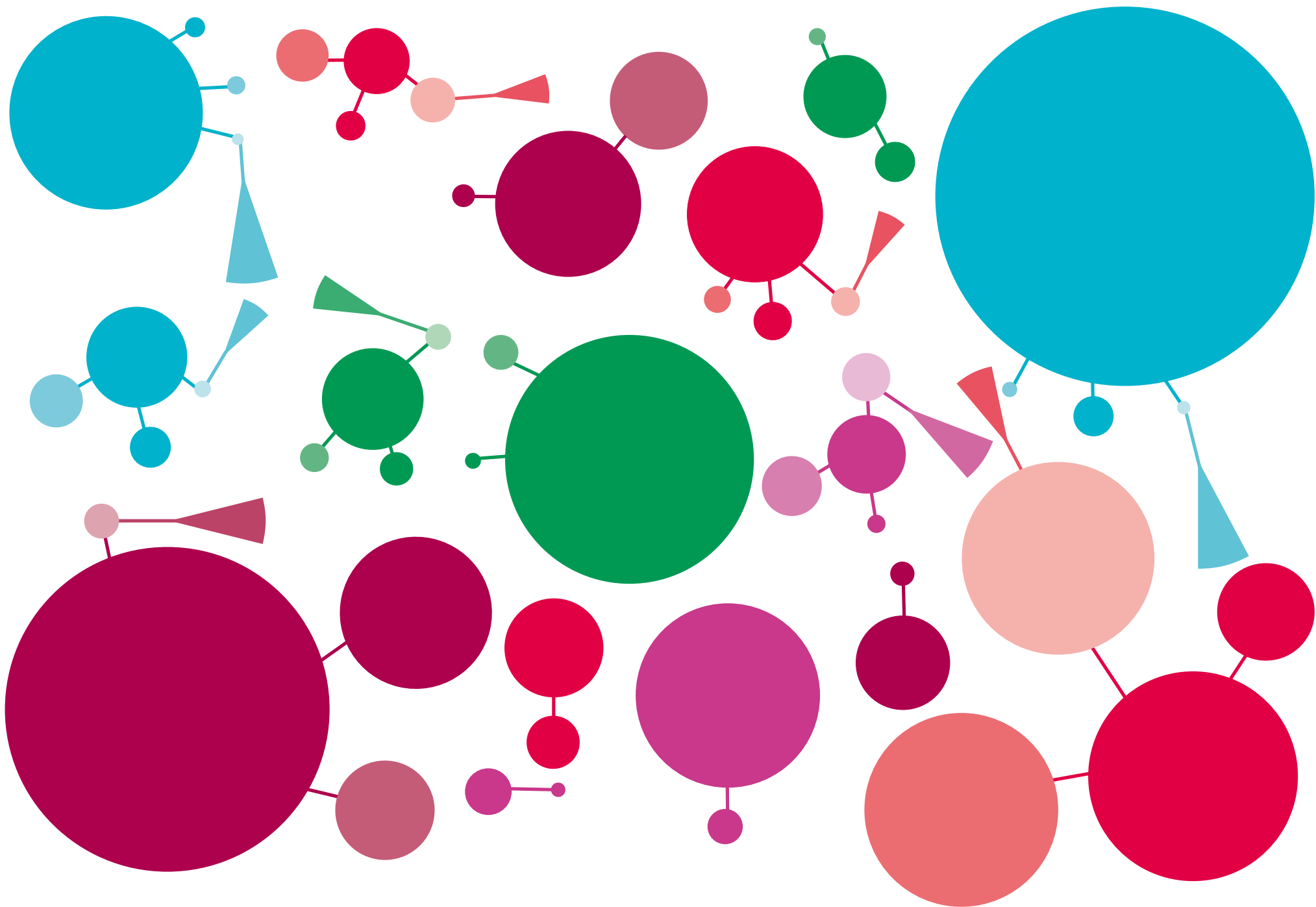


Department for  
**Innovation,  
Universities &  
Skills**

Annual Innovation Report 2008



Departmental expenditure on aspects of innovation – see page 54 for details.



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# FOREWORD



The publication of the *Innovation Nation* white paper in March 2008 marked the Government's ambition to make the UK the best place in the world to run an innovative business or public service. The global economic downturn has only reinforced the importance of this message. We're determined to support businesses through the current downturn and harness innovation as the driver for a new era of long-term prosperity. We must continue to invest in talent, research and innovation to emerge in a stronger position and seize the opportunities that will follow.

This first Annual Innovation Report not only describes the progress we have made since the white paper and since Lord Sainsbury's review of science and innovation in September 2007 but also set out the challenges ahead of us.

The Department for Innovation, Universities and Skills has been leading work to increase demand for innovation and challenge every government department to look at innovation as a tool to transform public services and create new markets through the production of their own Innovation Procurement Plan. The Technology Strategy Board is leading work on improving the Small Business Research Initiative – which the Ministry of Defence and the Department of Health are piloting – to help SMEs win government contracts. We are also publishing alongside this report guidance on how regulation can promote innovation.

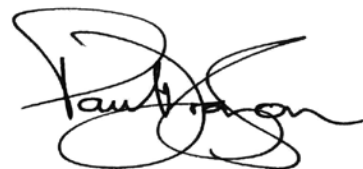
At the same time, we've been investing in new technologies. The £100 million Low Carbon Vehicles Innovation Platform will fund R&D and a fleet of up to 100 demonstration cars around the UK by the end of 2009. We're spending up to £55 million to reduce cases of illness caused by infectious diseases and the £6 billion a year spent by the NHS on treating them. The Technology Strategy Board's new support for the creative industries, meanwhile, provides funding for R&D and networking in this growth area.

