THE FOUNDATION FOR SCIENCE AND TECHNOLOGY

DINNER/DISCUSSION SUMMARY

Adding Value to Research & Development

Held at The Royal Society on Tuesday 10th June 2003

Sponsored by
Calderwood Han Limited
Engineering and Physical Sciences Research Council
QinetiQ

In the Chair: **The Rt Hon the Lord Jenkin of Roding**

Speakers: **Professor Gordon Edge CBE**
Chairman, Generics Group
Sir Peter Williams CBE FRS FREng
Chairman, Engineering and Technology Board
Professor John O'Reilly FREng
Chief Executive, Engineering and Physical Sciences Research Council

---

Professor Edge's talk[1] had put the view "that output metrics are inappropriate to R & D" and that "relative effectiveness" was the driver of added value and competitiveness. In discussion it was asked how effectiveness was to be assessed if output metrics were not to be used. In response reference was made to past studies which had identified 17 variables affecting the effectiveness of scientists in industrial labs. The variables had to be optimised for the organisation in question. The development of titanium dioxide pigments illustrated the inadequacy of simple measures of the value of R & D, because very small improvements in the optical qualities of the pigments were commercially significant.

It was suggested that R & D might have most commercial impact in relation to products sold to knowledgeable buyers. Sales in a mass market with inexpert consumers were heavily influenced by advertising and gamesmanship. Thus for sports gear or cosmetics the endorsement of David Beckham or Liz Hurley might count for more than technical superiority. Another speaker thought this a false dichotomy, citing a case where R & D was used to produce new sports goods which were marketed using the very methods described. Effective marketing was vital in order to add value.

The invited speakers had referred to the strengths of the UK science base, which stood up well in international comparisons. In discussion attention was drawn to the relatively low level of investment in R & D by industry, compared for example with other European countries. It was suggested, however, that the picture was more complex than it might seem, because large companies active in science and technology in the UK were liable to generate R & D in other countries as well. There was indeed a problem, though, in converting ideas into commercial reality in this country. Venture capitalists and retail banks were not interested in investing in manufacturing in the UK because the added value was low compared with investment in R & D. In America pension funds were much more willing to invest in high-technology industry than their UK counterparts.

There were other factors favouring industrial development in the US, for example public procurement policies which favoured small enterprises and froze out foreign suppliers. The Federal Government employed a big team in Britain to take UK technology to America. Scale might also make it unrealistic to expect the UK to punch above its weight commercially as well as scientifically, because a company needed to be big if it was to carry the risk of a major investment in a new process. The US domestic market was equal to the whole of the EU. The UK had important research assets, including funding agencies such as the research councils and the Wellcome Trust and a multiplicity of small

[1] The presentations can be read on the Foundation's web site www.foundation.org.uk

biotechnology companies, but emerging companies had to get overseas partners. This should not be seen as a matter for regret. A speaker recalled being publicly rebuked some years before by a Minister for "selling out to the Germans" after announcing a joint venture with Siemens. UK companies should be proud to exploit successful overseas partnerships.

A speaker expressed concern that the Government, having encouraged higher education institutions to interact with business in the past, seemed now to envisage that knowledge-transfer should be left to those institutions which were less active in research. In response it was suggested that such a polarisation was not intended. In order to engage in knowledge-transfer it was necessary to have something to transfer. There were many universities with different assets, and the question was how to make the most of them.

What contribution could the research councils realistically make? A number of speakers saw it as the prime job of the councils to fund unfettered research and pursue scientific excellence, as measured by international standards. The classic way to do this was by responsive mode funding, working with industrial partners where appropriate but not trying to pin researchers' feet down or impose research policies. It was not the job of a research council to second-guess the researchers. One of the current research councils had inherited a portfolio in which 70% of the programmes were managed, as a result of the funding body trying to back winners. The funder's job was to back researchers and engage with the research community. Research councils spent taxpayers' money, but it did not follow that it would be wise for them to pursue Government priorities at the expense of quality. It was said that a quarter of the gross domestic product of the US was based on European research, for instance in quantum physics, which would never have been funded under a system dominated by research policy factors.

A number of speakers observed that, these days, R & D skills lasted longer than products. There were important questions about the management of skills within organisations: how far they should be bought in, what form future R & D networks would take, how communication between people with different skills could be promoted. One speaker thought that physical proximity was essential. Researchers could not communicate effectively by telephone and e-mail, because there were subliminal factors that needed physical interaction, similarly it was argued that multinational companies had to put their skills where their clients were.

There was a perennial concern that not enough young people in the UK were attracted to science and engineering, apart from the biological sciences and IT. This was an international phenomenon. Engineering in particular was not thought to be cool, and engineering graduates (apart from Rowan Atkinson) had not been seen on television since John Harvey-Jones. Other speakers saw a problem of retention rather than recruitment. The UK awarded twice as many science and engineering degrees as the US pro rata, but fewer went into relevant jobs. Against this it was argued that there was no cause for concern if science and engineering graduates went on to careers in Government or commerce outside the field of their studies, because this represented a valuable exchange. Another speaker observed that the failure to motivate schoolchildren toward science and engineering and the inadequacy of industrial investment in R & D had been constant themes for the last twenty years. He wondered at what point people should accept that that was the way it would be? (Prince Albert was said to have raised the same question.)

Participants were invited to offer their choice of role models for young scientists and engineers to follow. Suggestions included Gordon Moore, in view of the remarkable accuracy of his prediction about the development of computer chips; Filippo Brunelleschi, Renaissance man and architect of the Florence Duomo; Michael Faraday; the geologist Arthur Holmes; Bill Hewlett and David Packard, the founders of the eponymous company; and, turning to contemporary figures, Sir John Maddox for his achievement in making *Nature* an interdisciplinary journal, and Professor Sir David King KB ScD FRS, the CSA, for his success in communicating with the public on foot and mouth disease.

Jeff Gill

The Foundation for Science and Technology
Tel: 020 7321 2220
www.foundation.org.uk