ERAWATCH COUNTRY REPORT 2012:
United Kingdom

Paul Cunningham
Thordis Sveinsdottir

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ACKNOWLEDGEMENTS AND FURTHER INFORMATION

This analytical country report is one of a series of annual ERAWATCH reports produced for EU Member States and Countries Associated to the Seventh Framework Programme for Research of the European Union (FP7). ERAWATCH is a joint initiative of the European Commission's Directorate General for Research and Innovation and Joint Research Centre.

The Country Report 2012 builds on and updates the 2011 edition. The report identifies the structural challenges of the national research and innovation system and assesses the match between the national priorities and the structural challenges, highlighting the latest developments, their dynamics and impact in the overall national context.

The first draft of this report was produced in December 2012 and was focused on developments taking place in the previous twelve months. In particular, it has benefitted from the comments and suggestions of Mark Boden from JRC-IPTS. The contributions and comments from Brian Ditcham, the International Knowledge and Innovation Unit, UK are also gratefully acknowledged.

The report is currently only published in electronic format and is available on the ERAWATCH website. Comments on this report are welcome and should be addressed to jrc-ipts-erawatch-helpdesk@ec.europa.eu.

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EXECUTIVE SUMMARY

The UK has the third largest population among the EU Member States, with almost 12.5% (62.9 million) of the total population of the EU. In terms of economic performance, in 2012 the UK is forecast to be responsible for 14.8% of the total GDP of the EU, contributing €1,913b. In line with the EU average, UK GDP is still showing some signs of a continued downward trend in spite of a small recovery in 2010. UK GERD in 2011 was €30,992.97m, contributing 12.08% of the aggregate R&D expenditure of the EU Member States, while UK R&D intensity was 1.77% in 2011, just below the estimated EU average. UK BERD for 2011 was €21.2m, up slightly from 2010 (€18.7m) and GOVERD for 2011 was €2.876m. The Government’s plans for austerity measures have continued to be applied, although offset by targeted investments aiming at boosting industrial growth and longer term recovery.

In terms of HRST as a share of the total labour force, the UK ranks above the EU average: much of this scientific and technological labour force is found in the HE sector which comprises some 115 universities, plus colleges, etc. Together with the intramural research capabilities of some Government Departments and institutes and centres maintained by the Research Councils, these comprise the UK Science Base. This is responsible for the majority of UK research and development activity and performs above its weight in terms of the production of scientific papers, particularly in terms of attracting citations. However, the UK performs below the EU average in terms of its per capita patents output.

The Department for Business, Innovation and Skills (BIS) plays the lead executive role in research issues, and is the major provider of research funds for the public sector. This provides funds for the seven Research Councils, each organised on a broad disciplinary basis, which in turn support R&D both in Higher Education Institutes (HEIs) and in their own institutions. Thus, BIS has oversight for the majority of R&D policy formulation, and forms the main author of strategic policies for R&D and innovation, while the Research Councils will develop their specific R&D policies.

The UK government provides support to research and innovation activities in the private sector through a number of mechanisms, including tax credits for R&D investment, and the work of the TSB, sponsored by BIS.

There have been no recent major changes in the institutional set-up of the innovation governance system, except for the closure of the Regional Development Agencies, which were replaced by Local Economic Partnerships (LEPs) throughout 2012. The TSB has largely assumed the functions of the RDAs and is, effectively, the UK’s innovation agency.

Over the period 2011-2012, a number of new measures have been introduced and modifications made to existing measures. Most of these were announced as part of the 2011 Innovation and Research Strategy for Growth; the recent Autumn Statement by the Chancellor of the Exchequer confirmed support for these measures while the BIS Annual Innovation Report for 2012 charted the progress made with their implementation. In general these measures and changes address:

- Continuing to stimulate and support knowledge transfer and dialogue between all sectors of the UK innovation system, particularly between public sector research performers and businesses

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• Targeted support on key emerging technologies with strong economic potential
• Increasing the accessibility and availability of financial support to SMEs, entrepreneurs and newly established companies, and improving the attractiveness of investing in R&D
• Providing more encouragement for activities relevant to innovation at a range of levels.

At the same time, the Government has continued its practice of assessment, evaluation and review in order to ensure it adheres to its longstanding commitment to evidence based policy-making.

According to the 2011 Innovation Union Competitiveness Report, based on a composite indicator derived from 25 IU Scoreboard indicators, the UK remains one of the group of ‘innovation followers’, while it is listed as a ‘slow grower’ with an average annual growth in innovation performance of around 0.1%.

Structural challenges facing the UK economy concern its oversupply of low skilled workers, an undersupply of bank finance for industry, especially SMEs and the need for investment in transport and energy infrastructures.

The UK Government’s 2012 Annual Innovation Report paints a more positive picture in terms of the country’s innovation performance: a strongly performing, well trained and well regarded research base, an attractive destination for foreign direct investment and comparatively good levels of innovation investment, although in some traditional innovation metrics the UK’s performance is less good

In summary, the main structural challenges facing the UK tend to remain largely unchanged from previous years’ analyses. These are:

• A continuing low level of private sector R&D investment, in all sectors of the economy;
• The need to maintain a continuing policy focus on the translation of the results of publicly supported R&D into commercial products, process and services;
• In the face of continuing economic pressures the need to maintain the present level of public funding of the science base;
• Uncertainties over the future supply of human resources in S&T (in the face of university teaching cuts and the introduction of higher student fees);
• Continuing pressure on the supply of venture capital for the growth and development of SMEs and start-ups.

According to the recent BIS Annual Innovation Report, the set of policies in place address the following objectives:

• Support innovation and research in business;
• Provide incentives for companies to invest in high-value business activities;
• Create a more open and integrated innovation ecosystem; and
• Remove barriers to innovation.

After reviewing the current policy mix and in the light of its recent development, it appears that both the priorities and policy mix are fully consistent with the challenges identified above. In addition, they are also fully consistent with the five ERA priorities and objectives. The UK has a thriving and open labour market for researchers, it performs well in terms of cross border cooperation and the measures in place to facilitate it (although few national programmes are open, i.e. provide financial support, to non-UK resident researchers), it boasts a large number of

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5 Ibid.
world class research infrastructures and has a strategic plan for their development, research institutions have a high degree of autonomy (although the shortfall of funding for teaching may have negative effects), interaction between the public and private sector are well developed and supported by a broad mix of policies, the outputs of research are well disseminated and moves are underway to further increase access to knowledge and data, and international cooperation with third countries is extremely extensive and supported by a coordinated cross-government strategic approach.

An overall assessment of the policy mix would seem to suggest that, as reported last year, a balance is being maintained and that there have been some positive responses to the prevailing macroeconomic uncertainty.
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1 INTRODUCTION

The UK has the third largest population among the EU Member States, with almost 12.5% (62.9 million) of the EU total population of 503 million in 2012. In terms of economic performance, in 2012 the UK is forecast to be responsible for 14.8% of the total Gross Domestic Product (GDP) of the EU (€12,818b), with a GDP of €1,913b. UK GDP decreased 4.4% in 2009, increased 2.1% in 2010, 0.9% in 2011 and is forecast to decrease 0.3% in 2012 in comparison to the EU average GDP decrease of 4.3% in 2009, increase of 2.1% in 2010, 1.5% in 2011 and a forecast 0.3% decrease in 2012 respectively. The actual amount spent on R&D (GERD) in 2011 was €30,992.97m, contributing 12.08% of the aggregate EU R&D expenditure of €256.6b in 2011. Eurostat also reported a UK R&D intensity (GERD/GDP) 1.77% in 2011 (1.87% in 2009 and 1.77% in 2010), which falls just below the estimated EU average of 2.03% for 2011. UK BERD for 2011 was €21.2m which is slightly up from 2010 (€18.7m). UK GOVERD for 2011 was €2.876m.

In terms of human resources in science and technology as a share of the total labour force the UK ranks above the EU average (45.1% compared with 40.5%). (Eurostat 2011). As of August 2011, there were 165 HEIs in the UK of which 115 were universities. Despite a shift towards privatisation, a number of Government Departments have retained their intramural research capabilities in some form or other. These institutes and centres are maintained by the Research Councils. Collectively, these form an important component of the science and engineering base, alongside the (much larger) component represented by the University sector. Apart from the physical scientific infrastructure, the UK’s innovation infrastructure also includes the National Measurement System (NMS), the academic IT network, the UK’s intellectual property regime and the UK’s standards and accreditation system, plus major initiatives such as the Census of Population Programme.

The UK produces 8% of the world’s scientific papers, but of the most widely cited scientific papers, UK authors account for 14%. The majority of these papers (9%) are co-authored with international researchers, which is the highest percentage outside the US. However, figures for 2008-2010 show that the UK has a relatively low level of patenting activity amongst G8 countries.

Eurostat figures for 2010 indicate that, with 77.31 estimated patent applications per million population, the UK lay below the EU average of 109.2.

