, Media & Sport	*The Department does not maintain a central record*
Home Office	*The Home Office does not specifically collate data on secondees*
Foreign & Commonwealth	*16 people over a 5-year period*

Table 3.1. Number of scientific staff seconded into various government departments during the five years between 1999 and 2003 [Source: *Hansard* [House of Commons] 18 November 2003, Column 766W and 843W; 19 November 2003, Column 1057W; 20 November 2003, Columns 1418W, 1240W and 1483W, together with associated letters in the Library of the House of Commons].

Shockingly, the Department of Trade and Industry, which has nominal responsibility for overall science policy, makes no attempt to know how many scientists it is bringing in to assist with its policies, and the Department for Education & Skills (which sponsors £1.2 billion's worth of research in the universities each year and is responsible for deciding what science is taught in schools) has not bothered to second a single scientist or engineer for a period of five years.

Despite the recommendation of a high-level committee appointed by the Prime Minister, it is plain that the value placed on science in departments of state remains extremely low.

All Departments of State should initiate an active programme of employing scientists and engineers in the civil service on secondments, to bring in fresh thinking and better understanding of the way that science can be used in policy-making and implementation. Short-term secondments are important, and there would also be considerable merit in developing a programme of medium-term or long-term posts for scientists within the civil service.

"I think only one scientific civil servant has ever reached Grade 1. Scientists reach Grade 3, and run things, but rarely Grades 1 and 2, where policy is made. Despite the well-publicized need to create equal opportunities for women in the Civil Service, they still have much better career prospects in the establishment than scientists!"

Steve Robinson, Retired Government Engineer

Complexity in the scientific advice system

Part of the problem with efforts to deal with scientific information is its inherent complexity. Box 3.1 gives some idea of the range of bodies within the Ministry of Defence.

The potential number of links among these bodies is huge, and in practice the interactions between just two, the Defence Scientific and Technology Laboratory and the Defence Scientific Advisory Council, are numerous and complicated.

The Chief Executive of DSTL is a member of DSAC, and each subsidiary board has a DSTL member of staff; the DSTL Technical Director is a member of the DSAC Technology sub board. Additionally, nominated members of DSTL staff are seconded to DSAC working groups which investigate and advise on various areas of the Ministry's technical programme. Members of DSAC attend DSTL's technical programme reviews, and also advise on both the technical programme selection and progress[19].

To obtain a picture of how complex the overall system is, these links must be multiplied across the huge range of different organisations, committees and individuals that have scientific functions within government. This is not a criticism, merely an observation of a potential problematic feature of the system for gathering and interpreting scientific information within government. As Figure 3.1 shows, the scientific and engineering element of public policy mak-

Box 3.1

Science and engineering at the Ministry of Defence

Figure 3.2 below shows the links between some of the internal bodies and external agencies of the Ministry of Defence that have an important scientific or engineering component.

Such a simple scheme hides a mass of detail. For example, the Defence Procurement Agency includes 71 Integrated Project Teams (IPTs), grouped in seven clusters, such as the Maritime & Shipbuilding Cluster and the Communications Network Cluster. Twelve Support Groups, such as the Technical Assurance Group and the Finance Assurance Group provide advice to the IPTs, giving a total of 852 possible interfaces. Other agencies sponsored by the Ministry and which have a substantial scientific component include the Medical Training Organisation, the Geographic & Imagery Intelligence Agency and the Meteorological Office. Non-Departmental Public Bodies of the Ministry of Defence include the Defence Nuclear Safety Committee and the Advisory Group on Medical Countermeasures. The Defence Scientific Advisory Council, which consists of independent outsiders has a number of permanent supporting boards, including the Operational Anaysis Board, the Technology Board and the Human Sciences Board. It also convenes temporary boards, which produce reports on a particular area and are then disbanded.

