

## **Russell Group response to Science and Technology Committee's inquiry on "Bridging the valley of death: improving the commercialisation of research"**

### **Summary**

- The Russell Group is pleased to contribute evidence to the S&T Committee's inquiry. Russell Group universities are **partners of choice** for thousands of leading businesses in the UK and internationally. The UK's world-leading institutions play a crucial role in stimulating economic growth, **by engaging closely with business, enhancing skills and competitiveness**, and generating major new products and world-beating spin-out companies.
- There are significant problems in the **UK's funding pipeline** to take a research idea through to a final product or service, including problems in accessing 'proof of concept' funds and sufficient venture capital (particularly compared to the US). It remains a significant challenge in the UK to **secure investment in new technologies**.
- Government initiatives should aim to address the issues in the funding pipeline, in order to increase the commercialisation of research. However, funds should not be diverted from basic research – this would be counter-productive. **Additional tax incentives**, building on the past strengths of the **University Challenge fund**, and strengthened support for the **role of incubators** would all be very beneficial to take research from conception to commercialisation.
- To address the UK's needs for accelerating technology and innovation, there is real value in **building on the strengths, competitive advantage and capacity of the UK's existing research base**. In straitened times, it is important that Government funding continues to support research-intensive universities in their innovation and knowledge transfer/exchange activities.

### **1. What are the difficulties of funding the commercialisation of research, and how can they be overcome?**

- 1.1 Russell Group universities are partners of choice for thousands of leading businesses in the UK and internationally. According to a recent survey by the UK Innovation Research Centre, academics at Russell Group institutions are particularly likely to have taken out a patent, licensed their research to a company or formed a spin-out than academics at other UK institutions. Data from HEFCE's Higher Education Business and Community Interaction survey showed that in 2009-10:
- (a) Representing just 12% of institutions included in Russell Group universities between them received 68% of all university contract research income from commercial businesses and charities.
  - (b) 81 per cent of universities with contract research with commercial businesses worth over £5 million were Russell Group universities.

- (c) Russell Group universities accounted for 61% of all intellectual property income generated by UK universities and for over half of all spin out company turnover.
- 1.2 The Russell Group has recently established a new initiative to drive forward collaboration with companies and enhance innovation. A new high-level working group on innovation will engage with leading industrialists and business leaders to realise maximum benefit for the UK economy from the world-leading research activities of Russell Group universities.
- 1.3 Collaboration and exchanging knowledge and skills with business is a core part of the missions of Russell Group universities. Russell Group universities are supporting businesses in developing and commercialising new technologies in a variety of ways, including:
  - (a) Technology exploitation via technology transfer offices, or often via dedicated technology transfer companies. For example, Imperial Innovations invested over £14m in 20 companies in 2008/9, and external investment in its portfolio of companies was £41m in 2008/9, rising to £75m in 2009/10.
  - (b) Provision of various kinds of incubation facilities for new companies, along with investment and knowledge transfer/exchange support. An example is the University of Warwick, which has a 'virtual tenancies' programme that allows emerging companies to access the support and facilities at Warwick's science park without having to physically relocate.
  - (c) Incentives to access research expertise. Most Russell Group universities have knowledge transfer/exchange secondment programmes in place. In addition, the Universities of Liverpool, Warwick, Birmingham, Nottingham, Glasgow and Newcastle have awarded local businesses thousands of pounds worth of "innovation vouchers", enabling small companies to access research expertise through consultancy or collaborative projects.
  - (d) In collaboration with industry and the Technology Strategy Board (TSB) Russell Group universities have sponsored the two main advanced manufacturing research facilities in the UK (the University of Sheffield at the Advanced Manufacturing Park and the Universities of Birmingham and Nottingham at the Manufacturing Technology Centre).
- 1.4 The Higher Education Innovation Fund (HEIF) in England and Northern Ireland, and the Knowledge Transfer Grant and Horizon Fund in Scotland, are major public funding sources underpinning the highly successful knowledge transfer/exchange activities undertaken by Russell Group universities. These funds are an essential component of the UK's innovation system, enabling institutions to share high quality innovation with businesses, diffusing knowledge into the economy and creating economic benefit for the nation. Many universities in England use HEIF funding to support Proof of Concept funding, and such small scale funding is critical, before seed and further capital becomes available.
- 1.5 The Government's recent changes to the allocation of HEIF will help to ensure Russell Group universities in England build on successful existing initiatives, and fulfil their potential in knowledge transfer/exchange activities. Although a cap remains on the amount of HEIF funding available to any single institution – restricting the ability of research-intensive universities to receive funding in proportion to the full scale or excellence of their knowledge base – the Government's changes to the allocation of HEIF are positive moves in the right direction. At a time of constrained resource, it is essential to target the investment through HEIF on those universities best able to translate world-class research and knowledge into economic benefit to the UK.

