Engineering and Physical Sciences
Research Council

SKILLS

PIONEERING SKILLS
TO BUILD BRITAIN'S FUTURE

EPSRC
Pioneering research
and skills

PIONEERING SKILLS TO BUILD BRITAIN'S FUTURE

Skills in Science, Technology, Engineering and Mathematics (STEM) are central to driving the innovation, creativity and competitiveness on which the future prosperity of the UK depends.

£167m
spent on postgraduate training in 2008/2009

9600
students sponsored at any given time

2500
students working in collaboration with industry and commerce

40%
of students are taken on by industry straight from qualification

1000+
companies involved in collaborative training

£300m
for 52 new doctoral training centres across the UK

EPSRC is the main organisation delivering postgraduate skills. We work with universities and companies developing new ways of providing high quality research and postgraduate training creating a new generation of world-class research leaders and a skilled workforce. We are the single largest funder of PhDs in the UK currently supporting some 9600 PhD students, 35% of all those working in the engineering and physical sciences. Around 2500 of these students are working in collaboration with industry and commerce and we are increasing the level of this joint training.

Skilling the Future

EPSRC's support for postgraduate training gives flexibility to providers in the way they manage that training better to meet the needs of the individual and employer.

EPSRC's training:

- develops the next generation of world-class researchers and research leaders with the knowledge and transferable skills to enable the UK to increase its global research impact and economic competitiveness
- attracts the most talented people to work in research
- helps the flow of people through their research career pathways and enhances their skills to meet the needs of users.

Drivers and Challenges

In 2006 the Leitch Review of Skills[1] concluded that *"to achieve world-class prosperity and fairness in the new global economy, the UK must achieve world-class skills. Without world-class skills, UK businesses will find it increasingly difficult to compete and innovate..... skills were once **a** key driver of prosperity and fairness, they are now **the** driver. Achieving world-class skills is the key to achieving economic success and social justice in the new global economy."* Last year[2] the Government recognised to recover from the recession we would need to respond to structural changes in the global economy such as the progressive financial and economic integration of national economies. To do this we need a workforce with high levels of skills and creativity to capitalise on the opportunities offered by low carbon technologies, the digital economy and new industrial processes.These depend upon progress in the engineering and physical sciences for growth.

The CBI Higher Education Task Force recently concluded that *"a competitive business sector needs excellent universities to produce the graduates, postgraduates, research and innovation that are required to drive economic growth and prosperity..... Success for UK in the global economy will increasingly depend on the development of high-value added sectors in services and manufacturing. These in turn will require a highly trained workforce....."*[3]

EPSRC with its support across a broad range of subjects is uniquely positioned to provide individuals with the skills required for these developments.

Meeting the challenges

PhDs with breadth and cross-disciplinary experience

We increasingly deliver cohort-based training in innovative and exciting environments combined with the ability to study for up to four years in a programme. Students emerge as individuals who are highly competitive internationally, and capable of greater productivity. The breadth of knowledge they gain through this training regime allows them increased mobility in their subsequent careers and the ability to make an impact in cross disciplinary topics.

The best environment is one supplied by top-class research carried out by international leaders. We encourage this by bringing in the best people from around the world to contribute to the UK economy and research base. At the postgraduate level we provide International Doctoral Studentships to give key universities the flexibility to recruit outstanding graduates from overseas. Currently 20% of EPSRC students come to the UK from outside the EU.

Flexibility

The flexibility we provide enables universities to adopt a more modular approach to suit the individual and their career aspirations. Options include combining the PhDs with broader skills training and opportunities to spend part of the time in overseas laboratories or in industry.

> **"Without work done by EPSRC funded students, the Trent 900 engine wouldn't have flown"**
> **COLIN SMALL, ROLLS ROYCE**

Working with Employers

To develop policy we are active in gathering views of users such as the CBI, Council for Industry and Higher Education and our Strategic Partners (who include major companies such as GlaxoSmithKline, Procter & Gamble, Rolls-Royce).

