



Innovation and the Role of Universities in Raising Business Competitiveness

August 2010





Innovation and the Role of Universities in Raising Business Competitiveness

Aim: To maximise the economic growth benefits of universities through new economic development structures in England.

Recommendation 1

Local Enterprise Partnerships (LEPs) should be encouraged to work with universities and business intermediaries to address the cultural and institutional barriers around small and medium enterprises (SMEs) working with universities at a local level. Continuation of the Higher Education Innovation Fund would enable Higher Education Institutions (HEIs) to continue some knowledge transfer and commercialisation activities in their institutions. It may not be cost effective for all HEIs to do this on an individual basis, so greater cross-institutional collaboration to deliver these services should be encouraged.

Recommendation 2

To provide continuity in delivery of successful government programmes encouraging collaboration between businesses and universities, **government should determine as quickly as possible those activities where the Technology Strategy Board will take the national lead**, which activities they will take over from the Regional Development Agencies, and what capabilities and resources they will need to do this.

Recommendation 3

The Department for Business, Innovation and Skills (BIS) should create a national innovation system offering an integrated approach and focused on high growth/high impact businesses and key sectors of the future. This would include **a network of Growth Centres, based around existing and new Centres of Excellence (including the proposed Technology and Innovation Centres), Innovation Centres and Science Parks, to provide comprehensive geographical coverage across England.** The Growth Centres would enable collaboration between businesses and universities and provide a bridge into LEPs and relevant supply chains.

Recommendation 4

Government should clarify what is expected of HEIs in relation to intellectual property and give a realistic expectation of how HEIs can benefit from this. HEIs could be supported to develop 'open source' mechanisms to make intellectual property more visible to businesses that can commercialise it.

Recommendation 5

BIS should work with the Higher Education Funding Council for England, Skills Funding Agency and Universities to ensure that skills investment and provision is informed by draft Regional Skills Priorities Statements, particularly in the development of higher level apprenticeships.



Introduction

Following the election of the Conservative-Liberal coalition in May 2010, the coalition programme has emphasised the importance of generating economic growth, but with a less interventionist approach in its relationship with business and against a background of severely reduced public spending. The coalition has committed to consider the implementation of the *Dyson Review* to make the UK the leading hi-tech exporter in Europe. The review recognises that, while the UK has far more than its fair share of leading universities, generally the UK is not world-class at taking ideas from universities to the market.

Recent speeches by David Willetts and other Ministers recognise the role of higher education and science in re-balancing the economy, and in underpinning the growth of new, high-value-added businesses. The new government has expressed its appreciation of the work of previous Science Ministers, including Lord Sainsbury, but has highlighted the limitations in the public funding now available to support higher education and business innovation.

Richard Lambert's 2004 report on business-university collaboration concluded that universities had done much to try to improve their collaboration with businesses, but that business demand for the knowledge outputs of universities was low. It described the importance of proximity in encouraging business collaborations with universities and recommended the introduction of simplified models for managing intellectual property rights in such collaborations. The report helped to inform the 2004 Comprehensive Spending Review and the development of Lord Sainsbury's 10 year science and innovation investment framework (2004-14) and his *Race to the Top* report.

This paper draws on previous work on the economic impact of universities undertaken by the Regional Development Agencies (RDAs), in concert with Vice Chancellors, Principals, Pro Vice Chancellors and other academics across England. It briefly summarises the main types of interventions previously undertaken by RDAs, makes recommendations for future policy and provides illustrations of projects in a series of appendices.

During 2008/09, the RDAs committed around £1 billion (including EU funding) over 3 years to help universities to increase their research capabilities and their capacity to engage more effectively with business. Quality Related research funding from the Higher Education Funding Council for England (HEFCE) over the 3 years 2008/9 to 2010/11 totalled £4.63 billion and Higher Education Innovation Fund (HEIF) funding was £396 million.

RDAs have worked closely with the Technology Strategy Board, Research Councils, Universities and HEFCE over the last 10 years. The remainder of this report reviews:

- (1) universities' critical activities in collaboration with business;
- (2) their support for businesses in growth sectors;
- (3) what more could be done to commercialise universities' intellectual property; and
- (4) their role in meeting higher skills needs.



Collaboration with Business

Whilst curiosity-driven research remains crucial to academic endeavour and, as the Lambert Report noted, much invention derives from serendipity rather than intention, universities in England have made substantial progress in collaboration with business. According to the Higher Education Funding Council for England (HEFCE, 2009) in 2007/08:

- £519 million of collaborative research (involving some public funding) was carried out, up 6.4 % on the previous year;
- £698 million of contract research (involving only private funding) was carried out, up 5.2 %, on the previous year;
- £277 million of consultancy contracts (innovative application of existing knowledge) was carried out, up 16 % on the previous year;
- In the UK as a whole, 93 % of Higher Education Institutions (HEIs) provided a contact point for small and medium enterprises (SMEs); and
- The Department for Business, Innovation and Skills (BIS, 2010) reports that the UK academic sector accounted for 60.8 % of UK participations in the seventh European Union Framework programme.

In 2008/09, Regional Development Agencies (RDAs) spent £199 million of their innovation support (out of a total of £300 million) on supporting collaboration between businesses, and between businesses and the knowledge base (BIS, 2010). The RDAs' interventions in science, research and development (R&D) and innovation infrastructure, which represent the bulk of RDAs' work with universities, have been shown to be very effective. On average, each £1 million of RDA spend resulted in over £8 million added to the regional economies (PricewaterhouseCoopers, 2009). The impact of these interventions is covered partially in the work being managed by the University of Strathclyde, funded by the Economic and Social Research Council (ESRC), but many of these interventions are long term and the full extent of their impact will not be felt for some years.

Inevitably, this short report cannot do justice to the vast array of imaginative and productive schemes that have been put into place by RDAs to support collaboration with universities, nor give a full account of the potential to do even more. A selection of illustrative case studies is presented in Appendix 1, to demonstrate the RDAs' work to broker relationships between businesses and universities and support the development of that relationship, often working with the Technology Strategy Board (TSB).

