Department for **Innovation, Universities** & **Skills**

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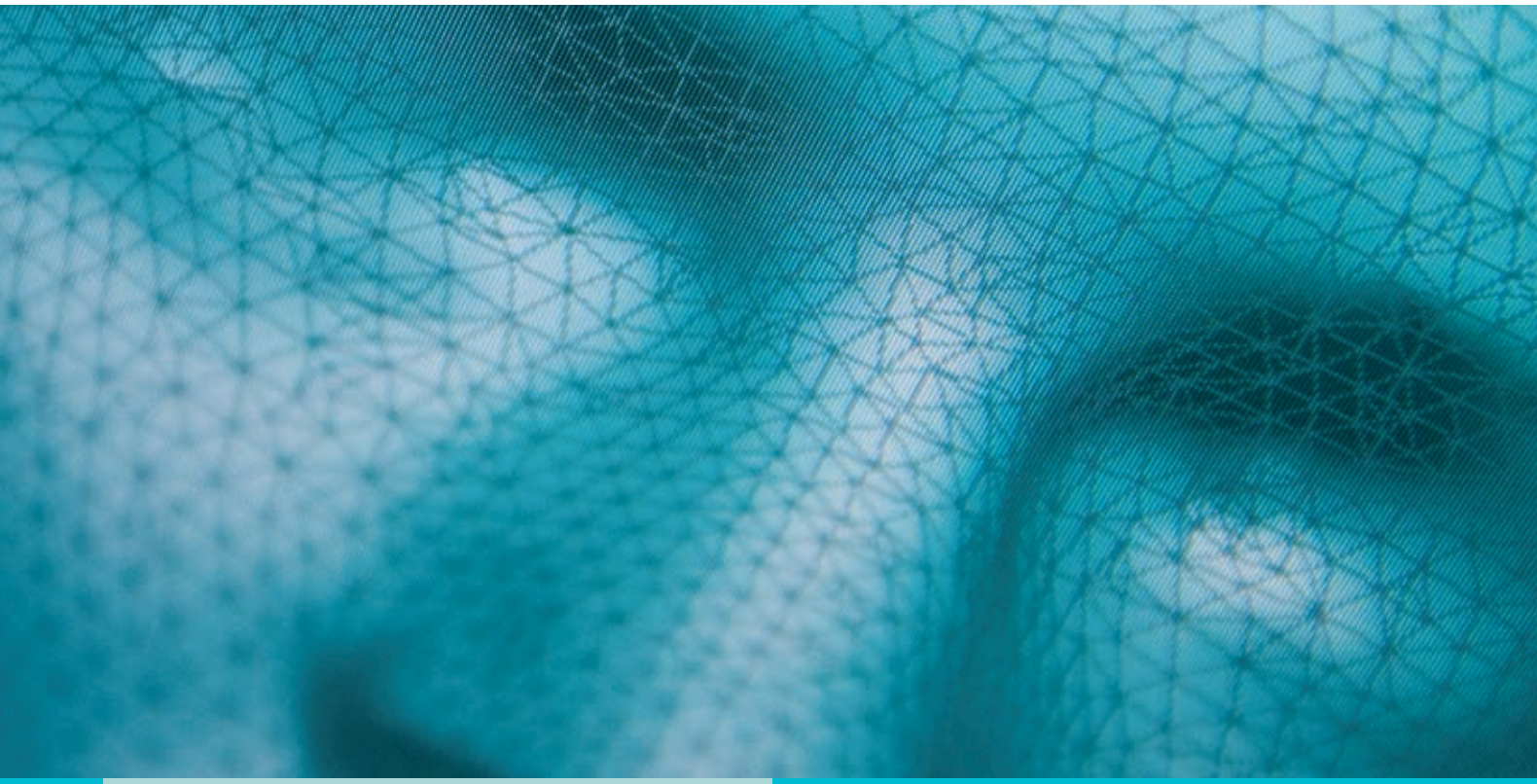

Science and Innovation Investment Framework 2004–2014

Annual Report 2008

department for children, schools and families

Contents

1. Introduction

1.1 This is the fourth annual report on the *Science and Innovation Investment Framework 2004-2014*[1] (SIIF). SIIF set out the actions which the Government and its partners committed to take to create the right conditions for Britain's knowledge-based economy to grow, and how their progress would be measured. This report concentrates on progress against the six broad themes[2], including key developments over the past year.

Innovation White Paper

1.2 Whilst the SIIF set out a longer term vision for UK science and innovation it also needs to be viewed as a constantly evolving policy framework. A major landmark this year was the publication in March 2008 of the DIUS White Paper, *Innovation Nation*[3], which set out the Government's aim to make the UK the best place in the world to run an innovative business or public service. The Government is therefore publishing a separate annual progress report on Innovation in parallel with this report.

Overall Progress

1.3 Overall, the fourth annual report concludes that continued good progress has been made, in delivering the vision for the future. Helped by rising public investment, the UK research base continues to perform strongly. Knowledge transfer activity remains on an upward trend, and there has been some progress in attainment and take-up for Science, Technology, Engineering and Mathematics (STEM). This year also saw the launch of a wide-ranging consultation on the relationship between science and society. However, whilst business investment in R&D is growing in real terms, as an overall percentage of GDP it remains static. Continuing to raise levels of business innovation across all sectors of the UK economy and accelerating the translation of fundamental research will be challenging under the current economic conditions.

[1] http://www.hm-treasury.gov.uk/spending_review/spend_sr04/associated_documents/spending_sr04_science.cfm

[2] World class research, Responsiveness to the needs of the economy, Business R&D and innovation, Supply of scientists, Public understanding and engagement, Science and innovation across Government.

[3] http://www.dius.gov.uk/publications/scienceinnovation.pdf

Sainsbury Review

In October 2007 Lord Sainsbury published his Review of the UK science and innovation system[4]. The Review examined the role of science and innovation in ensuring the UK remains competitive in our increasingly globalised economy. The Government accepted Lord Sainsbury's recommendations in full, and published its response and future plans in March 2008. Excellent progress has been made in delivering the 72 recommendations. Of these, over 20 have already been implemented and the rest are being addressed and are in the process of implementation.

Annual Innovation Report (AIR)

A key recommendation of the Sainsbury Review was that a report on the innovation performance of the UK should be published every year. The Annual Innovation Report (AIR) is the first comprehensive report on the innovation performance of the UK, covering the public, private and third sectors. It reports on the contribution of central government departments in key areas such as regulation and procurement, the progress made by the Technology Strategy Board (TSB) and the science research base, the Regional Development Agencies, the work of the Higher and Further Education sectors and of the wider public and third sectors. It assesses the level of investment by the private sector in R&D and innovation. It also provides an update on the progress towards implementing the commitments contained in Innovation Nation White Paper and the recommendations of the Sainsbury Review. The first AIR is published alongside this report.

[4] The Race to the Top. October 2007. http://www.hm-treasury.gov.uk/media/5/E/sainsbury_review051007.pdf

World class research

1.4 UK researchers are the most efficient and productive in the world. The latest report to DIUS on the performance of the research base[5] shows the UK maintaining its world leading research position as second only to the USA on most leading scientific indicators. The Government will be spending more than £6 billion per annum on science and research by the end of the Comprehensive Spending Review period in 2011. Nearly £4 billion is provided by the Science and Research Budget and nearly £2 billion will reach Higher Education Institutions (HEIs) through the Higher Education Funding Councils quality-related funding streams. Key allocations of the Science Budget included almost £2 billion for medical research over three years – a funding increase of 30% – to fund both basic and translational research. This is in line with the recommendations in Sir David Cooksey's[6] report on health research. In particular, the settlement will enable work to start on the future development of the new UK Centre for Medical Research and Innovation in London.

Improved financial sustainability

1.5 Continued good progress has been made on financial sustainability. 2008 saw the establishment of the Research Capital Investment Fund (RCIF) as a permanent stream of capital funding to ensure that the previous backlogs in infrastructure funding addressed by the Science Research Investment Fund (SRIF) do not build up again. RCUK is currently undertaking a review of the first three years of the full economic costing regime and its impact on UK Higher Education Institutions. Progress to replace the Research Assessment Exercise with a new less resource intensive Research Excellence Framework continues.

Greater responsiveness

1.6 The research base is responding to incentives to increase the economic impact of public funded research. Research Councils delivery plans recognise the increased emphasis on economic impact whilst maintaining research excellence. The increase in Higher Education Innovation Fund (HEIF) funding allocated by formula, is designed to provide further impetus for universities to increase economic impact. Evidence of increases are highlighted in the latest Higher Education - Business Community (HEBCI)[7] and Public Sector Research Establishment (PSREs)[8] surveys which show continued growth against a range of measures including an increase in business consultancy.

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[5] International comparative performance of the UK research base, July 2008. An independent report by Evidence Ltd for DIUS. http://dius.ecgroup.net/files/75-08-R_on.pdf

[6] A review of UK health research funding. December 2006. http://www.hm-treasury.gov.uk/media/4/A/pbr06_cooksey_final_report_636.pdf

[7] Higher Education – Business and Community Interaction Survey 2006-07. http://www.hefce.ac.uk/pubs/hefce/2008/08_22/

[8] Fourth Annual survey of knowledge transfer activities in public sector research establishments. http://www.berr.gov.uk/dius/science/knowledge-transfer/psre/page12062.html

Supply of scientists

1.7 Encouraging the take up of science at all levels was a key ambition of SIIF : Next Steps. Whilst there has been progress in a number of areas, there still remains much to be done to realise that ambition. Highlights in 2007/08 included the proportion of 14 year-olds reaching the expected level of competence in science have reached highest-ever levels, engineering diplomas are now available for 14-19 year olds and there are now 500 after school science clubs. The target for 18,000 Science Ambassadors to enthuse and inspire the next generation of scientists was also reached in 2008. Applications to start degree courses in 2008/09 show encouraging rises in many STEM subjects, including physics (+4.2%) and chemistry (+4.6%). On research careers, RCUK and Universities UK launched a revised Concordat to support the Career Development of Researchers and the UK Resource Centre for Women in Science Engineering and Technology (SET) has supported 1700 women to return to or progress in their SET career.

Increased business investment and engagement

1.8 R&D Tax credits continue to prove popular and were extended this year to SMEs with up to 500 employees and an annual turnover of less than €100 million. Whilst Business Expenditure on Research and Development (BERD) grew in real terms in 2006 (the latest year for which figures are available), it remains relatively static in GDP terms at 1.08%. Achieving the combined public and private sector GDP research expenditure ambition will continue to remain challenging over the next period. The first year of the Technology Strategy Board acting as a Non-Departmental Public Body (NDPB) is covered in more detail in the accompanying Annual Innovation Report.

Global partnerships

1.9 The Global Science and Innovation Forum (GSIF) published its strategy for international engagement in research and development in October 2006. The strategy includes recommendations for action across the Forum's membership and provides a context for the activities they undertake - across government and more widely – to ensure the UK can take advantage of emerging international opportunities and respond to challenges. An example of this is the new Research Councils UK (RCUK) office in Beijing working to foster more UK-China research collaboration. DIUS has worked to steer the development of the legislation to establish the European Institute for Innovation and Technology (EIT), which was passed by the European Parliament in February 2008, to reflect the UK's priorities that the EIT should support excellence, avoid excessive bureaucracy and not duplicate existing programmes at EU or national level.

Science and Society

1.10 In 2008 DIUS began a wide-ranging consultation on a future UK strategy for the relationship between science and society. The consultation covers topics around the themes of public engagement in science, development of a representative STEM workforce and greater confidence in both public and private sector use of science. Following the consultation, a long-term strategy will be developed with an implementation plan for publication early next year.