We are also working to ensure that the UK workforce has the right mix of skills to increase the national capacity to innovate. We now have better science teaching in schools and an increase in science A levels entries. We're seeing more undergraduates and postgraduates taking STEM subjects. In the Further Education sector, a competition over the summer to boost knowledge and technology transfer activities attracted 130 entries, far exceeding expectations.

For the first time, this report presents statements and headline statistics from all Government Departments about their capability to promote innovation. I would encourage you to look at the online version which contains many case studies of their activities and those of other publicly-funded support organisations. Subsequent reports will measure further progress made.

I welcome these signs of improvement in the UK's innovation performance but we cannot afford to be complacent. The Government will do everything it can to develop effective ways of helping people and organisations exploit their knowledge and skills.

For my part, the Prime Minister has asked me to chair a Cabinet Committee to lead this work, and we will focus on actions that deliver real benefits to people and businesses in the UK.

A handwritten signature in black ink, appearing to read 'Lord Drayson', with a stylized, cursive script.

**Lord Drayson**  
Minister for Science and Innovation

1

National  
**innovation  
performance**



# KEY FACTS

The proportion of innovation active businesses has risen from 49% in 2001 to 68% in 2007<sup>1</sup>

Business expenditure on R&D is 5th in the G7 but R&D performed by the largest UK companies increased by 5% from 2005 to 2006 in real terms

The UK has the second largest equity market in the world but only 4% of venture capital investment was in start up and early stage companies in 2007

The UK's number of US patents granted per head is equal 5th in the G7

The overall number of STEM degree level qualifiers has increased by 36,220 and doctorate qualifiers by 2,632 between 2003 and 2007

The proportion of the public who feel fairly well informed or better about scientific developments has increased from 39% in 2005 to 56% in 2007

This chapter presents selected headline indicators of the UK's innovation performance. Future progress will be recorded in subsequent Annual Innovation Reports and the indicators developed as additional measures and data become available<sup>2</sup>. Further details on the performance summarised in this chapter is given in the documents accompanying this report<sup>i</sup>

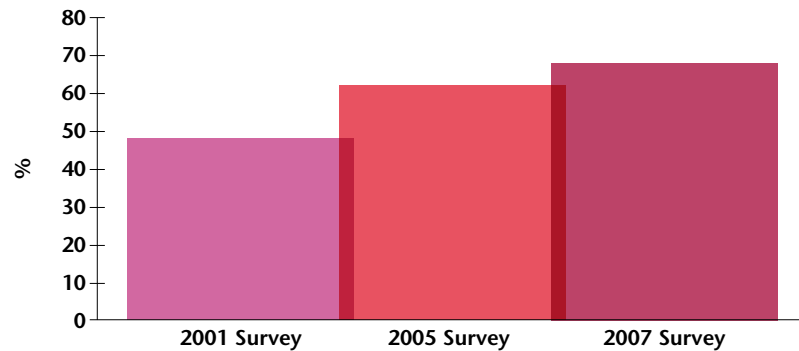
<sup>1</sup> Indicator for Public Service Agreement 4 "Promote world class science and innovation in the UK"

<sup>2</sup> Work by NESTA and others is underway to produce better metrics of innovation which go beyond traditional measures like R&D expenditure and patents to consider the whole range of innovation activities – see Annex 1

## 1.1 Business Innovation Activity

A detailed report of findings from the 2007 UK Innovation Survey is published alongside this Report. The survey is the largest and most comprehensive survey of UK business innovation activities with data from nearly 15,000 enterprises. Data from the survey are used throughout this Report.

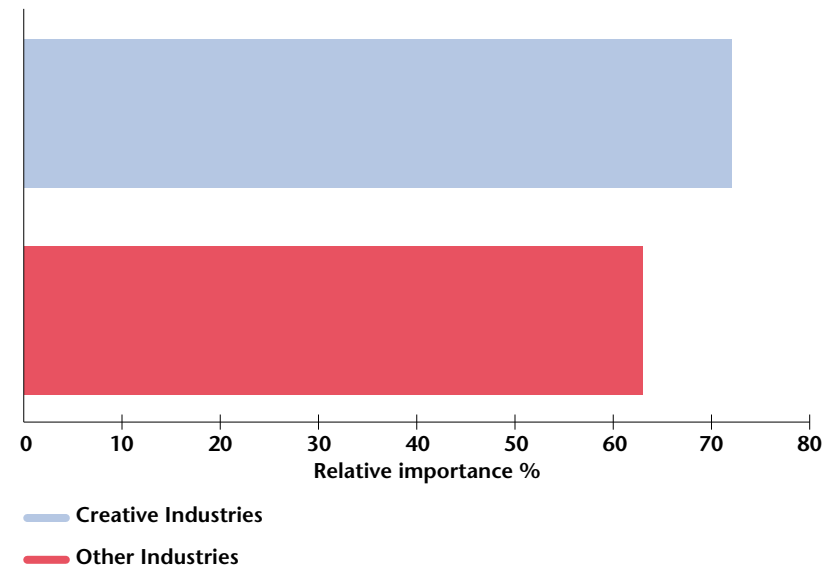
**Figure 1.** Proportion of innovation-active businesses in the UK



Source: UK Innovation Survey 2007

The 2007 UK Innovation Survey shows that the proportion of UK businesses with 10 or more employees undertaking innovative activities (including developing new services, products and processes) is rising (Figure 1)<sup>3</sup>. There is considerable variation in innovation activity across sectors – knowledge intensive services and the creative industries have particularly high levels of activity (Figure 2). However, the largest increase in activity since the last survey was in the construction sector.