It is clear that with the replacement of the RDAs with Local Enterprise Partnerships (LEPs) and the constraints on public sector funding, there will be considerably less support for business in this area. However, there is an opportunity to build on good practice by business intermediaries proactively encouraging deeper collaboration between SMEs and universities. Working with intermediaries can help SMEs to understand the reality of working with universities and to thus make a decision based on the true cost and value of that collaboration, rather than one based on the perception of high cost and inaccessibility, which universities alone may find difficult to correct.



Recommendation 1

Local Enterprise Partnerships (LEPs) should be encouraged to work with universities and business intermediaries to address the cultural and institutional barriers around small and medium enterprises (SMEs) working with universities at a local level. Continuation of the Higher Education Innovation Fund would enable Higher Education Institutions (HEIs) to continue some knowledge transfer and commercialisation activities in their institutions. It may not be cost effective for all HEIs to do this on an individual basis, so greater cross-institutional collaboration to deliver these services should be encouraged.

Much RDA support for innovation has been aligned with that of the TSB and, as the national leaders for innovation, the TSB is faced with both opportunities and challenges. The RDAs have developed strong and deep relationships with the TSB and had mutually agreed to align over £400 million of funding for innovation projects over the three years to March 2011, as detailed in the TSB's report on *Accelerating Business Innovation Across the UK*, launched on 23 February 2010. The benefit of this relationship for businesses is that RDAs and the TSB offer complementary support. This has resulted in a powerful innovation programme that not only supports the major primes, but also links them into SMEs, to supply chains and to the very high growth innovative companies that are critical for jobs growth (National Endowment for Science, Technology and the Arts (NESTA), 2009).

RDAs currently lead on the following Solutions for Business products: Innovation Infrastructure, Grant for R&D, Innovation Vouchers, Networking for Innovation and Innovation Advice and Guidance. Although it has been suggested that innovation will be led at the national level in future, rather than by LEPs, there has been no clear statement on the national body and scope of that role. RDAs have started informal work with the Technology Strategy Board. This, however, will need to be formalised as soon as possible in order for any specific government programmes to be made available through the Technology Strategy Board by 1st April 2011, by when the bulk of RDA programmes will have stopped or significantly reduced.

Recommendation 2

To provide continuity in delivery of successful government programmes encouraging collaboration between businesses and universities, **government should determine as quickly as possible those activities where the Technology Strategy Board will take the national lead**, which activities they will take over from the Regional Development Agencies, and what capabilities and resources they will need to do this.



Support for businesses in Growth Sectors

Regional Development Agencies (RDAs) and Devolved Administrations (DAs) have identified specific science and innovation priorities that build on the business and knowledge base strengths in each region. Figure 1 demonstrates how science and innovation priorities have been differentiated across the UK, which has formed the basis of the joint work by RDAs, DAs and the Technology Strategy Board (TSB) to support business innovation.

RDAs, working with universities, have developed Centres of Excellence that build on these strengths and a range of these centres across sectors and regions are described in Appendix 2. These Centres of Excellence support businesses to develop in growth sectors, so the UK can take advantage of the international opportunities in these sectors. These existing Centres of Excellence could form part of a network of centres across England. Such a network would enable high growth business to fulfil their potential for growth and provide high value employment in growth sectors with international markets, linking into and across Local Enterprise Partnerships (LEPs).

Recommendation 3

The Department for Business, Innovation and Skills (BIS) should create a national innovation system offering an integrated approach and focused on high growth/high impact businesses and key sectors of the future. This would include **a network of Growth Centres, based around existing and new Centres of Excellence (including the proposed Technology and Innovation Centres), Innovation Centres and Science Parks, to provide comprehensive geographical coverage across England.** The Growth Centres would enable collaboration between businesses and universities and provide a bridge into LEPs and relevant supply chains.

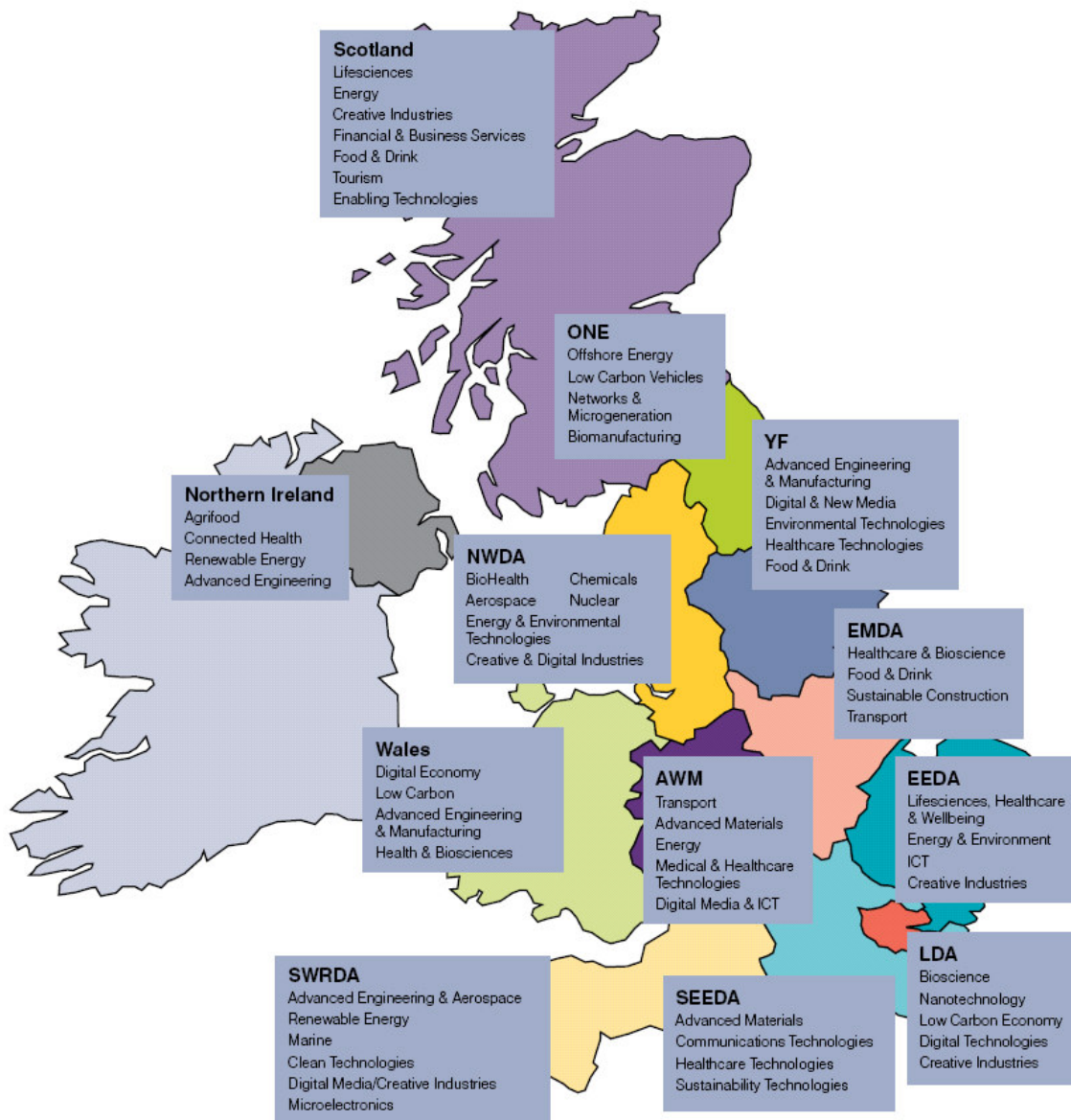
The Growth Centres should have a small core staff able to work with and support Local Enterprise Partnerships, and to facilitate links between high growth companies and relevant university research departments, private sector business services and voluntary support (e.g. business mentoring).