Science across government

1.11 The Government Office for Science (GO-Science), which is based in DIUS, was created in July 2007. GO-Science's main objective is to work with Government Departments to enable them to use science better, and to ensure that Government policy and decision-making is underpinned by robust scientific evidence and long-term thinking. GO-Science has continued to build on the steps highlighted in last year's Annual Report to ensure sustained improvement in the Government's management and use of science and innovation, such as the rolling programme of Science Reviews, the work of the Chief Scientific Advisers Committee (CSAC), the independent Council for Science and Technology (CST), the publication of the updated Code of Practice for Scientific Advisory Committees and the Horizon Scanning Centre (HSC).

Economic Impact Framework

1.12 In 2007 DIUS, in consultation with a wide range of stakeholders including HM Treasury, Department for Children, Schools and Families (DCSF), academics and business, developed a new Economic Impact Framework (EIF) to provide a unified approach to monitoring progress against the ambitions of the ten-year framework. This replaces the original Science and Innovation Investment Framework : Progress against Indicators. The second EIF is published as an Appendix to this report.

2. Research Excellence

This chapter outlines key achievements and actions to maintain and improve the international competitiveness of UK research and improve its long-term sustainability, including:

- continued strong performance of the UK research base in terms of quality, productivity and efficiency; second in the world, only to the USA, for total publication and citation output;
- the investment backlog in university research infrastructure has been largely addressed, a permanent research capital investment fund worth £500 million over the CSR period was established in 2008 to avoid any investment shortfall in the future;
- £236 million investment to develop large-scale research facilities and projects;
- Science Bridges scheme expanded to cover both China and India. RCUK Offices in Beijing and in Delhi launched new schemes with a total of £8 million of funding to promote collaboration on international research.

2.1 Ambitions relating to research excellence and sustainability for UK science and innovation were outlined in the ten-year framework as follows:

World class research at the UK's strongest centres of excellence:

- maintain overall ranking as second to the USA on research excellence, and current lead against the rest of the OECD; close gap with leading two nations where current UK performance is third or lower; and maintain UK lead in productivity
- retain and build sufficient world class centres of research excellence, departments as well as broadly based leading universities, to support growth in its share of internationally mobile R&D investment and highly skilled people

Sustainable and financially robust universities and research institutes across the UK:

- ensure sustainability in research funding accompanied by demonstration by universities and public laboratories of robust financial management to achieve sustainable levels of research activity and investment

2.2 The Science and Research Budget, set as part of the CSR settlement in 2007, continues the Government's record of sustained and rising investment in the research base, and will see the budget increasing by 2.7% in real terms over the CSR period.

Evidence of progress

2.3 The fifth independent annual report on the performance of the UK research base shows continued strong performance. The UK has the second highest world share of cited papers (12%) and has increased its share of the most highly cited papers to 13.4%. The USA continues to have the highest world share in both. The UK has also sustained a more consistent performance across the range of scientific disciplines than most other countries and retains its lead in the G8 on productivity measures. Whilst China is making unprecedented levels of investment in science and is rapidly increasing its global share of publications and citations, this study shows that the UK continues to maintain its world share despite intensifying competition.

Table 2.1: PSA target metrics for the UK research base[9]

Research field	World ranking	Trend 98-07	Highlights
Bioscience	2	↔	UK increasing overall citation and highly cited share
Business	2	↑	UK very high on citation "productivity"
Clinical	2	↑	Agile research base – second in seven out of ten broad research disciplines
Environmental sciences	2	↔	
Humanities	2	↔	
Pre-clinical	2	↔	
Social sciences	2	↑	
Mathematics	4	↔	
Physical sciences	4	↑	
Engineering	4	↔	

[9] Data reflects UK number and share of world citations in ten major research fields.

Key Highlights

World-class research

Research Assessment Exercise (RAE) – Next Steps

2.4 In Science and Innovation Investment Framework 2004-2014: Next Steps, the Government announced its intention to move to a simplified new quality assessment system that would make greater use of metrics after the 2008 Research Assessment Exercise (RAE), and ensure that excellent research of all types is rewarded, including user-focused and interdisciplinary research. A particular concern is for the quality and user value of applied research to be better recognised. During 2007, the Higher Education Funding Council for England (HEFCE) consulted widely on this and the new Research Excellence Framework (REF). HEFCE is currently undertaking pilot exercises as part of the development of bibliometric indicators as well as developing proposals for light-touch approaches to expert review of research outputs, to be used in subjects where bibliometric indices do not yet provide a sufficiently robust measure of quality. This includes discussing with practitioners and other interested bodies a range of possible approaches to capturing the quality of applied research. This work is expected to continue until early in 2009. HEFCE plan to consult the sector again on all main features of the REF including the operational details of the bibliometrics process; the use of other quantitative indicators; subject boundaries; and procedures for light-touch peer review during 2009. A full national exercise to produce bibliometric indicators will be run during calendar year 2010 to inform funding from 2011/12. The new framework will be in place and fully operational by 2014/15.

Financial Sustainability

Higher Education Institutions (HEIs)

2.5 World class science needs world class infrastructure. A key element of the Science and Innovation Investment Framework is to ensure that infrastructure and the sustainability of the research base are improved in order to keep the UK at the leading edge. Good progress has been made over the last year. A new more strategic approach to capital investment in the research base has been inaugurated. The Research Capital Investment Fund was created in 2008 and provides stable and predictable funding to support university research infrastructure based on Research Council income. This replaces the Science Research Investment Fund (SRIF) which has successfully completed its task of making good the main backlog in investment in research infrastructure. The new fund, worth £509 million over the current spending review period, will help Universities maintain their research infrastructure and avoid the backlog in investment reoccurring.

Case Study 2a SRIF: Liverpool University Institute of Sustainable Water, Integrated Management and Ecosystem Research (SWIMMER)

The SRIF investment in infrastructure has enabled the institute to develop research and establish joined up thinking in water and environmental sciences.

Water is an important global resource and is increasingly at the centre of major policy issues and research questions. Besides its direct uses, it does of course support natural ecosystems, goods services and environmental quality. As part of SWIMMER the Wetland Ecosystem Research Group carries out research, which is vital in developing our understanding of wetland soil processes, the role of carbon cycling within peat land and to help us to develop our understanding of river basins and their management.

SRIF funding has been used to help refurbish the Nicholson Building at Liverpool University, which has been specifically redesigned to facilitate the wide range of activities that SWIMMER will be involved in. It includes two state of the art laboratories and an administration centre within the facility, which allows researchers to analyse, water, soil and sediment samples.

Full Economic Costing (FEC)

2.6 The CSR07 settlement will provide resources to complete delivery of the policy that Research Councils should fund research at 80% of full economic costs. As it is three years since FEC was introduced, RCUK has decided to undertake a review of Full Economic Costing (FEC) to see how the system is bedding down. The review seeks to address a number of questions including the contribution of FEC to the physical and financial sustainability of UK HEIs, what effects FEC has had on the nature of grant applications to Research Councils and more widely what effects has FEC had on research undertaken for Government, charities, the EU and business. The review is due to report early in 2009.

Large Facilities Roadmap

2.7 In 2008 DIUS published the Large Facilities Roadmap and the allocation of DIUS' Large Facilities Capital Fund (LFCF). This included greater emphasis on the economic impact of facilities and the development of clearer guidance to those proposing projects. Projects for which funds were earmarked include:-

- £67 million for the re-development of a new Laboratory of Molecular Biology at Cambridge;

- £28.5 million for a research facility for Birth Cohort Studies – supporting the development at the interface between biomedical and social sciences;
- £65 million towards next generation supercomputing facilities.

Science and Technologies Facilities Council (STFC)

2.8 The first year for the Science and Technologies Facilities Council (STFC) has been a challenging one, but there have been a number of successes. STFC based projects were earmarked over £236 million of additional funding from DIUS' Large Facilities Capital Fund. This will facilitate the completion of STFC's world class Diamond and ISIS research facilities, the development of new research facilities in computational sciences, detector systems, imaging and materials design at STFC's Daresbury and Harwell Science and Innovation Campuses and support the UK's participation in the first phase of the international Square Kilometre Array astronomy project. STFC formed a Joint Venture company with the UK Atomic Energy Authority and Goodmans to take forward the development over the next 20 years of the Harwell Science and Innovation Campus. This major development will transform the UK Atomic Energy Authority's (UKAEA) old site into a new world leading Campus for research, innovation, engineering and technology development. STFC will be developing, in consultation with its diverse range of stakeholders, a forward looking strategy which will take into account the findings of the recently published Wakeham Review of Physics.

Public Sector Research Establishments (PSREs)

2.9 A commentary on the fourth monitoring exercise on the sustainability of Public Sector Research Establishments is being published alongside this report. This monitoring exercise helps research organisations in the public sector, and their parent departments, assess their long term financial sustainability.

Research Councils

Performance Management System

2.10 The Research Councils Performance Management System has successfully completed its third year. All Research Councils have published three Annual Delivery Plan reports setting out the achievements against the objectives in the Delivery Plans. The third annual report on output frameworks will be incorporated into DIUS's "Economic impacts of investment in research and innovation", published alongside this annual report.

Research Council Shared Services

2.11 The transfer to shared services is expected to realise a benefit of around £290 million net present value, with an overall payback period of six years.

Cross Council funding

2.12 The cross Research Council funding agreement ensures that gaps do not develop between the Councils' subject domains. The agreement ensures equality of opportunity for proposals at the interface between traditional disciplines, where many of the major research challenges of our time are located.

Case Study 2b : ISIS: Protecting Children in Online Social Networks

An example of funding under the cross-Council agreement is the ISIS: Protecting children in online social networks project, led by Professor Muhammad Rashid of Lancaster University, who successfully sought support from EPSRC and ESRC through a single application to the Research Councils.

The project aims to develop an ethics-centred monitoring framework and tools to help law enforcement agencies police online social networks, to help protect children. Because children actively participate in chat rooms and web-based communities, online social networks can pose a risk of child exploitation by paedophiles. Natural language analysis techniques will be developed to help identify paedophiles from chat logs, as well as monitoring mechanisms that can be non-invasively attached to file sharing systems for identifying distributors of child abuse media. The ethical issues associated with such monitoring activities will feed back into the development of the framework and tools. ESRC provided 30% of the funding (£123,581) and EPSRC agreed to provide 70% (£288,355).

Large Hadron Collider (LHC) CERN

2.13 UK scientists played a leading role in the biggest and most expensive basic science experiment ever undertaken. The Large Hadron Collider (LHC) at CERN is a new particle accelerator set in a 27 kilometre tunnel underground near Geneva, designed to study sub-atomic particles. LHC was switched on by the British leader of the project, Lyn Evans, on 10 September 2008 and has been the subject of worldwide media and public attention. The Government has contributed more than £500 million to the LHC over the construction period 1995-2008. It represents the largest sum of money ever invested by a UK Government in a scientific project. There are some 250 UK scientists and staff employed at CERN. In addition more than 500 UK scientists regularly use the facilities. The LHC will, amongst other things, test a theory developed by the British scientist Peter Higgs.

