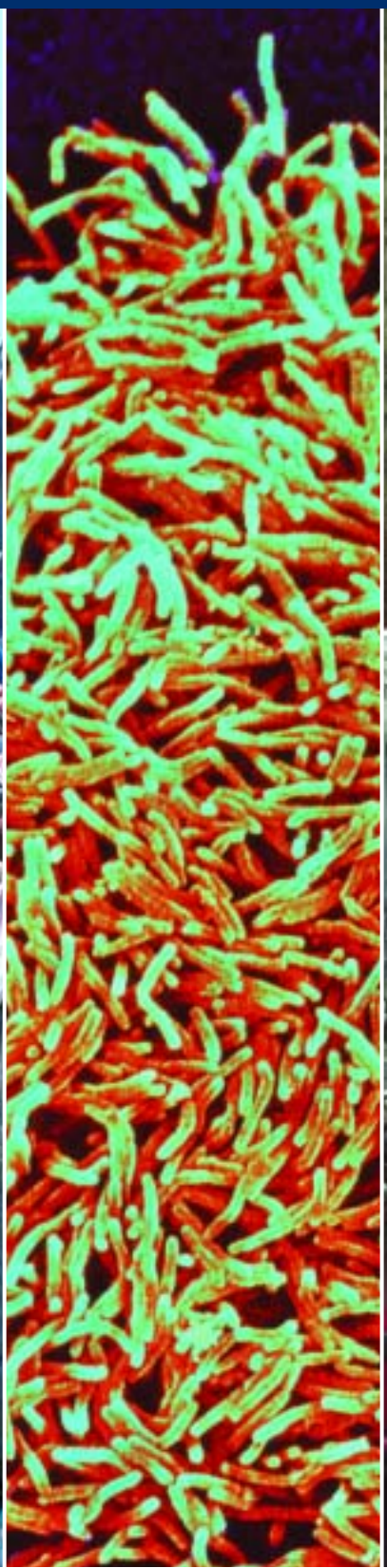
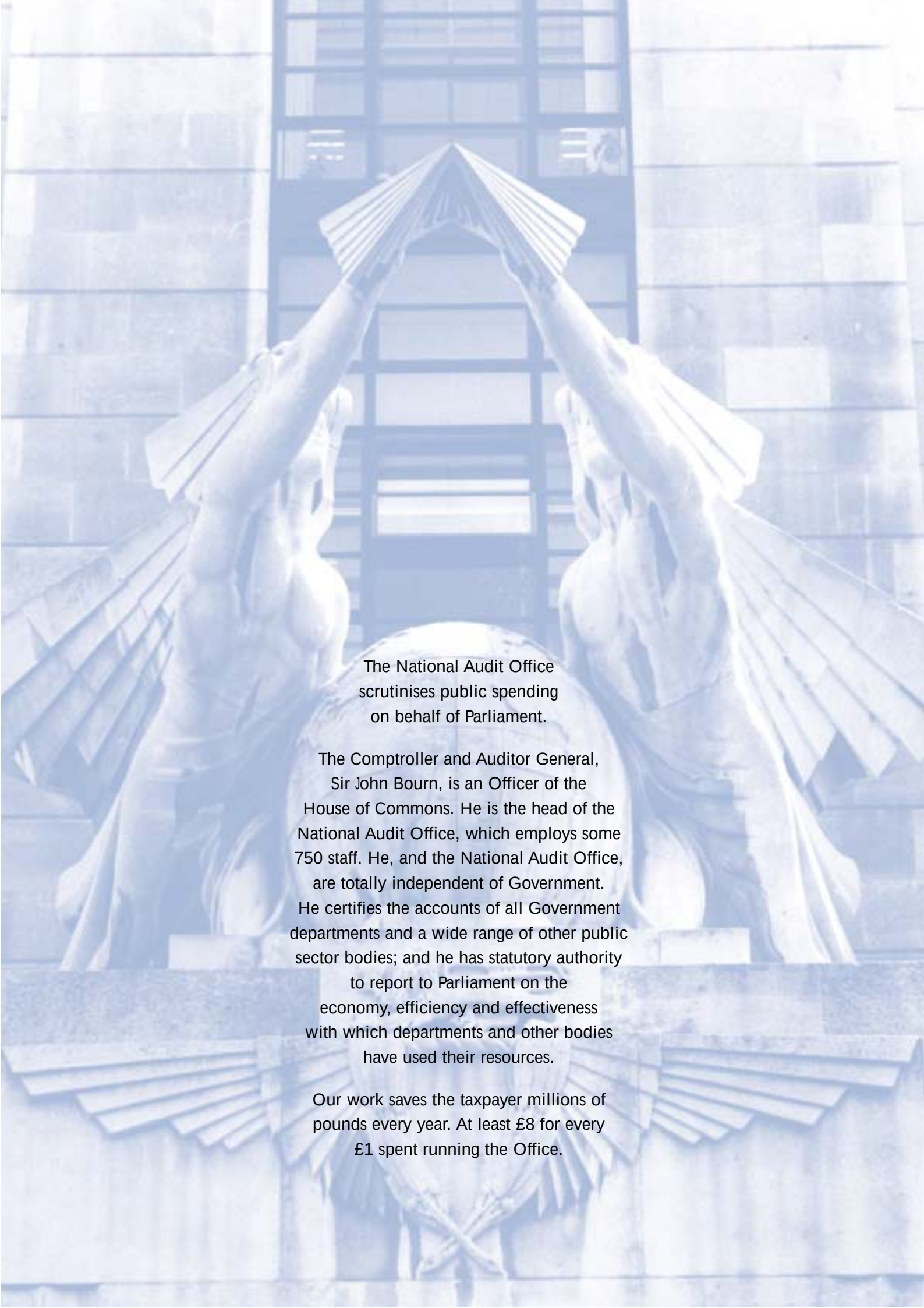
NATIONAL AUDIT OFFICE

Getting the evidence: Using research in policy making

REPORT BY THE COMPTROLLER AND AUDITOR GENERAL
HC 586-I Session 2002-2003: 16 April 2003



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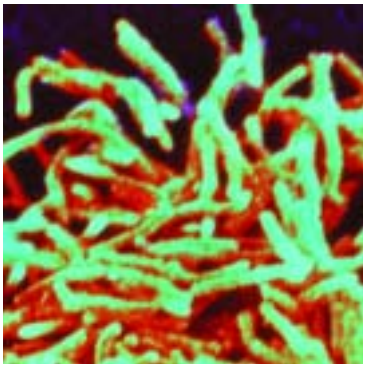

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John Bourn
Comptroller and Auditor General

National Audit Office
10 April 2003

This study was contracted out to RAND Europe. The core project team was led by Dr Jonathan Grant with support from Silvia Anton, Mirjam van het Loo and Dr Sally Ann Law.

This report can be found on the National Audit Office web site at www.nao.gov.uk

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Contents

Cover panel photographs represent research activities examined in departmental case studies in this report: The Department for International Development's Social Science research; the Department for Environment, Food and Rural Affairs animal tuberculosis research; the Office of the Deputy Prime Minister's housing, homelessness, urban and planning research; and research by the Centre for Environment, Fisheries and Aquaculture Science on managing fish stocks.

Foreword

Foreword by the Comptroller and Auditor General

This report presents the results of a value for money examination of how government departments commission research and how well that research is being used to improve service delivery and develop policies. The aims of the study were to assess how government departments are procuring research against the background of the Office of Science and Technology's programme of rolling reviews of department research, as recommended in the "Cross-Cutting Review of Science and Research" and in the government's science strategy, "Investing in Innovation".

The Executive Summary of this report outlines our key findings and conclusions. In summary, these are:

- Departments, with the support of the Office of Science and Technology, need to be clear about their strategic research aims and establish coherent systems for procuring research - including its commissioning, quality assurance and use.
- Departments, with the support of the Office of Science and Technology, need to be proactive and innovative in the way they disseminate and use research findings.
- Departments, with the support of the Office of Science and Technology, need to identify and share best practice and thus improve the effectiveness of commissioning, managing and using research.

This report makes recommendations for the Office of Science and Technology, departments who procure research and the Office for National Statistics. Part One explains the motivation for the study and our methods. The remainder of the report is structured around three different stakeholder perspectives - research managers (Part Two), research providers (Part Three) and research users (Part Four). In addition we have published a supporting paper, "An international review on Governments' research procurement strategies", comparing how five other countries procure research, which is also available on the NAO (www.nao.gov.uk) and RAND Europe (www.randeurope.org) websites.

The report identifies good practice that might be followed by departments that are involved in commissioning and managing research and ensuring that it is used effectively to inform service delivery.

executive summary

In this section

1 The Government's Science, Engineering and Technology budget in 2000/01 was £7.2 billion or 0.7% of GDP. As illustrated in **Figures 1 and 2**, civil government departments spent £1.4 billion on research and development in support of a number of different objectives. For example, the Department for Environment, Food and Rural Affairs commissions research to inform its policy on managing fish stocks and the Home Office commissions research into effectiveness of current and future crime prevention measures. Each department is responsible for identifying its research needs, for setting research strategies, for determining its research budgets, for procuring the research, managing it and assuring that research supports its departmental objectives.

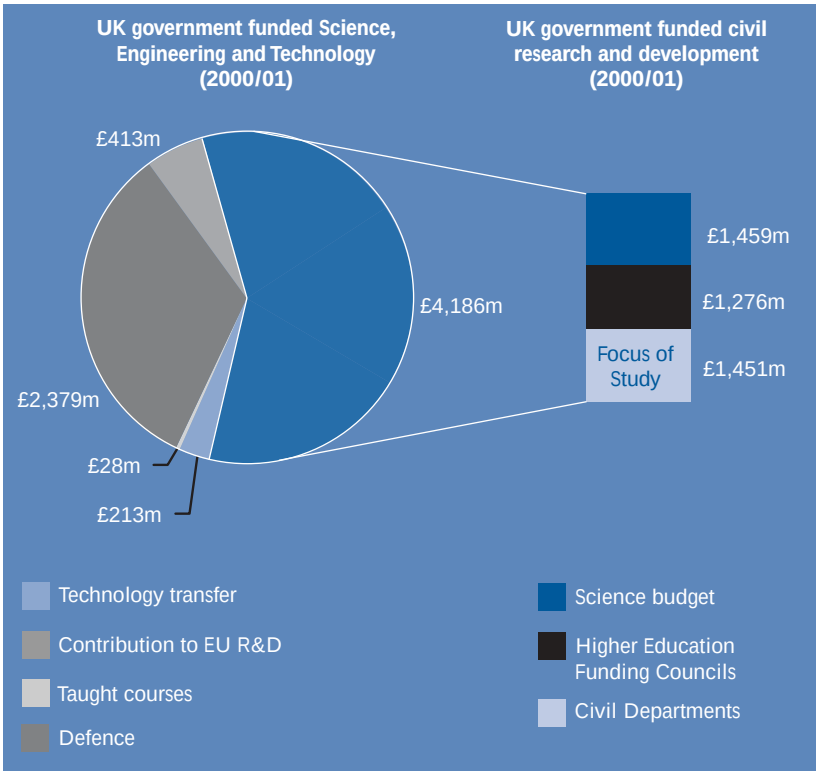
2 The Office of Science and Technology has a central role in formulating policy aimed at improving the way in which research is used across government. Following the publication of the "Cross-Cutting Review of Science and Research" and the government's science strategy, "Investing in Innovation", the Office of Science and Technology is implementing a rolling programme of external scrutiny and benchmarking of departments' research activities to facilitate the exchange of good practice and to encourage improvements in the ways departments use and manage research.

3 This report assesses how government departments procure research, against the background of the Office of Science and Technology's programme of rolling reviews. It is based upon an assessment of research activities in three government departments and an international review comparing how five other countries procure research, as well as discussions with other departments and stakeholders. The departmental case studies were: the Department for Environment, Food and Rural Affairs' food borne zoonoses[1] and (animal) tuberculosis research programme plus one of its Executive Agencies, the Centre for Environment, Fisheries and Aquaculture Science; the Department for International Development's Social Science Research Unit; and the Office of the Deputy Prime Minister's housing, homelessness, urban and planning research programme.

4 The report is structured around three different stakeholder perspectives - research managers, research providers and research users - and draws out wider messages about the management, provision, dissemination and use of research.

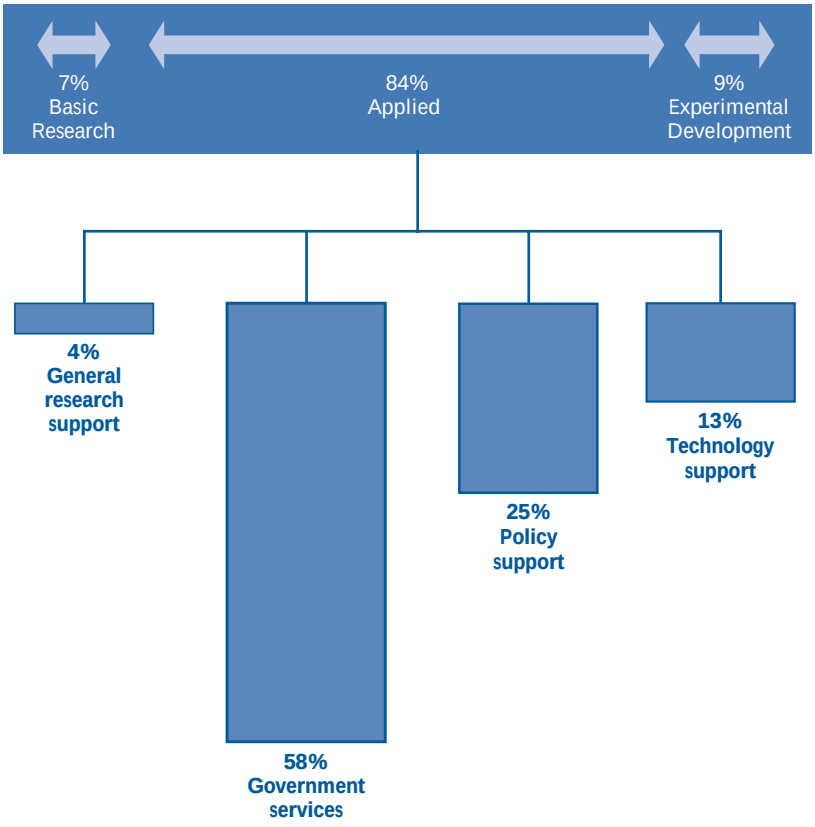
1 *Zoonoses is the transmission of animal diseases into humans.*

1 Government expenditure on science, engineering and technology



Source: Science, Engineering and Technology (SET) Statistics

2 Activities and purposes of Government department research



Key findings

5 We have made a number of observations that are applicable to research managers, research providers and research users, and we have identified areas of best practice based on innovative examples of how departments manage research.

