THE FOUNDATION FOR SCIENCE AND TECHNOLOGY

DEBATE SUMMARY

Maximising the value of the UK strengths in research, innovation and higher education

Held at The Royal Society on 13th November, 2013

The Foundation is grateful to BAE Systems, the ERA Foundation, and the Michael John Trust for supporting this debate.

The hash tag for this debate is #fstresearchstrengths .

Chair: **The Earl of Selborne GBE FRS**
Chairman, The Foundation for Science and Technology

Speakers: **Professor Sir John O'Reilly FREng**
Director General, Research and Innovation,
Department of Business, Innovation and Skills
Ben Ritchie
Senior Investment Manager, Pan-European Equity,
Aberdeen Asset Management
Professor Geoff Rodgers
Pro-Vice-Chancellor for Research
Brunel University

Panellist: **Peter Marsh**
Author, 'The New Industrial Revolution'
and former Manufacturing Editor, Financial Times

SIR JOHN O'REILLY provided a background to the discussion. Government spends £4.6 billion each year on research. It is crucial that this funding, and funding from the private sector and charities worked together to form a coherent whole. He saw his primary function as creating that coherence.

The UK had great strengths. He illustrated the international excellence of our universities and the proof of our research successes. Our success had been based on the use of the Haldane principle, long term secure funding, the dual funding structure and promoting competition.

But science was a global, competitive, rapidly changing arena. We cannot rest on past success. There will be continuing pressure on funding for science in the next Comprehensive Spending Review. We must work hard to persuade the taxpayer that their money is well spent on research; ensure that research and innovation go together and respond to international challenge. We can do this only with sustained collaboration between universities and industry. We already stand well on such collaboration in international comparisons; and we are attracting investment from global businesses. The government must work in partnership with industry to set a business friendly environment, sector specific regulation, and support for innovative technologies through a focus on particular sectors where the UK has strengths and opportunities.

Above all, government, industry and academia must work together to be responsive to change, flexible and "fleet of foot" to maintain our present excellence and continuously improve performance.

MR RITCHIE did not doubt the excellence of our research record as outlined by Sir John but he wished to explore why we were not capturing as much of this excellence in value for the economy as might be expected. On international scorecards we do quite well, but we need to examine more closely what we mean by "value". Is it employment, or productivity, or human capital and skills, or human contentment and health - or all of these things? It is clear that government, research institutions, and business are intertwined in creating value in these

aspects, and there is a surprising consensus on what this strategy should be. We need to keep down energy costs, have long-term policies, ensure a stable regulatory and tax environment, and invest in skills and education.

Although the share of GDP from manufacturing has fallen, it has still grown in value, and, of course, the services sector has grown rapidly (although manufacturing and services often overlap). His concern was that while UK industry and service industries were adapting well to changing technologies and circumstances, - he cited innovative adaption to changing markets by Rolls Royce, Pearson and the Daily Mail and General Trust (DMGT) - there was still a lack of innovation and value growth in many companies.

This can be seen in the comparative share price of companies in FTSE Europe and UK and S&P compared to the value of recent US technology IPOs (Twitter and Linked In) compared with the best of UK technology.

Our biggest problem was a cultural conservatism which pervaded industry and government - risk was seen as a threat, politically, financially and reputationally, and acceptance of new radical ideas was slow. The government needs to be clear about what sort of value we wish to achieve, and to understand that we cannot achieve equal value in all sense of the word. A clear line has to be set.

PROFESSOR RODGERS agreed with the speakers that innovation, higher education and research went together. But why was it that only 16% of UK businesses used information from higher education to help with innovation?

The Lambert Review of University and Business engagement ((2003) had found that the UK invested less in R&D than other countries, that human interaction in building linkages was key to knowledge transfer and that there needed to be a cultural change in HEIs to interact with businesses. Lambert found that the barriers business found in dealing with universities were poor customer service, difficulty in finding who does what, aggressive negotiation over IP and a reluctance of academics to value research with industry more than academic research.