Supporting world-class health research

2.14 In 2007/8 the Medical Research Council (MRC) and National Institute of Health Research (NIHR) have, under the aegis of the Oversight Committee for Health Research (OSCHR) Translational Medicine Board (TMB), jointly developed a coherent and ambitious new approach to translational medicine research. Coordinated MRC/NIHR strategies have been created that are designed to increase translational research activity and capacity. To achieve this, MRC/NIHR are creating a system which swiftly identifies the latest advances in basic science, develops their potential into promising interventions, and evaluates effectiveness, value for money and broader impact for use in the NHS. For the first time, all the "development gaps", where support was not consistently available, have been addressed. An example of this new approach is the MRC Developmental Pathway Funding Scheme. This is designed to support work which has a clear goal of delivering fundamental research towards the clinic. Investment is aimed at projects that target significant and unmet health needs by improving prevention, diagnosis, prognosis, or treatment of patients, or by developing the relevant research tools. The scheme was launched in April 2008.

Case Study 2c : Joint Patient Research Cohort Initiative

The MRC, NIHR and the health research departments in Northern Ireland, Scotland and Wales are spending over £7 million on a programme to identify small, carefully defined groups of patients to help researchers detect, treat or prevent diseases. The cohorts in this pilot study are in areas of high unmet need or where there are bottle-necks in turning research into therapies. This initiative is managed by MRC and was launched on 14 November 2007.

The decision to fund thirteen cohorts of a total value of £7.25million was announced in June this year. The portfolio of research will look at a range of common and rare diseases such as Type 2 Diabetes, the lung disease Chronic Obstructive Pulmonary Disease (COPD), Neuromuscular Mitochondrial Disease, and cohorts of adults and children.

Case Study 2d : Laboratory for Molecular Biology

A £200 million rebuild of the internationally renowned Laboratory of Molecular Biology was given the go-ahead by John Denham, Secretary of State for Innovation, Universities and Skills in June 2008.

Established in 1947, the Laboratory of Molecular Biology (LMB) has produced 13 Nobel Prize winners, most recently in 2002, and is where the structure of DNA was discovered and DNA sequencing invented. The funding will enable the Medical Research Council, which runs LMB, to meet the cost needed to rebuild the 40 year old building and replace it with an innovative research laboratory. The cutting-edge facility will enable LMB to expand its research portfolio into new areas such as neurobiology. It will also enable the expansion of the Laboratory's commercialisation activities.

This laboratory is a key example of the UK leading the world in conducting basic research, translating it into health benefits and commercialising it into wealth benefits. For example, basic antibody research carried out at LMB has resulted in cancer drugs such as Herceptin and current research is looking at monoclonal antibodies to treat asthma.

Scientists based at the Cambridge laboratory have helped start more than a dozen companies. The new site will enable researchers to work closely with Cambridge University's clinical school and the Cambridge University's Hospitals NHS Foundation Trust to continue to translate basic scientific breakthroughs into clinical and commercial applications.

Global Partnerships

International collaboration

2.15 As science research becomes increasingly globalised it is vital for the UK to remain at the heart of international collaboration. Recent evidence shows that UK academic papers involving a non-UK author have increased from 24% in the period 1996-2000 to 40% in the period 2001-2005. Recent research has also shown that internationally collaborative papers have, on average, higher impact than those with a solely national authorship.

Global Science and Innovation Forum (GSIF)

2.16 The cross-government Global Science and Innovation Forum (GSIF)[10] strategy sets out a framework of objectives to prioritise and coordinate the UK's international engagement in science and R&D. The strategy has a number of key goals:

- ensuring UK researchers and businesses engage with the very best research internationally;
- developing strategic partnerships, through Science Bridges to link world class UK universities with counterparts in China and India;
- improving coordination to create synergies across government and key non-governmental bodies; and
- supporting activities to increase the innovative nature of UK business.

Case Study 2e : RCUK Beijing

The Office was launched in October 2007 by UK and Chinese Ministers, attended by 350 representatives of over 140 organisations in UK and China.

Their work programme includes:

- 12 Science Workshops : in areas likely to lead to collaborative research possibilities;
- Summer Schools: first competition drew 55 applications. 10 awards for 2008 and 6 for 2009;
- Internship visits by research agency professionals: visits to UK in 2008 by staff from the National Science Foundation of China, and China National Centre for Biotechnology Development.
- Consultancy to develop a "User's Guide" to cross-cultural issues in UK-China research collaboration;
- Analyses of UK-China co-authored papers and their impacts (these are now available at www.rcuk.cn).

The Office liaises closely with many agencies in China to identify ways to align resources around common priorities, taking specific UK initiatives as a starting point including the RCUK Science Bridges call. Proposals for a new funding scheme to link 'best with best' are under consideration by RCUK.

[10] member organisations are OSI, FCO, UKTI, HMT, Defra, DFID, DfES, Department of Health, Home Office, Royal Society, British Council and Research Councils

EU Framework Programme

2.17 The UK played a major part in shaping the European Union's Seventh R&D Framework Programme (FP7) launched in December 2006, following an intense period of negotiation. The programme covers the period 2007-2013 and has a budget of €53 billion. The UK was successful in negotiating an increase in reimbursement rates in FP7; public bodies, universities and SMEs are now able to claim up to a maximum of 75% of their eligible costs for Research and Technological Development (RTD).

European Research Council

2.18 As part of FP7 a new European Research Council (ERC) was launched in February 2007 under the leadership of an autonomous Scientific Council and with a budget of €7.5 billion to boost excellence and creativity in basic research across the EU. A review of the ERC's structures and mechanisms will be carried out by independent experts over the coming months.

Joint Technology Initiatives

2.19 A new aspect of FP7 is the launch of Joint Technology Initiatives (JTIs) which are major public private partnerships to invest in industrially-driven research in key technologies. In 2008 five JTIs were launched in innovative medicines, aeronautics, joint fuel cells and hydrogen, embedded computing systems and nanotechnology. The UK has interests in all the JTIs and particularly in innovative medicines and aeronautics.

European Institute for Innovation and Technology (EIT)

2.20 The EIT was set up in 2008 and will operate on the basis of partnerships known as Knowledge and Innovation Communities (KICs). The EIT will pool together a critical mass of top class resources from higher education institutions, research organisations and businesses (the "knowledge triangle"), with the aim of boosting the EU's innovation capacity. The focus will be on strategic areas where the EU faces major challenges, such as climate change, renewable energies and the next generation of information and communication technologies. Operations are expected to begin in 2009.

Bilateral relationships

2.21 The successful "science bridges" scheme has been expanded from its pilot in the USA to cover both China and India. The new RCUK Offices in Beijing and in Delhi have launched new schemes with £8 million of total funding to promote sustainable research collaborations between world class research departments.

2.22 The UK and China launched Innovation China-UK, a novel collaborative programme providing funds to commercialise the results of joint research. Queen Mary, University of London led the initiative and the Higher Education Innovation Fund (HEIF) provided £5 million. A second phase of UK-China Partners in Science consolidated the research partnerships developed during the first phase in 2005, and EPSRC launched a £6 million call for collaborative projects with China on new and renewable energy.

2.23 The UK-Brazil Year of Science and Innovation brought together more than 1800 scientists, academics and industry representatives from both countries. It led to agreement for Amazonia 1, a joint space mission to monitor deforestation; the establishment of a Brazilian laboratory of agricultural science in the UK; and facilitating the cross-licensing of existing intellectual property.

2.24 The Carnegie Group of G8 Science Ministers/Advisers has now been expanded to include China, India, South Africa, Brazil and Mexico. The Japanese G8 Presidency successfully hosted the first meeting on global Science and Technology issues in 2008, where participants discussed the low carbon society, science and technology cooperation with developing countries and global cooperation on large scale scientific infrastructures.

3. Greater responsiveness to the needs of the economy

This chapter highlights key achievements over the past year to increase the economic impact of the research base. It includes changes in universities, public laboratories and Research Councils such as:

- continued growth in engagement between the research base and business, showing the increasing ability of researchers to exploit the fruits of their research;
- new commitments by the Research Councils to deliver a major increase in the economic impact of their research; and
- growth in the exploitation of research from Public Sector Research Establishments, especially in terms of business consultancy.

3.1 The past year has seen an increased emphasis on how to deliver greater economic impact from the research funded by the tax payer. Research Councils have published ambitious plans to deliver against this agenda. Universities and public sector research establishments are also reporting progress and realising the benefits of this important work.

Evidence of progress

HE-BCI

3.2 The Higher Education – Business Community Interaction (HE-BCI) survey helps to assess the volume and development of interaction between higher education, business and the wider community.

Growth in licensing and IP

3.3 The latest survey results reveal continuing positive trends in knowledge transfer activities (baseline taken as 2000-01).

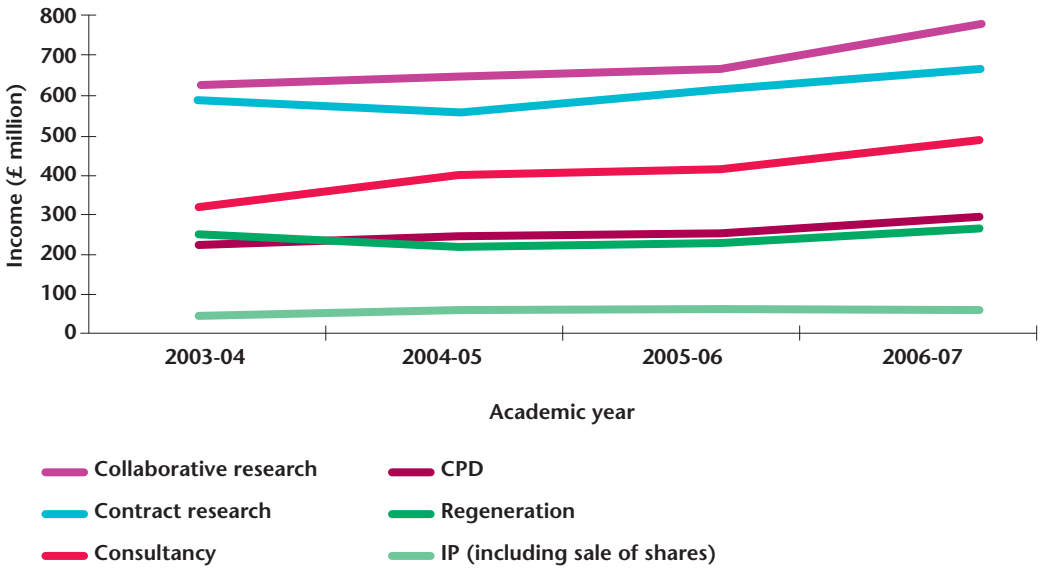
3.4 Whilst trends are positive, DIUS will continue to look for improvement in knowledge transfer and interaction with users. For example, as a requirement for releasing their Higher Education Innovation Fund (HEIF)4 funding allocations, all institutions were asked to set out their plans for improving knowledge transfer performance over time. Earlier this year, John Denham commissioned a report from Professor Paul Wellings, Vice Chancellor of Lancaster University, to look at how universities should manage Intellectual Property for their own benefit and that of the wider economy.

Table 3.1: Higher Education Business Community Interaction (HEBCI) Survey Indicators

Indicator - HEIs	2000/1	2001/2	2002/3	2003/4	2004/5	2005/6	2006/7
Number of new patent applications filed by Higher Education Institutes (HEIs)	896	960	1,222	1,308	1,649	1,537	1,913
Number of Patents granted	250	198	377	463	711	576	647
Number of licensing agreements	728	615	758	2,256	2,099	2,699	3,286
Income from licensing intellectual property (£ million)	18	47	37	38	57	58	58
Number of spin-outs	248	213	197	161	148	187	226
Income from business (value of consultancy contracts) (£ million)	104	122	168	211	219	236	288
Number of full time equivalent staff employed in commercialisation/ industrial liaison offices	1,538	1,836	2,283	2,706	3,077	3,448	7,440

3.5 University business income has grown, though some measures have increased more quickly than others. Universities also report a rapid increase in the number of staff engaged in knowledge transfer activity, responding to the incentives provided by HEIF.