6 **On strategy** - Following the publication of the 2000 White Paper "Excellence and Opportunity: A Science and Innovation Strategy for the 21st Century", most departments have developed and published science and innovation strategies in support of their objectives. These documents set out the purpose of the departments' research and development activities in the context of the departments' over-arching objectives and Public Service Agreements. In formulating their science and innovation strategies, departments need to have a clear understanding of their long-term strategic research aims, including future demand (i.e., research questions) and supply (i.e., research capacity and capability) of research, and consult research users to help identify and prioritise their research requirements.

7 Examples of best practice in this regard include: (a) a fellowship programme jointly funded between the Office of the Deputy Prime Minister and the Economic and Social Research Council which explicitly aims to build research capacity in both technical excellence and strategic thinking; and (b) the Department for Environment, Food and Rural Affairs' horizon scanning research programme which aims to identify emergent risks affecting its policy domains (such as the increasing prevalence of tuberculosis in cattle), and to explore novel ways of framing long-term research problems, by consulting both research users and providers.

8 **On statistics** - There is uncertainty about the calculation and reporting of research and development budgets. In our study we depended on the research and development statistics compiled by the Office for National Statistics. However, departments queried their accuracy and utility. Despite the Office for National Statistics' efforts to confirm data accuracy with departments and provide assistance with any difficulties in the provision of data, departments sometimes find it difficult to work with the official internationally agreed definitions and they sometimes run duplicate procedures for calculating and reporting research and development budgets. As a consequence, departments may present information in different ways to the outside world, and comparability of data provided by the different departments is not guaranteed.

9 **On commissioning** - Departments have to make a number of different choices when commissioning research. They can opt for either a direct competition (where a detailed specification is prepared) or an indirect competition (where departments issue a call for research in a broad topic, such as poverty elimination); for an open competition (which is advertised to all interested parties) or a closed competition (which is limited to invited providers); and for formal competition (using pre-specified objective criteria for evaluating bids) or an informal competition (relying on professional judgement and expertise). These decisions need to be made in the context of EC procurement law and in accordance with guidance and good practice promulgated by the Office of Government Commerce.

10 The appropriate approach will be determined by the strategic research aim of the department and an assessment of the transaction costs associated with commissioning research. For example:

- The Department for International Development's Social Science Research Unit runs a Responsive Research Programme that commissions a wide range of research activities in support of the department's objectives. As the aim of the programme is to encourage researchers to generate and answer relevant research questions, the competition is open (to encourage new ideas) and indirect and informal (as there is no pre-specified research question or methodology). In evaluating research proposals over £100,000 to the Responsive Research Programme, the Social Science Research Unit seeks professional judgement from technical experts (such as academics) to review the quality of the proposed research, and research users (such as internal policy staff) to review the relevance of the proposal in supporting the department's objective. This combination of technical and relevance review helps ensure the utility of the research and its translation into practice.
- One of the objectives of the Office of the Deputy Prime Minister's housing, homelessness, urban and planning research programme is to answer specific research questions and therefore it operates a policy of phased competitive tendering for contracts. For regular research projects, expressions of interest are submitted by potential contractors and are used as the basis for selecting 3-6 suitable organisations to tender for research contracts. This ensures that transaction costs are kept to a minimum, without preventing new entrants from submitting an expression of interest.

11 **On quality assurance** - Following the confusion at the Institute of Animal Health in 2001 over the origin and composition of sheep and cattle brain samples whilst testing for the presence of BSE in the national flock, the Department for Environment, Food and Rural Affairs is, in consultation with others, drafting a code of practice for quality assurance. Initially, research providers will be expected to make efforts to comply with the code, which will be auditable. In the longer term, the Department will expect compliance with formal standards. The draft code distinguishes between the quality of the science, which addresses the aims and methods of the project, and the quality of the research process, which addresses the procedures used to gather and interpret data. In requiring providers to assure the quality of the research process, departments need to be certain that the system is appropriate for the type of research and that the additional costs incurred ensure value for money by providing greater confidence in the reliability of the findings.

12 **On knowledge transfer** - Getting research into practice is widely acknowledged to be a difficult process. For research with potential commercial outcomes, a number of schemes are available to help researchers realise the economic potential of their findings, such as seed funding for protocol and pre-market development. However, for research that aims to improve service delivery and inform policy, the outcomes often are not commercially exploitable. Yet, for non-commercial research, there is also a need to help researchers realise the social benefits of their

findings. It is especially important as policymakers often describe research reports as being inaccessible. Research managers are aware of this and have experimented with a number of different approaches. Examples of best practice include: (a) id21, an internet dissemination service (www.id21.org) established and funded by the Department for International Development to communicate research findings to policymakers and practitioners; and (b), the concept of 'Linkage and Exchange' developed by the Canadian Health Services Research Foundation to involve policymakers in all stages of the research procurement process, on the premise that this is the best predictor for seeing research findings applied.

13 **On evaluation** - Although government departments carry out evaluations of ongoing and completed research, they have no systematic mechanisms for measuring the overall impact of their research effort, or for identifying and sharing best practice through interdepartmental benchmarking. Measuring the performance and results of research is problematical as they are often not quantifiable and it is difficult to attribute a policy impact to a particular research result. Despite this, it is important that those responsible for research in departments can justify the need for research and ensure its quality and relevance. In recognition of this, the Office of Science and Technology is developing a new programme of external scrutiny of departments' research programmes. This should include: the development of a common evaluation framework; the use of standardised research performance indicators; consultation with research users and providers; peer review to assess department research programmes; and the dissemination of best practice amongst departments.

Key conclusions

14 Our findings show that departments, with the support of the Office of Science and Technology, have been modernising the way they procure research. This is to be welcomed and encouraged, and the following conclusions support a continuation and consolidation of that process.

15 **More strategic focus on the use and management of research.** Given the different objectives of departments, diversity in the way they obtain and manage research should be expected. Even so, the types of strategic research aims identified by government departments have an effect on the most appropriate way to commission research and to assure its quality. Therefore, it is important that departments, with the support of the Office of Science and Technology, are clear about their strategic research aims and have coherent systems for procuring research - including its commissioning, quality assurance and use.

16 **More proactive and innovative dissemination of research findings.** The early involvement of potential users of the research will increase the likelihood that research results will be utilised. There is evidence from the literature and from this study that passive dissemination of research findings is not sufficient to ensure that research findings are used to improve service delivery and to inform policy. Departments, with the support of the Office of Science and Technology, need to develop targeted and innovative ways to ensure that the potential impact of research is fully realised. Fuller and earlier dissemination should result in clearer and more efficient demands for research from users and therefore more value for money in research procurement and production.

17 **More interdepartmental learning.** Departments and the Office of Science and Technology could do more to identify and share best practice and thus improve the effectiveness of commissioning, managing and using research. By implementing a programme of external reviews and interdepartmental benchmarking, the Office of Science and Technology should be able to identify best practice and consider how this will be shared with departments. The involvement of research providers and research users in this process will ensure that this learning is informed by and transferred between the different stakeholder groups.

Key recommendations

18 On the basis of these conclusions we make seven recommendations intended to help departments improve the way they procure, manage, use and disseminate research. These are outlined below, along with the aim and context of the recommendation and those we see as being ultimately responsible for their implementation.

	Recommendation	Aim	Context	Responsibility
A	**For departments, with the support of the Office of Science and Technology**			
A1	Departments should clearly state their strategic research aims for procuring and using research. (Paragraphs 6 - 7 of the Executive Summary & 2.4 - 2.8 of the Main Report).	To encourage clarity of thinking in developing science and innovation strategies.	We found that the strategic research aims of a department affect the way research is commissioned and its quality assured.	Department Chief Scientific Adviser or other equivalent heads of profession.
A2	Departments should review the ways they commission different types of research. (Paragraphs 9 - 10 of the Executive Summary & 2.11- 2.16 of the Main report).	To ensure that commissioning processes are 'fit-for-the-research-purpose' and cost effective.	We found that it is good practice that commissioning processes for research differ by research aim.	Department Chief Scientific Adviser or other equivalent heads of profession with advice from department procurement officers.
A3	Departments should use quality assurance systems of the research process, but ensure they are appropriate and cost-beneficial. (Paragraphs 11 of the Executive Summary & 3.8 - 3.11 of the Main report).	To ensure that research is conducted to the highest standards, without sacrificing cutting-edge innovative research.	We found that the Department for the Environment, Food and Rural Affairs is implementing a system to assure the quality of the research process.	Department Chief Scientific Adviser or other equivalent heads of profession.
A4	Departments should identify their primary research users and maximise the potential for involving them at all stages of the research process. (Paragraphs 12 of the Executive Summary & 4.1 - 4.12 of the Main Report).	To encourage the procurement of user-relevant research and therefore its utilisation in improving service delivery and informing policy.	We found that the early involvement of potential users of research will increase the likelihood that results will be utilised.	Department research programme managers or other equivalent heads of profession, and policymakers.

	Recommendation	Aim	Context	Responsibility
B	**For the Office of Science and Technology, with the support of departments**			
B1	The Office of Science and Technology should establish an interdepartmental network of research managers. (Paragraph 2.19).	To facilitate the sharing of best practice between departments.	During our study, we found ourselves sharing experiences and best practices amongst departments.	Chief Scientific Adviser and the Office of Science and Technology.
B2	The Office of Science and Technology should review the incentives and barriers to the translation of non-commercial research findings. (Paragraphs 12 of the Executive Summary & 4.13 - 4.16 of the Main Report).	To help ensure that research improves service delivery and informs policy by identifying innovative ways for disseminating research findings.	We found that users felt that research was not adequately disseminated and translated into policy relevant findings in order to review and inform policymaking.	Chief Scientific Adviser and the Office of Science and Technology.
C	**For the Office for National Statistics, with support from the Office of Science and Technology and departments**			
C1	The Office for National Statistics, with support from the Office of Science and Technology and departments, should take into account the findings of this report as part of the Office for National Statistics' planned review of the collection of R&D data from departments. Specifically this review should assess how the Office for National Statistics obligations to collect data to an internationally agreed definition can be aligned with the business need of departments. (Paragraphs 8 of the Executive Summary & 2.9 -2.10 of the Main Report).	To collect and publish usable, reliable and comparable research and development expenditure statistics by department.	We found that departments queried the accuracy and utility of official research and development statistics, and found them difficult to work with.	Office for National Statistics.

Part 1 Introduction

The government's research base

1.1 Government departments commission social, economic, scientific, engineering and medical research to support their policy development and delivery of services to the public. For example, the Department for Environment, Food and Rural Affairs commissions research to inform its policy on managing fish stocks, the Department of Health commissions research into the treatment of cancer, and the Home Office commissions research into effectiveness of current and future crime prevention measures.

1.2 The National Audit Office have highlighted in a number of recent reports the important role of high quality research, including social research, in evidence-based policies and improved service delivery. For example, "Delivering the Commercialisation of Public Sector Science", reported on progress in capturing the economic benefits of scientific research funded by the taxpayer. "Modern Policy-Making: Ensuring Policies Deliver Value for Money", emphasised the need for departments to have staff with necessary research and analytical skills to understand policy questions. Finally, "Procurement of Equipment from Research Grants", demonstrated that better procurement of research equipment could release some £9.5 million a year to support other worthwhile research projects.

1.3 The Secretary of State for Trade and Industry has overall responsibility for the Government's science policy and support for science and technology as a whole in her cross-Departmental role as the Cabinet Minister for Science and Technology. In taking a broad view of national needs, the Secretary of State aims to strengthen the United Kingdom's science and technology capabilities and to maximise their contribution to sustainable growth and productivity. The Department of Trade and Industry's Minister for Science and Innovation, and the Office of Science and Technology, support the Secretary of State in this role. The Head of the Office of Science and Technology is the Government's Chief Scientific Adviser, who advises the Prime Minister, the Cabinet, the Secretary of State for Trade and Industry and the Minister for Science and Innovation on science, engineering and technology matters. The Chief Scientific Adviser is supported principally by the Transdepartmental Science and Technology Group of the Office of Science and Technology. **Figure 3** shows the organisational structure of the civil government funded research community.

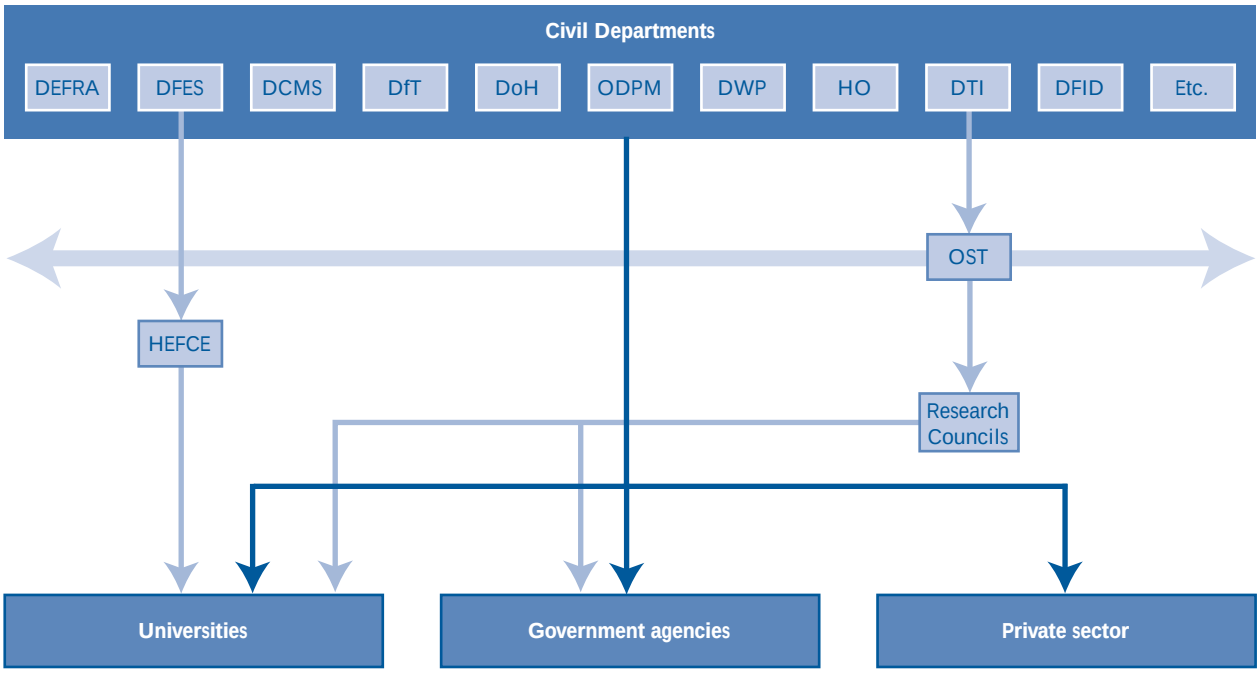
1.4 One of the roles of the Transdepartmental Science and Technology Group is to support the Minister for Science and Innovation and the Chief Scientific Adviser in strengthening the use of science in policy making, regulation, operations and procurement. Each department is responsible for identifying its own research needs, for setting research strategies, for determining research budgets, for procuring research, managing it and assuring that research supports departmental objectives. The Transdepartmental Science and Technology Group has introduced a number of initiatives, such as Guidelines 2000 on the use of scientific advice in policy making and the Code of Practice for Scientific Advisory Committees, aimed at improving the process of obtaining and using science and scientific advice.

