



COUNCIL FOR
SCIENCE AND
TECHNOLOGY

Council for Science and Technology

Annual Report 2005/06

The Council for Science and Technology (CST) is the UK government's top-level advisory body on science and technology policy issues.

CST's remit is to advise the Prime Minister and the First Ministers of the devolved administrations on strategic issues that cut across the responsibilities of individual government departments. CST organises its work around five broad themes (research, science and society, education, science and government, and technology innovation) and takes a medium to long term approach.

CST's past work profile includes reports on 'Better Use of Personal Information: Opportunities and Risks'; 'Health Impacts – A Strategy Across Government'; 'An Electricity Supply Strategy for the UK'; and 'Policy Through Dialogue: informing policies based on science and technology'. The Council has also provided advice to Government on improving interactions between academia and the services sector, and how procurement can drive innovation.

The members of the Council are respected senior figures drawn from across the field of science, engineering and technology. The current membership of the Council:

Professor Sir John Beringer CBE
Professor Geoffrey Boulton OBE FRS FRSE
Professor Janet Finch CBE DL AcSS
Mr. Andrew Gould
Professor Wendy Hall CBE FREng
Dr Hermann Hauser FREng CBE CPhys FInstP
Dr. Dieter Helm
Professor Alan Hughes
Dr Sue Ion OBE FREng
Sir David King KB ScD FRS (co-chair)
Sir Rob Margetts CBE FREng
Sir Paul Nurse FRS FMedSci
Sir Keith Peters FRS PmedSci (co-chair)
Dr Raj Rajagopal FREng CEng FIEE FIMechE FIE FCMI
Professor Michael Sterling FREng
Professor Kathy Sykes CPhys FInstP
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Contents

	Foreword	2
1	Introduction	3
2	Impact of CST's advice	5
3	CST advice delivered during 2005/06	7
4	Current CST projects	13
5	CST future work	14

Foreword

Now we are coming to the end of our first three-year term since the Council for Science and Technology (CST) was reconvened in March 2004, it is an opportunity to look both to the future and at our achievements. It has been a very exciting time for CST and we can point to a wide range of outputs that have had significant impact across Government and beyond.

We have set the agenda on promoting innovation in the services sector, and how the use of personal data by Government offers the potential to create more efficient and accessible public services. Our earlier report *Policy through Dialogue*, which encouraged Government to do more to engage the public in the development of science and technology based policies, has underpinned much of our subsequent work. For example our project examining how potential health impacts are assessed and used in policy-making across Government recommended more creative forms of consultation, not just involving public health experts and policy makers/officials. We have also provided short responses to Government on a wide variety of issues ranging from how we might value and reward the contribution of non-research-intensive universities, to the efficiency and effectiveness of peer review.

Whilst preparing our advice we have engaged with an extremely wide range of people and organisations inside and outside Government: Within Whitehall and Westminster we have had detailed discussions with the Prime Minister and other ministers, MPs and Peers, departmental Chief Scientific Advisors, and senior officials. We have been very keen to speak to the wider business and scientific community as well, having met Chief Executives and Chairs of leading companies, representatives of learned societies and individual academics, including a group of researchers at the start of their careers.

We will shortly be publishing two reports: the first on Nanotechnologies where we will be reviewing the Government's progress on implementing its policy objectives, and the second on *Pathways to the Future – the Early Career of Researchers in the UK* where we will be focusing on improving the career development of researcher staff.

We will be equally busy over the next year. Government has asked us for advice on what would be the best areas to focus resources for science, technology and innovation which could lead to applications in around five years time.

We are also making a few changes to our membership. The Prime Minister has appointed Professor Janet Finch to be CST's new independent co-chair, taking over from Sir Keith Peters who will stay as a member. We wish Janet well in her new role. Sir Rob Margetts, Dieter Helm and Andrew Gould will be leaving CST, and we welcome three new members – Professor Alan Gilbert, Professor Peter Davies and Philip Ruffles.

We look forward to another exciting and productive twelve months.