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8 The UK Office for Budget Responsibility forecasts a decrease of 0.1% only.
13 Ibid.
The Department for Business, Innovation and Skills (BIS) plays the lead executive role in research issues, and is the major provider of research funds for the public sector. This provides funds for the seven Research Councils, each organised on a broad disciplinary basis, which in turn support R&D both in Higher Education Institutes (HEIs) and in their own institutions. Thus, BIS has oversight for the majority of R&D policy formulation, and forms the main author of strategic policies for R&D and innovation, while the Research Councils will develop their specific R&D policies.

The UK government provides support to research and innovation activities in the private sector through a number of mechanisms, including tax credits for R&D investment, and the work of the TSB, which is sponsored by BIS and has responsibility for the formulation and delivery of the Government’s technology strategy. Other Ministries and Departments, particularly the Department for Environment, Food and Rural Affairs, the Ministry of Defence and the Department of Health, also have significant research portfolios within their areas of responsibility, and commission R&D through their own laboratories and institutes.

There have been no recent major changes in the institutional set-up of the innovation governance system, except for the closure of the Regional Development Agencies, which were replaced by Local Economic Partnerships (LEPs) throughout 2012. These are consortia of local authorities and businesses which are responsible for economic development in each region. The TSB has largely assumed the functions of the RDAs and is, effectively, the UK’s innovation agency; while not the only public sector agency responsible for innovation, it is the only one with a cross-economy, cross-sectoral remit, covering the whole UK.

The main actors in the performance of UK public sector research are the HEIs, most of which are universities. The majority of their research funding is provided in the form of grants from the Research Councils, awarded to individual researchers as well as to longer running programmes, units and centres. Other funds, including research funding, in England, Wales and Scotland are provided by BIS through dedicated non-departmental funding councils. In Northern Ireland, funding for research comes directly from the Department for Employment and Learning, Northern Ireland (DELNI) (Cunningham and Karakasidou, 2009).

With regard to R&D in the private sector the (final) R&D Scoreboard in 2010 reported that of the top 1,000 R&D performing firms in the world, 345 of the UK-owned were listed companies (with an R&D spend of €19,924m), 191 were privately owned (R&D spend = €1,717m) and 24 nationally owned (R&D spend = €224m). The remaining 440 were foreign owned and had an R&D spend of €8,303m. More recent data from the EU R&D Scoreboard show that UK companies account for 7% of the high-performers around the world and represent the top group of performing companies from within the EU.

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The UK R&I system

Key:
DCLG: Department for Communities & Local Government
DCMS: Department for Culture, Media & Sport
DID: Department for International Development
FCO: Foreign & Commonwealth Office
HEFCE: Higher Education Funding Council
HEIs: Higher Education Institutes
OLS: Office of Life Sciences
PSREs: Public Sector Research Establishments
RTOs: Research & Technology Organisations
Policy Level Bodies
Operational Level Bodies
Research Performers
2 Recent developments of the research and innovation policy and system

2.1 National economic and political context
During the period from 2011 to 2012, the UK has continued to be governed by the Conservative/Liberal Democratic coalition which entered office in May 2010 as the result of a hung parliament. This government has a mandate until May 2015. A proposed referendum on Scottish independence is due in autumn 2014. The full political, economic and governance implications of a ‘yes’ vote are as yet unclear.

Overall, economically, the UK has continued to suffer from the ongoing effects of the 2008 financial crisis and Eurozone uncertainty. According to the Office for Budget Responsibility (OBR)\(^\text{17}\), in 2012 the UK economy performed less strongly than forecast last March, largely due to weak performance in net exports. UK GDP is forecast to fall by 0.1% in 2012, with 1.2% growth in 2013 rising slowly to 2.8% in 2017. Weak productivity growth is likely to continue to constrain nominal earnings growth for longer and a slower fall in inflation will delay a recovery in real incomes.

On the positive side, despite weak GDP, the labour market has shown surprising strength and the overall level of employment rose to 29.6 million in the three months to September, higher than expected. This was largely driven by a rise in self-employment and part-time employees, although total hours worked per week have also risen. Over this period, the unemployment rate fell to 7.8%.

Continued pressure is also expected on bank funding costs for longer and investment will probably be restrained by poor credit conditions and uncertainty about demand. OBR forecasts public sector net borrowing to be around £108b (about €131b) or some 6.9% of GDP, this year. Although an extra £3.5b was anticipated from the auction of the 4G spectrum, only £2.34b (£2.85b) was actually raised, undermining these income expectations. The public sector net debt is now expected to peak at 79.9% of GDP in 2015-16.

In the light of this revised more modest forecast for recovery, the UK Government intends to continue with its programme of austerity measures in order to reduce public sector borrowing together with measures intended to stimulate growth. Thus, according to the Chancellor’s Autumn Statement (November 2012) there will be further cuts of around £6.6b (£8b) to welfare, overseas aid and Departmental spending, balanced by an additional £5.5b (£6.7b) infrastructure investment (including ‘science investment’) and support for businesses. The main rate of corporation tax will be cut by a further 1% from April 2014, to 21%, there will be a temporary increase in the Annual Investment Allowance, from £25,000 to £250,000 (from around €30,000 to €300,000) for two years to support SMEs and a £1b (£1.2b) ‘Business Bank’ will be created to help smaller businesses access finance and support.

2.2 Funding trends
An overview of funding trends is given below. A more detailed description is provided in the Introduction.

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012 (estimate, if such data are available)</th>
<th>2020 national target</th>
<th>EU average 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP growth rate</td>
<td>-4.0</td>
<td>1.8</td>
<td>0.9</td>
<td>-0.3</td>
<td>n/a</td>
<td>1.5</td>
</tr>
<tr>
<td>GERD as % of GDP</td>
<td>1.85</td>
<td>1.8</td>
<td>1.77</td>
<td>n/a</td>
<td>n/a</td>
<td>2.03</td>
</tr>
<tr>
<td>GBAORD (€ million)</td>
<td>10,916</td>
<td>10,929</td>
<td>10,561</td>
<td>n/a</td>
<td>n/a</td>
<td>92,308</td>
</tr>
<tr>
<td>GBAORD as % of GDP</td>
<td>0.69</td>
<td>0.64</td>
<td>0.6</td>
<td>n/a</td>
<td>n/a</td>
<td>0.73</td>
</tr>
<tr>
<td>BERD (€ million)</td>
<td>17,537</td>
<td>18,731</td>
<td>19,080</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>BERD as % of GDP</td>
<td>1.11</td>
<td>1.1</td>
<td>1.09</td>
<td>n/a</td>
<td>n/a</td>
<td>1.26</td>
</tr>
<tr>
<td>R&amp;D performed by HEIs (% of GERD)</td>
<td>27.94</td>
<td>27.23</td>
<td>26.86</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R&amp;D performed by PROs (% of GERD)</td>
<td>9.15</td>
<td>8.00</td>
<td>9.27</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R&amp;D performed by Business Enterprise sector (% of GERD)</td>
<td>60.4</td>
<td>60.92</td>
<td>61.47</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.3 New policy measures
Over the period 2011-2012, a number of new measures were introduced and modifications made to existing measures. These were generally announced as part of the 2011 Innovation and Research Strategy for Growth (IRS) and are described briefly below:

The Technology Strategy Board will allocate over £200m (€243m) in total until 2015 in a network of ‘Catapult Centres’. These are intended to provide businesses with access to:

- “Specialist technical expertise and skills needed across the sector from SMEs, supply chains and tier one companies, particularly multidisciplinary expertise;
- High value capital equipment, facilities and infrastructure beyond the affordability of individual companies;
- Technology and sector leadership and an independent “repository of knowledge; and
- Long-term investment in technology platforms or demonstrators beyond the normal business planning horizons”

Seven Catapult Centres are planned in: High Value Manufacturing; Cell Therapy; Offshore Renewable Energy; Satellite Applications; Connected Digital Economy; Future Cities and Transport Systems. Three have appointed CEOs and leadership teams, while the High Value Manufacturing Catapult is already fully operational via a consortium of seven centres based across the UK.

A Graphene Global Research and Technology Hub is in the process of formation: a £45m (€55m) National Institute of Graphene Research has been established at the University of Manchester (due to be fully operational by 2016), while, beginning in 2013, £20m (€24m) will be invested into support for research into graphene engineering and a further £10m (€12m) into research for manufacturing processes and technologies linked to graphene.
Although not a new measure, per se, the TSB has identified Special Interest Groups (SIGs) focused on technologies for priority investment which will operate across the existing Knowledge Transfer Networks scheme. The technologies are: Synthetic Biology; Energy Efficient Computing and Energy Harvesting. Competitions in these areas were launched by TSB in October 2012.

A new Seed Enterprise Investment Scheme (SEIS) was introduced in April 2012 to encourage investment in new small companies. The scheme offers income tax relief of 50% for individuals who invest in qualifying companies. A capital gains tax (CGT) holiday was also announced on gains realised in 2012/13 that are invested through SEIS in the same year in order to kick-start the scheme.

