

**OECD SCIENCE, TECHNOLOGY AND INDUSTRY OUTLOOK 2004
COUNTRY RESPONSE TO POLICY QUESTIONNAIRE**

UNITED KINGDOM

1. General framework and trends in science, technology and innovation policy

The Government believes that science, technology and innovation are central to the challenge of raising productivity and improving welfare. Therefore the Government has continued to invest heavily in research and training of university students, ensuring that funding is allocated to the best quality research. It is committed to ensuring that science plays its full role in supporting innovation, that is, knowledge is exchanged between the science base and both business and the community. Furthermore, it has sought to understand better the UK's innovation performance and the role it plays within it. The following publications highlight the general direction for policy.

The Roberts' Review: SET for Success (see succeeding chapters for more detail)

This 2002 report was commissioned to consider the supply of science and engineering skills in the UK and the difficulties employers face in recruiting highly skilled scientists and engineers.

Investing in Innovation (see succeeding chapters for more detail)

In 2002 the Government set out the measures it will introduce to ensure the UK's research endeavour can be sustained, in terms of both the physical and human infrastructure.

The Higher Education White Paper (see succeeding chapters for more detail)

The UK has an excellent record for teaching and research, but there is no room for complacency. The UK needs to ensure that it maintains the quality of both in a way that can be sustained for the long term, whilst at the same time expanding access.

As a result the Government is devoting considerable resources to research, and, through HE Funding Councils will be concentrating this in the best quality departments. It will continue to increase participation in HE towards its target of 50 per cent, mainly through two-year work focused foundation degrees. As well as providing additional funding, it believes that those who benefit directly – students – should also contribute to the cost of their education. It is advocating a variable fee arrangement with this to be repaid after graduation through the tax system, though at the same time it is advocating measures to ensure students from lower – income backgrounds are not disadvantaged.

The Lambert Review of Business – University Collaboration (see succeeding chapters for more detail)

The remit of the review was to:

- Identify the benefits to business of greater interaction with higher education, how this can be promoted and how any barriers holding back business demand for universities' knowledge and skills outputs can be addressed.
- Examine the national, regional and local economic impacts of business-university interactions, including how Regional Development Agencies and Sector Skills Councils can best support such interactions.
- Assess the lessons to be learned from business-university interaction across a range of countries and from best practice across the UK.
- Analyse how business employers can better communicate their skills requirements to a responsive university sector, and how they can improve the attractiveness of career paths to graduates and postgraduates, especially in technology; and
- Examine the effectiveness of measures such as the R&D tax credits on business demand for research and skills.
- Ask business for its views on the present governance, management and leadership arrangements of higher education institutions, and their effectiveness in supporting good research and knowledge transfer and providing relevant skills for the economy.

The Innovation Report: <http://www.dti.gov.uk/innovationreport>

Main features and rationale

The innovation report arose out of the perception that the UK was in a transition stage to a new phase of economic development where UK firms would increasingly have to compete on the basis of unique value and innovation, rather than lowest cost. Consequently innovation policies needed to be reconsidered in this light. A study by Porter and Kretels set out this thinking in more detail (DTI economics paper no 3, <http://www.dti.gov.uk/economics>).

Major changes in policy frameworks

The most significant changes in policy frameworks are:

- The Prime Minister has asked the Secretary of State for Trade and Industry to chair a Ministerial team to lead the innovation agenda across Government and drive forward the implementation of the Innovation Report.
- Greater cross government working to improve the Government's performance as an intelligent customer and to ensure greater use of outcome based regulation. Department of Trade and Industry (DTI) is for example working with National Health Service (NHS) Estates to look at how innovation can be drawn through the supply chain. And a cross Government project team led by DTI focus on three areas of environmental policy.

- Closer partnership working between the DTI, Regional Development Agencies (RDAs) and Devolved Administrations to ensure that national policy and priorities take full account of regional priorities, and that they also shape more effectively what is delivered by and through the RDAs at the regional level.
- In conjunction with business, the science, engineering and technology base, Government more widely and other stakeholders the DTI will develop a technology strategy, with a medium to long-term perspective, which will provide a framework for setting policy priorities and improving the effectiveness of business support.
- The Director General of Research Councils will agree with each of the Research Councils, plans and goals for increasing the rate of knowledge transfer through activities such as collaborative research, startup companies and the Small Business Research Initiative.