Table 3.2: Selected HE-BCI income streams 2003-07 (real terms*)



Source: HE-BCI 2003-2007

Table 3.3 Income by activity and partner 2006-07

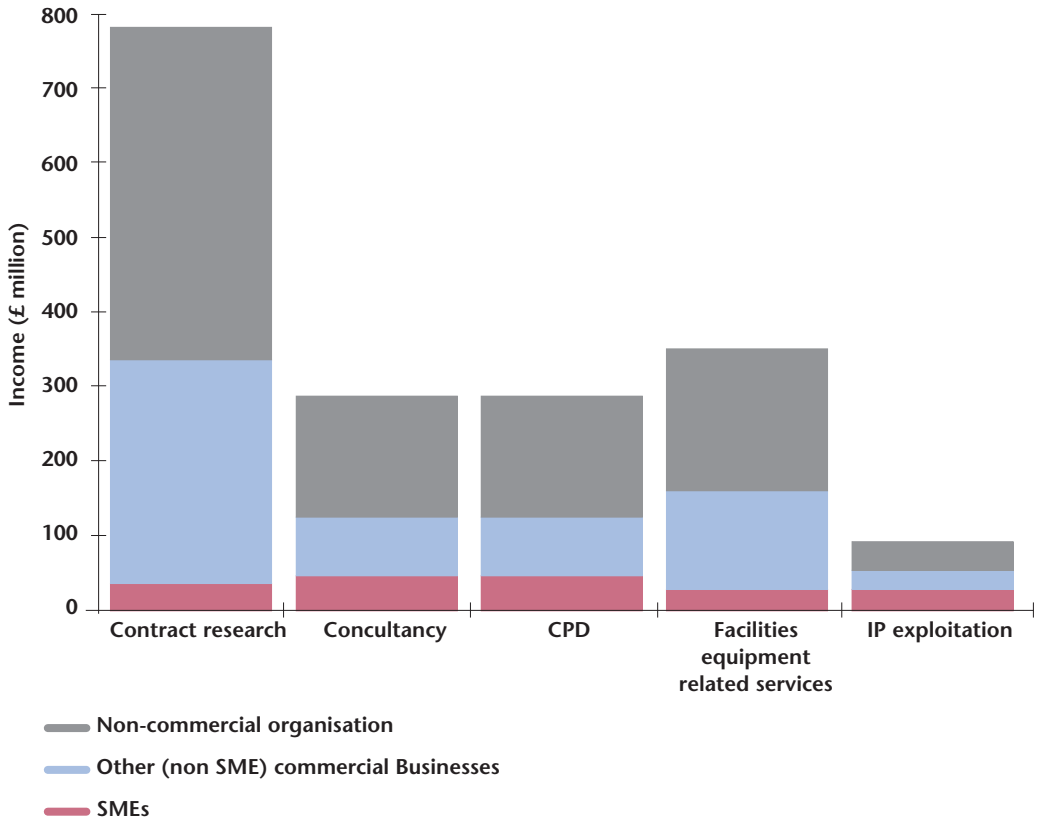
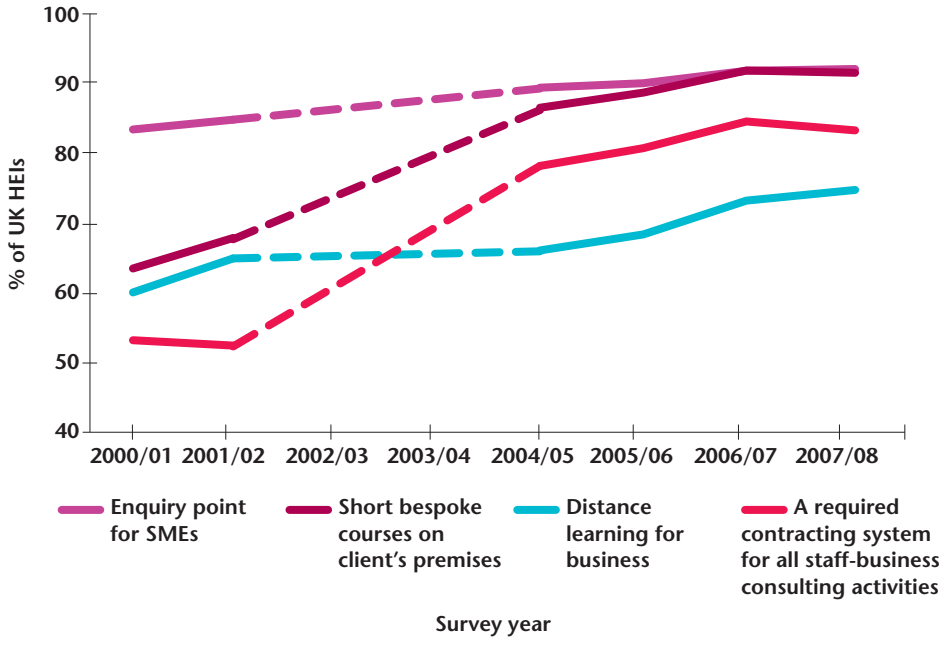


Table 3.4: Selected infrastructure indicators 2000-2008



Source: HE-BCI Part A Questions 11 and 29 (data)

Gowers Review

3.6 The Gowers Review highlighted the importance of supporting the creative industries through tackling IP Crime. IP crime has already been recognised as an area for police action in the updated National Community Safety Plan. Trading Standards Officers now have powers to enforce copyright offences, and £5 million has been made available to local government to fund this function in the first year.

IP Protection

3.7 The Government is also committed to providing greater support to UK business to help recognise, protect and maximise the value of their intellectual property, including through a pilot scheme offering IP health checks to small businesses. The pilot is part of the UK-IPO's Innovation Support Strategy. The early indications from the pilot support the view that effective IP management is essential if innovative businesses are to maximise the value of their intellectual assets. The UK-IPO is now developing an online diagnostic tool to make the health-check available to all.

Mutual Recognition and the Patent Prosecution Highway (PPH)

3.8 The UK-IPO is involved in various initiatives aimed at reducing duplication of work by patent offices worldwide. Plans are being developed for a system of mutual recognition with other accredited offices to reduce delays that can be an obstacle to innovation. The Patent Prosecution Highway (PPH), is being continued with both the Unites States Patent and Trademark Office (USPTO) and the Japanese Patent Office (JPO). The PPH allows accelerated examination of a patent application where examination has already taken place in one of the other countries. In addition to speeding up the patenting process for UK businesses in Japan and the USA, the initiative will help promote work sharing between patent offices around the world, thereby reducing duplication of effort.

Patent Informatics

3.9 In line with Lord Sainsbury's Review of Innovation, UK-IPO has consolidated its Patent Informatics Team to deliver patent analysis services to stakeholders. Since October 2007 the Team has been co-operating with the TSB to assist identification and assessment of disruptive emerging technology fields through the development of a patent analysis toolkit. The Team have completed numerous projects including commercial work for patent attorneys. The Team are currently co-operating with a number of Knowledge Transfer Networks to facilitate an accessible, responsive, useful patent analytics service for UK academics and innovators.

Lambert IP tool-kit

3.10 The Lambert IP tool-kit is showing increasing and effective usage in business-university collaborations and the Lambert group is working towards extending the tool kit for multi-partner research consortia. A one year review indicated that take-up of the model agreements has been positive in both public sector research organisations and industry. The Association for University Research and Industry Links (AURIL) reported that 72% of their responding members believed the agreements have simplified contract formation, providing savings in time and money. UK healthcare giant GlaxoSmithKline reported using the panel of five agreements in fifty nine partnerships, including ten overseas collaborations.

The Strategic Advisory Board for Intellectual Property Policy (SABIP)

3.11 Established in 2008, SABIP has been developing its work programme with plans for work on the Google Generation, enforcement, universities, and the philosophy of IP. SABIP's outputs will be underpinned by a strong evidence base which will be constructed on independent research commissioned by the Board.

Key highlights and next steps

Higher Education Innovation Fund (HEIF)

3.12 HEIF promotes knowledge transfer and engagement with business, and has played a key role in embedding these activities in universities. HEIF provided £238 million over the 2006/7 – 2007/8 spending period. HEIF has provided a number of examples of how the academic community and businesses in the UK have worked together to produce new and innovative products and services that have a significant impact on the UK's economy.

3.13 In October 2007 DIUS announced that the next round of HEIF would see the fund increase in size to £150 million per year over the CSR period. Funding is spread wider across the Higher Education sector, with more institutions now receiving the maximum allocation, and with an extra incentive for working with SMEs.

Research Councils Delivery

3.14 Research Councils continue to implement their action plan to demonstrate that they are delivering a major increase in the economic impact of their investments.

Specifically Councils have:

- jointly reviewed and improved their guidance to applicants and peer reviewers to ensure that there is a shared understanding about the value of addressing potential economic impact;
- reviewed and implemented changes to their assessment criteria, so that economic impact considerations have been properly reflected in funding decisions;
- published a user satisfaction survey;
- completed a project to understand the incentives and experiences of non academic peer reviewers, so that the perspective of end users is represented in funding decisions;
- developed a network of non academic peer reviewers with appropriate expertise;
- provided incentives and rewards for institutions that have demonstrated successful economic impact;
- Research Councils will collectively invest at least £120 million in partnership with the Technology Strategy Board (TSB) to improve the economic impact of the research portfolio over the CSR period.

3.15 Research Councils published delivery plans in December 2007 which included a commitment to delivering a step-change in economic impact. Delivery plans also included plans and targets for knowledge transfer. Councils will continue to develop methodologies for the assessment of economic impact.

Case Study 3a: Commercialising Research – Research Councils role

The Government's vision is that the UK should be one of the most attractive locations in the world for science and innovation, being a key knowledge hub in the global economy, with a reputation not only for outstanding scientific and technical discovery, but also a world leader at turning that knowledge into new products and services.

As major investors in research and postgraduate training the Research Councils play a key role in achieving this ambition. The Councils support the excellent research needed to generate new knowledge, train highly-skilled people, and work in partnership with business and a wide range of users to drive successful exploitation of research outputs. This ultimately delivers benefits for the UK in terms of new goods and services and other less direct benefits in terms of better healthcare, better public services, policy making and cultural benefits.

Maintaining this spread of investment is essential - speculative and novel research provides the ideas and knowledge on which more applied investments can be made. The view from the majority of the business community representatives who advise and work with the Research Councils is that what they value about the UK research base is its broad range of expert knowledge and its highly skilled people - elements that underpin their own R&D activities.

Highlights of the Research Councils activities are detailed in the RCUK publications: http://www.rcuk.ac.uk/innovation/default.htm

Public Sector Research Establishment (PSRE) Fund

3.16 The fund helps Public Sector Research Establishments develop commercialisation teams and provide other technical services required to turn ideas into commercial opportunities; and create seed funds to provide early stage capital for spin out companies and to take them to the next stage where they can secure third party investment.

3.17 The fourth annual survey shows a further increase in the value of licensing agreements and business consultancy. The results of the fourth round of the Public Sector Research Exploitation fund were announced in June. For the first time, applicants to the fund were required to raise co-funding from other sources. A total of £68 million was allocated to commercialisation of research, including £38 million from co-funding.