Also in April, the annual investment limit for the Enterprise Investment Scheme (EIS) was raised to £1m for individuals. At the same time, the gross asset limit, employee limit and investment limit for EIS and the Venture capital Trusts (VCTs) were increased along with some further modifications, including removal of the £1m limit on investment by a VCT in a single company.

The SME R&D Tax Credit was modified during 2012, raising the level to 225%. An awareness campaign targeting advanced manufacturing and innovative SMEs was launched in December 2012.

In September, the TSB launched a new innovation vouchers programme, targeting areas and sectors with relatively low levels of private sector innovation and growth: mainly in the agri-food and built environment sectors. The vouchers can be used by start-up, micro and SMEs to access up to £5,000 (€6,100) worth of advice and expertise from universities, research organisations or other private sector knowledge suppliers.

The Government has also provided an additional £200m (€240m) to the Enterprise Capital Funds, which offer finance of up to £2m (€2.4m) investment to SMEs with high growth potential.

Another area identified by the IRS concerned the issue of Intellectual Property. The UK’s Intellectual Property Office (IPO) has identified a number of areas where it can improve business support, including the funding of 200 strategic IP audits, IP Masterclass training for business advisors and a 2013 round of its Fast Forward competition, a £750,000 (€915,000) fund for prizes to projects which improve the management of IP in knowledge exchange.

The former Grant for R&D was relaunched by TSB in December 2012 as Smart, and funding was doubled to £40m (€48m) per year. In order to provide more help to early stage micro companies that have not previously worked with the TSB, linkages to other forms of support are being created such as to the private investment community and to the GrowthAccelerator scheme for coaching and mentoring.

Funding to the Designing Demand scheme was increased to £1.3m (€1.6m) over 2012/13 and the scheme was also evaluated (see below).

A further £200m was added to the £100m (€122m) funding already provided in the 2012 Budget for the UK Research Partnership Investment Fund (UKRPIF). The Fund assists universities in leveraging co-investment from the private and charity sectors into long-term strategic research partnerships. The scheme, which is managed by the Higher Education Funding Council for England, provides funding for large capital research projects of between £10-35m (€12-42m).

A key part of the UK Life Sciences Strategy, the Biomedical Catalyst was opened to applications in May 2012. Run by the Medical Research Council and the TSB, programme has a budget of £180m (€220m) over three years and offers funding for innovative SMEs and academics to
develop solutions to healthcare challenges. Three levels of funding are available: Feasibility Funding Awards, Early Stage Awards and Late Stage Funding Awards.

With support from the TSB and HEFCE, the N8 Industry Innovation Forum (N8 IIF) has begun to operate and has held two meetings focused on Advanced Materials and Healthy and Active Ageing. The N8 IIF is an initiative which connects the N8 Research Partnership, a set of research intensive universities and other key organisations and networks involved in innovation across the North of England, with leading businesses, including AstraZeneca, Croda, National Nuclear Laboratory, Procter & Gamble, Reckitt Benckiser, Siemens, Smith & Nephew and Unilever. In addition to increasing collaborative R&D and commercialisation, the Forum acts as a catalyst for open innovation by: matching industry requirements with science solutions and possibilities; creating ideas, insights and innovations through an agglomeration of talent and expertise and enabling cross sector innovation and knowledge exchange from a broad range of R&D firms.\(^{18}\)

Following a study into research equipment sharing by the N8 Research Partnership (June 2012), the Government introduced a VAT Exemption on cost sharing services in July 2012.

In September, an extra £6m (€7.3m) funding was announced for the Higher Education Innovation Fund (HEIF) to be shared between the top-performing HEIF-funded universities.

A new Innovation and Knowledge Centre (IKC), the Sustainable Product Engineering Centre for Innovative Functional Industrial Coatings (SPECIFIC) Production facility was opened in Port Talbot, Wales in October 2012, while plans for a seventh IKC, on Synthetic Biology, were announced in September 2012. The IKCs, of which six are now operational, are led by an academic institution and funded for five years by the EPSRC and TSB (and, where relevant, the BBSRC). IKCs are centres of excellence intended to accelerate and promote business exploitation of an emerging research and technology field.\(^{19}\)

In October 2102, a new online service to SMEs that are exploring the opportunities for globalising their businesses was opened. ‘OpentoExport’ is supported by UK Trade and Investment and brings together relevant information and advice sources for exporting businesses.

Finally, BIS has worked with NESTA in establishing the UK Centre for Challenge Prizes, which will offer support to galvanise innovation, encourage new collaborations and solve multi-disciplinary problems in hitherto neglected areas. Some £350,000 (€427,000) has been invested in the UK Prize Fund and the first two prizes (on cycling) were launched in June 2012. NESTA has also launched the Ageing Well and Waste reduction Challenges in collaboration with the Cabinet Office.

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\(^{18}\) [http://www.n8research.org.uk/industry-innovation-forum/industry-innovation-forum/](http://www.n8research.org.uk/industry-innovation-forum/industry-innovation-forum/)

\(^{19}\) [http://www.epsrc.ac.uk/funding/grants/business/schemes/Pages/ikcs.aspx](http://www.epsrc.ac.uk/funding/grants/business/schemes/Pages/ikcs.aspx)
2.4 Recent policy documents

The most recent strategy document produced is the Innovation and Research Strategy for Growth (IRS), published in December 2011, which remains the central guiding document for UK innovation strategy. This was supported by an Economics Paper which provided an overall analysis of the general context within which the IRS was situated.

A September speech by the UK's Business Minister focused on the idea of a new Industrial Strategy. Although this explicitly dealt with industrial strategy, since the UK view of innovation policy is rather holistic, some of the points raised were of interest to the broader context of innovation. The speech also referred to a new Economics Research Paper published, by BIS, on 11th September 2012 which identified a number of sectors where the UK could exploit their potential for growth. The details of the speech have since been made more explicit in the recent Autumn Statement.

Most recently, in November 2012, BIS published its Annual Innovation Report. This provides an assessment of progress made in the implementation of the 2011 Strategy, offers a number of lines of evidence against each of the identified innovation challenges and outlines new measures and other developments.

2.5 Research and innovation system changes

During 2012, the most significant change in the UK policy delivery landscape, although not restricted purely to innovation, was the closure of the Regional Development Agencies, which were responsible for some innovation support, most significantly the delivery of the Grant for R&D programme. Their closure was announced in the 2010 Budget shortly after the 2010 general election. As a result of this closure the TSB has now taken responsibility for Grant for R&D (now known as Smart) nationally. The RDAs met the target of operational closure by March 2012 and were formally abolished in July 2012. The role of the RDAs is to some extent, to be taken over by Local Economic Partnerships.

One other change to the innovation landscape is the opening of the Catapult Centres and the IKCs, both of which provide further sets of actors within the overall knowledge transfer interface.

2.6 Regional and/or National Research and Innovation Strategies on Smart Specialisation (RIS3)

Both the concept and the fundamentally ‘local – global’ character of Smart Specialisation has been acknowledged and accepted by national agencies in the UK and it is recognised that an effective system of coordination is required both from the top-down and from bottom up. This will entail government working with local partners to develop mechanisms for aligning national/local leadership team(s) and decision-making.

Many of the innovation support activities already in operation in England (and other UK regions) already fit within the concept of Smart Specialisation and the Government is seeking to identify and fill any gaps or disconnections. The Government’s current position with the European Commission is that there is no added value from a separate ‘stand alone’ Smart Specialisation Strategy. Rather, the real value of Smart Specialisation is as an ongoing process of learning, continually driving more productive and sustainable investments in innovation at all levels.

In this context, the role of the IRS acts as a sound base with strong political, institutional and financial backing. Several national actors play a major role in its delivery, primarily the TSB, but also others such as the Skills Funding Agency, HEFCE, Research Councils and the NHS. These will also be significant partners in terms of matched funding in relation to the EU CSF Funds. At the local level, the Local Economic Partnerships (LEPs) are of particular relevance to the notion of Smart Specialisation. LEPS, which are currently developing their activities in order to fill the ‘regional’ gap left by the closure of the Regional Development Agencies, vary enormously in terms of size, scale, coherence (both geographical and partnership maturity), ambitions and capability. However, they will be seeking to access support from the EU CSF funds for activities that seek to add value to nationally funded activities whenever these are delivered at the local level. They will also have an important role in devising local innovation strategies. Other relevant actors at the regional/local level are universities, councils, and various sub-national networks, clusters and alliances – often focusing on particular sectors, functions or client/member groupings. Hence, the recognised need for coordination and capacity at national and local levels and between these levels.