Sir David King
Co-chair



Sir Keith Peters
Co-chair

February 2007

1 Introduction

The Council for Science and Technology (CST) is the UK Government's top-level advisory body on strategic science and technology policy issues, reporting to the Prime Minister and the First Ministers of the Devolved Administrations.

CST was re-launched in March 2004, following a quinquennial review, with a new membership and new terms of reference. The terms of reference (Box 1) reflect its UK wide remit, in particular its responsibility for issues that cut across Government departments and the facility it has developed to engage in wide range of areas.

CST's sixteen independent members were appointed by the Prime Minister (see annex A). CST has two co-chairs: an independent chair chosen by the members from among themselves, Sir Keith Peters; and the Government's Chief Scientific Adviser, Sir David King.

Box 1 CST's Terms of Reference

To advise the Prime Minister and the First Ministers of the Devolved Administrations on the strategic policies and framework for:

- Sustaining and developing science, engineering and technology (SET) in the UK, and promoting international co-operation in SET
- Fostering the practice and perception of SET as an integral part of the culture of the UK
- Promoting excellence in SET education
- Making more effective use of research and scientific advice in the development and delivery of policy and public services across Government
- Promoting SET-based innovation in business and the public services to promote the sustainable development of the UK economy, the health and quality of life of UK citizens, and global sustainable development

The Council will work on cross-cutting issues of strategic importance, taking a medium to longer-term approach. In developing its advice it will take into account the cultural, economic, environmental, ethical and social context of developments in SET.

Our membership comprises of respected senior figures from across the fields of science, engineering and technology, and across the sectors of the wider UK economy. In the course of our work we engage with a wide network of stakeholders across Government Departments and public sector organisations, academia, business, learned societies and professional bodies. We are therefore well-placed to act as a sounding board on major SET issues.

We operate in a flexible way, depending on the particular needs and objectives, and draw on a wide range of external advice. The work agenda is developed both from within the membership, and in response to requests from Government, focusing on the medium to longer term. We provide our advice through published reports, at meetings with the Prime Minister, departmental ministers and senior officials, in letters to Government, and through written responses to consultations by Government and other bodies.

CST follows up its advice at regular intervals, reviewing Government's response and actions. The Council is keen to interact with policy makers at the beginning of the process and as policy is developed.

This report covers CST's work in the period from July 2005 to December 2006, with examples of the Council's impact, short descriptions of reports and other advice given, and an outline of the future work programme.

More information on CST's work, including its published reports and ways of working, is available at www.cst.gov.uk.

2 Impact of CST's advice

CST reports are given a very wide circulation – within Government to the Prime Minister, Chancellor, ministers and senior officials with relevant policy leads, the Cabinet Committee for Science and Innovation and to the Devolved Administrations. We also target the major players in business, key public sector contacts, and a broad range of regional and professional bodies. For example, CST's Personal Datasets report was sent out to over 100 interested parties across Government and business.

2.1 Meeting the Prime Minister

CST has held two meetings with the Prime Minister, in November 2005 and June 2006. Discussions proved to be very informative to both CST and the Prime Minister. The key areas discussed at the November 2005 meeting were:

- energy policy, drawing on the messages in CST's report: An electricity supply for the UK;
- CST's Personal Datasets project;
- public engagement and dialogue, drawing on the messages in CST's report Policy Through Dialogue; and
- innovation policy, focussing on the role of government procurement, and innovation in the services sector.

The Prime Minister then asked for a second meeting to discuss innovation and wealth creation. Key areas discussed at the June 2006 meeting were:

- energy, in the run-up to the launch of the Government's Energy Review;
- R&D in the services sector and the role of public procurement;
- how the Government might take advantage of the unique selling point of the NHS for biomedical research, and how to stimulate growth of high-technology medical businesses; and
- CST's Health Impacts report.

Following the meeting, the PM asked to see CST on a regular basis.

2.2 Impact Across Whitehall

In September 2006 CST wrote to the Chancellor making recommendations regarding the services sector and public procurement. The letter set out the need for a better strategic focus for the services sector in Government, finding a lack of architecture for knowledge transfer between academia and the services sectors – vital if services businesses are to continue to innovate and grow, and an area where Government should play a role (more detail is given in section 3.2). CST also described how Government can better meet its own objectives and stimulate innovation in business, particular smaller businesses, through better use of public procurement.

