EPSRC

Engineering and Physical Sciences Research Council

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Annual report and accounts 2005-2006

About EPSRC

The Engineering and Physical Sciences Research Council (EPSRC) is the UK's main agency for funding research in engineering and the physical sciences. Our specific targets are set out in our Delivery Plan and Scorecard 2005/06 to 2007/08. The Delivery Plan provides EPSRC's funding priorities and outlines the activities that EPSRC intends to undertake over the 2004 spending review period. These will contribute to the Department of Trade and Industry's Public Service Agreement targets for the UK Science and Engineering Base set out in the Science and Innovation Investment Framework 2004-2014

EPSRC invests in high-quality basic, strategic and applied research and related postgraduate training to help the nation exploit the next generation of technological change. The areas covered range from information technology to structural engineering, and mathematics to materials science. This research forms the basis for future economic development in the UK and improvements in everyone's health, lifestyle and culture. EPSRC also actively promotes public engagement in science and engineering. EPSRC works alongside sister Research Councils with responsibility for other areas of research. The Research Councils work collectively on issues of common concern as Research Councils UK. **For more information about EPSRC, including copies of our reports and plans, visit: www.epsrc.ac.uk**

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Annual report and accounts 2005-2006

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Chair of EPSRC's introduction

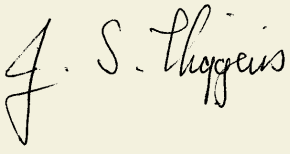
Julia Higgins

The Engineering and Physical Sciences Research Council (EPSRC) is the UK's main funding agency for frontier research, associated postgraduate training and knowledge transfer in engineering and physical sciences. In excess of £575m a year is invested in these activities to provide the basic knowledge that underpins future technological advances, leading to economic prosperity and improvements in health, personal wellbeing and lifestyle. As one of eight Research Councils funded by the UK Government, we work collectively with the other Councils on issues of common concern within the framework of Research Councils UK.

EPSRC has had a busy year developing its strategy in response to the challenges of the ten year investment framework for science and innovation published by HM Treasury, Department for Education and Skills and Department of Trade and Industry in July 2004. EPSRC consulted with its advisory panels, Council, staff and stakeholder communities to review and assess the options available to improve our ability to deliver the investment framework objectives. As a result, EPSRC is now developing a new Strategic Plan which will be published in the autumn of 2006.

Increasing the openness and transparency of Council and its business has become an important priority this year and in addition to the first EPSRC Council Open Forum, held in December 2005, to give our community the opportunity to meet with and put questions to our Council members, we also now publish Council papers and minutes on the EPSRC website.

To meet the increasing need to listen to and consider the public's views on research matters EPSRC has established a new Societal Issues Panel (SIP), see page 42, that will advise EPSRC about how best to engage and take account of public opinion and attitudes in policy development. The panel is chaired by Lord Robert Winston and met for the first time in April 2006.



Julia Higgins DBE FRS FREng
Chair

In accordance with Schedule 1 to the Science and Technology Act 1965, the Engineering and Physical Sciences Research Council submits the following report on its activities for the period 1st April 2005 to 31st March 2006.

Chief Executive's summary

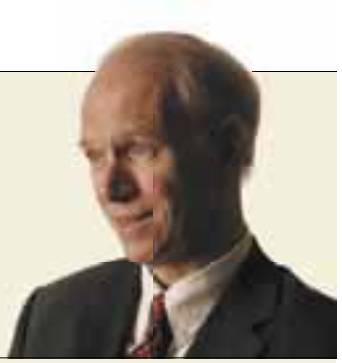
John O'Reilly

The year 2005-2006 has seen many important developments in the way that EPSRC supports and engages with its research communities. Some of these changes, such as implementing the full economic costs regime for funding research, recruiting a new intake of College members and holding EPSRC's first open forum have already had an impact. There are others, however, such as the setting up of the Societal Issues Panel and the introduction of live email alerts for calls for proposals which are only just starting to have an effect.

At this particularly important juncture in the history of public funding for research, the Research Councils have been set two main goals by the Office of Science and Innovation (OSI): to ensure a healthy UK science and engineering base and fuel better exploitation. Both of these are critically dependent on engineering and physical sciences. The Delivery Plan and Scorecard 2005/06-2007/08 outlines what EPSRC intends to do to help meet these core challenges.

Crucially important for EPSRC is building and maintaining the health of engineering and physical sciences disciplines in terms of research leadership, capacity and performance, for example the UK core e-Science Programme has appointed Professor Malcolm Atkinson to take up the new post of UK e-Science Envoy from 1st April 2006. A key strand of our activity is the firm conviction of the importance of allowing talented researchers to follow their own initiative in pushing the boundaries of knowledge. Alongside this we have announced specific actions to secure strategically important areas of engineering and physical sciences that are currently at risk. Over the last year we have taken further steps towards strengthening these areas through our Science and Innovation Awards (see page 13). In 2005 EPSRC together with the Higher Education Funding Council for England (HEFCE), the Scottish Funding Council (SFC) and the Department for Employment and Learning Northern Ireland, (DELNI) have announced funding for seven new programmes with a value of over £27m. We envisage further calls in 2006 and 2007 and aim to grow some 20 new strong research groups by 2007/08. Yet this is but one of many actions that will be required from EPSRC, other research funders and the end users of research if we are to see health across the disciplines and increased research leadership capacity.

Foreword



Key highlights of the year

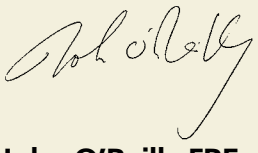
- The smooth implementation of the full economic costs regime
- The recruitment of a new intake of College members
- EPSRC's first Council open forum
- The establishment of the Societal Issues Panel
- Securing strategically important areas with the Science and Innovation Awards
- The inaugural Energy Research Summit for the coordinated Research Councils' Energy Programme
- The development of Integrated Knowledge Centres
- The appointment a UK e-Science Envoy
- The formation of the first EPSRC/QinetiQ Chair in Technology Transfer

As a result of the Spending Review 2004 the Research Councils were provided with additional funding for energy research, with EPSRC given the responsibility of taking the lead in coordinating work for the Research Councils in this area. This led to the launch of the UK Research Councils' Energy Programme at the inaugural Energy Research Summit held on 1st November 2005. The event aimed to stimulate engagement between funding agencies, industry and Government on energy related issues and featured a presentation by Malcolm Wicks, Minister of State for Energy and a showcase of energy research in the UK. EPSRC is engaging with others to ensure that the full spectrum of energy research, associated postgraduate training and knowledge transfer issues are addressed, embracing socio-economic, environmental and biological as well as physical science and engineering aspects.

The Government's ambition is for the UK to have a reputation not only for outstanding scientific and technological discovery, but also as a world leader in turning that knowledge into new products and services. EPSRC can make a distinctive contribution to improving the UK's innovation performance by acting as a catalyst for business-academia interaction. As well as enhancing existing collaboration, we are exploring with universities and business more interactive approaches to optimise knowledge transfer opportunities.

In November 2005 a pilot call was issued to fund Integrated Knowledge Centres, with the aim to promote strong partnerships between world-class research and businesses. The intention is to select two centres in the first instance, involving EPSRC support of £7m over five years which is to be substantially augmented by sponsorship from the university and other important partners, including Funding Councils, Department of Trade and Industry and Regional Development Agencies. EPSRC and the international defence and security company QinetiQ have also agreed to joint fund the UK's first professorship in technology transfer in the physical sciences. The £1m 'EPSRC/QinetiQ Chair in Technology Transfer in the Physical Sciences' has been awarded to Imperial College London.

EPSRC is continuing to refine its strategy and this will culminate in the development of the 2006 Strategic Plan.

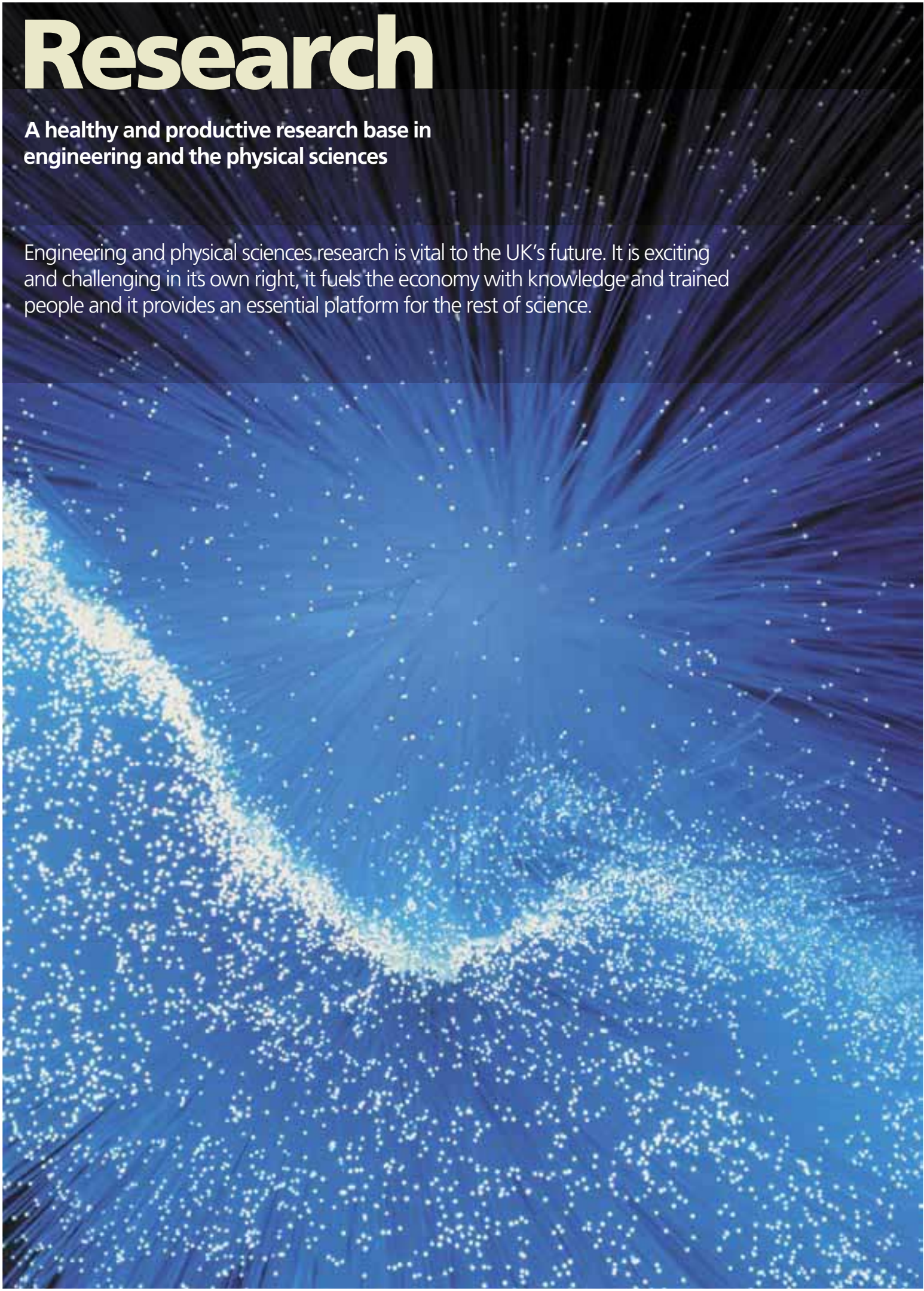


John O'Reilly FREng
Chief Executive

Research

A healthy and productive research base in engineering and the physical sciences

Engineering and physical sciences research is vital to the UK's future. It is exciting and challenging in its own right, it fuels the economy with knowledge and trained people and it provides an essential platform for the rest of science.



»10 Yrs Our 10-year vision is to improve the international quality across all disciplines of engineering and physical sciences research in the UK.

The year in context

April 2005 – March 2006

To sustain the breadth of the UK engineering and physical sciences research, EPSRC works in partnership with universities to meet the needs of government, industry and society. Our role is complementary to that of other research investors including government agencies, the private sector and the European Union (EU). In developing our research strategy we seek to take account of their priorities and of developments in Europe and elsewhere. We also work with sister Research Councils to develop and deliver the Research Councils UK's long-term vision for research.

To be effective, we must encourage new capacity in the fast-developing technology fields and in the underlying physical sciences and engineering disciplines. Many of the most exciting opportunities occur at the interfaces between disciplines, for example, between the physical sciences and life sciences. We will encourage multidisciplinary approaches to research challenges, jointly with others, for example through Interdisciplinary Research Collaborations and cross council research programmes.

Our 10-year vision, outlined in the EPSRC Delivery Plan, is to improve the international quality across all disciplines of engineering and physical sciences research in the UK. To achieve this EPSRC will:

- **Increase its investment in responsive mode funding**, enabling talented researchers to respond to emerging opportunities;
- **Build and strengthen capacity in strategically important research areas**, in collaboration with funding councils, nucleating and extending research centres of excellence in universities;
- **Foster agility** in addressing new and fast moving research areas;
- **Promote and support critical mass** through the maintenance of sufficiently strong research groups and retention of key personnel to enable the UK to make an impact internationally;
- **Enable increased engagement** of UK researchers with the best research groups internationally;
- **Promote the development of talented researchers**, for example through research fellowships and discipline-hopping awards;
- **Fund research sustainably**, in line with the Government's commitment to move towards 100% of the full economic costs of research being paid by the research councils.

EPSRC's research portfolio encompasses fundamental areas of science such as physics (£31m), chemistry (£38m) and mathematical sciences (£10m). These areas are intrinsically important as well as providing a platform for advances in many other areas of research and innovation.

EPSRC also supports a significant programme of activities in information and communications technologies (£52m), for example, research in optoelectronics, photonics and display technologies are a driving force behind our IT and communications driven economy. Optical fibres are a major enabling technology that grew out of pioneering research funded by EPSRC and have revolutionised our communications systems from broadband internet access to long distance connections. Research in materials (£38m), will provide new and improved materials and technology to meet the demands of 21st century living.

Expenditure for the engineering programme has totalled £64m with the infrastructure and environment programme investing an additional £22m to address issues such as urban sustainability, flooding and the implications of an ageing society. The innovative manufacturing programme, totalling £25m, covers a broad spectrum of research topics required to create or improve value adding processes, from business strategy and construction management to free-form fabrication processes and bio-processing.

Ensuring a sustainable research base

Full economic costs are vital to put university funding on a sustainable footing by addressing the under-investment that was demonstrated in the Transparency Review conducted by the Joint Costing and Pricing Steering Group (JCPSG). As part of the Government's commitment to achieving a sustainable UK research base, the Research Councils have received an extra £120m per year from 2005/06, rising to £200m per year from 2007/08, to enable them to support more fully their current volume of research in universities. EPSRC's share of these funds is £36m in 2006/07 and £71m in 2007/08; an initial contribution to universities of £141m in 2005/06 was made by ESRC on behalf of all Research Councils.

EPSRC began accepting grant proposals on 1st September 2005 based on full economic costs at an initial rate of 80% for research grants and fellowships. This rate was chosen to maintain the current volume of research with the additional funding provided. In line with the aspirations set out in the Government's 10-Year Science and Innovation Investment Framework, the Research Councils intend to move towards 100% of full economic costs early in the next decade. The existing application forms were discontinued at the end of July 2005, and a moratorium on applications was applied during August while systems were switched over.

EPSRC open forum

At EPSRC's first open forum delegates got to put their questions to members of Council, EPSRC's senior decision-making body. The event, held on 14th December 2005 at the Royal Institution, London, was open to all and attracted a large audience with academia, business and the learned societies being well represented. Above: Professor John O'Reilly introduces the work of EPSRC before the meeting is opened up for a question and answer session.

Big Bang theory

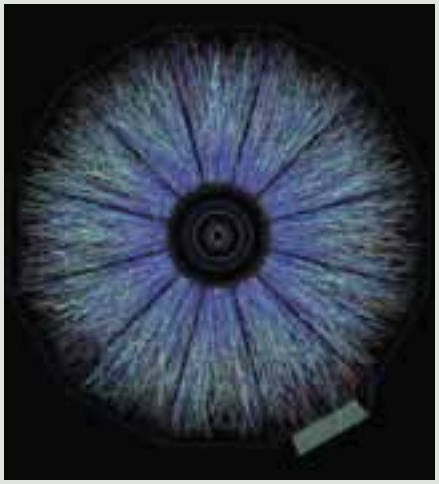
Not what we expected!

When scientists working in the multinational STAR Collaboration collided central cores of gold atoms together at almost the speed of light in the Relativistic Heavy Ion Collider (RHIC) at the Brookhaven National Laboratory in Long Island, New York, they produced a miniature version of the Big Bang that marked the first few microseconds of our Universe. But rather than behaving like a plasma of quarks and gluons, what resulted from the collision behaved like a perfect fluid, with almost zero viscosity.

"This aspect was totally unexpected," says Professor John Nelson of the School of Physics and Astronomy who heads an EPSRC funded research group at the University of Birmingham that is contributing to the STAR Collaboration, "and will lead to new research into the properties of certain types of matter at extremes of temperature and density previously inaccessible in a laboratory."

But although this type of experiment furthers understanding of what happened microseconds following the Big Bang and provides clues about the earliest moments of the Universe, it also throws up big questions. The unexpected nature of this new state of matter leaves physicists working on new theoretical models to support these surprising experimental results.

Professor John Nelson, University of Birmingham
Email: j.m.nelson@bham.ac.uk



The STAR detector captured these traces. When two gold nuclei collide in the RHIC particle accelerator, Brookhaven, they produce a cascade of new particles: each line on this image shows the path of one of those particles.

Building international links

A characteristic of world-class research is the level of collaboration with leading research groups internationally. EPSRC has put increasing emphasis on the enhancement of the international standing of UK science and in 2005 the EPSRC Technical Opportunities Panel (TOP) considered metrics under the themes 'Think Global' and 'Demonstrating Excellence'. 'Think Global' focuses on the need for the UK research community to collaborate internationally in order to conduct leading research and 'Demonstrating Excellence' requires UK research to be compared with the research outputs of other nations to assess excellence.

In addition to encouraging and enabling our research community to work with international partners, EPSRC actively supports international research programmes, including the EUROCORES (European Science Foundation Collaborative Research) programme with the European Science Foundation (ESF). EUROCORES has been designed to bring together national basic research funding bodies to collaborate on multidisciplinary issues that have European-wide relevance.

In September 2005, EPSRC issued a call to support participation in the 2005 National Science Foundation (NSF) 'Materials World Network: Cooperative Activity in Materials Research' between US investigators and their counterparts abroad. This will help foster opportunities for international collaborative activities in materials research with researchers in the US. A joint panel met in March 2006 with awards made in April 2006. This is the first ever joint panel between EPSRC and NSF.

EPSRC has continued to seek to work with other agencies both in the UK and overseas to help increase links between other countries and the UK. The grants system remains open to support international collaborations and networking through visiting fellowships, networks, overseas travel grants including INTERACT and N+N meetings.

EPSRC will continue to develop plans to improve the international standing of UK research in engineering and physical sciences. Some of the activities for 2006/07 will include improving opportunities for international collaborations, reviewing the benefits of engagement in EraNET, engaging in preparations for the European Research Council, exploring collaborations with China in energy research and undertaking the International review of ICT.

'EPSRC will continue to develop plans to improve the international standing of UK research in engineering and physical sciences.'

International workshops

Attendees at the first UK-China Spintronics Conference, held in China in October, 2005.

Bilateral research

Bilateral research workshops were conducted across the EPSRC remit including the UK-China Spintronics conference, held in China, in October 2005; a UK-China e-Science workshop held in China in December 2005; a UK-Singapore Physical Organic Chemistry workshop held in Singapore in January 2006; a UK-India Biologically Related Chemistry workshop held in India in February 2006; a UK-South Africa Renewable and Nuclear Energy mission held in South Africa in February 2006; a UK-US Synthesis workshop held in the UK in March 2006; and a UK-Canada nuclear skills training workshop held in Canada in March 2006.

In February and March 2006 a High Performance Computing (HPC) visit to China and Japan took place to visit their facilities and to discuss HPC strategy and explore possibilities for future collaboration.

Nanotechnology theme day

In June 2005 we held a theme day to evaluate our nanotechnology portfolio with an international panel. As a result a strategic working group has been formed to advise Council on future nanotechnology strategy.

Benchmarking research quality

International reviews in a particular discipline provide an independent insight into the strength of the UK research activity against world competitors. At the end of the first cycle of international reviews EPSRC conducted a review of the international review process. It was found that the reviews have provided potentially useful insights into structural aspects of the health of UK science and the use of international panels had provided a useful critical perspective. It was encouraging to note that so far the reviews have learnt from their predecessors, although the consequences of the reviews in terms of their influence on debate and science policy needs to be more visible.

The findings of the 2005 International Review of Research using High Performance Computing in the UK that took place from 4-9th September 2005 have now been published on the EPSRC website. The review was co-ordinated by the Deutsche Forschungsgemeinschaft and was chaired by Dr Horst Simon, Lawrence Berkeley National Laboratory, USA. The Panel found that research using high performance computing in many areas is of the highest standing and is competitive at the international level. Areas for further improvements have also been noted. The 2005 International Review of Physics and Astronomy took place from 31st October to 4th November 2005. The Review was co-ordinated by the Institute of Physics on behalf of the EPSRC, PPARC and the Royal Astronomical Society, and was chaired by Professor Jurgen Mlynek of Humboldt University, Berlin. The Panel was delighted to note that considerable efforts have been made to improve the status of physics and astronomy in the UK since the review in 2000. An international review of Information and Communications Technologies will take place in 2006/07.

It is essential that the EPSRC programme structures continue to meet the needs of both the research community and the wider users of research. In 2005, a major review of the impact that the Life Sciences Interface Programme has made since it was created in 1999 was undertaken. The impact study report, published in November 2005, included results of a stakeholder survey; analyses of the Life Sciences Interface portfolio and publication data provided by grant holders and a series of case studies. The study showed there has been strong growth in the number of life scientists collaborating with engineers and physical scientists on EPSRC-funded grants and that the programme has had a positive impact on the UK research landscape. The recommendations from the review were discussed at meetings with the research community in February 2006 and an action plan is being produced.

All reports are available on our website: www.epsrc.ac.uk

Our door is always open

EPSRC is strongly committed to responsive mode funding as an essential means of enabling talented researchers to follow their own initiative in pushing the boundaries of knowledge and responding to emerging opportunities.

Responsive mode funding can be used to support a wide variety of proposals at any time and in any field of research relevant to EPSRC's remit, including first grants, workshops, feasibility studies, networks, instrument development, equipment to support a number of research projects, overseas travel grants and visiting researchers, and long-term proposals to develop or maintain critical mass. Responsive mode funding is very flexible, with the scale of projects supported ranging from small travel grants to multi-million pound research programmes. High risk/high return research proposals, embracing new concepts or techniques, are particularly encouraged.

In 2005/06 responsive mode applications were received within Engineering, Chemistry, Information and Communications Technologies, Life Sciences Interface, Materials, Mathematical Sciences and Physics totalling £880m.

SPICE

SPICE (Simulated Pore Interactive Computing Environment) has won an International Supercomputing Conference Award 2006 in the Life Sciences category. This is one of the outcomes from the US-UK HEC project 2005/06 funded by EPSRC and the NSF.

Faraday Partnerships

During March 2006, the EPSRC reviewed all of the Faraday Partnerships to which it contributes funding to see if the scheme had met its original objectives related to research quality, training provision and knowledge transfer. The outcomes of this review are due in June 2006.

Analytical Science

In March 2006 a theme day was held to review research grants and studentships in the area of analytical science. The output of this activity will be used to influence EPSRC's strategy in supporting analytical science.

Responsive mode projects 2005/06

The majority of research funded by EPSRC is supported through responsive mode. Here is just a very small selection of some of the exciting projects in science and engineering supported in 2005/06.

Experimental burning of Mediterranean shrub in Portugal.

£3.3m

Dual focus

In a new £3.3m multidisciplinary research centre for Advanced Electron Paramagnetic Resonance (EPR) at Oxford University, a group led by Professor Peter Edwards and Dr Christiane Timmel of the Department of Chemistry are using a variety of pulsed and high field EPR methods to advance understanding of fundamental chemical and biological processes on the molecular scale. Projects will focus on two major areas: materials research; and chemical biology.

Email: peter.edwards@chemistry.oxford.ac.uk

£2.7m

A new approach to software engineering

A shift towards a machine based search approach could lead to benefits right across the software engineering lifecycle. This is the central idea behind the £2.7m SEBASE project, led by Professor Mark Harman of King's College London, with Professor John Clark (University of York) and Professor Xin Yao (University of Birmingham). The project will address theory, scalability, robustness, feedback and insight in Search Based Software Engineering (SBSE).

Email: mark.harman@kcl.ac.uk

£193,000

Modelling the burning bush

Fighting bushfires presents major difficulties. Helped by a £193k grant from EPSRC, Professor John Dold and co-workers at the University of Manchesterare modelling these fires, in collaboration with experimentalists and field workers in Australia and Portugal, in order to gain a better understanding of their behaviour and so helping to improve predictions of how bushfires can spread.

Email: john.dold@manchester.ac.uk

An electron interferometer for rapid transfer of information in a new concept of quantum computation.

£4.4m

Advanced nanostructures

A £4.4m award to a group led by Professor Sir Michael Pepper FRS of the University of Cambridge will make it possible both to fabricate advanced semiconductor nanostructures and use them to search for new phenomena based on quantum effects. The research could also lead to the emergence of new methods of transmitting and handling data in the developing fields of quantum computing/communications.

Email: mp1000@cam.ac.uk

£74,000

Early ALARMS of landslides

An early warning system based on acoustic emission monitoring being developed by Dr Neil Dixon of Loughborough University with a £74,000 grant from EPSRC will make possible the early detection of slope instabilities. The system could help to reduce the loss of life, property damage and disruption that results when nature and constructed slopes fail.

Email: n.dixon@lboro.ac.uk

£305,000

Music to a machine's ears

A £305,000 grant to a team led by Dr Simon Godsill of the University of Cambridge is enabling researchers to bring together recent advances in the understanding of musical signals, human perception and high level musical structure to build models that could give computers human like listening abilities.

Email: sig@eng.cam.ac.uk

£1.2m

Simplifying complexity in proteomics

Because of the sheer complexity of the protein mixtures being studied, the primary goal of proteomics – to identify and measure the amounts of every protein in a cell in a single experiment – has not yet been achieved. In a £1.2m project led by Professor Simon Gaskell of the University of Manchester, in collaboration with researchers at the Universities of Liverpool and Cambridge, researchers hope to bring this goal closer to reality by developing analytical strategies to streamline the proteomics workflow.

Email: simon.gaskell@manchester.ac.uk

£421,000

Nanotubes for electronics

A new method of growing carbon nanotubes without using metals, which is being developed by researchers at the Universities of Southampton and Oxford as part of a £421,000 EPSRC-funded project, will enable carbon nanotubes to be integrated on the same wafer as silicon electronic circuits. The work could lead to new types of tiny electronic device.

Email: pa@ecs.soton.ac.uk

£220,000

Epilepsy algorithm

In a £222,000 project, funded under EPSRC's First Grant Scheme in responsive mode and led by Dr John Terry of the University of Bristol, mathematicians from the University of Bristol and clinicians from King's College Hospital are using mathematical modelling and analysis to better understand seizure states. Their ultimate aim: an algorithm to predict when seizures will occur.

Email: j.r.terry@bristol.ac.uk

Meeting national research needs

There is strong evidence that some areas of strategic research in the UK may be compromised in their ability to sustain the required research capacity in the future. The term 'research capacity' encompasses not only the production of sufficient numbers of well-trained people but also the existence of inspiring people to lead research teams in universities. EPSRC has not only continued but increased its commitment to building and strengthening the research community, especially in shortage and priority areas.

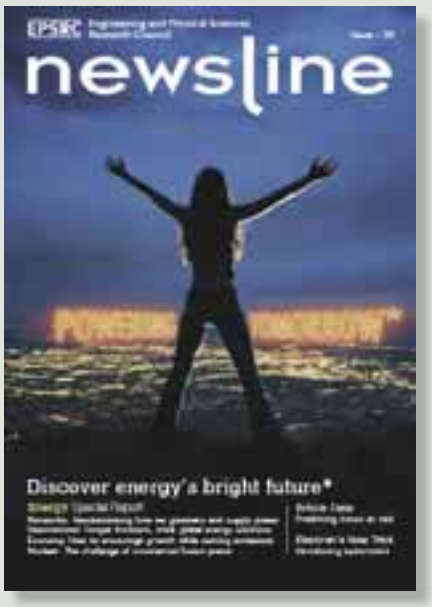
EPSRC, in partnership with the Higher Education Funding Council for England and the Scottish Funding Council, took the first steps towards building capacity through the introduction in 2004 of Science and Innovation Awards. The purpose of these awards is to secure strategically important research areas that are missing or at risk in the UK.