This approach would complement the outcomes of the Hauser review and offer an important new way for academia to work with businesses on cutting-edge technologies. RDAs have also supported centres with activity for businesses in growth sectors through:

- Supporting entrepreneurship and graduate/student placements and internships to improve the employability of graduates emerging from Higher Education Institutions (HEIs); and to increase the number of small and SMEs employing graduates
- Developing and delivering support for high growth companies, including:
 - High growth business support and business start-up products
 - The development of angel and venture capital networks
 - Venture capital and grants e.g. Grant for R&D, Grant for Business Investment, where finance from the market is not available.



Figure 1. RDA and DA science and innovation priorities supporting national priorities





Commercialisation

The commercialisation activities of universities are significant factors in helping to grow and maintain successful modern economies. Those economies, founded on an industrial base with significant concentrations of knowledge-intensive firms, and underpinned by powerful universities, are in a strong position to grow out of recession. Successful spin-outs and support mechanisms are described in Appendix 3.

Whilst the UK has an enviable reputation for the quality of its research, having won more than 100 Nobel science prizes, the conversion of this world-leading science into globally competitive companies lags behind other countries, with commercial rewards primarily exploited overseas. The size of the challenge is clear. Britain accounts for 3 % of global gross domestic product (GDP) and this is likely to fall to 1 % unless we do more to maximise the commercial spin-offs from science and technology.

Library House (2007) compiled a list of all companies spun-out from UK universities since 2001 and compared the volume of venture capital money they attracted with the amounts backing companies spun-out of three US universities (Stanford, Washington and Wisconsin). This survey positioned Cambridge University and the University of Southampton in second and third place after Stanford University (US). In comparison, however, Stanford generated almost double the volume of money that Cambridge attracted.

Whilst recognising that this is a complex subject interweaving culture, human behaviour, access to finance, legal barriers and management skills, there are nevertheless practical steps which can be taken to help ameliorate some of the existing problems. While most universities are involved in spin-out activities, too few of these spin-outs develop into scaleable international businesses. Universities feel pressured to focus on direct financial gain from intellectual property through licensing and spin-outs. Yet the financial benefits to universities from these sources are limited and intellectual property issues are frequently cited by businesses as a barrier to collaboration. Realistic expectations on the likely income streams from intellectual property exploitation and sensible approaches to commercialising knowledge are critical to successful exploitation. Universities should be supported to develop 'open source' mechanisms, which make intellectual property more visible to businesses that can take this and commercialise it.

Recommendation 4

Government should clarify what is expected of HEIs in relation to intellectual property and give a realistic expectation of how HEIs can benefit from this. HEIs could be supported to develop 'open source' mechanisms to make intellectual property more visible to businesses that can commercialise it.



Higher-level Skills Development

Higher-level skills are strongly linked to economic success and productivity as well as to incomes. With a continuing trend towards a deep and strong knowledge economy where higher-level skills are even more important, it is vital that every region of England makes progress in this area in order to maintain its international competitiveness and prosperity in the long term.

Universities are making good progress in working with business on higher-level skills development relevant to the future needs of industry and sector priorities. Their focus is particularly on leadership and management, entrepreneurship skills and higher technical skills. Considerable attention has focused on undergraduate employability and enterprise skills, for example the Flying Start programme managed by the National Council for Graduate Entrepreneurship.

In response to employers' concerns regarding the employability, enterprise and team skills of new graduates, several Regional Development Agencies (RDAs) have worked with universities in their regions to integrate generic skills into higher education curricula and further opportunities to nurture and grow graduate entrepreneurial skills and culture.

The case studies in Appendix 4 offer exemplars where the universities are taking on a key role in developing the critical higher skills needed to enable growth in new sectors. RDAs have also supported higher skills development through:

- Fostering the development of high level skills, particularly for learners already in the workforce, by working strategically with businesses, in particular on Science, Technology, Engineering, Maths (STEM) related work;
- Supporting widening participation into Higher Education (HE) through funding infrastructure for delivery and creating HE Centres in 'cold spots' of participation; and
- Working with Sector Skills Councils and other employer-led bodies to encourage the development of Higher Level Apprenticeships at Levels 4, 5 and 6.

The draft Regional Skills Priorities Statements submitted by RDAs to the Department for Business, Innovation and Skills (BIS) at the end of July 2010, suggest that technician skills continue to be in short supply, particularly with regard to STEM. The evidence supporting these Statements can inform the development of Higher Level Apprenticeships.