Since taking up these topics, CST has been pleased to see them being addressed by Government. In the recent 'Transforming Government Procurement' document from the Treasury, it is recognised that "the Government needs to make the most of innovations being developed in the world-class UK science base" and that departments will be

encouraged to interact with the science base on major complex procurements where advanced technology can play a role. DTI has also established a team to provide better cross-departmental focus for the services sector.

Box 2 Impact of the report on personal datasets

CST's report "Better use of personal information: opportunities and risks", launched in November 2005, described how the use of personal data by Government offers enormous benefits, with the potential to create more efficient and accessible public services, but that risks must be addressed in order to secure these benefits.

Key recommendations included the need for:

- extensive public engagement with the public and civil society groups
- regulatory and governance frameworks to minimise the risks
- research into privacy enhancing technologies
- the creation of federated databases rather than a single database.

The announcement in January 2007 from No10 and the Department of Work and Pensions on proposals to link Government databases and set up Citizens' Juries to understand people's privacy concerns reflects the recommendations set out in our report, and which we outlined to the Prime Minister. Government has also been developing a data sharing strategy, for launch in 2007.

The Government formally responds to all of CST's reports, and we have, in general, been content with the quality and timeliness with these responses. We have a number of examples where government policy has developed in directions which our reports have recommended. The examples of CST's reports on personal datasets (box 2) and public dialogue (box 3) illustrate this.

Box 3 Impact of the Policy through Dialogue report

One of the underlying themes of CST's advice to Government has been that of public dialogue and stakeholder engagement. In March 2005, CST published a report 'Policy through Dialogue' that encouraged Government to do more to engage the public in the development of science and technology based policies, or risk jeopardising the economic and social gains expected from the ten year investment framework for science and innovation.

The purpose of dialogue is to inform policy, not determine it. In approaching public engagement it is important that the issues are clearly articulated and that people have the freedom to re-define the issues in ways consistent with their values. Structured processes are needed that create a space in which the public, policy makers, other stakeholders and experts can engage in deliberative dialogue to re-evaluate their perspectives, evolve their thinking and explore ideas of mutual understanding which enable the outcomes to command acceptance and respect. CST's reports on personal datasets, energy and health impacts draw on these principles.

The Government responded to the report in September 2005, accepting the recommendations. CST welcomed the announcement in the December 2006 pre-budget report of the establishment of an expert resource centre for public dialogue on science and innovation, one of the key recommendations.

3 CST advice delivered during 2005/06

CST has produced a broad range of detailed reports over the last 18 months:

- Personal Datasets
- Innovation and Services
- Energy
- Procurement
- Health Impacts
- Universal Ethical Code for Scientists

CST has also responded directly to consultations on the Cooksey Review on Health Research, the reform of the Research Assessment Exercise, revising the Regulatory Impact Assessment and the European Institute of Technology.

Summaries of the advice given are set out below.

3.1 Personal Datasets

The objective of the Personal Datasets project was to understand the beneficial uses which could be made of the personal information stored in electronic databases, both now and in the future; what needed to change to enable these benefits to be achieved; and what needed to be in place to mitigate the risks. Two workshops were held in November 2004 and January 2005, attended by stakeholders from the research community, academia, business and Government. The ideas were tested through a process of reconvened focus groups with members of the public throughout July and August 2005

CST's report "Better use of personal information: opportunities and risks", launched in November 2005, described how the use of personal data by Government offers enormous benefits, with the potential to create more efficient and accessible public services, but that risks must be addressed in order to secure these benefits. Key recommendations are set out in Box 2.

3.2 Innovation in the Services Sectors

The objective of CST's services sector project was to understand more clearly the needs of services sector companies – which comprise over 70% of the economy and in some of the highest value-added areas – and how better to connect them to both the science base and Government. CST established a study group with DTI and Treasury to examine why apparently so little R&D expenditure is being performed within the UK services sector.