- 1.6 Universities still face considerable barriers in transforming ideas into social and economic impact due to the risks perceived by the private sector regarding investing in new developments. A report by the Russell Group shows that groundbreaking research conducted in Russell Group universities has resulted in far-reaching impacts, but successful commercialisation requires sustained long-term investment, often over many years or even decades.<sup>1</sup> There are significant problems in the UK's funding pipeline to take a research idea through to a final product or service, including problems in accessing 'proof of concept' funds and sufficient venture capital (particularly compared to the US). It remains a significant challenge in the UK to secure investment in new technologies.
- 1.7 Government initiatives should aim to address the issues in the funding pipeline, in order to increase the commercialisation of research. However, funds should not be diverted from basic research – this would be counter-productive. Instead, key areas the Government should consider include:
- (a) Resources should be focused where there is most competitive advantage to be gained from integrating research, teaching and translation. To address the UK's needs for accelerating technology and innovation, there is real value in building on the strengths, competitive advantage and capacity of the UK's existing research base. In straitened times, it is important that Government funding continues to support research-intensive universities in their innovation and knowledge transfer/exchange activities. Investments should complement rather than compete with the current capabilities of the UK's research base, and be considered on a national (rather than regional) scale.
  - (b) The Government should consider further reforms to the tax regime which would particularly encourage more investment in early stage high-tech companies. Changes in tax should make a clear distinction between technology-based businesses, distinct from other small or early stage ventures.
  - (c) The Government should build on the past strengths and lessons learned of the University Challenge Fund. This scheme was instrumental in promoting collaboration across institutions, attracting private sector investment in university companies, and developing seed funds in universities. For example, the scheme assisted the development of Imperial Innovations.
  - (d) Early stage ventures could be supported further, for example through rebates in corporation tax, allowing them to roll-over losses from one year to the next.

## **2. Are there specific science and engineering sectors where it is particularly difficult to commercialise research? Are there common difficulties and common solutions across sectors?**

- 2.1 The biosciences sector and large-scale advanced engineering in the UK benefit from major corporate R&D activities. However, even within these sectors, business models are rapidly changing with companies such as Pfizer closing sites in the UK. It is difficult to generalise across sectors, and the UK must not only sustain sectors which are currently strong, but also foster sectors where the UK shows promise. The £180 million 'Catalyst' fund, targeted at the biomedical sector, is a welcome boost to our universities' efforts to attract outside investment. However, it is important that the UK's cutting-edge research is supported from conceptualisation to commercialisation in a

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<sup>1</sup> Russell Group *The economic impact of research conducted in Russell Group universities* (2010) <http://www.russellgroup.ac.uk/russell-group-latest-news/121-2010/4134-economic-impact-of-research-at-russell-group-universities/>

range of other fields of research, with direct potential and opportunity for competitive global businesses.

### **3. What, if any, examples are there of UK-based research having to be transferred outside the UK for commercialisation? Why did this occur?**

- 3.1 The knowledge exchange activity at the UK's leading institutions is often compared to the US's top institutions, such as Stanford and MIT. While some have criticised the under-performance of UK universities on licensing income with respect to the US, research shows that this could be attributed to the time lags in achieving significant financial return from licensing, and the fact that US technology transfer operations have been established for much longer, and have had more time to build a licensing portfolio. In addition, when individual institutions are compared between the UK and US, on their ratio of income generated from intellectual property to research expenditure, the analysis shows that the top UK universities operate on similar levels to US universities such as Stanford, MIT, Harvard, Cornell and the University of Pennsylvania.
- 3.2 It should also be noted that some Russell Group universities release some of their IP to companies for free to maximise the impact of research. The University of Glasgow, King's College London and the University of Bristol are leading the Easy Access Innovation Partnership, a collaborative project to promote new ways of sharing intellectual property with industry through increasing engagement between universities and industry. The University of Edinburgh has developed a licensing system to allow industry easy access to two packages of university IP. This system complements the ut.com website that allows industry access to all technologies available from Scotland's key research universities.
- 3.3 Spinout companies in the UK tend to be acquired by companies outside the UK at a relatively early stage. For example, a company originating from technology developed at Cardiff University moved to the US early on in its development, due to lack of funding in the UK. Similarly, a company spun out of the University of Bristol was acquired by a Belgian company due to lack of sources of capital in the UK. In addition, there are examples at the University of Birmingham where commercialisation needed to take place overseas, as UK businesses were not sufficiently interested in the technology.
- 3.4 The fundamental weakness contributing to the movement of commercialisation of research to outside the UK is the lack of willingness of UK businesses to invest in early stage innovations (absorptive capacity). Overall business investment in R&D in the UK (1.15% of GDP in 2008) is very low by comparison to the rest of OECD countries. The best route across the Valley of Death is for UK businesses to be willing customers of innovation, taking on risks with the potential for significant downstream benefits. However, the change needed can only be achieved through the Government creating an improved environment for innovation by strengthening tax and other incentives for companies investing in innovation, and by becoming an innovation-focussed customer in its own right. Without action, the UK's top researchers will continue to turn to commercial partners overseas, leading to a loss of financial benefits to the UK economy.

