Parliamentary Office of Science and Technology

postnote

July 2004 Number 224

THE EUROPEAN RESEARCH AREA

Research and development (R&D) is central to UK and European Union (EU) policy to build a competitive, knowledge based, economy. EU policy is focused on the development of the European Research Area (ERA) and an initiative to raise average research expenditure to 3% GDP[1] by 2010. This note examines the extent to which involvement in the European Research Area may help the UK to achieve its own R&D goals.

The ERA and the UK

The ERA is an umbrella concept for EU R&D strategy. EU R&D funding is important for the UK. From 1998 to 2002, UK researchers received €2.0bn EU funding,[2] compared to a total UK science budget of €8.8bn.[3]

UK policy

The Government set out its own ambitions for UK R&D in a recent consultation on a 10 year investment plan:[4]

- world class excellence, driven by competition for funding and talent;
- a sustainable research base meeting the needs of public and private funders;
- university-business collaboration to focus research and drive innovation;
- better commercial translation of leading edge technologies;
- excellent teaching of science and technology;
- society confident about use and regulation of science.

The Office of Science and Technology (OST) believes that the ERA could help the UK realise its ambitions for science and technology but sees a need to draw a balance between national and international programmes.

EU policy

In 2000, the European Council set the challenging goal of making Europe "the most competitive and dynamic knowledge-based economy in the world" by 2010.

R&D investments in 2001[5]

	R&D spend, %GDP	% investment attributed to industry
EU15 average	1.98	56
UK	1.89	46
Germany	2.51	66
France	2.23	54
Finland	3.41	71
Romania	0.39	48
US	2.72	67
Japan	3.07	73

The ERA was established as part of a package of measures on research, education and environment to:

- increase research investment;
- reduce fragmentation and duplication of effort;
- boost researcher numbers and raise the excellence of their performance.

In 2002, EU member states agreed to raise average research expenditure to 3% GDP by 2010, in line with competing nations. The EU believes that industrial investment in R&D is needed for research advances to be translated into products and services. Therefore ~2/3 of this is intended to come from the private sector.

The EU has a strong research base - it has a higher annual publication rate for scientific papers than the US. However, it falls behind its rivals in its ability to translate research excellence into commercial benefits. This can in part be attributed to R&D funding (see table).[6]

The UK's commitment

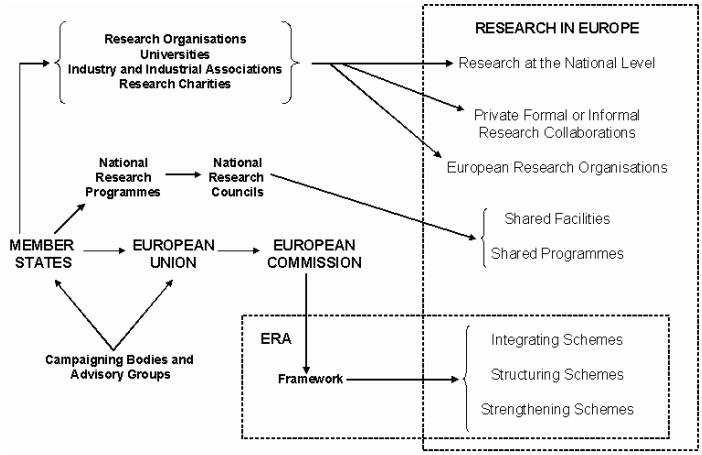
The Government has pressed for integration of EU R&D and competitiveness policy, and signed up to the 3% agreement, but has not set its own 3% target. In 2001, UK R&D spend was 0.57% GDP from Government, 0.87% from industry and 0.45% from other sources.[5, 7]

The Government does not believe that a solely numerical definition of R&D targets is useful. It plans to use a number of new measures, including public technology procurement and tax credits to encourage industrial R&D (page 3). It claims that the necessary foundations for innovation in fiscal, competition, trade and skills policies are in place. The Treasury has promised to maintain funding increases for R&D in the next Budget Review.