The barriers that universities found in dealing with business were unwillingness to pay the full cost of research projects, IP negotiations, costs and difficulties of out-reach activities, and the creation of partnerships which would be affected by changing business strategies, or ownership.

Underlying all this were the cultural differences between those for whom profit was the driver, and those for whom it was knowledge. This fed into timescales, openness and control of ideas, mismatched expectations and ways of working. There will always be problems about academic priorities - blue skies research versus problem solving; silos versus interdisciplinary.

Good progress since the Lambert Review was Partnerships with large companies (although not with SMEs) had strengthened, the advent of the Technology Strategy Board (TSB), the "impact" agenda and delivery of open access and open data projects. The impact agenda had the effect of embedding knowledge transfer into research projects at the start; it encouraged people transfer, building networks and training. But both universities and business needed to do more; universities needed to cooperate with Local Enterprise Partnerships and work harder to involve SMEs.

Industry needed to help universities design joint delivery programmes, take students on work placements and get involved in professional development at universities. Brunel had established with Cambridge the National Structural Integrity Research Centre, with funding from government, the Regional Growth Fund and industrial partners, and a School for Professional Development to enhance the employment prospects of students, and developed an innovation hub.

The impact of (a) research at Brunel would be maximized through reorganizing into three institute's energy futures, (b) materials and (c) manufacturing and environment health and society. Each institute has two industrial strategic partners. The University needed to work with SMEs through intermediaries.

MR PETER MARSH opened the following discussion. He endorsed Mr. Ritchie's emphasis on doubting the extent to which our excellent research gave full value to the economy - for example, often our best students come from abroad and then go

home, taking their skills and knowledge with them.

We need to be clear about where innovation is happening in industry, and understand the link between services and manufacturing (e.g. Stannah Stair Lifts). But capital heavy industries (e.g. JCB) are also innovative. It is important to raise awareness of these companies who are successful through innovation. The UK is doing well internationally in business innovation and we should publicize it.

Speakers were concerned that we might be too complacent about the success of our elitist culture. Outstanding research success and the reputation of our universities should be celebrated but our education system was not functioning in a way which would support research success in delivering value.

While 90% of children in Germany did mathematics in the Sixth Form, in the UK it was only 20%. In higher education, there was still much to be done to encourage interdisciplinary, and, above all, to equip students and researchers with business skills and understanding of business priorities.

Knowledge transfer depended on both business and academics understanding each other. If the "impact agenda" was to be effective in ensuring that researchers embedded knowledge transfer at the start of projects, they must understand how business might be able to use their research.

Innovation was severely constrained by the risk adverse culture in the UK. There would be major problems in changing this without investment managers taking a longer view of financial return, and universities and government willing to take reputation risk from failure of projects. The NHS was cited as an organization that was resistant to innovation; although progress had been made since the Cooksey Report, and the Francis Crick Institute was established as a true multi-disciplinary institute.

But there was still a lack of motivation in the civil service (and in government generally) to be seen to be innovative. Innovation was difficult, could lead to failure and diverted resources from other areas. The motivation to do it must be powerful. A common complaint from start-up companies was the failure of financiers to provide adequate capital for development; this led to promising companies being sold to the US where further capital was available. This was probably inevitable because the pool of capital in the US was so much deeper than here, and this afforded more opportunities for risk taking.

But, also, there were too many false expectations. There was need for further training of academics. It could be desirable for public servants to be chosen for their risk taking, entrepreneurial and commercial skills as well as other skills. More value could be created from the work of the Government Scientific Laboratories, in particular, globalizing their expertise.

Large companies were traditionally reluctant to sponsor and fund radical R&D. If absorbed into the mainstream organization, R&D departments tended to become less radical; separated they might be ignored, or starved for funds. The right balance between operational expenditure and R&D was a perennial problem in any company; it was the job of the CEO to get the balance and organization right, as circumstances changed.