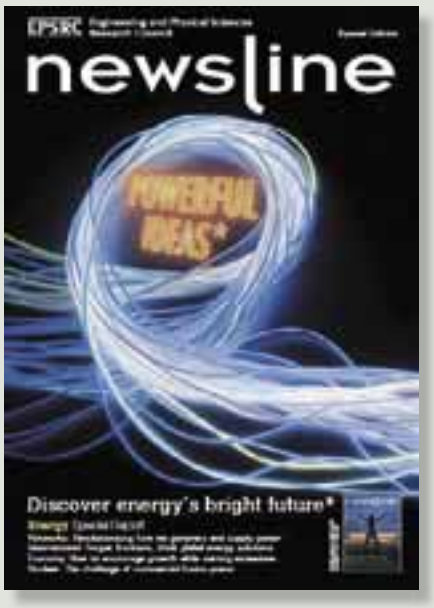
A panel held on 23rd November 2005 selected seven further Science and Innovation awards for funding, with support from all funding agencies totalling over £27m (see page 13) adding to the previous five awards announced in July 2005. The objective of the Science and Innovation awards is to enable universities to enhance capacity by fostering research groups in important areas of national need within the engineering and physical sciences remit. In the second call funding has been awarded to build the UK's research base in the areas of nanometrology, statistics, plasma physics and the Mathematics-Computer Science interface.

In addition the 2004 Spending Review identified energy as a priority research area of national importance and provided EPSRC with funds to substantially expand support for the research and associated training necessary to underpin all future energy options. EPSRC, on behalf of the Research Councils, has been tasked with taking a clear lead in driving forward the sustainable energy agenda, engaging with others to cover the full spectrum of energy research issues including socio-economic, environmental and biological aspects. From summer 2006, an Energy Senior Research Fellow will be appointed. In addition to conducting their own research portfolio the Senior Research Fellow will act as an ambassador for UK energy research; gather intelligence on international research developments and opportunities and work to achieve national and international visibility and co-ordination for the Energy research programme. Strategic engagement with energy business will be further developed through the second Energy summit.

In addition to responsive mode, EPSRC will continue to encourage research challenges that are becoming increasingly important for the future of the UK economy through targeted funding. For instance, EPSRC will continue to address research priorities in the areas of energy, information technologies, complexity, nanotechnology, healthcare, and crime and security.

Energy research special report





Newsline **issue 34 contained a special report on energy research. A special 12 page edition of the report was produced which can be downloaded or read on our website. Hard copies can be ordered by emailing jonathan.wakefield@epsrc.ac.uk**

f block metals

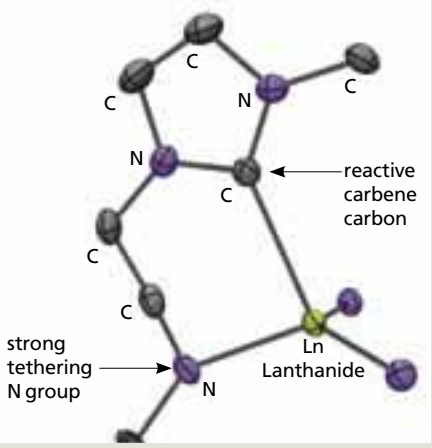
Weird and wonderful

The f block metals – the heavy lanthanides and even heavier actinides, such as uranium, have many uses. Some are used as industrial catalysts, and, thanks to their unusual optical properties others are used in things like invisible security inks and flat TV screens. Now a new metal-complexing ligand, or reactive molecule, discovered by chemist Dr Polly Arnold, who recently completed an EPSRC Advanced Research Fellowship, and her colleagues at the University of Nottingham look set to allow the f block metals to work in entirely new ways.

Using the new ligand the group are making complexes of f block metals that catalyse reactions with molecules that are normally considered to be inert. Some of the complexes could also lead to an understanding of better ways to separate the different radioactive elements in nuclear waste. Others can act as 'bifunctional catalysts' that can be used to control two compounds at once in some catalytic reactions.

"One arm of our ligand can bond reversibly to an f block metal, providing a dangling electron source," explains Dr Arnold. "Normally f-element complexes have no electrons left to do any further chemistry with. But here the ligand can join in the attack. It offers some interesting new possibilities for reactions." Industries including chemicals, pharmaceuticals and nuclear power all stand to benefit.

Dr Polly Arnold, University of Nottingham
Email: polly.arnold@nottingham.ac.uk



This reactive molecule – an N-heterocyclic carbene (NHC) – could hold the key to a new type of chemistry for lanthanides and actinides (one famous actinide is uranium).

» £9m is being used to establish a 5-year, research centre in large scale complex IT systems to address issues in the IT and communications industry.

Research at the cutting edge

In 2005/06 there have been a number of calls across the EPSRC portfolio for managed activity aimed at fostering agility, to encourage new capacity in the fast-developing technology fields and in the underlying physical sciences and engineering disciplines from which these new technologies develop. Many of the most exciting opportunities occur at the interfaces between disciplines, for example, between the physical sciences and life sciences. Calls to encourage research in fast-developing technology fields include: research at the systems biology/control engineering interface; wired and wireless intelligent networked systems; novel computational science; high throughput technologies; adventurous chemistry; physical organic chemistry; complexity research; electrophotonics; engineering functional materials; and the next stage of investment in reducing UK carbon emissions. The promotion of research into new areas ranges from the support of feasibility studies to seed corn new areas, for example at the life sciences/physics interface, to funding of large grand challenges such as life sciences/computer science grand challenges and the nanoengineering/multifunctional materials IRC.

For the future EPSRC has plans to address key areas of ICT that will be vital for the economy by enabling a comprehensive digital infrastructure building on previous knowledge management and e-Science funding (Advanced Knowledge Technologies IRC, Semantic Web, Semantic Grid); by continuing to support the development of ubiquitous computing building on the Wired and Wireless Intelligent Networked Systems initiative (WINES); and by exploring autonomic systems building on Novel Computation and Cognitive systems funding.

Complexity will be another area of priority for EPSRC. Understanding complex systems is a major scientific challenge and methodologies in this area could help solve a number of essential problems across the natural and human sciences. EPSRC will be building on previous activities and will establish a 5-year, £9m research centre in large scale complex IT systems to address issues in the IT and communications industry. Another £8m will be committed in two Doctoral Centres in Capacity Building and Complexity of Science to support specialised postgraduate training, which will be jointly funded with ESRC.

EPSRC has plans to strengthen its strategy for healthcare, recognising that the engineering and physical sciences underpin key technologies that will enable better provision, delivery and monitoring of healthcare in the future. Plans are to establish a strategic partnership with medical research charities on central nervous systems imaging; to renew the Innovative Manufacturing Research Centre and Doctoral Training Centres in healthcare, subject to satisfactory reviews; and to continue to work on strategic partnerships and joint activities with other Research Councils in areas such as systems biology and stem cells.

Following recommendations from the 'Evaluation of Engineering Research in the UK' and 'International Review of UK Research in Mathematics', funding will be available to improve the linkage between engineering and fundamental sciences. This will support new, long-term collaborations between researchers in the mathematical sciences, ICT and engineering, to help increase the cross-fertilisation of ideas and the take up of advances across the boundaries between these disciplines.

Hi-tech training

Going for gold: SEnsing for Sport And Managed Exercise

A newly formed EPSRC funded SESAME consortium is committed to going for gold – in the technological sense. The multidisciplinary group, led by Dr Stephen Hailes of the Department of Computer Science at University College London, is investigating the use of wireless sensor based systems to improve training and enhance the performance of athletes who show potential to become world class winners. But sports science is not the only area likely to benefit from the group's research.

"With the Olympic Games coming to London in 2012, our research is particularly timely," says Dr Hailes. "Although the initial focus will be on running – specifically sprinting – we will also be exploring the possibility of using the technology in other athletic disciplines. And because our technical approach will be deliberately generic, it will also be useful in other types of training and in a number of healthcare scenarios."

Dr Stephen Hailes, UCL
Email: s.hailes@cs.ucl.ac.uk

New Science and Innovation Awards

Seven new programmes with a value of over £27m have been awarded in the second round of the Science and Innovation Awards. These are in the areas of nanometrology, statistics, plasma physics and the Mathematics-Computer Science interface.

Professor John O'Reilly, Chief Executive of EPSRC, said: "A strong research base in engineering and the physical sciences is vital to the UK's success as a knowledge economy. These latest awards underscore EPSRC's commitment, working in partnership with the Funding Councils and the Department for Employment and Learning Northern Ireland, to address shortages of academics to lead research teams in some crucially important areas."

'A strong research base in engineering and the physical sciences is vital to the UK's success as a knowledge economy.'

Controlling the large balls of plasma inside full-size fusion reactors is one of the challenges facing scientists. Shown here is a three metre diameter plasma ball inside MAST, the UK's own fusion device.

University of Warwick

A new centre of excellence in fusion plasma physics will be set up in collaboration with the UK magnetic fusion programme at Culham Science Centre. Led by Professor Sandra Chapman (Warwick) and Professor Richard Dendy (Culham), the project will develop the understanding of hot plasmas required to sustain nuclear fusion. The long term programme of joint research which already exists across the two institutions, and draws upon their expertise in fundamental plasma physics with both astrophysical and fusion applications, will expand with the new award.

Email: s.c.chapman@warwick.ac.uk
Email: richard.dendy@ukaea.org.uk

Queen's University, Belfast

Led by Professors Bill Graham and Ciaran Lewis, this project aims to address the UK's need for more plasma physicists by complementing and strengthening the current experimental activity in high and low temperature plasma physics with theoretical and computational expertise. They also plan to create the first UK-wide, web-based teaching programme in plasma physics, in partnership with other universities, laboratories and industry.

Email: b.graham@qub.ac.uk

University of Cambridge

Professor Ian Leslie is leading this project to develop the Cambridge Statistics Initiative which aims to build a centre of excellence in statistical research and teaching that will produce a strong flow of experts in this field. The researchers will collaborate with other distinguished groups elsewhere in Cambridge and the UK and industrial collaborators.

Email: pvc-research@admin.cam.ac.uk

University of Bristol

Professors Peter Green and Guy Nason and Dr Christophe Andrieu plan to develop SuSTaIn – Statistics underpinning Science, Technology and Industry, within the supportive environment of the Statistics Group at Bristol University. The award will enable the recruitment of a strong, dynamic team where researchers will be free to develop the latest ideas in mathematical statistics.

Email: p.j.green@bristol.ac.uk

Imperial College London and University College London (UCL)

Professor Tim Jones (Imperial) and Professor Gabriel Aeppli (UCL) will develop new tools for nanoscale characterisation and metrology. The project will be based at the London Centre for Nanotechnology, a joint venture between Imperial College and UCL. The Centre brings together two internationally leading institutions in nanoscience and nanotechnology and has a unique operating model that accesses the combined skills of the departments of chemistry, physics, materials, medicine, electrical and electronic engineering, mechanical engineering and earth sciences across the two universities.

Email: t.jones@imperial.ac.uk
Email: lcn-director@ucl.ac.uk

'These latest awards underscore EPSRC's commitment to address shortages of academics to lead research teams in some crucially important areas.'

University of Warwick

Professor Mike Paterson will use the award to set up the Centre for Discrete Mathematics and its Applications. The project will be rooted in three internationally recognised departments at the University of Warwick: Computer Science, Mathematics and the Business School. It will focus on both the interface between mathematics and computer science and the fundamentals of operational research. An Industrial Affiliates Programme will transfer knowledge and solutions to industry and other users.

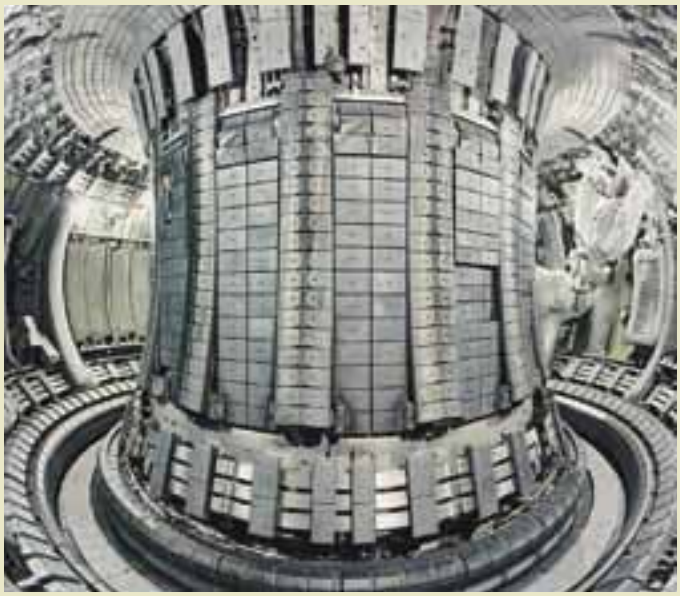
Email: mike.paterson@dcs.warwick.ac.uk

University of Strathclyde and King's College London

The award will be used to advance the emerging field of nanometrology, for applications in molecular science, medicine and manufacture. Led by Professor David Birch at the University of Strathclyde and in collaboration with Professor John Pickup's team at King's College London, the project will facilitate the multidisciplinary research environment required to develop the extra capacity needed to make the UK a leader in nanometrology.

Email: djs.birch@strath.ac.uk

Energy highlights



JET is an experimental fusion facility based at the Culham Science Centre.

Towards a sustainable energy economy

EPSRC has provided additional funding of £13.6m for the Towards a Sustainable Energy Economy (TSEC) programme in the areas of carbon capture and storage, the analysis of bioenergy demand and supply, public engagement with renewable energy technologies, a sustainable energy economy and economic policy analysis. The objective of the TSEC programme is to find reliable, diverse, affordable, publicly acceptable and safe ways to supply the growing demand for energy, while minimizing the carbon dioxide emissions from burning fossil fuels. We have invested a further £0.8m in a Carbon Vision project aimed at investigating the barriers to implementing low carbon systems. As a final phase of the current Carbon Vision Programme, a call has been issued to fund two awards to develop future research leaders in low carbon technology. Each award will be in the order of £1m to provide research support in terms of staff and other items to excellent researchers with the potential to become international leaders. EPSRC has also agreed to support an Energy Senior Research Fellow to publicise and champion energy research, to help strengthen the UK's links with research communities,and industry internationally, and to foster and support interactions with Research Councils and other Government departments.

The national fusion research programme, funded by EPSRC, represents an important long-term element of the whole activity: this funds the UK domestic programme and the UK host contribution to the Joint European Torus (JET) and the International Tokamak Experimental Reactor (ITER). A mid-term review of the fusion programme took place in January and February 2006 and overall the panel was impressed with the operations at Culham. In 2006 EPSRC will provide additional funding for JET enhancement and early research and development work at the ITER.

Keeping the nuclear option open

The consortium 'Keeping the Nuclear Option Open' started on 1st October 2005 and is led by Professor R Grimes at Imperial College, with funding of £6.1m plus an additional £0.5m contribution from BNFL. The programme covers fuel and reactor systems, materials and waste and involves many other key stakeholders from the nuclear area.

Training in Nuclear Physics

In May 2005 the Nuclear Technology Education Consortium was awarded a £1m Collaborative Training Account to provide masters level and continuing professional development training in nuclear energy related skills. An Engineering Doctorate Centre in nuclear skills training will be ready for its first intake of students in 2006/07.

SUPERGEN!

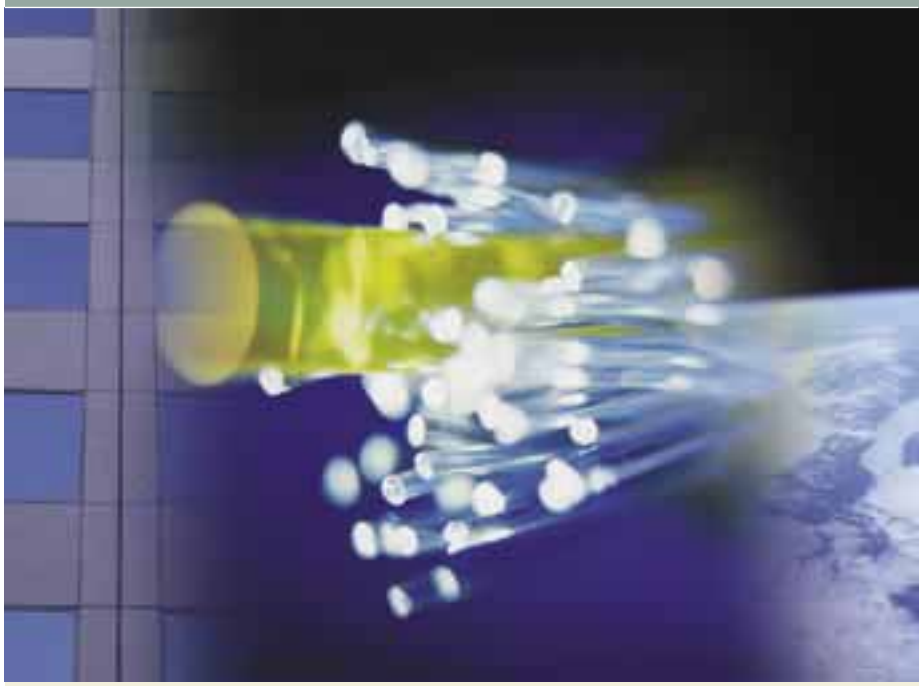
In 2005/06 the SUPERGEN Programme has supported four consortia: The Energy Storage Consortium led by Dr M Islam at Bath and Professor P Hall at Strathclyde with funding of £2.2m; the Wind Energy Consortium led by Professor P Tavner at Durham University with funding of £2.6m; the Biological Fuel Cells Consortium led by Professor F Armstrong at University of Oxford with funding of £2m; and the Energy Infrastructure Consortium led by Professor S Swingler at the University of Southampton with funding of £2.5m.

Energy research summit

The inaugural UK Energy Research Summit was held on 1st November 2005 in London to stimulate engagement between funding agencies, industry and Government on energy related issues. The Summit included a presentation by Malcolm Wicks, Minister of State for Energy, the launch of the Research Councils' Energy Programme and a showcase of energy research in the UK. This summit was a significant step forward in the process of strategic engagement of research and training priorities with energy related businesses. This will help the UK meet the objectives and targets set out in the 2003 Energy White Paper and drive forward the sustainable and low carbon energy agenda. A second summit will take place in Autumn 2006.

RESEARCH COUNCILS' energy PROGRAMME

Discipline hopping



Researchers broaden their horizons

Discipline Hopping Awards provide short-term support to enable individual researchers to acquire skills, familiarity and expertise in areas very different from their original training. The approach has been very successful at the interface between engineering and physical sciences and the life sciences where £1.4m was invested in 2005/06, and is being extended to mathematics and computer science in response to comments made in the International Review of Mathematics. There are also promising opportunities at the interfaces with the socio-economic and political sciences, environmental sciences and arts and humanities, particularly relating to the impact of science and technology.

In October 2005 an event was held to encourage discipline hopping collaborations at the Interface between Chemistry and Chemical Engineering. The event was very interactive and innovative, including a series of speed networking sessions. Following the event attendees were invited to submit full proposals and a total of £1m is available in 2005/06 to fund a number of these discipline hopping awards.

Working in partnership

In addition to the promotion of exciting research challenges within our own portfolio, EPSRC has also worked closely with the other Research Councils in supporting activities involving a wide range of disciplines. In 2005/06 EPSRC invested £17m in joint external funding of research initiatives. Current collaborations include: Designing for the 21st Century (with AHRC); the Science & Engineering of Stem Cells (with BBSRC); Management Research (with ESRC); and New Dynamics of Ageing (with ESRC, BBSRC and MRC). New areas for future co-operation to be explored include Modelling Climate Change (with NERC) and 21st Century Statistics (with MRC, BBSRC, NERC and ESRC). EPSRC has also participated in cross-council research programmes specifically initiated through recent spending reviews.

Platform grants

Platform grants are one of the key mechanisms by which EPSRC strives towards maintaining and developing the strength of the UK engineering and scientific research base, by supporting, through underpinning funding, those UK groups considered to be world leading in their fields.

The platform grants scheme has been standardised across Engineering, Information and Communications Technologies and Materials both in terms of the assessment process and resources that can be requested. In 2005/06 31 platform grants were awarded with a value of £13.9m including four at the interface between life sciences and chemistry.

Interactive memory aid

Speaking of the past

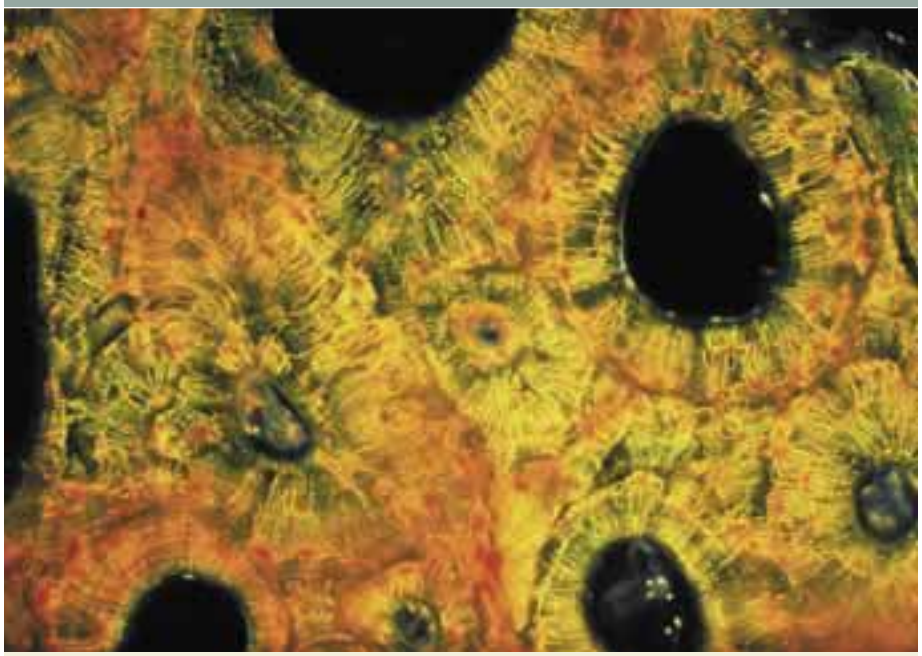
While people with dementia generally have trouble remembering recent events, their memories from the past are often relatively well preserved. An interactive memory aid, known as CIRCA (Computer Interactive Reminiscence and Conversation Aid) and developed by a team of researchers from the Universities of Dundee and St Andrews under the EPSRC funded EQUAL (Extending Quality of Life) project, takes advantage of this fact by drawing on past memories to help to make life more enjoyable for people with dementia.

The system is extremely simple to use, and takes the form of a touch screen operated multimedia computer system that provides old photographs, video footage and music to help dementia sufferers remember the past and engage in conversation with their carers. "CIRCA plays on the strengths of people with dementia in recalling the past, while at the same time avoiding their difficulties in laying down new memories and remembering recent events, says Dr Arlene Astell of the University of St Andrews' School of Psychology, one of the researchers who helped to develop CIRCA, "The declining ability of people with dementia to hold normal conversations causes a lot of stress and frustration. We think that helping them access their memories will make living with dementia more bearable and less distressing for them and those involved in their care.

Dr Arlene Astell, University of St Andrews
Email: aja3@st-andrews.ac.uk

The CIRCA system provides old photographs, video footage and music to help dementia sufferers remember the past and engage in conversation with their carers.

Systems biology



Light micrograph of a section through a mature human bone. Photo: Innerspace imaging/science photo library

Revolutionising the way bioscientists think

In partnership with BBSRC, six Integrated Systems Biology Centres have been established. Three centres were announced in July 2005 to the Universities of Manchester and Newcastle and Imperial College. EPSRC has committed approximately £1m in addition to £6m from BBSRC to these centres.
A further three centres at the Universities of Edinburgh, Nottingham and Oxford will be supported in 2006.

Systems biology means revolutionising the way bioscientists think and work by enabling multidisciplinary research combining theory, computer modelling and experiments. Integrative systems biology will make the outputs of biological research more useful and easier to apply to policy makers and industry, as well as providing completely new ways of understanding biological processes.

LARCI

The Local Authority Research Council Initiative (LARCI) aims to encourage and facilitate knowledge exchange between the Research Councils and local authorities, leading to better informed research and policy.

LARCI is run by a steering group, comprising members from the Research Councils, central and local government, and facilitated by a part-time Research Coordinator. Current and future research, collaborative opportunities, and examples of best practice relevant to local authorities are communicated through a seminar series, a quarterly newsletter, e-mail bulletins and a website.

Seminars during 2005/06 included: Climate Change Research – Science into Action; Research for Education – Making a Difference; Delivering Transport Services – Evidence from Research and Best Practice.

SPARC

EPSRC and BBSRC are supporting a major network, SPARC, (Strategic Promotion of Ageing Research Capacity – see www.sparc.ac.uk) to build a broad community of researchers in ageing research by attracting new researchers to the field. SPARC is a bottom up endeavour, managed by Professor Peter Lansley, University of Reading and Dr Richard Faragher, University of Brighton, and its key focus is to improve the quality of life of older people.

Thirteen pump-priming awards were made this year ranging from chemical tools for ageing research to the technology needs of older drivers. A second round of small projects will be supported later in 2006. In total, SPARC expects to commit around £1m in small grants over its lifetime.

e-Science

e-Science refers to the science that is made possible when the resources held on computers at widely-dispersed locations are pooled via high speed networks. After five years, the UK e-Science Programme, one of the first coordinated national e-Science programmes in the world, is entering a new phase during which a national e-Infrastructure for research and innovation will be established. The emerging e-Infrastructure incorporates the networks, services and software needed to do e-Science.

The UK core e-Science Programme has appointed Professor Malcolm Atkinson to take up the new post of UK e-Science Envoy from 1st April 2006. In addition to conducting his own research portfolio the e-Science envoy will act as a champion of e-Science research and help strengthen the UK's links with e-Science research communities overseas. Professor Atkinson is the director of the National e-Science Centre (NeSC) and the e-Science Institute (eSI) in Edinburgh. The e-SI is the national UK centre and the meeting place for e-researchers and has successfully gained funding until 2011. It already responds to current issues and community needs by running a programme of workshops, lectures, conferences and tutorials with hands-on training. It aims to provide a focus for the e-Science community analogous to the role the Newton Institute plays for the mathematical sciences.

Also in 2005 the Open Middleware Infrastructure Institute (OMII) was expanded from its initial base at the University of Southampton to include the Universities of Edinburgh and Manchester. The OMII mission is to provide Grid software distributions of choice for application scientists and industry wishing to either establish a grid infrastructure and/or develop applications and services for a grid infrastructure, based on the key middleware outputs of the UK e-Science Programme.

In September 2005 the fourth e-Science 'All Hands' meeting in Nottingham showcased research successes resulting from the programme including: the first release of a working 'Virtual Observatory' for astronomers developed within the AstroGrid project; the development of a web services-based system that incorporates real-time weather forecast data into the SARIS, Search and Rescue Information System; and the use by a pharmaceutical company of an output of the DiscoveryNet project to speed up the process of drug discovery.

e-Science

The three funding phases of the EPSRC e-Science programme, which began in 2001, have focused on specific objectives that reflect the maturity of e-Science technologies. The first phase (£17m), which is now complete, supported six major pilot projects to develop generic e-Science technologies through specific applications. The second phase (£18m), which is on-going, is focusing on technology capture and transfer and the fundamental computer science needed to underpin e-Science. The third phase (£9m), which is just starting, is funding new projects to highlight the faster, better or different science that e-Science enables.

The first six pilot projects finished during this year. All have developed and demonstrated e-Science tools and secured further funding from industry, the DTI or the EPSRC.

