Opinion Forum

Campaign for Science & Engineering in the UK

The views of members and supporters of CaSE Number 2 September 2005

Regional policies for scientific businesses

Summary of findings and recommendations:

- Some Regional Development Agencies (RDAs) have yet to establish effective working arrangements to assist science-based industries in their areas. They need to ensure that interactions with business are not made too far down the chain of operation, and that bureaucracy is kept to a minimum.

- The RDAs need to be more outward-looking in judging their practices by the standards of wider industry, and to offer attractive prospects to attract high-calibre staff, including those with a sound understanding of the private sector and the university sector. Territoriality both within and between RDAs is in some cases hampering their efficiency in promoting economic growth.

- The precise role of Science and Industry Councils is not widely understood by the business and academic communities and needs to be better clarified.

- Many academics and their institutions continue to overvalue their science financially, relative to the risk that financiers must take in supporting efforts to bring research results to market. However, this is partly because the university system has been so poorly funded that pressures to increase revenue have become unrealistic. By contrast, sections of the private sector continue to undervalue the fundamental research on which more applied science is based.

- Well run Centres of Industrial Collaboration (CICs) are used as troubleshooters by big businesses, particularly those from overseas (which may not be fully aware of the UK's academic system), but because they are typically only funded for three years, they fail to achieve their potential. The model should be extended, and the initial funding for CICs should last long enough for them to have a realistic chance of becoming self-financing.

- Public sector funding of university research is administered in ways that do not promote economic activity. In particular, the Research Assessment Exercise (the only mechanism by which a university can win extra funding) ignores industrial collaboration.

- Without adequate funding, universities will not be able to offer competitive salaries to attract the best researchers or people with the skills to commercialise research. RDAs could support struggling university departments in the short term; in the longer term, they should be adequately funded from central funds.

- Public sector policies underestimate the value to the economy of having the right skills at the right time. The role of the old polytechnics in providing technical training should be properly recreated. The economy changes rapidly, and more emphasis should be placed on continuing to develop the skills of the existing workforce, not just on the initial training of young people.

Continued overleaf

This report is based on discussions with representatives of small and large companies, regional development agencies, universities, trades unions and other interested organisations.

The main discussions took place at a meeting in July 2005, which was followed up with correspondence and conversations with a wider range of individuals.

The issues discussed varied from those specifically relating to regional policy (such as the operation of the Regional Development Agencies) to those of a more general nature but which tend to be mediated at a local or regional level. All the participants were from organisations based in England, but many of the issues that were discussed would be equally applicable in other parts of the UK.

The findings are representative of the participants' views, but the specific opinions are the responsibility of CaSE.

This document is one of a series of Opinion Forums that present the views of CaSE's members, contacts and supporters about current issues in science and engineering policy.

Summary of findings and recommendations:

Continued from front page:

■ Regional policies need to be placed in a firmer national context. Without better co-ordination, the regions will duplicate effort and compete with one another rather than adding to overall national competitiveness. Geographically-based policies, such as regional strategies, should be more closely aligned with sector-based policies, such as those of the Sector Skills Councils.

■ Britain needs to be better at lobbying in the European Union to obtain policy outcomes and funding decisions that support the UK's regions.

■ Industrial investment in research and development is too low in UK companies. Government policies should concentrate more on generating the 'pull' from industry wanting to use science than on creating the 'push' from universities with research that may or may not have economic potential. In particular, 'third-leg' funding for collaboration between universities and businesses should be channelled so that it more properly reflects companies' priorities rather than universities' financial aspirations.

■ The requirement for a great deal of government funding to be 'matched' is by no means always sensible. It can distort priorities, dissuade companies from applying, or dilute the objectives of industrial or academic institutions.

Part 1:
The Regional Development Agencies

The need for regional agencies

Since regional agencies need to be coordinated into an overall national strategy, some participants questioned the rationale for Regional Development Agencies, or felt that the geographic area over which they operated might in some cases be too small. For example, some universities felt that they punched above their weight, but suffered from being in a 'small' region. Others pointed out that at one time, the Treasury's regional office was alleged to consist of a single employee based in Birmingham, and that in at least some regions, the Development Agencies were significantly increasing the financial management and local relevance of publicly-funded activities. The RDAs were therefore seen to be fulfilling a genuine need, and it was agreed that by international standards, the size of administrative regions in the UK was not too small. At £100 billion a year, the economy of the North West of England is greater than that of any of the ten countries that most recently joined the European Union.