Table 3.5: PSRE indicators

	First annual survey 2003/4	Second annual survey 2004/5	Third annual survey 2005/6	Fourth annual survey 2006/7
Business representatives on governing bodies	175	214	247	207
FTE staff employed in commercialisation offices	385	368	513	669
Number of patent applications	316	335	290	316
Number of patents granted	228	148	193	172
Number of licensing agreements	621	352	286	604
Income from IP licensing	£33 m	£46 m	£186 m	£116 m
Number of spin-outs	69	84	74	101
Income from business consultancy	£36 m	£31m	£26 m	£43 m

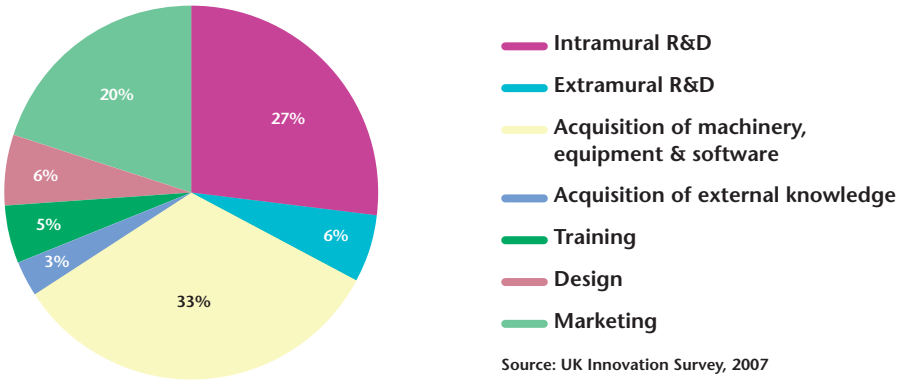
4. Increased business investment and engagement

This chapter highlights some of the key achievements and actions to increase business investment and engagement in the last year, including:

- Business Expenditure on R&D (BERD) up from £13.3 billion to £14.3 billion;
- further improvements to R&D Tax Credits, to provide stronger incentives for investment in R&D;
- established Energy Technologies Institute (ETI), a 50:50 partnership between business and Government; first technical programmes announced
- UK civil space strategy published;
- publication of the first Annual Innovation Report

4.1 In an increasingly knowledge-driven global economy, the countries that thrive will be those who invest in the knowledge and skills required to support the development of innovative new products and services. While the share of national income in R&D investment remains low compared to other leading industrialised nations, this is largely due to the UK's industrial mix: UK companies generally show similar R&D levels to others in their sectors, but the UK is quite specialised in less R&D intensive industries. The sector mix issue is analysed in depth in a DIUS analytical paper on Business Innovation Investment in the UK, published alongside 'Innovation Nation', which indicates that most of the difference in R&D intensity between the UK and leading competitors can be explained by sector mix. The paper also sets R&D in the broader context of investment for innovation[11].

Expenditure on innovation by type, 2006



Source: UK Innovation Survey, 2007

[11] http://www.dius.gov.uk/publications/innovation_nation_docs/BusinessInnovationUK.pdf

4.2 Nevertheless, raising levels of business innovation and investment in R&D remains a key priority under the ten-year framework.

4.3 The ten-year framework set out ambitions to raise investment in R&D to 2.5% of GDP by 2014 and improve business engagement with the UK science base for ideas and talent:

- increase business investment in R&D as a share of GDP from 1.25% towards a goal of 1.7% over the decade; and
- narrow the gap in business R&D intensity and business innovation performance between the UK and leading EU and US performance in each sector, reflecting the size distribution of companies in the UK.

4.4 As previous chapters have explained, the Government is already making good progress in creating many of the conditions required for increased levels of business innovation, including a world-class science base and better incentives for knowledge transfer between the science base and industry. The establishment of DIUS creates an opportunity to align policies on skills and innovation more closely, in order to deliver the skills base which innovative businesses require to succeed (see Chapter 5 for more details on skills). The ten-year framework also included a number of specific support measures to encourage greater business innovation and investment in R&D, including R&D tax credits and the creation of a business-led Technology Strategy Board (TSB).

Evidence of progress

Innovation

4.5 Results from the most recent UK innovation survey indicate that the share of innovation active businesses in the UK reached 68% in 2004-2006, up from 49% in 1998-2000.

4.6 In 2006, £14.3 billion was spent on total R&D performed in UK businesses. In real terms this was a 5% increase on 2005 (7% increase in cash terms)

- in real terms civil Business Expenditure on R&D (BERD) increased by 9% from 2005 to 2006, while defence BERD fell by 16%;
- BERD as a proportion of GDP was 1.08% in 2006 and generally in line with recent years;

- Government funding of business R&D was £1.1 billion in 2006, a decrease of 5% in real terms on 2005. This now represents 8 % of the total R&D spend in UK businesses;
- overseas funding of BERD increased in 2006 by 11% in real terms to £3.3 billion. This represents 23% of the total R&D spend in UK businesses.

4.7 It is important to note that due to inevitable time lags this data, while the most recent available, cannot fully reflect the impacts of the policies set out in the ten-year framework. The Government's strategy for supporting business R&D investment in the UK is based around four priorities:

- maintaining or growing R&D in sectors where the UK is strong;
- attracting more R&D investment to the UK from abroad;
- increasing R&D intensity in firms or sectors that are lagging behind their peers; and
- creating new R&D intensive sectors through the creation and growth of R&D intensive SMEs.

4.8 The past year has seen further reforms to improve the UK environment for business R&D and make progress against these priorities, including an enhanced role for the Technology Strategy Board and increases to the value of the R&D tax credit.

4.9 However R&D although vital, is not the only significant input to innovation and thus to economic performance. There is considerable evidence that the UK's wider innovation performance which includes, for example, the effect of design and business model innovation – is better than the R&D statistics suggest.

4.10 A recent HM Treasury Economic Working Paper investigates the consequences for the measurement of productivity of treating spending on intangible assets as investment. It finds that traditional measurement techniques may underestimate the importance of investment in intangibles in driving productivity growth, highlighting the importance to the UK economy of science, innovation and knowledge-based industries. On this basis, investment in intangible assets – such as human and organisational capital, design and software has been at a similar level to physical investment in recent years.

Key highlights and next steps

Technology Strategy Board (TSB)

4.11 The business-led Technology Strategy Board (TSB) has a key role in supporting business R&D and innovation, and identifying investment priorities in emerging areas of technology which have the potential to drive future economic growth. More details of the activities of the first year of the TSB as an independent NDPB are contained in the accompanying Annual Innovation Report.

R&D tax credits

4.12 To provide greater incentive for business investment in R&D, the Government introduced R&D tax credits for SMEs in 2000 and for large companies in 2002.

4.13 R&D tax credits provide enhanced tax relief for companies investing in scientific and technological R&D on certain expenditures which contribute to that R&D. The Government introduced R&D tax credits with the aim of promoting the productivity and competitiveness of UK industry through increasing spending by companies on R&D. The latest national statistics show that almost 30,000 claims had been made for R&D tax credits by 2005-06, with over £2.3 billion of relief claimed. Around 5,000 claims are made under the SME scheme each year, for support of just under £200 million, and almost 1,500 claims are made under the large company scheme each year, for support of over £400 million.

4.14 The 2007 Budget announced further enhancements to the schemes. From 1st April 2008 the rate of relief for qualifying R&D expenditure under the large company scheme has been increased from 125% to 130%. A number of changes were made to the SME R&D scheme which took effect from 1st August 2008. Relief under the SME scheme has been extended and will now be available to companies with up to 500 employees and which have either an annual turnover of less than €100 million or a balance sheet total below €86 million. At the same time the rate of relief available under the SME scheme has been increased from 150% to 175% of qualifying expenditure. The payable credit available to loss-making SME companies has also increased to 24.5% of qualifying expenditure.

4.15 In November 2006, Government launched a nationwide network of specialist R&D units within HM Revenue & Customs to simplify and improve the consistency of the claims process. The units, which handle all SME R&D Tax Credit claims, have been welcomed by business and financial intermediaries.

4.16 Alongside the launch of the new units, the DTI, in conjunction with HMRC and HM Treasury, published a brochure of case studies, Companies' experiences of applying for R&D tax credits, which illustrate a range of firms and projects already receiving R&D tax credits and the relative ease of making a claim. The companies offer their own hints and tips for making successful claims and major business organisations have endorsed the publication.

4.17 To improve levels of take-up, there is a continuing programme of promotion and awareness-raising, led by DIUS and HMRC, channelled through business and Government organisations, including RDAs and the Devolved Administrations, to help companies understand that the credits can apply to workshop-based R&D in design and engineering companies, as well as to R&D in laboratories.

Energy Technologies Institute (ETI)

4.18 The ETI mission is to accelerate the development, demonstration and eventual commercial deployment of a focused portfolio of energy technologies which will increase energy efficiency and reduce carbon emissions, helping to achieve the UK's energy and climate change goals. ETI was legally established in December 2007 as a 50:50 public:private Limited Liability Partnership - bringing together some of the world's biggest energy and engineering companies – BP, Caterpillar, EDF Energy, E.ON UK, Rolls-Royce and Shell. Their funding contribution (of up to £5 million per annum each), along with DIUS provides ETI with a potential budget of over £600 million over at least 10 years. Additional private sector partners are being sought to match Government's commitment of up to £550 million over the next decade. ETI will fund projects to develop low carbon energy technologies and solutions, involving universities, SMEs and other firms, and international collaborations. The ETI announced its first technical programmes in 2007 covering Offshore Wind, (in collaboration with the Carbon Trust) and wave and tidal stream energy. The third programme – on distributed energy – was announced in April 2008. Further programmes will follow in due course.

British National Space Centre (BNSC)

4.19 Following consultation with the space community and others, the new "UK Civil Space Strategy 2008-2012 and beyond"[12] was published on 14 February 2008. It set out a new five-part vision:

- win an increasing share of the global market in space systems, services and applications in the race to develop tomorrow's economy;
- deliver world-leading exploitation of space systems for managing our changing planet;
- be a partner of choice in global scientific missions to explore the Universe;
- benefit our society by strengthening innovation from space, and stimulate the creation of new products and services for everyday use;
- develop a major channel for skills development and outreach for a high technology future, and improve public and political recognition of the value of space systems as part of the critical national infrastructure.

4.20 Details will be addressed through a more detailed Implementation Plan later this year.

Transforming Government Procurement

4.21 Activities over the past year to transform Government Procurement including those under the Small Business Research Initiative (SBRI) are covered in more detail in the accompanying Annual Innovation Report (AIR).

Animal Rights Extremism

4.22 The Government is committed to taking robust action against extremists who put vital research at risk. Government Departments, enforcement agencies, industry and scientists are working closely together so that those responsible for criminal activity are prosecuted and sentenced. In parallel, the Government is pursuing a programme to enhance business confidence and resilience and continues to support world class science, including investment in the 3Rs (Replacement, Reduction and Refinement to reduce suffering) and well regulated research and testing, using animals only where there are no alternatives.

4.23 Government continues to build on the considerable success of its cross-departmental communications strategy tackling animal rights extremism, via media and stakeholder activity - including speeches to stakeholder and public audiences, visits programmes and media articles in a range of national, regional and non-news media.