DiscoveryNet and **myGrid** have developed workflows to enable researchers to cope with and make best use of the data deluge now engulfing them. myGrid has rapidly become the bioinformaticians's tool for extracting information and knowledge from the wealth of data now stored in databases all over the world, often in incompatible formats. The Taverna workflow software developed by the project has been downloaded more than 12,000 times for use in many fields. DiscoveryNet is enabling researchers to cope with the time-critical data generated by high throughput devices. Software developed under the project is being brought to the market by InforSense and DeltaDOT and is being used in the pharmaceutical industry, geohazard modelling and for systems biology research.

CombeChem has shown that Grid computing can transform the way in which chemistry is done, from the writing of a laboratory notebook to the publication of data and results. The National Crystallography Service has adopted its methods and other EPSRC-funded chemistry services are developing plans to do so.

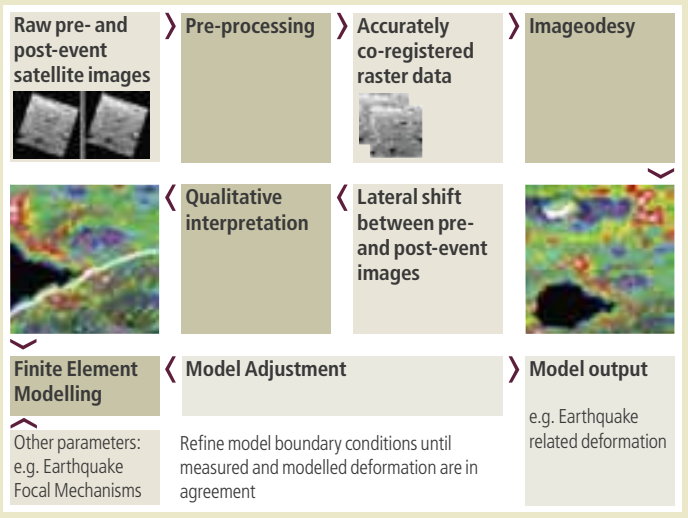
Reality Grid has developed Grid technologies to steer and view near real-time simulations of complex condensed matter systems, for example oil invading water-saturated rock or the development of a liquid crystalline gyroid phase. SPICE, an application of RealityGrid software, won major awards at Supercomputing 2005 and the International Supercomputing Conference 2006. The technologies are being taken up by several other leading-edge e-Science projects.

Geodise and **DAME** have developed tools for the engineer. Geodise enables design engineers to share knowledge by working in virtual organisations with access to widely distributed software, computing power and databases. The technology is being taken forward in real applications by several companies including Rolls-Royce, BAE Systems and Intel. DAME has demonstrated the use of Grid technologies to make sense of the vast amount of data returned by sensors on aircraft engines during flight. DAME technology is now being developed further by Rolls-Royce for use by real aircraft maintenance crews.

Two further pilot projects, **GOLD** and **Integrative Biology**, were funded under the second phase. **GOLD** has developed the basic architecture needed to set up a virtual organisation in the chemical process industry and **Integrative Biology** has demonstrated a prototype heart modelling infrastructure.

The second phase is also funding: best practise projects to transfer technology, key activities and middleware from one project to another; Computer Science for e-Science projects to investigate the fundamental computer science issues underpinning Grid architectures; and a number of joint activities with other research councils.

Three new pilot projects are about to begin under the third phase: **NanoCMOS** will develop a Grid-based infrastructure to meet the design challenges of nano-CMOS technologies; **CARMEN** will develop the use of e-Science technologies for neuroscience; and **PMESG**, Pervasive, Mobile, Environmental Sensor Grids, which the EPSRC is funding with the Department for Transport, will develop e-Science techniques for use in transport and environmental monitoring.



Above right: Using the CombeChem laboratory notebook.

Right: Discovery Net is comparing simulation of earthquake dynamics with measured surface deformations.

Think Crime

EPSRC's Think Crime initiative has funded 12 projects, six feasibility studies and two academic-user networks with a total value of £2.7m.

Basic Technology

The Research Councils' Basic Technology Research Programme, managed by EPSRC on behalf of all Research Councils, is concerned with building UK capability in technology research to underpin the next generation of tools, techniques and processes that will have a significant impact across science and will form the basis of the industries of the future. Basic technology research is fundamental, operating without Research Council constraints, and it challenges people to think beyond their own discipline with a focus on innovation.

The Basic Technology Programme has continued to make strategic investments to develop truly innovative, cutting edge technology. This research offers the prospect of making significant impact in the way that scientific advances will be made in the future. Success will undoubtedly bring the opportunity of changing the landscape of research knowledge and provide opportunities for commercial exploitation.

In July 2005 the Basic Technology Stakeholders Event was held to showcase the ground breaking research supported through the Basic Technology Programme and the potential impact it will have on the basic sciences in the longer term. In March 2006 twelve awards totalling £18m were made in response to the fifth call of this cross-council initiative.

Technologies for Crime Prevention and Detection

The Technologies for Crime Prevention and Detection programme aims to support technologies that will help achieve a safe urban environment, improve security of people and property, provide proof and protection of identity and aid forensic science and crime detection.

EPSRC's 'Think Crime' initiative includes the areas of understanding motivation, perception and risk, creating environments to reduce opportunities for crime and terrorism, increasing the security of people and property, ethics and civil liberties, designing more secure products, aiding detection, effective response, culture and security, and international comparisons. In 2005/06 the fourth call for the 'Think Crime' initiative has funded 12 projects, six feasibility studies and two academic-user networks with a total value of £2.7m.

In March 2006 Andy Burnham MP, then Parliamentary Under-Secretary of State for Immigration, Citizenship and Nationality gave a keynote address at the EPSRC Crime Prevention and Detection Technologies Event: Forensic Science. The showcase focused on promising research into technologies for the detection of substances of interest to the police in preventing and detecting crime, from DNA to explosives.

EPSRC will continue to invest in developing research areas that contribute to enhanced security and reduce opportunities for crime and terrorism by maintaining its 'Think Crime' initiative. We are also committed to improving our understanding of the social and cultural context in which new technologies need to be developed through close collaboration with stakeholder organisations and the Home Office.

Take Heed

Learning from the World Trade Centre disaster is the aim of a new project. Researchers at the Universities of Greenwich, Ulster and Liverpool will be gathering information from WTC disaster survivors through interviews and questionnaires and using this data to develop the High-rise Evacuation Evaluation Database – HEED. This information will be the basis for improvements to behaviour and evacuation models and will help to shape future building codes and standards, building design and management procedures.

Professor Ed Galea
Email: e.r.galea@gre.ac.uk

Descent: Researchers are simulating the evacuation of the WTC so that lessons can be learnt.

Net defence

HACK ATTACK: a new analysis system may help track down hackers and cyber criminals.

Cyber crime under attack

A new approach to studying internet attacks will help to tackle hackers and cyber criminals. Gathering information on real attacks is difficult – one solution is to place special machines within a network that record any attacks.

However, much of the large amount of data generated relates to known automated attacks rather than new hackers or criminals. EPSRC-funded researchers at Loughborough University aim to develop advanced data analysis systems which can identify data that is likely to relate to human attackers and pass this on for more detailed investigation.

Professor David Parish, Loughborough University
Email: d.j.parish@lboro.ac.uk

Support for research facilities

As part of the EPSRC vision for improving the international quality of engineering and physical sciences in the UK, EPSRC is working with Government, CCLRC and others to ensure that engineering and physical sciences researchers have access to the best facilities.

High performance computing

There are currently two national high performance computing services. The CSAR service, located at the University of Manchester, started in 1998 and is planned to finish on 30th June 2006 with a total expenditure of £30m. The HPCx service, located at Daresbury Laboratory, started in 2002 and is planned to finish in 2008 with a total expenditure of £55m.

The procurement of the next generation high end computing service, HECToR, has begun. EPSRC is procuring the service on behalf of BBSRC, EPSRC and NERC with a target start date of the service of April 2007. The service will provide an order of magnitude increase in performance and include a substantial investment in computational science and engineering support.

SuperSTEM

The SuperSTEM facility based at CCLRC Daresbury Laboratory provides a world-class aberration-corrected Scanning, Tunnelling and Electron-Microscopy service for the UK academic community. The facility is suitable for the investigation of a wide range of material types, with emphasis on high-end samples which have been pre-processed by the investigator.

The facility is operated by a consortium comprising the Universities of Liverpool, Leeds and Glasgow. The facility was built from new in 2002 with funding from the North West Science Initiative. In addition to the service offered to EPSRC grant-holders under a new facility grant operating from August 2006, the instrument team's activities include a strong element of technique development to maintain its leading-edge position.

Dehydration can impede mental and physical performance. A scanner was loaned to a doctor who carried out thermal imaging at the TT races to show riders how they can get dehydrated during racing.

III-V Research

The EPSRC National Centre for III-V Technologies at Sheffield provides direct collaborative access to a comprehensive range of unique III-V research and development facilities. It is the main provider of III-V semiconductor materials for the UK academic community, supplying a wide range of epitaxial layers and a comprehensive range of prototype device fabrication services. In March 2006, the EPSRC renewed the National Centre for III-V Technologies for a further four years with £4.6m to fund the core of its activities in molecular beam epitaxy, metalorganic vapour phase epitaxy, and device fabrication.

Ion Beam Centre

The Ion Beam Centre, based at Surrey University, aims to promote and facilitate world class research in the field of ion beam applications for the UK academic and industrial communities. It provides resources for ion implantation; ion beam analysis; and processing and measurement of samples for EPSRC grant holders and industrial collaborators. In February 2006, EPSRC renewed the Surrey Ion Beam Centre grant for a further four years with £2.2m to fund the core of its activities and to underpin the development of new beam lines and metrology systems.

20th anniversary for instrument pool

2005 was the 20th anniversary of the Engineering instrument pool, funded by EPSRC and provided by staff at CCLRC. The pool provides an invaluable service making high specification instruments available to academics for short periods of time, free of charge. With an annual cost of £400k, the pool provides a wide range of instruments to a large number of universities in a cost effective manner ensuring maximum usage of the instruments (see: www.eip.rl.ac.uk).

Between February 2005 and June 2006 the pool purchased ten new instruments worth over £1m following a call made in 2004 to the academic community. These are high cost, high specification instruments including two particle imaging velocimeters, called PIVs, which can be used for particle sizing, investigating surface coatings and measurements in flows. The instruments purchased are:

- Vector Network Analyser;
- High resolution PIV;
- Imacon 200;
- High speed PIV system;
- Photon counting system;
- Micro Raman System;
- Tri-axis Scanning Laser Vibrometer;
- Atomic Force Microscope;
- Laser Scanning Confocal microscope;
- XYRIS Surface Profiler.

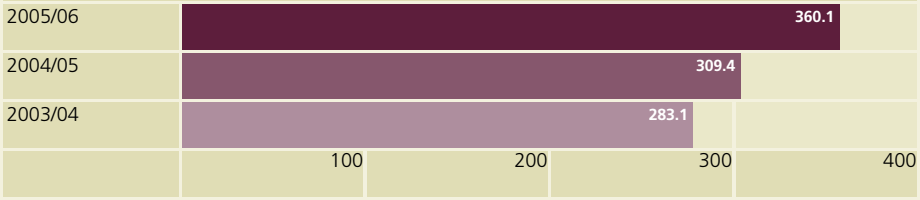
Net research grant expenditure by programme (£m)

Programme	2003/04	2004/05	2005/06
Chemistry	28.4	30.7	37.8
Engineering	41.9	47.8	63.8
Information and Communications Technologies	56.4	49.6	52.1
Infrastructure and Environment	17.5	21.0	21.5
Innovative Maufacturing	26.1	21.0	24.8
Life Sciences Interface	10.6	12.7	15.1
Materials	32.5	32.1	38.3
Mathematical Sciences	7.6	8.7	10.0
Physics	25.3	24.3	31.1
Public Engagement	2.2	1.8	2.9
Total	**248.5**	**249.7**	**297.4**
Joint Programmes with Other Research Councils			
Core e-Science	6.2	13.1	10.3
Basic Technology	8.6	16.1	22.2
Total	**14.8**	**29.2**	**32.5**
Other Activities			
Fusion	15.6	18.7	15.9
Other activities (also includes Crime Prevention, Stem Cells, Brain Science)	4.2	11.8	14.2
Total	**19.83**	**30.49**	**30.1**
Grand Total	**283.1**	**309.4**	**360.1**

£360.1m

Our net research grant expenditure in 2005/06 was £360.1m

Net research grant expenditure (£m)

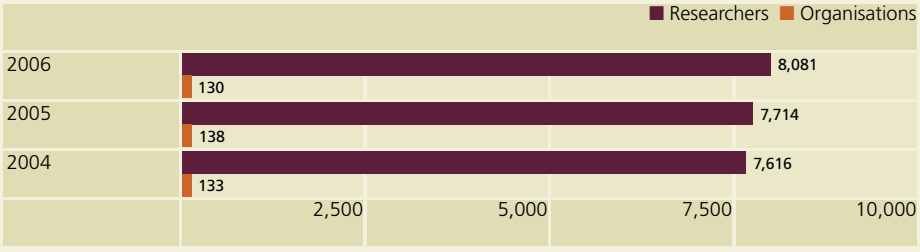


In the above table grant expenditure is shown on a net basis (i.e. after deducting receipts). The Annual Accounts show grant expenditure on a gross basis (i.e. before deducting receipts).

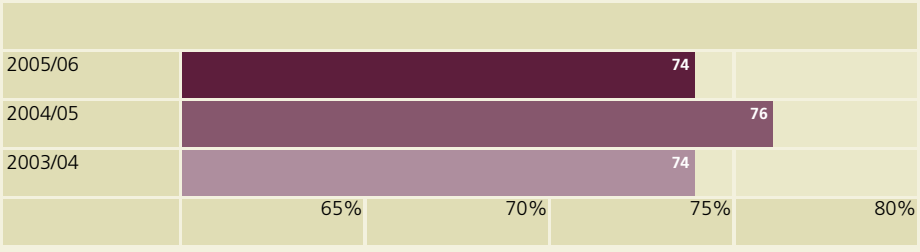
Total number of researchers and organisations with current funding on 31st March each year

3,668

The research grants announced in 2005/06 funded 3668 researchers in 108 organisations



Trends in final reports achieving the highest approval rating* (%)

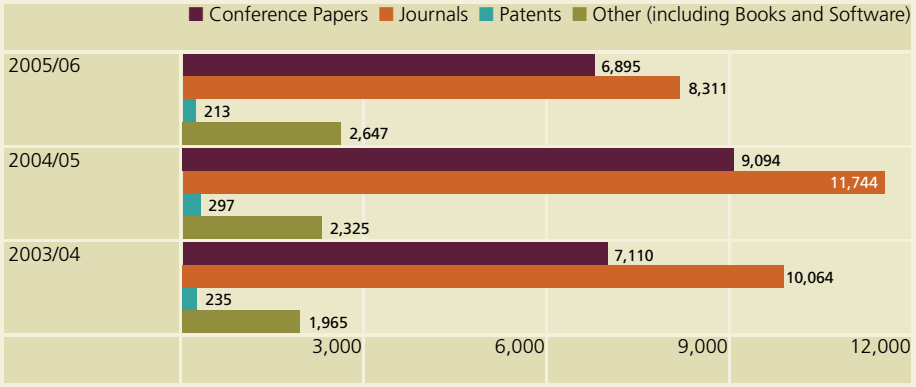


*Tending to Outstanding and Outstanding
A final report is required to be produced at the end of every grant. The report is then peer reviewed and graded.

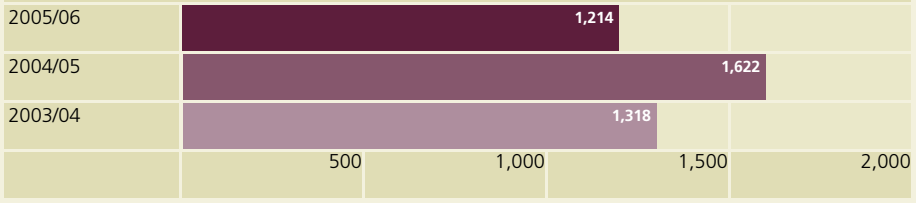
18,066

18,066 publications were reported in 2005/06

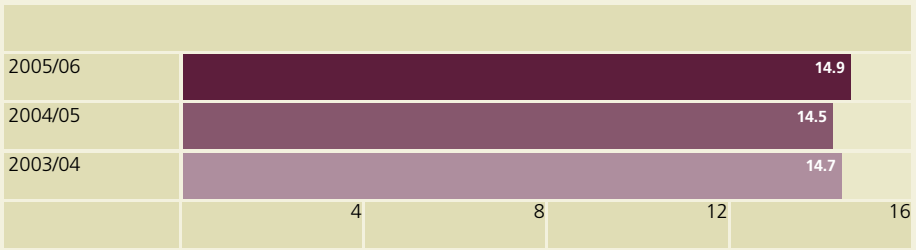
Trends in Publications



Number of Final Reports received reporting publications

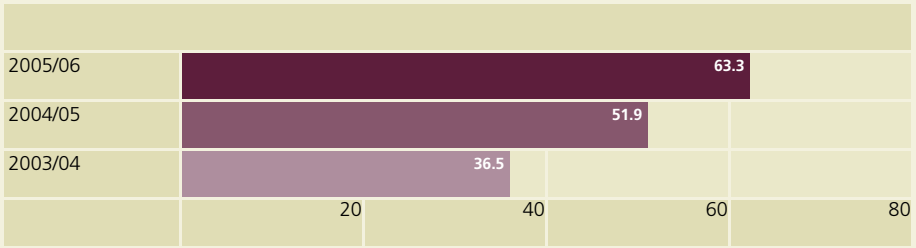


Average number of publications per Final Report

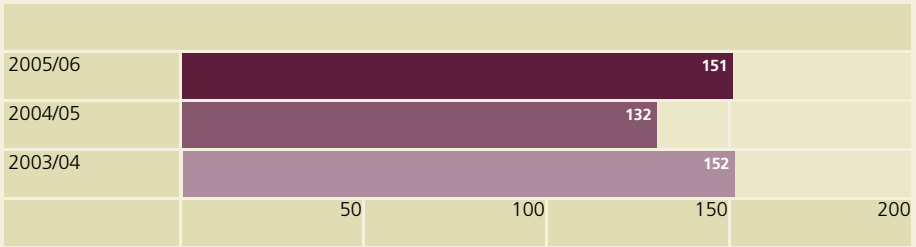


Researchers are asked via the Final Report to indicate total numbers for the following types of publications: Conference Papers, Journals, Patents, Books and Software.

Trends in equipment investment – Capital Grants (£m)



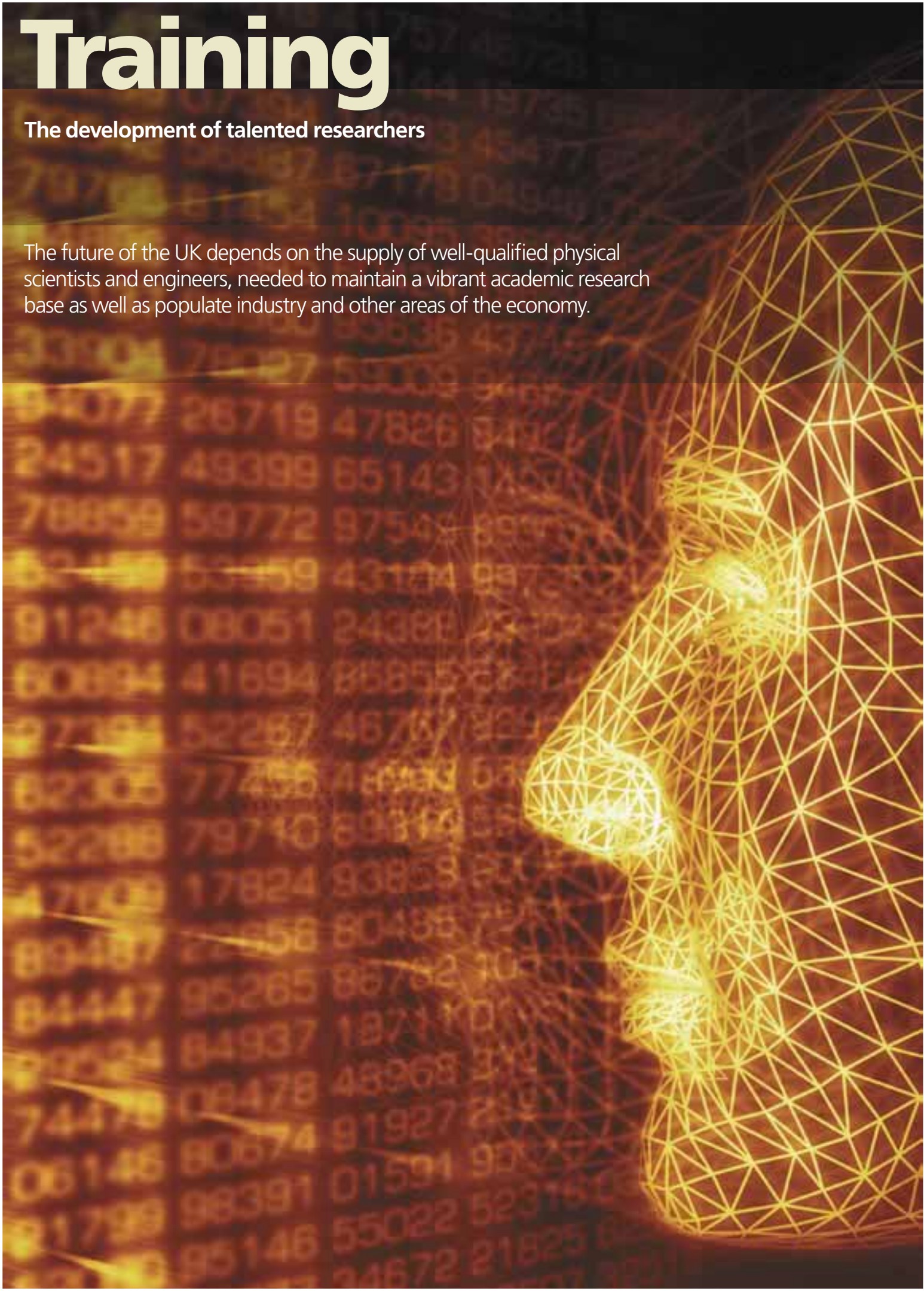
Number of First Grant Scheme research grants announced



Training

The development of talented researchers

The future of the UK depends on the supply of well-qualified physical scientists and engineers, needed to maintain a vibrant academic research base as well as populate industry and other areas of the economy.



» £73.5m During 2005/06 DTAs amounting to some £73.5m were announced. Estimated student starts for 2005/06: 1,230.

The year in context

April 2005 – March 2006

EPSRC is committed to ensuring access to research careers by the most highly skilled individuals, both within the UK and from overseas, irrespective of background and gender. Over the 10-year period of the Government's Science and Innovation Investment Framework, EPSRC will provide increasing opportunities for talented researchers to devote more of their time to research. To provide the right opportunities a key activity in 2005/06 was the development of the EPSRC Postgraduate Training Strategy. The strategy went to consultation with our research community concluding in January 2006 and, on the whole, the community were broadly supportive.

The key tenets of EPSRC's Postgraduate Training Strategy are:

1. To play a proportionate role in ensuring the UK has sufficient numbers of students with postgraduate level research skills in engineering and the physical sciences to meet future needs in the UK;
2. To create a market for EPSRC-sponsored training that is able to respond to changes in demand in line with future requirements in the UK;
3. To produce postgraduates that meet the needs of employers.

The future success of the UK R&D base is dependent upon an adequate supply of high quality students who want to take up research training. To address this we will seek to:

- Stimulate student demand, for example, through the introduction of research internships for undergraduates;
- Increase the availability of placements in high quality research teams and international assignments;
- Encourage further use of enhanced stipends where financial barriers exist.

Boosting the domestic supply of students entering postgraduate studies in science, engineering and technology depends upon successful policies for widening participation from women and ethnic groups, and increasing the attractiveness of research careers.

A key new activity developed as a result of the Postgraduate Training Strategy is the EPSRC Vacation Bursaries Programme to be implemented in 2006. These Bursaries aim to provide a mechanism to encourage more of the most able undergraduate students to consider a career in research by providing funding for them to gain first-hand experience of research in a UK university.

The emphasis will be on employing the most able students, but the programme will be given further direction by steering universities towards using the funds to engage students in research that:

- Falls within the identified 'Roberts' shortage areas' i.e. Statistics and Operational Research, ICT, Engineering and Materials;
- Is being carried out by internationally leading groups e.g. groups that hold EPSRC Portfolio Partnerships, Platform or IRC grants;
- Has strong industrial links.

On 1st April 2005 the RCUK Research Careers and Diversity Unit was launched. This is hosted by EPSRC. The work of the unit is to build on and extend existing cross-Council working fostered by the Postgraduate Training Group. A key role of the unit will be to report back to Government on the impact of the funding provided in response to the SET for Success (Roberts') Review and continue to take forward the recommendations of the review that relate to researchers from PhD to their first academic posts.

Training for the future

EPSRC support for postgraduate training is largely delivered through the Doctoral Training Awards (DTAs) and Collaborative Training Accounts (CTAs). The DTAs are awarded on an algorithm basis related to the research grant income provided by EPSRC. Flexibilities are in place within DTAs to enable the average length of PhD to be 3.5 years. Encouragement is given to HEIs converting a proportion of the awards to 'CASE' through collaboration with users. Currently some 40% of the total postgraduate training portfolio is collaborative.

In 2006/07, an evaluation of the DTAs will be carried out to identify the effectiveness and impact of this funding mechanism. This will help to assess the quality of research training being provided and the level of engagement with industry and the responsiveness to skills demand, to feed into strategic decisions on future allocations.

Following the success of the pilot in 2004, the Dorothy Hodgkin postgraduate awards have been extended and expanded, with EPSRC providing £2.25m in 2005. The scheme is designed to bring outstanding students from India, China, Hong Kong, South Africa, Brazil and the developing world to come and study for PhDs in leading UK research facilities and is co-funded by the Research Councils and by private sector organisations (www.rcuk.ac.uk/hodgkin). One hundred and sixty awards were made in 2005.

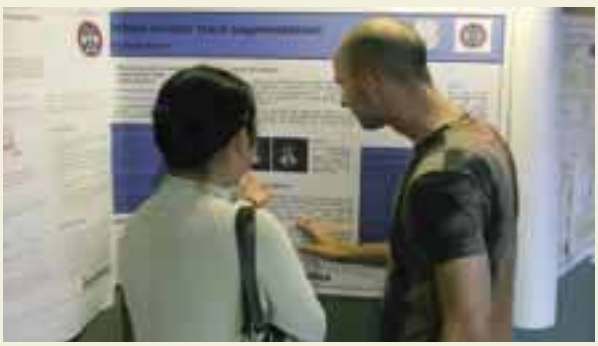
Workshop

Building links

The first annual workshop for students of the Life Science Interface (LSI) Programme's Doctoral Training Centres (DTCs) was held in Birmingham on 5-6th September 2006. These DTCs, funded in partnership with other EPSRC Programmes, BBSRC and MRC, offer students the opportunity to cross disciplinary boundaries and apply advanced physical science techniques to problems in biology and medicine. All DTC students in their second or third year were invited, and a major aim of the workshop was to give the students the chance to network and build links across the DTCs.

An introductory talk about the philosophy behind the DTCs and the importance of multidisciplinary training both to individuals and to the UK research community was followed by a lively poster session. In the next session students were formed into cross-DTC focus groups and asked to consider how EPSRC should review all aspects of the DTCs to date. Expert advice on the financial dimensions and day-to-day running of a DTC was available. The outputs from this session are being used to inform the review framework of the DTCs.

The final session was all about science communication. Students were asked to consider how best to describe their research for a non-expert audience and produced 2-minute TV and radio presentations which provided a dynamic end to the workshop.



Fellowships

In 2005/06 we awarded six Senior Research Fellowships to outstanding academic scientists and engineers to enable them to devote themselves full-time to personal research for up to five years.

We also awarded 49 Advanced Research Fellowships (ARFs) to outstanding researchers at an earlier stage in their career. They are expected to establish an independent research career of international standing by the end of the award. An evaluation of the ARF scheme is currently underway and the report is expected to be published in September 2006.

Postdoctoral Research Fellowships (PDRFs) have been awarded in a number of programmes including five in theoretical physics and ten in mathematics. Ten awards were also made in engineering, jointly with the Royal Academy of Engineering, and eleven overseas postdoctoral research fellowships were awarded at the interface with the life sciences.