The challenge for Government is to understand services company needs, foster innovation, find ways to connect them to the research base and universities and develop an overall strategy to interacting with these important and high value-added sectors of business.

CST's recommendations, sent to the Prime Minister and Chancellor of the Exchequer covered five broad areas:

- the need for a better strategic focus for the services sector in Government;

- metrics – the level of innovation and R&D in the services sectors is not adequately captured;
- the misunderstanding between services companies and the science base because of different understandings of language – services businesses talk about knowledge, or know-how; universities talk about research, development;
- the lack of architecture for knowledge transfer between academia and the services sectors – vital if services businesses are to continue to innovate and grow and an area where Government should play a role;
- the perception that the regulatory burden has increased at the expense of innovation, commercialisation and growth.

3.3 Energy

CST published its first report on energy, An electricity supply strategy for the UK, in May 2005. The Government responded by inviting CST to discuss with the Minister for Energy how it might provide further advice as part of the Government's Energy review. CST was asked for the following:

- To produce a set of timelines for the development of key energy technologies and where the barriers were likely to be. This was delivered to the minister in April 2006.
- To organise a one-day conference, "Energy 2100" or "100 years on" with the Royal Academy of Engineering. This took place in May 2006 with the minister and 150 experts attending, provoking stimulating debate.
- To deliver a note on public engagement following discussions within DTI. CST subsequently identified two areas where deliberative dialogue could be valuable:
 - exploring the range of energy options appropriate (say at a regional or country level) and the factors that would make the different options more acceptable, for society and the environment, in the medium and long term.
 - how individuals and organizations can be supported and encouraged to change behaviour to reduce energy usage.

3.4 Health Impacts

The focus of this project was how potential health impacts are assessed and used in policy-making across Government other than the Department of Health. In defining the scope of the project CST wanted to consider examples of where policy making is successfully joined up, and those where it is not.

A set of case studies were developed to identify and describe policy processes, which demonstrate the benefits of assessing potential health impacts by Government departments or processes, which lead to unsatisfactory outcomes. A workshop was held in March 2006, attended by stakeholders from the research community, academia and Government to assist CST in developing recommendations.

CST's report, Health Impacts – a strategy across Government¹ was published in December 2006. The key message was that improving the health of the population as a whole, as well

1. <http://www.cst.gov.uk/cst/reports/files/personal-information/csthealthimpacts.pdf>

as reducing health inequalities, should be the business of all Government departments and not just the Department of Health. Similarly, the positive effects stemming from the large investments in modernising the NHS could be blunted if other Government departments did not take into account the health impacts of their policies.

The Report's recommendations covered the following areas:

- Consistency of the policy-making process – embedding health considerations at a very early stage of policy development and in a common and consistent way across Government
- the quality and availability of the evidence.
- public engagement and dialogue

Since the launch of the report CST has been liaising with the Department of Health and Cabinet Office to ensure that the report is considered by the Cabinet Sub-Committee on Public Health at the earliest opportunity.

3.5 Universal ethical code for scientists

During the latter half of 2004, Sir David King, the Government's Chief Scientific Adviser, convened a small working group to help him consider the issues around developing a universal ethical code of conduct for scientists. Rigour, Respect and Responsibility: A Universal Ethical Code for Scientists was the product of the group's work. Sir David King asked the CST, to consider how the code could be disseminated more widely and how, in practice, it could have a useful role.

Between May and November 2005, CST consulted widely across universities, professional bodies, research funders, industry bodies, schools and colleges and trade unions seeking feedback on the proposed code. Sixty-seven responses were received².

The proposed Code was warmly received and there was a general agreement that it could be a useful catalyst for stimulating debate and raising awareness among scientists of their ethical, professional and legal responsibilities. Two main roles were identified:

- educating and training new scientists, and
- informing and supporting the development of more specific codes.

On 13 March 2007, as part of National Science and Engineering Week, Sir David King will be challenging the wider scientific community to adopt Rigour, Respect and Responsibility – a Universal Ethical Code for Scientists. This follows a successful pilot involving several Government agencies and of course the consultation exercise conducted by CST.