[12] http://www.bnsc.gov.uk/assets/channels/about/UKCSS0812.pdf

5. Supply of scientists, engineers and technologists

The key achievements in ensuring the UK retains a strong supply of scientist, engineers and technologists over the past year include:

- the proportion of 14 year-olds reaching the expected level of competence in science reached highest-ever levels in 2007;
- from September 2007, all pupils in England have an entitlement to study at least two sciences at GCSE, and from September 2008, those who achieve above average Key Stage 3 results will be able to take three separate sciences;
- Diplomas in engineering are available for students to take from September 2008;
- a further 250 science clubs have been established in 2008 for pupils at Key Stage 3 with an interest and aptitude for science, bringing the total to 500;
- in 2007 the number of entries to A-level courses increased. Especially encouraging is the increase of the numbers of pupils taking A-level physics after an eight year decline;
- STEMNET reached its target of 18,000 Science & Engineering Ambassadors (SEAs) in place by March 2008. A new and expanded target of 27,000 SEAs by March 2011 was announced;
- the number of applications to start first degree courses in 2008/09 is up on the previous year by 4.2% in Physics; 4.6 % in Chemistry; 7.1% in Maths; and engineering subjects by 6.1%;
- in June 2008, RCUK and Universities UK launched a revised Concordat to support the Career Development of Researchers; this was accompanied by the launch of new Vitae programme, to implement the Concordat and build on the successes of the UK GRAD programme;
- July 2008 saw the launch of A Vision for Science and Society, a consultation on developing a new science and society strategy for the UK. A key part of that vision is to support a representative well-qualified scientific workforce, and the consultation seeks views on how this goal can be taken forward in the strategy.

5.1 The ten-year framework highlighted the importance of a strong supply of scientists, engineers and technologists to the long-term health of the science base and the wider UK economy, and set clear ambitions to achieve a step change in:

- the quality of science teachers and lecturers in every school, college and university, ensuring national targets for teacher training are met;
- the results for students studying at GCSE level;
- the numbers choosing STEM subjects in post-16 education and in higher education;
- the proportion of better qualified students pursuing R&D careers; and
- the proportion of minority ethnic and women participants in higher education.

5.2 Building on the original framework proposals Science and Innovation Investment Framework 2004-2014: Next Steps included a range of further commitments. These aim, notably, to:

- raise further pupil attainment and the quality of school teaching in science and mathematics;
- promote more collaboration between schools and higher education institutions in the teaching and learning of STEM subjects; and
- review and evaluate the changes to the curriculum to ensure science continues to enthuse and inspire pupils.

Evidence of progress

5.3 A range of policy reviews have picked up skills issues since the previous report.

5.4 In response to Lord Sainsbury's recommendations in Race to the Top, the Government pledged invest £1 billion over the next three years to boost business innovation and technology development and will create a new science and innovation strategy, to help position Britain as a key knowledge economy at the forefront of 21st century innovation. These included new measures to improve further the teaching of science, technology, engineering and mathematics (STEM) subjects, by boosting investments in the training of specialist science teachers, improving STEM careers advice and doubling the number of science and engineering school clubs.

5.5 The Government's consultation on its high level skills strategy, published as 'Higher Education At Work – High Skills: High Value' in April 2008, asked what more could be done, including whether there was a case for specific incentives to prospective students to take STEM subjects, and incentives to universities or employers to encourage more young people to study STEM and pursue related careers. The consultation closed on 7 July 2008.

5.6 The joint BERR/DIUS Manufacturing Strategy 'New Challenges, New Opportunities' aims to help UK firms take advantage of changing global trends in manufacturing and was published in September 2008. The strategy brings together almost £150 million of medium term support for UK manufacturing, and sets out Government's view of what the sector needs for success in the long term - including seizing the opportunities of the low carbon economy and supporting skills. A new body, 'Manufacturing Insight' will be established and there will also be a 'Manufacturing the Future' schools campaign to promote manufacturing career prospects to young people.

5.7 The STEM High Level Strategy Group has overseen work to rationalise the many specialist STEM schemes into a more manageable framework of eleven Action Programmes which STEM organisations can work within. The framework was published in September 2008.

5.8 DIUS has been leading a research project, in collaboration with BERR, DCSF and the Prime Minister's Strategy Unit, to analyse the demand for STEM skills from employers in private and public sectors, with a view to improve our understanding of prospective employer and research base needs for STEM graduates and the UK's future needs for STEM skills. Research Councils the key stakeholder bodies including the CBI, EEF, BCB and others, have been involved in gathering supporting evidence and interpreting its findings.

5.9 University links with schools can help strengthen school science and widen participation. John Coyne, Vice Chancellor Derby University and Julia Goodfellow, Vice Chancellor Kent University and former Chief Executive of BBSRC, have agreed to explore how universities could increase work directly with schools to raise attainment in the key STEM subjects, especially with a view to reaching schools where science performance is poor, in order to help deliver our widening participation goals.

5.10 The recent DIUS consultation, A Vision for Science and Society, has at its core recognition that, for the UK to secure its future in a highly competitive global environment, it is essential that the next generation of scientists and engineers are properly equipped. A key goal of the vision is to have a "representative, well-qualified scientific workforce".

Key highlights and next steps

5.11 Key Stage 3 data for 2007 showed that the proportion of pupils reaching the expected level for 14 year-olds in mathematics had risen by 2 percentage points from 2005 to 76% - although this was down from 77% in 2006. In science, there was a rise of 3 percentage points to 73% - the highest-ever level for science. The number of pupils achieving level 5 in mathematics and science was 76% and 73% respectively.

5.12 Figures for England show that in 2007/08, Maths was the second most popular A level subject, behind English with 57,620 taking the subject, representing an increase of 8% from the previous year. Results for 2008 also show increases in the number entries for Biology, Chemistry, and Physics, with numbers increasing as follows:

	2007	2008	% Increase
Biology	46,883	48,340	3.1
Chemistry	35,145	36,360	3.5
Physics	23,932	24,700	3.2
Mathematics	53,331	57,620	8.0

5.13 At HE level the number of STEM first-degree entrants decreased by 3.4% between 2005/06 and 2006/07, compared to a 3% fall in non-STEM entrants. There have been falls in nearly all STEM subjects, with a notable exception being Mathematical sciences, which saw an increase of 1.5%.

5.14 A more positive story emerges on HESA data for 2006/07 on STEM qualifiers, with figures for individuals qualifying in Biology (5.1%), Chemistry (5.7%) and Mathematical Sciences all seeing an increase from the previous year.

5.15 UCAS figures on applications to start degree courses in 2008/09 are encouraging, with increases in applications to study many STEM subjects, including physics (+ 4.2%); chemistry (+ 4.6%); biology (+6.0 %); maths (+7.1%).

Schools

5.16 Science and Innovation Investment Framework 2004-2014: Next Steps identified measures to increase the number of qualified STEM teachers, curriculum changes and improvements to careers advice. Over the past year there has been progress in all these areas.

Teacher recruitment

5.17 The Training Development Agency (TDA) are piloting a continuing professional development programme leading to an accredited diploma to give existing science teachers without a physics or chemistry specialism the deep subject knowledge and pedagogy they need to teach these subjects effectively. The introduction of these courses will increase significantly the overall volume of subject knowledge training being supplied. The DCSF has also launched Transition to Teaching, a partnership between employers and the TDA to encourage people who are leaving employment in scientific, technological or mathematical fields to consider training to become a secondary teacher of mathematics, physics, chemistry or ICT.

Science Learning Centres

5.18 In partnership with the Wellcome Trust a national network of Science Learning Centres has been set up to provide professional development for science teachers, technicians and other science educators. The training focuses on encouraging innovative and exciting teaching practice that will enthuse and inspire young people.

Project Enthuse

5.19 Together with the Wellcome Trust and industry, DCSF are funding Project Enthuse to enable science teachers to experience high quality professional development in contemporary science at the National Science Learning Centre.

Curriculum

5.20 From September 2007, all pupils in England had an entitlement to study at least two sciences at GCSE, and from September 2008, those who achieve level 6+ at Key Stage 3 will be able to take 3 separate sciences. The Learning and Skills Network is providing practical support and guidance to schools on the challenge involved in providing triple science.

5.21 A new programme of study for science at key stage 3 will be introduced into schools for first teaching from September 2008.

14-19 Diplomas

5.22 From September 2008 the Diploma in Engineering will be one of the first 14-19 Diplomas to be available in schools and colleges. It will be available at three levels, 1, 2 and 3. At each level, a young person who achieves a Diploma will have developed a range of skills and knowledge.

A Level STEM

5.23 The number of entrants to all A-level STEM subjects increased in 2007. This was especially welcome in physics, which has seen a decline in entries in the previous eight years.

After-school clubs

5.24 An initial £5 million programme saw 250 after school science clubs set up across the country to help teachers bring a "real life" dimension to STEM study. An additional 250 clubs began operating in September 2008. The clubs give pupils an opportunity to try out science and technology for themselves, through activities and visits to businesses and museums.

Careers

5.25 DCSF have commissioned a programme of support and guidance aimed at increasing the number of young people continuing their study of STEM (science, technology, engineering and mathematics) subjects post-16, by showing the wide range of careers available to those who study STEM.

5.26 DCSF have commissioned a three year STEM communications campaign to inform pupils, parents and others of the wide ranging and exciting opportunities that are open to students when they choose to study STEM subjects and qualifications up to and post-16. The campaign is directed at students aged 11 upwards, their parents and the school and college workforce and involves cinema, radio, TV and print advertising. It was launched in autumn 2008.

5.27 DCSF are also funding the student associate scheme in which science undergraduates spend time in school supporting teachers and deciding whether to become teachers themselves.

Case Study 5a: The Minster School, Southwell, After school Science and Engineering Club

The Minster School at Southwell is a voluntary aided, comprehensive school with around 1500 boys and girls aged from 8 to 19.

Their after school science and engineering club started in October 2007. Following some warm up projects, the theme of 'Mission to Mars' was chosen by the pupils. The club takes place on Tuesday evenings and lasts about an hour.

The club is about 20 strong. Pupils come from years 7 to 9 and are of mixed ability (levels 5–7) with approximately 3:2 boys to girls. This club has started well with very enthusiastic members and club leaders. The theme of 'Life Mission To Mars' gives scope for a wide range of activities both now and in the future.

The pupils have already experimented with models of rockets to get to Mars and are now working on a 4.5m geodesic dome in which they will investigate self sustaining environments. The dome, sited in the school grounds, will eventually be able to meet all its own energy needs and inside will be a range of exotic and carnivorous plants tended and monitored by robots. The project will even include a seismic study.

The aims of the project are:

- To understand the energy requirements needed for society
- To know how we can help meet those energy requirements with a variety of
- alternative energy solutions
- To be able to see how energy requirements for remote locations are managed and maintained
- To find out about how life can be sustained in space

Club leader, Matt Arnold, said that the club has had considerable support and encouragement from senior management, and that working closely with staff from other departments has benefited both staff and pupils. Once students have moved up a year they will be encouraged to become involved in the running of the club, offering help both to staff and students. A small team of students may even become "brainiacs", offering to visit feeder schools to help put on science and engineering events.

Continuing Professional Development

5.28 The National Teaching and Learning Change Programme, delivered by the Learning and Skills Improvement Service, embraces Science, Maths Engineering and ICT. The National Teaching and Learning Change Programme has been revised to meet the specific needs of regions and local partnerships. Where there is an identified specific training need the programme now has the ability to respond positively to these using a system of local grants which it is envisaged will be used in conjunction with the Subject Learning Coach Network to develop local resources for local institutions.

Curriculum

5.29 The Government, working with the Qualifications and Curriculum Authority (QCA), is reforming vocational learning routes to respond to employers' concerns to tailor the focus of qualifications to employer needs. From 2008, the new 14-19 Diplomas will be introduced, with 14 to be available by 2013 covering the key sectors of the economy. The initial five to be launched in 2008 include Engineering, IT and Construction and the built environment. There are also at present 91 Centres of Vocational Excellence in STEM subjects.

STEMNET

5.30 DIUS continues to fund STEMNET, a UK-wide organisation, whose purpose is to encorage all young people, regardless of background, to understand the excitement and importance of Science, Technology, Engineering and Mathematics (STEM) in their lives, and the career opportunities to which STEM subjects can lead.