The main message is that the Government believes that there is no need for local partners to develop a stand alone strategy for Smart Specialisation, neither is it likely to be a requirement to release funding\(^24\). Many local actors are undertaking activities that might be described as Smart Specialisation, although these take place within the general context of local and regional innovation development and are not labelled as such. Across the UK there is, as yet, no consistent approach with the devolved administrations of Northern Ireland and Scotland\(^25\) have prepared strategies as has the County of Kent. However, recent indications are that a UK wide ‘strategic policy framework for smart specialisation’ (the term used in EU negotiations) is under preparation which will include chapters relating to the devolved administrations of Scotland, Wales and Northern Ireland. A chapter on England will be drawn up by BIS in cooperation with the relevant Local Economic Partnerships.

\section*{2.7 Evaluations, consultations}

There was a positive assessment made of the UKIIF, published in May 2012. This early review of progress found that the fund was seen to be effectively addressing the gap in the supply of equity finance in 2009 and is still required today, as few private sector UK institutions focus on VC market investment. The fund was also seen to have successfully encouraged additional private investment leverage and investment diversification, while the surveyed UKIIF recipient businesses are all currently developing highly innovative products or services\(^26\).

\begin{footnotesize}
\begin{itemize}
  \item BIS: pers.comm. and derived from “Smart Specialisation: Messages for national and local partners: Updated workshops held in Birmingham on 16th November ’12”
  \item http://www.sdi.co.uk/~/media/SDI/Scotland%20Europa/Resources%20Public/Regional%20Rural%20Urban/Scotland%20Europa%20Developmental%20Guide%20and%20Factsheet%20for%20Smart%20Specialisation.pdf
  \item Early Assessment of the UK Innovation Investment Fund, BIS, May 2012
  \item http://www.bis.gov.uk/assets/BISCore/enterprise/docs/E/12-815-early-assessment-uk-innovation-investment-fund.pdf
\end{itemize}
\end{footnotesize}
A 2012 evaluation of Designing Demand identified strong returns to business, both actual and anticipated: for every £1 businesses invest in design, increased revenues of over £20 can be anticipated with an increase of over £4 in net operating profit and over £5 in exports. There were also reported boosts to confidence, strategic thinking, brand and business identity, and the creation or safeguarding of 2,460 net FTE jobs as a direct result of the programme. The evaluation found a potential return on investment of £3.75 in Net Value Added per £1 of public money spent. The evaluation also identified benefits to the design industry, with most of the participating businesses acknowledging a commitment to ongoing investment in design as a core business function.

Monitoring and evaluation plans for the catapult Centres are being developed by TSB.

In addition to specific evaluations, a number of broader and focused reviews have been conducted over the past year:

The N8 Research Partnership published the outcome of a study into new and different ways to share investments in key research equipment across the N8 universities. Funded by the EPSRC, ‘Sharing for Excellence and Growth’ "highlights the costs and challenges for sharing equipment but also the wider benefits that can be realised, including developing state of the art new research equipment in partnership with manufacturers, recruiting and training talent, and enabling more ambitious and novel research strategies. This has been shared with other regional university groups and others, to explore the opportunities for further integration of approaches”.

A scoping study on the current state of research on the value and impact of design was published in August 2012. The report was produced by the Design Council and the Arts and Humanities Research Council (AHRC). The report found that the design research community plays a key role in economic and social value creation but faces challenges in terms of the measurement of the value of design, evidence-gathering and business and policy partnerships.

Finally, as a contribution to the wider policy debate concerning plans to bring the UK out of the economic downturn of 2008, and the options presented by austerity and stimulus measures, NESTA produced a policy discussion document in September 2012. This outlined 12 recommendations for recovery.

The annual (2012) HE-BCI survey examined the exchange of knowledge between universities and the wider world in order to inform the strategic direction of 'third stream' activity undertaken by funding bodies and HEIs in the UK. The surveys collect financial and output data per academic year, summarise the results and provide information on a range of activities, from the commercialisation of new knowledge, through the delivery of professional training, consultancy and services, to activities intended to have direct social benefits.

Other reviews of interest and relevance include the BIS Economics papers mentioned above.

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28 Ibid.

29 http://www.nesta.org.uk/areas_of_work/economic_growth/plan_i/assets/features/plan_i_report

30 http://www.hefce.ac.uk/whatwedo/kes/measureke/hebci/
3 Structural challenges facing the national system

Previous ERAWATCH Country Reports and INNO Policy TrendChart reports have alluded to the fact that the UK demonstrates a major strength in the area of innovation policy governance by virtue of the fact that does not undergo dramatic shifts in priorities, instruments or structures. On the contrary, it depends on a long-term strategic view of innovation policy which is informed by an extensive process of review (including evaluations of the performance of the various policy instruments and structures). However, as noted in the previous section and in common with many other countries, the effects of the economic downturn and financial uncertainties (both global and those deriving from the problems of the Eurozone) continue to significantly impact the economic performance of the country. Consequently, there have been impacts on a range of innovation indicators (or their proxies) and this continues to pose challenges for the maintenance of this stable policy governance approach, not least in the availability of resources in support of innovation, from the public, private and not-for-profit sectors.

According to the 2011 Innovation Union Competitiveness Report, based on a composite indicator derived from 25 IU Scoreboard indicators, the United Kingdom remains one of the group of ‘innovation followers’ together with Austria, Belgium, France, Ireland, Luxembourg and The Netherlands, all of which show a performance above to the EU27 average. The UK is second in this group, just behind Belgium.

However, in terms of growth, the 2012 IU Scoreboard lists the UK as a ‘slow grower’ with an average annual growth in innovation performance of around 0.1%. Over the period 2007-2011, the Innovation Union Competitiveness Report 2011 (IUCR) notes that the UK showed relatively higher growth in the following innovation-related indices: new doctoral graduates (ISCED 6) per thousand population aged 25-34; population completing tertiary education; international scientific co-publications per million population; innovative SMEs collaborating with others, and community trademarks. Moderate or low growth was seen in: youth attaining upper secondary education; scientific publications within the 10% most cited scientific publications worldwide as % of total scientific publications of the country; non-EU doctorate students; R&D expenditure in the public sector; employment in knowledge-intensive activities, and knowledge-intensive service exports. On the negative side, the IU Scoreboard highlights moderate decline in: public-private scientific co-publications; PCT patent applications; patent applications in societal challenges per billion GDP (PPS€); community designs, and SMEs introducing marketing or organisational innovations. More pronounced decreases are identified for: venture capital provision; SMEs introducing product or process innovations; medium-high and high-tech product exports; sales of new to market and new to firm innovations, and licence and patent revenues from abroad as % of GDP.

The country rankings for each innovation dimension presented in the IU Scoreboard show that the UK had the following rankings among the EU27: human Resources – 4th; Open, excellent and attractive research systems – 4th; finance and support – 4th; firm investments – 11th (down from 8th last year); linkages & entrepreneurship – 2nd (up from 4th last year); Intellectual assets – 12th; Innovators – 19th; and Economic effects – 9th (down from 7th last year).

The overall macroeconomic forecast projected in the Council Recommendation on the 2012 UK National Reform Programme diverged somewhat from the figures presented by the Chancellor.


in the recent Autumn Statement (see Section 2.1). More specific indicators presented by the Council Recommendations show continuing high household debt and uncertainty over the impact of the Government’s strategy for residential construction. There was also concern over high unemployment, which stood (as of July 2012) at 8.4%, with youth unemployment much higher at 22.2%. However, very recent figures from the UK Office of National Statistics indicate that “unemployment in Britain recorded its sharpest quarterly drop in more than a decade in the late summer and early autumn as strong jobs growth by private companies more than offset labour shedding in the public sector”. The figures showed the number of jobless fell by 86,000 to 2.51 million in the three months to October 2012. However, the latest official data again show that earnings have failed to keep pace with inflation, with average earnings (excluding bonuses) rising at an annual rate of 1.7%, far below the current inflation rate of 2.7%.

Nevertheless, the Council also pointed towards the UK’s oversupply of low-skilled workers (for whom demand is falling) and a shortage of the workers with high-quality and vocational skills who are demanded by the UK’s goods producing and exporting sectors. More advanced qualifications in vocational education and training are also required. Adult basic literacy and numeracy skills are also reportedly very poor. Of greater relevance to the innovation system, the Council notes that financing conditions remain tight, particularly for SMEs, while net lending to the corporate sector was negative in 2011. Evidence from surveys indicates “a significant number of SMEs are credit constrained, while there are also potential challenges on the demand side. Additionally, access to non-bank lending remains largely restricted to bigger firms, and competition in the banking industry is limited”. A substantial ongoing financing gap, especially for SMEs, has been predicted over the next five years. Other challenges concern the country’s energy and transport infrastructures, with significant investment required into the upgrading of its electricity generation capacity.

The UK Government’s 2012 Annual Innovation Report offers “a clear picture of the UK’s innovation performance during the recent recession, up to and including 2010”. Painting a more positive picture, it notes that the UK continues to perform well in most key areas. Clear and acknowledged strengths lie in areas such as the performance of the UK’s world leading research base, while compared to other countries the overall level of innovation investment in the UK remains strong. However, areas of relative underperformance are also noted, including performance against traditional forms of innovation metrics, such as R&D as a proportion of GDP, where the UK continues to lag behind most of its main competitors. Nevertheless, some positive signs also exist.