**Figure 2.** Comparison of innovation activity between the creative industries and other sectors



Source: UK Innovation Survey 2007

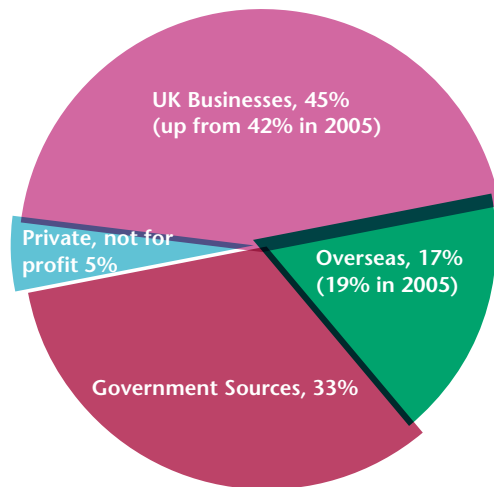
<sup>3</sup>The survey collects data over a three year reference period. Thus, for example, innovation activity as recorded in the 2007 survey relates to the activities of businesses in the period 2004-2006. These data are also corrected for expansions in the sectoral coverage of the survey to enable comparisons with previous surveys.

## 1.2 Research and Development Investment

Investment in R&D supports a wide range of innovations in products and services but can also unlock new business models or innovative organisational and process changes<sup>ii</sup>. It accounts for about a third of all business investment in innovation.

The UK spent 1.75% of GDP on R&D in 2006, which represents £23.2bn and a 4% increase in real terms from 2005.

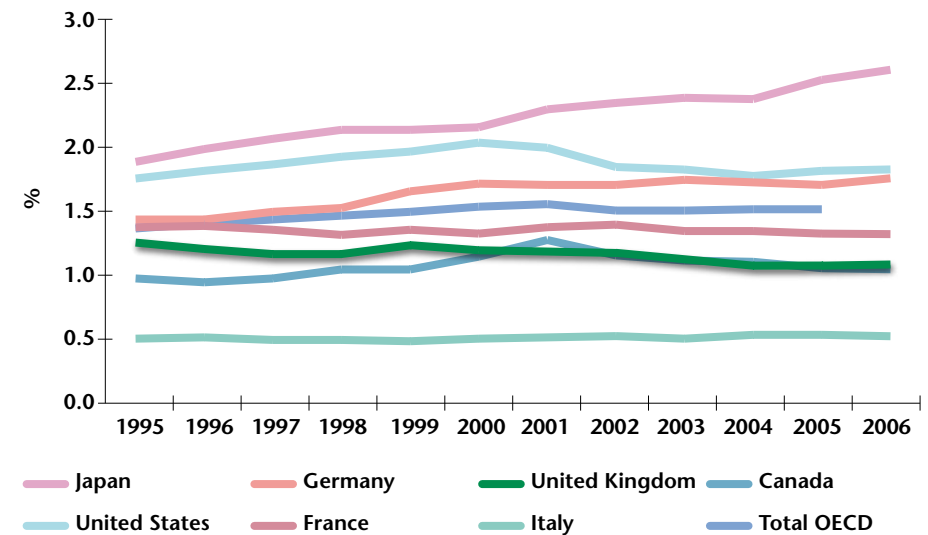
Figure 3. Sources of funding for R&D in the UK (2006)



Source: Office of National Statistics

Approximately half of the funds for R&D in the UK comes from UK businesses and a third from Government Departments, higher education funding councils and Research Councils (Figure 3; further information is in Chapter 3.1).

Figure 4. Business R&D as a percentage of GDP



Source: OECD Main Science and Technology Indicators

In comparison with other countries, UK business R&D as a proportion of GDP has been fairly consistently 5th among OECD countries (Figure 4). However, 62% of total UK R&D is performed in the business sector, a proportion comparable with other countries<sup>iii</sup>.

Figure 5. International comparison of R&D intensive sectors



Source: 2007 R&D Scoreboard<sup>iv</sup>

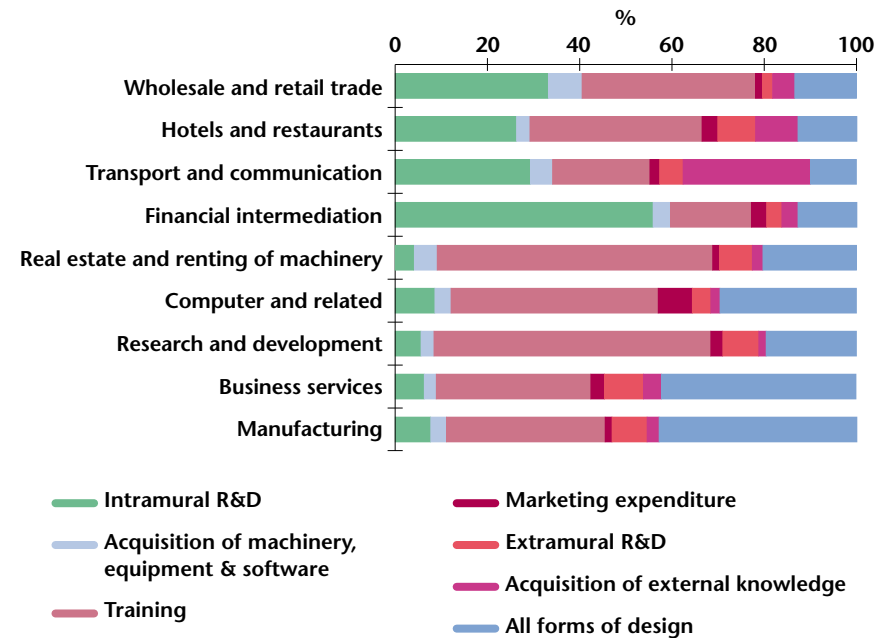
Patterns of R&D spend differ across countries (Figure 5). More than half of the R&D expenditure of the largest UK companies investing in R&D was in pharmaceuticals and aerospace. In other countries the patterns are quite different – for example Germany

and Japan have large automotive companies investing in R&D, unlike the UK.

