

The role of **Yorkshire's universities** in driving the region's economy



Introduction

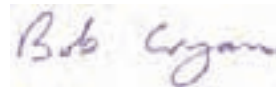
We are delighted to have the opportunity to introduce this volume which outlines the Yorkshire and Humber contribution to the Government's Going for Growth initiative.

The publication highlights some of the ways in which the higher education sector in Yorkshire and the Humber is working to drive the region's economy. Inevitably, in the space available, it is possible to give only a glimpse of what is happening, and the examples shown are therefore brief descriptions of the many innovative and effective ways in which universities are putting their efforts to supporting business and growth in Yorkshire and the Humber. Some are now well-established programmes, whilst others are specifically intended to address the immediate difficulties of the economic downturn, and an important third group are laying the essential foundations for future recovery.

All, however, are characterised by their collaborative approach. Partnership is at the heart of how we work in the region and this is demonstrated by the remarkable degree of co-operation that exists across our universities, and between them and Yorkshire Forward. Between us, and with our businesses and other partners, we are determined to make the most effective use of the knowledge and expertise in our universities to ensure Yorkshire builds an innovative and sustainable knowledge-based economy.



Terry Hodgkinson
Chair, Yorkshire Forward



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Economic role

1. Yorkshire and Humber is fortunate in having such a strong and diverse Higher Education (HE) sector, with nine universities and three higher education institutions (HEIs) and a regional arm of the Open University. Outside London and the South East, the region is the largest net importer of students, producing over 55,000 graduates each year, many of whom remain after graduation bringing high-level skills to support further economic development. Part time students – overwhelmingly living and working in our region – represent some 68,000 students. The impact of the expertise and knowledge gained by learning and research activities feeds directly back into the businesses and communities of our region.
2. The research base – valued at approximately £340 million and equivalent to 40 per cent of total regional R&D spend – offers expertise and further resources that businesses and other organisations can access to develop their products and services. Contract research income is £62m – over 11 per cent of the England total and a figure only surpassed by that of London and the South East.
3. With a total income of £1.43 billion per annum, it is calculated that the sector is worth £2.8bn to the Yorkshire and the Humber region, equivalent to 3.2 per cent of GDP (2008 figures). This is the same as, or slightly above, sectors such as banking and insurance, food and drink, and hotels and catering. The sector is also crucial to health, culture, sport and community development throughout the region.