Major shifts or changes in policy instruments

The DTI has consolidated the original, sometimes confusing list of schemes into ten integrated business support solutions. They are designed to respond effectively to the challenges faced by UK businesses.

The DTI's new approach to business support provides:

- a select range of ten business solutions designed to meet different stages in a business's development and growth, and which are simpler to understand and use
- easier access to the solutions through dedicated channels such as Business Link, for small businesses, or via DTI Sector Teams, simplifying and shortening the information-gathering process
- tailored and knowledgeable guidance from experienced advisers who can guide businesses through the solutions that are relevant to their circumstances and point them in the direction of other appropriate sources of assistance across the public, private and voluntary sectors
- simplified application procedures which are generally less demanding in terms of information and input required.

2. Public sector research and public research organisations

Changes in overall levels of R&D funding for public research organisations

Building the science and engineering base has been, and continues, to be a priority for the present Government. In 2002 the Government announced further funding increases for science, engineering and technology. It is expected that funding for Research Councils will rise to £2.5 billion by 2004/05 from £1.7 billion in 2001/02 in real terms. Higher Education Funding Council expenditure will increase from £1.5 billion to £1.6 billion over the same period (see Table 3 Forward Look <http://www.ost.gov.uk/research/forwardlook03/>).

Shifts in the allocation of funding

The increased levels of expenditure on science, engineering and technology by Research Councils and Funding Councils has not been accompanied by explicit shifts in the balance between

either funding source, nor between Research Councils. For instance, the share of funding accounting for by the Science Budget has risen relative to Funding Councils, but the former is making a greater contribution to infrastructure than in previous years. New developments from 2003/04 for Research Council funding reinforce cross – Council priorities, which include stem cells (£ 40 million), a sustainable energy economy (£28 million), and rural economy and land use (£20 million), as well as continued investment in existing priorities of post - genomics and proteomics (246 million), e - science (£213 million) and basic technology (£104 million), which were established in 2001/02 (all figures are in nominal terms for the lifetime of the programmes, see Science Budget document <http://www.ost.gov.uk/research/funding/budget03-06/>).

Table. Net Government expenditure on SET by Research Councils and Higher Education Funding Councils

£ million base year 2001/02	2001/02	2002/03*	2003/04**	2004/05**
OST	167.2	318	397	569
BBSRC	213.9	234	247	249
ESRC	73.5	83	89	96
MRC	347.8	362	399	415
NERC	175.5	210	292	297
EPSRC	477.7	483	440	450
PPARC	214.3	244	249	250
CCLRC	10	10	95	116
Pensions/Other	27	28	28	29
Science Budget	1706.9	1972	2236	2471
HEFC	1473.5	1551	1583	1626
Total	3180.4	3523	3819	4097

* Estimate

** Planned

Changes in the use of different types of funding instrument for financing R&D or the balance among them

There have been no major changes to the types of instrument the Government uses to fund Science, Engineering and Technology, but there has been an increased focus on the funding of infrastructure. Recognising the concerns raised by a recent Cross – cutting Review of Science and Research about underinvestment in university infrastructure caused by over trading of competitively funded projects, the Government announced in 2002 that it would make further funding available for capital investment http://www.hm-treasury.gov.uk/media/3A7B0/science_crosscutter.pdf. This includes an additional £50 million per annum for the Science Research Investment Fund, on top of the base line of £250 million per annum in 2004/05 and 2005/06.

The Government will make available a further payment of £120 million in 2005/06 to help Research Councils make a greater contribution to the full economic cost of research.

Major initiatives to reform the organization and governance of universities and public research organizations

To enable universities to manage research funded from a diverse set of sources, the Transparent Approach to Costing, a system of activity based costing, has been implemented across the sector. The first reports for the sector based on this system were produced in 2001. Building on this initiative the Government launched a consultation in 2003 to look at how best to implement an interlinked set of reforms to the ways in which Higher Education Institutions (HEIs) cost and price their research and Research Councils fund it. This includes how HEIs estimate the full economic costs of individual research activities; how best to allocate the £120 million per year, from 2005-06, which has been provided to increase the contribution that Research Councils make to the cost of the existing volume of research that they support; the basis on which Research Councils support research in HEIs and draft guidelines for HEIs to use when interacting with non-Research Council sponsors of research.

Recognising the range of funding sources and stakeholders, the Government has also established a Funders' Forum to bring together all those with an interest in the long term sustainability of the university research base (including Charities, Industry, Universities, Funding Councils and Research Councils) to take a strategic overview of the working of the science base.