[1] *Prosperity for all in the Global Economy – world class skills* December 2006

[2] *New Industry, New Jobs* April 2009

[3] *Stronger together: Businesses and universities in turbulent times* CBI, September 2009

CASE STUDY 01

DESIGNS ON TRAINING – TIM STONOR AND SPACE SYNTAX

Tim Stonor is managing director of Space Syntax an architectural design consultancy that has been involved in major projects worldwide. Set up 20 years ago the company grew out of research sponsored at UCL by EPSRC and others. Tim has been with the company for 15 years following spells with other architectural companies and a masters degree at UCL. He bases his personal success on the training he received coupled with his experiences in industry. The company's continuing success also depends on a continuing supply of knowledge and skills. This is ensured through continued strong research and training links between UCL and the company delivered with a two-way flow of personnel: UCL students do joint projects with the company and company staff spend extended periods at the University.

"We are a technology-driven company but, ultimately, the quality of our product is down to the skills of the people using the technology. Our clients recognise this – if we want them to be loyal to us then we need to nurture the processes that support the development of our staff members."

CASE STUDY 02

PERSONNEL CHEMISTRY – THE VALUE OF PHDS

David Lathbury, Head of Process Chemistry at AstraZeneca has looked at the value the pharmaceutical industry gains from PhD training. The sector in the UK punches above its weight internationally and is responsible for an impressive list of "blockbuster" drugs which, at their peak, had sales in excess of US $20 billion. In looking at the origin of these and other successes he found that more than 95% of the inventors were organic chemists and more than 80% of these had PhDs. The subject of those PhDs was generic but that detailed knowledge of synthetic organic chemistry and the other skills learned enabled them to pose and answer difficult questions an ability which, in turn, was vital in the process of drug discovery. As David puts it:

"PhD students produced by our higher education sector create far more monetary wealth than that associated with a particular project funded in their university department"

All our training schemes provide the flexibility for postgraduate training to be done in collaboration with partners in the user community: industry, commerce, third sector, public bodies and government. However some of our support is designed specifically to support the needs of users. In 1992 the Engineering Doctorate was introduced as a new way of delivering PhD training more relevant to the needs of industry. Since its inception more than 500 companies have sponsored studentships in this scheme with 28 sponsoring at least six and some (BT, Thames Water, Corus, QinetiQ) sponsoring more than 20 each. Many of the postgraduates go on to leadership roles in industry.

This involvement with users provides another benefit – leverage of EPSRC funds. For example the Centres we support often match from business the funding provided by EPSRC thereby enabling even more students to be supported. Some 250 companies are involved with our Centres potentially leveraging around £100 million of co-funding over their lifetime.

Centres for Doctoral Training

EPSRC has recently injected £300 million – our largest single investment in training – into the establishment of 52 Centres for Doctoral Training (including Industrial Doctorate Centres). These represent a bold new approach to training PhD students. The Centres will train more than 2200 students to form a new generation of scientists and engineers for the new economy. They will create communities of researchers to work on current and future challenges in collaboration with business and industry. The areas being tackled include high-tech crime and global security, strengthening high-value UK manufacturing, improving healthcare, advancing carbon capture and clean coal technologies, building a low carbon future and the future of transport.

The Centres have secured around 500 industrial organisations as potential collaborative partners to date.

The research and training regime at these Centres will turn out people who have developed a breadth and depth of knowledge which enables them to be highly mobile and flexible in their careers. They are highly competitive internationally, more productive and with a high impact in academic research.

This approach allows us to meet the needs being expressed by Government and business. We are doing this by working in partnership with business, the Universities and other funders.

> "It is on the skills of the British workforce – and on the development and use of new skills – that our future prosperity in large part depends"
>
> **RICHARD LAMBERT**
> **DIRECTOR GENERAL, CBI**

Beyond the PhD

Whilst the bulk of our training support is for PhD places we support scientists and engineers throughout their career path (see Fig 1). This starts with Vacation Bursaries which give undergraduates a taste of a career in research and goes beyond postgraduate training to the support of postdoctoral researchers, the awards of Fellowships and grant support to early career researchers and the more prestigious Career Advancement and Leadership Fellowships given to outstanding established researchers. The emphasis at every stage is to attract and support the best minds to work at the highest level on the challenges we face.