Research at the European level

Around 80% of European level research is conducted through the EU Framework Programme (FP), which is the main instrument of the ERA. Most research funded in this way must involve partners from more than one country. Informal collaborations between researchers and formal international agreements that exist for networking and infrastructure management account for the remainder of European level research (figure below).

European Research



EU framework programmes

FPs encompass support for researcher training and mobility, infrastructure development, coordination and set up of national programmes, identification of future priorities and funding for a variety of R&D projects. Researchers in universities, businesses and research centres can apply for funding. The current FP, FP6 (2002-2006), has a total budget of €19bn. The UK contributes to the FP as part of its annual commitment of ~€15bn to the overall EU budget.

OST plans to develop its policy on FP7(2007-2013) in accordance with responses to its current consultation.[2] Six themes are likely to characterise FP7:

- supporting individual projects
- strengthening infrastructure
- developing human resources
- building European level public-private partnerships
- networking to develop "poles of excellence"
- coordinating national research programmes.

Coherent action on space and security may be supported.

Other European level research

Other formal European level research activities mainly focus on facilitating informal collaboration through networking, conferencing and researcher exchange. Coordinating bodies include COST, a support scheme set up by a ministerial conference in 1971, the European Science Foundation whose members include research organisations from across Europe and independent bodies such as the UK's Royal Society. Formal agreements also exist between national governments for funding and managing of large facilities such as CERN, the world's largest particle physics centre. Pan-European research is also a reality for many large businesses.

Advantages of research at the European level

As research becomes increasingly interdisciplinary, increased funds and more researchers, from a variety of backgrounds, are required to take projects forward. Such collaboration is necessary to enable scientists to tackle ambitious projects such as the Human Genome Project. Projects where evidence is scarce (rare diseases) or those that are better tackled with greater geographical spread (sustainable development) require collaboration at the international level. Large facilities, which are expensive to set up and require continued investment through their lifetimes, are often beyond the budgetary and managerial means of single nations.

Since the UK has a strong research base, campaign group Save British Science suggests it should collaborate with nations of similar research capacity. These are not necessarily its EU counterparts. However, new initiatives in FP6 provide a unique opportunity to coordinate national programmes and establish joint projects between research councils (Box 1). It is hoped that these will promote excellence by widening competition for funding and avoiding duplication of effort. High level collaborations could make EU R&D more attractive to the best researchers and more visible to industrial investors.

Box 1 European and Developing Countries Clinical Trials Partnership

The EDCTP is a joint effort between the EU and developing countries to combat poverty related diseases (HIV/AIDS, TB and malaria). Its main focus is support of clinical trials in disease endemic countries.

The initiative brings together the national clinical research programmes of 14 national research councils in Europe, including the UK's Medical Research Council (MRC). Funds will be submitted to a total budget of €600M over four years including contributions from the European Commission and from public–private partnerships.

Networking of funding agencies is a new development. It is too early to say whether it will prove more useful than networking teams of scientists. The MRC has suggested that, given sustained funding, the ERA can create something greater than the sum of its parts, in this area.

So far, UK science has benefited from FPs. The House of Commons Science and Technology Committee found the UK received more funding than it contributed to FP5 and that funding facilitated research that would not otherwise have happened.[8] The UK won 16% of FP5 funds and participated in 41% of projects. This trend looks set to continue; to date, UK organisations have accounted for 11% of FP6 participations, which is comparable with Germany and France.[2]

Financial issues

Funding for FP projects generally only covers a small proportion of overhead costs. Individual UK researchers are not always able to claim back the shortfall from the block grant given to their university by the higher education funding councils to cover overheads for projects funded by the research councils, charities and FP. This could create a disincentive to apply. Save British Science calculates that the UK will win ~€2.5bn from FP6 but the research will cost ~€3.1bn.

The Government requires that research councils and Government departments count 50% of the EU R&D funding they receive against their annual expenditure limits. No other member state does this. Research councils must weigh the benefits of participation in EU programmes against the possibility of obtaining greater funding for national projects.