5.31 All STEMNET's activities are focussed on providing that schools and colleges with the support they require to inspire and enthuse all of their students about STEM. This includes:

- playing a key role in the Government's STEM support strategy with specific responsibilities for better co-ordination of Enhancement & Enrichment efforts;
- providing all schools and colleges with access to professional, impartial advice on how to engage their students in STEM through STEMPOINT contracts with sub-regional partners;
- managing the Science & Engineering Ambassadors programme (SEAs) – a flagship programme funded by the Department for Universities, Innovation and Skills (DIUS) through which over 20,000 individuals volunteer their time and expertise to help schools and colleges bring STEM to life for their students;

- co-ordinating STEM clubs – managing an After School Science & Engineering Clubs programme for the Department for Children, Schools & Families (DCSF) which is currently supporting Clubs in 500 schools.

Science and Engineering Ambassadors

5.32 The Science and Engineering Ambassadors programme has been expanded after it met its initial target of having 18,000 SEAs in place by 2008. A new target of 27,000 by March 2011 has been set. Volunteer Ambassadors are drawn from the widest range of careers and backgrounds – they include environmental scientists, civil engineers, marine biologists, medical physicists, apprentices, professors, digital designers, financial modellers, energy analysts and cytogeneticists to name but a few. The case study below gives a flavour of the work they do, and the benefits that they themselves gain from that experience.

5.33 STEMNET works hard to ensure the population of Science & Engineering Ambassadors reflects the diversity of the local populations they serve. Over 40% of current Ambassadors are women, with over 10% describing themselves as from BME backgrounds. STEMNET has enthusiastic Ambassadors from 18 to 70 years of age.

Case Study 5b : A Science & Engineering Ambassador with a rock-solid passion for geology

At first glance, 23-year-old Samme Brough is a relative newcomer to STEMNET's Science & Engineering Ambassadors (SEAs) programme, having joined it just a year ago. With that said though, her commitment is evident. Boosting the engagement of young people is the means to secure a future for the science industries, she tells us. Samme works with Ikon Science, a company that develops software and physics models to aid worldwide petroleum exploration. As an SEA she has already made trips to local schools, run practical sessions on geology, and developed a new group called Scientific Edge.

One thing is clear: Samme finds her involvement with the SEAs programme very rewarding. "It's been fantastic to speak with primary and secondary aged pupils," she says. "You can make such a difference to 15 and 16 year olds who are facing big decisions and choices for the future. You can truly change lives."

"For me, work is about pursuing a passion. It's great to do something you enjoy, and you do it better because you enjoy it. Students can get a lot from someone else's energy. The process gives me more energy too. It reminds me why I'm doing this kind of work in the first place."

The SEAs programme seems to fit perfectly with Samme's own visions for her industry. In her own time, she has recently co-founded an online resource to draw in young geologists and oceanographers: www.geologise.com. What's more, she tells us that her experiences in the classroom have helped with her own development in presentation and communications skills – things you would pay for in regular business life.

Staying with the subject of the classroom, Samme says the most common things she is asked by school pupils relate to her studies and travel time. It often leads to showing off holiday snaps and telling stories about mountains, jumping volcanoes and glaciers. The chance to relive her experience is fun in every aspect, she says. Unsurprisingly, the tales of volcanoes and mountains are an attractive prospect for her audience too. "Kids always come back with the best questions. Often these are things I can't answer there and then, and I have to go away to do my own research before getting back to them."

Further Education

Recruitment

5.34 The 2006 FE Reform White Paper announced a series of new strategic recruitment processes:

- working with major employers to identify staff looking for a change or a part-time opportunity to come and teach. This is currently being piloted for construction skills;
- a programme looking for people with limited work experience but good degree qualifications to enter a national programme and build a structured career within FE;
- a support package to help colleges recruit senior managers from industry in the colleges sector to bridge the gap between industry and education; and
- a national interchange programme to engage business, the public sector and educational establishments in a dialogue.

Continuing Professional Development (CPD)

5.35 The National Teaching and Learning Change Programme, delivered by the Learning and Skills Improvement Service, embraces Science, Maths Engineering and ICT. The National Teaching and Learning Change Programme has been revised to meet the specific needs of regions and local partnerships. Where there is an identified specific training need the programme now has the ability to respond positively to these using a system of local grants which it is envisaged will be used in conjunction with the Subject Learning Coach Network to develop local resources for local institutions.

Higher Education

Strategic Subjects

5.36 HEFCE continues to monitor the position of STEM subjects and others of "strategic importance". Its October 2008 progress report to Government will note increasing STEM numbers alongside a £350 million investment in subjects of strategic importance (primarily STEM). HEFCE has (to date) invested £29 million in additional student numbers for STEM; and invested £76m for demand raising and capacity building work in STEM. An example of this is SEPNET, the South East Physics Network. With £12.5 million of HEFCE funding, this initiative brings together the region's physics providers to promote and sustain physics for the benefit of the regional and national economy[13].

[13] Further detail about HEFCE's work to support STEM is available at http://www.hefce.ac.uk/AboutUs/sis/

5.37 HEFCE also announced additional funding recognising the high costs of some science subjects. From 2007/08, £100 million over 4 years will help maintain provision in subjects including chemistry, physics, chemical engineering, and mineral, metallurgy and materials engineering while student demand grows.

Strategic Development Fund

5.38 HEFCE's Strategic Development Fund is already supporting an increasing number of institutions in developing employer-focused provision and engagement. To date £60 million has been invested in developing capacity in HEIs and more than 35 institutions are delivering co-funded HE. Three regional Higher Level Skills Pathfinders, promoting collaborative HE engagement with regional services for business, are also being piloted, to develop understanding of how best to drive up and respond to employer engagement and co-funding. Evidence from the pathfinders and engagement projects will inform the development of further collaboration between HE institutions and employers.

High Level Skills Strategy

5.39 DIUS has consulted this year on its high level skills strategy. This was published as Higher Education at Work - High Skills: High Value and was the subject of consultation until July 2008. Over 200 responses were received which added to comments received via events, focus groups and other consultation activity. A report on the responses will be published on the DIUS website, but initial analysis shows endorsement of the direction of the current Government strategy. A formal response will be issued later.

Research Careers

Research Careers and Diversity Strategy

5.40 As part of the HE debate, Professor Nigel Thrift (Vice Chancellor at Warwick University) is exploring research careers, with the aim of establishing their relative attractiveness to capable young graduates, including issues surrounding the incentives to pursue a research career and the flexibility available to develop wider skills.

Concordat

5.41 In June 2008, Research Councils UK, together with partners including Universities UK, launched the new revised Concordat to Support the Career Development of Researchers, a document which sets out the expectations and responsibilities of researchers, their managers, employers and funders. It aims to increase the attractiveness and sustainability of research careers in the UK and to improve the quantity, quality and impact of research for the benefit of UK society and the economy.

Vitae

5.42 Launched alongside the revised Research Concordat, Vitae builds on, the UK GRAD programme, as a key vehicle for promoting good practice in the delivery of skills training and building capacity for researcher training within universities. Vitae aims to:

- champion the development and implementation of effective policy;
- enhance higher education provision through sharing practice and resource;
- provide access to development opportunities and resources;
- build an evidence base to support the researcher development agenda.

The programme, funded by the Research Councils, will provide resources, advice, information and fora for individual doctoral researchers and members of research staff to develop their professional careers.

Enterprise Training

5.43 The Warry Report 'Increasing the Economic Impact of the Research Councils' recommended that, as part of their influencing role, Research Councils 'encourage the universities to make enterprise training widely available for researchers in all disciplines.' In 2007 and 2008, EPSRC allocated money to support enterprise training to institutions with large numbers of Research Council funded researchers[14].

Areas for strengthening researchers' impact on the economy include:

- skills for employability – e.g. entrepreneurship, knowledge transfer, broader technical skills (e.g. quantitative methods), science into policy
- skills for interdisciplinary working
- influencing career flows and public perceptions – outreach to schools and public engagement

UK Resource Centre for Women

5.44 In the last twelve months, the UK Resource Centre for Women in Science, Engineering and Technology (UKRC) has developed links with over 700 companies advising and supporting on recruitment, retention and progression best practices for women scientists and engineers.

[14] http://www.rcuk.ac.uk/cmsweb/downloads/rcuk/researchcareers/07repsument.pdf.

5.45 43 organisations have now signed the UKRC CEO Charter, where company's top management make a public commitment to support the increased participation of women in SET – including National Grid Transco and Atkins Global.

5.46 To date the UKRC has supported 1700 women to return to or progress in their SET career.

Ethnic Minorities initiative

5.47 The STEM Access Grants programme has provided an opportunity for schools to access funding to engage in STEM activity those Black and Minority Ethnic (BME) pupils which research indicates are under-represented in STEM, specifically those of Caribbean, Pakistani and Bangladeshi origin. Funding has been provided directly to 46 schools, with a further 20 schools benefiting as partner schools. Schools from across the UK were invited to bid for up to £10,000 per annum to support meaningful STEM activities to engage their pupils. The projects have been as diverse as the communities they serve, and while the variety of projects has been extensive there have been some consistent threads throughout. One of the strongest themes running through the Grant Programme is how schools have used the funding to take science to the community.

National Science & Engineering Week (NSEW) small grant scheme for schools

5.48 The aim of the scheme is to provide small amounts of money to schools, with either a high proportion of pupils from disadvantaged backgrounds or from ethnic minority communities, in order to run some sort of activity or event for NSEW. In 2008 – 191 schools were successful in obtaining a NSEW small grant and an estimated 44,300 pupils in total attended these school events. Funding has been doubled to enable provision of £100,000 directly to schools for NSEW in 2009.

6. Public engagement with scientific research and its innovative applications

This chapter highlights key achievements on building engagement and improving public attitudes to science, including:

- the launch of a wide-ranging consultation to develop a UK strategy for Science and Society;
- publication of the results of the third Public Attitudes to Science survey;
- launch of the Sciencewise Expert Resource Centre for Public Dialogue in Science and Technology in response to the Council for Science and Technology's recommendation to create a corporate memory of engagement practice;
- increase in the National Science and Engineering Week's media impact and development of an expanded UK Young Scientists' and Engineers' Fair with a National Science Competition element;

6.1 The ten-year framework highlighted the importance that the Government attaches to greater public confidence and improved engagement in scientific research and its innovative applications. The ten-year framework set an objective to:

- "demonstrate improvement against a variety of measures, such as trends in public attitudes, public confidence, media coverage, and acknowledgements and responsiveness to public concerns by policy-makers and scientists".

6.2 In November 2007, the then Minister for Science and Innovation articulated his vision for a society that is excited about science, values its importance to our social and economic wellbeing, feels confident in its use, and supports a representative well-qualified scientific workforce. In July 2008, DIUS launched a wide-ranging consultation on developing a new strategy for the UK to achieve this vision for science and society. The consultation document suggests that there is a pressing need to do two things:

- strengthen the level of high quality engagement with the public on all major issues; and
- increase the number of people who study scientific subjects and work in research and scientific careers.

6.3 This chapter describes work to support the first of these, public engagement; the second is dealt with in chapter 5. The Government's public engagement with science programme continues to provide a lead in encouraging open, constructive and informed debate on the social, ethical, health, safety and environmental implications of new and emerging science and technologies.

