

DINNER/DISCUSSION

## RESEARCH PORTFOLIOS: CHOOSING PROGRAMMES AND PRIORITIES

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In the Chair: **The Rt Hon The Lord Jenkin of Roding**, Chairman, The Foundation for Science and Technology

Speakers: **Dr John Taylor OBE FRS FREng**, Director General of Research Councils, DTI  
**Professor Keith Burnett**, Engineering and Physical Sciences Research Council and Oxford University  
**Dr Hermann Hauser**, Amadeus Capital Partners Limited

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Dr. Taylor gave a summary of the process by which public funds were allocated for scientific and engineering research. He set out the complex matrix of bodies and factors involved – the players (such as the OST, The Funding Councils, EU, and industry), the performers (Universities, groups, individuals), the owners (e.g. Universities, Research Councils) legislative constraints and opportunities, lobbyists and activists. A total of £3,955m was spent – OST contributing 32%, HEFC 28%, and Government Departments 12%. But funding for projects and programmes came from a variety of sources – the model was dual, or triple, or more sources. Public funding had virtually doubled over the last two decades in real terms, but Government was understandably demanding much more concrete answers about the outcomes of this investment. Three questions were crucial – who now does world class research? (The answer is known through the RAEs); are we getting good trained researchers? (Yes – we can count heads); are we facilitating knowledge transfer to aid wealth creation, guide policy and ameliorate social problems – a much more difficult question. The allocation itself used both a top down (search the landscape for weaknesses and strengths, develop portfolios of projects across it) and a bottom up (use peer review to search out the best people and projects) approach. The allocation had to consider disciplines (e.g. chemistry), missions (e.g. cure cancer), special programmes (e.g. nanotechnology), and regions; it looked at issues such as high/low risk; near/far market; private/public funding mix. International comparisons were sought but were difficult to use. For the next cycle, he would be seeking to identify criteria by which to judge the

quality, growth potential, effectiveness of projects and, not least, the exit strategy if they did not deliver.

Professor Burnett outlined the business planning process at the EPSRC. The aim was to identify priorities; to examine the capabilities of the bodies and people that exist; and to optimize the impact of investment on research and training. Evaluation of past funding was essential – was there a demand for the people trained; was the research done being used; what was the potentiality for technology transfer and wealth creation? It was important not to have too many resources tied up in long-term programmes – a third of the resources in any year should be available for new projects. But the EPSRC should not itself try to determine who should do individual projects. It should determine the strategy and develop programmes, but it should seek bids for doing the actual work. Top class innovative research would come only from those who were passionately committed to doing something which they felt important and the EPSRC sought to bring forward bids from such people. The Advanced Fellowships were a means of getting young researchers to fulfil themselves in such work. Evaluation had to depend on peer review, which had many defects, but, like democracy, fewer than other systems; knowing the defects was the best way of guarding against them. Evaluating potential exploitation of research was peculiarly difficult, if not impossible; the best that could probably be done was to look at the people involved, the record of the institutions and promote exploitation knowledge.

Dr. Hauser said the crucial path was from ideas to wealth; look at the international comparisons. On any

of them, a vast gap appeared between the ability of the US to tread this path quickly and profitably, and the ability of the UK. It was not that the UK did not produce quality scientists who could become entrepreneurs (many Silicon Valley companies were developed by UK scientists), nor that all new technology was developed in the US (mobile technology was a European success) but that there was a cultural gap, which came from the lack of drive to teach and value entrepreneurship. What other reason was there to explain Stanford's £1,500bn from University spin-offs compared with Cambridge's £30bn? He set out a High Technology Wealth Creation Model. It started by looking at all places where ideas came from: universities, large companies, consultancies, and individuals. Wherever the origin, there needed to be support if entrepreneurship was to be encouraged – e.g. good IPR rules, access to Venture Capitalists, good infrastructure, and a network of advice. Universities should support entrepreneurial staff by taking stakes in their companies, and not by seeking to licence the IPR. The speed of development of new technologies and their impact on the market was still not appreciated – the value of technology companies on the S&P 500 index had gone from 8% of the total in 1990 to 26% now. A second phase of the Model was releasing the wealth in the new companies – this could be, for example, by trade sale or IPO. The value of this for the founders was that they became very rich, and could employ their money again (as, for example Business Angels), for the venture capitalists, that they could recycle money to the financial institutions, and for the universities, by creating valuable endowments. For this phase to become successful, taxation changes on sales of shares, and CGT were necessary. But, underlying both phases of the model was the need to train scientists in entrepreneurship, and for big and small companies to work together.