The European Commission has suggested FP funding should be doubled for FP7, in part to fund a European Research Council (page 4). Money could come from a rise in national contributions to the EU budget. The UK Government does not want national contributions to be above 1% of GDP, noting that the R&D budget could be increased by redirecting funds from other EU budgets.

Issues for researchers

FP users complain that: the administrative burden from Brussels is heavy; project payments can be late; intellectual property agreements are excessively complex; and application advice services are weak. Bureaucracy can be particularly off-putting for SMEs (Small and Medium Sized Enterprises).

There are a number of fellowship initiatives funded by FPs that promote researcher mobility (trans-national access to facilities and expertise). Their efficacy is reduced by problems with visas and transferability of social security.[9]

Some FP projects have specific requirements to include participants from a number of member states. Applicants have claimed there is also a hidden requirement to include "research-poor" member states (despite strong denial by the European Commission and use of anonymised peer review in FP5). Some believe that fewer restraints on the make up of research teams would better enable them to build optimal teams.

Competitiveness

The EU and the UK want to be able to compete economically with the US. Increasing funding for R&D, including basic research, and increasing capacity for innovation are major targets. UK scientists acknowledge that it is important to raise the capacity for R&D across Europe, but they warn that this should not be confused with the need to fund the very best science.

Two EU member states (Finland and Sweden) already spend over 3% GDP on R&D (Box 2) but an average annual R&D spending growth rate of 6.5% is required for the EU to reach the 3% target. The current rate is 2.07%, with the greatest shortfall in the private sector.[11] There are various ways to attract private investment.

Box 2 Finland: A case study

Finland has recently been rated the "most competitive country in the world".[10] Its R&D spend is over 3% GDP and more than 70% of this comes from the private sector.[5] Investment has been sustained even in recession. National technology programmes with industry projects organised around university R&D have forged strong links between public and private sectors. "Finnsoft" technology program enabled Nokia to gain a lead in mobile communications technology. Good education and public recognition of the importance of R&D have also brought success.

Encouraging industrial investment in R&D

UK initiatives

Two types of policy are being used in the UK to encourage industrial R&D. The Government is directly and indirectly financing industrial R&D (supply side) and is piloting projects to create markets for innovative products and services (demand side).

Supply side policies include fiscal incentives, direct grants focused on areas of strategic importance and reimbursable loans. These are regulated by EU state aid rules (due to be modernised in 2005).[9] UK R&D tax credits have been cited by the Association of the British Pharmaceutical Industry as the main reason behind the relocation of Pfizer's research capacity to the UK. Companies appreciate this mode of support as it allows greater freedom than specific research grants.

On the demand side, Public Technology Procurement (PTP) can encourage companies to extend their R&D capabilities, safe in the knowledge of a new and guaranteed market. One example involved the purchase of highly responsive "traffic light" systems by the Highways Agency. The £25m contract persuaded the company, VMS Ltd, to invest in R&D necessary to develop the system.[11] The Small Business Research Initiative is intended to increase access of smaller enterprises, which are important in a knowledge based economy, to PTP funding.

The EU approach

A strong, industrialised, European research base could allow UK businesses access to the best researchers, databases and facilities in a number of fields. Likewise, European companies may be keen to invest in UK research expertise. However, current industrial interest in FP is low. In 2003, most biotech companies had not applied for FP6 funding as they were unaware it existed.[12] The Commission hopes that plans for FP7, such as European level technology projects including university-industry collaborations, will change this. Simplifying intellectual property management through the introduction of a single EU patent may also encourage industrial investment. However, discussions have stalled over legal and language issues.

Venture Capital
Most research organisations cannot independently finance the high risk early stages of commercial exploitation of research. In the US, where early stage venture capital investment is high (0.045% GDP in 2002, compared to 0.036% in the UK and a 0.029% EU15 average),[5] high tech companies have thrived. One of the purposes of the €282m UK Higher Education Innovation Fund for 2004-2006 is to provide early stage funding for university spin out companies. The EU supports new technology oriented SMEs through its €2.45bn European Investment Fund portfolio.[13]

Basic research
The UK has strong basic research capacity, as measured by the number of cited publications per million of the population (31, compared with an EU15 average of 19 and a US rate of 38).[14] There is currently no specific mechanism for funding basic research at European level. However, in March 2004, EU member states agreed that basic research could become an integral part of the ERA. The UK is likely to secure substantial EU funding for basic research. However successful research councils must count this against their spending limits (page 3).