3.6 Consultation response on revising the Regulatory Impact Assessment

CST responded directly to the Better Regulation Executive consultation on proposals to revise the Regulatory Impact Assessment (RIA). A proposal was that health issues be decoupled from the RIA, whereas CST's report on Health Impacts had recommended that health issues need to be more focussed and visible within the RIA process.

2. A full list of respondees and conclusions drawn by CST can be found at <http://www.cst.gov.uk/cst/reports/#11>

Our letter in response to the consultation made clear that any such decoupling would need a mandatory mechanism to be in place that covered health issues. We are concerned that if this decoupling goes ahead without safeguards, the Government's objective of improving the health of the population as a whole may be placed in jeopardy.

We welcome the fact that Government has decided to consider this consultation further, in the light of CST's and others' concerns, before setting out its proposals in this area. We look forward to further discussions of these important issues.

3.7 Consultation response on Research Assessment Exercise Reform

The consultation proposed a metrics-based research assessment and funding system to replace the Research Assessment Exercise after 2008. CST's response³ recognised that the RAE has been beneficial in maintaining the excellence and international competitiveness of UK university research but that it had also produced a number of undesirable effects that must be addressed as a pre-requisite to reform of the system. Our response sets out how a new research assessment and funding system would avoid the drawbacks, and so help to maintain and strengthen the UK Science Base.

In particular, CST considered that a future system for quality-related (QR) funding must:

- continue to recognise international excellence as a key parameter; but also
- acknowledge the diverse roles that universities play in the economy and society, rewarding a greater range of activity;
- be effective at funding interdisciplinary research; and
- reduce the bureaucratic burden.

CST did not believe that the proposals set out in the consultation document went far enough to meeting the last two criteria.

3.8 Consultation response to Cooksey Review on Health Research

CST's responded to Sir David Cooksey's review of the best institutional arrangements for the new single fund for health research, with three key principles

- The new health research fund should operate at arm's length from Government, sitting within RCUK.
- The value of R&D in the NHS must be fully recognised and reflect healthcare requirements for the 21st century.
- The opportunities to drive innovation in the NHS should not be lost.

The results of the Cooksey Review recommended a more strategic approach to the planning, funding and delivery of health research. Key to this is the recommendation that a new Office for Strategic Coordination of Health Research (OSCHR) be established.

3. can be found in full at <http://www.cst.gov.uk/cst/news/>

3.9 Consultation response on the Efficiency and Effectiveness of Peer Review

During RCUK's consultation exercise on the efficiency and effectiveness of peer review, the Chief Executive of the RCUK Executive Group, Professor Ian Diamond met with CST. The discussion fed into the consultation with the following points being made:

- The most important objective for peer review was to ensure that the best research was supported within the UK.
- The consultation was based on imperfect questions and that this review of the peer review process was a missed opportunity focusing on controlling costs rather than improving effectiveness.
- Of the options set out in the consultation document, most support was associated with the consolidation option particularly as applied to the award of longer grants
- Research Councils should carefully consider the potential impacts and consequences for supporting high risk or multidisciplinary research.

Once responses to the consultation have been compiled, CST will seek to meet with RCUK for further discussions as the recommendations are being developed.

3.10 Consultation response on the European Institute of Technology

The European Commission's proposals for the development of a European Institute of Technology (EIT) were put out to consultation in the summer of 2006. CST wrote to Jan Figel, European Commissioner for Education, Training, Culture and Multilingualism raising the following points:

- Funds earmarked for the EIT could be better spent supporting initiatives such as the European Research Council.
- The Commission's proposal to offer its own degrees through an EIT rather than to work in collaboration with existing institutions is a retrograde step.
- CST is also concerned about the Commission's top-down approach, rather than a bottom-up approach in collaboration with industry and existing research institutions.

The Commission communication of October 2006 recognised some of the points that CST amongst others highlighted with a small central governance structure for EIT and a network of 'Knowledge and Innovation Communities', which will carry out the tasks of the EIT.