Partnership for growth

4. As these figures demonstrate, the scale of HE activity is, in itself, highly valuable economically to the region. However, this impact is further strengthened by the well-established culture of collaboration that characterises both the relationship between individual institutions, and those between the sector and business and other relevant agencies.
5. The Yorkshire and Humber region was one of the first to establish a regional higher education partnership – now Yorkshire Universities (YU) – that brought together the universities and HEIs to identify opportunities for working together, and with other partners, to address regional and local agendas. This strong partnership means that there is maximum opportunity to draw on the strengths of all of the region's universities in targeting local needs and opportunities. It means that it is possible to capture, and integrate, both the leading-edge research of the research-intensive institutions alongside those institutions which are teaching-led, informed by research, working closely with the professions, especially in the area of supporting appropriate Higher Level Skills work.
6. The most recent joint initiative is in the area of low carbon activities (led by Hull, Leeds, Sheffield and York) and is a good example of how expertise across a sector, and across disciplines, can be brought together, supported by Yorkshire Forward, to maximise impact and benefit for the region. Such co-operation has also been reflected in the considerable success of Lifelong Learning Networks (LLNs) in Yorkshire and Humber both in progressing vocational learning opportunities and supporting the wider skills agenda.
7. One of the most important relationships for the sector has been that with the Regional Development Agency, Yorkshire Forward (YF). Over the past few years, this relationship has moved away from a simple 'funding-based model' where the RDA looked to HE to provide projects that would help it deliver its targets and the sector looked to the RDA to provide additional funding. It has been replaced by one that is essentially strategic and is driven by the search for common agendas that will underpin sustainable growth. Widely recognised as an exemplar for joint working, the relationship between the HE sector and Yorkshire Forward has matured as both parties have sought to identify those longer-term, and larger-scale, interventions that will bring about durable, positive impact for the region's economy.
8. Although it is recognised that there may be some changes in sub-national architecture and responsibilities going forward, alongside the need to work ever more closely with local government, the universities in Yorkshire and Humber are determined to preserve the regional perspective on economic development agendas that has been facilitated by the work of Yorkshire Forward. The relationship is one that has been mutually beneficial and, more importantly has assisted HEIs in maximising the economic contribution to the region from their activities.
9. Collaboration has also been facilitated by a close relationship with the region's Science and Industry Council, Yorkshire Innovation, who have been instrumental in mobilising the important contribution that HEIs have to make to delivering the regional vision to be a sustainable, commercially-focused, and innovation-driven economy. In 2006, Yorkshire Innovation commissioned work to identify those areas of regional academic strength that could be classed as truly world-leading and which had the capability to translate the research excellence into economic impact. 'Sustainability Science' was identified as the strongest of these areas, and in January 2008, this was adopted as a key initiative for the YF-YU Strategic Alliance through the new Centre for Low Carbon Futures. Yorkshire Innovation, Yorkshire Forward and Yorkshire Universities are now looking to replicate this approach by exploiting regional expertise in low carbon economy and alternative energy; healthcare industries; advanced manufacturing; and digital and creative industries.
10. Working collaboratively, and in partnership with key regional agencies, has also meant that the sector has been able to respond rapidly and collectively to changing demands and new initiatives. This was illustrated by the sector's success under the Hefce's Economic Challenge Initiative Fund, which was match funded by Yorkshire Forward. Since spring 2009, the sector has been working to support employers and employees in over 1,000 regional businesses in overcoming the economic challenges they are facing. More than any other region, the response was a collaborative one designed to ensure that the various projects will address real and practical issues and in a way that will generate maximum impact and build confidence and resilience.
11. An illustrative example is the business improvement project, Grimsby Slipways, which involves local companies, the University of Hull and North East Lincolnshire Council. ECIF funds are enabling group of small ship repair companies in Grimsby to combat the recession by helping them forge an effective alliance to capitalise on emerging business opportunities in off-shore renewable energy. Two existing organisations will merge into a single cohesive force representing 25 SMEs with a clear strategy to up-grade the slipway and enhance the companies' collective capability to secure significant business growth in the post-recession economy.

Transformational change

12. 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 AMRC has generated over £500m in contracts and supported collaborative research and innovation.
13. 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. With co-investment and a long-term commitment to capitalise on world leading research capabilities, the centre will revitalise the UK civil nuclear supply chain, 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 the expected £1bn per year contribution to UK companies by the new civil nuclear industry.

Collaboration with business

14. Although curiosity-driven research remains crucial to academic endeavour and, as the Lambert Report noted, much invention derives from serendipity rather than intention, the region's universities are at pains to ensure that commercial and business benefits accrue from their work. Working with business is a core activity for all institutions and both Yorkshire Forward and Yorkshire Innovation are crucial vehicles in ensuring that work both benefits, and is informed by, businesses.
15. Again, too, it is an area which is characterised by collaboration. This is illustrated by work of the **White Rose University Consortium**, a strategic alliance between the universities of Leeds, Sheffield and York covering selected areas of mutual research interest which was established in 1997. Over the last twelve years, the partnership has secured over £100m funding to support collaborative research, to ensure that maximum business and commercial benefit derives from the region's knowledge base, and to promote enterprise and cement business partnerships. Working with world-leading companies, as well as locally-based SMEs, the three universities are using their knowledge and expertise to establish critical mass in areas such as healthcare technologies, advanced manufacturing and bioscience. These collaborations typically involve working with complementary research strengths in universities outside these three, in order to assemble the strongest possible capacity in the region.
16. In South Yorkshire, the University of Sheffield and Sheffield Hallam University have co-operated across a wide range of activities. They include an ERDF Objective One funded triumvirate, led by Sheffield City Council called Knowledge Starts aimed at creating a platform to form new commercial ventures and, a Hefce funded Innovation Leaders programme for local and regional businesses. Other forms of collaboration are under discussion, including discussions with Creative Sheffield as part of moves to 'Redefine the City' and to maximise the universities' contribution.
17. In the Humber, the University of Hull established a **Logistics Institute** in partnership with Yorkshire Forward and regional businesses to add value to the economy based on the Humber ports. The initial £9m project funding was provided by the university, Yorkshire Forward and ERDF. Working closely with regional businesses to increase value in the supply chain delivered £55m of benefit to the region. The Logistics Institute has been invaluable in promoting the benefit of trading through the Humber and has helped confirm the ports as a global gateway for trade into the UK.
18. In 2007/08, the region's universities undertook over £21.4m in consultancy contracts and a further £87m in contracted research (excluding collaborative research – an additional £53m) and was ranked third in England for contracted research income (Hefce HE-BCI survey 2007/08).