### 1.3 Wider Innovation in Business

Businesses engage in a range of innovation activities in addition to R&D. For example, responses to the 2007 UK Innovation Survey indicated that business spending on activities like marketing and design was also regarded as innovation (Figure 6).

Figure 6. Proportions of innovation expenditure by type and sector



Source: UK Innovation Survey 2007

*Innovation Nation* described how businesses now regard organisational and strategic change, to give two examples, as important innovation activities in their own right alongside more traditional process or product focused activities. The UK Innovation Survey showed that these wider types of innovation form a significant proportion of business innovation in some sectors (Figure 7).

A recent BERR/DIUS study of service sector businesses<sup>v</sup> found the widely held view that the more difficult the economic climate, the greater the imperative to have a strong market focus, differentiate against the competition through innovation and manage scarce resources efficiently. A similar view was reported in a recent CBI/QinetiQ report<sup>vi</sup> on innovation in the service sectors which recommended that firms should take risks with new ideas, even during an economic slowdown. It found that barriers to innovation in service businesses included difficulties in finding the right skills, the availability of finance, some forms of regulation and organisational culture.

**Figure 7. Businesses using wider innovation**

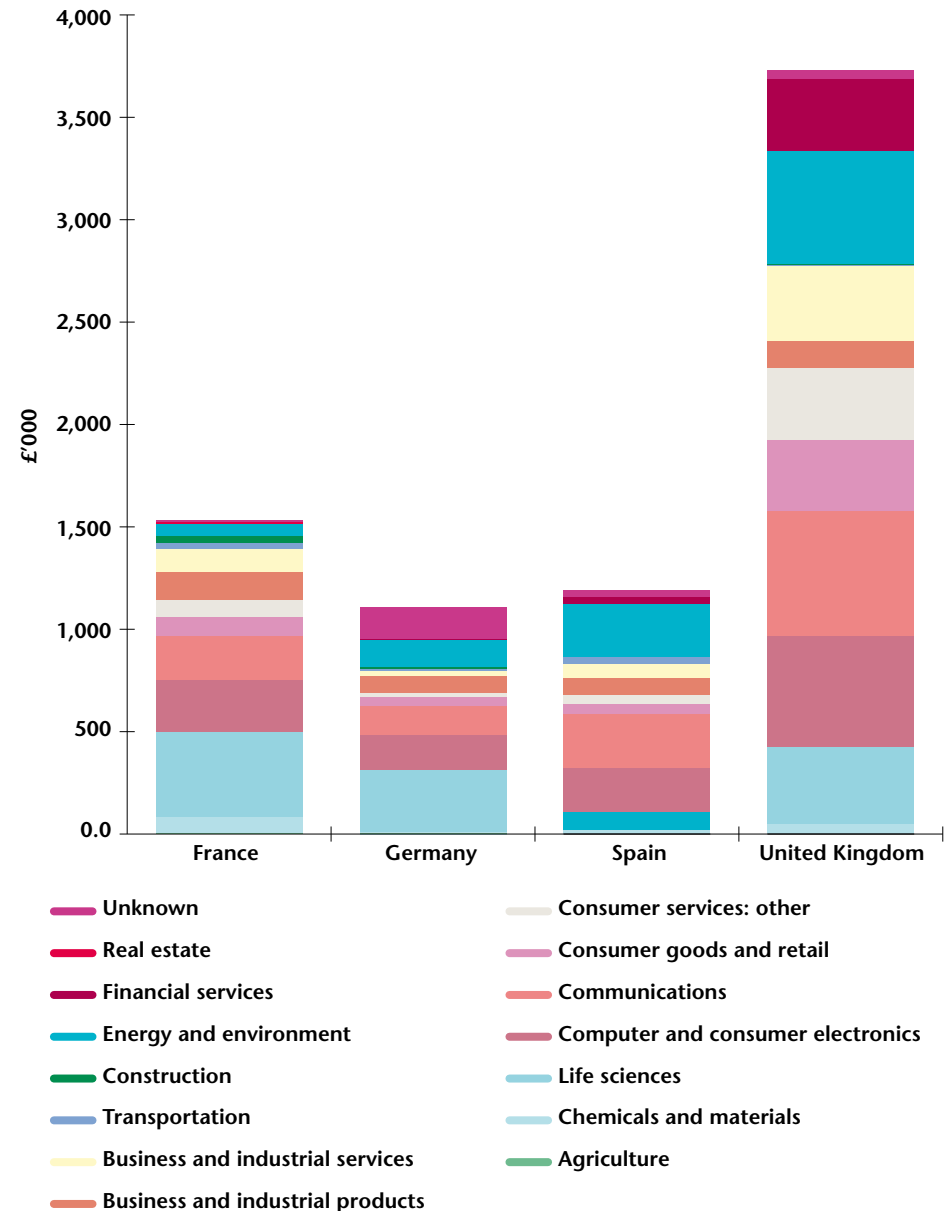


## 1.4 Venture Capital for Innovation

The UK continues to have a favourable legal and fiscal environment for private equity and venture capital (VC), has the second largest equity market in the world and continues to be the first choice for American investors outside of the USA.

BVCA Members invested £12 billion last year of which £3.5 billion was invested in expansion capital and of which £683 million was invested in venture capital in both the UK and overseas. The communications sector attracts the highest level of investment, with energy, environment, business and industrial services and life sciences featuring in the top five. Overall, however, UK venture capital investment in life sciences is proportionately lower than some other countries such as France.