Academic Fellowships is an Office of Science and Innovation scheme (www.rcukac.uk/acfellow), which was introduced to help researchers on temporary contracts attain permanent contracts. The EPSRC is leading the administration of the scheme for RCUK. A total of 89 higher education institutes applied for 972 RCUK Academic Fellowships in the second round of the scheme. An expert panel, covering the remit of all eight Research Councils, has awarded 400 RCUK Academic Fellowships to 73 institutions, to start in the next two academic years.

Dr Chris Hooley.

Aiming for leaps in quantum theory

Thanks to his Advanced Research Fellowship award, Dr Chris Hooley of the School of Physics and Astronomy at the University of St Andrews, is able to spend his working hours just where he'd like to be – at his desk and at his computer, working to understand the properties of quantum systems in their non-equilibrium states. By studying things like quantum dots, ultracold atoms in electromagnetic traps, and unusual low temperature crystals, he's hoping to shed light on the more general organising principles that apply in quantum systems.

"It's hard to predict what practical application this research will have," he admits. "But a fairly safe bet is that some of it will be important for the future development of computing. I also hope that the insights I gain will provide new perspectives on equilibrium systems, such as high temperature superconductors, which continue to puzzle solid state physicists."

But while the potential applications of his research remain uncertain, the advantages of his award are crystal clear. "The Advanced Research Fellowship is buying me time from teaching so I can concentrate on my research and develop essential collaborations," he says. "And when it comes to conferences, I can now choose where to go on the grounds of academic worth – rather than location."

Dr Chris Hooley,
University of St Andrews
Email: christopher.hooley@st andrews.ac.uk

Taking giant steps towards tiny machines

Advanced molecular motors and machines are set to move one step closer to reality – thanks to pioneering research being carried out by Senior Research Fellow Professor David Leigh of the School of Chemistry at the University of Edinburgh.

In previous EPSRC-funded research Professor Leigh and his colleagues built molecules that can move objects larger than the size of an atom, and then used ultra violet light to stimulate the molecules to propel small droplets of liquid up 12 degree slopes against the force of gravity. It may sound like small achievement, but it's actually equivalent to using tiny movements in a conventional machine to raise objects higher than a kilometre, or nearly twice the height of the world's tallest structure, the 553 metre tall CN Tower in Toronto.

Now, thanks to an EPSRC Senior Research Fellowship, Professor Leigh will be able to devote himself full-time to reaching new heights of understanding. And he hopes to be able to take further significant steps towards the development of artificial muscles that take advantage of molecular or nanomachines to help perform physical tasks.

"Nature uses molecules as motors and machines in all kinds of biological and chemical processes," explains Professor Leigh. "Our understanding of how to build and control molecular machines is still at an early stage. My Senior Research Fellowship is providing a wonderful opportunity to further a type of nanoscale science and engineering that could have a real life enhancing impact on society."

Professor David Leigh,
University of Edinburgh
Email: david.leigh@ed.ac.uk

Professor David Leigh.

'My Senior Research Fellowship is providing a wonderful opportunity to further a type of nanoscale science and engineering that could have a real life enhancing impact on society.'

Professor David Leigh

» £11.3m Following a call for Doctoral Training Centres in Systems Biology in 2005 three new awards totalling £11.3m have been made to the Universities of Manchester (£4m), Oxford (£3.9m) and Warwick (£3.4m).

Engineering doctoral centres

The Engineering Doctorate (EngD) scheme, established in 1992, is EPSRC's flagship postgraduate training programme. The EngD is a work-based alternative to the traditional PhD, where students (known as research engineers) spend around three-quarters of their time working with their collaborating company. Industry partners have a key role in designing the projects undertaken, in sponsorship and joint supervision.

There are currently 21 EngD centres, now supported through EPSRC's Collaborative Training Accounts, of which three started in 2005: Nondestructive Evaluation at Imperial College and Bristol, Systems Engineering at Loughborough University and Systems Engineering at Bristol and Bath. A further EngD centre in Nuclear Engineering research is due to commence in October 2006. The Engineering Doctorate Centres are currently being reviewed to ensure that the scheme continues to address the needs of industry and students. The outcome of the review will be known in May 2006.

A further three EngD Centres have been formed by the research community making use of the flexibility that exists under existing Collaborative Training Accounts: Micro – and NanoMaterials and Technologies (MiNMaT) at Surrey; Molecular Modelling and Materials Simulation and Environmental Engineering Science, both at University College London.

Postgraduate training

Service beneath the canvas

Many of our greatest art treasures are inscribed on a versatile yet vulnerable material; canvas. An analytical technique familiar to engineers working in the aerospace industry is now helping to shed light on the best way to preserve valuable paintings and panels.

Dr Christina Young, a physicist in the Department of Conservation and Technology at the Courtauld Institute of Art in London, and her PhD student, Manjit Debashis, are working to understand how the surface of a canvas deforms – or moves – under tension or due to changes in the natural environment. As part of an EPSRC research project the pair are using Electronic Speckle Pattern Interferometry (ESPI), an optical technique often used by aerospace and automotive engineers. ESPI relies on measurements of the scattering of laser light to measure tiny deformations – or changes in shape in the submicron range – of the surface. These data can then be processed to determine the amount and distribution of strain the canvas is subjected to. The resulting strain maps give valuable clues as to how a piece of artwork might be safely repaired or reinforced.

With A levels in both physics and art, a degree in physics, an MSc and industry experience in applied optics and a PhD in mechanical engineering from Imperial College London, where she worked on the biaxial tensile testing of canvas, Dr Young's interests and academic background means she's well placed to take on the challenge. And it's clearly one she relishes. "It's wonderful work because each painting represents a unique problem," she says. "It's fantastic to be in contact with the paintings all the time. I've been involved in developing non-destructive testing methods through my work at the Tate, Imperial College and the National Gallery, and as I've moved from one institution to another, the work has moved with me. Now we have a unique facility at the Courtauld with biaxial tensile and non-destructive optical testing. There's never a boring day!"

Engineering research funding

Focus on funding

Challenging Engineering is a new activity specifically focused on providing funding and developmental support for engineering researchers at an early stage in their careers. This activity resulted from the recommendations in the 2004 International Review of Engineering. In June 2005 £2.6m went to six outstanding individuals in the area of 'Sensors in Extreme Environments'. A second call in the area of engineering and its interfaces with the fundamental sciences, including social sciences, had a closing date in March 2006.

A workshop 'Engineering the Future' was held in September 2005 with the key aims of enhancing researchers' creative thinking and improving their interactions with EPSRC.

Sixty researchers attended the event and were given access to training and experiences not usually available to them. Participants were given tools and techniques in problem solving using creative teamwork which they then used to address issues such as how to get involved with and influence EPSRC, and thinking about career goals, identifying barriers and how to overcome them. An interview on career development was also held with Professor Elaine Martin from the University of Newcastle who talked about her career path, experiences, skills and future aspirations.

Feedback from the event was positive and attendees are developing a proposal to establish a Challenging Engineering Network.

Students/researcher details on Je-S (Joint electronic Submission)

EPSRC has greatly developed its facilities for capturing personal, project and funding information on research students recruited by research organisations to Doctoral Training Grants (DTGs) and Collaborative Training Grants (CTGs). The Je-S capability was expanded to include RCUK Academic Fellows (which EPSRC manages on behalf of all the research councils), plus Research Assistants Industrial Secondments (RAIS) and Knowledge Transfer Partnerships (KTP) appointed on CTGs. The receipt by EPSRC of the first-ever Je-S-compliant Financial Expenditure Statements (FES) and the creation of new online facilities for research organisations to update their current studentship records were the other major innovations in the year. Finally, EPSRC started work in partnership with RCUK to investigate the possibility of syndicating the studentship data collection capabilities on Je-S to all the studentship-awarding research councils.

'As a result (of the EngD) you do not only innovate but you are also able to implement that innovation.'

Student perspective – Review of the Engineering Doctorate Programme 2006

Springboard Fellowships

Springboard Fellowships provide short-term support to enable researchers in the mathematical sciences, who are permanent employees of an eligible research organisation, to work:

- At the interface with another discipline;
- With business or industry;
- On a particularly innovative project or a short-term feasibility study.

The aim of these awards is to provide opportunities for researchers to take time out from their normal activities in order to develop their careers in new directions and to expose them to new ways of working, with the fellowship acting as a 'springboard' for their future research. In 2005/06 three Springboard Fellowships were awarded.

Doctoral training centres

Four new Doctoral training centres were awarded at the life sciences interface, three in systems biology and one in targeted therapeutics which is based at the University of Nottingham's School of Pharmacy, in partnership with the pharmaceutical company AstraZeneca. This is the first time EPSRC has partnered with industry to establish a DTC.

The centres, funded in partnership with BBSRC and MRC, offer students the opportunity to cross disciplinary boundaries and apply advanced physical science techniques to problems in biology and medicine.

Pilot Vacation Bursary

The purpose of the Vacation Bursary Programme is to provide funding for undergraduate students to gain first-hand practical experience of research in a UK university. The emphasis is on employing the most able students to encourage them to consider a career in research in the future.

EPSRC has invited a number of pre-selected universities to take part in a pilot which will take place during the summer of 2006. Funding will be made available to support up to 150 students in total. These students will be engaged in research projects that: fall within the identified 'Robert's Shortage Areas'; is being carried out by internationally leading groups or that has strong industrial links, and it is intended that the programme should be accessible to underrepresented groups.

EPSRC will be monitoring and evaluating the pilot with a view to extending it in the future.

Net training expenditure (£m)

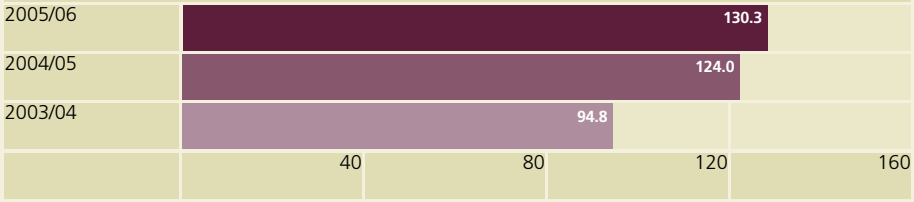
	2003/04	2004/05	2005/06
Doctoral Training Grants/Accounts	61.6	69.0	73.3
Life Sciences Interface Doctoral Training Centres	0.9	2.0	3.4
Industrial Case Training Grants	8.7	7.9	6.7
Collaborative Training Grants/Accounts	22.8	39.0	37.7
Graduate Schools	0.8	1.9	0.9
International Doctoral Scholarships	–	0.4	0.9
Dorothy Hodgkin Awards (EPSRC only)	–	0.1	0.5
Roberts Skills Payments*	–	3.7	6.9
Total	**94.8**	**124.0**	**130.3**

In the above table training expenditure is shown on a net basis (i.e. after deducting receipts)
The Annual Accounts show training expenditure on a gross basis (i.e. before deducting receipts)

£130.3m

Our total training expenditure in 2005/06 was £130.3m

Net training expenditure (£m)

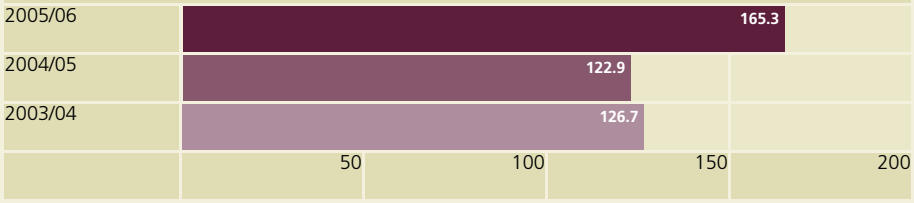


Training commitment (£m)

	2003/04	2004/05	2005/06
Doctoral Training Grants/Accounts	63.0	72.0	75.7
Industrial Case Training Grants/Accounts*	14.3	6.7	–
Collaborative Training Awards	49.4	40.3	87.4
CASE for New Academic Appointees	–	2.4	–
Dorothy Hodgkin Awards (EPSRC only)	–	1.5	2.2
Total	**126.7**	**122.9**	**165.3**
Academic Fellowships (All Research Councils)	–	49.8	–

*In addition, a further £8.6m relating to Industrial CASE 2004/05 was committed in May 2005.
Academic Fellowships are administered on behalf of all Research Councils.
Commitment is made on a biennial basis.

Training Commitment (£m)



Estimated number of Studentships supported by EPSRC programmes at 31st March 2004, 2005 and 2006

	Doctoral Students[1,3]			Project Students[2]		
	2004 (est'd)	**2005** (est'd)	**2006** (est'd)	**2004**	**2005**	**2006**
e-Science	–	–	–	32	32	24
Basic Technology	–	–	–	55	67	44
Total	**–**	**–**	**–**	**87**	**99**	**68**
All Engineering Programmes	850	796	784	429	472	385
Mathematical Sciences	596	541	507	41	38	40
Physics	446	425	421	117	147	116
Chemistry	930	783	726	264	257	265
Materials	635	619	620	189	208	176
Information and Communications Technologies	699	685	672	231	279	291
Life Sciences Interface	64	132	187	7	6	3
International Studentships[4]	–	39	79	–	–	–
IDEAS Factory	–	–	–	–	–	6
Other Activities[5]	2	11	31	7	4	48
Total	**4,222**	**4,031**	**4,027**	**1,285**	**1,411**	**1,330**
Grand Total	**4,222**	**4,031**	**4,027**	**1,372**	**1,510**	**1,398**
Number of organisations with funding from Collaborative Training Accounts	–	–	86			
Number of organisations with funding from Doctoral Training Accounts	–	–	83			
Number of Institutions with Studentship support[6]	–	–	93			

EPSRC administers the Core e-Science and Basic Technology programmes on behalf of RCUK.

1 In October 2001 EPSRC introduced Doctoral Training Grants to Universities to replace individual studentships. Exact student numbers for each EPSRC programme cannot be given under this system. In order to preserve continuity with previous data an estimate for the number of 2004, 2005 and 2006 starts based on the funds allocated by each programme has been used.

2 Project studentship posts are at doctoral level and supported through research grants. In previous Annual Reports there has been an under reporting on Project Student numbers due to the way the data was compiled.

3 EPSRC monitors the incidence of collaborative doctoral studentships – typically between 10-15% of standard DTA studentships are converted per annum. This is in addition to the specific collaborative schemes shown below.

4 EPSRC acts as a scheme sponsor (39 students in 2004 and 40 in 2005) and administers the Dorothy Hodgkin Postgraduate Award Scheme on behalf of OSI. In addition during 2004 the International Doctoral Scholarship scheme was introduced to allow leading research teams to recruit students from anywhere in the world. Universities with EPSRC supported Portfolio Partnerships or Interdisciplinary Research Collaborations (IRCs) have been given the flexibility to transfer up to 10% of their Doctoral Training Grants into the new scheme. In 2004 seven and in 2005 eleven universities took advantage of the scheme, and funding to support around 20 students in 2004 and 33 students in 2005 was provided.

5 Other Activities includes, Crime Prevention, Partnerships for Public Engagement and High Performance Computing. ESRF/ILL funding was discontinued in 2003.

6 As institutions may receive funding for both Collaborative Training Accounts and Doctoral Training Accounts this figure reflects the total number of organisations that have received funding from either or both schemes.

7,113

We supported an estimated 7,113 postgraduate students during 2005/06

Estimated number of PhD students supported by Collaborative Schemes as at 31st March 2004, 2005, 2006

	2004	**2005**	**2006**
Engineering Doctorate	493	556	604
Industrial Case Training Grants	821	951	898
Case for New Academic Appointees	225	265	254
Total	**1,539**	**1,772**	**1,756**

1 As a result of introducing Collaborative Training Accounts (CTA), data concerning masters students and courses is currently not available. As the CTA mechanism develops, more data will become available.

2 All the above schemes are now delivered through Collaborative Training Accounts. Appointments are based on training awards of 3 years duration.

292

292 Fellowships were current in 2005/06

EPSRC Fellowships current at 31st March 2002, 2003, 2004, 2005 and 2006 [6]

				Calendar year	
Current Fellowships	**2002**	**2003**	**2004**	**2005**	**2006**
Postdoctoral [1,7]	23	30	32	32	33
Overseas Postdoctoral [2]	–	–	–	7	9
Springboard [3]	–	–	–	–	6
Advanced	169	185	186	198	219
Senior	17	15	16	14	18
Senior Media [4]	–	1	2	4	3
EURYI [5]	–	–	–	2	4
Total	**209**	**231**	**236**	**257**	**292**

1 Postdoctoral Fellowships are supported only by the Mathematical Sciences and Physics programmes.
2 Overseas Postdoctoral Fellowships support research in appropriate physical sciences and engineering disciplines outreaching to the Life Sciences. Fellows spend up to half of their 3 year Fellowships working in overseas laboratories.
3 Springboard Fellowships provide short-term support (12 months in duration) to enable researchers in the mathematical sciences to work at the interface with another discipline, with business or industry or on an innovative project.
4 EPSRC awards Senior Media Fellowships through its Public Engagement Programme.
5 The European Young Investigator (EURYI) Awards Programme is a European scheme that EPSRC makes a financial contribution to (in 2004/05 EPSRC contributed 360k Euros and 2005/06 EPSRC contributed 720k Euros). Funds are awarded from a central resource comprising contributions from 20 participating organisations across Europe. From 2006/07 EPSRC will no longer be a participating organisation in this scheme, however the annual contribution will be continued until 2010/11.
6 In addition to the activities shown in the table, EPSRC is involved with the following fellowship schemes:
- Administering the Academic Fellowships Scheme on behalf of RCUK;
- Helping in the administration of Engineering Postdoctoral Fellowships in collaboration with the Royal Academy of Engineering;
- Contributing to Royal Society Industrial Fellowships (£200k per annum);
- Contributing to the Daphne Jackson Memorial Fellowship Trust (up to £35k per annum).

7 An adjustment has been made to the number of Postdoctoral Fellowships in 2005, from 42 to 32. This reduces the total to 257 from the quoted 267 in the 2004/05 Annual Report.

PhD students first employment destination

As a result of introducing Collaborative Training Accounts, data concerning first destinations of masters students is currently not available. As the CTA mechanism develops, more data will become available.

		Finishers in Academic Year	
PhD students First employment destination	**2001/02**	**2002/03**	**2003/04**
Private Sector Industry & Commerce	301	327	291
Government/other public sector	53	73	69
Teacher training	28	30	30
Permanent academic appointment	58	57	63
Fixed term academic appointment	274	278	286
Further training	39	20	24
Other employment	48	13	10
Not employed [1]	292	214	217
Total	**1,093**	**1,012**	**990**

1 As a result of a change in the data collection method, we are now able to subdivide the 'not employed' category. For example within the 2002/03 finishers, the number actively 'looking for employment, further study or training', was 72 and in the 2003/04 finishers 59.
In previous Annual Reports 'not knowns' were also shown. These have been removed from the table above.

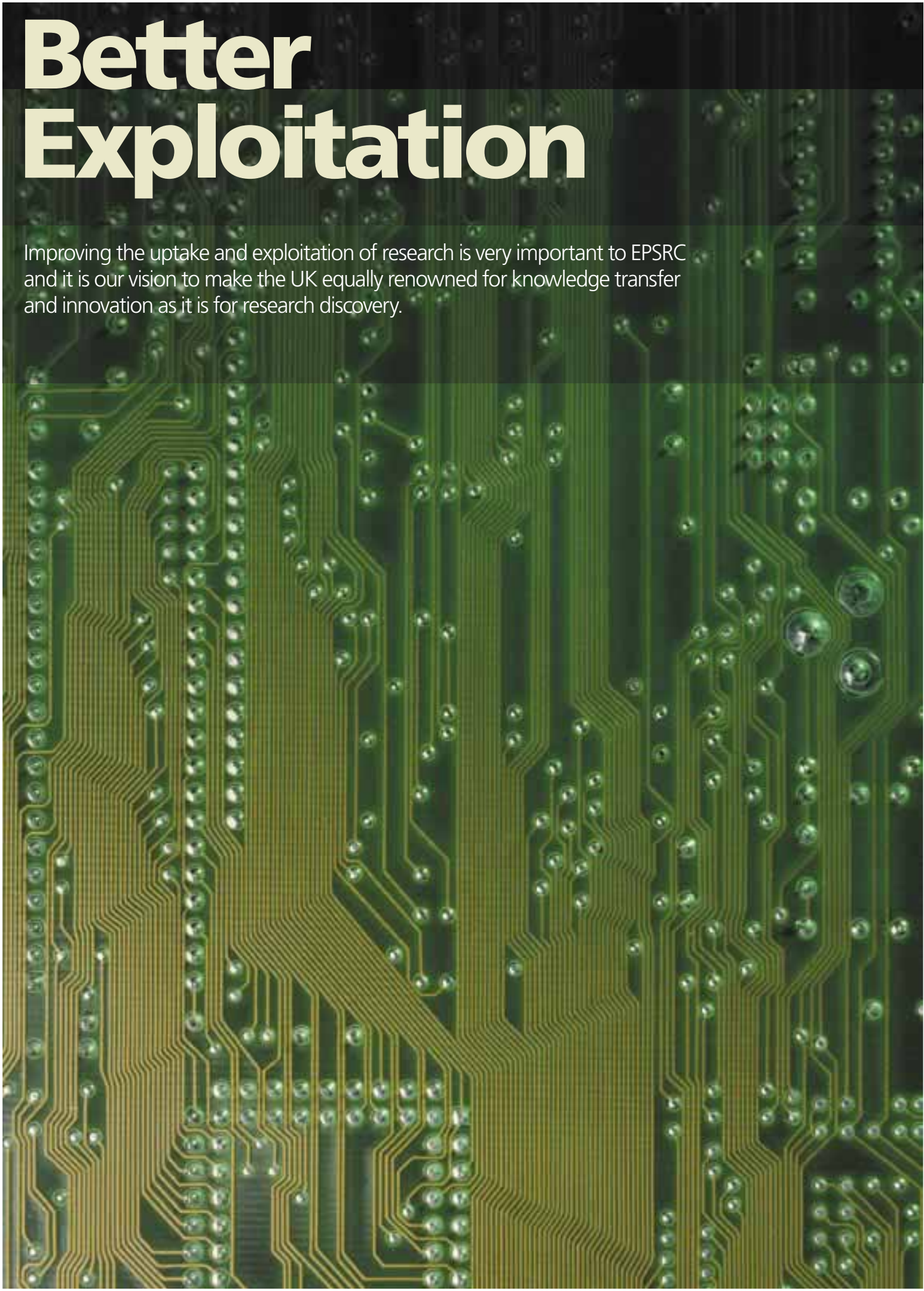
PhD completion rates (%)

			Survey year
PhD Submission Rates	**2002**	**2003**	**2004**
Within 4 years	73%	77%	72%
Within 5 years	78%	79%	85%
Within 6 years	78%	79%	80%

1 Figures exclude those where the results were not known to EPSRC.
2 For the 2002 Survey, a sample adjustment has resulted in our stating the figure of students completing within 6 years at 78%. A figure of 84% was quoted in the 2003-04 Annual Report.
3 Each survey year has within it 3 cohorts of students i.e. the 2002 survey includes students from the cohort due to complete in 2001-02; students resurveyed from the cohort due to submit in 2000-01; students resurveyed from the cohort due to submit in 1999-00.

Better Exploitation

Improving the uptake and exploitation of research is very important to EPSRC and it is our vision to make the UK equally renowned for knowledge transfer and innovation as it is for research discovery.



10 Yrs Our 10 year vision for Knowledge Transfer is "that the UK should be as equally renowned for knowledge transfer and innovation as it is for research discovery".

The year in context

April 2005 – March 2006

Following the publication of the Science and Innovation Investment Framework (published on 12 July 2004) EPSRC is giving greater attention to ensuring that Knowledge Transfer receives equal prominence to research quality across our activities. The User Panel (UP) has been heavily involved in discussions and advice on how EPSRC might best promote and support better exploitation from its investments. UP has interacted with an internal working group to develop a clear view of the role that EPSRC plays in the pathways to better exploitation. This role can be summarised as:

- A **primary role** in enabling the generation of Intellectual Property (new knowledge) in areas of national importance;
- A **significant role** in Knowledge Transfer and encouraging enhanced levels of business-university interaction (principally in partnership with third parties);
- A **lesser role** in the actual exploitation and commercialisation (i.e. revenue generation) of research into new products, processes, systems and services.

Professorship first

In December 2005, EPSRC and the international defence and security company QinetiQ announced the creation of, and joint funding for, the UK's first professorship in technology transfer in the physical sciences. The £1m 'EPSRC/ QinetiQ Chair in Technology Transfer in the Physical Sciences' has been awarded to Imperial College London.

The Chair of Technology Transfer will lead academic research to establish reliable mechanisms which develop wealth-creating products and services from physics-based sciences.

'The User Panel has been heavily involved in discussions and advice on how EPSRC might best promote and support better exploitation from its investments.'

Vision and plans: maintaining a forward looking agenda

Our 10 year vision for Knowledge Transfer is "that the UK should be as equally renowned for knowledge transfer and innovation as it is for research discovery". Such a vision fits well with the aims of improving the UK economy through investing more strongly in its knowledge base, largely through an increase in private sector funded R&D, and translating this knowledge more successfully into innovation.

The global environment for the science base and business is becoming increasingly competitive and dynamic. The UK must retain its core strengths and values to remain an attractive place to undertake research and innovation. Key to achieving this will be the development of a strong shared vision with business and other collaborating sponsors and partners. We are also aware that many universities are currently restructuring in response to this changing situation and the recognition that companies will increasingly source knowledge which offers the best return on a global basis. Against this background, we see the key challenges are:

- To **strengthen** our engagement with business and reach out to a broader cross-section of companies. This should result in increased business awareness and visibility for the activities that EPSRC supports;
- To **stimulate** enhanced user demand for research and subsequent pull-through of research into business;
- To **maintain** current levels of collaboration whilst also promoting better quality interactions between business and academia.

This requires that we maintain a forward looking agenda through which we will strengthen our engagement with business so that there is much more genuine user demand within the system, and many more entrepreneurial firms look naturally to the science base and feel that they have a positive relationship with it in order to improve and increase knowledge transfer. One aspect of this aim will be to raise the visibility of our activities across a wider cross-section of business in order to secure greater levels of engagement. This can be seen already in the development of 'strategic alliances' with leading companies and other organisations to develop a greater shared understanding and partnership.

MONSTIR brain scanning

Shedding light on babies' brains

Magnetic resonance imaging and ultrasound can be used to perform brain scans on small babies, but both techniques have some drawbacks. Now a multidisciplinary team made up of physicists, engineers, physiologists and medics is developing an alternative way to examine the brains of critically ill babies, in the form of a portable brain scanner called MONSTIR.

The new scanner uses optical tomography – in which data about the time taken for flashes of safe, low intensity laser light to travel through the brain is analysed to build up a three dimensional picture of the way the brain is functioning. The analysis is carried out using software developed with EPSRC funding. The results can illuminate the flow of oxygen and blood through the brain, and reveal evidence of brain damage and brain haemorrhages.

"The technology we're developing as part of our EPSRC-funded research is cheaper than MRI and has the potential to produce high quality images of babies' brains at the cot side," says Dr Adam Gibson, a member of the research team at the Department of Medical Physics and Bioengineering at University College London. "It could make an important contribution to the care and treatment of critically ill babies." MONSTIR could also prove to be a valuable tool for breast imaging to aid in the prevention and treatment of breast cancer.

Dr Adam Gibson, University College London
Email: agibson@medphys.ucl.ac.uk
www.medphys.ucl.ac.uk/research/borl/research/monstir

Scanning made simple – the new technology is designed to cause minimal disturbance to the baby.

» 46% As at 1st April 2006, 46% (by expenditure) of all research grants were collaborative with users of research, involving over 2000 non-academic organisations.

European exchange

Return visit

When Gavin Salisbury, an associate programme manager in the Life Sciences Interface Programme, took up the opportunity to spend six weeks on secondment to the Bonn and Berlin offices of the main German research funding body, DFG (Deutsche Forschungsgemeinschaft), last November, it was a return visit in more ways than one. Gavin's visit followed a successful visit to EPSRC earlier in the year made by DFG staff member Gerit Sonntag. And it also provided Gavin with a welcome opportunity to re-visit a country where he'd spent time as a post doc.