What is research?

1.5 The Organisation for Economic Co-operation and Development has published guidance on how to describe and measure research and development activities in the Frascati Manual[2]. For the purposes of this study we have used the internationally agreed definition of research and development outlined in **Figure 4**. The manual is applied in a number of countries allowing for international comparisons and was last revised in 1993[3]. The 1993 revision followed a House of Lords Select Committee on Science and Technology report on definitions of research in 1989-90, and a National Audit Office report in 1991, on the classification of defence research and development expenditure. The National Audit Office report recommended that the (then) Central Statistical Office should encourage the Organisation for Economic Co-operation and Development to make a number of changes to the 1993 revision.

2 *Organisation for Economic Co-operation and Development (1993).*
3 *A new revision of the Frascati Manual is expected in April 2003.*

3 Organisation of department research



DEFRA = Department for Environment, Food & Rural Affairs
DFES = Department for Education and Skills
DCMS = Department for Culture, Media and Sport
DfT = Department for Transport
DH = Department of Health
ODPM = Office of the Deputy Prime Minister
DWP = Department for Work and Pensions
HO = Home Office
DTI = Department of Trade and Industry
DFID = Department for International Development
HEFCE = Higher Education Funding Council for England
OST = Office of Science and Technology

Source: RAND Europe

Civil department expenditure on Research and Development

1.6 Collectively, the UK Government's civil research and development budget in 2000/01 was £4.2 billion. Figure 4 shows that civil research and development expenditure includes the science budget (i.e., Research Council spend), research money for the Higher Education Funding Councils (i.e., used to fund the indirect costs of research in universities) and civil department research and development budgets. In 2000/01, civil departments spent £1.4 billion on research and development. About 60 percent of civil departments' research and development spend is on service provision, and 80 percent is used in support of applied research.

Reviewing research

1.7 As summarised in Appendix 1, since the Comprehensive Spending Review, a number of studies have been commissioned assessing the funding of the United Kingdom science base to ensure that they deliver maximum long-term benefits to the economy and quality of life. These studies examined:

- The amount of time academics spend on teaching, research and other activities;
- The commercial exploitation of research in Public Sector Research Establishments;
- The funding of research infrastructure in universities; and
- The supply of scientists and engineers to UK business and universities;

The Government's "Cross-Cutting Review of Science and Research" and its science strategy "Investing in innovation" were informed by these studies.

Our objectives and our methods

1.8 An in-depth assessment of how government departments commission research and how well it is being used to improve service delivery and develop policies is missing from Appendix 1. We therefore undertook this study to:

- Assess how government departments are procuring research, by:
  - describing departments' research procurement processes, including the assessment of research needs, ways of commissioning, managing and using research, the dissemination of research, and the evaluation of research;
  - assessing the strengths and weaknesses of different approaches;
  - suggesting how departments could improve research procurement processes.
- Inform the Office of Science and Technology's programme of rolling reviews of department research, as recommended in "Investing in Innovation".

1.9 The methods we used in this study are set out in detail in Appendix 2. The main features are:

- Review of civil research and development funding in the UK;
- Comparative literature review of civil research and development funding in the Netherlands, Finland, Germany, United States of America and Canada.
- Face-to-face interviews with ten members of the Chief Scientific Adviser's Committee or their representatives, and desk research on the departments.

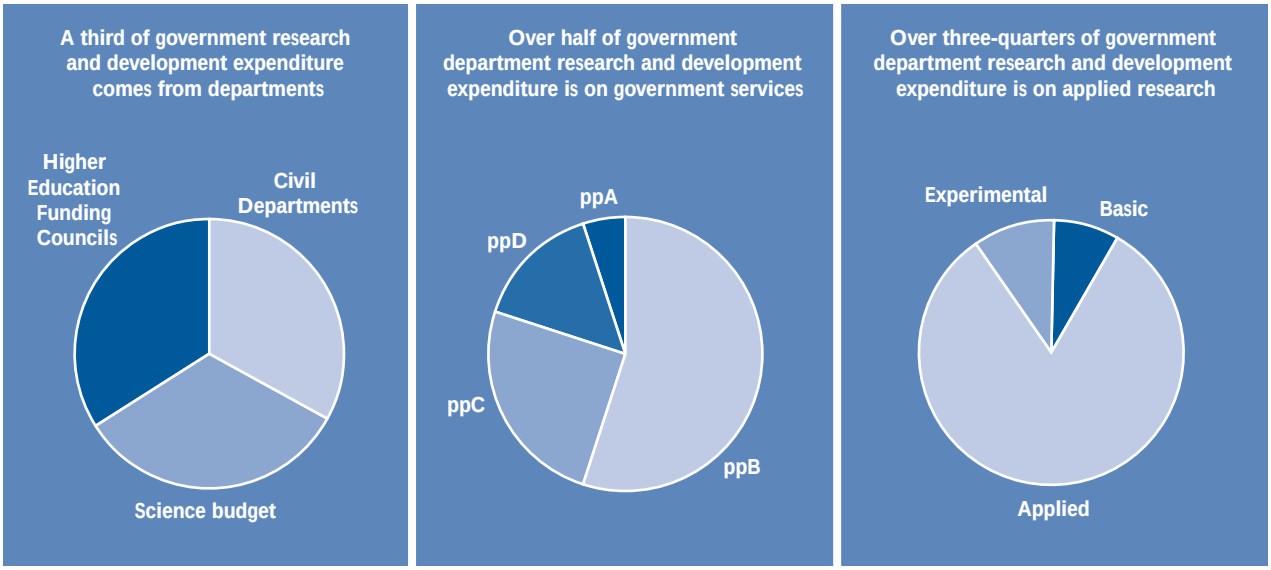
4 Describing and measuring research

The Organisation for Economic Co-operation and Development provides the most widely used international analyses of Research and Development (R&D) expenditures, under the guidance of the Frascati Manual which sets out how to describe and measure R&D activities. The Frascati Manual subdivides R&D into three related activities:

- **basic research** is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view;
- **applied research** is also original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective; and
- **experimental development** is systematic work drawing on existing knowledge gained from research and practical experience that is directed to producing new materials, products or devices; to installing new processes, systems or services; or to improving substantially those already produced or installed.

Unlike the Frascati categories, which deal only with the classification of the R&D, it is also useful to know why the R&D is being funded by the public sector. This is known as the primary purpose (pp). For R&D funded by Government, the primary purposes are:

- **ppA, general support for research -** all basic and applied R&D which advances knowledge for its own sake; support for postgraduate research studentships;
- **ppB, government services -** R&D relevant to any aspect of Government service provision (all defence included here);
- **ppC, policy support -** R&D which Government funds to inform policy (excluding ppB and ppD) and for monitoring developments of significance for the welfare of the population;
- **ppD, technology support -** applied R&D that advances technology underpinning the UK economy (but excluding defence). The category includes strategic as well as applied research, and pre-competitive.



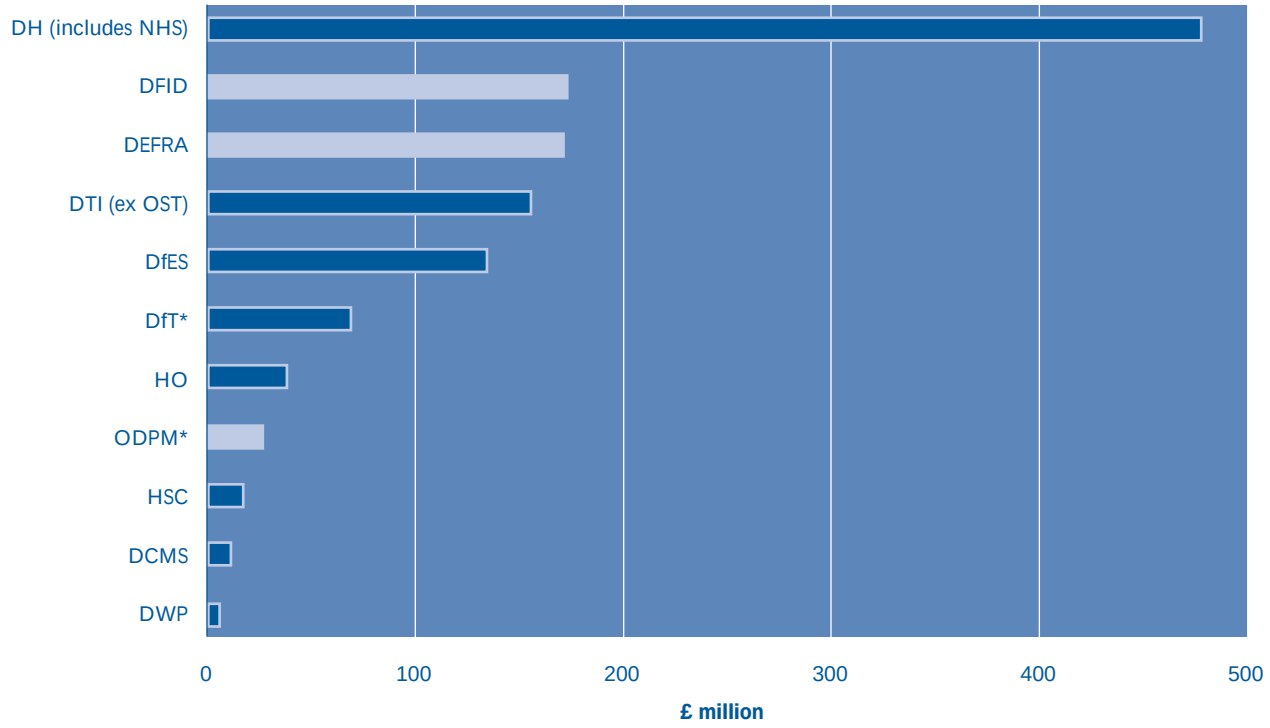
Source: Office for National Statistics; Science, Engineering and Technology (SET) Statistics

- Face-to-face interviews with other stakeholder groups including two Research Councils, Universities UK, the Food Standards Agency, the Ministry of Defence, the Cabinet Office and the Scottish Executive.
- In-depth case studies of three government departments (Department for International Development, Department for Environment, Food and Rural Affairs, and the Office of the Deputy Prime Minister). The case studies included:
  - document and web research;
  - face-to-face interviews with 40 research managers, research providers and research users;
  - postal survey of over 300 researchers;
  - telephone interviews with 26 research users.

1.10 The case study departments were selected to represent the range of research expenditure and practice across the Government's research base (see **Figure 5**). Within each department we selected research programmes to ensure we covered a number of different subject areas. Background information on the departments and the associated research programmes is provided in **Figure 6**.

1.11 We have structured the remainder of the report around the three stakeholder perspectives - research managers (Part Two), research providers (Part Three) and research users (Part Four). In addition we have published a supporting paper, "An international review on Governments' research procurement strategies", which is also available on the NAO (www.nao.gov.uk) and RAND Europe (www.randeurope.org) websites, comparing how other countries procure research.

5 Civil research and development expenditure by department, 2000/2001



NOTE

* ODPM and DfT figures are 2002/03 planned expenditure.

Source: Science, Engineering and Technology (SET) Statistics

6 Case study departments, research programmes and establishments

The **Department for International Development** (DFID) is the Government department responsible for promoting development and the reduction of poverty. Its aim is the elimination of poverty in poorer countries. The primary objective of DFID research programmes is to provide and share new knowledge on reducing poverty with policymakers and communities in developing and developed countries and to provide policy solutions.

- For our review of DFID research, we focused on the **Social Science Research Unit (SSRU)**. The SSRU aims to fund high quality research that is likely to be of practical relevance to poor people in developing and transitional countries. The SSRU is responsible for procurement of all social science research on development issues, and does not employ any in-house researchers. The SSRU funds research through its Responsive Research Programme or through Development Research Centres.
  - The **Responsive Research Programme** supports a wide range of investigator-articulated research that is capable of contributing to DFID's overall objectives.
  - The **Development Research Centres** are a new initiative to improve the integration of economic and social research, policy influencing and southern capacity building. The aims of these Centres are to generate policy-relevant research, which will help the wider development community and DFID to achieve their objectives.

In 2001/02 DFID spent £75.5 million on its central research programmes. Approximately 11% of this was allocated to the Social Science Research Unit.

The **Office of the Deputy Prime Minister** (ODPM) was created on the 29th May 2002 incorporating policy areas from both the former Department for Transport, Local Government and the Regions (DTLR) and the Cabinet Office. There are five policy Groups within ODPM: Housing, Homelessness, Urban Policy and Planning (HHUP); Local and Regional Government; Neighbourhood Renewal; Social Exclusion; and Regional Co-ordination. These are supported by six research programmes: Housing, Urban and Planning; Local and Regional Government; Neighbourhood Renewal; Social Exclusion; Fire; and Building Regulations.

- For our review of ODPM research, we focused on the **Housing, homelessness, urban and planning research programme.** The programme supports the whole of the HHUP Group and has strong links to other parts of ODPM. A major strand of policy supported by the Housing, homelessness, urban and planning research programme is housing policy, delivered by the Housing Directorate. The primary objective of the Housing Directorate is to ensure that everyone has the opportunity of a decent home and to promote social cohesion, well-being and self-dependence.

In total, ODPM spends £5.4 billion on its main programmes. It spends about £29 million on research related activities, the Housing, homelessness, urban and planning programme accounting for the largest share, about £13 million in 2002/03.

The **Department for Environment, Food and Rural Affairs** (DEFRA) is responsible for ensuring: a better environment at home and internationally, and sustainable use of natural resources; economic prosperity through sustainable farming, fishing, food, water and other industries that meet consumers' requirements; and, thriving economies and communities in rural areas, and a countryside for all to enjoy.

DEFRA spends around £250m annually on research and other scientific activities such as surveillance and monitoring. At any one time, DEFRA is responsible for around, 1500 ongoing research projects, aimed at supporting the Department's responsibilities.