Figure 8. Venture capital investment by sector (2007)

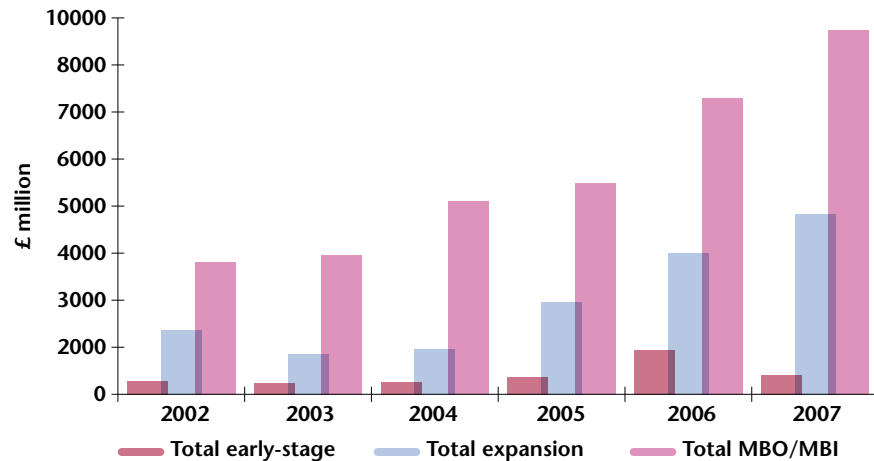


Source: BVCA<sup>vii</sup>

Whilst the value of investments overall has increased steadily since 2002, growth in the UK has been heavily focused on private equity investment – the combined investment in start-up and early-stage companies declined in 2007 to £434 million, 4% of the total (Figure 9a). This compares to a figure of over 30% in the USA.

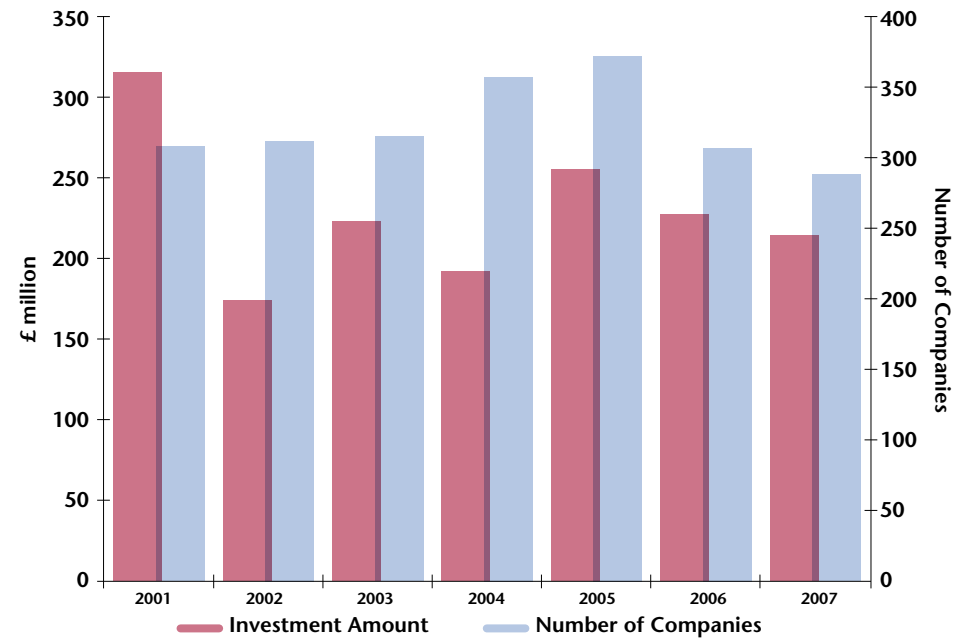
Investment in technology companies has tailed off a little, falling from £918 million in 2006 to £835 million in 2007. Of this figure some £214 million was invested in early-stage technology companies continuing a reduction in this type of funding in recent years (Figure 9b). Overall the UK invests less in early-stage technology as a percentage of GDP than the USA, Israel and Finland.

**Figure 9a.** Venture Capital Investment by financing stage



Source: BVCA

**Figure 9b.** Early stage venture capital investment in technology companies

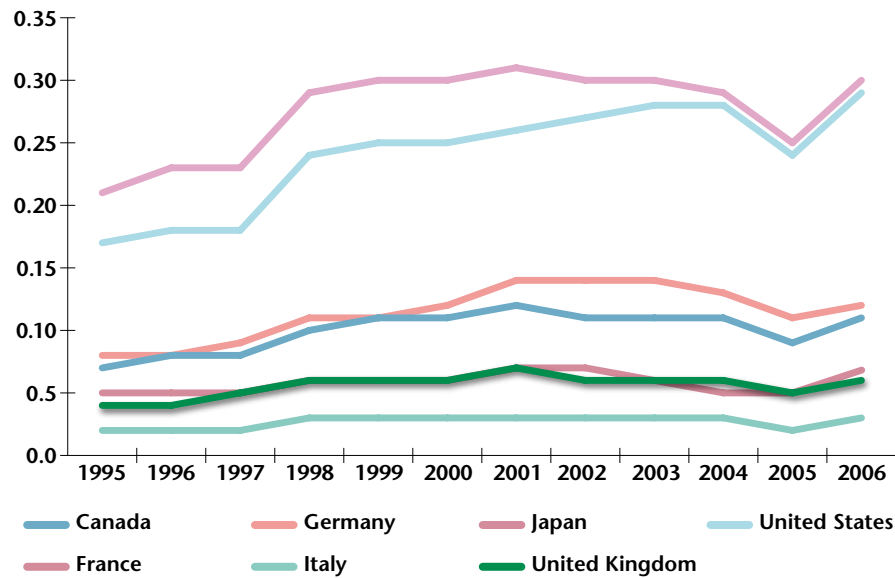


Source: BVCA

## 1.5 Intellectual Property Protection

The number of patents granted by the US Patent and Trademark Office per head of population is often used as a proxy indicator for outputs of technology-based innovation. Although this is likely to overstate the patenting performance of the US due to “home country bias”, it allows a fair comparison of the patenting performance of EU countries. The UK’s number of US patents granted per head has been consistently 5th in the G7 with France (Figure 10).