Interaction between RDAs and business

There was a consensus among participants that business interaction occurs 'too far down the chain' of the management of the RDAs. Decision makers are often several stages removed from business representatives, and some companies have found them to be generally inaccessible. Likewise, in at least some cases Science & Industry Councils were thought to be poorly connected to businesses. Some participants had found that RDAs' well-intentioned intermediary bodies were actually a hindrance or obstruction rather than a support mechanism; they merely added stages of bureaucracy and tapped off a proportion of available funds.

Practice within the RDAs

There was a strong feeling among many of the Opinion Forum's participants that the Regional Development Agencies have yet to establish the most effective working arrangements to assist scientific businesses in each region. In some cases, Science & Industry Councils have found that staff of the RDAs feel that 'they are already doing everything perfectly' and are reluctant to look outside their region or outside the UK to learn from others' best practice. Representatives of businesses working in more than one region felt that they would benefit from greater consistency across RDAs. The experience of some participants was of a good deal of territoriality even within a single RDA. The apparent lack of streamlining was described simply as 'mad' by industrial standards.

Some participants had experienced the negative effects of the 'politics of competition' between different RDAs. For example, two different RDAs had separately been spending taxpayers' money trying to attract research organisations into their areas.

Both academic and industrial participants felt that RDAs did not consistently employ staff with the relevant expertise to understand the needs of their sector. It was suggested that offering fewer posts at a higher salary would enable RDAs to attract staff with the experience and expertise needed to work more effectively with both sectors.

A number of participants had experience of RDAs focusing on 'selling' their region to potential investors, but failing to deliver what small companies actually needed. RDAs need to be more realistic with businesses about what they can actually offer.

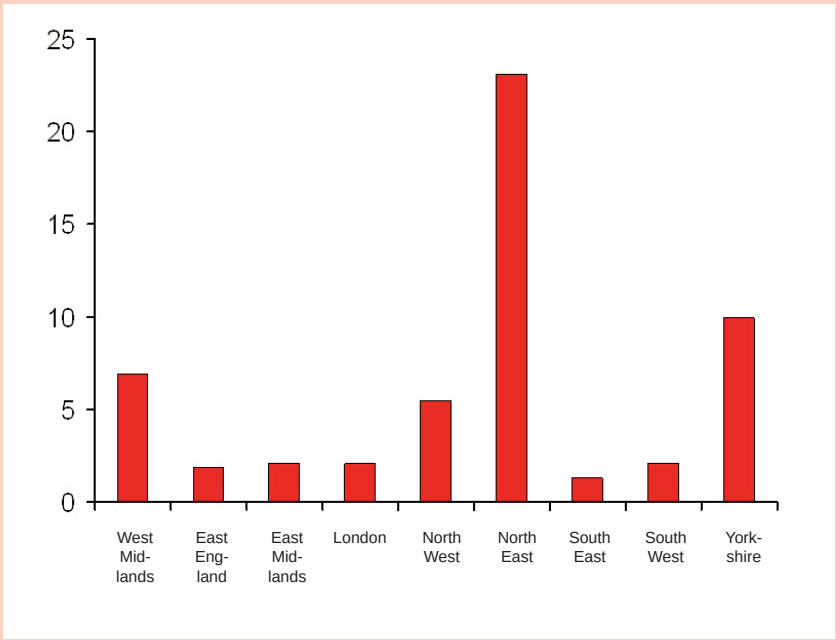

Figure 1. Annual expenditure on science and engineering and technology related activities in £ per head of the population for each of the English RDAs [Source: *Science and the RDAs*, House of Lords Science & Technology Committee, 2003].