3.11 Rewarding Universities

Sir Keith O'Nions, Director General of the Research Councils, asked CST for advice on how the contribution of non-research-intensive universities could be better valued and rewarded, to feed into the Government's Comprehensive Spending Review. CST's advice, sent in January 2007, set out the following principles:

- We should avoid categorising Universities as either research-intensive or non-research-intensive. This implies uniformity within a single institution that simply does not exist.

- We must maintain a competitive environment that permits institutions or parts of them to develop new areas of excellence.
- Excellence in a range of outputs delivered by universities, rather than solely international research excellence, should be valued and rewarded.

Issues raised included: rewarding universities' diversity whereby the funding landscape is broadened so that a stream or streams of money are available to reward university excellence in the full range of activities that they are involved in; mechanisms and metrics – setting out some possible options which, separately or together, might inform a new funding regime. Options touched upon include extension of QR funding, regional funding, offering a strategic alternative to QR, business drivers and the use of metrics.

4 Current CST projects

4.1 Research Endeavour

The CST Research Endeavour subgroup⁴ is considering how the UK should position its research base so that it continues to be fit for purpose in 20 years time. There are two main components in this – the high quality people that the science base needs to continue to attract, and the university structures that need to evolve.

Having highly motivated young researchers at PhD and Post-Doctoral levels is central to ensuring that the UK continues to punch above its weight in terms of research excellence in our universities. Recommendations are being developed, helped by a 'Young Researchers' workshop organised in June 2006, a study by Technopolis Ltd, which reviewed available evidence, and a workshop and dinner/discussion hosted by the Foundation of Science and Technology in February 2007 entitled "does the UK offer an effective career path for young scientists and engineers who wish to stay in research".

A report is expected to be published in the spring of 2007.

4.2 Innovation and Wealth Creation

A short project looking at Innovation Barriers to Growth in High-Technology SMEs: The Role of Absorptive Capacity is being conclude. CST has worked with two leading academics⁵ to develop case studies of five emergent SMEs in the UK fuel cell sector in their second stage of development, and consider ways in which Government policy may impact/assist their growth.

CST is also exploring the role that Corporate Venturing could play in providing access to management and finance and other resources for technology based small firms and whether there was a role for Government in this whole area.

4.3 Nanotechnologies

At the request of Government, CST is reviewing progress on actions set out in the Government's response to the Royal Society/Royal Academy of Engineering report "Nanoscience and Nanotechnologies: opportunities and uncertainties". A Nanotechnologies subgroup⁶ has been established to lead this work. As part of its review, CST issued a call for evidence in July, held a seminar in September 2006 which looked at recent developments in nanoscience and nanotechnologies, undertook a fact-finding mission to Germany and held a series of meetings with a wide range of stakeholders from within Government, industry and non-Government organisations. The report will be published in spring 2007.

4. Membership of the Research Endeavour subgroup comprises: Professor Wendy Hall (convenor), Professor Kathy Sykes, Professor Geoffrey Boulton, Dr Sue Ion, Professor Michael Sterling and Sir Paul Nurse

5. Andy Cosh, Assistant Director of the Centre for Business Research, Cambridge University and Chris Hendry, Centenary Professor in Organisational Behaviour and Associate Dean for Research, Cass Business School, City of London University

6. Membership of the Nanotechnology subgroup comprises: Sir John Beringer (convenor), Dr Sue Ion, Professor Geoffrey Boulton, Dr Hermann Hauser and Mr Andrew Gould

5 CST future work

5.1 Strategic Focus

CST is being commissioned by the Secretary of State for Trade and Industry on Strategic Focus, to advise Government on what would be the best areas to focus resources for science, technology and innovation which could lead to applications in around five years time. This work would be carried out within the context of the Government's five Comprehensive Spending Review challenges of globalisation, demographic and socio-economic change, climate and environmental change, global uncertainty and, most particularly, technological change – looking at acceleration in the pace of innovation.

Within this context CST will look to develop a basic methodology that Government might use in the future to make better choices between competing areas for science and technology funding. The methodology used will be important, not just for this project but also as a set of general principles and techniques that can be used in the future.