What he observed at DFG provided much interesting food for thought. "Although DFG has the same aims and objectives as we do at EPSRC – that is, to fund the highest quality research – their portfolio covers all disciplines, ranging from arts and social sciences to physical sciences and engineering."

Although Gavin is the first so far from EPSRC to take up the opportunity to go on secondment to another European funding body, he clearly hopes he won't be the last. "Given the international nature of science, this sort of exchange gives a greater understanding of the decision-making processes in other national organisations and improves collaboration."

Email: Gavin.salisbury@epsrc.co.uk

DFG's head office in Bonn.

Enhanced business-university relationships

It is important to recognise that many interactions between business and universities funded by EPSRC have their origins in 'point to point' contacts between individual researchers and their colleagues in companies, in which we have had no direct involvement. Our role here is to foster and maintain an environment where collaborations are valued and supported. We also work with intermediary organisations, such as RDAs (Regional Development Agency), DAs (Development Agency) and Faraday Partnerships, who are able to reach companies that we are unable to reach alone.

A key aim for us is to promote better quality collaborations between industry and academia. In 2005/06 we piloted an evaluation questionnaire for industry collaborators to develop our understanding of what constitutes a successful collaboration in order to inform future investments.

Our primary role is to support the generation of new knowledge and we also have a key role in supporting the transfer of this knowledge to users. We have a lesser role to play in direct exploitation and commercialisation and it is within this space where we should look to work with other stakeholders. Through the Technology Programme (www.dti.gov.uk/innovation/tech-priorities-uk/index) we are working closely with DTI, other Research Councils and other partners to support more applied collaborative R&D projects in the following technology areas:

- Electronics and Photonics;
- Advanced Materials;
- Information and Communication Technologies;
- Bioscience and Healthcare Technologies;
- Sustainable Production and Consumption;
- Design Engineering and Advanced Manufacturing;
- Emerging Energy Technologies.

'The quality of the researchers, research students and research in general at this institute exceeds that of any other academic or research institution that I am aware of anywhere in the world.'

EPSRC Collaborator Satisfaction Survey 2006

EPSRC commits £14m p.a. in Technology Programme

EPSRC is a key funding partner in the Technology Programme and has been working with DTI on this activity since April 2004. EPSRC plans to commit up to £14m per annum from 2006/07 to the academic component of 'Successful Science to Business' projects. To date, we have committed approximately £8m funding towards 17 projects.

EPSRC Collaborator Satisfaction Survey 2006

The EPSRC Collaborator Satisfaction Survey targeted all 'industrial collaborators' on research projects that had completed our standard assessment process during 2004 and 2005.

Of the 36% responses received from SMEs, 23% of the companies were multinationals and 77% employed fewer than 100 staff. Of the larger companies 81% were multinationals. Overall the survey indicated that nearly 80% of respondents professed themselves either satisfied or very satisfied with the research project they had worked on.

Key findings indicate that in addition to 'know how', over 50% of SMEs and 45% of non-SMEs cited one or more of 'new/improved product', 'new/improved process' and 'new/improved service' as a real outcome of the research collaboration. In addition almost half of all respondents cited 'important underpinning science' as a key relevant ouput of the research conducted. Respondents also provided a number of suggestions on how EPSRC could help collaborators derive more benefit from projects, these ranged from improving our communications with collaborators and speed of grant processing to more proactive involvement in collaborative projects. Further in depth analysis will be conducted during 2006/07.

80%

The survey indicated that nearly 80% of respondents professed themselves either satisfied or very satisfied with the research project they had worked on.

50%

Over 50% of SMEs and 45% of non-SMEs cited one or more of 'new/improved product', 'new/improved process' and 'new/improved service' as a real outcome of research collaboration.

» £60m Current support for collaborative training is approximately £60m p.a., largely provided through Collaborative Training Accounts (CTAs).

We play a proactive role in raising the appetite of business for interactions with the science base and this is a primary aim of our sector work. This important activity involves 14 sector teams, working across the programmes, comprising some 60 members of staff. We have reviewed our sector activities, and will be making some changes in both structure and emphasis. We have also reviewed, through our User Panel, the technology priorities from each of our sectors and incorporated these into a smaller number of priorities which we have shared with other Research Councils and the National Technology Strategy Board. These priorities will be taken forward within our Delivery Plan allocations from 2006/07.

Facilitating Knowledge Transfer

Collaboration between businesses and universities on research projects remains one of EPSRC's principal ways of facilitating knowledge transfer and better exploitation of research results. As at 1st April 2006, 46% (by expenditure) of all research grants were collaborative with users of research, involving over 2000 non-academic organisations. One significant component within this collaborative activity is the 17 Innovative Manufacturing Research Centres (IMRCs).

In addition to developing particular strategic partnerships with specific companies, consortia and other organisations we work closely with other externally funded activities to achieve greater knowledge transfer from the science base to relevant user communities. We have played an active role with the DTI in the review of Faraday Partnerships and the migration of these into new Knowledge Transfer Networks (KTNs) funded through the Technology Strategy Board. We have also conducted our own review of the Faraday Partnerships as to the benefits to EPSRC and participated in decisions on the creation of new KTNs in technical areas not covered by the Faraday Partnerships.

We see the KTNs as beneficial in helping to provide:

- Strategic input to the EPSRC Technology Strategy;
- A dissemination route for EPSRC activities (calls, workshops), particularly to an industrial audience;
- A dissemination and publicity route for the outcomes of EPSRC activities (knowledge transfer, people), and assistance with identification of case studies of successful collaborative activity;
- A network of industrial and academic contacts;
- Identification of research and training needs in a particular sector or technology area.

We have allocated 36 Industrial CASE awards to the KTNs within EPSRC's remit for take up in 2006.

Industrial CASE is a three and a half year postgraduate award where the research is driven by the industrial collaborators. Most Industrial CASE studentships are supported through CTAs, but in addition to this companies are now able to bid into a pool of studentships. This is operated on a competitive basis with a particular focus on innovative SMEs. The aim of the pool is to open the scheme up to a much wider range of companies and provide a greater degree of flexibility in the use of the awards. Regional organisations have received an allocation of Industrial CASE Studentships following a bidding process and are encouraged to promote the opportunity locally in order to reach companies not previously known to EPSRC. In using the RDAs/DAs as delivery agents EPSRC can enable local SME and regional business contacts in the allocation of PhD studentship places at local HEIs. A total of 33 Industrial CASE awards have been allocated to RDAs for allocation and uptake in 2006.

In order to build increased engagement with users and sustain a better knowledge and understanding of user needs, EPSRC is seeking to engage with leading companies through formal strategic alliances to determine future research priorities. A strategic alliance comprises the number of strategic activities in which EPSRC engages formally in a joint funded venture with public or private organisations. Company partnerships consist of the organisations which engage with EPSRC through formal strategic alliances.

Industry Fellowships

The Industry Fellowships Scheme, administered through the Royal Society, provides good opportunities for two-way people flow between industry and academia. Of the 31 Industry Fellows in post over the past four years, 25 have been within EPSRC's remit. 19 of the Fellows moved from academia into industry, with the other 12 moving from industry to academia for their Fellowship.

We will be increasing our annual contributions to the scheme from £200k p.a. to £250K p.a. from 1st April 2006 to 31st March 2009. We also co-fund a number of Postdoctoral Research Fellowships with the Royal Academy of Engineering, to enable high quality engineers to quickly establish research careers.

EPSRC and Philips: A strategic alliance

EPSRC and Philips Research have announced a strategic alliance to develop next generation biomedical diagnostic technologies. Above: Terry Doyle, General Manager Philips Research Europe-Redhill, UK (right), and John Hand, Head of the Healthcare Sector at EPSRC (left), after signing the Memorandum of Understanding.

» £90m By 1st April 2006, EPSRC had established 21 strategic alliances, worth £90m, of which the industrial cash contribution was £39m with considerable additional in kind contributions.

Postgraduate initiative

Skills add up

Swapping life in a mathematics department for a three month stint at the Parliamentary Office of Science and Technology (POST) was a leap into the unknown for Oliver Tearne, a final year PhD student at the University of Warwick – but it's something he obviously enjoyed. In April Oliver went to work at POST for three months as part of the Joint EPSRC and POST Postgraduate initiative.

During his time at Westminster he worked to compile a briefing, or 'POSTnote', covering the effects of long hours and unusual working practices on people's health, safety and how this impacts on society. The job involved talking to scientists and experts about everything from new licensing laws to research into accidents caused by sleep deprivation.

"It was a thrill to interview experts from government departments, academia and industry, and to produce a document that will help legislators understand the latest research," Oliver recalls. And it was also an excellent opportunity to learn a lot and make use of his mathematical skills. "The 'POSTnote' had a lot of biology in it – so I had a lot to learn. But my mathematics background came in very useful, because my analytical skills helped me to identify and get to the heart of the important issues fast", he explains. "All in all, it was a great experience and I learnt a lot of transferable skills."

Email: tearne@maths.warwick.ac.uk

Oliver Tearne.

These alliances are formal co-funding agreements between companies and EPSRC, to address particular research areas and activities. By 1st April 2006, EPSRC had established 21 strategic alliances, worth £90m, of which the industrial cash contribution was £39m with considerable additional in kind contributions. The strategic alliances cover collaborative research with more than 30 companies in areas such as systems integration, non-destructive evaluation and low carbon technologies, postgraduate training and joint funding of research chairs.

Our most recently announced strategic alliance is with Philips. This £6m partnership, lasting four years will fund research aimed at the development of next generation diagnostic and monitoring technologies for medical devices. EPSRC has also concluded an agreement with Astra Zeneca for the establishment of a jointly supported Doctoral Training Centre in Drug Delivery, the first students should be recruited in October 2006.

We work with regional organisations to ensure that there are effective opportunities between the science base and users, within a local environment. As part of our general 'capacity building' with the regions we held a second 'RDA study tour' in June 2005 with the objective of enabling both EPSRC and RDA Innovation Managers to exchange information about funding opportunities, best practice and business planning strategies. A number of future actions were identified to continue on building the relationships initiated.

EPSRC have, alongside other Research Councils and regional bodies, received additional funding from the OSI over 2006/07 and 2007/08 to increase the level of partnership activity for mutual benefit aimed at ensuring greater knowledge transfer from the science base into business and society. A joint EPSRC/SEEDA (South East of England Development Agency) workshop is planned for May 2006 with the aim of exploring the opportunities for EPSRC, SEEDA and the relevant HEIs in the region to work together to stimulate industrial engagement and partnership with EPSRC-funded CTAs and DTAs.

Design in Technology: Partnerships in Action

This publication resulted from a joint Design Council and EPSRC project to see how design can speed up technological research's journey from the lab to the marketplace. Six researchers joined forces with six designers to look at opportunities for commercialising technologies ranging from intelligent cameras to laser imaging. The report gives a full account of their experiences together with a report on a debate that gave designers, researchers and others the chance to debate the big questions around design's role.
www.designcouncil.org.uk

Follow-on Fund

The Research Councils' Follow-on Fund aims to increase the level and accelerate the rate of commercialisation of ideas arising from the research community, by providing funds to enable projects to be brought to a stage where commercial opportunities can be secured. EPSRC participates in the Fund with BBSRC, NERC and PPARC.

In 2005 EPSRC supported 21 Follow-on Fund projects with a value approaching £1m, representing a doubling of our contribution after the first pilot call in 2004.

The review of the Follow-on Fund pilot for 'proof of concept' ideas showed that the scheme was successful. It was decided to continue the scheme with a £1m (pre fEC) budget per annum. A further Follow-on Fund call was released in November 2005 jointly with BBSRC and NERC with a deadline of 17th February 2006. For the 2006 call, individual projects limits will be raised to £110k at Full Economic Costs and the overall fund will rise to £1.45m. Successful proposals are expected to be announced in the summer of 2006.

CASE allocation

New arrangements for Industrial CASE allocation for 2006 have been announced. Allocations have been made to 40 individual companies, with a previous record in collaborative research with EPSRC, nine Regional Development Agencies, and 13 Knowledge Transfer Networks. Further allocations will be made through sector teams and through a competitive pool.

Business Plan competition

The second joint Research Council Business Plan Competition (www.rcuk.ac.uk/innovation/bpc) involving all eight Research Councils was launched on 15 October 2005 with the closing date for business ideas on 31 December 2005. One hundred and thirty eight business ideas were received and 110 teams were invited to attend one of the five two-day commercialisation workshops (Feb/March 2006).

The next phase is to submit five page plans by 31 May 2006 which will be reviewed in June. A seminar will be held in July for the teams who are invited to produce a full business plan. During this time they will be provided with expert support from a network of mentors and coaches. The final event will be held in December 2006 with the winning team getting up to £25,000 to progress their business idea.

Integrated Knowledge Centres

A pilot call to fund Integrated Knowledge Centres was issued in November 2005 with the aim to promote strong partnerships between world-class research and businesses and to address EPSRC's objective to improve the exploitation of research.

The IKCs will:

- **Combine world class research with strong partnerships with business;**
- **Be established in areas where the research field is emergent and there are businesses with the inclination and capability to exploit the resultant knowledge-base to create potential new market opportunities;**
- **Provide a university campus-based environment to support the full, complex and multi-dimensional knowledge transfer process;**
- **Have considerable flexibility to develop an effective knowledge transfer programme matched to the needs of business.**

It is envisaged that pilot IKCs will engage in generating intellectual property, knowledge transfer and exploitation and, for the first time, EPSRC support will provide some funding towards the costs of management of collaborative, entrepreneurial and commercial services. EPSRC funding of £7m over five years will be provided for each pilot. This funding will consist of £2.2m for a core knowledge transfer programme, with additional matching funding coming from both business and other sponsors, and £4.75m for a collaborative research programme, again with matching funding sought from business and other sponsors. The host university will also be expected to make a contribution of at least £2m towards the overall activities of the IKC.

Evidence of sponsorship from the university and other important partners, including Funding Councils, Department of Trade and Industry and Regional Development Agencies, is a requirement in this call. Decisions will be made in June 2006.

Skills and people flow

Our aim is to help create a national workforce within the engineering and physical sciences to drive discovery and innovation and make the UK an attractive, and competitive, knowledge and skills hub within the global economy.

Current support for collaborative training is approximately. £60m p.a., largely provided through Collaborative Training Accounts (CTAs). CTAs are distributed to selected universities and account for about 40% of overall training provision. CTAs offer substantial guaranteed funding to universities and encompass all EPSRC schemes that link training to the workplace. The CTA mechanism offers great flexibility allowing research organisations to respond dynamically to the changing needs of industry. CTAs provide businesses with:

- Clear visibility of the skills training on offer (especially for existing employees to re-enter education at masters or doctoral level);
- Single-point entry into individual universities;
- The option of different length relationships;
- The ability to leverage their financial input with that of other public (including RDAs/DAs) and private sector sponsors.

The CTA mechanism will be reviewed in 2007. Key aspects of the review will include:

- The extent to which individual CTAs have fostered appropriate people flow in response to user needs;
- Adoption of best practice approaches to working with business.

The next call for CTA top-ups will be made in 2006, for further allocations of some £50m+ during 2007/08.

At present, about one-third of all EPSRC research students' projects involve formal collaboration with industry. Around 50% of all EPSRC-supported PhD students and about 30% of research assistants enter the private, government and other public sectors. We are currently working with a number of professional institutions to improve our understanding of career paths and impact. CTAs enable postdoctoral research assistants to spend up to one year within their collaborating companies to embed the skills, knowledge and technology developed through the project within the company.

Risk management

Experts in risk management at Imperial College London and the Universities of Edinburgh and Southampton are teaming up to form the Quantitative Financial Risk Management Centre. This will bring together specialists in this field to examine current models of risk management and explore new ways of assessing credit risks.

The Director of the Centre will be Professor David Hand from Imperial College London. Additional funding has come from ESRC and the Institute of Actuaries, with further funding coming from various financial bodies including Fair Isaac and Link Financial.

Innovative Manufacturing Research Centres (IMRCs)

The 17 current IMRCs represent an EPSRC investment of £77m and are expected to attract matched funding (mostly in kind) from industry partners. These IMRCs collaborate with over a thousand companies, many of which are SMEs (Small and Medium-sized Enterprises).

A recent review of the scheme found a high level of satisfaction for the IMRCs amongst industrial collaborators, primarily because of the significant levels of long-term funding: this enabled the development of more strategic relationships and plans and the ability of the IMRCs to respond quickly to business needs.

In 2005 the twelve original IMRCs underwent a mid-term review by an international panel to assess progress and to decide on future funding. The review resulted in ten of the centres receiving funding for a further five years.

The Innovative Manufacturing Programme has provided more than £14m support for four large grand challenge consortia that started operation during 2005/06. Each includes a large multidisciplinary team from across the 17 IMRCs and other leading research groups.

They address a diverse range of issues seen as having significant long-term potential for UK wealth creation. These include: how to design and produce multifunctional 3-D micro-miniaturised devices; how to manage engineering information related to complex products such as buildings or aero-engines which are increasingly being provided as a service across the whole product lifecycle; how to prepare consistent manufacturing and business models for a future industry supplying regenerative medicines based upon human cells and tissues; and generally how to develop robust mechanisms to speed the flow of ideas from the science base to the marketplace.

A new IMRC, the Health and Care Infrastructure Research and Innovation Centre (HaCIRIC) with a value of £7.2m, will start on 1st April 2006 with Imperial College London as the lead university.

The aim of the centre is to inform the development of policy and practice for the provision of strategically critical healthcare facilities and infrastructure for the next twenty years. The programme of research will include major new research projects designed to improve the way healthcare buildings are planned, designed, procured and delivered, and research on the likely impact of innovative new approaches to this for the National Health Service and social care system.

IMRC Figures

£77m
Investment in IMRCs

£14m
Provided by the Innovative Manufacturing Programme

£7.2m
Value of new Health and Care Infrastructure Research and Innovation Centre (HaCIRIC)

Ideas Factory

The IDEAS Factory is continuing to stimulate innovative and more risk-accepting research activities though its sandpits. These residential, interactive workshops are held over five days and involve 20-30 participants, a director and a number of independent stakeholders.

An essential element of the sandpit is the highly multidisciplinary mix of participants taking part, some being active researchers and some being potential users of research outcomes, to drive lateral thinking and radical approaches to addressing particular research challenges.

A £1.5m budget is available for each topic and outcomes of these sandpits can range from a single large research project to several smaller projects, including feasibility studies, networking activities and overseas visits.

Five topics have been selected for sandpits in 2006/07:

- Emergence: how, when and why the whole is greater than the sum of the parts;
- Coping with extreme weather events;
- Matter compilation via molecular manufacturing: reconstructing the wheel;
- Taking care to the patient: new thinking in mobile healthcare delivery;
- Computing with uncertain future devices.

The four following sandpits were held in 2005/06:

A noisy future

9-13 January 2006

Director: Professor Trevor Cox
University of Salford

Considerable effort is going into noise reduction but new innovative thinking and approaches are needed. Current policy in this area is aimed at measuring noise levels and controlling or reducing them. This sandpit brought together academics from a wide range of disciplines, industrialists and policy makers to challenge assumptions about future soundscapes and predict how they might evolve over the next 10-20 years.

Among the issues they looked at were: the things that makes sounds attractive or unattractive; the possibility of developing ways of measuring 'sound quality' rather than noise; and the possibility of designing desirable soundscapes in the same way we design buildings, lighting or landscape effects in urban areas. Two projects and a network have been funded from this sandpit.

Bridging the global digital divide

12-14 December 2005
5-6 January 2006

Director: Professor Alan Blackwell
University of Cambridge. Developed in partnership with AIDWORLD

In many situations, existing computing and communication devices are ineffective owing to a lack of infrastructure, training and capital. The challenge is to develop a new model for communication that is effective without the support infrastructure we rely on in urban environments and wealthy countries, is intuitive, easily used and universally affordable. International experts with direct experience of the 'Digital Divide' provided advice to the 30 leading UK researchers who participated in this workshop. A network has been established and four projects have been awarded.

Scientific uncertainty and decision making for regulatory and risk assessment purposes

23-27 January 2006

Director: Professor Peter Grindrod,
Lawson Software

The assessment and decision making processes within environmental, health, food and engineering sectors pose numerous challenges. Uncertainty is a fundamental characteristic of these problems. Academics, industrialists and policy makers from these sectors met to discuss how best to account for all the uncertainties in the complex models and analyses that inform decision makers, and how the uncertainties can be communicated simply but qualitatively and transparently. They also looked at how decision makers use those uncertainties when combining the scientific evidence with more socio-economic considerations. Eight projects including one network have been funded.

Gun crime: taking the heat off the streets

5-9 September 2005

Director: Professor David Williams,
Loughborough University

This sandpit explored long-term ideas for preventing gun crime, protecting against gun crime and assisting in the detection of gun crime. Four proposals – including one network – arising from this sandpit have now been supported. These involve collaborations with a large range of stakeholders including the Forensic Science Service, the Home Office, Metropolitan Police, Association of Police Officers of England, Wales and Northern Ireland, Greater Manchester Police, The Forensic Alliance Ltd and the National Firearms Centre. The projects are all multidisciplinary and multi-institutional.

'An essential element of the sandpit is the highly multidisciplinary mix of participants, some being active researchers and some being potential users of research outcomes.'

Bridging the divide.

» £4m The Rail Research Centre UK underwent a successful review in October 2005 by a panel chaired by William Tyson of the Greater Manchester Passenger Transport Executive. The centre was renewed for a further four years with £4m funding.

Sustainable water management

Water recycling hits the roof

Gardeners in the south of England facing hosepipe bans are only too well aware of the need to conserve water. Now some of the plants they nurture could be put to use in rooftop gardens to recycle the grey water from washbasins, baths and showers, thanks to the Green Roof Water Recycling System (GROW). GROW is the brainchild of Chris Shirley Smith of the company Water Works UK and is now being developed by researchers at the Centre for Water Systems at the University of Exeter and at Cranfield University under the EPSRC funded Sustainable Water Management Programme (WaND).

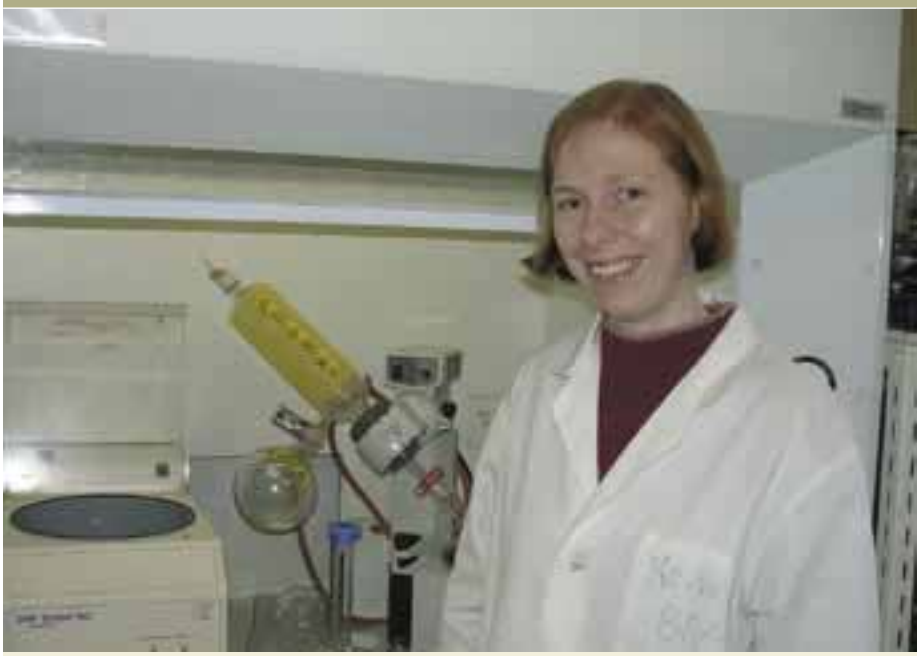
GROW consists of an inclined framework of interconnected horizontal troughs which are planted with rows of specially chosen plants that are resistant to the pollutants they absorb. As grey water trickles through the GROW framework, the plant roots take up the dissolved pollutants to produce 'green water', which can be used to flush toilets and water gardens. Thanks to GROW, much of the water that enters a building can be used twice before entering the national wastewater management system.

"The beauty of this system is that it doesn't require sophisticated maintenance - just tending, like any garden," says Professor David Butler of the University of Exeter, who is overseeing both the GROW project and WaND. "Our overall aim is to contribute towards sustainable water management in new developments. We hope that GROW will be one of the tools that can help us achieve that goal."

Professor David Butler, University of Exeter
Email: d.butler@ex.ac.uk

The Green Roof Water Recycling System, GROW, will bring a splash of colour to the rooftops of office blocks and flats in cities across the UK. It will also help recycle water.

A CASE for New Academics



Dr Yvonne Perrie.

Delivering dual benefits

EPSRC's CASE for New Academics (CNA) programme provides a route for new academics to co-supervise a CASE student and to build links with a company at an early stage in their career. For Dr Yvonne Perrie of the School of Life and Health Sciences at the University of Aston, who co-supervised PhD student Sarah McNeil, along with the London based biopharmaceutical company, Lipoxen Technologies Ltd, CNA also provided an opportunity to renew old acquaintances. Dr Perrie had previously worked for Lipoxen, and her own PhD work formed the basis of some of Lipoxen's products.

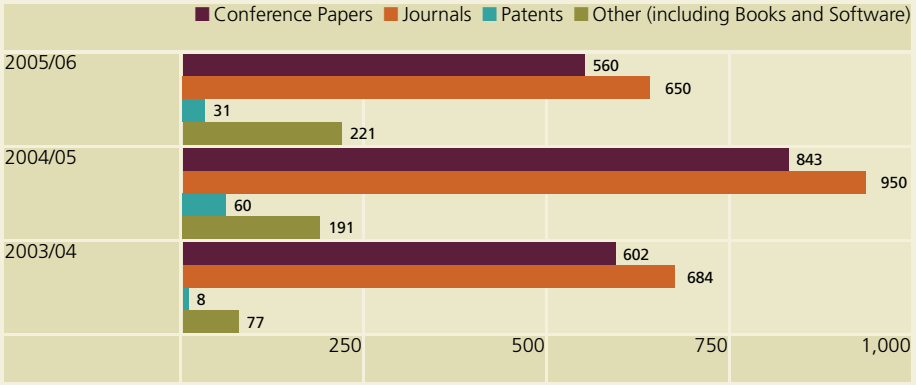
For Dr McNeil, the CASE studentship provided an opportunity to see her PhD research on delivery systems for vaccine – which involved small lipid based spheres known as liposomes – from both an academic and an industrial perspective. And for Dr Perrie, the benefits of the CASE studentship were just as valuable. "My research interests overlapped well with the sponsoring company," she explains. "Co supervising Sarah's CASE studentship supported me to develop my research group and further my research interests."

Dr Yvonne Perrie, University of Aston
Email: y.perrie@aston.ac.uk

Case studies

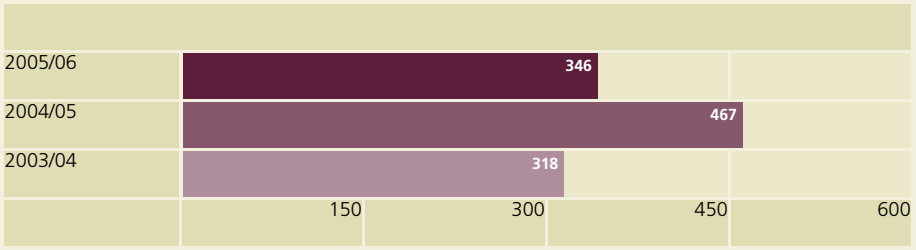
Timeline case studies are being developed looking at how the outputs of previously funded engineering and physical sciences research have been taken up into industry.

Number of co-publications with industry

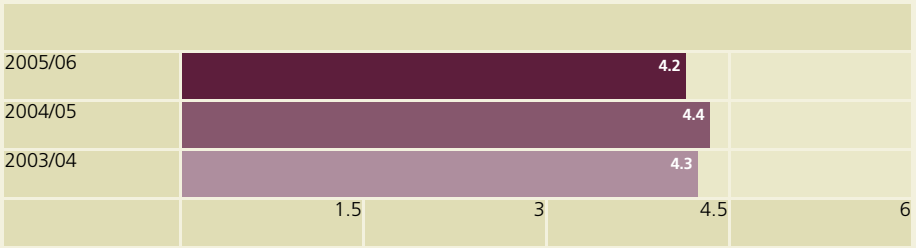


Researchers are asked via the Final Report to indicate total numbers for the following types of publications: Conference Papers, Journals, Patents, Books and Software.