Taking into account all intangible investment, the UK is among the top performing countries. Despite a nominal fall in investment, investment as a share of value added in the UK private sector increased by 1.5% and spending on innovation held up reasonably well in the UK as it entered recession;

The UK also provides a favourable environment for innovation. The proportion of the UK labour force trained in science and technology has increased over time, and the UK has a high proportion of engineering and doctoral graduates in comparison to other countries. Furthermore, the UK is a highly attractive destination for foreign direct investment, with an exceptionally high share of UK business R&D funded from abroad.

The outlook for outputs and efficiency is promising, with the UK proving to be a strong innovator with a healthy innovation ecosystem. The country has a particularly strong reputation for high quality research, with a 14% share of the world's most highly-cited scientific papers. It also performs well on international collaboration and international investment measures, with the

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34 Department for Business, Innovation and Skills, Annual Innovation Report: Innovation Research and Growth, November 2012
highest proportion of R&D funded from abroad amongst the OECD countries at 16% of total R&D.

The UK is a good place to do business. It is number one in the OECD’s ease of entrepreneurship index which is an inverse measure of the regulatory barriers to the entry of new firms to the market place35, while UK innovative firms are far more likely to be active in foreign markets than many of their counterparts.

A further cause for concern relates to the production of trained graduates: it is now possible that the implications of the introduction of full student fees of up to £9,000 (€10,300) per year by the majority of UK universities (although students in Wales and Scotland do not have to pay fees if attending home country universities) are emerging. UK applicants for 201236, the first year in which full fees were charged, dropped by 12%, while those from EU applicants fell by over 9% (UCAS, 2012)37. The increase generally represents a trebling of the previous level of fees. Latest figures for November 2012 show the number of applicants to UK higher education has fallen by 8% on the same time last year, although it is noted that changes at this point in the cycle can be a poor guide to final demand38.

One major problem with many of the above indicators is that due to their reliance on historical data, they may still not fully reflect the effects of the 2008 financial crisis. Nevertheless, the UK Government adopts the view that the underlying evidence against which the 2011 Innovation and Research Strategy for Growth was developed is still relevant and that the Strategy will address the major structural challenges faced by the UK.

Hence, the overall picture to emerge from the above analyses is largely as that presented in the 2011 Country report: the UK has a relatively strong S&T research system but this is not matched by business innovation performance. The IUCR 2011 attributes this strength to a number of world-class universities, a large share of young doctoral graduates and competitive strengths in some high-tech and medium-high tech sectors such as pharmaceuticals although this is being slightly eroded. The reliance of the economy on the services sector also is a cause for ongoing concern since it is dominated by the banking, insurance and business services – all of which have been negatively impacted by the economic downturn and other exogenous factors.

In summary, the above indicators and priorities tend to suggest that the main structural challenges facing the UK tend to remain largely unchanged from previous years’ analyses. These are:

- A continuing low level of private sector R&D investment, in all sectors of the economy;
- The need to maintain a continuing policy focus on the translation of the results of publicly supported R&D into commercial products, process and services;
- In the face of continuing economic pressures the need to maintain the present level of public funding of the science base (despite ring fencing over the next 3 years);
- Uncertainties over the future supply of human resources in S&T (in the face of university teaching cuts and the introduction of higher student fees);
- Continuing pressure on the supply of venture capital for the growth and development of SMEs and start-ups.

36 Based on numbers of applications received by universities by 15 October (deadline for Oxford, Cambridge and courses in medicine, dentistry and veterinary medicine) which form an early indicator of the total across all courses this year.
38 http://www.ucas.ac.uk/about_us/media_enquiries/media_releases/2012/novstatscomment
<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Value</th>
<th>EU Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUMAN RESOURCES</td>
<td>New doctorate graduates (ISCED 6) per 1000 population aged 25-34</td>
<td>2.2</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>Percentage population aged 25-64 having completed tertiary education[^1]</td>
<td>43.0</td>
<td>33.6</td>
</tr>
<tr>
<td>Open, excellent and attractive research systems</td>
<td>International scientific co-publications per million population</td>
<td>928</td>
<td>301</td>
</tr>
<tr>
<td></td>
<td>Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country</td>
<td>12.83</td>
<td>10.73</td>
</tr>
<tr>
<td>Finance and support</td>
<td>R&amp;D expenditure in the public sector as % of GDP</td>
<td>0.65</td>
<td>0.76</td>
</tr>
<tr>
<td>FIRM ACTIVITIES</td>
<td>R&amp;D expenditure in the business sector as % of GDP</td>
<td>1.08</td>
<td>1.23</td>
</tr>
<tr>
<td>Linkages &amp; entrepreneurship</td>
<td>Public-private co-publications per million population</td>
<td>61.7</td>
<td>36.2</td>
</tr>
<tr>
<td></td>
<td>Intellectual assets</td>
<td>3.27</td>
<td>3.78</td>
</tr>
<tr>
<td></td>
<td>PCT patents applications per billion GDP (in PPS€)</td>
<td>0.73</td>
<td>0.64</td>
</tr>
<tr>
<td>OUTPUTS</td>
<td>Medium and high-tech product exports as % total product exports</td>
<td>30.60</td>
<td>48.23</td>
</tr>
<tr>
<td></td>
<td>Knowledge-intensive services exports as % total service exports</td>
<td>65.80</td>
<td>48.13</td>
</tr>
<tr>
<td></td>
<td>License and patent revenues from abroad as % of GDP</td>
<td>0.52</td>
<td>0.51</td>
</tr>
</tbody>
</table>

4 Assessment of the national innovation strategy

4.1 National research and innovation priorities

As reported in the 2011 ERAWATCH UK Country Report\(^{40}\), the then newly elected Conservative/Liberal Democratic coalition government, faced with the global economic crisis and public debt issued an Emergency Budget in June 2010. This was subsequently followed by a Comprehensive Spending Review CSR which resulted in a number of severe cuts (austerity measures) in departmental budgets in order to drastically reduce the scale of public spending. Despite the cuts, the Science Budget was preserved at around €5.6b in cash terms for the life of the current Parliament, although university budgets, excluding research, were cut by 40%. Welfare funding was particularly hard hit, although health spending was ring-fenced and international aid expenditure increased.

In early December 2011, BIS published an Innovation and Research Strategy for Growth (IRS)\(^{41}\), accompanied by an Innovation and Research Strategy for Growth Economics Paper\(^{42}\), which provided the background evidence underpinning the IRS. The IRS focused on “how the Government will support innovation activity across the most important sectors of the UK economy, in particular those that offer the greatest scope for boosting growth and productivity” and forms the basis for ongoing Government policies in this area.

Most recently, in November 2012, BIS published its Annual Innovation Report\(^{43}\). This provides an assessment of progress made in the implementation of the 2011 Strategy, offers a number of lines of evidence against each of the identified innovation challenges and outlines new measures and other developments. In keeping with the broad policies identified by previous documents, the IRS outlines four priorities for UK innovation policy:

1. Facilitation of collaboration between organisations in the private, public and third sector, from the international to local level, to generate and apply new knowledge and to strengthen the sharing and dissemination of knowledge within the innovation system.
2. “The need to maintain and develop a full scale and coherent knowledge infrastructure – the university science system, research labs and organisations, and information agencies working in design, intellectual property, quality assurance and specialist support”.
3. Incentivisation of businesses across the economy to make investments into innovation. This includes attention to the innovation performance of the service sector, and of large medium and low tech industries in manufacturing, construction, energy supply, etc, all of which is crucial to the development of the UK economy.
4. “Transformation of the public sector into a major driver of innovation whilst recognising that the complexity and culture of the public sector create operational barriers towards this aim.”\(^{44}\)

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\(^{40}\) Cunningham, P., Sveinsdottir, T. and Gok, A. (2011) ERAWATCH COUNTRY REPORTS 2011: United Kingdom

\(^{41}\) BIS, Innovation and Research Strategy for Growth, December 2011

\(^{42}\) BIS, Economics Paper 15: Innovation and Research Strategy for Growth, December 2011


\(^{44}\) BIS, Innovation and Research Strategy for Growth, December 2011
The central elements of the Government’s approach were set out as:

- “continued support for blue skies, curiosity-driven research across a broad range of disciplines, with a focus on supporting excellent research and excellent universities;
- identifying and mobilising resources to exploit emerging technologies such as graphene, whilst driving innovation in high technology sectors and in response to societal challenges;
- encouraging increased business investment in all forms of innovation, particularly by SMEs, including technology development, but also in intangible assets such as design, the development of new business models and skills;
- increasing knowledge exchange and facilitating networks, clusters and research campuses as hubs for interaction at local, national and international level;
- strengthening the capability of the UK to be an active participant in and beneficiary of the changing geography of innovation, supporting UK research and business communities in benefitting from international collaboration, FDI and market access; and
- a commitment by Government to maximise its contribution, by making public data available to innovators, removing red tape that blocks innovation, using prizes and challenges to solve problems and acting as a lead customer for innovative products and services.”