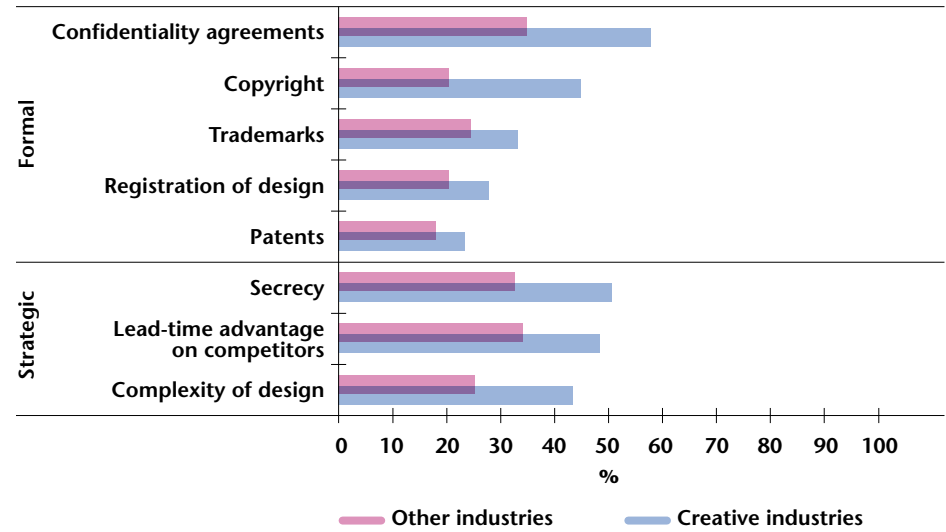
Figure 10. US patents granted per thousand population



Source: DIUS Economic Impacts of Investment in Research and Innovation 2008

Patents are not the only means of protecting intellectual property – registered designs, trademarks and copyright are significant for companies in many sectors, particularly the creative industries (Figure 11).

Figure 11. Relative importance of types of intellectual property protection



Source: UK Innovation Survey 2007<sup>5</sup>

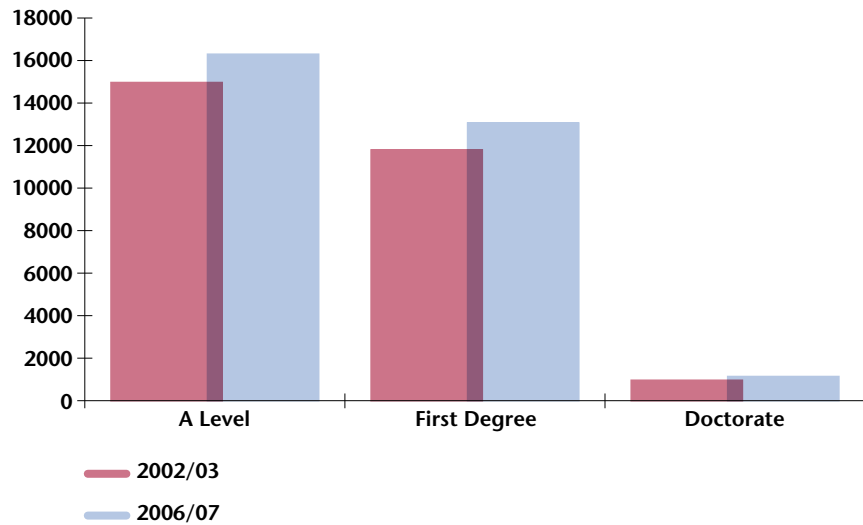
## 1.6 STEM Skills Performance

Together with investment in research and knowledge, the number of people undertaking advanced training in science, technology, engineering and mathematics (STEM) is one proxy indicator of the health of innovation-related skills. Between 2002/3 and 2006/7, trends have been positive with increased numbers of A-level entries and graduate and postgraduate level qualifications in STEM subjects (Figure 12)<sup>6</sup>.

<sup>5</sup> The chart records the percentage of respondents saying that a particular form of IP protection was of some importance

<sup>6</sup> A Level figures are for entries in STEM subjects (rather than qualifiers) in England only. Degree and PhD qualifications are for the UK

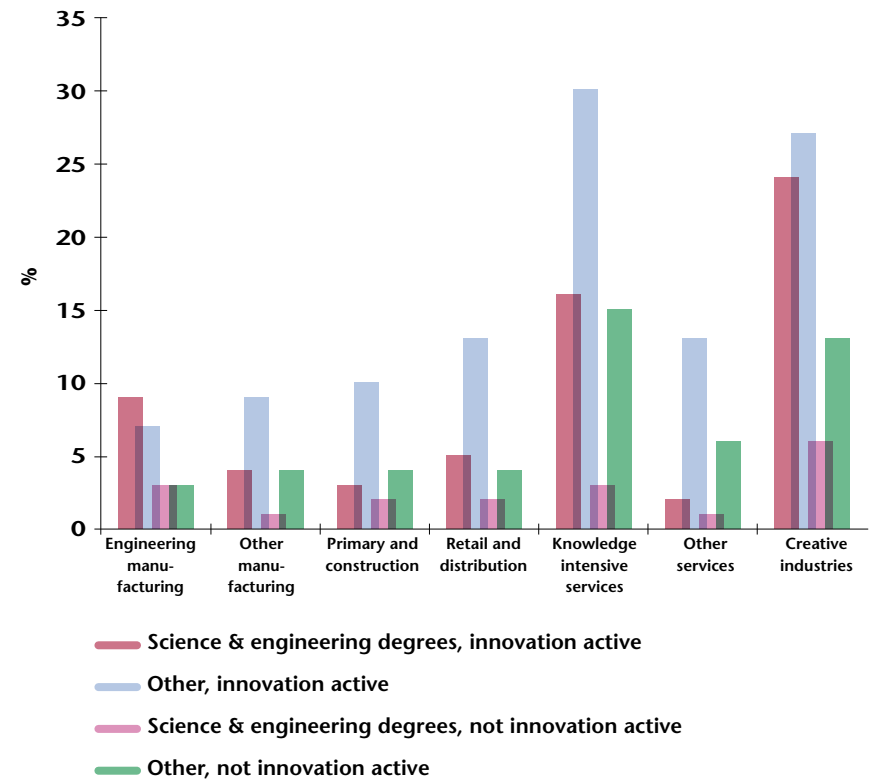
**Figure 12.** Change in number of qualifications in STEM subjects