Number of Final Reports received reporting publications with industrial co-authors



Average number of publications with an industrial co-author per Final Report



Science in Society

New research developments in the physical sciences and engineering can impact on all aspects of society. EPSRC is committed to fostering engagement between researchers and the public to provide members of the general public with better opportunities to understand, comment on and influence developments in engineering and the physical sciences.

The year in context

April 2005 – March 2006

EPSRC has continued to demonstrate its commitment to encouraging effective engagement between researchers and the public, allocating a budget of £2.9m in 2005/06.

As the priority of the Science in Society agenda has grown, so has the desire among the bodies involved in public engagement with science and technology for greater coherence of activities to achieve greater collective impact. EPSRC has continued to actively seek new opportunities to collaborate through RCUK and with external partners. A key activity has been to work as part of RCUK to ensure that the RCUK Science in Society Unit, established on 1 April 2005, is empowered to take the Research Councils' collective agenda forward.

The RCUK Science in Society (SiS) Unit has made significant progress in coordinating the Research Councils' Science in Society work and is adding value by bringing together business and financial administration including taking responsibility for a number of joint Research Councils' activities. EPSRC has been closely involved in the hand over of the management of activities to the unit, including our involvement in the Researchers in Residence, BA CREST and Nuffield Bursaries schemes.

The Research Councils have successfully produced a joint strategy which contains a number of future activities which will further add value and increase efficiency in this area, including creating a joint public engagement grant funding framework for all researchers, leading the next government-sponsored national survey of public attitudes to science and technology, working with Science Learning Centres to develop a programme of continuing professional development for science teachers, and developing a joint approach to National Science Week and science festivals and centres.

Engaging the young

A priority has been to work with cross-council colleagues to bring together many school-based activities within the RCUK Science in Society Unit. We will continue to ensure that engineering and physical sciences are appropriately represented within the unit's activities, and take action to address areas of particular concern and exploit opportunities in appropriate subject areas.

Physics: 2005 World Year of Physics

2005 was World Year of Physics and was promoted in the UK as Einstein Year. EPSRC with PPARC and the Institute of Physics continued to fund a major touring exhibition 'Move Over Einstein' throughout 2005 (with special appeal to 11-14 year olds) and has recently agreed to extend the exhibition to further venues in 2006. This fascinating exhibition uses hands-on exhibits and takes you inside some of the latest projects Einstein's successors are working on, which include:

- An electronic supernose that will sniff your breath and give early warning of illness;
- Tiny robots which may soon navigate your bloodstream, targeting drugs to specific sites within your body;
- Production of codes that even the greatest super-sleuth can't crack, making Internet shopping completely safe;
- Using 'wobbly stars' which may lead us to discover alien life.

Science festival

This year's Festival of Science held at Trinity College Dublin, featured a dazzling array of talks, exhibits and debates and included appearances by EPSRC NOISE role models.

Encouraging the research community

We have continued to encourage researchers to engage with the public, at all stages in their career from involvement at PhD level in initiatives such as Researchers in Residence, through awards to researchers for public engagement projects, to awards of Senior Media Fellowships to leading researchers.

Engineering flexibility

A new type of non-project based funding for public engagement was piloted in the engineering community, by establishing three Stage Awards worth £800k in acoustics, medical engineering and robotics. The three year awards will be used to fund a communicator to work with a network of researchers in the topic to coordinate, support and deliver its public engagement activities.

Beyond supporting a member of staff to act as coordinator and enabler of the group of researchers, the resources provided by the award will be used flexibly to respond to evolving opportunities and build upon successes. If the model proves successful we will roll it out to other subject areas as appropriate.

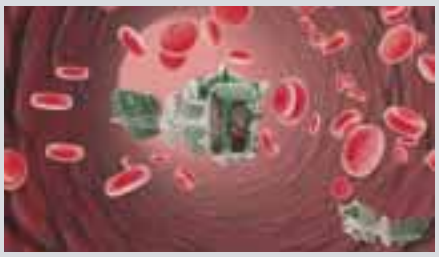
Showcasing our research

We have continued to support activities to highlight the work of our researchers in partnership with science centres and major national festivals and events. This has included support for activities during National Science Week, the BA festival and the Royal Society Summer Exhibition. In future years we will be looking to integrate these activities more fully within RCUK.

Science week

Marking the end of science week, current and past EPSRC Senior Media Fellows Noel Sharkey and Tony Ryan gave a public lecture at the Crucible Theatre in Sheffield on 20th March 2006. In 'A robot in your blood?' Noel and Tony argued about the possibility of real nano-robots.

Senior Media Fellow, David Howard also ran a stand on 'voice, food and drink' in York Science Week from 16-18th March 2006, and gave a lecture and a morning of science in two York schools.



Moving towards dialogue

Many of our public engagement activities are designed to provide information and stimulate thinking about research, and the issues that arise from research. There is a growing recognition that researchers may need to consider more fully the policy impacts and societal impacts of new technologies, and that to achieve that we need to build an effective dialogue with the public.

A key priority for the future is to consider how we can more fully take account of societal impacts and policy implications of emerging research areas, and we will look to establish appropriate mechanisms to allow us to take account of the ethical, health, safety and environmental impacts of our research, as well as horizon scanning to identify emerging research areas and any likely public concerns surrounding them.

Taking society seriously

Following discussions with Council on how to factor society more effectively into its thinking, EPSRC has established a Societal Issues Panel, chaired by Lord Robert Winston. The Panel will provide a high level and visible forum for advising on the societal, political and regulatory environment in which EPSRC operates, and its impact on Council's policy and operations. It will report directly to the Chief Executive and Council on such matters. The first meeting was held in April 2006, where the panel discussed its role and workplan for the coming year. Photograph by Penny Tweedie/Science Photo Library

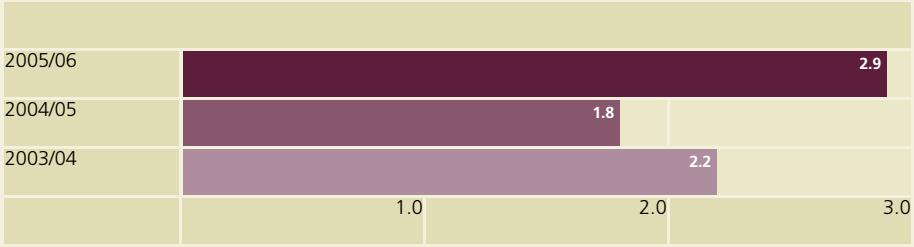
Holmes Hines Memorial Fund

This charitable fund, administered by the EPSRC, was set up following a bequest which stated that it should provide annual prizes, scholarships, exhibitions or research grants, the incidental expenses of visiting scientists, the purchase of scientific apparatus and equipment, and funds for "such other purposes for the advancement of scientific knowledge as the Council shall see fit". The Holmes Hines Memorial Fund can be used to help individuals or organisations and offers awards for activities relating to science and engineering for which public funds are not available. Although the fund is administered by the EPSRC, awards are not restricted to subjects falling within the EPSRC remit and applications can cover any area of science or engineering.

Examples of awards made during 2005/06 were:

- Support for a student to attend the International Space University's summer school;
- Support for students to attend the London International Youth Science Forum;
- Support for students to attend a NASA study course;
- Funding of equipment for a primary school wildlife club;
- Purchase of alternative energy experiment kits for a primary school.

Science in Society Programme expenditure (£m)

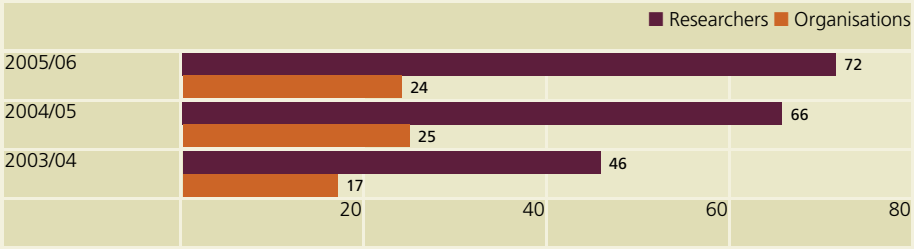


Proposals considered and funded

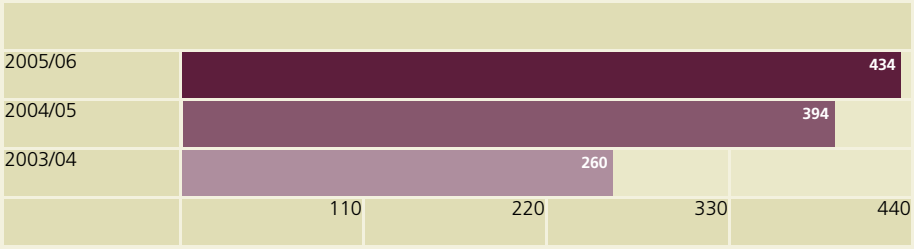
	PROPOSALS CONSIDERED					
	2003/04		2004/05		2005/06	
	Number	Value (£m)	Number	Value (£m)	Number	Value (£m)
Partnerships for Public Awareness	67	5.2	96	7.8	111	9.7
Senior Media Fellow	4	0.3	4	0.4	3	0.3

	PROPOSALS FUNDED					
	2003/04		2004/05		2005/06	
	Number	Value (£m)	Number	Value (£m)	Number	Value (£m)
Partnerships for Public Awareness	20	1.1	33	1.7	31	2.3
Senior Media Fellow	1	0.1	2	0.3	–	–

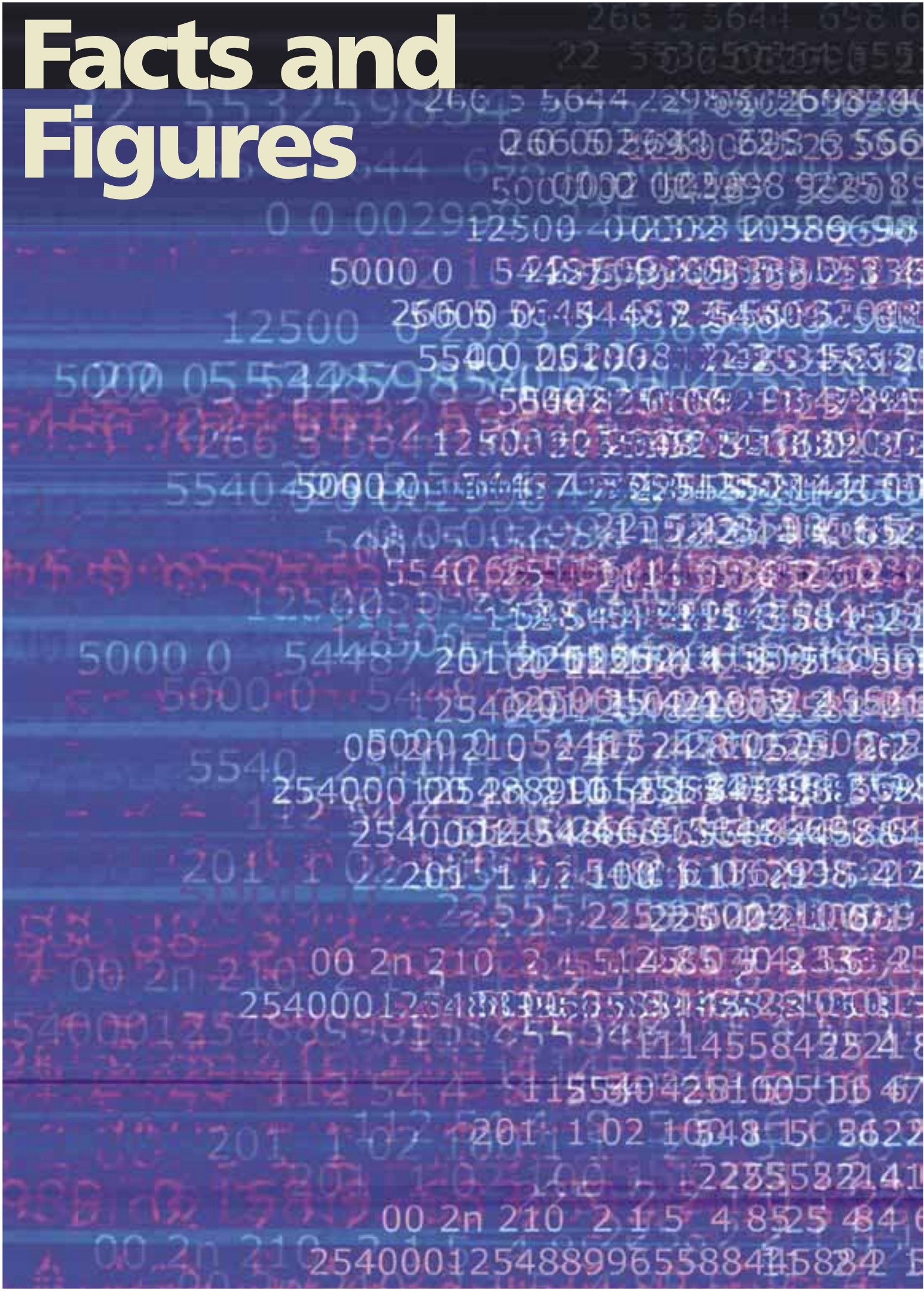
Number of researchers and organisations receiving Science in Society Programme funding by financial year



Number of researchers taking up Public Communication Training funding



Facts and Figures



Council Membership

Professor Dame Julia Higgins FRS, FREng **Chair**	Imperial College London
Professor JJ O'Reilly FREng **Chief Executive**	Engineering and Physical Sciences Research Council
Professor R Anderson FRS	Ministry of Defence
Professor JS Archer CBE, FREng, FRSE	Heriot-Watt University
Professor JN Chapman FRSE	University of Glasgow
Professor AP Dowling CBE, FRS, FREng	University of Cambridge
Professor SE Gibson	Imperial College London
Dr D Grant CBE, FREng	Cardiff University
Dr C Harrison	Uniqema
Mr D Hughes FREng	Department of Trade and Industry
Dr S Ion OBE, FREng	BNFL
Mr D Jordan CBE, CEng, FIEE, FCMA	Independent
Mrs JAG Kennedy OBE, FREng	Ove Arup & Partners Ltd
Mr JN Loughhead (until 30th September 2005)	Independent
Professor M Taylor FRS	University of Manchester
Professor WA Wakeham FREng	University of Southampton
OST Representative	Mr J Neilson

Technical Opportunites Panel (TOP) Membership

Professor AP Dowling CBE, FRS, FREng **Chair**	University of Cambridge
Professor B Cantor FREng	University of York
Professor L Gladden OBE, FRS, FREng, FIChemE	University of Cambridge
Professor WG Graham	Queens University, Belfast
Professor EB Martin CEng, FRSS, FIChemE	University of Newcastle upon Tyne
Professor J McDonald FREng	University of Strathclyde
Professor TCB McLeish	University of Leeds
Professor DA Rand	University of Warwick
Professor T Rodden	University of Nottingham
Professor M Sarhadi	Brunel University
Professor RH Templer FRSC	Imperial College London
Professor D Tildesley	Unilever Research
Professor P Withers	University of Manchester

User Panel (UP) Membership

Mr JN Loughhead (until 30th September 2005) **Chair**	Independent
Professor TW Broyd FREng	CIRIA
Dr I Childs	BBC Research and Development
Dr D Clarke	Rolls Rpyce Groupl Plc
Professor C Doyle, CEng FIMM	Xeno Medical Ltd
Professor P Gregson FREng, CEng	Queen's University Belfast
Professor A Grieve	Pfizer
Dr AM Hodge MBE, FIEE, CEng	Qinetiq
Dr WA MacDonald	Dupont Teijin Films
Dr DW Prest	Johnson Matthey
Dr D Watson	IBM UK Labs Ltd
Mr DJ Way CEng	Department for Trade and Industry
Mr D Wright	Manufacturing Advisory Service, West Midlands

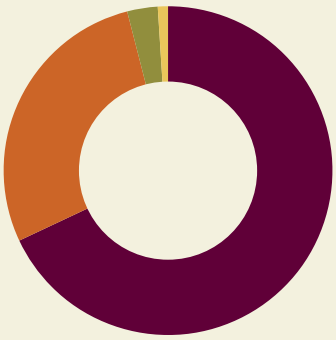
Resource Audit Committee (RAC) Membership

Mrs JAG Kennedy OBE, FREng **Chair**	Ove Arup & Partners Ltd
Mr S Buckingham	Lloyds TSB
Professor JN Chapman FRSE	University of Glasgow
Dr D Grant CBE, FREng	Cardiff University
Mr A Neal	Lancaster University
Mr P Mabe	Ministry of Defence

Societal Issues Panel (SIP) Membership

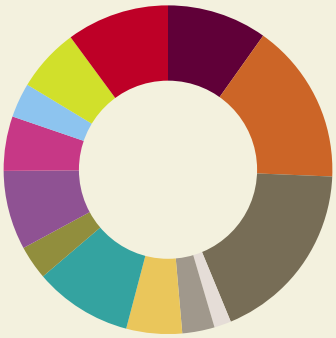
Professor Lord Robert Winston **Chair**	Imperial College London
Dr D Bruce	Church of Scotland
Professor D Burke	Independent
Mr D Jordan CBE, CEng, FIEE, FCMA	Independent
Professor G Laycock	University College London
Professor K Sykes	University of Bristol

Summary Research grant investment by Programme



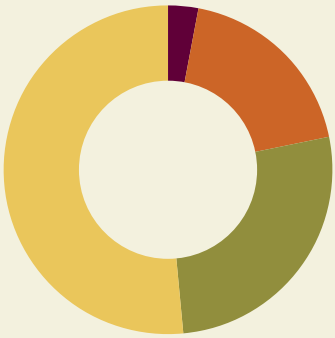
EPSRC expenditure by category (%)

	%
Research Grants	68
Postgraduate training and fellowship awards	28
Administration and restructuring	3
CCLRC and other non-ticketed domestic facilities	1



EPSRC research grant commitment by programme (£m)

	£m
Chemistry	48.2
Engineering	77.7
Information and Communications Technologies	88.8
Infrastructure and Environment	8.2
Innovative Manufacturing	15.6
Life Sciences Interface	26.9
Materials	47.4
Mathematical Sciences	16.4
Physics	38.2
Energy	26.3
Core e-Science	16.7
Basic Technology	30.7
Other activities	49.5
	490.6



Research and training support for individuals (%)

Total number of new posts awarded in year: 3,451
Total number of Research Students training for PhD or equivalent:1,790
(including 1284 Doctoral Training Grant students and 506 Collaborative Training Grant students starting in 2005/06)

	Posts	%
Fellowships	88	3
Project Students	654	19
Postdoctoral Research Assistants (PDRAs)	919	27
Research Students	1,790	51
	3,451	**100**

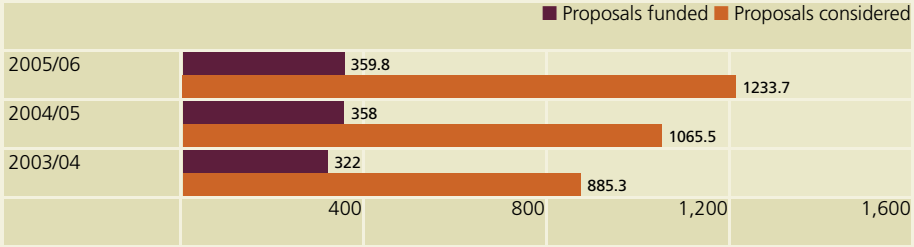
Research grant investment by Programme

Financial Year 2005/06	Proposals considered [1]		Proposals funded		% funded	
EPSRC Core Programmes	**Number**	**Value (£m)**	**Number**	**Value (£m)**	**Number**	**Value (£m)**
Engineering	1,574	392.5	346	81.5	22%	21%
Innovative Manufacturing	17	18.5	11	14.0	61%	76%
Infrastructure and Environment	10	14.6	6	10.1	56%	69%
Mathematical Sciences	293	36.3	129	14.0	44%	39%
Physics	293	82.8	113	37.8	39%	46%
Chemistry	604	146.1	175	49.2	29%	34%
Materials	811	209.3	170	47.1	21%	23%
Information and Communications Technologies	1,192	293.8	355	90.2	30%	31%
Life Sciences Interface	132	39.7	43	15.9	33%	40%
Total	**4,925**	**1,233.7**	**1,347**	**359.8**	**27%**	**29%**

	Grant funding	Funding from other sources [2]	Non-grant funding [3]	Net programme totals		
EPSRC Core Programmes	**Value (£m)**	**Value (£m)**	**Value (£m)**	**(2003/04)**	**(2004/05)**	**2005/06**
Engineering	81.5	(6.6)	2.8	69.3	81.5	77.7
Innovative Manufacturing	14.0	–	1.6	17.9	23.4	15.6
Infrastructure and Environment	10.1	(0.2)	(1.7)	32.8	24.9	8.2
Mathematical Sciences	14.0	(0.1)	2.4	11.7	16.2	16.4
Physics	37.8	(0.6)	0.9	32.0	39.1	38.2
Chemistry	49.2	(0.9)	(0.1)	46.1	42.7	48.2
Materials	47.1	(0.3)	0.6	42.7	47.4	47.4
Information and Communications Technologies	90.2	(4.2)	2.8	63.6	80.4	88.8
Life Sciences Interface	15.9	(0.6)	11.6	15.5	28.2	26.9
Total	**359.8**	**(13.5)**	**20.9**	**331.6**	**383.8**	**367.4**
Joint Programmes with Other Research Councils						
Core e-Science				12.7	3.1	16.7
Basic Technology				24.2	26.5	30.7
Energy [4]				–	–	26.3
Total				**36.9**	**29.6**	**73.7**
Other Activities (including Public Engagement, Crime Prevention, Complexity, IDEAS Factory, Science and Innovation Awards)				9.6	21.7	49.5
Total				**9.6**	**21.7**	**49.5**
Grand Total				**378.1**	**435.1**	**490.6**

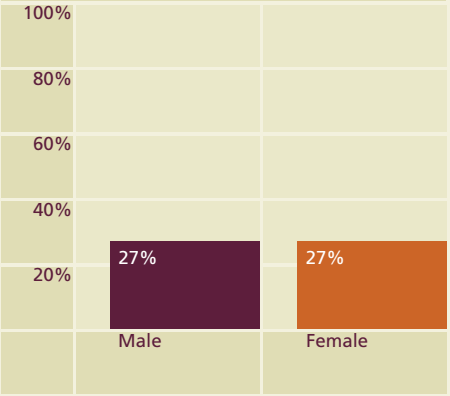
1 i.e. on which a final decision was made between 1st April 2005 and 31st March 2006.
2 Co-funding from other organisations e.g. Defence Science & Technology Laboratory (Dstl), Ministry of Defence (MoD), other Research Councils.
3 e.g. LSI Doctoral Training Centres, Research Chairs, Postdoctoral Research Fellows.
4 Energy previously embedded in core programmes and only separately classified in 2005.

Value of grant proposals in EPSRC Core Programmes considered and funded (£m)



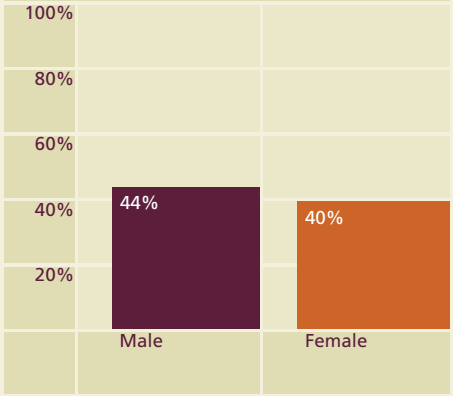
The Data for 2003/04 has been adjusted to Financial Year as it was reported by Calendar Year in the 2003/04 Annual Report.

Standard research grants awarded 2005

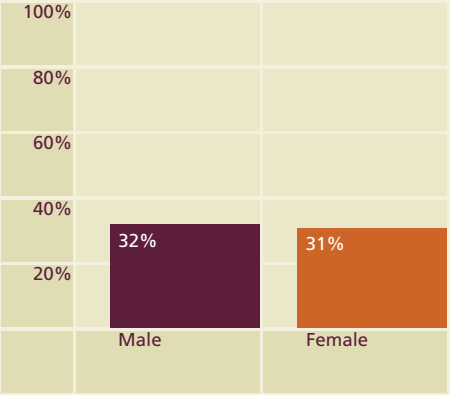


Standard research grants awarded between 2003 and 2005

First Grant Scheme grants awarded in 2005

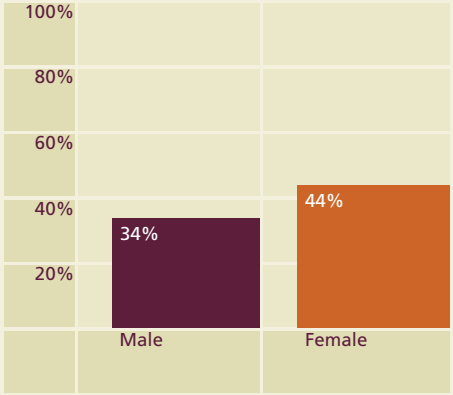


Research grants awarded to young researchers (under 35 years) 2005

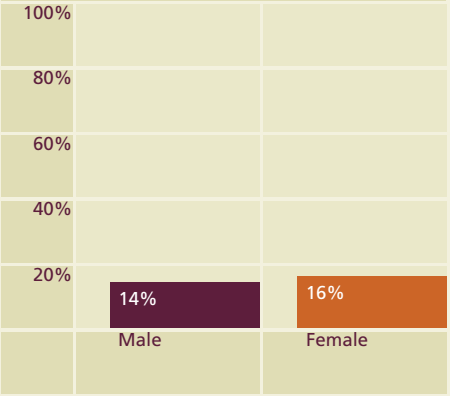


Research grants awarded to young researchers between 2003 and 2005

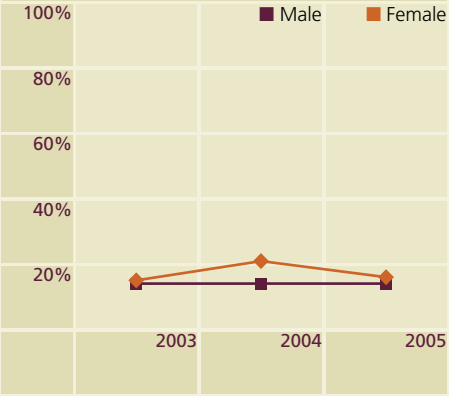
Partnerships for Public Awareness Awards (PPA) awarded in 2005



Advanced Fellows awarded 2005



Advanced Fellowships awarded between 2003 and 2005



Data is by calendar year

Ethnic origin of research grant Principal Investigators – where known (%)

	2003	2004	2005
Asian and Asian British	2.6	3.2	3.1
Black and Black British	0.3	0.5	0.2
Chinese or Other	6.0	5.1	4.9
Mixed	0.2	0.5	0.5
Not Disclosed	5.0	3.7	4.6
Unknown	1.4	2.2	2.0
White	84.5	84.9	84.7

The Engineering and Physical Sciences Research Council (EPSRC) was established by Royal Charter on 16th December 1993 and began operations on 1st April 1994. The EPSRC inherited part of the programme previously funded by the Science and Engineering Research Council (SERC).

The EPSRC receives its principal funding through the Grant in Aid from the Office of Science and Innovation (OSI). The amount received in 2005/06 was £555 million (2004/05 £490 million). Income was also received from other Research Councils, Government Departments and other bodies.

Mission

The mission of the EPSRC as set out in the 1993 Government White Paper on Science, Engineering and Technology *'Realising our Potential'* is:

"to promote and support high quality basic, strategic and applied research and related postgraduate training in engineering and the physical sciences (Chemistry, Physics and Mathematics), placing special emphasis on meeting the needs of the users of its research and training outputs, thereby enhancing the United Kingdom's industrial competitiveness and quality of life".

The EPSRC's objectives, as defined in its Charter, are:

a) To promote and support high quality basic, strategic and applied research and related postgraduate training in engineering and the physical sciences;
b) To advance knowledge and technology and provide trained scientists and engineers to meet the needs of users and beneficiaries (including the chemical, communications, construction, electrical, electronic engineering, information technology, pharmaceutical, process and other industries), thereby contributing to the economic competitiveness of the United Kingdom and the quality of life of its citizens;
c) To provide advice, disseminate knowledge and promote public understanding in the fields of engineering and the physical sciences.