- For our review of DEFRA research we focused on the **food borne zoonoses and (animal) tuberculosis** research programme and the **Centre for Environment Fisheries Aquaculture Science** (CEFAS). The Animal Health Directorate funds research into food borne zoonoses including tuberculosis, and acts on the basis of advice from Veterinary Teams concerned with, amongst others, zoonoses and endemic diseases. The principal aim of the tuberculosis and food borne zoonoses research is protecting public health in relation to food and to animal disease transmissible to humans, and comprises a substantial set of sub programmes amounting to £8.1 million in 2000/01.
- Other advisory structures within DEFRA exist through its Executive Agencies such as CEFAS. It represents a scientific research and advisory centre for fisheries management and environmental protection. Its main aim is to present a source of high quality scientific support to DEFRA and other customers. The majority of research commissioned by DEFRA is provided by CEFAS in matters of fisheries, environment and aquaculture science.

Part 2

The research manager

2.1 The procurement of research by departments presents research managers with a number of challenges. First, there will be uncertainty about the value and the outcome of research. As a result there is always an inherent risk in procuring research. Second, there is often a long time interval between funding the research and its impact on policy becoming evident. The combination of these two challenges makes it even more important that those responsible for research and development in departments can demonstrate the need for and utility of high quality, relevant, research in support of departmental missions, aims and objectives.

2.2 The 2000 White Paper "Excellence and Opportunity: A Science and Innovation Strategy for the 21st Century", asked departments to develop and publish science and innovation strategies in support of departmental objectives. These documents set out the purpose of the departments' research activities in the context of the departments' over-arching objectives and Public Sector Agreements. The 2002 government science strategy, "Investing in Innovation", further required departments to include proposed budgets by research and development objectives and activities. In addition, it recommended that departments which use or commission an appreciable amount of research appoint a departmental Chief Scientific Adviser to ensure that the department's science activities are well directed and that policy is soundly based on good research, and to be the department's scientific spokesman to the outside world.

2.3 Partly as a result of these recommendations, departments have been giving considerable thought to their research and development strategy and organisational structure. In our study, the Department for International Development recently reviewed its research activity, whilst our other two case study departments - the Department for Environment, Food and Rural Affairs and the Office of the Deputy Prime Minister - were in different stages of organisational change following restructuring within Whitehall. The Department for Environment, Food and Rural Affairs was formed in June 2001 and brought together the Environment Protection Group and the Wildlife and Countryside Directorate from the former Department of the Environment, Transport and the Regions; all the functions of the former Ministry of Agriculture, Fisheries and Food; and responsibility for certain animal welfare issues and hunting with hounds from the Home Office. The Office of the Deputy Prime Minister was formed in May 2002, taking responsibility for policy areas from both the former Department for Transport, Local Government and the Regions and the Cabinet Office.

Departments have to be clear about their strategic research aims

2.4 In formulating and implementing their science and innovation strategies, departments need to have a good awareness of their short and long-term research requirements, and the current and future capacity and capability of research providers to meet those requirements. Based on this understanding, departments should be able to define their strategic research aims and determine the appropriate mechanisms for commissioning research and assuring its quality.

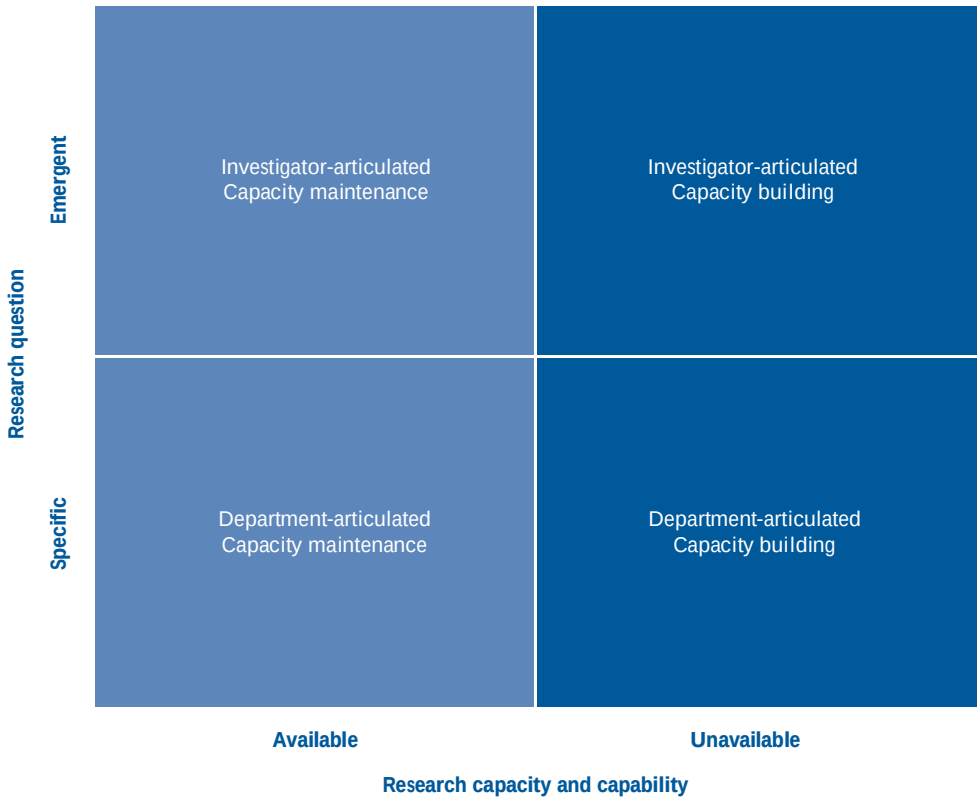
2.5 This is illustrated in **Figure 7**. On the vertical axis is the expression of the research question and on the other is the availability of research capacity and capability. If the department can specify the research question then the research will usually be department-articulated. If the question is emergent (because it is unknown, unforeseen or innovative), then the research question will usually be articulated by the investigator. In both instances, and as discussed in Part Four, the research question is being articulated on behalf of the research user. The availability of research capacity and capability takes the form of both human and physical capital and can include qualified personnel, as well as research equipment and infrastructure. Departments need to assess if there is suitable research capacity and capability to meet their research demands. Should they conclude that there is, the strategic aim will be to maintain that capacity and capability. Alternatively, they may conclude that there is not, then the department will have to ensure that research capacity and capability is developed.

2.6 In assessing research capacity and capability, departments can choose to buy research from outside vendors such as universities, independent research institutes, private companies etc., or can choose to develop and maintain an in-house function to conduct research. This report focuses on external research contractors (including public sector research establishments), primarily because the aim of the study is to assess how government departments procure research.

2.7 By combining the demand and supply characteristics in Figure 7, it is possible to identify four broad strategic research aims available to departments:

- **Investigator-articulated/capacity-maintenance research** will generate new knowledge that will inform future research and policy, and maintain a cadre of researchers capable of working at the cutting-edge of research problems. Typically, the outcome of this type of research will be unpredictable, and the research will be more 'basic' in nature. In the departments we looked at, this type of research was not widely supported, but an example from the Department for Environment, Food, and Rural Affairs would be when the Centre for Environment, Fisheries and Aquaculture Sciences identifies possible research questions internally before approaching the department with a list of research topics necessary to maintain their expert advisory function. The Centre for Environment, Fisheries and Aquaculture Sciences receives "seedcorn" funding to undertake its own research to help identify new threats and opportunities and to invest in scientific skills and capacity to support main programmes.
- **Investigator-articulated/capacity-building research** will also generate new knowledge, but will aim to increase the research capacity. Although the research outcomes will remain unpredictable, they would be expected to generate new research capacity by producing highly qualified people, new equipment etc. For example, the Development Research Centres established by the Department for International Development are centres of specialisation around a particular research and policy theme, usually identified by the research providers. In addition to research, the activities that may be funded as part of the contract include developing training materials, capacity building in developing countries and dissemination. The Centres thus have an explicit assignment to contribute to the building of research capacity in developing countries. Likewise, the Office of the Deputy Prime Minister is about to initiate a New Horizons programme to assist horizon scanning capabilities. It aims to identify potential new challenges over the next decade, seeking proposals

7 Classification of potential strategic research aims



Source: RAND Europe

from outside researchers. New ideas can be explored which would not normally be in the departments main research programmes and novel and innovative approaches to issues and research will be encouraged.

- **Department-articulated/capacity-maintenance research** will address a specific issue (for example, the evaluation of a new policy) and maintain a cadre of researchers capable of undertaking this type of research in the future. Typically, the range of possible outcomes to this type of research will be predictable, and the research will be more 'applied'. An example would be the Department for Environment, Food, and Rural Affairs' research focusing on improving policies for the prevention of tuberculosis transmission in cattle. In this case of scientific uncertainty about the roots of tuberculosis transmission in cattle, maintaining expertise in this disease area is crucial to effective policymaking in the future.
- **Department-articulated/capacity-building research** is quite rare. This type of research aims to address specific issues, and to train researchers in the necessary skills or to develop new research infrastructures for particular types of analysis. We found an innovative example of this research category at the Office of the Deputy Prime Minister in the housing, homelessness, urban and planning research programme. Explicitly aimed at building research capacity in both technical excellence and strategic thinking, the Office of the Deputy Prime Minister and the Economic and Social Research Council jointly fund research studentships for master and PhD students and postdoctoral research fellowships. The Economic and Social Research Council is responsible for the management of the scheme and the Office of the Deputy Prime Minister provides the research opportunities, guidance and publication/ dissemination support. A second phase of the scheme is to be launched in early 2003.

2.8 In developing science and innovation strategies, departments could use the framework presented in Figure 7 to clarify their strategic aims for different research programmes. This is not to say that departments should have equal amounts of research funding within the quadrants in Figure 7, and in practice there is likely to be some overlap between the four boxes. However, such a framework will enable departments to focus on the different types of research they are purchasing and, as discussed below, this will inform the way the research is commissioned and managed.

Departments need to be assisted in using internationally agreed research statistics

2.9 Published sources suggest that the Government's total civil department expenditure on research and development in 2000/01 amounted to £1.4 billion (Figures 1, 4 and 5). These statistics are used by government (and others) as a management tool to help control expenditure, to guide policy and as an indicator of national investment in science and innovation. They are compiled from the Office for National Statistics' annual survey of Central Government Research and Development, which is sent to all departments and published in the Office of Science and Technology, "Science, Engineering and Technology Statistics". The Office for National Statistics returns are then republished in Eurostat and the Organisation for Economic Co-operation and Development annual surveys on research and development expenditure.

2.10 In our study we used these official statistics but their value and accuracy was queried by two of the three departments we spoke to. This is largely a definitional issue with, for example, the Department for International Development's own "Internal Audit Report on Knowledge and Research Programmes" identifying several methods for producing and presenting information on research expenditure **(Figure 8)**. The Department for International Development intends to rationalise the two sets of data it produces on research to meet its business needs and would like to use the same data set to report to the Office for National Statistics. However, at present reporting requirements from the Office for National Statistics necessitate producing an additional, separate data set. The departments we spoke to do not use the Frascati definitions[4] in their internal information management systems and find the collection and completion of the Office for National Statistics returns difficult. This means that some departments are running duplicate procedures for calculating research expenditure and are at risk of presenting different sets of information to the outside world. The Office for National Statistics recognises that definitional problems can arise and offers a visiting programme to all departments to assist in the provision of data. However take-up is fairly limited. In addition, in terms of accuracy, all R&D data collected from government departments are returned to them for confirmation before publication. The Office for National Statistics is planning a review of the collection of R&D data from departments during 2003/04.

4 *Frascati definitions are used to describe and measure research and are illustrated in Figure 4.*

8 Accounting for research expenditure

The Department for International Development (DFID) uses several methods to produce information on research expenditure producing different results, as shown by the table below. DFID's internal audit report concludes that using different methods of producing information on research expenditure has several disadvantages. For example, presenting conflicting information to external contacts carries risks; and it is not economical to use different systems for calculating research expenditure.

Output of different ways of calculating DFID research funding by major sectors (in £m)

	DFID research report	ONS-return	Statistics on International Development
Renewable Natural Resources	30.5	33.7	36.9
Health and Population	12	16.6	14.5
Engineering	11.2	16.8	20.5
Social Science Research	6	6.3	12
Social Development	0.6	-	-
Education	1.2	24.8	2.9
Other	-	1.2	16.3
Total, centrally-funded research	**61.6**	**99.4**	103
Regionally-funded research	50	49	-
Total DFID-research	**111.5**	**148.4**	-

Source: DFID, Internal Audit report, 2001

Departments need to be clear what type of research they require and what is the most appropriate way to commission it

2.11 As illustrated in **Figure 9**, the Social Research Association has identified three basic choices facing departments when commissioning research[5]. These choices provide a framework for designing appropriate ways to commission research and must be made within the context of EC procurement law and in accordance with guidance and good practice promulgated by the Office of Government Commerce. For emerging research, departments are handing over responsibility of the research question to the researcher and therefore it is appropriate for the department to operate an indirect competition. For example, the Department for International Development's Social Science Research Unit runs a Responsive Research Programme that commissions a wide range of research activities in support of the departments' objectives. In submitting a proposal, researchers are asked to identify the research question and objectives they seek to address, and explain how the research will be carried out. Thus there will be uncertainty about the relevance, feasibility and utility of the research outcome. In managing this type of risk a rational approach would be for departments to minimise its likelihood (by defining the research question) and the potential for adverse consequences (by monitoring the research process). However, as the aim of emergent research is to encourage creative cutting-edge thinking by researchers, this is likely to be counter-productive.

2.12 The control departments have over emergent research is usually limited to their actual commissioning process. For example, a committee of internal and external experts assesses research proposals submitted in a standardised format to the Social Science Research Unit's Responsive Research Programme for more than £100,000. As each proposal is likely to have different research objectives, it is not possible to use tightly defined selection criteria, and therefore the competition is informal and relies on the professional judgement and experience of the Department for International Development's staff and advisers.

2.13 Departments must also decide whether to operate an open or closed competition. For emergent research, it is rational to operate an open competition as this will generate the maximum amount of new investigator-articulated research questions. However, the transaction costs of commissioning research in an open competition are high. The Social Research Association has estimated that it costs providers around £10,000 to develop a proposal for a social research project. In an open competition, departments may receive up to 30 proposals which would equate to provider transaction costs of £300,000; costs that are ultimately passed on to the purchaser as overheads. In addition, there will be higher purchaser transaction costs including marginal costs associated with administering the competition and the indirect costs of using external advisers.

2.14 In a closed competition, the departments can reduce the transaction costs by inviting a small number of preferred providers to compete for the research contract. However, the disadvantage of closed competitions is that, without a strategy for supplier development, they create

5 *Social Research Association (2002).*

9 Commissioning choices

Direct competition occurs when two or more research providers are asked to engage in a specific competitive process for awarding a research contract. Typically a range of possible suppliers are invited to submit costed proposals from which a choice can be made.	versus	**Indirect competition** does not operate through a direct competitive process, but through a generalised market mechanism. Research providers compete for business in a general sense even where the purchaser does not run a specific competition for a particular project.
An **open competition** is advertised and any interested parties can enter. Although this process can be expensive, it ensures that new research providers can enter into the market and can be useful in developing research capacity and capability.	versus	A **closed competition** is one in which only invited research providers take part. Providers may be identified through a preliminary open competition, and from past commissions.
Formal competition uses fixed procedures designed to produce a winner from a list of contending research providers.	versus	**Informal competition** proceeds by making less structured soundings of competence and costs as a basis for professional judgement.