Recommendation 5

BIS should work with the Higher Education Funding Council for England, Skills Funding Agency and Universities to ensure that skills investment and provision is informed by draft Regional Skills Priorities Statements, particularly in the development of higher level apprenticeships.



References

Department for Business, Innovation and Skills, *2009 Annual Innovation Report*, 2010
<http://www.berr.gov.uk/files/file54587.pdf>

Higher Education Funding Council for England, *Higher Education – Business and Community Interaction Survey 2007-08*, 2009
http://www.hefce.ac.uk/pubs/hefce/2009/09_23/

HM Treasury, *Lambert Review of Business-University Collaboration*, 2003
http://www.hm-treasury.gov.uk/d/lambert_review_final_450.pdf

HM Treasury, *Science & innovation investment framework 2004 - 2014*, 2004
http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/spending_sr04_science.htm

HM Treasury, *The Race to the Top: a Review of Government's Science and Innovation Policies*, 2007
http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/media/5/E/sainsbury_review051007.pdf

Library House Ltd, *Spinning out quality: university spin-out companies in the UK*, 2007
Franklin, Roger, Holi, Martin, Lapinski, Jens, 2007.

National Endowment for Science, Technology and the Arts, *The vital 6 per cent*, 2009
<http://www.nesta.org.uk/library/documents/Report-Summary-Vital-6-per-cent-v13.pdf>

PricewaterhouseCoopers LLP, *Impact of RDA spending: national report. Volume 1: main report*, 2009
<http://www.berr.gov.uk/whatwedo/regional/regional-dev-agencies/Regional%20Development%20Agency%20Impact%20Evaluation/page50725.html>

Technology Strategy Board, *Accelerating business innovation across the UK*, 2010
http://www.innovateuk.org/assets/pdf/corporate-publications/tsb_acceleratingbusinessinnovation.pdf

University of Strathclyde, *IMPACT website for the Impact of Higher Education Institutions on regional economies initiative*, 2010
<http://ewds.strath.ac.uk/Default.aspx?alias=ewds.strath.ac.uk/impact>



Appendices

Appendix 1: Exemplars of Support for Collaboration with Business

Linking businesses and research 1:

London Technology Network in the Greater South East

London Technology Network's (LTN) mission is to stimulate the transfer of technology-based innovation. Cited in the Lambert Review of Business-University Collaboration as an example of best practice, LTN is funded by the European Commission and the three Greater South East Regional Development Agencies (London Development Agency, South East England Development Agency and East of England Development Agency). The cross regional support for LTN reflects the knowledge geography of the Greater South East: a 'super region' which has knowledge capabilities that are vital to the continued success of the UK economy.

LTN links companies with the technology research base and innovation capacity of the region's academic and business communities. To do this LTN has created a network of over 100 university based research experts linking 6,000 academics across London, the East of England and the South East of England, to map their research in order to provide technology solutions to business needs. LTN is also part of the Enterprise Europe Network, which is a trans-European network of more than 500 organisations, spanning 40 countries aimed at stimulating the exchange of technologies across Europe, and promoting the activities of businesses to the wider European market. In the 5 years ending June 2009 LTN generated:

- 6,900 negotiations between companies and research scientists
- 1,450 of which resulted in collaborative projects being initiated
- £63 million in aggregate value for the universities.

The vast majority of these interactions are between partners who had not previously collaborated.

Linking businesses and research 2:

Centres of Industrial Collaboration in Yorkshire and Humber

The key objective of the Centres of Industrial Collaboration (CICs) is to exploit Yorkshire and Humber's well developed science base, leading to a substantial improvement in regional competitiveness and productivity. CICs stimulate a greater understanding of technology commercialisation within the academic research community and within Small and Medium Enterprises (SMEs). Fourteen CICs have been accredited, with expertise from local universities covering the region's priority industrial sectors. The main criterion for the centres was scientific excellence, coupled with a good track record in knowledge transfer.

Host universities for each CIC received £600k over three years to build sufficient commercial income to become self-sustaining. No subsidies are provided to companies or research groups, instead the funds cover the incremental costs of providing a professional business-university interface and promoting their services to business. This meant that the



CICs were able to generate a culture change within regional businesses, such that these businesses understood that R&D has a value in itself and is something worth spending their own money on.

Since their launch in 2003, the Centres of Industrial Collaboration have collaborated with business over 1400 times and generated in excess of £50 million research income for the region, safeguarding more than 1,000 jobs. Out of the fourteen centres developed, ten are still operating commercially post-funding. The CIC initiative is increasingly been seen as a model of good practice in the UK and internationally. In 2008, CICs won the EU's RegioStars award for technological innovation leading to economic growth against seventy-one applicants.

**Innovation Vouchers:
West Midlands and across England**

The first RDA Innovation Voucher scheme was launched by Aston University on behalf of Advantage West Midlands in June 2007. The Innovation Vouchers provide short, flexible innovation engagements worth £3,000 to small businesses, many of whom will never have worked with a university before. The vouchers offer a demand-led approach which allows businesses to choose which of the 13 regional universities they work with. Innovation Vouchers are one element of a coordinated, business-led programme of support managed by Business Link West Midlands under Solutions for Business.

In March 2008, the *Innovation Nation* White Paper recognised the potential of the scheme and recommended that the vouchers should be made available across England. The Innovation Vouchers were offered across most of the English regions and are available to SMEs that have a choice of knowledge base institutions to work with.

Their value is less than £10,000 and is typically £3,000 to £7,000 of public money. The vouchers are in effect 'tasters' that aim to encourage collaboration with the knowledge base and ultimately lead to collaborations that are not funded by vouchers but other products, or by business themselves. Regional flexibilities enable the RDAs to pilot a programme that is most relevant to their business and knowledge base.