The Research Councils themselves are taking a more cooperative approach to facilitate greater collaboration, both strategically and operationally. In 2002 they established Research Councils UK (RCUK). A top level, strategy group that is chaired by the Director General of Research Councils and comprises the Councils' chief executives, leads the venture.

The UK has also reviewed its RAE mechanism for allocating institutional funding. In response to the review, the Government announced that the next RAE planned for 2008 will use quality profiles to provide a fuller and fairer assessment of research carried out in universities and colleges in the UK. The quality profiles measure the different proportions of work in a submission that reach each of the four defined levels. They will replace the overall judgement of research for each department based on a seven point grading system used in the previous exercises. It is expected that this will provide more of an incentive for institutions to include all their researchers in the assessment rather than aim for a particular grade. It is also expected that this will benefit small pockets of excellence within larger departments. The new approach will also be designed to recognise excellence in applied research, in new disciplines and in fields crossing traditional discipline boundaries.

The Higher Education White Paper, published in 2003, made it clear that HE institutions need greater levels of funding to compete internationally on quality of teaching and research <http://www.dfes.gov.uk/highereducation/hestrategy/>. The Government is proposing to allow HE institutions to charge variable fees, between £0 and £3,000 per year per course, from 2006/07. The Government is committed to putting in place a number of safeguards to ensure that all young people with ability can go to the university of their choice to study the subject of their choice.

Under its proposals, fee deferral means that no student or their family will have to pay anything up front. Instead the graduate pays, once he or she is earning over £15,000, and then through a subsidised loan repaid through the tax system at a rate that varies according to earnings. From 2006, 30% of the poorest full-time students will be protected through a guarantee of at least £3000 a year in help. This will be made up by following elements:

- A single combined up-front grant of up to £2,700 per year. This will replace the previously proposed HE grant of up to £1500/year and tuition fee remission grant of up to £1200/year.

- And, where their university decides to charge £3000 for their course, students in receipt of the maximum grant of £2,700, should not have to take out any additional loan to pay their tuition fees. So if these students are on a course costing £3,000, the Office for Fair Access (OFFA) will expect them to receive financial support of at least £300 from the university.

3. Government support for private sector R&D and innovation

Tax treatment of R&D

The UK has two tax incentives for R&D: a small firms tax allowance has been available since April 2000 and a large firms allowance was available from April 2002.

Direct public funding of R&D

Following the recent DTI Innovation Report (<http://www.dti.gov.uk/innovationreport/index.htm>) the DTI is developing and implementing a business-focused Technology Strategy and associated Technology Programme.

The Technology Strategy will identify the technology priorities with potential long-term economic benefit to the UK economy and society, and encourage our partners across Whitehall and the regions to focus on complementary parts of the innovation system.

The Technology Programme will take its steer from the Technology Strategy and will:

- help business ‘pull through’ technologies in priority areas from the UK and international academic base by providing some of the funding and sharing some of the risk in taking new technologies to the market
- take a more strategic approach to the money we spend on knowledge transfer, focusing on technologies with wide potential applications across business sectors .

Public procurement

Two new measures, relating to procurement, were announced in the Innovation Report:

- The Office of Government Commerce (OGC) will produce best practice guidance for policy, project and procurement staff on capturing creativity from suppliers by March 2004.
- To support the Government’s efforts to improve its performance as an intelligent customer, the DTI will work across Government to look at the opportunities for, and barriers to, innovation in key public sector markets. DTI will pilot this approach by working with NHS estates to look at how innovation can be drawn through the supply chain and with the Department of Health to address barriers to greater uptake of telecare and telemedicine technologies. DTI will ask its industry-led Innovation and Growth Teams (IGTs) to identify where public procurement could better facilitate innovation and how this could be achieved.

Support for VC

The UK has a number of targeted interventions to support the development of venture capital and, in so doing, address ‘finance gaps’. Regional venture capital funds have been set up across England. These are investing £270m in SMEs with growth potential, backed up by £80m of Government

funding. The Early Growth Funding Programme which complements the regional funds by providing smaller amounts of risk capital for start up and early stage businesses. Similar arrangements are in Scotland and Wales. The Government also supports the UK High Technology Fund – a fund of funds – which supports early-stage high technology businesses across the UK.