Source: Social Research Association

barriers to entry, which in the long run will constrain research capacity and capability. The Office of the Deputy Prime Minister operates a policy of phased competitive tendering for research contracts. For regular research projects, expressions of interest submitted by potential contractors are used as the basis for selecting 3-6 suitable organisations to invite to tender for research contracts.

2.15 Where the research question is more specific, departments will have a clear idea of the possible outcomes of the research and are in a stronger position to control the commissioning process. Departments can enhance the relevance of the research by liaising with primary users; they can dictate the research objectives and methodologies; and they can enhance the utility of the research by taking on responsibility for its dissemination. This allows departments to operate direct competition with more formal tendering processes. At the Office of the Deputy Prime Minister, for instance, many projects in the housing, homelessness, urban and planning research programme are procured under direct competition, for example, the regularly up-dated English House Condition Survey. It provides information on the changing condition of the housing stock and the characteristics of households living in different types of housing.

2.16 For specific research, the decision about whether to operate an open or closed competition will be determined by the availability of researcher capacity and capability. As with emergent research, departments can operate a two-phased system where they start with an open competition for preliminary proposals or 'expressions of interest' and invite a shortlist of researchers to develop their ideas in a competition.

Departments need to demonstrate the effectiveness of research activities

2.17 Departments are faced with a number of different options in defining and implementing their science and innovation strategies. To inform their decision-making, they need to know the most effective ways of funding research and to be able to answer questions, such as:

- Are research centres more likely to lead to 'blue skies' thinking?
- What type(s) of provider deliver the highest scientific quality?
- What type(s) of provider offer the most policy relevant research?

2.18 Neither the departments we spoke to nor the Office of Science and Technology have an objective way of answering these questions, although they have undertaken regular and ad hoc reviews and evaluations of different research programmes. We accept that measuring the performance and results of research is difficult and complex. Research impacts are often not quantifiable and it is difficult to attribute a policy impact to a particular research result. As illustrated in Appendix 3, this problem is not unique to the United Kingdom. In the United States of America the 1993 Government Performance and Results Act required federal agencies - including those that fund research - to set strategic goals and to use performance measures for management and budgeting[6]. In Canada, the 1994 report of the Auditor General concluded that departments and agencies should establish the mechanisms and practices they need to

6 *Committee on Science, Engineering and Public Policy (1999 and 2001).*

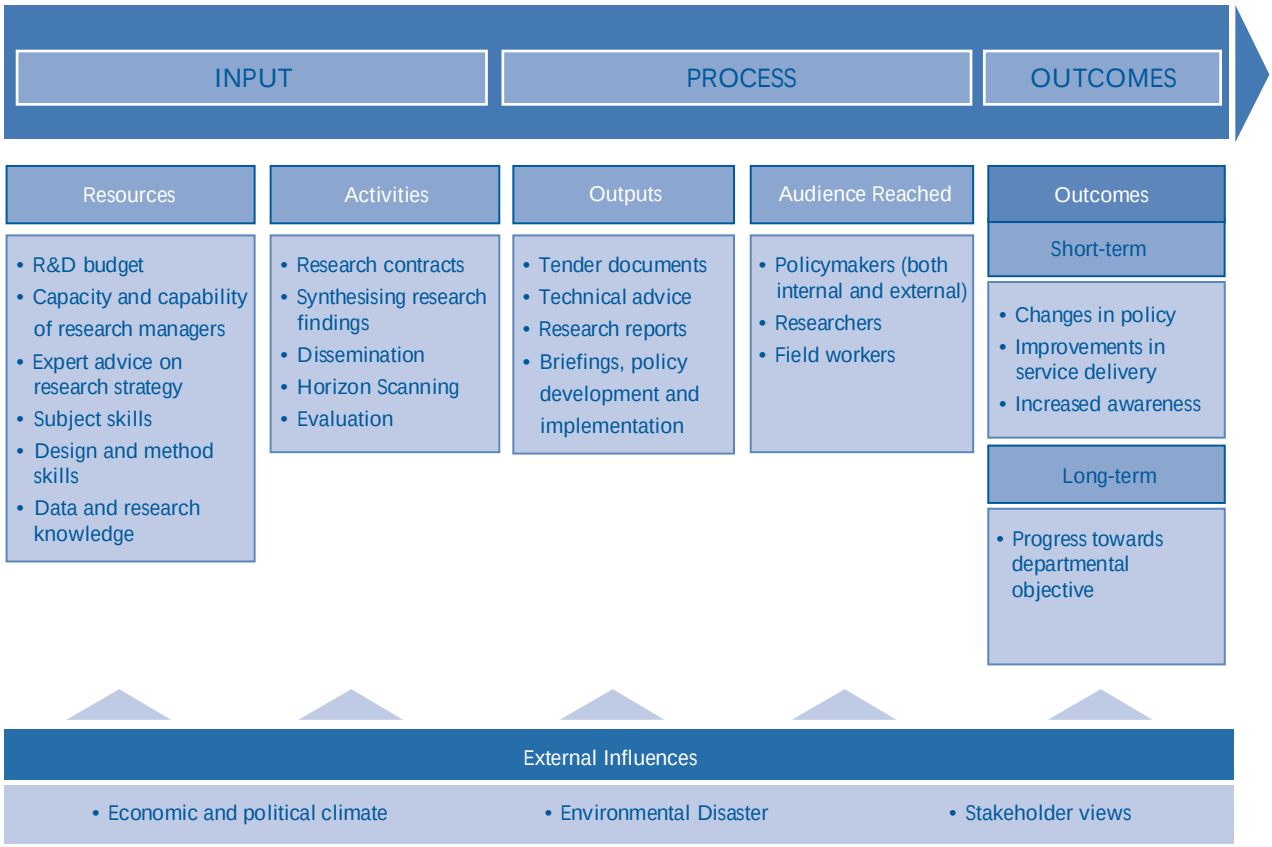
demonstrate the results of their science and technology activities and to ensure that their resources are allocated to those activities that provide the greatest benefit[7].

2.19 The Office of Science and Technology approached the National Audit Office for advice on how to implement a programme of external scrutiny of departments' research and development activities and that is one of the primary reasons for this study. Based upon our review of the literature on research evaluation and performance measurement and experience from other countries, we propose that departments and the Office of Science and Technology:

- **Develop an evaluation framework that is common to departments.** Comparisons between departments will highlight areas of good practice and, if adopted, lead to increased effectiveness of science and innovation strategies. To contrast departments it is necessary to have comparable benchmarks within a common framework. This means that the Office of Science and Technology needs to develop, with departments, an evaluation framework that covers the breadth of department research as illustrated in **Figure 10**[8]. It is important to stress that Figure 10 is only indicative and that key performance measurement points include quantitative and qualitative elements, such as a description of how departments seek expert advice.
- **Identify appropriate comparators for benchmarking.** The Office of Science and Technology, working with departments, will need to identify and agree appropriate comparators for benchmarking. This will usually be with other government departments, but there will sensible exceptions. For example, for some performance indicators the logical comparators for benchmarking with the Department for International Development would be other donors engaged in research such as the Dutch Government's development agency and the World Bank.
- **Identify appropriate performance indicators.** Where available, the performance indicators used by the comparator institutions are a useful starting point. In addition, the Quinquennial Review of the Grant-Awarding Research Councils[9], sets out a number of general principles for a new performance measurement system for the Research Councils. Some of these principles are applicable to government departments. It is also likely that the performance indicators, such as time taken to make a decision on a research proposal, being developed for the Research Councils will be common to departments. Where there is overlap the Office of Science and Technology should ensure the use of common data definitions and collection methods.
- **Seek views from all stakeholders.** It will be important that departments and the Office of Science and Technology survey representatives of all the stakeholder groups, in developing a programme of rolling reviews. In undertaking this study, we surveyed research providers and sought their views on the seven critical success factors in using science and managing research, as identified in "Investing in Innovation". This is illustrated in **Figure 11**. From the provider perspective, all three departments are rated high on their open approach to the publication of research results, with the Office of the Deputy Prime Minister rated highest on their commitment to excellence and using research. Conversely, less than half of the researchers we surveyed agreed or strongly agreed that departments were effective in horizon scanning and knowledge sharing and transfer.
- **Use peer review to synthesise the performance indicators and stakeholder surveys.** The benchmarking data generated from the evaluation framework will raise a number of issues that can only be answered through an in-depth qualitative review of departments' research activities. For example, the benchmark data on provider satisfaction in Figure 11 would indicate that a peer-review committee might want to focus on horizon scanning and knowledge transfer. The review should occur on a regular basis (say every 3-5 years) and include representatives from the stakeholder groups and the international community.

7 *Report of the Auditor General of Canada (1994).*
8 *This logic model is deliberately incomplete as it will be important for the Office of Science and Technology to work with departments in agreeing a common framework.*
9 *Department of Trade and Industry (2001).*

10 Draft logic model for assessing the procurement of research by departments

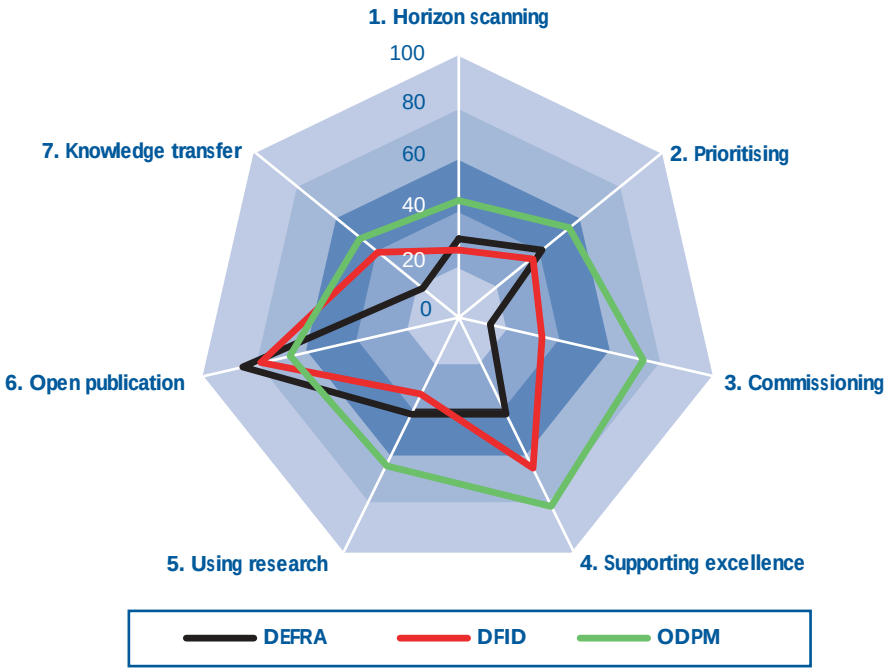


Source: RAND Europe

- **Disseminate findings widely.** During our discussions, we found ourselves sharing experiences and best practices amongst departments. Our study identified a significant amount of analytical work, but found that this knowledge was not being shared across government. We would therefore recommend that the Office of Science and Technology makes public and disseminates the findings from the benchmarking and peer review and facilitates a government-wide network in sharing best practice in the management of research. This is partially achieved through the Chief Scientific Adviser's Committee. However, other mechanisms, such as monthly seminars, annual conferences, a best practice website, etc., are essential to engage research managers at all levels of government.

2.20 We appreciate that this is an ambitious set of recommendations that will provide departments with guidance on best practice. Given the magnitude of the effort, the Office of Science and Technology will want to consult widely with departments, especially in establishing the evaluation framework and standardised performance indicators, and implement these recommendations over a three to five year period.

11 **Provider perceptions of how departments procure research. Proportion of respondents agreeing or definitely agreeing with critical success factors**



Critical success factors in using science and managing research:

1. Effective horizon scanning so that issues involving science, or where science could be involved, are identified in advance;
2. Effective arrangements for deciding what current or potential science could benefit the needs of the department and hence whether new research is needed;
3. Strong procurement process, run by expert research programme managers;
4. Commitment to excellence in research, which is fit for purpose, and carried out to high standards;
5. Critical use of the results of research and scientific advice in policy formulation;
6. Open approach to publication of results and debate about implications; and
7. Effective knowledge sharing and transfer.

Source: RAND Europe survey. Please note the data for the Department for Environment, Food and Rural Affairs is based on 17 valid responses from 32 surveyed (see Figure 18 in Appendix 2 for base numbers and response rates) and thus, given the small number, the data should be treated with caution.

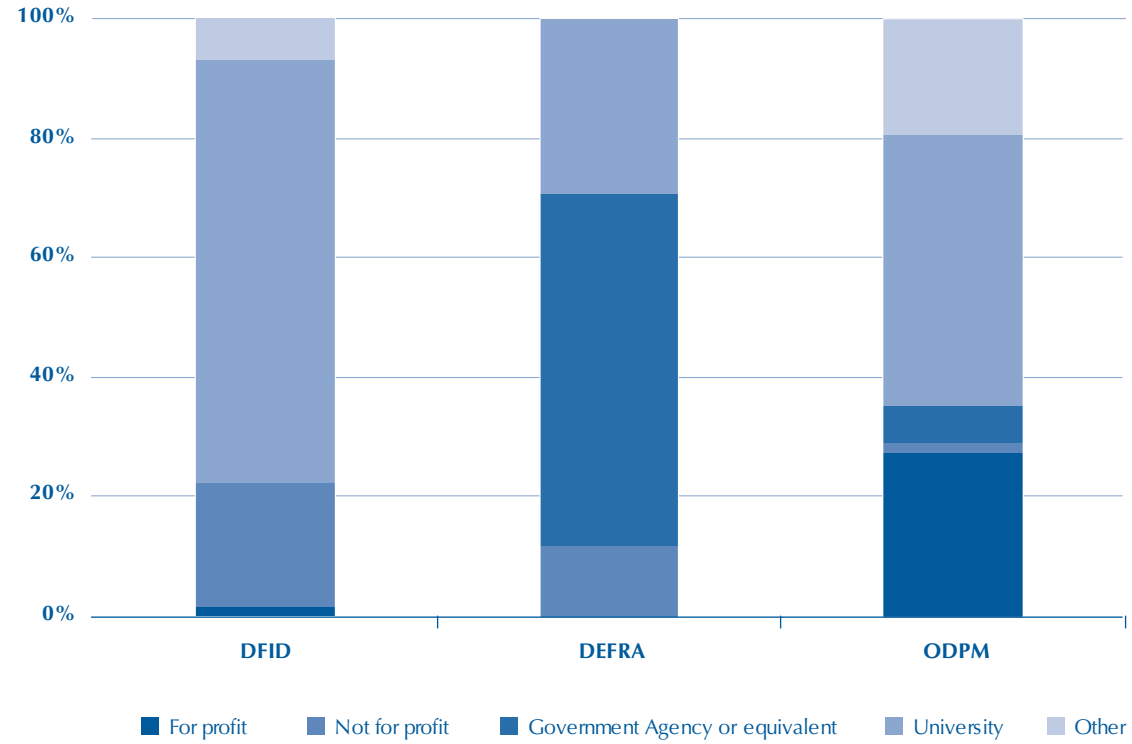
Part 3

The research provider

3.1 A variety of different organisations provide research to government departments. In some organisations research is the main endeavour, whilst in others it coexists with activities such as teaching, surveillance and advocacy. Research can be provided by a number of different organisations including for profit research institutes, not for profit research institutes, government agencies or equivalent and universities. The case studies showed that government departments procure research from different types of research provider, reflecting differences in terms of policy areas, kind of suppliers, modes of procurement and size of operation. For example, based on an analysis of our provider survey (described in more detail below), 71 per cent of contracts awarded by the Department for International Development Social Science Research Unit are to universities, whereas the Department for Environment, Food, and Rural Affairs' procures 59 per cent of its research on food borne zoonoses and tuberculosis from government agencies.