**Knowledge Transfer Partnerships (KTPs):
Increasing business take up in all regions**

The impact of KTPs has been recognised nationally in terms of the value generated to the business with 2 new jobs created for every KTP placement and £200k improvement to profits. 80 % of students are retained with the company after the KTP. The Shorter KTP programme was launched nationally by the Technology Strategy Board in 2009 and supports 3 to 9 month graduate placements in regional businesses. It is a new version of the highly successful KTP format building on several regional schemes, including KEEP in the East of England, NIPPER in the North East and Business+ in the South East.

The existence of these regional schemes allowed the national scheme to draw on best practice and incorporate this in the national scheme, which was piloted by Coventry University. The RDAs are now working with the Technology Strategy Board to use European



Regional Development Funding to fund the delivery of the national KTP programme in their region.

Collaborative Research and Development:

Northern Way working with the Technology Strategy Board

The North of England has an energy-intensive economy, but also strengths in many of the industries with the potential to diversify into the development and supply of carbon abatement technologies. Through a £15 million collaborative R&D competition with the Department of Energy and Climate Change and Technology Strategy Board, The Northern Way collaboration between North West RDA, One North East and Yorkshire Forward has been able to take a lead in developing a 'low carbon' economy in the North by supporting collaboration between businesses and universities. Using their connections with the local business and university base, the RDAs helped businesses to network and helped create strong demand for the competition. The partners' marketing sessions and briefings brought together many companies and universities that had neither worked together before nor participated in collaborative R&D competitions led by the Technology Strategy Board before.

Great Western Research

Great Western Research (GWR) is an excellent example of the type of project emerging from partnerships between South West RDA and its Higher Education Institutions (HEIs), enhancing regional economic growth through innovative approaches to delivering higher education outputs. GWR is a £14 million programme funding 130 new PhDs in collaboration with business. Supported by South West RDA, Higher Education Funding Council for England (HEFCE) and the private sector (£3.5 million), led by the Universities of Exeter, Bath and Bristol and involving all South West HEIs, its focus is on driving closer collaboration between researchers and business and between HE research teams. Focused on science and technology strengths in the region, including materials science, digital and applied mathematics, each research project has a business partner who part funds the work.

Over 30 projects are with SMEs, many of whom are collaborating in research with a university for the first time. Other projects involved major companies such as Rolls-Royce and Airbus and have significantly deepened the business-academic relationship, helping to lay the ground for further collaborations. Each PhD student is jointly supervised by academics from at least two institutions. This has brought academic teams together and has already led to successful joint bidding for £12 million of new research activity by larger and more capable 'virtual' research teams.

Finally, the region is building a substantially larger pool of researchers with experience of solving real world problems who speak highly of the value of this to their future employability.

Major facilities 1:

Advanced Manufacturing Park

The Advanced Manufacturing Park (AMP), on the transformed 100 acre site of the former coking plant at Orgreave, has created space and facilities for high technology advanced



engineering, manufacturing and materials organisations. The AMP, anchored by the University of Sheffield's 'Advanced Manufacturing Research Centre with Boeing' (AMRC) and the 'Rolls-Royce Factory of the Future', grew out of university-industry collaboration connecting scientific excellence, expertise and technological innovation of companies throughout the aerospace supply chain. Since 2001 the ARMC has generated over £500m in contracts and supported collaborative research and innovation.

The latest initiative on the Advanced Manufacturing Park aims to create a £25m Nuclear Advanced Manufacturing Research Centre and is led by the University of Sheffield with the University of Manchester and Rolls-Royce. Building on co-investment and a long-term commitment to capitalise on world leading research capabilities, the centre will revitalise the UK civil nuclear supply chain, and create new technology and new jobs for the region. Over the next 25 years, the centre will contribute to the expected creation of over 4,500 engineering jobs and an expected £1bn per year contribution to UK companies by the new civil nuclear industry.

Major facilities 2:

Daresbury Science & Innovation Campus

Daresbury Science & Innovation Campus is world class location for high-tech business and leading edge science. It provides a unique environment for innovation and business growth, with knowledge sharing, collaboration and networking. Home to the groundbreaking Daresbury Laboratory and the Cockcroft Institute as well as nearly 100 high-tech companies, its stakeholders are the North West Development Agency (NWDA), the Science and Technology Facilities Council (STFC), Halton Borough Council and the Universities of Liverpool, Lancaster and Manchester. The most recent development is start of construction on Vanguard House, which will offer grow-on space for the rapidly growing companies on the campus and will take NWDA's total investment in the campus to £67 million.

Major facilities 3:

BioCity in the East Midlands

BioCity is a 200,000 square foot specialist facility offering a number of units to companies providing both sector specialist and generic business support and consultancy. Its success has placed BioCity as one of Europe's largest biosciences incubators with over 60 companies and circa 500 skilled employees, and is regarded as an engine for the creation of a large and economically significant bioscience industry.

In 2002, a consortium between Nottingham Trent University, The University of Nottingham and the East Midlands Development Agency (*emda*) established BioCity Nottingham Limited. Since then, approximately £13m of single pot and European Regional Development Fund (ERDF) has been spent to redevelop the site, bringing back into use 200,000 ft² of laboratory and office space. Targeting high-growth businesses operating in the life sciences sectors (which encompass bioscience, healthcare and pharmaceutical firms), the facility provides a managed and structured environment in which they can grow to their potential. To enable growth and commercialisation, businesses have access to a variety of support and advice services. In addition, BioCity makes available a small number of units to companies providing both sector specialist and generic business



support and consultancy. The key motivating factor for business occupancy at BioCity is its physical accommodation offer, in particular the availability of specialist facilities and grow-on accommodation. The co-location of patent lawyers, specialist biosciences consultancies, on-site business support particularly financial advice, test lab facilities and a sector focused organisation (MediLink East Midlands) has provided a fertile environment for the development and commercialisation of new innovative products and services. As a result, the majority of BioCity tenants are engaged in high levels of R&D activity with more than half of their total costs expended on R&D. This package of specialist support reflects the nature of companies engaged with BioCity and attests to the importance that is placed on R&D which is leading to innovative breakthroughs.

The collaboration and partnership between the two universities and *emda* has been instrumental in the success of BioCity. The consortium has demonstrated skilful, strategic and collaborative working from the outset with particular focus on urban regeneration. The impact of BioCity has been significant with a return of £2.35 private funding for every £1 of public sector investment. In addition, over £27m has been invested in companies at BioCity and the success has resulted in an asset value of at least £68m.