Low carbon economy

19. The region's long-standing track record of successful collaborations with industry and the public sector to grow the region's economy can be characterised by recent success in establishing the **Centre for Low Carbon Futures**, a £50m initiative to pool the significant research strengths of all the region'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.
20. The Centre has already identified its first four pilot research projects, covering the regional economics of climate change, low carbon supply chains, biorenewables and carbon capture technology.

Healthcare technologies

21. The region has particular strengths in healthcare technologies. A long-term strategic partnership, targeted support to the health technologies sector and a holistic approach to research, knowledge transfer, skills provision and commercialisation has led to the creation of the £10m **Graduate Academy for Tissue Engineering and Regenerative Medicine Centre** delivering the skills for industry.
22. Yorkshire Forward's £11m **Centre for Industrial Collaboration (CIC)** programme – designed to help industry access research expertise and facilities, worked on over 1,400 projects with businesses, generating £50m income and safeguarding more than 1,000 jobs. One of the first CICs, the Biomaterials and Tissue Engineering (BITE) CIC, provided support the health technology businesses in the region. BITE CIC is now operating as an independent business supporting organisations taking new concepts through to market in all areas of healthcare and medical device technology. This has all led towards a £20m investment from the EPSRC and BBSRC, Technology Strategy Board, Yorkshire Forward and the University of Leeds to establish a new **Innovation and Knowledge Centre (IKC)** that will mix business acumen with the most up-to-date research to harness the full potential of developing new regeneration therapies and devices addressing the needs of an ageing population. Of the other CIC's, over half have achieved financial sustainability, including Design Futures and the Materials Analysis Research Services at Sheffield Hallam University.
23. Yorkshire Forward's ongoing commitment to supporting business investment in R&D is evidenced by the creation of three **Innovation Networks** in healthcare technology, product formulation and advanced materials. The Healthcare Technology Innovation Network is bringing together companies with the potential to grow through increased business-to-business and business-to-knowledge base collaborative projects and enhancing those businesses' future capabilities to deliver new products and services to the global health market.

Business and community collaborations

24. It should not be assumed, however, that working with business is restricted to large-scale R&D activities or 'hard' science', as illustrated by the work that York St John University is doing through its 're-ablement' Knowledge Transfer Partnership (KTP) with City of York Council and its **Phoenix Incubator** for start-ups in creative and digital industries. Another example, the **Centre for Young People and Families** at Leeds Trinity University College, is recognised as a centre of excellence for the study of early years and support for children, and to provide professional development for the region. The centre is currently working with employers to provide staff training and development and support in flexible forms of delivery tailored to the needs of business.
25. The University of Huddersfield's Centre for Precision Technologies collaboration with the National Physical Laboratory has led to the establishment of a new **NPL** Measurement Services Laboratory on campus – the first of its kind in any university in the UK.
26. The structure of business support has been rationalised and the HEIs are working with the new Business Link for Yorkshire. This approach complements the universities' connections with SMEs and is part of the family of interventions, including the Innovation Vouchers, which whilst low in value have provided many organisations with their first access to HEIs.