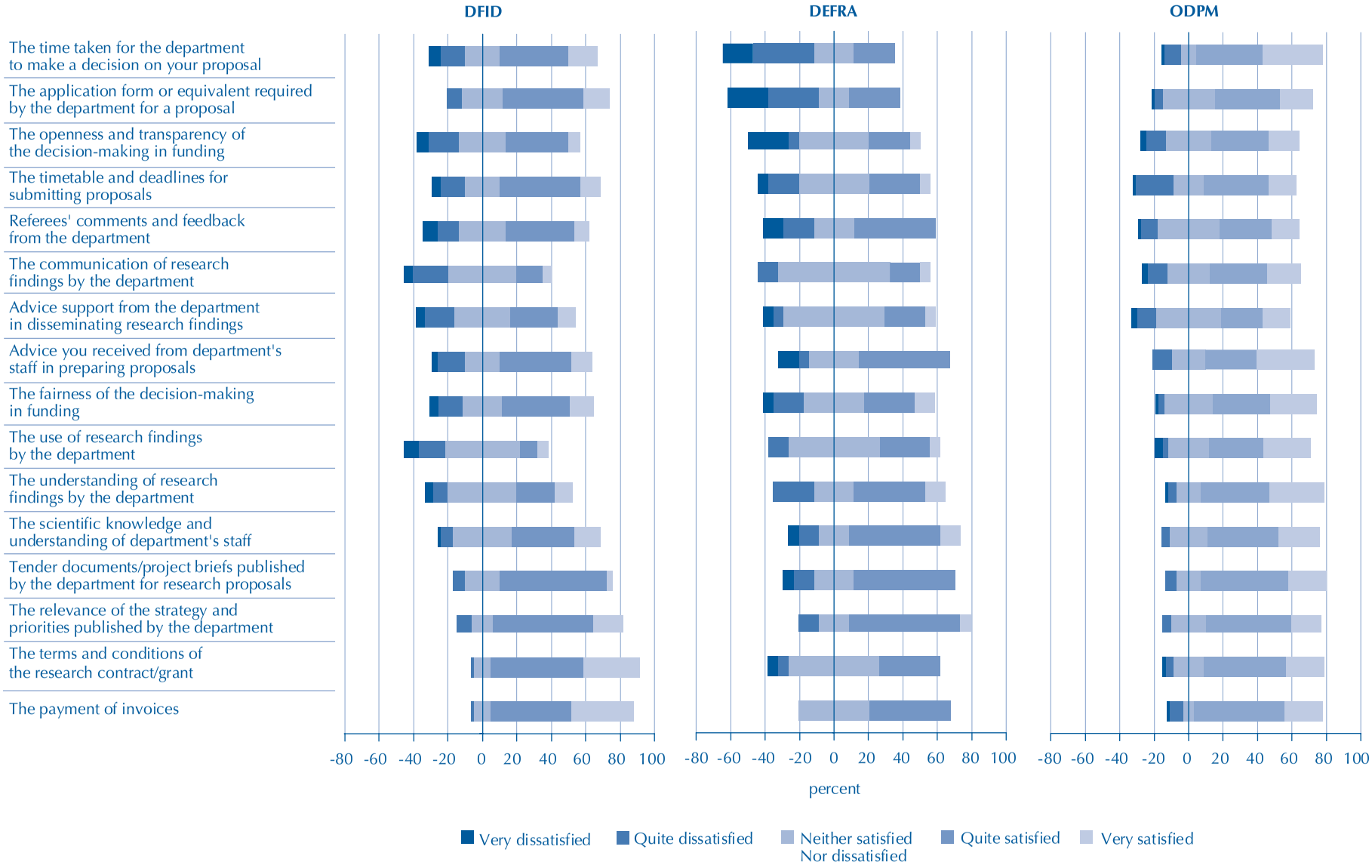
3.2 The different profiles may be partly explained by the strategic aims of the research and the way the research is commissioned. For example, the main aim of Department for International Development's Social Science Research Unit is to support emergent research and this is commissioned through an open competition. Over the past five years, the Social Science Research

12 Provider by type of organisation



Source: RAND Europe survey. Please note the data for the Department for Environment, Food and Rural Affairs is based on 17 valid responses from 32 surveyed (see Figure 18 in Appendix 2 for base numbers and response rates) and thus, given the small number, the data should be treated with caution.

13 **Provider satisfaction of departments' procurement of research**



Source: RAND Europe Survey. Please note the data for the Department for Environment, Food and Rural Affairs is based on 17 valid responses from 32 surveyed and thus, given the small number, the data should be treated with caution (see Figure 18 in Appendix 2 for base numbers and response rates). Also, non-responders to the individual dimensions are excluded from the graph and this explains why the results do not add up to 100%.

Unit has awarded over 100 research contracts, including the Development Research Centres. The vast majority of research providers worked in universities. On the other hand, a large part of the Department for Environment, Food and Rural Affairs' food borne zoonoses and tuberculosis research is commissioned directly with specific contractors because they either have unique facilities or are recognised centres of excellence. Open competition is used where these special factors are not in play.

3.3 As noted in Paragraph 2.6, departments are faced with 'make' or 'buy' decisions regarding research, where 'make' refers to using their own resources to conduct the research and 'buy' refers to obtaining the research extramurally. This decision, which can greatly affect the size of the departmental research staff, was by design beyond the focus of the present study, but merits further investigation.

Research providers can help evaluate the way departments procure research

3.4 We carried out a provider survey in order to understand researchers' views on different aspects of the departments' research procurement process[10]. The response rate for the survey ranged from 38 per cent (for the Office of the Deputy Prime Minister) to 55 per cent (for the Department for International Development)[11]. It should be noted that the survey for the Department for Environment, Food and Rural Affairs is based on 17 responses (from 32 surveys giving a response rate of 53 per cent), and this reflects the small size of the research provider capacity for research on food borne zoonoses and tuberculosis. Given these small numbers, the data should not be over interpreted.

3.5 **Figure 13** illustrates provider satisfaction by 16 dimensions for the three departments, ranked by the average satisfaction rating for all three departments[12]. In terms of best practice, the highest satisfaction ratings were identified for administrative functions such as the payment of invoices and the terms and conditions of research contracts. However, the Office of the Deputy Prime Minister was also rated highly on the quality of the tender document and the project briefs published by the department for research proposals, whilst the Department for Environment, Food and Rural Affairs was rated highly for the scientific knowledge and understanding of the department's staff.

3.6 Researchers had relatively high levels of dissatisfaction about the time taken for the department to make a decision on proposals, although there was significant interdepartmental variation, with 53 per cent of respondents being very or quite dissatisfied for the Department for Environment, Food and Rural Affairs, compared to 11 per cent for the Office of the Deputy Prime Minister.

3.7 Interestingly, one of the lowest levels of satisfaction for the Department of International Development was in the advice and support from the department in disseminating research. As we discuss in Part Four, this is at odds with our findings where we concluded that the department's funding of a dissemination website was an example of best practice. This reinforces the point made in Paragraph 2.19, that benchmarking data should be used to identify issues that can be addressed in an in-depth qualitative review of departments' research activities. In this case, a possible explanation is that the department has raised expectations in its provider community by supporting the website and other initiatives and these new and higher expectations are not being met. For the Office of the Deputy Prime Minister, areas for possible improvement would include the advice and support from the department in preparing proposals, and the timetable and deadlines for submitting proposals. For the Department for Environment, Food and Rural Affairs, providers were relatively dissatisfied with the application form required by the department, and the openness and transparency of the decision-making in funding.

Research providers have a responsibility for quality assurance

3.8 In our discussions with the Department for Environment, Food and Rural Affairs, the case for a formalised system of research quality assurance for research providers was made. This follows the confusion at the Institute of Animal Health in 2001, over the origin and composition of sheep and cattle brain samples whilst testing for the presence of BSE in the national flock[13]. The Department for Environment, Food and Rural Affairs, along with the Food Standards Agency, the Biotechnology and Biological Sciences Research Council and the Natural Environment Research Council are drafting a code of practice. In the short term, research providers will be expected to make efforts to comply with the code which will be auditable. In the longer term, the Department for Environment, Food and Rural Affairs will be expecting contractors to comply with formal standards, such as those from the International Standards Organisation.

10 A copy of the survey is available from RAND Europe.

11 We checked for a response bias by comparing the type of organisation between responders and non-responders. For the Department for International Development and the Department for Environment, Food and Rural Affairs, the profiles were similar. For the Office of the Deputy Prime Minister research providers from universities were more likely to respond to the survey.

12 The satisfaction rating is the proportion of respondents who were either very satisfied or quite satisfied, minus the proportion of respondents who were either very dissatisfied or quite dissatisfied.

13 Baker Tilly (2002).

3.9 The quality assurance of the research processes does not ensure quality of the research content. For example, if a department commissions research featuring an opinion survey, the ISO 9001 standards of the International Standards Organisation, if followed, will assure that the survey protocols are prepared and rehearsed before fielding the survey, that the survey is consistently administered, that data are double-checked when entered, and that such validity checks as comparisons of respondent and non-respondents, inter-item consistency and the like are done. These standards, however, will not assure that the correct sampling frame is chosen for the survey, that all the relevant interest groups are surveyed, that the questions asked address the policies of interest to the department, that the statistics performed on the data are the appropriate ones, or that the analysis makes full and accurate use of the data obtained.

3.10 The draft code of practice being drawn by the Department for Environment, Food and Rural Affairs and other agencies, acknowledges these differences by distinguishing between the quality of the research, which addresses the aims and methods of the project, and the quality of the processes underlying the research, which gives confidence that the procedures used to gather and interpret the results of the research are appropriate, rigorous, repeatable and auditable. In implementing the code of practice, departments should assess the nature of the research being commissioned. As discussed in Part Two, the aim of emergent research is to encourage the development of creative cutting-edge ideas and therefore the application of the code of practice is probably inappropriate. In any case, departments need to be satisfied that the proposed research is of high quality and will be conducted to the highest standards. To assure this, departments typically use a peer-review system where experts are asked to evaluate the research proposals before the contract is awarded.

3.11 More specific research (such as the example of the Institute for Animal Health) would benefit from the code of practice. In this case, departments are advised to use peer-review to assess the quality of the research proposals. However it may also be appropriate for departments to set clearly defined administrative-oriented quality requirements up front and to monitor the research as it progresses. This will involve additional costs in return for greater confidence in the reliability of research findings.

Part 4

The research user

4.1 A key characteristic of modern policymaking is the ability to draw on many sources of information, analytical skills and relevant scientific disciplines in order to act as an 'intelligent customer' for complex policy evidence[14]. But, as identified in the National Audit Office report "Modern Policy-Making: Ensuring Policies Deliver Value for Money", the successful policymaker needs to combine this evidence-based approach with political instinct, foresight and creativity. This means the modern policymaker, and other research users, need to be sophisticated in applying research; knowing when evidence and different types of evidence are appropriate. At the same time the research community need to be more sophisticated in their understanding of the policy process.

The user perspective

4.2 In **Figure 14 (overleaf)** we have mapped the different types of research user. As the proximity of these users to the research varies, it is important to identify the primary users of a particular research project from its inception, and to acknowledge that the primary users vary from project to project. If the research question is emergent, it is generally more likely that the primary user will be other researchers, and if the research question is specific it is more likely to be aimed at policymakers and practitioners. There may also be times when some of the secondary and even end users are, for a particular project, classified as primary users, but on the whole non-governmental organisations, companies, the media and the public are not widely involved in research procurement.

4.3 At the outset of this study we were keen to seek the views of research users and asked departments' research managers to suggest to whom we should speak. Some departments found this difficult. For example, the Department for International Development had some difficulties in identifying policymakers within the department that use research procured by the department. On reflection, this is perhaps not surprising given the majority of research supported by the Social Science Research Unit addresses emergent research questions for the global public good and the primary users are other development researchers and practitioners. The Office of the Deputy Prime Minister had difficulties identifying specific external users of their research, but in this case, as much of the research they procure is aimed at improving the department's service delivery, their primary users are internal policymakers.