Appendix 2: Universities and RDA Centres of Excellence Supporting Growth Sectors

1. Advanced Manufacturing:

Midlands – Manufacturing Technology Centre

The Manufacturing Technology Centre (MTC) in Ansty Park, Coventry, is being developed collaboratively between the East Midlands Development Agency (*emda*), Advantage West Midlands (AWM), the Technology Strategy Board, three universities (Nottingham, Loughborough and Birmingham), TWI and initially four companies. MTC is an example of multi-partner working which brings together the research strengths of different universities in a way which facilitates easier engagement with high-technology industry. The scale and ambition of the MTC, which will open in 2010, builds on the success of the other centres and will cover a broad range of process technologies including high integrity joining, fabrication and automation and will complement other centres for manufacturing in the UK.

2. Plastic Electronics:

North East – Printable Electronics Technology Centre

Plastic Electronics is a disruptive technology which is forecast to grow to a global market of £125 billion by 2025. The Printable Electronics Technology Centre (PETEC), based at NETPark Sedgefield, received over £5.5 million from the Northern Way to create a competitive supply chain to develop new products and processes from this technology by linking PETEC in the North East with materials expertise in the North West at Manchester University (OMIC) and the Yorkshire and Humber Digital Print CIC based at Leeds University. Earlier this year a £20 million expansion for PETEC, funded by the national Advanced Manufacturing Strategy and One North East, was agreed, which is expected to stimulate the creation of up to 1500 jobs nationally and up to 250 in the North East.

3. Composites:

South West – National Composites Centre

The South West RDA working with private and public sector partners are developing a £16 million National Composite Centre in Bristol which is key to the delivery of the new national strategy for composite materials. This will drive strategic research and development, skills and knowledge transfer activity across a number of sectors including aerospace, marine, defence, automotive and renewable energy. The National Composites Centre will be engaged in collaboration with other centres of excellence in composite technology and link with other key research centres such as those based at Manchester and Sheffield. The University of the West of England is developing a composites skills gateway to support the developments described above with support from the national Further Education Specialisation and Innovation Fund.

There is also a link with foreign direct investment. Vestas is one of the world's leading wind energy companies. With the drive to build larger wind turbines off-shore, Vestas needs to develop new blades which are larger, stronger and lighter. They have chosen University of Bristol to help with this work because of their knowledge of composites and background in engineering. Vestas is supporting 3 Research Associates at Bristol to work on Morphing Structures, Lightweight Structures and Composite manufacturing. The projects will run for over two years and represent a total investment of £750,000 in research. Vestas will



support 2 more PhD studentships and 2 Doctoral studentships and will be a key partner in the composites centre.

4. Digital:

South East – Space sector and Harwell Science and Innovation Campus

The South East England Development Agency (SEEDA) is supporting the development of the Harwell Science and Innovation Campus as a hub for the UK space sector, building on the European Space Agency (ESA) research centre located on the campus and a regional resource centre for training advanced technicians for the space industry. Following a successful Strategic Investment Fund (SIF) bid, an International Space Innovation Centre is being established at Harwell to support collaboration between universities and business at the hub of the UK space industry. Cooperation across regional boundaries has established a hub and spoke network for space across the UK that includes the universities of Leicester, London, Nottingham, Reading, Bath and Surrey, working with business. These spokes will ensure that growth in the space sector is stimulated across the regions and the UK retains its global competitive position. SEEDA is working with the University of Surrey to establish ISIC Surrey – a Satellite Engineering Innovation Centre that will draw together academic research partners, international businesses and small & medium enterprises (SMEs) from across the South East of England into a 'cluster,' stimulating an entrepreneurial environment for uniting upstream and downstream satellite technologies and communications research, innovation and skills.

5. Creative Industries:

North West – MediaCity UK

MediaCity UK is an ambitious 200 acre development at Salford Quays which will create a media hub with 10,000 jobs and support 1,150 creative businesses, the largest cluster outside London and the South East. Salford University has become a key component in the wider regeneration plan and the MediaCity UK development and will invest over £200 million over the coming years.

The higher education community will be fully engaged with this development, particularly in the short to medium term through the BBC Education and Community Partnerships and activity through the Create and Connect network. In addition, a large collaboration led by Salford University involving the BBC, Lancaster University, Goldsmiths College, Cambridge University and MIT with the support of NWDA and other regional agencies has been developed with an initial focus around a significant funding bid to the Engineering and Physical Sciences Research Council (EPSRC).

6. Life Sciences:

East of England – Stevenage Bioscience campus

The £37 million Bioscience Campus in Stevenage, funded by the Government, GlaxoSmithKline, East of England Development Agency (EEDA), Wellcome Trust, and Technology Strategy Board, will create a world-leading hub for early-stage biotech companies operating under a model of open innovation and collaboration with universities across the UK. The campus will offer each company access to specialist skills, equipment and expertise to help stimulate innovation in drug development. By sharing knowledge each company will increase its chance of success while retaining its



independence so entrepreneurship can flourish. It is estimated that development of the campus could create up to 1,500 new jobs, most of which will be highly skilled. The campus will initially be home to around 25 companies co-located with GlaxoSmithKline on its existing research site, with plans to increase capacity at the park fivefold over the next 10 years.

7. Low Carbon:

A. South West – Marine Renewable Energy

The Peninsula Marine Institute for Marine Renewable Energy (PRIMaRE) is a £13 million project supported by the South West RDA (£7 million) with further funding of £6 million from the European Regional Development Fund and the university partners of Exeter and Plymouth. The Institute is developing a programme of research into the marine renewable energy sector. Operating as part of a European network, PRIMaRE is supporting businesses seeking to bring new environmental technologies to market. The expertise and facilities support the development of technologies from concept to early stage development. The Wave Hub provides a test-bed for full-size wave energy converters and the activities of PRIMaRE are critical to its success. The investment in PRIMaRE is a milestone in establishing the UK as a leader in the global marine energy industry.