Science & Industry Councils

The role of the Science & Industry Councils of the RDAs was an issue that participants felt should be better clarified. It was not clear where the balance lies between advising on and steering the science strategies of the Development Agencies. There was no clear consensus as to what the optimum balance should be, although some felt that as unelected public bodies, RDAs would benefit from having independent steering groups focused on specific issues. Science & Industry Councils do not necessarily have any powers over RDA policy, and feel that exerting an influence is crucial to their role, since they do not exist to fund projects directly. It was noted that DTI officials had requested input on national technology strategy from regional Science & Industry Councils, which were clearly seen by national Government as a source of advice.

Part 2:
Links between the academic and business sectors

Misunderstanding between universities and companies

There was a wide consensus among participants that collaborations between universities and private sector companies can be difficult, partly owing to the significant differences in work culture. Expectations of timescales, and differences in motivation can be causes of friction.

Some participants felt that academics may resist industrial collaboration simply because research questions seem 'pedestrian' and uninspiring when judged on their academic merits. However, it was more widely acknowledged among participants that a more significant problem was that academics tend to overestimate the financial value of their research and underestimate the investment that is required in development if applications are to be brought to market. The likelihood of any one piece of research producing profitable results is small, so that if financiers do invest, they expect a large stake in the outcome. University representatives were quick to point out that such problems could arise as a consequence of historic public sector underfunding of university research, or by contemporary pressures on universities to increase the proportion of their income derived from the private sector. Moreover such expectations are unrealistic, given that UK universities currently receive a higher proportion of their income from industry than their counterparts in most other countries [see Figure 2].

However, the failures of understanding were not entirely on the side of the universities. It was agreed among participants that while industrial partners appreciate some of the near-market R&D carried out in universities, there is sometimes a lack of appreciation for the necessity of the more fundamental research that generates the new ideas on which more applied research is based.

Centres of Industrial Collaboration

There are major advantages to initiatives such as Centres of Industrial Collaboration (CICs), used as 'trouble shooters' by larger companies, for example in negotiating terms for the allocation of intellectual property. The Biomaterials and Tissue Engineering CIC is an excellent example. It bases its work on individual academic contacts rather than working with whole departments, avoiding bureaucracy. Large US firms that are not generally concerned by UK regional issues find these organisations attractive and advantageous for 'taking the pain out of' collaborations. Such companies continue to approach universities for collaboration independently, but where effective CICs are available, tend to choose them. However, the three year financial support typically provided by RDAs is insufficient for CICs to establish enough of a reputation that they can become self sustaining. The need to focus staff attention on funding sources thus diminishes CIC productivity for a significant proportion of their funded lifespans.

The strength of the university system

Although they differed on their way of expressing the problem, participants tended to agree that the university system needed strengthening. The university sector perceives a problem of underfunding, while the private sector sometimes perceives that higher education institutes are badly run and inefficient. It was widely agreed, however, that universities need to be able to provide more competitive salaries to attract high-calibre staff, both scientists and those with industrial experience relevant to the commercialisation of academic research.

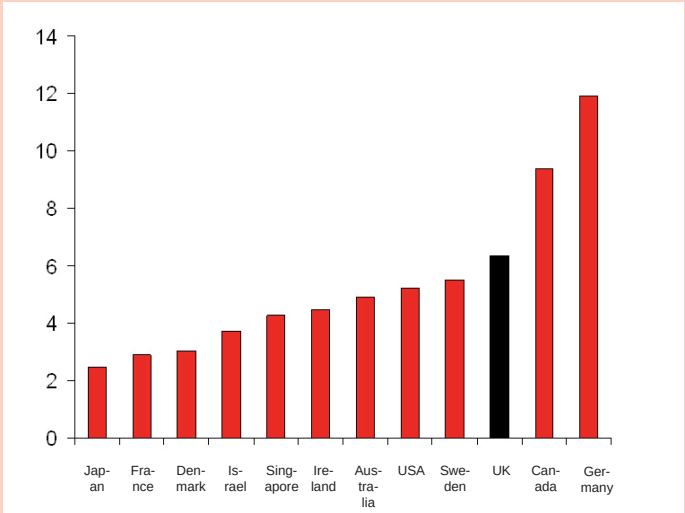

Figure 2. Percentage of university research financed by industry (average of all figures available since 2000) [Source: *Main Science and Technology Indicators*, OECD, 2005].