Source: Higher Education Statistics Agency (HESA) Student Record; DCSF

Some business sectors tend to have more graduate employees than others, notably the creative industries and knowledge intensive service companies (Figure 13). Companies reporting innovation activity in 2007 tended to have significantly more graduate employees than those that reported no activity – this was the case in all sectors.

**Figure 13.** Average proportion of employees educated to degree level in innovation active and non-active enterprises



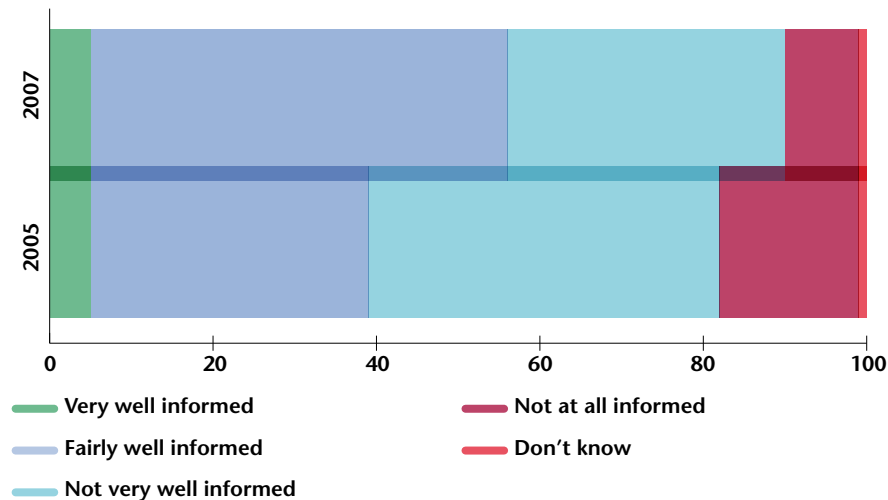
Source: UK Innovation Survey 2007

## 1.7 Science and Society

DIUS has been leading work on the interactions between science and society. For example: How can we raise the level of scientific literacy of society at large? How can scientists improve the way they communicate and interact with the public and policy makers? How can we encourage and enhance the learning of science? How can we ensure a well-qualified and representative scientific workforce which meets the needs of employers?

DIUS has just completed a consultation using the latest online communication tools on a new UK strategy for science and society. A cross-departmental team will work with stakeholders to develop a strategy and implementation plan over the coming months.

**Figure 14.** How well informed the public feel about science and scientific developments



Source: RCUK<sup>viii</sup>

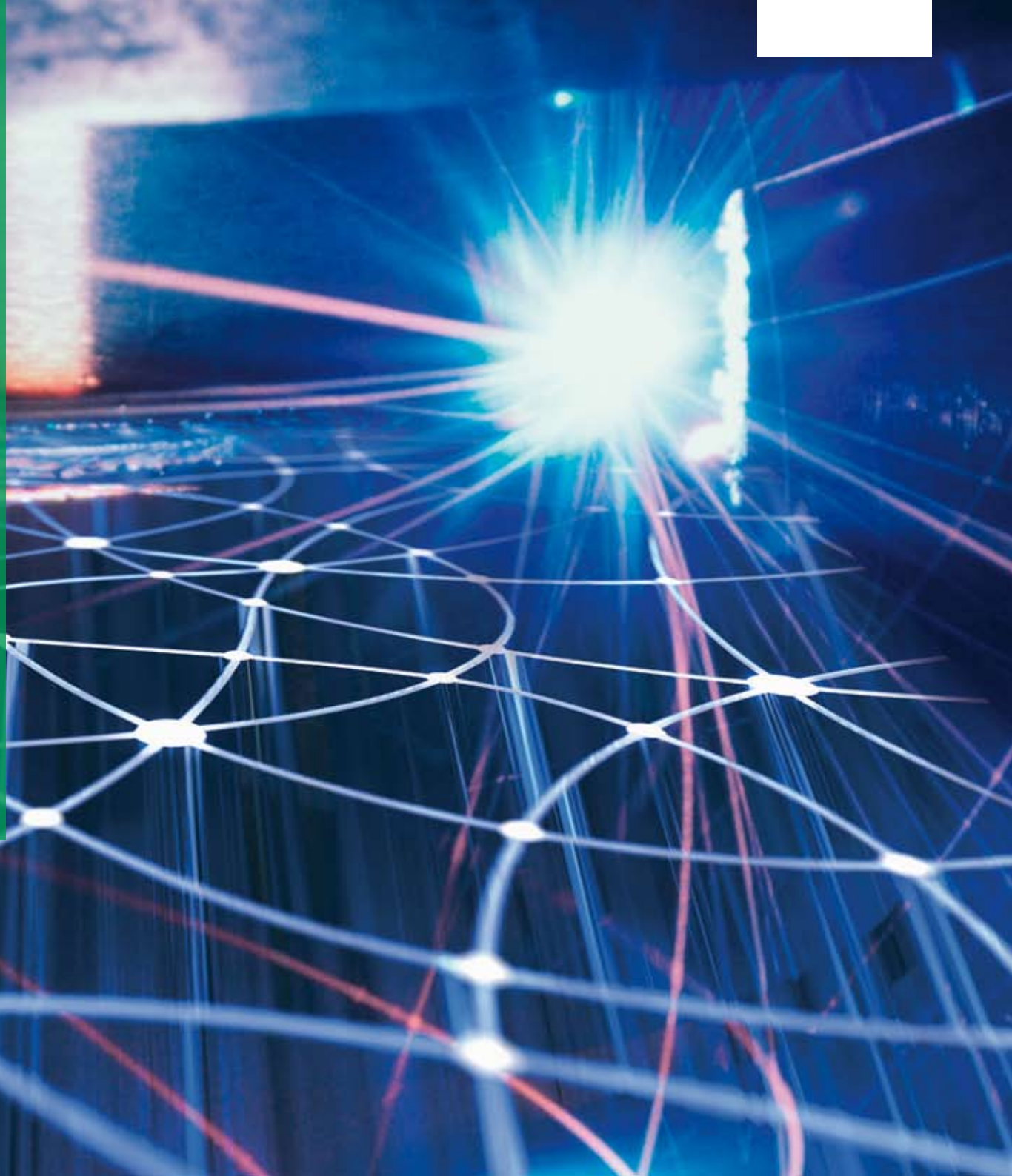
Results from the latest Public Attitudes to Science survey indicates that the public felt better informed about scientific developments in 2007 than two years earlier, enabling them to make more informed decisions regarding technical innovations in products and services (Figure 14).