B. Midlands – Low Carbon Vehicles

The West Midlands has strength in low carbon vehicle technology. AWM and emda have now confirmed more than £50 million to low carbon vehicle initiatives and the Midlands was recently announced as the Low Carbon Economic Area for Advanced Automotive Engineering. The Midlands programme of low carbon automotive projects includes Aston, Birmingham, Loughborough, Warwick, Birmingham City and Coventry universities in collaboration with leading automotive businesses such as Toyota, LTI, Mitsubishi, Microcab, Smart plus, EON, MIRA, JCB, Ricardo, JLR and Tata alongside the Technology Strategy Board and other Regional Development Agencies. The research includes intelligent transport systems, vehicle lightweight technologies, systems integration, the national ultra low carbon vehicle trial (known in the West Midlands as CABLED), niche vehicle research and development and vehicle customer interface technologies.

The Midlands also have a central role in coordinating a successful bid to the new European Institute of Innovation and Technology (EIT), which will see a unique consortium of six European regions, including the West Midlands, five of Europe's top universities and ten major companies (including CISCO, Shell, Thales and Bayer) deliver Europe's trail-blazer on climate change – the €750 million Knowledge and Innovation Community, known as 'Climate KIC'. This programme will bring universities from the UK and EU together collaboratively to support businesses involved in low carbon transport and low carbon living and to develop the next generation of highly skilled specialists in the low carbon economy.

C. Yorkshire and Humber – The Centre for Low Carbon Futures

The Centre for Low Carbon Futures is a £50 million initiative led by the Universities of Hull, Leeds, Sheffield and York to pool the significant research strengths of all Yorkshire and Humber's universities across the sciences, social sciences and engineering, with knowledge contained within innovation-led businesses. The centre will deliver knowledge



and solutions designed to optimise carbon efficiency within businesses, organisations and communities, helping the region to meet its own emissions reduction targets and to exploit the opportunities available as world economies change to a low carbon model.

D. London and South East – Thames Gateway Institute for Sustainability

The Thames Gateway Institute for Sustainability will significantly advance the UK's capability to deliver solutions for a sustainable built environment by forging practical research collaborations and sharing the outcomes regionally, nationally and internationally.

To do this the Institute is building on the triple helix model, working with partners from the private, public and academic sectors to share best practice in delivering sustainable communities, dissemination and enabling practical application of research and demonstration outputs across the Thames Gateway. The partners include 10 universities from across the regions and major international companies, led by Arup. A major programme of retrofitting homes will be one for the first demonstration projects.



Appendix 3: Exemplars of Spin-outs and Support Mechanisms

Bioscience incubation in London

Science and technology sectors play a key role in maintaining London's competitive edge. The London Development Agency (LDA) is working with Queen Mary University of London, Imperial College London and the Royal Veterinary College to align marketing and increase the supply of facilities within the sector. The bioscience incubators at Queen Mary University of London, Imperial College London and the Royal Veterinary College help accelerate the growth of start-up companies by providing high quality laboratory and office space, business support services and research. Imperial Innovations, which operates Imperial's BioIncubator suite, provides strategic management and mentoring advice.

The LDA contributed £7 million to the project at Queen Mary's and £3 million to the BioIncubator. The London Bioscience Innovation Centre (LBIC), located at the Royal Veterinary College in Camden, has received a total of £4 million from the LDA. Innovative companies arising from London's research organisations are housed by the highly successful, state-of-the-art biotechnology incubator.

SETsquared Partnership

The SETsquared partnership was established in 1999 by the Universities of Bristol, Bath, Southampton and Surrey to encourage business spin-outs, licensing and incubation. There are four incubators which provide mentoring and office space to entrepreneurs who are given access to technology experts, investors and support professionals. Over the last 4 years, companies supported by the centres have raised over £170 million and created over 1100 jobs. Even during the recession, companies in the incubators have attracted £52 million from private investors and venture capital funds, creating 142 new jobs.

The partnership also supports businesses from the wider community, helping them to access new UK and US markets. In 2006 the partnership was awarded £1.5 million DTI Science Bridges funding to support applied research and US market access. It has built a close relationship with the Connect programme at the University of California, San Diego, and has built on the best practice examples seen there to promote the growth of early stage, high technology businesses. SETsquared has been supported by Higher Education Innovation Fund (HEIF) funding and capital investment by the South West Regional Development Agency (SWRDA) in incubation facilities.

The University of Bath and SETsquared have also established a network to build links between companies and universities on low carbon technologies. This will make it easier for companies, entrepreneurs, investors and researchers to meet and exchange ideas and opportunities. The network currently has around 1300 members.

University of Manchester Intellectual Property

North West Development Agency (NWDA) supported the University of Manchester's technology transfer company, University of Manchester Intellectual Property (UMIP), which helps to commercialise the university's world-leading research. A limited company with almost 40 employees, UMIP is wholly owned by the University of Manchester.



The company consists of faculty oriented business management teams backed up by a central corporate office which provides company secretarial, marketing, legal and financial expertise. UMIP's key activities are managing IP created at the university, identifying, protecting and evaluating the commercial potential of research from all faculties and commercialising IP via the most appropriate route: sale, licence or spin-out.

UMIP holds the university's patent budget, manages its Proof of Principle awards and provides access to spin-out investment funds via the UMIP Premier Fund and has access to an extensive network of industry experts, consultants, professional advisers and investors.

UMIP has helped to create hundreds of jobs, has an annual rate of 20 licences with UK and international companies, and regularly sells shares and collects royalties. In the last five years businesses that have emerged from the university have attracted over £150 million in funding.

Surrey Satellite Technology Limited

In the mid-1970s a group of highly skilled aerospace researchers were working in the Electrical Engineering Department of the University of Surrey. At the time, space exploration was something only countries with enormous aerospace budgets could dream about, and it was still far out of reach for most countries. They decided to experiment by creating a satellite using standard consumer technology, known as 'commercial off the shelf' (COTS) components.