Shortly after the publication of the IRS, concerns over the ongoing economic crisis, manifested themselves with discussion on how the economy could be rebalanced, with new attention to industry and innovation policy. This was apparently accompanied with greater recognition by the UK government for a need for a more active role in innovation policy (despite the prevalence of the ‘not picking winners’ discourse). In a speech in January, 2012, the Minister for Science stated “Governments find themselves making decisions about allocations of resources and we should not pretend we do not. (…) We need to judge the technologies that will matter in the future… We are not picking individual business sectors but Government is backing the development of specific key technologies”.

In a speech in September 2012, the Business Minister referred to new Industrial Strategy which included some elements of innovation support. Although details of these were not made more explicit, they appear to have related to policies that were reinforced or expanded upon by statements made in the BIS Annual Innovation Report and in the Chancellor’s Autumn Statement (November 2012).

4.2 Evolution and analysis of the policy mixes
The recent BIS Annual Innovation Report notes that the policies currently in place address the following objectives:
- Support innovation and research in business;
- Provide incentives for companies to invest in high-value business activities;
- Create a more open and integrated innovation ecosystem; and
- Remove barriers to innovation.

However, the UK policy mix has generally evolved along the main priorities that have been described in previous Country Reports.

45 Ibid.
An ongoing low level of private sector investment in R&D&I has been an issue identified by a succession of governments through a series of policy documents. The main instruments addressing it, in terms of size, are the R&D Tax credits for large companies and SMEs. These are accompanied by a range of indirect measures such as awareness promotion, prizes, advisory services, etc. In terms of their appropriateness and impact, the focus on tax credit offers business a demand-led flexible support, which can be used according to the specific needs of each company, rather than a cumbersome and confusing range of targeted measures. In addition, tax credits offer a relatively administratively simple instrument for government and avoid issues such as deadweight, market distortion and the need to balance multi-modal interventions. Against this, they do however remove from government the flexibility to prioritise funding on certain sectors or technologies. These main instruments are supported by range of lower cost flexible services and awareness-raising initiatives which appear to satisfy a number of business support niches.

The challenge of translating the results of publicly supported R&D into commercial products, process and services has led to the development of an extensive range of long-standing measures. To this has been added new cluster-type measures (such as ‘Catapults’, Knowledge and Innovation Centres and Research and Innovation Campuses) and other incentives, which address a range of actors, through a broad variety of modalities to promote and sustain collaboration for innovation. As might be expected, the complexity of the innovation process which engages a diverse set of actors along its timeline and the periodic assessment of the impact of government interventions has resulted in the development of a comprehensive set of measures. Evidence suggests that these measures have been successful – indeed the longevity of several of them (albeit subject to some modification) points towards them having received positive appraisals during their lifetime. With regard to the overall policy mix, there has been criticism that the emphasis placed on research quality by the RAE – the mechanism for the allocation of university block funding for research (notably assessed through the production of research publications in ‘high impact’ journals) and which, in the past, has tended to reward individualistic publication-oriented research activities, has acted in an opposite direction to other policy interventions that seek to reward the increased relevance of research and interaction with business and other potential users of such research. However, whilst retaining the ‘gold standard’ of research quality, the additional inclusion of ‘impact’ criteria in the new REF should mitigate this tension through rewarding the broader impact of research.

Efforts towards the maintenance of the science and research infrastructure have largely been achieved through the provision of long-term stable funding streams. Support for the science base has been a priority of a succession of administrations (of all political persuasions) since 1993 when the value of research in underpinning innovation and, hence, the broader economy, was fully recognised. Additional support streams for capital equipment and facilities have also been added to the policy mix, initially to offset the erosion of research infrastructures caused by the structure of HE research and more latterly as a more strategic effort to maintain and support infrastructure for research in key priority areas. The recent ring-fenced protection of the science base funding appears to offer a continuing stable platform of support although any significant increases in inflation may erode the real value of research funds in the longer term unless further adjustments are made. Support for large scale science infrastructure has declined with the reduction of the funding via the Large Facilities Capital Fund and Research Capital Investment Fund, although this has been offset somewhat by the new Research Partnership Investment Fund. Thus, despite cutbacks in other government areas, support for science and research seems to be holding despite the continuing series of economic uncertainties. Since the start of the Spending Review in 2010 the annual £4.6b (€5.6b) funding for science and research programmes has been protected in cash terms and ring-fenced during the spending review period. A further £600m (€730m) funding was announced in November 2012, to be invested in facilities for
technological R&D and Research Council infrastructure. This amounts to an additional £1.5bn (€1.8bn) of capital funding for science, research and innovation since the beginning of the Review.

In terms of ensuring the future supply of HRST, there has been continuing support for research training (through the Research Councils) although universities have seen significant cutbacks in their funding for teaching activities. The shortfall was supposed to be addressed by the increase of the cap on student fees that HEIs could charge, although the full effects of these changes are as yet unclear (early indications are that there may be a real and sustained decline in the uptake of university places). To some extent prompted by continuing calls for skilled graduates from employers, there has been some increased attention on workplace skills initiatives and reform of the Further Education (FE) sector plus the establishment of University Technical Colleges for students aged 14-19 that combine practical and academic studies. Some might argue that further structural change is required and that the emphasis placed on the HE sector as the leading supplier of skilled manpower is inappropriate, since the lack of a strong vocational/technical training sector remains an issue. However, the recent FE reforms and announcements of additional support for FE teaching facilities may be a step towards addressing some of the problems. Extra money has also been made available for the Employer Ownership Pilot, taking it to £340m (€415m) overall, to assist businesses in the design and development of their own training programmes.

Support for SME growth is a further challenge in the UK. The specific tax credits scheme for SMEs provides a major focus of policy support and this is reinforced by a range of more tailored schemes of R&D support which address the specific needs of SMEs. There has also been an increase of policy attention on a range of schemes aimed at mobilising financial support and investment – more recently, these schemes have received even greater attention in response to the need to protect newly created and developing small companies from the effects of the credit crunch. Measures aimed at the creation of start-ups and spin-offs also exist under the broad challenge of increasing the transfer of research results into economic outputs. Overall, SME support is delivered through a multimodal and flexible range of support measures addressing the spectrum of SME needs, which cover all the aspects of SME provision (direct funding, mobilisation of finance, provision of advisory services, etc.) at both national and targeted regional/local levels. Recent developments include the £1bn confirmed for the business bank to address the long-term structural gap in lending to small businesses; extra funding £140m (€170m) for UK Trade & Investment (UKTI) to help SMEs export abroad; £1.5bn (£1.8bn) to help small companies access growing markets overseas, together with further measures to cut back red tape that acts as a barrier to business growth.

Finally, the challenge of mobilising the significant resources invested by government in the procurement of (high tech) goods and services continues to focus policy attention on the issue of public procurement in support of innovation and demand led innovation. There are a limited number of schemes, the most significant being the Government-wide SBRI, although some also exist at departmental level – notably in the NHS. The topic continues to attract significant policy debate and there are policy efforts in place to raise activity in this area. Some evidence of success exists at the level of specific projects, e.g. in NHS ran schemes but the main aim is (or should be) to induce behavioural change in government procurement practice at the local level rather than through flagship national level procurement initiatives concerning major infrastructures.
Recent policy changes

Research policy

- No major changes
- Science budget for research frozen (but not cut)
- Fields selected for additional funding: clean technologies, renewables, agri-food, utilities, biotechnology
- Funding initiatives also focused on graphene and life sciences

Assessment of strengths and weaknesses

- + Long-term strategic vision and plan, backed by implementation targets is seen as a major policy strength
- + Sustained investment over recent years may protect research system from major economic impacts
- - Uncertainty of full impact of austerity measures on economy and the knowledge economy.

Innovation policy

- Additional measures to stimulate business access to research knowledge, including innovation vouchers and institutional based centres, etc.
- Changes to schemes/arrangements to mobilise financial support for SMEs, including small business bank and some new measures
- Maintained focus on procurement as driver for innovation

Assessment of strengths and weaknesses

- + Balanced policy mix – overall seems to perform well
- + shift towards some growth policies designed to stimulate business recovery
- - Prolonged credit crunch may still impact firms’ access to finance
- - Decline in public spending and size of public sector may have negative impact on procurement policies

Education policy

- Major cuts to HEFCE teaching budget
- Removal of cap on university teaching fees
- Increased funding for apprenticeships schemes
- Reform of FE system with some investment
- Introduction of UTCs

Assessment of strengths and weaknesses

- - Potential long term negative impact
- - translation of the results of publicly supported R&D into commercial products, process and services
- - investment of €58m in graphene research hub, €24m in satellite-based sensing services and €209m in to life sciences commercialisation
- - Collaborative R&D (€174m in 2011-12)
- - Knowledge Transfer Networks (KTNs): (€17.5m in 2011-12) (new Special Interest Groups in priority areas)

Other policies

- Closure of Regional Development Agencies and formation of LEPs
- Formation of Regional Innovation Campuses and Catapults

Assessment of strengths and weaknesses

- - Apparent gap for delivery of regional innovation support – still unclear how regional funding to be distributed – development of LEPs slow
- + may revitalise cluster type initiatives

4.3 ASSESSMENT OF THE POLICY MIX

A more detailed assessment of specific measures and policies, as outlined above, is given in the table below.