Commercialisation

27. Fostering a culture of enterprise amongst students and staff, and working with business and employers, are important themes in the joint Yorkshire Universities and Yorkshire Forward agenda and the region was very successful in obtaining support for enterprise-based **Centres of Excellence in Teaching and Learning** (CETL) at Leeds, Leeds Metropolitan, Sheffield, Sheffield Hallam and York – under the earlier Hefce initiative. Building on the CETLs, the work of Yorkshire Forward in the area of enterprise and Hefce's employer engagement initiative, universities across the region are working hard to embed enterprise and employability as core institutional missions. Underpinning commercialisation is the need to support an 'enterprise journey' that travels from encouraging enterprising outlooks and attitudes amongst students and graduates (a key role for the CETLs in curriculum development), help in formulating technical and commercial concepts and support to develop concepts as potential models to take to market.
28. Individually and collectively, the region's universities have developed an extensive portfolio of services and facilities to stimulate enterprise formation and growth and foster a culture of entrepreneurship amongst staff, students, and graduates. This includes tailored business support services, proof of technical and commercial concept, incubation and incubator facilities. A good example has been the development at the University of Huddersfield of the Masters and Doctor of Enterprise programmes. Within these courses students develop their innovative ideas via research whilst learning core business skills as the catalyst to starting up their own ventures.

Enterprising culture

- 29. Yorkshire Concept** is a new 'proof of commercial concept' fund designed to stimulate the commercialisation of research and knowledge-based activities in the Higher Education Institutions (HEIs) across the Yorkshire and the Humber region. The project was pioneered by Bradford, Hull and Sheffield Hallam as a Hefce-funded pilot and its success led to the roll-out of a scheme for all the region's universities. It is funded jointly, on the principle of matched funding, by Yorkshire Forward and the region's HEIs and is managed by Sheffield Hallam on behalf of the region. Activities focus on supporting projects which enhance potential for a new product or process to become commercially viable and on forging collaborations between higher education and private sectors to encourage innovation.
- 30.** For the past seven years businesses and organisations across Yorkshire have been investing time and money in **Venturefest** – a one-day 'expo event' which brings together the region's finest science, technology and knowledge entrepreneurs, the professional services who support them and world-class business speakers.
- 31. The White Rose Technology Seedcorn Fund** is an early stage seedcorn fund, which invests in exciting new technology emerging from the Universities of York, Leeds and Sheffield. A portfolio of investee companies represents the commercialisation of high quality science and technology combined with professional management teams to produce investor-ready and partner-ready opportunities. The £9m fund (including £3m from Yorkshire Forward) provides venture capital funding of up to £500,000 to enable the transition from promising research to commercial reality. The fund provides growing companies with advice and experience, and brings an investor's viewpoint to bear at an early stage.
- 32.** Support for university researchers is provided through the **Yorkshire Enterprise Fellowship**, designed to help create businesses based on research. Building on the highly successful Bioscience Yorkshire Enterprise Fellowship scheme launched in 2004, this initiative from Yorkshire Forward has created over 60 Fellowships and delivers practical support to commercialise ideas and research from the region's universities.