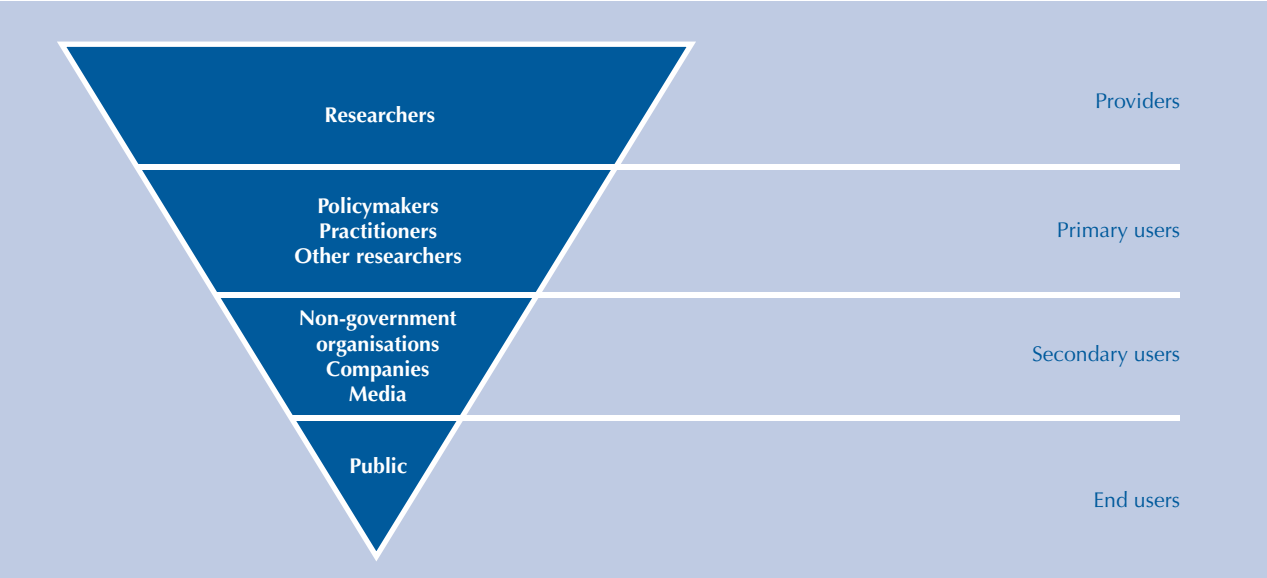
Using 'Linkage and Exchange' to move research into policy

4.4 Encouraging partnership between researchers and users is a precondition of delivering evidence-based policymaking. However such partnerships do not come naturally. In the course of this study we spoke to research users who often complained that communication of research findings by departments was poor, and that there were few knowledge transfer mechanisms in place to ensure effective communication and dissemination. This observation was also made in the Cabinet Office report, "Professional Policy Making for the Twenty First Century", which reported on anecdotal evidence that little of the research commissioned by departments was used by policymakers.

4.5 During the course of our work, we came across the model of 'Linkage and Exchange' used by the Canadian Health Services Research Foundation[15]. The basis of this model was that bringing policymakers who can use the results of a particular piece of research into its formulation and conduct is the best predictor for seeing its successful application. This explicit model may not be directly applicable to the United Kingdom or other, non-health, fields. However, given evidence that two-way communication between policymakers and researchers should facilitate the use of research[16], we used the model as a benchmark for our case-study departments as summarised in **Figure 15 (overleaf)**, and described in more detail for two of the dimensions below.

14 *Cabinet Office (1999).*
15 *Lomas (2000).*
16 *Hanney et al (2002); Innvær et al (2002); Stone et al (2001).*

14 Different types of research users



Source: RAND Europe

4.6 Linkage and Exchange is comparable to the 'double lock principle' employed by the Department for Environment, Food and Rural Affairs. The department's internal policy directorates hold research budgets and all the research they fund must support their policy objectives - the first lock. The Chief Scientific Adviser is responsible for ensuring that sufficient scientific expertise is available to these policy directorates. In turn, this ensures that the research commissioned is of the right quality and has the best chance of success - the second lock. The Chief Scientific Adviser is also responsible for the balance of the research programme across the Department.

4.7 From our discussions with departments and research users, and our review of the literature on research utilisation, we would advocate that research users are engaged in all stages of the research procurement process. One of the key points coming out of the literature is the importance of developing long-term relationships between researchers and users[16] Such arrangements can help encourage the joint development of research priorities which not only reflect user concerns but might also mean that researcher perspectives are better understood. This will help ensure that the research is both relevant and utilised. However, in encouraging increased linkage and exchange, departments should be alert to possible perverse spillover effects whereby researchers, in developing close relationships with policymakers, may lose their objectivity and independence.

Research users can help in setting research priorities

4.8 As illustrated in Appendix 4, most countries have in place formal structures and processes for setting research priorities. Typically these will include national advisory councils whose function is to ensure coherence and co-ordination between government agencies. This results in national research strategies and priorities. In the United Kingdom, there are mechanisms in place to enable Government to take a strategic overview of science. For example, the Cabinet Ministerial Committee on Science Policy promotes a coherent and co-ordinated approach to science, engineering and technology policymaking, and the Council for Science and Technology provides independent views and recommendations about strategic issues concerning science and technology. While there is no formal central structure for setting research priorities, the Chief Scientific Adviser and his cross-departmental committee, together with the Government Chief Social Researcher, have a formal role in ensuring co-ordination between departments[17].

4.9 In "Investing in Innovation", the Government concluded that it needs a more forward-looking and strategic approach to research policy. The Department for Environment, Food and Rural Affairs has recently established a horizon scanning research programme. The aim of the programme is to improve the department's capability to anticipate and prepare for new science risks and opportunities. In establishing the programme, the department has consulted with users, purchasers and

17 *A Government Chief Social Researcher was appointed last year to provide strategic direction to the Government Social Research Service and to support it in delivering high quality, timely and accessible social research to support government in the development, implementation, review and evaluation of policy.*

15 Linkage and Exchange in practice

	Canadian Health Services Research Foundation	Department for Environment, Food and Rural Affairs	Department for International Development	Office of the Deputy Prime Minister
Setting research priorities	Policymakers, along with researchers and health service managers, are consulted every three years through a series of nation-wide workshops to determine the research priorities for the coming five years.	The double-lock principle is being implemented, and users discuss research priorities together with providers and purchasers. The Chief Scientific Adviser gives strategic guidance in setting research priorities.	Users are not involved in setting the overall research strategy, but are involved in setting priorities within specific policy areas, e.g. the Development Research Centre on Regulation and Competition involves both representatives of the Private Sector Department of DFID and regulators from developing countries.	The overall research strategy reflects policy priorities but does not involve non-ODPM users. External interests are involved in setting priorities in specific policy areas, e.g. policymakers from ODPM and other government departments, leading academics and other stakeholders are involved in a research network on urban renewal.
Funding research projects	The Foundation only funds 50 per cent of the research costs and expects co-sponsorship from other partners.	Users are responsible for the research budgets and for the direction of their research. The Chief Scientific Adviser is responsible for ensuring that the research is of the right quality through the expertise of the Department's scientific staff.	Users are not involved in funding of research.	ODPM sometimes funds projects jointly with other users, for example, with the Department for Work and Pensions on housing benefits, and on a variety of issues with the ESRC, Joseph Rowntree Foundation, Housing Corporation, English Partnerships and others.
Assessing research applications	Peer review panels have equal representation of researchers and policymakers. The panel uses explicit criteria to assess both scientific quality and policy relevance. All proposals must past a threshold on both dimensions.	DEFRA employs a mixture of external and internal peer reviews, but the user is not actively involved in assessing research applications.	Users are involved in peer reviewing research applications. Usually, these are policymakers from DFID, and academics.	Policymakers from the ODPM are involved in the evaluation of research applications. Non-ODPM users are not involved in this process. Where merited, external colleagues are also involved in proposal assessment.
Conducting research	A requirement of funding is that the research team includes at least one policymaker actively engaged in the area under study.	At the Centre for Environment, Fisheries and Aquaculture Science primary users conduct research that feeds into the agency's statutory role of advising on licence applications.	Users are generally involved in an advisory role; not as co-investigators.	Users are generally involved in an advisory role; not as co-investigators.
Communicating research findings	The Foundation supports the synthesis and dissemination of research evidence around a topic identified by policymakers.	Policy customers receive annual reports and a summary of research findings that serve as the basis for policymaking.	It is assumed that communication of research findings will occur by involvement in the research process. In some programmes policymakers visit developing countries to communicate research findings (e.g., road shows).	Communication of research findings by users will take place automatically, as a consequence of involving users in the above four phases.

providers of research to identify its research priorities. This included an internet-based consultation that elicited 282 research ideas from over 400 individuals[18]. Approximately half of the consultees worked at a research institutions, while users from government, industry and non-government organisations accounted for 20 per cent. Following this consultation phase, The Department for Environment, Food and Rural Affairs Horizon Scanning Strategy for Science was launched in December 2002.

4.10 One of the objectives of the horizon scanning programme is to 'think the unthinkable'. It is essential to the success of the programme, therefore, that research users are fully engaged stakeholders who can detect signals about new risks affecting the policy domain, and can assist in framing long-term problems. Thus the experience from the Department for Environment, Food and Rural Affairs would suggest that, as with knowledge transfer, departments need to be more proactive in seeking the input of users into the research process. To do this, the Department for Environment, Food and Rural Affairs ran two workshops that included an equal mix of research users and research providers. This broad involvement has continued into the horizon scanning programme, for example, through review and input to research concepts prior to competitive tendering.

Research users can help in assessing the relevance of research proposals

4.11 As discussed in Part Two, departments usually review the quality of research proposals through technical peer review based on criteria including the study design and research methods. To ensure the utility of the research, departments could also conduct relevance reviews, where research proposals are appraised on the importance of the research to the departments' policy objectives. As illustrated in Figure 15, in our discussions with departments, policymakers were involved in evaluating research proposals for the Department for International Development, and for the Office of the Deputy Prime Minister.

4.12 Departments should use their primary research users identified in Figure 14 to review research proposals. At the same time it is important to choose users who have an understanding of the wider policy need and do not focus too narrowly on a single issue. For technical proposals research providers may have to provide a summary to explain the relevance of the research.

Departments and the Office of Science and Technology need to support non-commercial knowledge transfer

4.13 The government administers a number of 'knowledge transfer' schemes that broadly aim to maximise the contribution of research to the economic development of the United Kingdom. Schemes such as the University Challenge, the Higher Education Innovation Fund and Public Sector Research Establishment Fund, will total £300 million by 2005/06, and provide finance to support commercial knowledge transfer, including access to seed capital funding. In two recent reports, "Delivering the Commercialisation of the Public Sector Science" and "Reaping the Rewards of Agricultural Research" the National Audit Office have examined how departments are commercialising research outputs and therefore in this study we have focused on 'non-commercial knowledge transfer'. Non-commercial knowledge transfer refers to any process or mechanism that facilitates the uptake of research in order to improve service delivery and develop policies.

4.14 In our discussions with departments and in our telephone interviews with research users, it was widely acknowledged that there was a gap between what researchers produce and what policymakers need. This is not a new issue. At least three recent literature reviews on research use refer to numerous academic studies published over the past 30 years reporting on the difficulties of getting research into practice[19]. Based on our case studies and the literature review, we are able to identify a number of explanations for the perceived

16 Why knowledge is not transferred

- Research results are not easily accessible
- Poor understanding of policy questions by the researchers
- Poor communication of the research results by the researchers
- Poor understanding of research results by policymakers
- No direct, short-term relevance of research results for policy
- Lack of resources for dissemination activity

18 *Berkhout et al (2002).*
19 *Hanney et al (2002); Innvær et al (2002); Stone et al (2001).*

gap between policy and research **(Figure 16)**. Understanding why it is difficult to move research into practice will inform the most appropriate way to facilitate non-commercial knowledge transfer. For example, difficulties to access research findings might be reduced through technological solutions, whereas the perceived irrelevance of some research results might argue for early involvement of potential users in research projects.

4.15 On the whole, departments are more likely to support passive, non-commercial knowledge transfer mechanisms. This is probably because traditionally the responsibility for these mechanisms has largely been transferred to the research provider and the translation of research is not an intrinsic part of the research project cycle. However, in our discussions with departments there was a widespread realisation of their responsibility to be more proactive in facilitating the dissemination of research. Departments, supported by the Office of Science and Technology, may therefore want to adopt a more active role in promoting non-commercial knowledge transfer mechanisms. An example of best practice would include id21, a dissemination service, funded by the Department for International Development, with the objective to bring United Kingdom-based development research findings and policy recommendations to policymakers and development practitioners world-wide as highlighted in **Figure 17**.

4.16 The involvement of users throughout the research process, helps to create a cadre of sophisticated research users who are not only able to make effective use of the research, but can more clearly specify what their needs are in the next cycle of research procurement. The research providers, for their part, are better able to generate research targeted to the users' need. In this way the linkages amongst the three legs of the triangle - the procurer, provider and user - are tightened, and the resulting efficiency should yield increased value for money.

17 id21 - Information for Development in the 21st Century

id21 is an internet-based dissemination service (see: www.id21.org), established in 1997, to communicate development research findings to development policymakers and practitioners. The aim is to inform the policy debate by presenting information in a user friendly and accessible manner. A team of in-house and freelance development researchers and professional journalists summarise research reports into short Research Highlights, focusing on the policy relevant aspects of the research. In addition, id21 also provides other information services, such as:

- Insights, a quarterly newsletter that provides a round up of new research and appears both in print and on-line; and
- id21News, an e-mail newsletter service that provides regular updates of recent research to users who have limited Internet access

id21 is continuously striving to improve its services, and is, for example, currently experimenting with an electronic discussion group on health care in developing countries.

About two thirds of id21's growing global audience can broadly be termed 'policymakers'. Just over a third are researchers, academics, and students (the last not being a target group, but a natural audience). Southern users are an important target and make up over a third of users. id21 pieces are regularly taken up by media organisations, such as One World and the Media Channel.

id21 monitors the volume of traffic coming to the website. Current monthly average hits stand at 274,678, with a monthly average of 28,891 separate user sessions. They also undertake to measure the impacts of the website, by conducting interviews with (potential) users, and by surveying researchers and subscribers to the e-mail service. Although useful insights are retrieved from the impact assessment, the 'real' impact on poverty elimination is hard to quantify.

Appendix 1 Recent reviews of scientific and technological development

The Transparency Review

Following publication of the Comprehensive Spending Review in 1998, the Office of Science and Technology, with the support of HM Treasury, initiated a 'transparency review', designed to see how much time and money academics spent on teaching, research and other activities. By comparing the income and expenditure of the 40 most research-intensive universities in the UK, the review estimated that publicly funded research in universities was in deficit by 35 per cent. Under the guidance of the Joint Costing and Pricing Steering group, the review established a methodology to cost all the activities in higher education.

The Baker Report "Creating Knowledge, Creating Wealth"

The Baker report was commissioned in 1999 by HM Treasury and the Department of Trade and Industry to investigate the commercialisation of research in Public Sector Research Establishments. The report noted that knowledge transfer through commercialisation is a difficult and complex process and made a number of key recommendations. The Government broadly accepted Baker's recommendations, including decentralising ownership, making changes to civil service rules affecting government scientists, and providing funding to help bridge the gap in finance for seed investment.

The White Paper "Excellence and Opportunity: A science and innovation strategy for the 21st Century"

This 'science' White Paper was published in 2000 and set out the Government's agenda for investing in scientific excellence, increasing opportunities for innovation and providing a basis for public trust in science. The White Paper set out 16 proposals including the publication of science and innovation strategies for government departments and the implementation of stronger guidelines on how scientific advice should be used in drawing up Government policy.

Quinquennial review of the grant-awarding Research Councils

The Department of Trade and Industry published in December 2001 the outcome of a major Government review of the UK's grant-awarding research councils. The review recommended: the establishment of a new strategy group to provide a framework for cross-Council working at all levels; the development of a clearer identity and mission; the establishment of stronger links with other science organisations; and a closer relationship between the Councils and other key stakeholders.