PhD Studentships by Industry Sector
(funded on 31 March 2009)

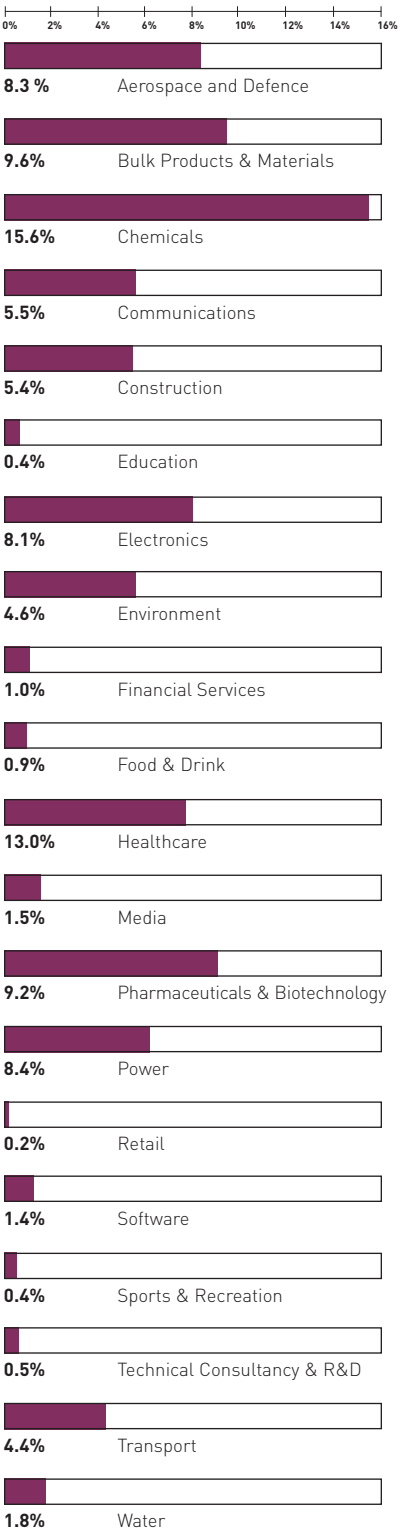

Fig. 1

EPSRC provides support for researchers in universities throughout their careers, but we have a specific responsibility for postgraduate training.

CASE STUDY 03

MAKING A SPLASH – TOM WALLER

Tom is head of R&D for Speedo, one of the biggest brands in sport. He is in a position to influence everything from Olympic finals to family holidays. His path to the top started when EPSRC-funded PhD project at Loughborough University in the Sports Technology Institute which also receives EPSRC support.

"It is vital that we get support from EPSRC to create the knowledge that can be taken up by brands like Speedo"

CASE STUDY 04

MAKING SENSE OF DATA – AUTONOMY AND MIKE LYNCH

Autonomy is the second largest software company in Europe developing systems that are better at extracting information from the vast sea of data that surrounds us. Customers include household names like Tesco, Phillips, Nestlé and more than 2 billion people rely on Autonomy's software every day.

The company is founded on work done by CEO Mike Lynch during his PhD studies in Cambridge funded by the Research Council and the tributes his career success to this.

"My autonomy to undertake a research project was instrumental in my subsequent career success"

"An active government approach to equipping this country for globalisation means making sure we have the skills that underwrite the industries and jobs of the future. That means skills for the high tech, low carbon, more high-value added sectors that drive the growth that underwrites everything else we want to achieve as a society. These skills are becoming more sophisticated and complex, and more vital"

LORD MANDELSON

EPSRC is the main UK government agency for funding high-quality basic, strategic and applied research and related postgraduate training in engineering and physical sciences to help the nation exploit the next generation of technological change. It invests more than £800 million a year in a broad range of subjects – from mathematics to materials science and from information technology to structural engineering.

www.epsrc.ac.uk