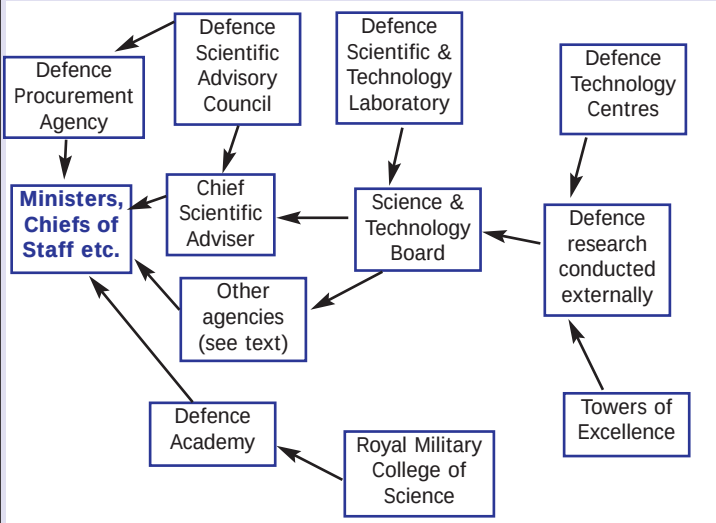

Figure 3.2. Some links between major scientific bodies in the Ministry of Defence

ing is inherently complex.

Box 3.2 examines how the problems are particularly acute given the new complexity caused by devolution in Scotland, Wales and Northern Ireland.

These difficulties were relatively easy to overcome at a time when science and technology played a relatively minor part in many policy areas, but now that they have such an all-pervading influence on so many aspects of public policy, a more streamlined system is required.

The most effective solution would be to create a Ministry for Science, and to create a post of Cabinet Minister whose primary responsibility was in science, engineering and technology.

Such a system need not preclude individual ministries from commissioning their own research, because they could retain their own research budgets, although the core costs of running the Public Sector Research Establishments would become the responsibility of the new Ministry. An adequate system would need to be adopted for dealing with the output of those PSREs which have been privatised.

The Government should create a post of Cabinet Minister for Science and Engineering, responsible for a Ministry of Science with a remit to coordinate scientific and technological issues across Government.

3.3 The budget for policy-driven research

Figure 3.3 shows the overall Government budget for research and development in the civil departments and in the Ministry of Defence over the past few years.

Although the decline has levelled off in recent years, total investment remains a third lower than it was in the mid 1980s; to restore investment to former levels would involve an extra £950 million in the defence arena annually, and £700 million in civilian research and development.

Although the Treasury anticipated 'real terms rises' in 2000[14], the view had changed by 2002, when the official policy had become 'that the research spend in the main civil departments should at least be maintained in real terms'[15] and the Chief Scientific Adviser was reluctant to argue for increased research budgets[16].

By 2004, although the Government prided itself on at least having modestly reversed the decade-long decline in research funding in departments of state, the only specific financial pledge in 16 pages of strategy was a £20 million increase in the research budget of the Department for International Development[17],

Box 3.2
Science Policy and Devolution

The need for effective communication regarding science policy among the different parts of the UK was highlighted during the crisis over mad cow disease when, for example, Northern Ireland was certified to have clear herds of cattle that could be sold in Europe, while other parts of the UK were not.

Devolution has brought increases in the budgets for policy-driven research in Wales and Scotland, as Figure 3.4 demonstrates, but the uncertainty regarding the political settlement in Northern Ireland has clearly held this process back.

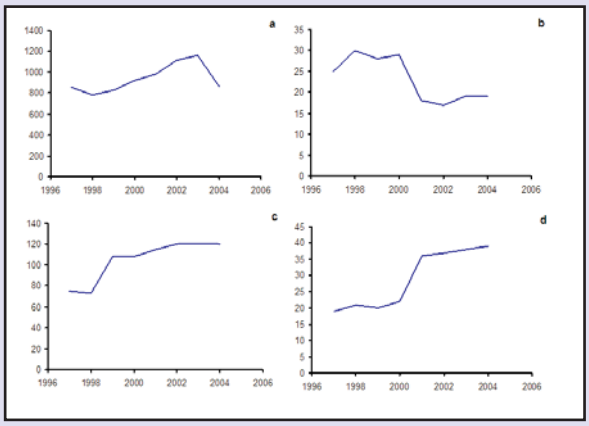

Figure 3.4. Investment in civil research via Government ministries since devolution (a) in Whitehall (b) in Northern Ireland (c) in Scotland and (d) in Wales (£ million in real terms at 2001 prices) [Source: Forward Look 2003: Government funded science, engineering and technology, DTI, 2003].