Review of the Year

The Income and Expenditure Account records a surplus for the year of £3.6m (2004/05 £6.1m). There was an increase in expenditure on research grants, with annual expenditure totalling £366.1m (2004/05 £314.9m) and an increase in expenditure on postgraduate and fellowship awards, with annual expenditure of £159.1m (2004/05 £141.3m).

During the year the EPSRC paid a total of £5k to the Consolidated Fund (2004/05 £5k).

Transfers to and from reserves are shown in Note 20 to the Accounts.

Full details of the activities in the year and future plans are shown in the Management Commentary.

Research and Development

As an organisation wholly engaged in research, the EPSRC does not classify research and development separately in the Accounts.

Payment Policy

In accordance with Government guidelines, it is the policy of the EPSRC to seek to comply with the CBI Prompt Payers' Guide that states that commercial invoices should be paid within 30 days of the presentation of a valid demand for payment.

During 2005/06 the majority of payments by the EPSRC were made to predetermined scheduled dates. Payment of commercial invoices, as defined by the CBI, was monitored throughout the year and 98% of those invoices were paid within 30 days of receipt against a target of 95%.

The remittance advice, which accompanies payable orders, gives a point of contact within Finance for queries or complaints from suppliers on payment performance. No complaints, under the terms of the CBI code, were received during the reporting year.

In November 1998, the Late Payment of Commercial Debts (Interest) Act came into force, providing small businesses with a statutory right to claim interest from large businesses (and all public sector bodies) on payments that are more than 30 days overdue. Amended legislation (the Late Payment of Commercial Debts Regulations 2002) came into force on 7th August 2002 providing all businesses, irrespective of size, with the right to claim statutory interest for the late payment of commercial debts. No such claims were received during the reporting year.

Details of the Prompt Payers' Guide can be found at www.payontime.co.uk

Resource Audit Committee

The Resource Audit Committee (RAC) includes three members of Council together with other members from the commercial and academic communities. RAC meets three times a year to review corporate governance, risk management, internal and external audit matters, efficiency and the Council's Accounts.

Equality of Opportunity

The EPSRC has a policy of non-discrimination against people on the grounds of gender, age, religion, religious beliefs, disability, race or sexual orientation. This applies in recruitment, training, promotion and to all aspects of employment within EPSRC. All relevant EPSRC policies are being reviewed in the light of the new age legislation to ensure they contain no age discrimination.

EPSRC gained accreditation as a Disability Symbol user in 2004 approved under the scheme operated by the Employment Service. An EPSRC Equal Opportunities report was produced during the year for senior management.

EPSRC continues to be a member of the Research Councils' Equality and Diversity Advisory Group.

Learning and Development

EPSRC continues to invest in L&D and projects have been set up to manage a number of priority activities following the Investors in People successful reaccreditation in 2004:

- Management development;
- Employee involvement;
- Business awareness.

In addition, the induction and evaluation policy and processes have been reviewed and improvements been made.

The L&D Coordinator group (with representatives from each Directorate) has reviewed the L&D policy and processes to bring more emphasis on L&D activities.

Health and Safety

The EPSRC complies with all relevant legislation and regulations concerning health and safety at work. Comprehensive programmes of inspections, tests, risk assessments and training are carried out to ensure that safe and healthy working conditions are provided for all employees. The on going restructuring of accommodation continues to deliver benefits, and a number of new initiatives have been taken on health promotion.

Employee Involvement

Employee involvement in management and policy matters has continued through meetings between management, staff and the trade unions.

The Joint Pay Committee agreed the 2005 pay award which maintained the restructured pay system first introduced in 2003. This has continued to provide for improved progression as well as addressing issues surrounding equal pay.

Auditors

The Accounts of the EPSRC are audited by the Comptroller and Auditor General under the terms of Paragraph 3(3) of Schedule 1 of the Science and Technology Act 1965. The cost of the statutory audit in 2005/06 was estimated to be £39k. There was no auditor remuneration for non-audit work.

So far as the Accounting Officer is aware, there is no relevant audit information of which the EPSRC's auditors are unaware. The Accounting Officer has taken all the steps that he ought to have taken to make himself aware of any relevant audit information and to establish that EPSRC's auditors are aware of that information.

Council members

The following were members of the EPSRC Council in 2005/06:

Chair	
Professor Dame Julia Higgins FRS, FREng	Imperial College London

Chief Executive	
Professor J J O'Reilly FREng	EPSRC

Members	
Professor R Anderson FRS	Ministry of Defence
Professor J S Archer CBE, FREng, FRSE	Heriot-Watt University
Professor J N Chapman FRSE	University of Glasgow
Professor A P Dowling CBE, FREng, FRS	University of Cambridge
Professor S E Gibson	Imperial College London
Dr D Grant CBE, FREng	Cardiff University
Dr C Harrison (from 1 April 2005)	Uniqema
Mr D Hughes FREng	Department of Trade and Industry
Dr S Ion OBE, FREng (from 1 April 2005)	BNFL
Mr D Jordan CBE, CEng, FIEE, FCMA	Independent
Mrs J A G Kennedy OBE, FREng	Ove Arup & Partners Ltd
Mr J N Loughhead (to 30 September 2005)	Independent
Professor M Taylor FRS	University of Manchester
Professor W A Wakeham FREng (from 1 April 2005)	University of Southampton

A representative from the Office of Science and Innovation was in attendance at all Council meetings.

EPSRC Council Members' Register of interests

Name	University interest	Industry interest	Other Government departments	Other
Professor R Anderson, Ministry of Defence	Imperial College, London London School of Hygiene and Tropical Medicine	None	Chief Scientific Officer, Ministry of Defence	None
Professor J Archer, Heriot-Watt University	Heriot-Watt University	None	MTD	SEEL (Scottish Enterprise Edinburgh & Lothians)
Professor J Chapman, University of Glasgow	University of Glasgow	Research collaborations with Seagate, Philips and Siemens	DTI Link Assessor	Fellow of the Royal Society of Edinburgh, Fellow of the Institute of Physics and Senior Member of the IEEE
Professor A Dowling, University of Cambridge	University of Cambridge	Consultant to Rolls-Royce and Thales Naval Ltd. Collaborative research with Rolls-Royce, Goodyear, Land Rover, MHI, IHI, Westland, Thales Underwater Systems, Kawasaki, Innogy & several EU consortia, BA, BAA, NATS, CAA, Marshalls Aerospace	Member of the Regulation, Environment & Safety Group of the Aerospace Innovation & Growth team, DTI. Member of EU Advisory Committee for Aeronautics	Museum for Science & Industry – trustee Cambridge-MIT Institute Ltd – Non-executive director Royal Society/Royal Academy of Engineering study on nanotechnology – Chairman
Professor S Gibson, Imperial College, London	Imperial College, London	Research collaborations with James Black, Foundation and Medivir UK	None	None
Dr D Grant, Cardiff University	Cardiff University	None	None	Welsh Networking Ltd – Chairman Member of the Royal Academy of Engineering Standing Committee for Education and Training Member of UK Socrates-Erasmus Council Chair of Universities UK Management, Leadership and Governance Strategy Group
Dr C Harrison, Uniqema	None	Uniqema – Director Shareholdings in Imperial Chemical Industries plc, Astra Zeneca plc	Member of the DTI Innovation Stakeholder Group	Centre for Process Innovation – Non-executive director Chemistry Leadership Council Innovation Taskforce – Chair
Professor Dame Julia Higgins	Imperial College, London	None	None	Royal Society – Vice-President, Trustee and Foreign Secretary National Gallery – Trustee
Mr D Hughes, DTI	None	None	DTI	Member of Cardiff University Innovation and Engagement Board

EPSRC Council Members' Register of interests continued

Name	University interest	Industry interest	Other Government departments	Other
Dr S Ion, BNFL	University of Manchester	BNFL NNC	Council for Science and Technology	Royal Academy of Engineering
Mr D Jordan, Independent	None	None	None	None
Mrs J Kennedy, Ove Arup & Partners	Project management of capital projects for Imperial College London and Kingston University	Port of London Authority Board Member Director, Ove Arup & Partners	Department for Transport	Royal College of Art Commissioner, Royal Commission for the Exhibition of 1851 Capital projects for MRC
Mr J Loughhead, Independent	Loughborough University Industrial Advisory Board; Queen Mary & Westfield College, Industrial Advisory Board Cardiff University Engineering School Advisory Board Imperial College, London	Past Vice President of Technology, Alstom Various research collaborations	Member of the Defence Scientific Advisory Council Technology Board DTI Technology Programme Assessor Advisor to EC Research Directorate on Energy Programmes	Vice President, Trustee, Council Member and Fellow of IEE Fellow of IMechE
Professor J J O'Reilly, Chief Executive, EPSRC	University College London (leave of absence) Centre for Advanced Software Technology Ltd – Chair University of Wales, Bangor	None	Chair of the UK Network Interoperability Consultative Committee (NICC) for Ofcom	Past President, Council Member, Fellow and Trustee of IEE Fellow of Royal Academy of Engineering Fellow of Institute of Physics Fellow of the British Computer Society
Professor M Taylor, University of Manchester	Chairman to the advisory panel at the Heilbronn Institute, Bristol	None	None	Vice-President and Physical Secretary of the Royal Society
Professor W Wakeham, University of Southampton	University of Southampton Universities & Colleges Employers Association – Board Member Southampton University Development Trust – Trustee Worldwide University Network Group – Board Member Worldwide University Network Trading – Board Member Worldwide University Network Foundation – Trustee Research Collaboration (CASE Award) Schlumberger Cambridge Research	Meridian TV Plc – Non-executive director COGENT – Non-executive director Southampton Asset Management Ltd – Director	South East England Development Agency – Director	Southampton and Fareham Chamber of Commerce – Board Member Higher Education South East – Board Member

Professor John O'Reilly Accounting Officer
13th July 2006

Remuneration Policy

The remuneration of the Chief Executive of EPSRC is decided by a Remuneration Panel chaired by the Director General, Science and Innovation and approved by the DTI Permanent Secretary.

EPSRC's Council has established a Remuneration Committee to assess, annually, the individual performance of the EPSRC Directors, and decide, in the light of these assessments, the remuneration they shall receive. The Committee members are the Chair of EPSRC, Chair of the Resource Audit Committee and EPSRC's Chief Executive.

The remuneration of members of EPSRC's Council is reviewed annually by the Office of Science and Innovation.

Details of the service contracts of the Chief Executive and Directors are given in the table below.

	Contract Start Date	Contract End Date	Notice Period
Professor J O'Reilly, Chief Executive	1 October 2001	30 September 2008	3 months
Mrs C Coates, Director	Permanent Contract	–	3 months
Mr A Emecz, Director	Permanent Contract	–	3 months
Professor R Richards, Director	Permanent Contract	–	3 months
Mr S Ward, Director	Permanent Contract	–	3 months

Audited Information

Salary and Pension Entitlements

The following section provides details of the remuneration and pension interests of the Chief Executive, Directors and EPSRC Council members.

Remuneration

Chief Executive and Directors	2005-06 Salary £k	2005-06 Performance Related Bonus	2004-05 Salary £k	2004-05 Performance Related Bonus
Professor J O'Reilly, Chief Executive	115-120	to be decided	110-115	15-20
Mrs C Coates, Director	65-70	to be decided	60-65	0-5
Dr D Leech, Director (to 30 September 2005)	80-85	to be decided	75-80	0-5
Mr A Emecz, Director (from 1 October 2005)	50-55	to be decided	–	–
Professor R Richards, Director	75-80	to be decided	70-75	0-5
Mr S Ward, Director	70-75	to be decided	65-70	0-5

'Salary' includes gross salary; overtime; recruitment and retention allowances and any other allowance to the extent that it is subject to UK taxation.

There were no benefits in kind during either 2004/05 or 2005/06.

Pension Benefits

A Cash Equivalent Transfer Value (CETV) is the actuarially assessed capitalised value of the pension scheme benefits accrued by a member at a particular point in time. The pension figures shown relate to the benefits that the individual has accrued as a consequence of their total membership of the pension scheme, not just their service in a senior capacity.

The real increase in CETV reflects the increase in CETV effectively funded by the employer. It takes account of the increase in accrued pension due to inflation, contributions paid by the employee (including the value of any benefits transferred from another pension scheme or arrangement) and uses common market valuation factors for the start and end of the period.

Pension Benefits continued

Chief Executive and Directors	Prof. J O'Reilly Chief Executive £'000	Mrs C Coates Director £'000	Dr D Leech Director (to 30.09.05) £'000	Mr A Emecz Director (from 01.10.05) £'000	Prof. R Richards Director £'000	Mr S Ward Director £'000
Accrued pension at age 60 as at 31.03.06	5-10 plus 15-20 lump sum	20-25 plus 60-65 lump sum	30-35 plus 100-105 lump sum	10-15 plus 30-35 lump sum	35-40	30-35 plus 95-100 lump sum
Real increase in pension at age 60	0-2.5 plus 2.5-5 lump sum	0-5 plus 25-30 lump sum	0-5 plus 5-10 lump sum	0-5 plus 0-5 lump sum	0-5	0-5 plus 0-5 lump sum
Cash Equivalent Transfer Value (CETV) at 31/03/06	139	426	742	156	700	743
CETV at 31/03/05	90	172	644	109	531	589
Real increase in CETV	30	61	42	7	54	30

The Research Councils' Pension Schemes (RCPS), of which most of the Council's employees are members, are unfunded multi-employer defined benefit schemes, but EPSRC is unable to identify its share of the underlying assets and liabilities. A full actuarial valuation was carried out at 31st March 2002 and details can be found in the Research Councils' Pension Schemes Account at www.bbsrc.ac.uk.

For 2005/06, normal employers' contributions of £1,651,129 were payable to the RCPS (2004/05 £780,497) at a rate of 21.3% (2004/05 10.1%). Employer contributions are to be reviewed every four years following a full scheme valuation by the Government Actuary. The contribution rates reflect benefits as they are accrued, not when the costs are actually incurred, and reflect past experience of the scheme.

No members of the RCPS retired on ill-health grounds during 2005/06.

Council Members' Remuneration

The Chair and the Council Members are appointed by the Office of Science and Innovation (OSI) on behalf of the Secretary of State for Trade and Industry. The contract terms vary between individual members, but the terms and conditions of appointment are standard. EPSRC provides each member of Council with a Code of Practice which sets out a framework in which they are expected to operate.

Council members receive an honorarium in recognition of their service to EPSRC, together with a refund of their reasonable expenses. Council members are not employees of EPSRC and the appointments are not pensionable. Members of Council who are civil servants are not entitled to receive an honorarium.

Remuneration	2005-06 £	2004-05 £
Professor Dame Julia Higgins FRS, FREng – Chair	14,900	14,550
Professor R Anderson FRS	–	–
Professor J S Archer CBE, FREng, FRSE	6,200	6,060
Professor J N Chapman FRSE	6,200	6,060
Professor A P Dowling CBE, FREng, FRS	8,265	8,080
Professor S E Gibson	6,200	6,060
Dr D Grant CBE, FREng	6,200	6,060
Dr C Harrison	6,200	n/a
Mr D Hughes FREng	–	–
Dr S Ion OBE, FREng	6,200	n/a
Mr D Jordan CBE, CEng, FIEE, FCMA	6,200	6,060
Mrs J A G Kennedy OBE, FREng	8,265	8,080
Mr J N Loughhead (to 30 September 2005)	4,080	8,080
Professor M Taylor FRS	6,200	6,060
Professor W A Wakeham FREng	6,200	6,060

Professor John O'Reilly Accounting Officer, 13th July 2006

Statement of the responsibilities

of the Engineering and Physical Sciences Research Council and of its Chief Executive with respect to the Financial Statements

Under Paragraph 3 of Schedule 1 to the Science and Technology Act 1965, the Secretary of State for Trade and Industry has directed the EPSRC to prepare for each financial year a Statement of Accounts in the form and on the basis set out in the Accounts Direction. The Accounts are prepared on an accruals basis and must give a true and fair view of the state of affairs of the EPSRC and of its income and expenditure, recognised gains and losses and cash flows for the financial year.

In preparing the Accounts the Accounting Officer is required to comply with the requirements of the *Government Financial Reporting Manual* and in particular to:

- Observe the Accounts Direction issued by the Secretary of State for Trade and Industry, including the relevant accounting and disclosure requirements, and apply suitable accounting policies on a consistent basis;
- Make judgements and estimates on a reasonable basis;
- State whether applicable accounting standards as set out in the *Government Financial Reporting Manual* have been followed, and disclose and explain any material departures in the financial statements; and
- Prepare the financial statements on a going concern basis.

The Secretary of State has appointed the Chief Executive as the Accounting Officer for the EPSRC. The responsibilities of an Accounting Officer, including responsibility for the propriety and regularity of the public finances for which the Accounting Officer is answerable, for keeping proper records and for safeguarding the EPSRC's assets, are set out in the Accounting Officers' Memorandum, issued by HM Treasury and published in '*Government Accounting*'.

Accounting Officer's Statement on Internal Control

1. Scope of responsibility

As Accounting Officer, I have responsibility for maintaining a sound system of internal control that supports the achievement of the EPSRC's policies, aims and objectives, whilst safeguarding the public funds and organisational assets for which I am personally responsible, in accordance with the responsibilities assigned to me and described in '*Government Accounting*'.

2. The purpose of the system of internal control

The system of internal control is designed to manage risk to a reasonable level rather than to eliminate all risk of failure; it can therefore only provide reasonable and not absolute assurance of effectiveness. The system of internal control is based on an ongoing process designed to identify and prioritise the risks to the achievement of organisational policies, aims and objectives, to evaluate the likelihood of those risks being realised and the impact should they be realised, and to manage them efficiently, effectively and economically. The system of internal control has been in place in the EPSRC for the year ended 31st March 2006 and up to the date of approval of the annual report and accounts, and accords with Treasury guidance.

3. Capacity to handle risk

Executive Management Group

The Executive Management Group (EMG), comprising the Chief Executive, the four Directors and the Head of Finance, is the executive body for the EPSRC, providing top-level leadership and guidance on risk management issues. EMG has agreed a corporate risk management policy. EMG regularly considers risk matters, and reviews the corporate and Directorate risk registers for changes in risk status and for issues requiring consideration and action. Business-critical projects are reviewed at least every three months and, should problems arise, EMG will consider appropriate actions at one of its twice-monthly meetings.

Business Assurance

The Head of Finance is responsible for the Business Assurance function within the EPSRC, including the coordination of risk management activities. These activities include: maintaining the corporate risk register; providing advice and guidance to Directorates; ensuring that Directorate risk registers are kept up-to-date; obtaining quarterly business-critical project progress reports and providing these to EMG; and liaising with internal audit on its audit activities.

Performance and Risk Management Project

EPSRC implemented the Performance and Risk Management (PRM) System on 1st April 2006. PRM uses a balanced scorecard methodology to link key performance indicators with strategies and risks to form an integrated management system.

Staff Training

All staff undergo an induction process that involves a risk awareness element, familiarising them with the need for risk management activities within the Council and providing them with the basics on how to assess, monitor and control risks. Risk registers and risk evaluation criteria are provided on the document management system and the PRM system for information and to provide examples of what is required when managing risk. Similarly, the Research Councils' Internal Audit Service Good Practice Bulletin on Risk Management is also available for guidance.

Any staff requiring more information than is described above have available various options. An individual's Directorate risk coordinator or the Head of Financial Accounting can be contacted, as these staff have gained suitable experience of the approaches required in risk management within the Council to be able to provide relevant advice and guidance. If it is decided, by a line manager or Director, that an individual requires formal training in risk management, perhaps as a result of responsibility for one or more major risks, then this can be undertaken. Adequate resources are provided to allow for staff training, and Directorate Learning and Development Coordinators are able to find appropriate courses with external providers.

Good Practice

The Research Councils' Internal Audit Service (RCIAS) regularly carries out audits relevant to the Councils' risk management activities. In 2005/06 relevant audits were on Business Critical Projects and the use of the Government Procurement Card (as part of the annual Finance Health Check). Final reports have yet to be received on these audits, but no issues have been brought to the attention of EPSRC staff.

4. The risk and control framework

The Council of the EPSRC

The Council of the EPSRC has a responsibility to ensure that high standards of corporate governance are observed at all times. Council periodically receives information about risk management. It also receives an annual report from the Resource Audit Committee which includes comment on risk management and business-critical projects. Council has responsibility for decisions on major capital projects, after having reviewed the business case and the risks involved in the venture.

Directors and Directorates

EMG delegates responsibility for each of the corporate risks to one or more of the Directors. Each Director bears responsibility for these and the risks associated with his/her Directorate's activities. Responsibility for the day-to-day management of each of these risks, including ongoing monitoring of the risk status and taking actions to mitigate the risk, is frequently delegated to a member of the Directorate staff. Each Directorate has an individual responsible for coordinating risk management activities. Directors, risk coordinators and relevant staff regularly review the Directorate risks: for new elements to a risk; for changes in status (changes in the likelihood of occurrence or in the impact that would be felt should the risk be realised) as a result of factors internal or external to the Council; for progress in mitigating risks; to determine whether or not the existing controls are adequate; and to determine whether further actions are required. Proposed projects or initiatives are considered at an early stage to assess risk management and to determine the balance of benefits and risks. The Director responsible will then make a decision on whether or not to proceed, or will seek a decision from EMG.

The Resource Audit Committee

The Resource Audit Committee (RAC) is a committee of Council tasked with monitoring standards of internal control and propriety, economy, efficiency and effectiveness, and for evaluating the extent to which systems and procedures are appropriate to allow the EPSRC's objectives to be met. The Resource Audit Committee's responsibilities include: examining the manner in which management ensures and monitors the adequacy of the nature, extent and effectiveness of internal control systems; paying particular attention to risks and contingency plans on all business-critical projects; and monitoring the nature and scope of the work of Internal Audit. RAC makes recommendations to EMG and reports to Council following its meetings.

Research Councils' Internal Audit Service

The Research Councils' Internal Audit Service (RCIAS) and EMG work together to agree the range of audits to be carried out each year. The Resource Audit Committee confirms the annual audit plan. The report of this audit is used by EMG in its decision-making on what actions are necessary to maintain high standards in the EPSRC's corporate governance and risk management procedures.

In addition to the advice resulting from audits, Internal Audit guidance is welcomed as a source of updated best practice.

Controls

EPSRC has in place a system of controls which includes:

- Annual Directors' Internal Control Statements;
- A programme of visits by officials to Higher Education Institutions and office-based tests which seek assurance that research grant funds are used for the purpose for which they are given and that grants are managed in accordance with the terms and conditions under which they are awarded;
- Ongoing review of risks and the necessary resulting actions;
- Responsibility for managing risks delegated to the appropriate level within the organisation;
- Regular management review of risks and business-critical projects;
- Regular external review of risk management procedures.

EPSRC currently has two projects designated as business-critical – the procurement of the next generation UK high performance computer service, and the Performance and Risk Management project.

5. Review of Effectiveness

As Accounting Officer I have responsibility for reviewing the effectiveness of the system of internal control. My review of the effectiveness of the system of internal control is informed by the work of the internal auditors and the executive managers within the EPSRC who have responsibility for the development and maintenance of the internal control framework, and comments made by the external auditors in their Management Letter and other reports. I have been advised on the implications of the result of my review of the effectiveness of the system of internal control by the Council and the Resource Audit Committee, and a plan to address weaknesses and ensure continuous improvement of the system is in place.

The internal control system provides confidence that the risk is managed to a reasonable level and I can provide assurance that it supports the achievement of the EPSRC's policies, aims and objectives.

Professor John O'Reilly Accounting Officer
13th July 2006

The Certificate and Report of the Comptroller and Auditor General to the Houses of Parliament

I certify that I have audited the financial statements of the Engineering and Physical Sciences Research Council for the year ended 31 March 2006 under the Science and Technology Act 1965. These comprise the Income and Expenditure Account, the Balance Sheet, the Cashflow Statement and Statement of Total Recognised Gains and Losses and the related notes. These financial statements have been prepared under the accounting policies set out within them.

Respective responsibilities of the Council, Chief Executive and Auditor

The Council and Chief Executive are responsible for preparing the Annual Report, the Remuneration Report and the financial statements in accordance with the Science and Technology Act 1965 and Secretary of State for Trade and Industry directions made thereunder and for ensuring the regularity of financial transactions. These responsibilities are set out in the Statement of Council and Chief Executive's Responsibilities.

My responsibility is to audit the financial statements in accordance with relevant legal and regulatory requirements, and with International Standards on Auditing (UK and Ireland).

I report to you my opinion as to whether the financial statements give a true and fair view and whether the financial statements and the part of the Remuneration Report to be audited have been properly prepared in accordance with the Science and Technology Act 1965 and Secretary of State for Trade and Industry directions made thereunder. I also report whether in all material respects the expenditure and income have been applied to the purposes intended by Parliament and the financial transactions conform to the authorities which govern them. I also report to you if, in my opinion, the Annual Report is not consistent with the financial statements, if the Engineering and Physical Sciences Research Council has not kept proper accounting records, if I have not received all the information and explanations I require for my audit, or if information specified by relevant authorities regarding remuneration and other transactions is not disclosed.

I review whether the statement on pages 57 to 59 reflects the Engineering and Physical Sciences Research Council's compliance with HM Treasury's guidance on the Statement on Internal Control, and I report if it does not. I am not required to consider whether the Accounting Officer's statements on internal control cover all risks and controls, or form an opinion on the effectiveness of the Engineering and Physical Sciences Research Council's corporate governance procedures or its risk and control procedures.

I read the other information contained in the Annual Report and consider whether it is consistent with the audited financial statements. This other information comprises only the Chair of EPSRC's Introduction, the Chief Executive's Summary, the Management Commentary, the Directors' Report and the unaudited part of the Remuneration Report. I consider the implications for my report if I become aware of any apparent misstatements or material inconsistencies with the financial statements. My responsibilities do not extend to any other information.

Basis of audit opinion

I conducted my audit in accordance with International Standards on Auditing (UK and Ireland) issued by the Auditing Practices Board. My audit includes examination, on a test basis, of evidence relevant to the amounts, disclosures and regularity of financial transactions included in the financial statements and the part of the Remuneration Report to be audited. It also includes an assessment of the significant estimates and judgments made by the Council and Chief Executive in the preparation of the financial statements, and of whether the accounting policies are most appropriate to the Engineering and Physical Sciences Research Council's circumstances, consistently applied and adequately disclosed.

I planned and performed my audit so as to obtain all the information and explanations which I considered necessary in order to provide me with sufficient evidence to give reasonable assurance that the financial statements and the part of the Remuneration Report to be audited are free from material misstatement, whether caused by fraud or error and that in all material respects the expenditure and income have been applied to the purposes intended by Parliament and the financial transactions conform to the authorities which govern them. In forming my opinion I also evaluated the overall adequacy of the presentation of information in the financial statements and the part of the Remuneration Report to be audited.

Opinion

In my opinion:

- The financial statements give a true and fair view, in accordance with the Science and Technology Act 1965 and directions made thereunder by the Secretary of State for Trade and Industry, of the state of affairs of the Engineering and Physical Sciences Research Council as at 31 March 2006 and of its surplus for the year then ended;
- The financial statements and the part of the Remuneration Report to be audited have been properly prepared in accordance with the Science and Technology Act 1965 and Secretary of State for Trade and Industry directions made thereunder;
- In all material respects the expenditure and income have been applied to the purposes intended by Parliament and the financial transactions conform to the authorities which govern them.

I have no observations to make on these financial statements.

John Bourn Comptroller and Auditor General, 18th July 2006
National Audit Office, 157-197 Buckingham Palace Road, Victoria, London SW1W 9SP

Income and Expenditure Account

for the year ended 31st March 2006

	Notes	2006 £'000	2005 £'000
INCOME			
Parliamentary Grant-in-Aid	3	**553,228**	489,199
Release of Government Grant Reserve	20	**567**	506
Joint Infrastructure	7	**–**	4,992
Foresight Link 3	7	**212**	1,609
Other Operating Income	4	**21,627**	18,568
		575,634	514,874
EXPENDITURE			
Research	6	**366,137**	314,933
Joint Infrastructure	7	**–**	4,992
Foresight Link 3	7	**212**	1,609
Science in Society Programme	8	**3,231**	2,013
UK Research Facilities	9	**21,625**	24,749
International Subscriptions	10	**171**	161
Postgraduate Awards	11	**134,750**	125,726
Research Fellowships	12	**24,340**	15,562
Staff Costs	13	**13,751**	12,138
Other Operating Costs	14	**9,207**	8,540
		573,424	510,423
OPERATING SURPLUS		**2,210**	4,451
Non-operating income	5	**5**	5
Amounts payable to the Consolidated Fund	5	**(5)**	(5)
Notional Cost of Capital	19	**1,406**	1,621
SURPLUS FOR THE YEAR		**3,616**	6,072
Reversal of Notional Cost of Capital	19	**(1,406)**	(1,621)
		2,210	4,451

All activities are continuing.
The Notes on pages 65 to 75 form part of these Accounts.