The first satellite, UoSAT-1 (University of Surrey satellite) was launched in 1981 with the help of NASA, who had become very interested in the group's work. The mission was a great success, outliving its planned three-year life by more than five years. Most importantly, the team showed that relatively small and inexpensive satellites could be built rapidly to perform successful, sophisticated missions. To prove it, UoSAT-2 was built in just six months and launched in 1984.

In 1985, the University formed Surrey Satellite Technology Limited (SSTL) as a spin-out company to transfer the results of its research into a commercial enterprise able to remain at the forefront of satellite innovation. At the end of 2008, EADS Astrium NV bought a 99% shareholding in SSTL from the University of Surrey, allowing the Company to fulfil its growth potential. Just over a year later, on January 7th 2010, SSTL announced its success in winning a £212 million contract for the Galileo Satellite programme. Today SSTL employs almost 300 staff, has launched 34 spacecraft, with 7 more under manufacture, and is delivering missions that provide critical and valuable services to customers across the globe.

Cambridge Enterprise and the Cambridge Phenomenon

Cambridge possesses a highly developed cluster of around 250 knowledge based businesses launched on the back of intellectual property or knowledge from the university. This has had a dramatic impact on the local economy, with university originated ventures generating combined annual revenues of more than £880 million and employing more than 9,000 people. Critical to this success in creating the climactic conditions for students and employees to start innovative new ventures has been the development of a



technology transfer office which positively encourages the transfer of knowledge to the commercial sector. Through its technology transfer arm, Cambridge Enterprise, the university has played a lead role in helping university based research get to market. However, the vital support provided by Cambridge Enterprise is enhanced by the availability of government grants which enable technological risks to be shared between Cambridge Enterprise, business and the Regional Development Agency which manages the government's Grant for R&D programme.

A recent study published by the British Venture Capital Association identified government grants as a one of the most important sources of financing for spin-out companies. Grants provided by the East of England Development Agency (EEDA) have played a major role in supporting the growth of university backed businesses through the early stages of development. The latest Deloitte's Fast 50 report contained two Grant for R&D backed university spin-outs, Ubisense and Blue Gnome, which had achieved growth rates in excess of 2,000 %. These investments follow in the footsteps of major spin-out successes such as Cambridge Display Technology. Founded in 1992, the company was formed out of research work carried out at Cambridge University. Supported by grants from the former Department of Trade and Industry, the company went public in 2005, before being acquired by Sumitomo Chemical Company in 2007. Despite passing into foreign ownership, the company has gone from strength to strength, retaining employment at its head office, research and manufacturing facilities in Cambridgeshire.

Innovation Networks (iNets) in East Midlands

The iNets bring together consortia of business, university and public sector organisations to take responsibility for improving innovation performance in their sector. They provide intensive innovation support to organisations and individuals in the Healthcare and Bioscience, Sustainable Construction, Food and Drink, and Transport sectors in the East Midlands. iNet advisors operate within the Solutions for Business support framework, providing intensive innovation support to businesses and individuals. All of the regional universities are active members in iNets, for example, the universities of Loughborough and Northampton are the contract leads for the Transport and Sustainable Construction consortia. Academics from across the universities provide their expertise into the iNet Strategic Advisory Panels, as well as offering services to projects brokered by advisors.

The iNets have a comprehensive range of support packages including Collaborative Research and Development grants, technology exploitation and demonstrator grants. They also deliver the Innovation Advice and Guidance product to business and signpost and broker businesses to other support programmes such as the Manufacturing Advisory Service (MAS). The iNet impact since their launch in 2008 has been significant. Key figures include over 1350 businesses assisted in improving their performance and brokering over 360 successful collaborations with the universities.



Appendix 4: Exemplars of Higher Skills Development

Midlands Energy Graduate School

The Midlands Energy Consortium comprises the Universities of Birmingham, Loughborough and Nottingham, and is supported by Advantage West Midlands (AWM) and East Midlands Development Agency (*emda*) drawing on many existing collaborations. The Midlands Energy Graduate School (MEGS) is run by the consortium to provide a unique training programme for the energy researchers of the future.

Core funding of almost £3 million for MEGS was awarded to the consortium by the Higher Education Funding Council for England (HEFCE). MEGS will accelerate the supply of highly trained graduates and postgraduates with specialist knowledge and multidisciplinary ability, equipped with a broad understanding of energy technologies and practical engineering skills. This will produce highly-trained postgraduates in renewable energy, power generation and carbon capture, hydrogen and fuel cells, sustainable building, energy efficiency and many other areas crucial to the low carbon economy of the future. MEGS will have the following impacts:

- Develop the required skills base to support the Energy Technologies Institute and regions low carbon capabilities
- Facilitate knowledge transfer between the knowledge base and business
- Provide the human resource to facilitate the commercialisation of research
- Assist in graduate and skill retention within the midlands
- 150 new PhD students will benefit from the doctoral training centres.

LEAD in the Northwest

The LEAD programme, funded by the North West Development Agency (NWDA) and developed by Lancaster University Management School (LUMS), is a 10 month intensive leadership development programme targeting owner managers of businesses with up to 20 employees. Piloted with 60+ businesses, the programme has been proven to increase turnover and have a positive impact on growth. The programme is now being rolled out across a network of 13 providers across the northwest, supported by a quality framework and provider forum, targeting 2000 small and medium enterprises (SMEs). The forum includes Swansea University, which is leading the roll out of the programme to Wales, in partnership with the NWDA and LUMS.

Higher Education (HE) Enterprise Champions in the Northwest

The HE Enterprise Champions programme, funded by the NWDA (European Regional Development Funding (ERDF) matched by Single Pot) and led by the National Council for Graduate Entrepreneurship (NCGE), brings together a network of 10 universities across the northwest region. The programme aims to stimulate enterprise and entrepreneurialism within the culture and teaching of the institutions, led by a senior level enterprise champion who acts as a catalyst for change. Enterprise education is embedded to develop graduates with enterprising skills, behaviours and attitudes. An interim evaluation of the first phase indicates a return on investment of 6:1, with 176 businesses created and 50 net additional jobs. Based on the success of the first programme, a second phase is currently in the process of being approved, funded by ERDF with match from the institutions.