### **4. What evidence is there that Government and Technology Strategy Board initiatives to date have improved the commercialisation of research?**

- 4.1 As noted in question one, HEIF and University Challenge Funds have made a real and positive difference to commercialisation, knowledge transfer activities and seed

funding within universities. Schemes such as the Technology Strategy Board's Knowledge Transfer Partnership (KTP) programme are also important in developing partnerships to transfer research outcomes into the market. Adopting a planned and systematic approach to communicating the benefits of KTPs to companies and academics is essential to increasing the number of KTPs. For example, the number of KTPs at Cardiff has increased from 5 to 26 over the past 3 years.

- 4.2 We welcome recent changes to TSB funding schemes which will develop closer working relationships with universities. Members of the Russell Group collaborate enthusiastically with the TSB because they recognise the TSB's strength in assisting to translate outstanding fundamental science into marketable products and process improvements. There are examples where TSB funding has been essential in funding university spin out companies. We would emphasise that TSB funding should complement, rather than compete with, the current capabilities of the UK's research base, and be considered on a national (rather than regional) scale. Also, funding for the TSB and other initiatives to increase the commercialisation of research should not be diverted from basic research – this would be counter-productive.
- 4.3 The Government will need to consider and monitor how the new Catapult centres fit within the existing research environment. To achieve maximum impact the new centres should be closely linked to the world-class research base within the country's leading universities. Decisions for the location of these centres should be based on proven academic expertise and industrial capability. Existing successful centres are often closely associated with, or even embedded within, universities which have a critical mass of excellent research and teaching, and a proven track record of translation.
- 4.4 The High Value Manufacturing Catapult Centre (involving Bristol, Sheffield, Birmingham, Manchester, Nottingham, Warwick with Loughborough and Strathclyde) is acting to bring employees of established companies (potential customers), early stage companies and academics together in an environment where co-creation and co-location engenders the acceleration of technology adoption - this can be viewed as an embodiment of open innovation. This is well exemplified in the National Composites Centre, hosted by the University of Bristol.

## **5. What impact will the Government's innovation, research and growth strategies have on bridging the valley of death?**

- 5.1 We welcome the Government placing research and innovation at the heart of its growth strategy, and the recent innovation and research strategy. However, we consider it is very difficult to predict the outcome on bridging the valley of death. As outlined in questions one to three, we would urge the Government to go further in addressing the problems in the funding pipeline taking research from conception to commercialisation, and to introduce funds similar to the 'Catalyst' fund for other sectors.

## **6. Should the UK seek to encourage more private equity investment (including venture capital and angel investment) into science and engineering sectors and if so, how can this be achieved?**

- 6.1 Yes. Relationships between investors and universities are highly productive, resulting in much learning on both sides of different working cultures, and models such as Fusion IP, IP Group and Imperial Innovations have helped bridge the gap between City investors and universities. The role of informed angel investors, where expertise

is perhaps more critical that investment capital, is well documented in the US and they are increasingly playing a more prominent role in the UK.

## **7. What other types of investment or support should the Government develop?**

- 7.1 As outlined in question one, we would welcome the Government developing initiatives that address the entirety of the funding pipeline, from conception to commercialisation. Costs include IP protection, undertaking effective market research, and investment readiness. We would encourage the Government to develop initiatives that look at the funding pipeline as a whole, rather than developing initiatives that only address one part of the pipeline at a time without consideration to other parts. Regional Venture Capital funds and Enterprise Capital Funds have been very valuable, in many cases these are co-invest funds with Government funding or interest matched against private capital.
- 7.2 The role of Incubators as ideal places to support, nurture and accelerate the fragile early stage companies should be supported. This is exemplified by the family of SET squared Business Acceleration Centres (at Southampton, Bristol, Bath, Exeter and Surrey). This model offers a proven route that ensure ideas 'fail fast' with a controlled closure, or are accelerated in a highly supportive yet totally commercial environment.
- 7.3 Government tax measures are valuable in supporting early stage companies across the Valley of Death. The Enterprise Investment Scheme is important, and its extension into SEIS is helpful, as are R&D tax credits, although take up at early stages can be low. The Government may wish to consider how R&D tax credits could be both better promoted and simplified.