Balance Sheet
as at 31st March 2006

	Notes	2006 £'000	2006 £'000	2005 £'000
FIXED ASSETS				
Tangible fixed assets	15		**7,658**	6,285
CURRENT ASSETS				
Debtors	16	**8,121**		9,282
Cash at bank and in hand		**3,594**		9,281
		11,715		18,563
CREDITORS DUE WITHIN ONE YEAR	17	**(51,051)**		(60,065)
Net current liabilities			**(39,336)**	(41,502)
Total Assets less Current Liabilities			**(31,678)**	(35,217)
CREDITORS DUE AFTER MORE THAN ONE YEAR	18		**(255)**	(367)
			(31,933)	(35,584)
CAPITAL AND RESERVES				
Government grant reserve	20	**4,739**		4,013
Revaluation reserve	20	**2,650**		2,003
Capital land reserve	20	**270**		270
Income and Expenditure Account	20	**(39,592)**		(41,870)
Deficit on Government Funds	20		**(31,933)**	(35,584)

The Notes on pages 65 to 75 form part of these Accounts.

Professor John O'Reilly Accounting Officer
13th July 2006

Cash Flow Statement
for the year ended
31st March 2006

	Notes	2006 £'000	2005 £'000
CASH FLOW STATEMENT			
Net cash (outflow)/inflow from operating activities		**(5,687)**	1,285
Capital expenditure:-			
Payments to acquire fixed assets	15	**(1,293)**	(801)
Net cash (outflow)/inflow before financing		**(6,980)**	484
Financing:-			
Capital Grant-in-Aid received	3, 20	**1,293**	801
(DECREASE)/INCREASE IN CASH		**(5,687)**	1,285

RECONCILIATION OF OPERATING SURPLUS TO NET CASH (OUTFLOW)/INFLOW FROM OPERATING ACTIVITIES			
Operating surplus		**2,210**	4,451
Depreciation charge/losses on disposal of assets	14	**635**	559
Decrease/(increase) in debtors	16	**1,161**	(1,618)
Decrease in creditors	17,18	**(9,126)**	(1,601)
Release of Government Grant Reserve	20	**(567)**	(506)
Net cash (outflow)/inflow from operating activities		**(5,687)**	1,285

RECONCILIATION OF NET CASH FLOW TO MOVEMENT IN NET FUNDS		
Cash at 1st April	**9,281**	7,996
(Decrease)/increase in cash in year	**(5,687)**	1,285
Cash at 31st March	**3,594**	9,281

Statement of total recognised gains and losses
for the year ended
31st March 2006

	2006 £'000	2005 £'000
Surplus for the year	**3,616**	6,072
Capital Grant-in-Aid received in the year	**1,293**	801
Release of Government Grant Reserve to Income in year	**(567)**	(506)
Reversal of Notional Cost of Capital	**(1,406)**	(1,621)
Surplus on revaluation of Fixed Assets in the year	**715**	96
Total recognised gains and losses relating to the year	**3,651**	4,842

The Notes on pages 65 to 75 form part of these Accounts.

1. Accounting policies

(a) Accounting Convention

These Accounts have been prepared under the historical cost convention, adjusted to include the revaluation of certain fixed assets, complying with the Accounts Direction of 27th November 2001 given by the Secretary of State for Trade and Industry in accordance with section 2(2) of the Science and Technology Act 1965.

The Accounts conform, in so far as is practicable and appropriate, with the Accounting Standards, Companies Acts, Financial Reporting Manual and specific Treasury guidance.

(b) Going Concern

The Balance Sheet at 31st March 2006 shows net liabilities of £31.9m. This reflects the inclusion of liabilities falling due in future years which, to the extent that they are not to be met from the EPSRC's other sources of income, may only be met by future grants or grants-in-aid from the EPSRC's sponsoring department, the Department of Trade and Industry through the Office of Science and Innovation (OSI). This is because, under the normal conventions applying to parliamentary control over income and expenditure, such grants may not be issued in advance of need.

Grant-in-aid for 2006-07, taking into account the amounts required to meet the EPSRC's liabilities falling due in that year, has already been included in the Department's Estimates for that year, which have been approved by Parliament. As part of the formal accounting and audit process the OSI has provided an assurance of their financial support for the accumulated deficit, and there is no reason to believe that the Department's future sponsorship and future parliamentary approval will not be forthcoming. It has accordingly been considered appropriate to adopt a going concern basis for the preparation of these financial statements.

(c) Fixed Assets and Depreciation

Capital expenditure includes the purchase of land and/or buildings, construction and services projects, and equipment valued at £3,000 or more. Individual items valued at less than the threshold are capitalised if they constitute integral parts of a composite asset that is in total valued at more than the threshold. Individual items valued at less than the threshold and not forming part of a composite asset are not capitalised.

Tangible fixed assets are included at cost or at valuation. The basis of valuation is Open Market Value for existing use where this can be established, otherwise Current Depreciated Replacement Cost. Land and Buildings and major items of equipment are professionally valued at least every five years, at which time the remaining useful life of each revalued asset is also reassessed. The last valuation was in January 2006, conducted by Powis Hughes and Associates, Chartered Surveyors. The basis of the valuation was Open Market Value. Between formal professional valuations appropriate indices are used.

Surpluses or deficits on revaluation are taken to the Revaluation Reserve, except that any permanent diminution in value is charged to the Income and Expenditure Account in the year in which it arises. Increased depreciation charges arising from the revaluation are matched by annual transfers from the Revaluation Reserve to the Income and Expenditure Account. On the disposal of a fixed asset, that element of the Revaluation Reserve which thereby becomes realised is transferred directly to the Income and Expenditure Account.

Tangible fixed assets are depreciated at rates calculated to write off the costs or the valuation of each asset evenly over its expected useful life, as follows:

Freehold land	not depreciated
Freehold buildings	62 years
Specialist scientific equipment	10 – 15 years
IT equipment	3 years
Software (third party licences)	the lesser of 5 years or the term of the licence
Software (not third party licences)	5 years
Fixtures and fittings	5 years
General office equipment	5 years

(d) Ownership of Equipment Purchased with EPSRC Research Grants

Equipment purchased by an organisation with research grant funds supplied by the EPSRC belongs to the organisation and is not included in the EPSRC's fixed assets. Through the Conditions of Grant applied to funded organisations, the EPSRC reserves the right to determine how such equipment shall be disposed of, and how any disposal proceeds are to be utilised, if disposal is to occur during a certain period determined at the award of the grant. After that date the equipment is at the free disposal of the organisation.

(e) Equipment Located Elsewhere

EPSRC owns assets with a combined net book value of £2.4m which are located elsewhere but are included in the Balance Sheet.

A pool of scientific equipment is provided and updated by the Council for the Central Laboratory of the Research Councils (CCLRC) on behalf of the EPSRC, specifically for loan to research organisations. Wherever located, this equipment remains the property of the EPSRC and is therefore included in the Balance Sheet.

In 2005/06, EPSRC purchased assets valued at £541.3k for Fusion research at Culham. This equipment will remain the property of the EPSRC and is therefore included in the Balance Sheet.

Scientific equipment derived from the dismantled Nuclear Structure Facility at Daresbury Laboratory remains in the care of organisations in the UK and abroad, and for the time being also remains the property of the EPSRC.

(f) Grant-in-Aid

Grant in Aid for revenue purposes is credited to income in the year in which it is received. Grant in Aid applied for the purchase of land is credited to the Capital Land Reserve. That applied to the purchase of other fixed assets is credited to the Government Grant Reserve and released to the Income and Expenditure Account over the estimated operational lives of those assets.

(g) Research and Development

As a research organisation, all the EPSRC's research and development expenditure is charged to the Income and Expenditure Account when it is incurred. Intellectual property rights arising from research and development funded by the EPSRC are passed to the organisations performing the research.

(h) Foreign Exchange

Transactions denominated in foreign currencies are translated into sterling at the rate of exchange ruling at the date of transactions. Any exchange differences arising in the ordinary course of business are taken to the Income and Expenditure Account. Assets and liabilities in foreign currencies in existence at the Balance Sheet date are translated at the rates ruling at that date.

(i) Research Grants

Subject to the terms and conditions under which research grants are awarded, the EPSRC makes payments for grants on the basis of pre-determined quarterly profiles. Profiles are arranged, in overall terms, to reflect the rate and incidence of expenditure at the grant holding organisation. Payments are normally made in the period to which they relate, although the EPSRC retains some latitude in timing. Future commitments at the Balance Sheet date are disclosed in Note 21.

(j) Value Added Tax

As the EPSRC is partially exempt for VAT purposes, all items of expenditure and fixed asset purchases are shown inclusive of VAT where applicable. Residual input tax reclaimed under the partial exemption scheme is taken to the Income and Expenditure Account as other income.

(k) Superannuation Schemes

Employees of the Council are members of the Research Councils' Pension Scheme, which is funded on a pay-as-you-go basis. The amount charged against income and expenditure represents the contributions payable to the scheme in respect of current employees in the accounting period. Contributions are charged on a year-by-year basis in accordance with the requirements of the scheme administrators. A small number of EPSRC staff retained membership of the UKAEA Principal Non-Industrial Superannuation Scheme (PNISS) by virtue of their earlier employment.

(l) Notional Cost of Capital

In line with HM Treasury requirements, the EPSRC has included non-cash income in respect of cost of capital charged at 3.5% (2004/05 3.5%).

2. Financial instruments

FRS 13, *'Derivatives and Other Financial Instruments'*, requires disclosure of the role which financial instruments have had during the year in creating or changing the risks an entity faces in undertaking its activities. Because of the largely non-trading nature of its activities and the way in which the EPSRC is financed, the EPSRC is not exposed to the degree of financial risk faced by business entities. Moreover, financial instruments play a much more limited role in creating or changing risk than would be typical of the listed companies to which FRS 13 mainly applies. The Council's financial assets and liabilities are generated by day-to-day operational activities and are not held to change the risks facing the department in undertaking its activities.

As permitted by FRS 13, debtors and creditors which mature or become payable within 12 months from the balance sheet date have been omitted from the currency profile.

Liquidity Risk

The Council's net revenue resource requirements are financed by resources voted annually by Parliament, as is its capital expenditure. The EPSRC is not therefore exposed to significant liquidity risks. The EPSRC is dependent on funding from the Department of Trade and Industry to meet liabilities falling due in future years, but there is no reason to believe that this funding will not be forthcoming.

Interest-Rate Risk

None of the Council's financial assets or liabilities is subject to interest, and the Council is not therefore exposed to interest-rate risk.

Currency Profile

At the balance sheet date the EPSRC held no significant foreign currency assets or liabilities.

Foreign Currency Risk

The Council's exposure to foreign currency risk is not significant. Foreign currency expenditure and income during 2005/06 were negligible.

3. Parliamentary Grant-in-Aid

The grant was provided under the Request for Resources 2 for the financial year 2005/06. Components of the Grant-in-Aid provision are as follows:

	2006 £'000	2005 £'000
Total amount received for the year	**554,521**	490,000
Amount employed on capital expenditure	**(1,293)**	(801)
Amount employed on revenue activities and credited to the Income and Expenditure Account	**553,228**	489,199

4. Other operating income

	2006 £'000	2005 £'000
Contributions from Other Research Councils	**9,262**	8,430
Contributions from Government Departments	**842**	1,274
Contributions from Executive Agencies	**3,916**	4,651
Contributions and Grants from Other Bodies	**3,719**	2,156
Other Operating Income	**3,888**	2,057
Total	**21,627**	18,568

5. Non-operating income

	2006 £'000	2005 £'000
Unanticipated receipts this financial year relating to amounts paid or claims registered in previous year	**5**	5
Total surrendered to Consolidated Fund (CFER)	**5**	5

6. Research

Total gross expenditure on research grants shown by programme:

	2006 £'000	2005 £'000
Basic Technology	**22,229**	16,079
Chemistry	**38,346**	31,158
Core e-Science	**10,428**	13,473
Engineering	**65,741**	51,594
Fusion	**15,932**	18,701
High Performance Computing	**468**	75
Information and Communications Technologies	**53,437**	51,048
Innovative Manufacturing	**25,067**	21,201
Infrastructure and Environment	**23,789**	22,153
Life Sciences Interface (LSI)	**15,494**	13,266
Materials	**39,561**	33,953
Mathematical Sciences	**10,138**	8,778
Physics	**31,549**	24,876
Other Activities	**13,958**	8,578
Total	**366,137**	314,933

Although Fusion is not strictly speaking an EPSRC programme, Fusion grants have been separated out to reflect the significant level of expenditure.

7. Joint infrastructure and Foresight Link

The EPSRC acts as managing agent for Joint Infrastructure grants on behalf of the OSI, and Foresight Link 3 grants on behalf of the DTI. Funds are drawn down from the OSI to match expenditure incurred.

8. Science in Society Programme

The EPSRC has a Science in Society Programme (SiS) for its research grant holders and Fellows.

	2006 £'000	2005 £'000
Research grants	**1,471**	918
Senior Media Fellowship	**87**	46
Programme sponsorships	**1,673**	1,049
Total Expenditure on SiS	**3,231**	2,013

9. UK Research Facilities

	2006 £'000	2005 £'000
High Performance Computing:		
CSAR	**5,961**	4,875
University of Edinburgh	**8,165**	11,009
Total High Performance Computing	**14,126**	15,884
CCLRC	**3,405**	3,504
Other expenditure on research facilities	**4,094**	5,361
Total expenditure on UK research facilities	**21,625**	24,749

10. International Subscriptions

Total amounts paid in the year for current operations:

	2006 £'000	2005 £'000
European Science Foundation (ESF)	**171**	161

11. Postgraduate Awards

	2006 £'000	2005 £'000
Collaborative Training Grants	**34,873**	28,069
Cooperative Awards in Science and Engineering (CASE)	**565**	3,341
Doctoral Training Grants	**72,259**	64,303
Dorothy Hodgkin Postgraduate Awards	**3,593**	1,167
Engineering Doctorates	**754**	2,425
Industrial CASE	**6,659**	7,941
International Doctoral Scholarships	**901**	369
LSI Doctoral Training Centres	**3,568**	2,028
Masters Training Packages	**716**	6,290
Research Studentships	**325**	1,350
Other awards	**10,537**	8,443
Total	**134,750**	125,726

12. Research Fellowships

	2006 £'000	2005 £'000
Academic	**8,929**	2,337
Advanced	**9,090**	8,573
European Young Investigator (EURYI)	**694**	66
Postdoctoral	**2,164**	1,495
Senior	**852**	899
Other Fellowships	**2,611**	2,192
Total	**24,340**	15,562

13. Staff

(a) Staff Costs

	2006 £'000	2005 £'000
Salaries and wages:		
Permanent Staff	**8,222**	7,962
Agency Staff and Contract Personnel	**2,830**	2,351
Social Security Costs	**573**	591
Other Pension Costs	**1,668**	790
Council and Panel members' fees and honoraria	**439**	469
Current Staff Costs	**13,732**	12,163
Net Early Retirement Costs (see note (b) below)	**19**	(25)
Total Staff Costs	**13,751**	12,138

(b) Staff Early Retirement Costs

Staff Early Retirement costs are stated net of a refund of pension funds amounting to £2k. The total staff restructuring costs increased by £21k during the year.

(c) Staff Numbers

Average numbers of full-time equivalent employees during the year:

	2006	2005
Senior Management	**37**	39
Managerial and Supervisory	**173**	180
Administrative Support	**92**	97
Average number of staff employed	**302**	316
Contract Staff	**34**	29
Agency Staff	**5**	6
Total average number of staff	**341**	351

(d) Remuneration of Senior Employees

The following numbers of senior employees, including Directors, received remuneration falling within the ranges shown:

	2006	2005
£100,000 and above	**1**	2
£90,000 – £99,999	**–**	–
£80,000 – £89,999	**–**	–
£70,000 – £79,999	**2**	3
£60,000 – £69,999	**1**	1
£50,000 – £59,999	**5**	2

(e) Remuneration of Council and Panel Members

The total emoluments of the Chair, Professor Dame Julia Higgins, were £14,900 including taxable benefits.

The Chairman of the E-Science Steering Committee, Professor D Wallace (start of appointment 1st April 2001), received emoluments totalling £6,200.

The standard honorarium paid to Council members was £6,200 (2004/05 £6,120), although two Council members during the year who were members of other Government departments were not entitled to claim honoraria.

The standard daily attendance allowance paid to Panel members was £160 (2004/05 £150).

	No	**2006 £'000**	No	2005 £'000
Council members' annual honoraria:				
£5,001 to £10,000	**12**	**77**	11	67
Daily attendance fees paid to panel members		**357**		391
Social Security Costs		**3**		3
		437		461
Chair's emoluments		**15**		15
Total		**452**		476

14. Other operating Costs

	2006 £'000	2005 £'000
Services	**3,859**	3,672
Travel and Subsistence	**1,692**	1,565
Equipment and Supplies	**99**	257
Consultancies	**1,096**	710
External Auditors' Remuneration	**39**	38
Rent, Rates and Maintenance	**694**	588
General Administration	**1,095**	1,156
Write-offs and Recoveries	**(2)**	(5)
Depreciation and Loss on Disposal of Assets	**635**	559
Total	**9,207**	8,540

15. Fixed Assets

	Freehold Land & Buildings £'000	Office & Scientific Equipment £'000	Totals £'000
Valuation			
Balance as at 1st April 2005	6,665	6,170	12,835
Additions (see note below)	–	1,293	1,293
Revaluation for year	892	(118)	774
Disposals	–	(94)	(94)
Valuation at 31st March 2006	**7,557**	**7,251**	**14,808**
Depreciation			
Balance as at 1st April 2005	2,404	4,146	6,550
Charge for the year	107	512	619
Revaluation adjustments	125	(66)	59
Disposals	–	(78)	(78)
Depreciation at 31st March 2006	**2,636**	**4,514**	**7,150**
Net book value:			
at 31st March 2006	**4,921**	**2,737**	**7,658**
at 1st April 2005	4,261	2,024	6,285

These assets are funded solely from Grant-in-Aid. Additions for the year include assets valued at £541k purchased for Fusion research at Culham and £645k purchased for the Engineering Loan Pool at CCLRC.

Included in Freehold Land and Buildings is £852,060 (2004/05 £716,314) in respect of Freehold Land which is not depreciated.

The last professional valuation of land and buildings was in January 2006, conducted by Powis Hughes and Associates, Chartered Surveyors. The basis of the valuation was Open Market Value for existing use. The valuation was made in accordance with RICS Appraisal and Valuation Manual or a named alternative. Between formal professional valuations appropriate indices are used.

16. Debtors

	2006 £'000	2005 £'000
Debtors:		
Other Central Government bodies	**1,220**	1,449
Public Corporations and Trading Funds	**14**	–
Other debtors	**2,529**	1,613
Prepayments and Accrued Income:		
Other Central Government bodies	**2,884**	2,009
Public Corporations and Trading Funds	**905**	1,204
Other prepayments and accrued income	**569**	3,007
Total	**8,121**	9,282

Note: Other Debtors includes the sum of £195k (2004/05 £276k) relating to debtors due after more than one year.

17. Creditors due within one year

	2006 £'000	2005 £'000
Creditors:		
Other Central Government bodies	**315**	982
Public Corporations and Trading Funds	**4**	–
Other creditors	**28,361**	40,386
Accrued Expenditure:		
Other Central Government bodies	**2,947**	6,997
Public Corporations and Trading Funds	**18**	431
Other accrued expenditure	**12,208**	6,872
Deferred Income:		
Other Central Government bodies	**995**	492
Other deferred income	**6,203**	3,905
Total	**51,051**	60,065

18. Creditors due after more than one year

	2006 £'000	2005 £'000
Early retirement costs	**255**	367

19. Notional cost of capital

	2006 £'000	2005 £'000
Notional cost of capital	**1,406**	1,621

The EPSRC is not funded for interest-bearing debts, but to ensure that the Income and Expenditure Account bears an appropriate charge for the use of capital employed, a notional interest charge has been included.

In accordance with HM Treasury guidance, the cost of capital is calculated as 3.5% of the average of net assets or liabilities during the year. Because the net assets of EPSRC are negative, the cost of capital is a credit rather than a charge, and has been included in the Income and Expenditure Account to arrive at the surplus for the year.

20. Reconciliation of movements in Government funds

	Government Grant Reserve £'000	Revaluation Reserve £'000	Capital Land Reserve £'000	Income and Expenditure Account £'000	Government Funds £'000
Opening Balance	4,013	2,003	270	(41,870)	(35,584)
Surplus for the year after reversal of cost of capital	–	–	–	2,210	2,210
Transfer from Revaluation Reserve to income and expenditure account	–	(68)	–	68	–
Net surplus on revaluation of tangible fixed assets	–	715	–	–	715
Capital Grant-in-Aid received in year	1,293	–	–	–	1,293
Release of Government Grant Reserve to income in year	(567)	–	–	–	(567)
Closing Balance	**4,739**	**2,650**	**270**	**(39,592)**	**(31,933)**

21. Research and Training Grant Commitments

The future costs to completion of research and training grants at 31st March 2006 are estimated to be £1,319 million. It is anticipated that this expenditure will be spread over the following four years in the proportions 4:3:2:1.

22. Capital Commitments

No contractual commitments existed as at 31st March 2006.

23. Contingent liabilities

The EPSRC had no contingent liabilities as at 31st March 2006.

24. Related party transactions

(a) The EPSRC is a Non Departmental Public Body (NDPB) sponsored by the Department of Trade and Industry (DTI). It complies with the Financial Reporting Standard on Related Party Transactions (FRS 8) issued by the Accounting Standards Board, as amended for Central Government use by HM Treasury.

The DTI is regarded as a related party. During the year, the EPSRC had a number of material transactions with the DTI and with other entities for which the DTI is regarded as the parent Department (viz. the Economic and Social Research Council, the Biotechnology and Biological Sciences Research Council, the Particle Physics and Astronomy Research Council, the Council for the Central Laboratory of the Research Councils, the Natural Environment Research Council, the Medical Research Council and the Arts and Humanities Research Council). In addition, the EPSRC had material transactions with other Government departments and with other central Government bodies (viz. the Ministry of Defence, HM Treasury and the Department for Environment, Food and Rural Affairs).

(b) During the year the EPSRC announced the following grants to organisations in respect of proposals from members of the EPSRC Council:

Organisation	Proposer	Grant Reference	Value £000
University of Glasgow	Prof. J N Chapman	EP/D003199/1	425
Imperial College, London	Prof. S E Gibson	EP/C547322/1	125
Imperial College, London	Prof. S E Gibson	EP/C548604/1	125
University of Cambridge	Prof. A Dowling	EP/D011035/1	266

The relevant Council members were not involved in the approval of these grants.

24. Related party transactions *continued*

(c) During the year the EPSRC announced the following numbers and cumulative values of grants and postgraduate and fellowship awards to organisations where Council members occupied senior positions in the organisation:

Organisation	Research Grants		Partnership for Public Engagement Awards		Postgraduate Awards		Research Fellowships	
	No.	£000	No.	£000	No.	£000	No.	£000
Cardiff University	19	3,242	1	257	3	3,728	–	–
Heriot-Watt University	18	4,267	1	30	1	1,659	1	295
Imperial College, London	91	48,636	1	16	3	5,597	12	2,927
Loughborough University	28	12,490	–	–	1	1,722	1	298
Queen Mary, University of London	21	3,192	–	–	3	2,300	2	514
University of Manchester	86	32,879	2	66	5	20,327	5	1,885
University College London	74	22,374	3	241	3	4,398	2	875
University of Cambridge	77	35,637	–	–	4	12,709	12	1,510
University of Glasgow	19	7,807	2	203	3	3,362	1	262
University of Southampton	56	26,644	2	106	3	3,893	2	199
University of Wales, Bangor	2	169	–	–	1	324	–	–

No Council member was involved in the approval of grants or awards to the organisation where he/she is a member of staff.

(d) The EPSRC operates a process of peer review of proposals for research grants, as part of which 'Colleges', panels formed of senior members of the academic and industrial communities, evaluate grant proposals for technical merit and then propose a ranking for funding. The EPSRC receives their recommendations but is not bound by them, taking as it does other significant factors into account, such as the availability of funds and Government policy. These panel members are not therefore regarded as Related Parties within the context of FRS 8.

(e) The EPSRC has adopted a Code of Practice for all those who assist the work of the Council, which embraces the 'Seven Principles of Public Life' drawn up by the Nolan Committee and endorsed by Parliament. This is designed to remove any staff member from any decision-making process under which he/she or any of his/her close family may benefit.

During the year, the EPSRC identified those members of staff who could be regarded as being in positions of financial influence, and required a declaration from each of any financial transactions with the EPSRC under which the staff member or a member of his/her immediate family was in receipt of a significant amount of money from the EPSRC, and where the staff member was able to exercise any influence over the transaction.

Such a declaration was also required from members of Council, the Resource Audit Committee, the Technical Opportunities Panel and the User Panel. A Council Members' Register of Interests is available for viewing on the EPSRC website.

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Glossary

AHRC	Arts and Humanities Research Council
ARF	Advanced Research Fellow
BBSRC	Biotechnology and Biological Sciences Research Council
CBI	Confederation of British Industry
CCLRC	Council for the Central Laboratory of the Research Councils
CERN	European Organisation for Nuclear Research
CETV	Cash Equivalent Transfer Value
CTA	Collaborative Training Accounts
CTG	Collaborative Training Grants
DA	Development Agency
DELNI	Department for Employment and Learning Northern Ireland
DFG	German Research Agency
DTA	Doctoral Training Accounts
DTG	Doctoral Training Grants
DTI	Department of Trade and Industry
EMG	Executive Management Group
EngD	The Engineering Doctorate
EPSRC	Engineering and Physical Sciences Research Council
ERANET	European Research Area Network
ESF	European Science Foundation
ESRC	Economic and Social Research Council
EU	European Union
FEC	Full Economic Costing
HEC	High End Computing
HEFCE	Higher Education Funding Council For England
HEI	Higher Education Institution
HM	Her Majesty
ICT	Information and Communications Technologies
IMRC	Innovative Manufacturing Research Centre
IoP	Institute of Physics
IT	Information Technology
ITER	International Tokamak Experimental Reactor
Je–S	Joint electronic Submission
JET	Joint European Torus
KTP	Knowledge Transfer Partnership
KTN	Knowledge Transfer Networks
L&D	Learning and Development
LARCI	Local Authority Research Council Initiative
MP	Member of Parliament
MRC	Medical Research Council
NERC	Natural Environment Research Council
NHS	National Health Service
NOISE	New Opportunities in Science and Engineering
NSF	National Science Foundation
OMII	Open Middleware Infrastructure Institute
OSI	Office of Science and Innovation
PA	Per Annum
PPARC	Particle Physics and Astronomy Research Council
PRM	Performance and Risk Management
RAC	Resource Audit Committee
RAE	Research Assessment Exercise
RAEng	Royal Academy of Engineering
RAIS	Research Assistants Industrial Secondments
RCIAS	Research Councils' Internal Audit Services
RCPS	Research Councils' Pension Schemes
RCUK	Research Councils United Kingdom
RDA	Regional Development Agency
SEEDA	South East of England Development Agency
SERC	Science and Engineering Research Council
SFC	Scottish Funding Council
SIP	Societal Issues Panel
SiS	Science in Society
SME	Small and Medium-sized Enterprise
SPARC	Strategic Promotion of Ageing Research Capacity
SPICE	Simulated Pore Interactive Computing Environment
SRF	Senior Research Fellow
TOP	Technical Opportunities Panel
TSEC	Towards a Sustainable Economy
UP	User Panel
WINES	Wired and Wireless Intelligent Networked Systems

Feedback

We welcome feedback on all our publications. Comments on this Annual Report should be sent to:

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