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Policy measures/actions48</th>
<th>Assessment in terms of appropriateness, efficiency and effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>low level of private sector investment in R&amp;D&amp;I</td>
<td>- R&amp;D Tax credits: modification to SME R&amp;D Tax credit</td>
<td>- apparently popular measure (claims related to over €13b worth of projects in 2010/11); apparently efficient and effective measure</td>
</tr>
<tr>
<td></td>
<td>- national network of Catapults (£240m between 2011-15)</td>
<td>- measure based on thorough review (Hauser, 2010). Too early to assess efficiency or effectiveness – one now fully operational</td>
</tr>
<tr>
<td></td>
<td>- investment of €58m in graphene research hub, €24m in satellite-based sensing services and €209m in to life sciences commercialisation</td>
<td>- based on strategic reviews and designed to capitalise on UK research strengths. Too early to assess.</td>
</tr>
<tr>
<td></td>
<td>- Collaborative R&amp;D (£174m in 2011-12)</td>
<td>- existing measure. Evidence suggests well used and effective.</td>
</tr>
<tr>
<td></td>
<td>- Knowledge Transfer Networks (KTNs): (€17.5m in 2011-12) (new Special Interest Groups in priority areas)</td>
<td>- supports 15 KTNs with over 38,000 members through the Connect web platform. Apparently well-used and successful measure.</td>
</tr>
</tbody>
</table>

48 Changes in the legislation and other initiatives not necessarily related with funding are also included.
<table>
<thead>
<tr>
<th>Challenges</th>
<th>Policy measures/actions</th>
<th>Assessment in terms of appropriateness, efficiency and effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Knowledge Transfer Partnerships (KTPs) (£29m in 2011-12)</td>
<td>- over 1,000 live projects per year – apparently popular and successful longstanding measure. Positively evaluated several times</td>
<td></td>
</tr>
<tr>
<td>- Innovation and Knowledge Centres</td>
<td>- focus on business exploitation of emerging research and technology fields</td>
<td></td>
</tr>
<tr>
<td>- Higher Education Innovation Fund (£174m in 2011-15) – extra £7m input 2012</td>
<td>- good uptake, recently revised allocation process.</td>
<td></td>
</tr>
<tr>
<td>- range of IP support services (launch of Fast Forward (£915,000) and other new initiatives)</td>
<td>- addresses potential barriers to commercialisation through improved IP awareness and advice – Recently reviewed by IPO</td>
<td></td>
</tr>
<tr>
<td>- introduction of EU VAT cost-sharing exemption, to avoid VAT costs and encourage university/charity cooperation</td>
<td>- new measure, based on N8 review of cost sharing measures</td>
<td></td>
</tr>
<tr>
<td>maintenance of the science and research infrastructure</td>
<td>- UK Research Partnership Investment Fund: budget raised to £336m</td>
<td>- number of partnerships already in place</td>
</tr>
<tr>
<td>- protection of the science and research budget 2010-2015 (£23b)</td>
<td>- appropriate measure given financial climate; efficient use of resources given need to maintain system stability; indicators (publications, researchers, etc.) seem to indicate effectiveness.</td>
<td></td>
</tr>
<tr>
<td>- additional £575m of capital investment since 2010: Large Facilities Capital Fund; Research Capital Investment Fund; HEFCE Research Capital allocation</td>
<td>- measures are appropriate; efficiency and effectiveness are ensured through strategic Large Facilities Roadmap which prioritises needs</td>
<td></td>
</tr>
<tr>
<td>- tax breaks worth £174m over 4 years for research &amp; innovation campuses in local Enterprise Zones</td>
<td>- regional measure aimed at improving performance of centres of excellence for business-research innovation activities</td>
<td></td>
</tr>
<tr>
<td>ensure future supply of HRST</td>
<td>- existing range of research training through Research Councils (incl. CASE awards), move towards delivery through teaching/research clusters and centres of excellence</td>
<td>- addresses both generic and more specific employee skills needs. There is still demand from employers for additional skills sets.</td>
</tr>
<tr>
<td>- continuing review of training and teaching needs addressed by HE funding bodies and research councils</td>
<td>- ensures delivery of appropriately trained researchers into the research base and business</td>
<td></td>
</tr>
<tr>
<td>- support for early career post-doctoral research fellowships through Royal Societies and British Academy</td>
<td>- support for excellent researchers, addresses need to maintain quality as lynch pin of research support</td>
<td></td>
</tr>
<tr>
<td>- increased support for Apprenticeships schemes in 2011 – no mention in 2012 Annual Innovation Report</td>
<td>- addresses absence of adequate pathway for lower level technical skills provision – skills addressed at several levels</td>
<td></td>
</tr>
<tr>
<td>- planned reforms to FE system plus facilities funding; introduction of UTCs; proposed sector led FE guild</td>
<td>- will report on measures to improve relevance of university training to business needs</td>
<td></td>
</tr>
<tr>
<td>- Wilson review of university-business links</td>
<td>- based on recent assessment of tax credit; effective and efficient measure</td>
<td></td>
</tr>
<tr>
<td>support for SME growth</td>
<td>- R&amp;D Tax credits: increased rate to 225% for SMEs</td>
<td>- advisory services: add further dimension to increase absorptive capacity.</td>
</tr>
<tr>
<td></td>
<td>- Grant for R&amp;D relaunched as /Smart (budget doubled to £48m in 2012)</td>
<td>- long-standing measure – addresses finance market failure, positively evaluated.</td>
</tr>
<tr>
<td></td>
<td>- Business Coaching For Growth</td>
<td>- manufacture advisory service to increase absorptive capacity.</td>
</tr>
<tr>
<td></td>
<td>- Manufacturing Advisory Service</td>
<td></td>
</tr>
<tr>
<td>Challenges</td>
<td>Policy measures/actions</td>
<td>Assessment in terms of appropriateness, efficiency and effectiveness</td>
</tr>
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<td>---------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| - Business Link  
- Growth/Accelerator  
- OpentoExport | - Grant for Business Investment wound down  
- Enterprise Capital Funds programme increased by €232m  
- UK Innovation Investment Fund  
- Enterprise Finance Guarantee  
- Venture Capital Trusts | - over subscribed – rationale for closure unsure – move criticised  
- addresses decrease in availability of VC due to credit crunch. Too early to assess.  
- positive review in 2012 |
| - Business Angel Co-Investment Fund (€58m) | - supports UK business angels market against economic downturn. Figures suggest co-investment has declined possibly due to downturn |
| - reformed investor tax reliefs including Enterprise Investment Scheme and new Seed Enterprise Investment Scheme | - stimulates investment support in financial downturn. Too early to assess effects. |
| - encouraged five main banks to set up a Business Growth Fund of €2.9b to fund high growth companies | - addresses lack of supply of bank capital support for small companies engendered by credit crunch. Too early to assess uptake |
| - Leveraging of ERDF funding for innovation  
- awareness raising on Smart Specialisation  
- new innovation voucher scheme launched (agri-food and built environment)  
- extension of Launchpad: TSB investment to help small businesses finance developing products or services and to leverage in private sector finance. Designed to strengthen clusters through facilitating cooperation and networking | - channels ERDF support to regional needs through existing measures  
- based on regional pilots, will focus on sector with low levels of private sector innovation and growth  
- tailored to specific local needs. Early examples appear to be successful. |
| support for public procurement and demand led innovation | Small Business Research Initiative (€5.8m in 2011-2012)  
Innovation Platforms (€243m)  
BIS is exploring options for a new Centre of Expertise to provide expert advice on the development of innovation to the public sector | Appropriate to policy goals of investigating potential of demand led innovation from Government. Some examples of success.  
Address sectoral demand issues (linked to societal challenge areas) through collaborative activities; strong connection to KTNs  
To early to assess |
## 5 National policy and the European perspective

Table 1: Assessment of the national policies/measures supporting the five strategic ERA priorities (derived from ERA Communication 2012)