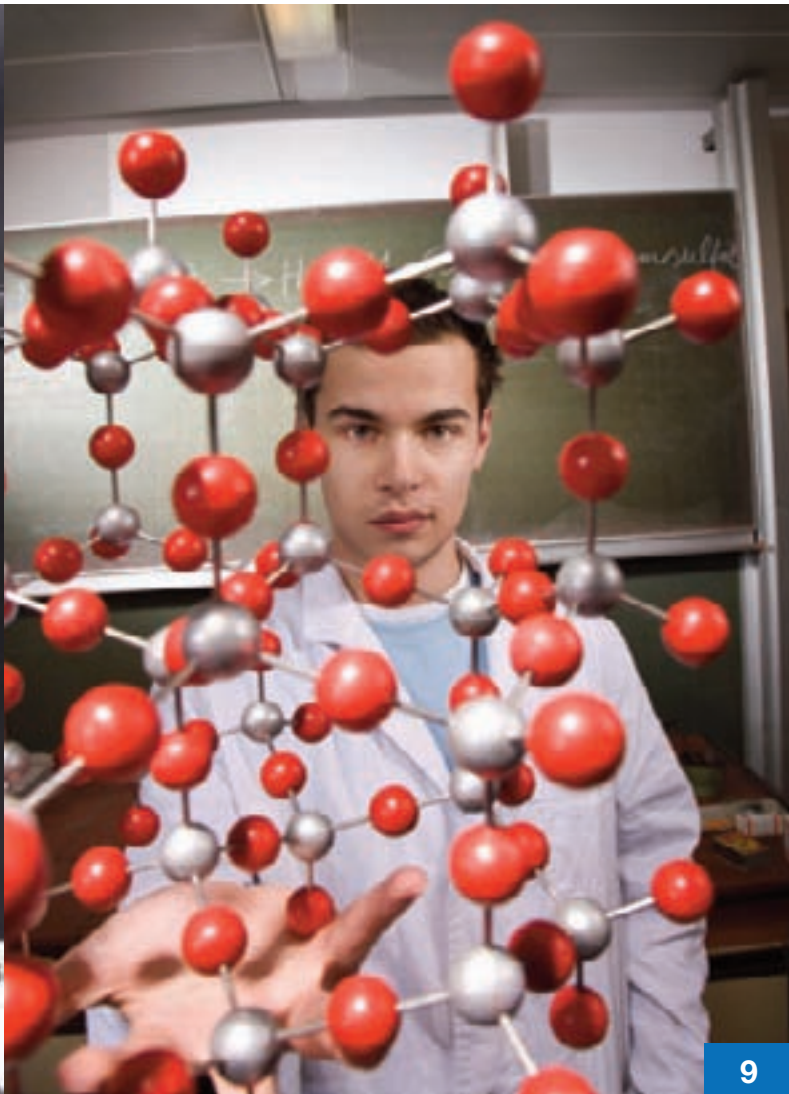
Incubation space

- 33.** One of the earliest, and most successful, national examples of incubation space is **York Science Park**, housing 100 businesses employing 1200 people, which links closely with the work of **Science City York**, the first of what are now six 'science cities'. The Science City York initiative was launched in 1998 as a unique working partnership led by the University of York and City of York Council, with the support and involvement of key private sector representatives and subsequent funding from Yorkshire Forward. Initially focussed on driving forward York's economy, by 2001, three years into its five year plan, Science City York had achieved its original target of creating 1600 new jobs, attracting 27 new inward investors to the City and assisting in the creation of 25 technology-based businesses. Reported figures now stand at 99 new technology-based businesses and 2800 jobs.
- 34.** Recently, Science City York was successful in obtaining £19m of ERDF support to put in place further incubation and knowledge-transfer facilities as a core part of the University's expansion at Heslington East and, for the first time, workspace on the Food and Environment Research Agency (FERA) facility at Sand Hutton close to the York campus.
- 35.** Other universities' incubation services and incubator accommodation include:
- Bioscience Business Incubator – University of Bradford.
 - University of Bradford's Think Business' Programme for its students and graduates and 'Ideas Lab' providing pre-incubation support services.
 - Business Mine – University of Huddersfield.
 - Enterprising Barnsley – University Campus Barnsley.
 - The Hatchery Incubator at Sheffield Hallam located in the Sheffield Science Park supported by placement schemes, business advisors and workshops.
 - Innovation Hub (including bio-incubator and 'non-traditional' innovation/knowledge transfer) – University of Leeds.
 - Bio-incubator, IT Incubator and Innovation Centre – University of York.
 - Business Start-up Incubator – Leeds Metropolitan University.
 - Phoenix Incubator for start-ups in the creative and digital industries – York St John University and Science City York.
 - Enterprise Centre at Hull.



