

# The Innovation Challenge: Lessons from America and the UK

Representatives from Government, industry and academia took part in the Cambridge-MIT Institute's annual Competitiveness Summit in Edinburgh on 30 November, where they discussed ways of boosting knowledge exchange between universities and industry to help promote science and engineering enterprise. Speakers included two senior innovation policy advisers, one from the US and one from the UK. These are their personal views on how to tackle the innovation challenge.

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The UK and the US face common challenges in bringing the results of research to the market, and there is much to learn on both sides of the Atlantic. The US offers UK policymakers some interesting lessons, and some mechanisms that could potentially be adapted to Britain – like the Small Business Innovation Research program (SBIR). This has successfully funded thousands of high-technology businesses in the US, and helped many entrepreneurial academics set up their own firms. Similar programs are currently under way in Finland and Sweden, and “an SBIR-type program” was recommended by the European Advisory Board.

Now, the US is far from having all the answers for successfully encouraging science and technology innovation. The common assumption that the US has a well-oiled, well-run innovation system is a myth – not least because no one entity is really in charge. Instead of having a science ministry, or a central plan for science, we have multiple and competing sources of decision-making. This means the system is responsive to new challenges, but it can also lead to a lack of coherence that is potentially damaging to innovation. What the US does have is a business climate and a positive social attitude that support innovation.

It is also important to say that UK innovation is faring better than many people think, helped by the relatively low regulatory burden the UK places on its small firms, and the high quality of British science research. The challenge for the UK is to capitalise on its R&D investment, and to generate returns to British taxpayers in the form of new, welfare-enhancing products, and jobs and growth that new companies can offer. To the UK's advantage, the Government recognises this challenge and is seeking to address it.

## Lack of finance

One barrier in both our countries to the establishment of new, high-tech firms is a financial “Valley of Death” – a lack of available finance for new ideas. In the US, the SBIR is one mechanism set up to help bridge this Valley. SBIR is a competitive program that awards funds in two phases. Just 12 per cent of applicants receive Phase I awards (of \$100,000), and less than half of these go on to win a Phase II award, of \$750,000, after demonstrating the feasibility of the technology they are developing. But the awards are highly sought-after, for good reasons. The grant does not have to be paid back, and the company keeps the IP rights. Importantly, the award also sends out signals of research quality and commercial potential that help attract funds from private investors.

The US Government, which provides awards through agencies ranging

from the Department of Defence (which funds half the program) to the National Institutes of Health, and the National Science Foundation, regards its payback as the development in the US of vital new technologies in health, defence, energy and the environment. These address the specific missions of these agencies, as well as the larger national goal of a robust and innovative economy. A recent evaluation by the National Academy of Sciences of the Program at the Department of Defence confirmed that SBIR has been successful in stimulating the creation of thousands of new start-ups, including those by academics.

A major advantage of the SBIR program, which now distributes \$2 billion a year, is its stability. Introduced in 1982, SBIR is currently funded through a set-aside of 2.5 per cent on the external R&D budgets of the participating agencies. This means the program does not require yearly approval by the US Congress, making its budget predictable and ensuring growth apace with US R&D expenditure. The former Smart scheme in the UK was in some ways similar to the SBIR program. However the changes made to it recently mean that in its current form, it no longer has the resources and outreach necessary to help promising small companies.

## Tyranny of the small scale

At a time when the UK Government is making a sustained effort to put new money into science in a smart way, and paying a commendably high level of attention to this area, I would caution against the British tendency to under-fund well-conceived programmes. This leads to a tyranny of the small scale, ie too many well-conceived but under-funded initiatives operated for too short a time. This short-changes the potential of the UK's excellent science base. As the example of the SBIR program shows, Government-funded initiatives work best if they are highly competitive, well funded, and stable over time. An innovation economy requires sustained policy attention, but the rewards in growth and employment are worth it.

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Currently there is considerable UK policy interest in how to harness the excellence of university science and research so it can be used as the platform for successful innovation by businesses. Hence, a number of policy initiatives are fostering more links between universities and industry generally, and encouraging university spin-outs and licensing activity in particular.

But is this the right policy emphasis to enhance UK innovation levels? The first findings from a new research project, benchmarking innovative behaviour in the UK and US, are revealing a complex picture of the relationships UK businesses forge with universities – and indeed with other organisations – as they search for competitive advantage. It suggests that pursuing university spin-offs and licensing is not necessarily the best or only solution, as this is just one of many

ways in which universities interact with the commercial world.

The Cambridge-MIT Institute is sponsoring the “Innovation Benchmarking” research, which is being conducted by Andy Cosh and myself at Cambridge University's Centre for Business Research with Richard Lester at MIT's Industrial Performance Center. Together, we are interviewing ultimately 4,000 companies in the US and UK to measure and compare their innovative behaviour and performance

### **Collaborative activities**

Preliminary findings for smaller firms in our study (those employing between 20 and 500 staff) show that the number of UK companies that have relationships with universities is actually greater than previously thought, and more than in the US. Here, two-thirds of companies use universities and higher education institutions as sources of knowledge, compared to one third in the US; and almost one in four UK companies (23 per cent) are involved in collaborative activities with them, compared to around one in seven (14 per cent) in the US.

The relationships are broad-ranging. Our study confirms a growing (but often neglected) body of evidence that knowledge exchange between business and universities takes place in many diverse ways, ranging from open channels (eg publication of papers, conferences and informal interactions) to more closed and formal collaborations, like joint research and development projects, and academic consultancy.

People play a key role as central carriers of knowledge in exchange relationships (as recruits, consultants, interns etc), though interestingly, we found US companies use internships far more as a method of interacting with universities than in the UK. Also when we asked companies in both the UK and the US the purpose of their collaborations with universities, “sharing in-house research”, “helping to develop specialist services or products

required by customers” and “gaining access to specialised equipment or information” all came higher up the list than developing licensing activities or supporting spin-outs.

However, UK policy-makers will be most concerned by our findings that while a smaller proportion of small American companies collaborate with US universities, those that do have a more intense relationship with them, and value their collaboration more highly than in the UK. In our study, thirty per cent of US companies that had university links rated them as a “highly important” source of knowledge, compared with just thirteen per cent in the UK.

This may be because American companies place a greater premium on education generally. Our study provides evidence for this with its findings that more American company chiefs, and more American workers, have a degree than their UK counterparts.

### **Private sector commitment**

These emerging results from our study raise some interesting policy issues. The ten-year Science and Innovation investment framework commits the UK to raise R&D by 75%, or some £16.5 billion in real terms. The Government has outlined its commitment and contribution to this target. But it will be an enormous challenge for the private sector, whose R&D spend is twice as important as that of the public sector in quantitative terms, to reach this level. And with smaller firms in the UK expected to be a key driver in this, our study suggests that major behavioural changes are required.

The 2003 Lambert Review of Business-University Collaboration suggested that the main challenge for the UK lay in raising “the overall level of demand by business for research from all sources.” We agree with this, but we would emphasise the importance of the intensity and quality of this demand, and the need to raise the capacity of business to absorb and apply knowledge if we are to rise to the innovation challenge.