- i DIUS (2008) *Annual Update 2008 on the Science and Innovation Investment Framework 2004 – 2014; Economic Impacts of Science and Innovation 2008; UK Innovation Survey 2007 Report*
- ii DIUS (2008) *Innovation Nation section 1.7 – The changing face of innovation*
- iii DIUS (2008) *The Economic Impacts of Investment in Research & Innovation 2008*
- iv DIUS (2008) *The 2007 R&D Scoreboard*  
[http://www.innovation.gov.uk/rd\\_scoreboard/](http://www.innovation.gov.uk/rd_scoreboard/)
- v BERR (2008) *Supporting Innovation in Services*  
<http://www.berr.gov.uk/files/file47440.pdf>
- vi CBI/QinetiQ (2008) *Excellence in Service Innovation*  
<http://www.cbi.org.uk/pdf/Excellenceinserviceinnovation.pdf>
- vii BVCA (2007) *Private Equity and Venture Capital: Report on Investment Activity*  
<http://www.bvca.co.uk/>
- viii RCUK (2008) *Public Attitudes to Science 2008; A survey*  
<http://www.rcuk.ac.uk/sis/pas.htm>

# 2

## Highlights of progress on ***Innovation Nation***



## 2 Highlights of progress on *Innovation Nation*

*Innovation Nation* highlighted the importance of Government policies and spending in driving up the demand for innovation – both within Departments as customers for goods and services to deliver their objectives and within businesses and other potential suppliers. Each Department committed to produce an **Innovation Procurement Plan (IPP)** setting out how it would do this and since the White Paper was published, guidance on how to produce these plans has been developed and is published alongside this Report; DIUS is also publishing its own IPP at the same time.

A key target for innovation procurement is the community of small and medium high-tech businesses with innovative potential solutions to the challenges Departments are tackling. The **Small Business Research Initiative** has now been refocused by the Technology Strategy Board to help these businesses access Government contracts and is being piloted by the Ministry of Defence (building on their Defence Industrial Strategy) and the Department of Health, helping them access Government contracts.

One recently announced investment demonstrates another approach to driving innovation through procurement – investment to anticipate the future technology needed to meet the challenge of reducing carbon emissions in transport. The **Low Carbon Vehicles Innovation Platform** led by the Technology Strategy Board involves the Department for Transport, the Engineering and Physical Sciences Research Council, Advantage West Midlands and One NorthEast who have together committed to invest £100 million on fundamental and collaborative R&D as well as an ultra-low carbon vehicle demonstration competition which will see up to 100 ultra-low carbon demonstration vehicles around the UK by the end of 2009.

Building on the recommendations of the Commission on Environmental Markets and Economic Performance (CEMEP) Report, a competition across the wider public sector for **Forward Commitment Procurement** has been launched by DIUS, the Technology Strategy Board and the Centre of Excellence in Sustainable Procurement in the Office of Government Commerce. The winning bids will be announced by Spring 2009 and will receive a tailored support package to guide them through the FCP process.

Another way in which Government can influence the demand for innovation is through **regulation**. An analysis of the ways in which regulations promote or hinder innovation has shown that the relationships between the two are complex. It has nevertheless been possible to develop a checklist of issues for regulators to consider when developing and implementing regulation which may help promote innovation. Both the analysis and checklist are published alongside this Report.

*Innovation Nation* emphasised the strong potential role of the Further Education sector in driving business innovation and announced work to develop the capacity of specialist FE networks to support businesses through **knowledge and technology transfer**. A competition for pathfinder projects over the summer attracted over 130 entries, far exceeding expectations, and revealing the scale of the sector's innovation potential. Five pathfinder projects were announced on 1 December.

Further details of progress on these and the other commitments in *Innovation Nation* are given in the following chapters and in Annex 1.