Higher skills

- 36.** Higher level skills are strongly linked to economic success and productivity as well as to incomes. With a continuing trend towards a knowledge economy where higher level skills are even more important, it is vital that the region makes progress in this area to maintain its competitiveness and prosperity in the long term.
- 37.** Whilst the proportion of the region's working population with higher level skills (NVQ Level 4+) did increase between 1999 and 2007, the rise was only modest and this has meant the gap with other regions has grown. Projected long term, these trends would result in the region becoming a lower skilled, lower paid economy compared to most others. There are economic cold spots in the region which have low levels of knowledge intensive sector employment (Graduate Economies in Britain: A Local and Regional Analysis, Frost and Hepworth 2008). Addressing these is a key challenge to the region and widely acknowledged.
- 38.** Assisting the region's workforce to acquire high-quality generic transferable skills has also been identified by Yorkshire Forward as being of the utmost importance both during the current recovery, for future prosperity and in tackling inequalities. In Yorkshire and Humber we will need to maximise opportunities to ensure that workers get their share of the 'jobs of the future' in the key industries, technologies and services that will drive economic growth and help regional businesses compete in emerging growth sectors.



Skills for growth

39. Future investments in skills are focused taking a long-term perspective on the region's aspirations and strategic needs and to create new industries, jobs and opportunities to drive the region's economy, particularly in the industrial sectors of advanced engineering and manufacturing, low carbon economy and alternative fuels, healthcare industries and to build on the impact of the Digital Region project providing superfast broadband to all of South Yorkshire.
40. Yorkshire Forward, the University of Leeds, the Manufacturing Advisory Service and industry specialists have developed a unique post-graduate qualification, **Manufacturing Masters**, balancing theoretical best practice and industry application in a three layer model culminating in an MSc in Manufacturing Leadership. The programme has attracted a significant number of regional manufacturing companies and businesses to invest in higher level skills.
41. The **Ecoversity programme** at the University of Bradford delivers bite-sized modules which will support new jobs and skills in support of the emerging low carbon economy. In the next phase, under the banner of a UN regional centre of expertise (RCE) awarded to the region in 2009, all Yorkshire's universities will work together on sustainable development issues including curriculum mapping, taking forward the recommendations of a recent low carbon skills report commissioned by Yorkshire Forward and best practice sharing in low carbon economy curriculum materials. Similarly, a programme based at the University of Huddersfield and funded by Hefce has developed training for those within the recycling and waste management sectors.
42. A Master's degree in Logistics and Supply Chain Management has proved popular with international students with over 100 students enrolled each year. The programme provides opportunities for students to interact with business and conduct significant projects with the business community. The programme helps build the region's reputation as a leader in logistics.
43. The development and expansion of higher education in the region has supported public sector transformation (e.g. teacher education) and the growth of key sectors such as health and social care (e.g. nursing). The **university campus at Barnsley** established by the University of Huddersfield in 2005 has created new HE presence in the area, contributing significantly to the regeneration of Barnsley and opening up opportunities for businesses and communities to access facilities e.g. public lectures and open space for leadership and management development.
44. A particular regional flagship is the **National Science Learning Centre**, based at the University of York and led by White Rose Consortium and Sheffield Hallam University (which also runs the Regional Science Learning Centre). Opened 2006, with a £25m grant from the Wellcome Trust, the purpose-built centre has offered world-class professional development to thousands of science teachers. In early 2008, the Centre won a grant from the Gatsby Charitable Foundation of £5m to establish the National STEM Centre, extending the remit to mathematics, technology and engineering. In March 2008, Chancellor Alastair Darling announced a £10m contribution by the Government to the National Science Learning Centre's Project Enthuse. With £10m from each of government and Wellcome, plus £10m from a range of science-based industries such as BP and Rolls Royce, Project Enthuse will provide funding for the National Science Learning Centre over five years to support the activities of the Centre and to provide generous bursaries to teachers. These successes will consolidate NSLC's position as the centre for driving the renewal of science education in the UK.
45. Recently, Hefce supported the establishment of the **Training Gateway** based at the University of York, as an entry point into the professional development available across the sector. With over 2200 members from every UK University and around 50 colleges, the facility has promoted over 1000 different business opportunities worth in excess of £85m. Of these opportunities, 70 per cent are UK-based.