<table>
<thead>
<tr>
<th>ERA dimension</th>
<th>Main challenges at national level</th>
<th>Recent policy changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 More effective national research systems</td>
<td>Universities enjoy high degree of autonomy. Cuts to teaching funding may not be offset by increase in student tuition fees cap – several universities likely to face shortfall in income from domestic student income. Student application numbers continue to be slightly lower again.</td>
<td>Raising of cap on student tuition fees.</td>
</tr>
<tr>
<td></td>
<td>UK has its own Large Facilities Roadmap which informs spending allocations for large scale infrastructures. Significant funding streams have been generally maintained: no real challenges.</td>
<td>New Research Excellence Framework being developed – will include criteria to assess and reward impact of research in addition to high quality.</td>
</tr>
<tr>
<td></td>
<td>Longstanding policy goal to increase the extent to which research results are translated into commercial goods and services. Addressed by variety of measures, including UKRPIF.</td>
<td>No major changes made to Large Facilities Roadmap. Significant investments in major new research facilities announced.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Introduction of new Research and Innovation Campuses, Catapult Centres and IKCs to facilitate science-industry interaction and the development of clusters. Review of IP regulations to remove barriers to commercialisation and to facilitate research cooperation.</td>
</tr>
<tr>
<td>ERA dimension</td>
<td>Main challenges at national level</td>
<td>Recent policy changes</td>
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<tr>
<td>2</td>
<td><strong>Optimal circulation, access to and transfer of scientific knowledge including via digital ERA</strong></td>
<td>UK has very open research system – no identified challenges.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Research Councils and HEFCE support for open access publishing. Government response and take up of Finch Review of Open Access recommendations. €12m to help universities with transition to open access (plus €45m via Research Councils for Article Payment Charges by universities) Open Data White Paper published June 2012. Data Strategy Board established. Planned establishment of Open Data Institute to facilitate broader use of public domain data.</td>
</tr>
<tr>
<td>3</td>
<td><strong>An open labour market for researchers</strong></td>
<td>No real challenges – UK performs well in attracting overseas researchers and students and in producing them domestically. UK performs very well in European programmes in terms of participation and coordination roles. However, few programmes are open to non-UK residents and there is some non-alignment with EU priority research areas. No serious challenges exist, however.</td>
</tr>
<tr>
<td>4</td>
<td><strong>Gender equality and gender mainstreaming in research</strong></td>
<td>No challenges – equal opportunities legislation is fully in place across the entire UK labour market.</td>
</tr>
<tr>
<td>5</td>
<td><strong>Optimal transnational co-operation and competition</strong></td>
<td>UK cooperates with range of partner countries. Overall guidance and coordination across government is provided by BIS/GSIF. No major challenges.</td>
</tr>
</tbody>
</table>

References


BIS, Early Assessment of the UK Innovation Investment Fund, May 2012


BIS, Smart Specialisation: Messages for national and local partners: Updated workshops held in Birmingham on 16th November 2012.


## List of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AHRC</td>
<td>Arts and Humanities Research Council</td>
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<tr>
<td>BBSRC</td>
<td>Biotechnology and Biological Sciences Research Council</td>
</tr>
<tr>
<td>BERD</td>
<td>Business Enterprise Expenditure on R&amp;D</td>
</tr>
<tr>
<td>BIS</td>
<td>Department for Business, Innovation and Skills</td>
</tr>
<tr>
<td>CBI</td>
<td>Confederation of British Industry</td>
</tr>
<tr>
<td>CIHE</td>
<td>Council for Industry and Higher Education</td>
</tr>
<tr>
<td>CSA</td>
<td>Chief Scientific Adviser</td>
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<tr>
<td>CSR</td>
<td>Comprehensive Spending Review</td>
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<tr>
<td>CST</td>
<td>Council for Science and Technology</td>
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<tr>
<td>DAs</td>
<td>Devolved Administrations</td>
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<tr>
<td>DCLG</td>
<td>Department for Communities and Local Government</td>
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<tr>
<td>DCMS</td>
<td>Department for Culture, Media and Sport</td>
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<tr>
<td>DEFRA</td>
<td>Department for Environment, Food and Rural Affairs</td>
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<tr>
<td>DFID</td>
<td>Department for International Development</td>
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<td>DH</td>
<td>Department of Health</td>
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<tr>
<td>EPSRC</td>
<td>Engineering and Physical Sciences Research Council</td>
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<td>ERA</td>
<td>European Research Area</td>
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<td>ESFRI</td>
<td>European Strategy Forum on Research Infrastructure</td>
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<tr>
<td>ESRC</td>
<td>Economic and Social Research Council</td>
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<tr>
<td>FE</td>
<td>Further Education</td>
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<tr>
<td>fEC</td>
<td>Full Economic Costing</td>
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<tr>
<td>FP</td>
<td>European Framework Programme for Research and Technology Development</td>
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<tr>
<td>G7</td>
<td>Group of seven industrialised nations</td>
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<tr>
<td>GBAORD</td>
<td>Government Budget Appropriations or Outlays for R&amp;D</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GERD</td>
<td>Gross Expenditure on R&amp;D</td>
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<tr>
<td>GSIF</td>
<td>Global Science and Innovation Forum</td>
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<tr>
<td>HE</td>
<td>Higher Education</td>
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<tr>
<td>HE-BCI</td>
<td>Higher Education-Business and Community Interaction</td>
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<tr>
<td>HEFCE</td>
<td>Higher Education Funding Council for England</td>
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<tr>
<td>HEI</td>
<td>Higher Education Institutions</td>
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<tr>
<td>HEIF</td>
<td>Higher Education Innovation Fund</td>
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<tr>
<td>HERD</td>
<td>Higher Education Expenditure on R&amp;D</td>
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<tr>
<td>HM Treasury</td>
<td>Her Majesty’s Treasury</td>
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<tr>
<td>KTN</td>
<td>Knowledge Transfer Network</td>
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<td>KTP</td>
<td>Knowledge Transfer Partnership</td>
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<td>LCFC</td>
<td>Large Facilities Capital Fund</td>
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<td>LEP</td>
<td>Local Economic Partnership</td>
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<td>MoD</td>
<td>Ministry of Defence</td>
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<tr>
<td>MRC</td>
<td>Medical Research Council</td>
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<td>NAO</td>
<td>National Audit Office</td>
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<tr>
<td>NERC</td>
<td>Natural Environment Research Council</td>
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<tr>
<td>NESTA</td>
<td>National Endowment of Science Technology and the Arts</td>
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<tr>
<td>NHS</td>
<td>National Health Service</td>
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<tr>
<td>NRP</td>
<td>National Reform Programme</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation &amp; Development</td>
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<td>ONS</td>
<td>Office for National Statistics</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>PRO</td>
<td>Public Research Organisation</td>
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<tr>
<td>PSA</td>
<td>Public Service Agreement</td>
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<tr>
<td>PSRE</td>
<td>Public Sector Research Establishment</td>
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<tr>
<td>RAE</td>
<td>Research Assessment Exercise</td>
</tr>
<tr>
<td>RCIF</td>
<td>Research Capital Investment Fund</td>
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<tr>
<td>RCUK</td>
<td>Research Councils UK</td>
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<tr>
<td>RDA</td>
<td>Regional Development Agency</td>
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<tr>
<td>REF</td>
<td>Research Excellence Framework</td>
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<tr>
<td>RTO</td>
<td>Research Technology Organisations</td>
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<tr>
<td>S&amp;T</td>
<td>Science and Technology</td>
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<tr>
<td>SBRI</td>
<td>Small Business Research Initiative</td>
</tr>
<tr>
<td>SET</td>
<td>Science, Engineering and Technology</td>
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<tr>
<td>SME</td>
<td>Small and Medium-sized Enterprise</td>
</tr>
<tr>
<td>STEM</td>
<td>Science, Technology, Engineering &amp; Mathematics</td>
</tr>
<tr>
<td>STFC</td>
<td>Science and Technology Facilities Council</td>
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<tr>
<td>TSB</td>
<td>Technology Strategy Board</td>
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<td>UKTI</td>
<td>UK Trade and Investment</td>
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<td>UTC</td>
<td>University Technical College</td>
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</table>
Abstract
This analytical country report is one of a series of annual ERAWATCH reports produced for EU Member States and Countries Associated to the Seventh Framework Programme for Research of the European Union (FP7). The main objective of the ERAWATCH Annual Country Reports is to characterise and assess the performance of national research systems and related policies in a structured manner that is comparable across countries.

The Country Report 2012 builds on and updates the 2011 edition. The report identifies the structural challenges of the national research and innovation system and assesses the match between the national priorities and the structural challenges, highlighting the latest developments, their dynamics and impact in the overall national context. They further analyse and assess the ability of the policy mix in place to consistently and efficiently tackle these challenges. These reports were originally produced in December 2012, focusing on policy developments over the previous twelve months.

The reports were produced by independent experts under direct contract with IPTS. The analytical framework and the structure of the reports have been developed by the Institute for Prospective Technological Studies of the Joint Research Centre (JRC-IPTS) and Directorate General for Research and Innovation with contributions from external experts.
As the Commission’s in-house science service, the Joint Research Centre’s mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle.

Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new standards, methods and tools, and sharing and transferring its know-how to the Member States and international community.

Key policy areas include: environment and climate change; energy and transport; agriculture and food security; health and consumer protection; information society and digital agenda; safety and security including nuclear; all supported through a cross-cutting and multi-disciplinary approach.