The Research Assessment Exercise

Representatives of all sectors felt strongly that some of the disadvantages of the Research Assessment Exercise (RAE) now far outweigh its benefits. At its simplest, the problem is that industrial research does not contribute to the exercise's rankings, and this can often deter potential collaborators within universities from engaging with the private sector. In many cases, university departments rated 4 in the RAE are more useful industrial collaborators than those rated 5 or 5*. Grade-4 institutions are particularly likely to be involved with local businesses, while 5* departments may be involved in collaborations at an international level. RDAs may currently have a role to play in supporting these departments to boost local business research and development.

However, in the longer term it would be more appropriate if they were more effectively supported through central funds.

Skills

Participants at the Opinion Forum were keen to stress that the availability of skills at the right time and place can be just as much of an issue for industry as the general availability of a pool of science graduates. Public sector policies can tend to focus attention on the financial barriers to research and development while neglecting the importance of the availability of skills, as well as the importance of understanding the market for new products.

Support from the Regional Development Agencies could be valuable in achieving this dynamic skills market. Production of graduates with the right skills is recognised by many in industry as more valuable than either the research output of universities or opportunities for collaborative projects. Participants felt that the loss of polytechnics had been greatly damaging to UK industry for their ability to be responsive to skills requirements.

Moreover, the political emphasis on new graduates ignores the fact that the importance of retraining older workers who have been using skills for the earlier part of their working lives that may have become out-dated.

Part 3:
Regional issues in a national and international context

The North-South divide

Participants at the Opinion Forum felt that it was significant that the three northern RDAs (Yorkshire Forward, the North West Development Agency and One North East) collectively invest more in science than all of the rest put together. While the northern universities are ambitious to compete with the 'Golden Triangle' Universities (in Oxford, Cambridge and London), their RDAs can only fund university research where a direct economic impact can be clearly demonstrated, which is a very unusual circumstance. The North West Development Agency is the only RDA to offer matched funding for R&D, and it anticipates difficulties in maintaining this level of funding over the medium term.

Infrastructure issues (such as the airports of the availability of international schools) were considered crucial in attracting any kind of business, including science-based ones, so that the relative weakness of infrastructure in the north was harming its ability to attract inward investment.

Aligning geographical and subject-based policies

A number of participants felt that geographically-based strategies (such as those of the RDAs) often did not dovetail well with subject-based or sector-based activities. Thus, while a Sector Skills Council may be calling for more of one particular kind of skills, the RDAs may be putting more effort into training people in something else. Some felt that 'bland reassurances' about 'working together' disguised a lack of joined-up thinking. Indeed, 'skills partnership organisations' were thought in some cases to be inaccessible even to groups and institutions with which they shared key interests.

Regional policies in the UK and EU

Although each region has its own distinct needs, participants felt strongly that these should fit into the UK's wider strategy, and should be properly co-ordinated at a national level. There would be no point, for example, in each of the English regions trying to create its own biotechnology cluster, but with the lack of co-ordination that currently exists, it would be possible for them all to try.

The international context was also considered to be very important. For example, RDAs are concerned to see that their technology strategies can be aligned with the European Union's Framework Programme in order to benefit from the funds that are channelled through the Programme. Some participants felt that Britain's influence on the EU's science and engineering activities was not strong enough, and that resources directed into more lobbying in Brussels would be a good investment.

In addition, it was thought important to look internationally for examples of success. Toulouse, Boston and North Carolina were cited as regions successful in science and innovation, from which UK regions might learn. For example, Boston's success may be based on educating university students in entrepreneurship (rather than a purely academic emphasis), while North Carolina has succeeded despite having no large research-intensive university as a base for knowledge transfer activities.

Part 4:
Funding industrial research and development

Public investment in industrial R&D

Government support is available to businesses at the stage of R&D, but representatives of many companies felt that they need the most help at the stage of bringing a product to market. Support from the RDAs would be welcome at this stage. DTI SMART awards served this purpose excellently (see Figure 3) but the scheme has been altered, and the new version remains untested.