Evidence of progress

Public attitudes to science

6.4 To support the science and society vision, Government needs to develop and use a robust measurement system to provide evidence of improvement towards its goals. DIUS and RCUK published the third in a series of surveys on Public Attitudes to Science in March 2008. The results showed that overall attitudes to science remain positive and interest in science has increased since 2000. More people now agree:

- 'I am amazed by the achievements of science' up to 82 per cent from 75% in 2000;
- 'Science is such a big part of our lives we should all take an interest' up to 79% from 74% in 2000.

The main drivers of the public's attitude to science were the extent to which they appreciated the benefits and/or importance of science; understood science; and were concerned about the control and direction of science.

6.5 In response to the recommendation from the Council for Science and Technology's (CST) report 'Policy Through Dialogue' to develop a "corporate memory" with regard to public dialogue on science and technology, the Sciencewise Expert Resource Centre on Public Dialogue in Science & Innovation (ERC) was launched in May 2008. The Resource Centre aims to build capacity across government (Departments and Agencies) for quality dialogue on key science and innovation issues, and will capture and disseminate best practice, with the aim of integrating public engagement and dialogue in the development of policy.

6.6 The work done on public engagement and dialogue in Nanotechnology helped to inform the publication of the "Statement by the UK Government about Nanotechnologies", published in February 2008. This set out Government's aim for the UK to derive maximum benefit from the development of nanotechnologies and their products, whilst being done in a way that safeguards health, safety and the environment and addresses the aspirations and concerns of the public.

National Science & Engineering Week (NSEW)

6.7 National Science and Engineering Week (NSEW) in March 2008 involved over 3,500 events and attracted around 1.4 million participants. For the first time this year, an online site was set up with over 200 scientists answering the public's Big Questions on Science. A new UK Young Scientists' and Engineers' Fair was established during the run-up to the week. Next year's is planned to be even bigger, running over the three days immediately prior to NSEW and including the finals of a new National Science Competition.

Key highlights

Openness, dialogue and effective communication with the public

Sciencewise-Expert Resource Centre (ERC)

6.8 The Sciencewise-Expert Resource Centre (ERC) has evolved from the Sciencewise Programme and has continued to support and develop projects that inform key policy areas. Of the 12 projects supported under the Sciencewise Programme, nine are now complete, three are ongoing and the ERC is supporting two new projects since launch. Projects completed since July 2007 are:

- Brain Science Addiction and Drugs – resulting from the Foresight report and led by the Department of Health (DH) and the Academy of Medical Sciences (AMS), this project drugsfutures fed directly into the Academy's advice to Government in July 2008 on future research and regulation around the use of psychoactive substances (such as cognition and mood enhancing drugs); and
- the results of the Sciencehorizons, mass public engagement programme, released in September 2007, helped the ERC to prioritise areas for future public dialogue and tested a range of methods to gather public views;
- the Human Fertilisation and Embryology Authority (HFEA) public dialogue project supporting its consultation on the ethical and social implications of creating human/animal embryos in research which was conducted in June 2007 and directly informed their decision in September 2007 in principle to award licences to two research teams;

- the Human Genetics Commission project on the forensic use of DNA published the results of its Citizen's Inquiry conducted with panels in Birmingham and Glasgow in August 2008. The project was the first stage in a larger consultation process by the HGC, and its results will help frame the questions in the formal four-month consultation which runs until early November 2008;
- the BBSRC and MRC project to bring scientists and the public together to identify public expectations, aspirations and concerns about stem cell research is continuing its programme of dialogue with the public and policy makers and the results will be launched towards the end of 2008;
- the community x-change project, begun in 2006, came to fruition at the BA Festival of Science in September 2008. The project which explored new methods for dialogue ran a series of workshops in the run up to the Festival looking at functional foods and the use of animals in research, and used performances of plays to stimulate the discussions.

6.9 The Sciencewise-ERC has been working with policy makers to identify new projects. The first of these was commissioned by BERR in August 2008 for a project to assess the public perception of Industrial Biotechnology – the application of bioscience (including genetically modified organisms) for the processing and production of chemicals, materials and energy. The project will receive £60,000 from Sciencewise.

7. Science and innovation across Government

The ten-year framework highlighted that science and innovation are not only key drivers of wealth creation, but also underpin evidence-based policy making and improved service delivery. Government therefore needs to use – and be seen to use – the highest quality science and scientific advice.

Over the past eighteen months, the Government has:

- created the Government Office for Science (GO-Science);
- appointed the new Government Chief Scientific Advisor, Professor John Beddington CMG FRS;
- continued its rolling programme of departmental Science Reviews, undertaken a scrutiny of the Reviews process, and started to implement its outcome;
- published the UK statement on nanotechnologies;
- created a Community of Interest for scientists and engineers working in Government;
- created the Core Issues Group of Chief Scientific Advisers (CIG);
- launched the Foresight project "Tackling Obesities: Future Choices";
- launched the Foresight Project, Mental Capital and Wellbeing, which considers how everyone can realise their greatest mental potential and wellbeing and flourish throughout life;
- started a new Foresight Project – Land Use Futures; and
- published the update to the Code of Practice for Scientific Advisory Committees.

Evidence of progress

7.1 The rolling programme of departmental Science Reviews has continued, with the publication of one report in the last year with a positive response to the recommendations from the department concerned, and the initiation of two new reviews in 2008.

7.2 The Government Chief Scientific Adviser (GCSA), supported by departmental Heads of Science and Engineering Profession (HoSEPs), has created a cross Government Science and Engineering Community of Interest.

7.3 The Foresight report 'Tackling Obesities: Future Choices'[15] made an immediate impact on the government's inter-departmental response to this major long-term challenge, and formed the scientific basis for the Government's obesity strategy.

7.4 The GCSA led a peer review of the Gallagher Report on biofuels during its development, to assure the robustness of its findings and analysis from the perspective of the underpinning scientific and economic evidence.

Key highlights and next steps

Cross-Government working

Core Issues Group of Chief Scientific Advisers (CIG)

7.5 CIG was created by the new GCSA with the aim of identifying and driving progress based on excellent science at a strategic level on key priority issues on which CSAs acting jointly can expect to add value. Its membership includes a number of senior departmental CSAs. CIG has already identified a series of issues which it is addressing via sub-groups. The first two sub-groups focus on counter-terrorism and climate change/food security. CIG has also begun developing a stronger relationship with RCUK by holding regular discussions with Research Council CEOs.

Head of Profession

Community of Interest

7.6 The GCSA is Head of Science and Engineering Profession (HoSEP) in Government. He has established a cross-Government Community of Interest for scientists and engineers. So far over 1,300 civil servants have registered to join. The community will support and promote the profession across Whitehall and the regions, raising understanding of the skills, values and expertise of its members.

Working with advisory groups

Council for Science and Technology (CST)

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

[15] http://www.foresight.gov.uk/OurWork/ActiveProjects/Obesity/KeyInfo/Index.asp

7.8 The Council has recently completed a project for DIUS Secretary of State, John Denham, to investigate ways in which the interaction between academia and public policy makers in Government can be improved, as part of DIUS's broader HE debate. CST is also reviewing how far Government has implemented its recommendations in the Policy through Dialogue report, and assisting Government in developing its refreshed Science and Society strategy; as well as undertaking projects investigating whether the UK is under-investing in R&D and innovation in water technology; whether sufficient capital investment is available to early-stage UK-based innovation companies via corporate venturing; and mechanisms for encouraging cross-disciplinary R&D in the UK.

Measuring Government Performance

Science in Government: A Strategy

7.9 The Government Office for Science is planning to publish a strategy, setting out in one place for the first time the Government's approach and plans for its management and use of science, including evidence more broadly, to support excellent policy and delivery. It fits within and relates closely to the overall policies on science and innovation led by the Department for Innovation, Universities and Skills.

Science Reviews

7.10 The Science Review team has continued its rolling programme of independent reviews of science in Government Departments. The review of the Home Office and Ministry of Justice was published in December 2007 and the departments have responded positively. The Department of Health (DH) review was published in October 2008 and the Food Standards Agency is currently under review. This year the efficiency and effectiveness of the Science Review process has itself been subject to independent scrutiny. It is essential to ensure the on-going fitness of purpose for the programme that ensures delivery of a strong evidence base in support of government decision making. The results of the review will be published in the forthcoming Science in Government strategy document.

Performance Indicators

7.11 The Government is revising the framework of key performance indicators (KPIs) it will use to monitor the management and use of science in Government. The revised framework builds on and clarifies earlier criteria set out in the Cross-Cutting Review and Ten Year Framework on the effective management and use of science across Government. Details of the new KPIs will be included in the Science in Government strategy document.

Priority issues

Energy

7.12 In January 2006 the joint public/private Energy Research Partnership was launched to provide enhanced leadership and coherence to UK investments in energy research and innovation. An early initiative of the Partnership has been to support the establishment of the Energy Technologies Institute, which came formally into existence in December 2007 (see para 4.15 check for further details). Other achievements included developing a vision for the UK's future energy RD&D funding landscape, as well as inputting to a new Environmental Transformation Fund and to the development of key Government initiatives, such as the renewables energy strategy.

Nano-technologies

7.13 In May 2007 the Government responded to the Council of Science and Technology's review of its delivery of its commitments on nanotechnologies. The review had recognised that the Government had made good progress in many areas, particularly in the international arena and in developing common measurement standards. However, there is still much to be done and a Ministerial group has been established to help the UK continue to play a leading role in the understanding, development and regulation of nanotechnologies. The Ministerial group's first output was the Statement by the UK Government about nanotechnologies in February 2008. This described what the Government is doing to ensure that the UK derives full benefit from nanotechnologies and their products in a way that safeguards health, safety and the environment and addresses the aspirations and concerns of the public.

Futures work

Horizon Scanning Centre (HSC)

7.14 The HSC has now run over 30 futures projects involving over 40 public bodies, including most central Government departments. Recent projects have looked at the future of issues such as: the international geopolitical environment; wider implications (e.g. ethical, legal, social) of science and technology; the UK food system; families; and identity fraud.

7.15 To raise capability across Government, the HSC continues to work with the National School of Government on Professional Skills for Government (PSG) training and has led training and networking events attended by over 1,000 people including ministers.

Projects

7.16 Foresight is the Government's science-based think tank which aims to strengthen strategic policy making by embedding a futures approach across government. It provides evidence on strategic cross-departmental future policy. Recent reports include 'Intelligent Infrastructure Futures', 'Infectious Diseases: preparing for the future', 'Tackling Obesities: Future Choices' and 'Mental Capital and Wellbeing'[16]. All projects feature diverse groups of specialists working in a multidisciplinary framework. Current projects are Sustainable Energy Management and the Built Environment, which reports in November 2008 and Land Use Futures which will report in early 2010. A new project looking at the global issues around food and farming is due to begin in November 2008.

Case study 7a: Tackling Obesities: Future Choices

Foresight demonstrated that the growth in obesity is driven by a multitude of inter-related complex and diverse factors.

- The health and economic impacts of obesity and its co-morbidities on individuals, the health service and society as a whole are significant and alarming. Mitigating this risk is reflected in the UK government's new commitment to child health and well being and in January 2008 it launched its £372 million strategy 'Healthy Weight, Healthy Lives: a Cross-Government Strategy for England' (HWHL), which draws heavily on the Foresight study. It sets out action in the five themes as in the Foresight report: 1) *children: healthy growth and healthy weight;* 2) *promoting healthier food choices;* 3) *building physical activity into our lives*, 4) *creating incentives for better health and* 5) *personalised advice and support*.
- Both reports recognise that no single government body is able to deliver the solution to the challenge of obesity. Therefore this strategy calls on relevant government and non-governmental organisations to work in an integrated way to achieve its goals.

[16] http://www.foresight.gov.uk

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