The Government has also announced a series of proposals to build on the success of existing interventions. It intends to establish a pathfinder round of Enterprise Capital Funds (ECFs), based on the small business investment company model, that has played an important role in channelling risk capital to smaller companies in the US. ECFs will be commercial venture funds, investing a combination of private and public capital in UK based companies.

Changes in IPR

Two new measures, relating to IP, were announced in the Innovation Report:

- The Patent Office will develop a major awareness-raising programme which will target SMEs to ensure they can use the IP system effectively. This will build on the success of current initiatives. It will also target ‘innovators of the future’ such as business studies, design and technology students and entrepreneurs to raise awareness of IP.
- The Patent Office will, in conjunction with rights holders and enforcement bodies, develop a new national strategy for dealing with IP crime, to be launched by summer 2004. In particular, this will involve improving the evidence base, removing administrative overlap, and setting out agreed priorities.

4. Enhancing collaboration and networking among innovating organisations

Major initiatives to promote collaboration and networking among private firms

Following its Innovation Review the DTI expects to launch programmes to foster collaboration and networking for innovation, adopting principles from past successful schemes. These programmes are:

- *Collaborative R&D*, which supports some of the costs and risks associated with research and technological development, by facilitating collaboration between different businesses and between business and the SET base across the UK. The future focus of programmes will be on broader strategic areas of technology likely to impact across sectors and key market priorities and thereby engage a broader range of industrial participants. The Collaborative R&D programme builds on the LINK scheme, which previous evaluations have found to promote significant additional benefits.
- *Knowledge Transfer Networks*, which will encourage the diffusion of new and existing technology. The product builds upon the existing Faraday Partnerships, which connect universities and independent research organisations with business and finance in key areas of technology. While this type of networking will continue, the new arrangements provide for a wider, more flexible range, of networking activities to deepen and broaden knowledge transfer into UK businesses and will focus on the areas that have the potential to maximise UK productivity.

Major policy initiatives to promote stronger industry/science relations

The Government employs a number of schemes to help HEIs to create the capacity and capability to engage business and the community.

University Challenge

The first round of UC funding in 1999 allocated £50 million (OST £30 million; Wellcome Trust £18 million and the Gatsby Foundation £2 million). A further round of funding allocated £10 million in 2001.

UC provides seed funds in order to assist the transformation of good research into good business. Early stage funding is provided to bring research discoveries to a point where commercial usefulness can be demonstrated. The broad objective is to increase the number of high grade companies. As well as the direct funding, it is anticipated that UC will stimulate others to invest in the science and engineering base. It is also hoped that HEIs which are particularly successful in investing UCs will generate an endowment fund through IP exploitation.

Science Enterprise Challenge

There have been two previous rounds of SEC. The first in 1999/2000 allocated £28.9 million; the second in 2001 £15 million.

The broad aims of SEC are to:

- foster the commercialisation of research and new ideas
- stimulate scientific entrepreneurialism
- incorporate the teaching of enterprise into the science and engineering curricula
- support centres of excellence for the transfer and exploitation of scientific knowledge and expertise.

The scheme is based around 13 Centres which aim to achieve world class excellence. Each Centre has partner HEIs and around 60 HEIs in total are participating in the scheme. Networking is an important aspect of the scheme: between a Centre and research and teaching within the HEI; between Centre and partner HEIs; with external businesses and business support agencies; and with CMI (see below).

Higher Education Innovation Fund

The Government has allocated £77 million in the first round of funding over the period 2001/2002. The objective is for HEIs to change culture, to build capacity to work with business and manage intellectual property and assets, and to ensure staff and students have the skills to interact with business and the community. Applications were invited for single institution bids and also large strategic collaborations to establish excellence and coherence in meeting regional needs.

Both SEC and UC will be subsumed in to a new round of HEIF, which will allocate £186 million over financial years 2004/5 to 2005/6. The Government will allocate a total of £171 million for commercialization activities through two streams. The first will fund commercialization of the work

of universities that are achieving international research excellence to the amount of £69 million. The second stream will allocate £102 million to less research intensive universities with a greater focus on consultancy, diffusion of existing knowledge and regional partnerships. A new £16 million initiative within HIEF, Knowledge Exchanges, will build on this latter stream.

Public Sector Research Exploitation Fund (PSRE)

This fund was a response to the Baker Report (August 1999) on realising the economic potential of public sector research establishments, including Research Councils and their institutes, Government Laboratories, NHS Innovation Hubs and major museums.