Tax credits were widely acknowledged to provide a significant boost for firms to increase the amount of R&D carried out, although, for small companies, inefficiencies in the application process made the tax credits less worthwhile than they might otherwise have been.

The constant requirement for companies and universities to raise matching funds in order to release public investment was seen by many participants as a significant problem. In some cases (such as the universities' Science Research Investment Fund), it distorted what research was being done, and in others, the source of the funds required such a dilution of the original aims that it was not worth bothering to claim the Government support.

Representatives of small companies at the Opinion Forum emphasised that for them, investing in research and development is a risk, and their greatest need can be for support in sharing this risk. Attracting separate Venture Capital for each new 'idea' can be a time consuming and messy business, but a more coordinated pool of shared support might be easier for companies to use. One example is the NorthWest RDA's nanotechnology facility, which is an enabling tool for the companies in its area that operate in this field.

Business investment in industrial R&D

Participants at the Opinion Forum generally perceived that there was a larger 'gap' in industrial than in public investment in R&D. But while some express this as 'industry should do more,' others suggested that a more sophisticated view might be that public policies needed to create a climate in which industry wants to invest in R&D in the UK. It was widely agreed that Government policies on linking the private and public sector would be more effective if they concentrated more on generating industry 'pull' rather than university 'push'. Some experiences show, for example, that placing an industrial scientist in an academic laboratory generally produces better results (in terms of knowledge transfer between the public and private sector) than placing academic scientists in industrial laboratories. It could be that 'Third Leg' funding for the commercialisation of university research would be better channelled through the companies rather than through the universities.

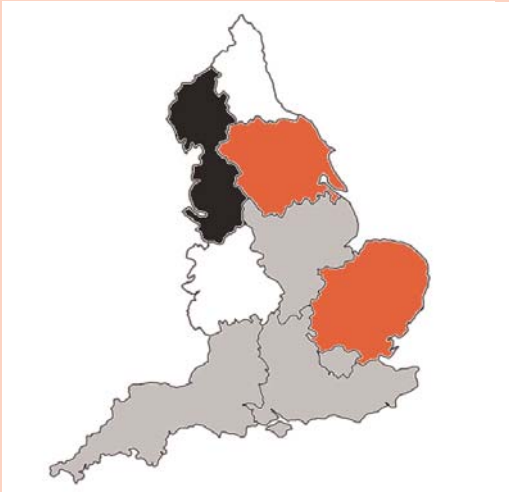

Figure 3. Number of SMART awards per year in each region (2001-2003) [Source: DTI Website]

- More than 100 per year
- 75-99 per year
- 50-74 per year
- Fewer than 50 per year

This is one in a series of Opinion Forums designed to represent the views of CaSE's members, supporters and contacts about current issues in science and engineering policy.

Others recently published or currently being planned include subjects such as *Science & Engineering in Further Education, Hidden Science in Museums and Public Sector Laboratories* and *Science & Engineering Policies in Wales.*

Participants from industry, the Regional Development Agencies, academia, trades unions and the voluntary sector at the Opinion Forum meeting on *Regional Policies for Scientific Businesses* at Hazelwood Castle in Yorkshire in 2005.

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Campaign for Science & Engineering in the UK

The Campaign for Science and Engineering is a pressure group aiming to improve the scientific health of the UK.

Our objective is to communicate to Parliament and the nation as a whole the economic and cultural importance of scientific and technological research and development and the vital need for the funding of this research by Government and industry.

We achieve this by meeting directly with ministers, civil servants and advisers in Westminster and Whitehall, as well as in Edinburgh, Cardiff and Belfast; by networking with a wide range of industrialists, educationalists, researchers and academics involved in science and engineering; by commenting in the media and interacting with backbench Parliamentarians to keep science policy at the forefront of the public agenda; and by publishing analyses, briefings and responses to public consultations.

Our work is supported by 1,500 individual scientists and engineers and by a wide range of industrial companies, universities, city financiers, learned societies, publishers and others.

To discover more about our work, please visit our website:

www.sciencecampaign.org.uk

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