It is possible that a specific mechanism for basic research funding will be introduced in the next FP (FP7) The European Commission has plans to institute a European Research Council (ERC) to administer this. It has proposed that, to achieve a balance of scientific freedom and accountability, an ERC could be run through an executive agency. This would ensure that it would be at arms length from the Commission and address concerns that funding decisions could be biased in favour of "research-poor" member states. FPs currently only fund trans-national collaborative projects whereas ERC funds could be obtained by single teams.

Some argue that it is not surprising that the EU, which is an industrial pact, concentrates on applied research. The Council of Ministers that monitors competitiveness supports funding for basic research, provided that "an appropriate balance is maintained with other priorities, approaches and activities in R&D and innovation".[15]

European enlargement
Some are concerned that the recent expansion of the EU from 15 to 25 countries could affect the EU's ability to raise its competitiveness. However, it is unlikely there will be an effect on overall research investment. The average research spend in EU15 in 2001 was 1.98% GDP, in EU25 it was 1.93%.[6] Further, new member states have taken part in FPs since FP5, contributing and participating in its projects under the same conditions as existing member states.

Although some of the new member states (Poland, Hungary and the Czech Republic) have strong scientific traditions, all have relatively weak infrastructures. The EU can grant funds to its members for regional development (these are not research grants). Competitiveness would rise in the long term if new member states use this money (or money from a dedicated funding stream) to develop their science base. Some countries, for example Hungary, will devote them to building the science base but others will spend the money on development. Some researchers are concerned that new member states will increase political pressure to spend R&D funds on developing their research capacity. However, the European Commission and new member states have indicated that they would not favour this.

Overview

- Most EU member states are not on track to reach 3% spend on R&D by 2010. The greatest shortfall is in the private sector.
- The UK has no fixed target for R&D funding but hopes to increase industrial investment by creating markets for innovative products and providing financial support for industrial R&D. EU plans for FP7 (2007-2013) include measures to encourage industrial investment.
- The European Commission has requested increased funding for R&D in FP7. The UK Government would prefer this to come from redistribution of the EU budget rather than increased national contributions.
- To date, UK researchers have done well in competition for EU funding. This is expected to continue. The ERA provides unique opportunities for coordination of national applied research and FP7 may, for the first time, also include funding for basic research.
- New member states with strong science backgrounds could improve the EU R&D base, provided structural funds are used to develop scientific infrastructure.

Endnotes
1 GDP – a measure of the domestic production output of a particular country irrespective of who owns the production
2 7th EU R&D Framework Programme consultation document, Office of Science and Technology, April 2004
3 www.ost.gov.uk/setstats; conversion rate £1:€1.51
4 www.hm-treasury.gov.uk/media//F1761/science_406.pdf
5 Eurostat, OECD, http://europa.eu.int/comm/eurostat/
6 European and Basic Research, European Commission, COM(2001)9
7 European Research Area/Framework Programme 7, Council for Science and Technology, September 2003
8 HoC S&T Committee, 6th Report of Session 2002-2003, HC 386-1
9 3% - An Action Plan for Europe, Press Briefing, European Commission, March 2004
10 Towards 3% - Attainment of the Barcelona Target, EASAC Policy Report 01, April 2004
11 Innovation report, DTI, December 2003
12 European Biotechnology News, 4(2), 2003, p22
13 www.ost.gov.uk/enterprise/knowledge/, www.eif.org/venture
14 www.cordis.lu/indicators/ind_hcpublication.htm
15 2570th European Council meeting, Brussels, March 2004

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POST would like to thank Katherine Byrne for preparing this briefing and PSTIF for funding her fellowship.

The Parliamentary Office of Science and Technology, 7 Millbank, London SW1P 3JA Tel 020 7219 2840

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