It was also the responsibility of the CEO to be aware of how foreign companies handled innovation and to understand how to globalize successes. There was a danger that many companies thought that their strength was design, and manufacture was better done elsewhere, or restrict their product to luxury items. This was unnecessarily minimalist.

Some contributors suggested the presenters had ignored the contribution that social sciences and the humanities could make to innovation and add value in the economy. Failure to understand the workings of society, the economic structure of the intended market, the means of persuasion for creating new markets were crucial to creating value.

It had been said that a feature of a good business environment was an effective regulatory system. The UK had with the HSE a body of health and safety regulation based on goal setting which was globally admired. But such a system depended on an understanding of where regulation was needed, and where voluntary action could be relied on. Social scientists researched such systems.

Compared to the US, the UK's scientific and research base was closely centred on London and the South East. Why had not clusters of research institutes and companies developed in the UK as they had in the US? The answer was, in part, geographic - England is the same size as Silicon Valley - partly historic; but it was now changing; Manchester and Edinburgh were burgeoning centres. However a true cluster had to embody a wide variety of skills - legal, financial, relationships with the public sector - and the capital would inevitably be focussed.

Great universities became great because they gave rise to great inventions, which had taken many years to come to fruition. To suggest that research should be done on a short time scale would result, over time in our outstanding institutions losing their leadership.

Major points from the discussion were that universities, government and business must work coherently together to create innovation which will lead to value for the economy. To create such cohesion there must be a long term strategy with stable funding. All three need to adapt their cultures to take advantage of the possibilities arising from innovation, and be aware of the consequences of not pursuing it.

Cultures change slowly and the government has a leading role in persuading others, and the public, of the value that can be created from research and innovation. The key is knowledge transfer. To achieve it, universities must ensure their students and researchers understand business needs and goals, and work harder with business to develop multi-disciplinary teams which can meet the problem solving requirements of business. Businesses must understand the long time scale involved in academic research and be prepared to meet its cost.

Sir Geoffrey Chipperfield KCB

TED Talk:

Brain Cox: Why we need the explorers
www.ted.com/talks/brian_cox_why_we_need_the_explorers.html

Useful Links:

1994 Group
www.1994group.co.uk

Aberdeen Asset Management
www.aberdeen-asset.co.uk

The Arts and Humanities Research Council
www.ahrc.ac.uk

BAE Systems
www.baesystems.com

The Biotechnology and Biological Sciences Research Council
www.bbsrc.ac.uk

Brunel University
www.brunel.ac.uk

Department for Business, Innovation and Skills
www.gov.uk/government/organisations/department-for-business-innovation-skills

Department for Employment and Learning Northern Ireland
www.delni.gov.uk/index/further-and-higher-education

The Economic and Social Research Council
www.esrc.ac.uk

The Engineering and Physical Sciences Research Council
www.epsrc.ac.uk
The ERA Foundation
www.erafoundation.org

The Foundation for Science and Technology
www.foundation.org.uk

Higher Education Funding Council for England
www.hefce.ac.uk

Higher Education Funding Council for Wales
www.hefcw.ac.uk

Peter Marsh
http://www.youtube.com/watch?v=FDwXaiOysRo&noredirect=1

The Medical Research Council
www.mrc.ac.uk

Million+
www.millionplus.ac.uk/research-policy/reports/latest-reports/million-annual-report-12-13

The Natural Environment Research Council
www.nerc.ac.uk

Royal Academy of Engineering
www.raeng.org.uk

The Royal Society
www.royalsociety.org

The Russell Group
www.russellgroup.ac.uk

Scottish Funding Council
www.sfc.ac.uk

The Technology Strategy Board
www.innovateuk.org

Universities UK
www.universitiesuk.ac.uk

University Alliance
www.unialliance.ac.uk

Universities and growth: the Witty Review
www.gov.uk/government/uploads/system/uploads/attachment_data/file/249720/bis-13-1241-encouraging-a-british-invention-revolution-andrew-witty-review-R1.pdf

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