In addition, the PSRE fund has provided seed funding to support the very early stages of business formation from ideas emerging out of research in the public sector science base. First round awards worth £10m were made in October 2001. The Second round awards will allocate £15m from April 2004.

Knowledge transfer practitioners training fund

In October 2003, £1m was made available to fund projects to provide training for knowledge transfer professionals including provision of training, course materials and associated support (information exchange, mentoring, sharing of best practice and signposting of provision) for knowledge transfer practitioners working in HEIs, public sector research institutions, and industry at the business-HEI interface, across the UK.

This funding was intended to address the shortage of people with the right mix of training and experience to undertake knowledge training activities, which was identified by the Oaklands Review of Business Interface Training Provision (BITS).

It will enhance the delivery of future industry – science relationship programmes by increasing the training provision for knowledge transfer professionals in the HEIs and PSREs. Funding is being provided for two years from 2004.

CMI

OST has continued to provide funding for the collaborative alliance brings together the University of Cambridge and the Massachusetts Institute of Technology (MIT). The goal is to undertake joint education and research initiatives that will improve entrepreneurship productivity and competitiveness in the UK. This work will provide models for knowledge transfer between academia and industry. Contracts have been awarded for four Knowledge Integration Communities (KICs) which bring together various activities – research, undergraduate/graduate teaching and executive education and focus them towards explicit knowledge exchange between industry and academia.

Knowledge Transfer Partnerships

These provide direct support for knowledge transfer by enabling universities and others in the SET base across the UK to work with businesses using recently qualified graduates, who have an academic supervisor, to undertake specific knowledge transfer projects in firms of all sizes. This builds on the former Teaching Company Scheme (TCS). Successive reviews of TCS confirmed the value to the business of the technology transferred. TCS was largely restricted to two year projects, the new form of support is more flexible, allowing projects from between 1 and 3 years and encouraging a wider engagement of knowledge based partners (such as Further Education Colleges).

To improve the benefits accruing to the UK from industry – science relationships, particularly in the context of improving the UK’s innovation and productivity performance, there have been two significant areas of policy analysis, namely the Lambert Review of Business – University Collaboration and the Department of Trade and Industry’s Innovation Report http://www.hm-treasury.gov.uk/consultations_and_legislation/lambert/consult_lambert_index.cfm. The Lambert Review concluded:

- Weakness of the demand side is a real issue;
- Universities have engaged with knowledge transfer;
- Best form of knowledge transfer is through people;
- Diversity of mission and of funding should be encouraged;
- Proximity matters for collaboration with business;
- Governance of HEIs plays a important role in managing relations with business and the community.

It recommended:

- Measures to stimulate demand, including that business should establish a high – level forum to enhance the effectiveness of technical innovation in business in the UK and better marketing of the existing R&D tax credits, particularly highlighting that they apply for R&D contracted to universities;
- That third stream funding should be increased by £150 million per annum;
- A new stream of business – relevant research funding, which would be available to support university departments that can demonstrate strong support from business, though this wouldn’t be used to subsidise business; The Review’s preferred approach is for existing regional agencies to allocate this stream of funding;
- The Government should support regional shared services in technology transfer;
- Development of model contracts and a protocol for IP to speed up negotiations, with the assumption of HEI ownership if it invests public funds, unless its partner makes a significant contribution. Ownership of the IP should not restrict public research;

In parallel with the Lambert Review the Department of Trade and Industry launched a review of Innovation performance in the UK. With respect to industry – science relationships, the Director General of Research Councils will agree with each of the Research Councils, plans and goals for increasing the level of interaction with business through a variety of channels. Where these are not in place, Research Councils will establish measures of collaboration, so that progress can be monitored. Furthermore, the level of interaction with business by each Research Council will be subject to peer review within RCUK and to external challenge by a group including business representatives.