A principal theme in the following discussion was whether the Research Councils were going the right way about identifying excellence; and whether the many features described by the speakers as entering into the allocation process masked the fact that it was only outstanding individuals who produced first class work, and that the vital need was to concentrate on finding, nurturing and monitoring them. This meant being selective - even unfair, - and taking risks. Risk taking was not just a matter of the Research Councils risking their credibility by backing losing horses (inevitably there would be some) but also of getting scientists to understand entrepreneurial risk – their companies might go bust. They must understand that this was not an apocalyptic disaster, but a commercial circumstance, which, provided they had done a proper business plan which recognized this possible outcome, should not devastate them. Risk, for both the councils and individuals, could be managed. But risk taking flair was not a plausible subject for peer review, and efforts to inject a factor for exploitation of research into the RAE exercise were to be viewed with suspicion, as all too likely to lead to further form filling. On the other hand, the US had published figures on individual universities' success on technology transfer, and OST might try the same here. The problem was that even collecting these statistics would involve

more forms. Another concern was whether there was sufficient incentive for cooperation across disciplines; it was suggested that, although a social science element was almost always necessary for successful exploitation of research, funds were not available for this cross disciplinary contribution: indeed, it could be argued that part of the problem was having too many Research Councils: did we need seven? The speakers agreed that developing cross disciplinary projects, with funding from more than one Research Council (or an agreement between them, that if I pick up some of your bill, you will pick up some of mine) was important, and thought that they were making progress in funding such projects. A cynical note was inserted by a speaker who suggested that the whole rational allocation process could be, and in some cases was, undermined by successful political lobbying

A further theme was how to develop and train entrepreneurs. A lot more could be done to associate the financial community with the exploitation of scientific research. For example, the knowledge of financial analysts about the state of research in various areas, the standing of different institutions, and the likelihood of innovations being commercially successful, was impressive. But was there any example of their expertise being used by Universities to help them train their researchers and help exploitation? Universities were still too slow to recognize that wealth created by spin-offs from research was a public good, and not something which should be viewed as a narrow commercial activity for their profit (see the MIT experience). Universities also need to be flexible about the means through which technology transfer took place – the idea of the monopolistic Technology Transfer Office handling all such work was mistaken. Such offices should be available for advice, and used if wished, but entrepreneurs should be free to choose their own route to wealth. Scientists could be excited by commercial opportunity – the success of the Cambridge Business Plan competition showed that.

Other speakers referred to underlying problems about scientific research which the efforts of the OST and the Research Councils could do little about. Fundamental were the lack of interest in science in schools, poor science teaching, and the reluctance of competent scientists to teach in schools. Equally serious was the pay and conditions of academic staff in Universities. In computer departments, it was difficult enough to get students to complete their degrees, when such lucrative jobs awaited them outside, and it would soon be impossible to persuade good postgraduates to stay in academic life. The additional funds made available to Universities to pay outstanding staff were trivial compared with the funds needed to motivate and reward most staff.

Sir Geoffrey Chipperfield KCB

The discussion was held under the Foundation's Rule that the speakers may be named but those who contribute in the discussion are not. None of the opinions stated are those of the Foundation, since by its nature and constitution, the Foundation is unable to have an opinion.