Study of Science Research Infrastructure

In May 2001 the Office of Science and Technology, the Department for Education and Employment, and HM Treasury, together with the Funding Councils, devolved administrations and Universities UK commissioned a study to look at under-investment in university science research infrastructure. The study was completed and the report published in March 2002. It reviews past investment in infrastructure for science research in UK universities and colleges. It assesses the extent of remedial investment required and sets out the conditions needed to manage the research infrastructure on a sustainable basis in the future.

The Roberts' Review "SET for success: The supply of people with science, technology, engineering and mathematical skills"

The Roberts Report commissioned by HM Treasury, the Department for Education and Skills, and the Department of Trade and Industry and published in April 2002, examined the supply of scientists and engineers in the UK. It found emerging shortages in the supply of high-level mathematics, physics, chemistry and engineering skills - due to increasing demand by employers for these skills and fewer students choosing to take these subjects at A level, and also later at university. Sir Gareth Roberts also identified particular issues in schools, further and higher education, and in the attractiveness of jobs in research and development that are contributing to these shortages.

Arts and Humanities research infrastructure

The Higher Education Funding Council for England published, in June 2002, a review of the requirements for infrastructure for research in the arts and humanities in UK universities and colleges of higher education. It assessed the extent of remedial investment required, and set out the conditions needed to manage this infrastructure on a sustainable basis. The report is primarily concerned with current need, but looks at trends and developments and their implications for the infrastructure required to support them. It makes recommendations that need to be considered in the context of the study on science research infrastructure.

"Cross-Cutting Review of Science and Research"

On 25 June 2001, the Chief Secretary to the Treasury announced seven initial cross-cutting reviews to contribute to the Spending Review 2002. The Science and Research cross-cutting review included a review of funding of the UK science base, and the effectiveness of departments' own science and research programmes to ensure that they deliver maximum long-term benefits to the economy and quality of life. The review reported in March 2002.

"Investing in Innovation. A strategy for science, engineering and technology"

As part of the Spending Review, in July 2002, the Government published its science, engineering and technology strategy. The strategy, issued jointly by the Department for Education and Skills, the Department of Trade and Industry and HM Treasury, tied together increases to science, engineering and technology spending across schools, universities and the research base, along with the Government's actions to boost business innovation through wider economic reforms. It also set out how the Government aims to improve the way it manages science within Government.

Appendix 2 Methodology

The techniques used to provide a value for money examination of how governments procure research can be classified into five information sources:

- Review of civil research funding and research procurement in the United Kingdom, the Netherlands, Finland, Germany, the United States of America and Canada.
- Consultation with members of the Chief Scientific Advisers Committee or their representatives.
- Consultation with stakeholder groups such as Universities UK, the Cabinet Office and others.
- In-depth case studies of three government departments.
- Two workshops attended by RAND Europe's project team and staff from the National Audit Office and the Office of Science and Technology.

Review of civil research in the United Kingdom, the Netherlands, Finland, Germany, the United States of America and Canada

We reviewed official statistics on civil research and development funding in the United Kingdom. We looked at funding trends over the past 10 years and planned expenditure for the future. Our primary source of material was the governments' SET Statistics series but supplemented this with original cross-tabulations provided by the Office for National Statistics.

In addition to reviewing United Kingdom government expenditure we looked at how North American and European countries procure research. The purpose of these international reviews was to put in context United Kingdom civil department funding of research and to identify areas of good practice that could be imported into the United Kingdom. We have published separately a descriptive benchmarking report, which is available on the NAO (www.nao.gov.uk) and RAND Europe (www.randeurope.org) websites.

Consultation with departments' Chief Scientific Advisers

We undertook desk research on 10 government departments and semi-structured interviews with departmental Chief Scientific Advisers (or other equivalent heads of profession). The purpose of the interviews was to generate a list of the issues that we evaluated in the case studies and surveys of the user and provider communities and to determine the case study departments.

Consultation with other stakeholder groups

We interviewed eight stakeholder groups who have an indirect external influence on the procurement of government department funded research. This allowed us to identify and describe factors that are not under the direct control of the funding departments but have the potential to impact on their research strategies.

Case studies of three government departments

To evaluate the issues identified in the first phase of the study, we focused our analysis on three case study departments: the Department for Environment, Food and Rural Affairs, the Department for International Development and the Office of the Deputy Prime Minister. The case study departments were selected on a number of criteria, including: the amount spent on research and development; the proportion of money the department spends on research; the type of science; and, the organisational structure of the departments' research function.

Within each department we focused on specific research programmes. At the Department for Environment, Food and Rural Affairs we reviewed the food borne zoonoses and tuberculosis programme and the Executive Agency, the Centre for Environment, Fisheries and Aquaculture Sciences. At the Department for International Development, we examined the research sponsored by the Social Science Research Unit and at the Office of the Deputy Prime Minister, we focused on the housing, homelessness, urban and planning research programme.

In the case studies we used four main methods of data collection:

- Face-to-face semi-structured interviews with various stakeholder groups;
- Postal survey of research providers;
- Structured telephone interviews with research users; and
- Document, literature and web review.

Face-to-face semi-structured interviews with various stakeholder groups

In consultation with the case study departments we identified 40 individuals who we interviewed. The interviewees were selected because they were involved in the research procurement. We aimed for about two thirds of our interviews to be with purchasers and one third each with providers and users, although in practice individuals did not easily fit into these groups and quite often assumed a number of different roles.

Postal survey of research providers

We conducted a postal survey of all research providers awarded contacts over the past five years for each of the research programmes. A copy of the survey is available from RAND Europe. Given that the providers are independent researchers they were under no obligation to respond. The survey was in the field for 4 weeks, with a follow-up reminder at 2 weeks. The total response rate for all three departments was 45 per cent, which considerably exceeded our target of 30 per cent **(Figure 18)**. There was no difference in the organisational profile of non-responders for researcher providers of the Department for International Development and the Department for Environment, Food and Rural Affairs. For the Office of the Deputy Prime Minister, providers from universities were more likely to respond than those working for independent research organisations. The small numbers for the Department for Environment, Food and Rural Affairs reflects the number of research providers' surveyed and given, the small sample size, the results for the Department for Environment, Food and Rural Affairs should be cautiously interpreted.

Telephone structured interviews with research user

During our face-to-face semi-structured interviews, we asked departments to suggest research users. Using this 'snowballing' technique we identified 26 individuals from a variety of organisations who use research to inform their policy and practice. We surveyed these individuals through a structured telephone interview to seek their views on the procurement of research and, more specifically, on its use. A copy of the structured telephone protocol is available from RAND Europe.

Document, literature and web review

We reviewed websites, published and unpublished documents recommended by and received from interviewees.

18 Response rates to postal survey of research providers

	DFID	DEFRA	ODPM
Number of valid questionnaires sent	105	32	167
Number questionnaires returned	58	17	63
Response rate	55%	53%	38%

Appendix 3 Evaluating research - an international overview

In the United States of America the 1993 Government Performance and Results Act (GRPA) required federal agencies - including those that fund research - to set strategic goals and to use performance indicators for management and budgeting. The objective of the GPRA is to encourage greater efficiency, effectiveness and accountability in federal programmes and spending. Because of concerns that implementing the act would be particularly difficult for research activities, the Committee on Science, Engineering and Public Policy (COSEPUP) of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine has considered the most effective ways to assess the results of research. The results of this study are described in two reports: Evaluating federal research programs and Implementing the Government Performance and Results Act for research.

COSEPUP made a number of conclusions, including:

- Both applied and basic research can be evaluated meaningfully on a regular basis;
- Agencies must evaluate research programmes by using measurements that match the character of the research. Differences in the character of the research will lead to differences in the appropriate timescale for measurement, in what is measurable and what is not, and in the expertise needed by those who contribute to the measurement process;
- The most effective means of evaluating federally funded research programmes is expert review. Expert review - which includes quality review, relevance review, and benchmarking - should be used to assess both basic research and applied research programmes.

For a long time, evaluation has had a steady role in the formulation of innovation policy in Finland. National policies, individual measures and institutions have been subjected to extensive evaluation, especially since the early 1990s.

The effectiveness of government actions is assessed at different levels. All major organisations have been evaluated by international evaluation teams. Experts from abroad are commonly involved in evaluation panels. In this way, foreign examples are taken into account in evaluations. This has been important to ensure the objectivity of evaluations and the transfer of transnational policy learning. These evaluations have given recommendations for future developments and for types of instruments that should be supported.

The major policy actors, such as the National Technology Agency (Tekes) and the Academy of Finland, regularly have their own programmes evaluated. In addition, the ministries have commissioned a number of evaluations.

At the programme level, there is usually an evaluation and/or final programme report after a programme is finished covering basic indicators describing the projects (money allocated, number of projects and companies involved etc.). At the end of the 1980s, Tekes decided to evaluate all its technology programmes. Since then, experts have evaluated more than 60 Tekes technology programmes. Recently evaluations have become more structured and standardised. For that purpose, it created a separate Impact Analysis Directorate, consisting of an Evaluation Unit and a Quality Unit. As much as possible, evaluations are done by outsiders; often international experts are used. Tekes is further developing and structuring its evaluation activities. The evaluation unit has developed an evaluation handbook.

Germany has a rich tradition of evaluation of its research institutions and activities. Evaluation takes place at several levels of the research base and at several stages of the research work, most often in the form of either internal or external peer reviews by academics and industrialists.

There are evaluations at the system level, the institutional level, and the programme and project level. The first two types of evaluation are initiated by the responsible Federal Ministries and the Federal State Committee for the entire German research landscape in 1996 and have been conducted from 1997-2001. These evaluations are conducted by the Wissenschaftsrat and international evaluation organisations. In this context, the larger research institutes (Max Planck, Fraunhofer, Blue List organisations) have all been fully evaluated in the past six years. Programme and project level evaluations have also taken place, but are mostly initiated within the research organisations. There is no common framework for evaluation nor is there convergence of how evaluations should impact future operations and research work

Second, evaluation takes place at various stages of the research work. Ex-ante evaluations are often conducted by means of workshops, aimed at assessing the appropriateness of certain research priorities and programmes. Since 2000, all programmes of the Federal Ministry of Education and Research (the main sponsor of research work) use programme monitoring systems to assess how the objectives of the research programmes are translated into activities and the effects of preliminary results. Such evaluations of ongoing work are often used in overall programme evaluations ex-post.

Appendix 4 Setting research priorities - an international overview

The development of a new federal science and technology strategy in 1996 resulted in the establishment of new government structures and mechanisms in this field. This strategy has lead to the development of much more explicit and structured approaches to determining research strategies.

Following the publication of Science and Technology for the New Century: A Federal Strategy, most of the science-based departments and agencies have established external advisory bodies.

The Council of Science and Technology Advisors (CSTA) was established in April 1998 to provide the Cabinet Committee for the Economic Union (CCEU) with external expert advice on internal federal S&T issues. The CSTA consists primarily of representatives from external Science Advisory Boards (SAB) that report to ministers or other senior officials of science-based departments and agencies (SBDAs). The CSTA draws these advisers into a single body to improve federal S&T management by examining issues common to a number of departments, and by highlighting opportunities for synergy and joint action.

The CSTA draws its members from these Science Advisory Bodies and was created to better integrate the diverse array of external advice to address federal horizontal S&T issues.

The German policy and research system is very complex. The research performance base is very fragmented. Science and technology policy responsibilities are divided over both the federal and state level. To aim for co-ordination of overall research strategy, research structure and program focus at both levels, two organisations have been assigned specific advisory responsibilities: the German Research Council (Wissenschaftsrat) and the Federal State Committee for educational planning and research promotion (Bund-Laender-Kommission, BLK).

The Science Advisory Council that represents both state and federal governments however is not binding. They broadly advise on science and evaluate the structure and institutions of the German research system.

The BLK is the permanent forum for the discussion of all questions of education and research promotion which are of common interest to the Federal and Länder governments. It submits recommendations to the Heads of the Federal and Länder governments.

Its three main tasks are:

- to co-ordinate the Federal and Länder governments' research policy planning and decisions and develop a medium-term plan for this field.
- to plan priority measures and make recommendations concerning the mutual exchange of information between the Federal and Länder governments in matters of research promotion.
- to propose to the heads of the Federal and Länder governments the approval of the annual grants for the research institutions, research funding organisations and research projects jointly financed by all the parties to the Agreement.

Foresight plays an important role in the process of setting research strategies and priorities in the Netherlands.

Foresight exercises are tailor-made, interactive processes. The Netherlands has a dense intermediary level of institutions, councils and independent bodies which contribute to agenda setting, mediate between the resource allocation and the performance of research and oversee parts of that research.

Each of these organisations conduct foresight activities, however, in most cases using distinguishing perspectives:

- the Advisory Council for Science and Technology Policy (AWT) looks at the broader science and policy strategic direction;
- the Royal Academy of Sciences (KNAW) examines developments that affect the various scientific disciplines;
- the Sector Councils initiate foresight studies that explore the social, economic and environmental challenges to the specific policy domain;
- the allocation of investment funds in the Dutch knowledge infrastructure (ICES-KIS) are conducted through frequent rounds of exploring potential future gaps in the infrastructure that should deal with prominent policy issues.

The entire process ensures the inclusion of all relevant stakeholders, such as academics and industrialist as well as interest groups and research users.

Appendix 5 References

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Appendix 6 Glossary of terms

Benchmarking	A continuous systematic process for evaluating the products, services, and work processes of organisations that are recognised as representing best practices for the purpose of organisational improvement.
Best practice	A comprehensive approach to continuous improvement of all facets of an organisation's operations.
Capacity maintenance	Maintaining sufficient capacity in research organisations to ensure that the departments' research questions can be answered.
Capacity building	Building capacity in existing or new research organisations to ensure that the departments' research questions can be addressed.
Department-articulated research	Research where the hypothesis or research question is identified by the department.
Food borne zoonoses	Disease pathogen found in food that is transmissible from animals to humans.
Frascati-definitions	Classification system for defining and measuring research and development expenditure as described in detailed in Figure 3.
Investigator-articulated research	Research where the hypothesis or research question is identified by investigators.
ISO 9001	A standard for quality systems covering design, development, production, installation and servicing organisations.
Knowledge Transfer	Any process or mechanism to transfer knowledge that facilitates the uptake of new research.
Logic model	A map of logical linkages between resources, activities and short, medium and longer-term outcomes in the delivery of a policy.
Peer-review	Assessment of research proposals and outputs by peers.
Research Provider	Individuals or organisations that undertake research on behalf of government departments.
Research Purchaser	The organisation or department commissioning research.
Research User	Government and non-government organisations and individuals who use research to improve service delivery and inform policymaking.