5. Human Resources for S&T

<http://www.hesa.ac.uk/holisdocs/pubinfo/stud.htm>

(see “Qualifications Obtained” for data on undergraduates and postgraduates in the UK since 1994/95)

Pre university science and engineering education

Following the recommendations of the Roberts’ Review, the UK is implementing a number of measures to improve education standards for scientists and engineers, including:

- Modernising the curricula to develop practical understanding of science, to help students engage with matters of topical interest, such as GM foods, to be implemented from 2006;
- Piloting different approaches to bridging the gap between students’ prior knowledge and the requirements of HE study;
- In partnership with the Wellcome Trust (a large medical research charity) setting up a £51 million network of Science Learning Centres to provide training for science teachers and technicians, to open Autumn 2004. There will be up to nine regional centres and one national one.
- Recruiting more people to science teacher training courses (a 24% increase since 1999/2000), making further resources available for pay increases targeted on recruitment and retention of permanent staff in all disciplines including science;
- Significant funding for better quality science labs.
 - Department for Education and Skills’ investment in school buildings has risen from £683 million in 1996-97 to £3 billion for 2002-03 and will then rise to £3.8 billion in 2003-04 and over £5 billion by 2005-06
 - £60 million capital allocated for local authorities to spend on schools labs in 2000-2001 and 2001-2002

Recognising the long time lags to develop highly skilled people the Government also works with schools to provide:

- A network of local centres for science, engineering, technology and mathematics. These centres act as information points; facilitate cooperation and highlight opportunities to improve the delivery of education in these disciplines;
- An S&E ambassadors programme that gives a framework to schemes that encourage young SET workers to support clubs and offer mentoring and career guidance. This programme has received the backing of companies such as BAE Systems, BP, IBM, Ford and Unilever. This is in addition to a Students Associates scheme that provides bursaries to up to five hundred science, ICT and maths HE students to work in schools supporting teachers.

University education and post PhD careers

The UK has put in place funding to make advanced study more attractive, as well as measures to ensure that future careers in public science are less uncertain. These initiatives include:

- Increasing the minimum and average Research Council PhD stipend, the average will be £13,000 by 2005/06, up from £8,000 in 2002/03;
- Increasing the average Research Council funded postdoctoral salary by £4,000 by 2005/06;
- Funding for skills training for both PhD and postdoctoral researchers;
- Better provision for short-term contract researchers within HR strategies;
- 1,000 new academic fellowships which will provide stable and attractive routes into academia;
- 50 new teaching fellows.

Women in SET

Like many other countries, the UK has also found that proportionately fewer women studying for pre university SET qualifications in chemistry and physics. However, the number of female SET graduates is increasing. Over the period 1992-2002, female SET graduates have increased by 55% compared to a 29% increase in male SET graduates, but only 1 in every 3 SET graduates in 2002 were women. Hence, in addition to working with children of school age, with projects such as SPARK magazine to counter gender stereotypes and to inspire girls to study SET subjects, the Government plans to work with employers through a new Resource Centre for Women as part of the new strategy, published in 2003 http://www2.set4women.gov.uk/set4women/research/the_greenfield_response.htm. The new Centre managed by the JIVE Consortium¹ will:

- Share best practice for flexible working arrangements;
- Recognise good SET employers;
- Fund mentoring, networking and public speaking;
- Create a database of female experts in different fields of science;
- Support returning workers for instance encouraging employers to maintain contact with staff who take breaks from their careers,

In addition, it will implement other measures, such as a pilot scheme to allow women who aren't recent graduates to take part in the Knowledge Transfer Partnerships Scheme. The Government has set an independent group to monitor the progress it makes in making science and technology more attractive to women.

¹ The successful JIVE (Joint Interventions) consortium's lead partner is *Let's TWIST*, a joint initiative between Bradford College and Sheffield Hallam University. The JIVE Consortium also includes, the Open University (Dept. of Telematics) and WiSETI University of Cambridge.

Attracting Mobile Workers from other Countries

The Highly Skilled Migrant Programme (HSMP), introduced in 2002, has proved successful in enabling highly-skilled individuals to enter the UK to seek and take up work without needing a prior offer of employment. Applicants can demonstrate their eligibility through educational qualifications, work experience, achievements in their field and past income. The Government has recently strengthened this scheme by taking into account partners' achievement and by introducing a new category of eligibility for younger workers. Furthermore the duration of work permits has been lengthened from 4 years to 5 years.

Overseas students can help to relieve UK shortages in the supply of science, technology, engineering and mathematics skills, and the Government is committed to encouraging them to utilise their skills in these subject areas after they graduate. The Government will, therefore, introduce a new entitlement for foreign students beginning or continuing courses in these subjects to work in the UK for 12 months following graduation from a UK institution. This will apply to students completing courses from summer 2004.