The BSE inquiry criticised the lack of coordination among the constituent parts of the UK on issues of science policy. Among many shortcomings, the inquiry criticised Whitehall's 'failure to make accessible to [the devolved administrations] the thinking of [the expert committee] and its interpretation of the various research findings that emerged'.

There remains an inherent barrier to communication in that in some committees, such as the Chief Scientific Adviser's Committee, officials from the devolved administrations must leave the room and are denied access to relevant papers when matters are under discussion that are likely to become the basis of advice to the UK Cabinet. This would become a particular difficulty if, as is ultimately inevitable, a future UK government belongs to a different political party from the government of one of the devolved parts of the UK.

Strict adherence to constitutional rules must not hinder the proper flow of information, and if necessary, new formal mechanisms must be put in place to ensure that ministers and officials of the devolved parts of the UK have access to the most reliable scientific information.

"Why was the Welsh Chief Medical Officer not only ignored but told to mind her own business when she raised pertinent questions [about BSE]?"

Prof Hugh Pennington

equivalent to an increase of less than half of 1% in the overall budget for research in the government sector[18].

Whilst it is true that quality is at least as important as quantity, it will be impossible for the Government to generate and implement effective policies in whole areas of its administration if it is not prepared to invest in the research required under its own eminently sensible guidelines.

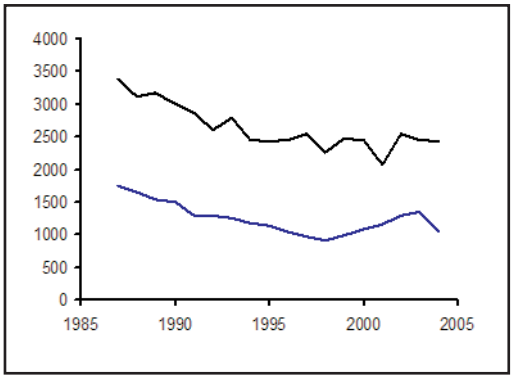

Figure 3.3. Government investment in policy driven research in the military field (Black line) and civil field (Blue line) (£ million in real terms at 2001 prices) [Source: *Forward Look 2003: Government funded science, engineering and technology*, DTI, 2003; Data for the National Health Service are ommitted because they were not reported until 1995].

As a first step towards restoring adequate investment in the evidence base on which policy is built, the overall budget for research within Government departments should be increased by at least 20% in real terms over the course of the next Parliament.

3.4 Parliamentary scrutiny

One of the strengths of the way in which science has been handled by policy-makers in Britain in recent decades has been a powerful system of Parliamentary scrutiny.

During the 1980s, when science budgets were being cut and the scientific community expressed concern at the way in which policy was developing, the House of Lords Science and Technology Committee was seen as a strong forum in which policy could be tested.

More recently, the Science and Technology Committee of the House of Commons has gained a high profile and reputation for raising difficult issues and dealing with them.

Because the Office and Science and Technology is not a department of state, but a part of the Department of Trade and Industry, it is by no means constitutionally necessary for the Government to ensure the formation of a separate science and technology committee, but science policy would be weaker without it.

The Science and Technology Committee of the House of Commons should be re-established as on a permanent basis, equivalent to the Select Committees that shadow departments of state.

3.5 Openness and trust

One of the problems with the use of science in policy-making is that some people and groups have come to distrust government because of a perceived lack of openness.

The same problem has affected parts of private industry, where the mood is changing about the degree to which research results should be made available to the general public. For example, the pharmaceutical industry has agreed that the results of its clinical trials should be made much more freely available[20].

Trust in Government science requires that people can see how scientific results affect public policy.

In general, all scientific advice to Government should be published as soon as possible in a form that is widely accessible.