In 2003 the Prime Minister announced a new £10m initiative to bring high quality PhD students from overseas to top UK universities to study science. The new Dorothy Hodgkin Postgraduate Awards will allow over 100 PhD students from India, China, Hong Kong, Russia and the developing world to study here (see www.ost.gov.uk/research/funding_schemes.htm). These students will be a welcome 'brain gain' for the UK during their time here and hopefully future research and commercial collaboration with participating countries will be made possible. Essential scientific expertise will be gained around the world when they return, to tackle issues like clean water provision, secure energy supplies and to combat diseases like AIDS and malaria.

The 'Dorothy Hodgkin Postgraduate Awards' will be fully funded and open to top quality science, engineering, medicine, social sciences and technology students from overseas to study for PhDs in highly rated UK research environments. The first intake in October 2004 will provide fully funded scholarships for over 100 students. Joint funding will be provided by Government and the private sector. To date the following companies are contributing to the scheme: Hutchison Whampoa; BP; Vodafone; and Scottish Power. Their contributions will be matched by allocations from the Government funded Research Councils which support UK science. Initial funding has been provided for the first intake of students for the duration of their PhDs and it is intended to extend the scheme in following years.

6. Policies to boost innovation in the service sector

UK support for innovation is 'sector neutral' that is in principle firms from all sectors are eligible for support. This applies to R&D incentives; start up firms; human capital; deregulation; IPR and procurement.

7. Policy evaluation

The UK is fully committed to evaluating its science and innovation policies. Such information is an integral part of its evidence based approach to policy making.

DTI is required to demonstrate the achievements of its programmes across all, areas of the Departments work, including innovation policy. To this end, a central committee agrees an annual work programme of evaluations. Decisions on which evaluations to undertake are based on a number of criteria (in no particular order):

- The amount of public (DTI) funding directed at the programme;
- The economic and societal importance of the programme;
- The extent to which new evidence is likely to be forthcoming as a result of the work;
- The time since the activity was last evaluated;
- The likelihood of further activity in the area.

Evaluations may be undertaken by in-house evaluators, who have no responsibility for the programmes themselves, or by consultants appointed for the purpose.

To initiate the evaluation, a methodological planning paper is prepared outlining the nature of the evaluation, what the evaluation is expected to achieve and the methodological approach to the work. To ensure a robust approach to the work the planning paper is considered by the Evaluation Methodology Group (EMG), a peer group of the Department's evaluators. Methodological approach varies according to the nature of the programme to be evaluated, but include:

- Surveys (postal, telephone etc), of participants/beneficiaries;
- A programme of face to face interviews with participants, beneficiaries experts in the field etc
- Analysis of the available management/monitoring data
- Commissioning academic research into particular aspects of the activity (the importance of patenting to the particular industrial sector);
- Analysis of existing work (academic and other sources) in the area

Draft evaluation reports setting out the findings of the evaluation are considered by EMG to ensure that they have conformed to the original evaluation plan and have adequately and robustly covered all important issues. EMG will take a view on the appropriateness of the conclusions and recommendations and how they should be taken forward into future policy. EMG makes recommendations to the Performance Committee whose role is to ensure that the evidence arising from the evaluation and the policy recommendations are taken account of by DTI's high level Investment Committee, other policy formulators and designers of future DTI Products.

In terms of the evaluation of science policy, each Research Council uses a variety of means to monitor and evaluate how they are doing, which includes peer review of completed work, surveys of users, case studies, the monitoring of statistics and bibliometric measures and the reviews by international experts. They evaluate individual projects, programmes (e.g. the Economic and Social Research Council's review of its Intellectual Property programme of research which ran between 1996-1998), themes (e.g. postgraduate training or particular science disciplines. All this information will be reviewed by the Research Council's Government Council, which include industry members.

The Office of Science and Technology, who manages the budget it allocates to the Research Councils, has a close working relationship with them. In practice this means the information that Research Councils' monitor is congruent with that that the Office of Science and Technology measures as part of a Public Service Agreement, that it agrees with HM – Treasury. For its Public

Service Agreement, the Office of Science and Technology analyses the expenditure on public research, the numbers of researcher, publications and PhD graduates, citations, measures of productivity, and measures of relevance.

The Office of Science and Technology monitors and evaluate its knowledge transfer programmes. It collects data regularly through annual monitoring statements for each programme and through the Higher Education Business Interaction Survey, which is a survey of all HEIs of their knowledge transfer activities. The Office of Science and Technology is about to launch an interim evaluation of UC, SEC, HEIF, PSREF and CMI.

For the HE Funding Councils the RAE provides a benchmark for assessing performance, as well as allocating funding.