Employer engagement and investment in skills

46. According to research carried out by Yorkshire Futures, businesses in Yorkshire tend to be less likely to invest in training for their employees, and tend to look to the public sector to support it. There is also firm evidence that businesses are failing to see the link between higher skills and opportunities and competitiveness. In 2007/08 the region's universities delivered 142,594 days of CPD provision, generating £39.8m of which £1.5m through engagement with SMEs (rank 5th in England, Hefce HE-BCI survey 2007/08).
47. The **Train to Gain Enhancement Fund** is a £50m resource aimed at engaging employers in Yorkshire and Humber to invest in skills development and therefore increase the skills base in the region. The regional fund supports higher level skills and workforce development which cannot be funded through the Train to Gain service. Over 60 businesses have accessed training delivered by Yorkshire's universities including provision in resource and waste management (University of Huddersfield) and executive and business coaching (Leeds Metropolitan University).
48. Universities in the region have been working with the Train to Gain Enhancement fund to deliver higher level skills support to businesses in the region. The funding has also been used to maximise the impact of university-led Economic Challenge Investment Fund programmes in the region to deliver flexible skills solutions to businesses and individuals at a time when real help is needed.
49. Yorkshire Forward has established a range of Task Forces to work with businesses in several sectors important to the Yorkshire and Humber economy. The multinational steel company Corus is facing major changes to their plants in the region. **West Yorkshire Lifelong Learning Network (WYLLN)**, based at the University of Huddersfield, has provided careers packages to middle and senior managers who are facing redundancy, including the delivery of psychometric testing not available from the Executive Packages offered through Job Centre Plus. This represents a unique offer, funded as part of the ECIF programme. The careers services of Bradford, Huddersfield and Leeds universities have worked collectively to provide a package of guidance interviews, psychometric testing and workshops to several Corus employees.
50. **Higher York's** employer engagement strategy focuses on working with businesses mainly from the local area, offering both accredited and non-accredited options for the private, public and voluntary sectors. Working closely with business support agencies such as Business Link Yorkshire – and with business networks such as the York Business Forum, the Chambers of Commerce and York Professionals – the Higher York partnership of five HE and FE institutions delivers broad support to businesses and individuals. Since 2005, over 200 progression routes and 40 new courses have been developed. More recently, with support from ECIF funding, Higher York has engaged with over 50 businesses offering business planning, CPD and training for staff, and access to consultancy support.
51. The University of Hull is the academic lead for **Working Higher**, a major £2.9m employer engagement project funded by Hefce. Working Higher is developing a solution to an identified skills gap, providing those working in strategic science-based industries with an opportunity to develop their talents and reduce shortages of expertise. A suite of flexible, work-based Foundation Degrees are being delivered by the project to ensure that the UK has a managed supply of technical skills for the science-based sectors. This is all the more critical as the workforces concerned are older than the general working population. Working Higher is a highly collaborative project initially developed between the University of Hull, the UK Physical Sciences Centre and the Cogent Sector Skills Council it now engages a broad range of employers, Semta Sector Skills Council, Foundation Degree Forward (fdf) and a consortium of universities.
52. Yorkshire Forward and Hefce have also invested significantly in Higher Level skills in the region, including provision at Further Education Colleges. The University of Hull works with colleges across the eastern part of the region and as part of this role it was able to help secure a £6m capital investment by Hefce into a Higher Education Centre at **Grimsby Institute of Further and Higher Education**. Yorkshire Forward is also investing £5m in this project which is based in an area of particularly low HE participation and with significant skills needs.
53. Another example is the work of the Open University in the region, working in partnership with business to solve problems and in delivering bespoke learning and training to address higher level skills shortages in the water industry in Yorkshire and Humber.
54. The skills investment programme **Escalate** provides a further example where public sector investment and HE-RDA partnership has successfully led to employer investment in higher level skills in the region. This Yorkshire Forward and Hefce funded initiative, led by the University of Bradford, opens up the university's curricula to employees. Focused on employer responsiveness and 24/7 access to the full curriculum, Escalate is working with businesses and the public sector to invest in the skills of their existing workforce. For example, recent engagement with the CBI in the region has focused on how relationships between business and universities can be enhanced, and how universities can make a greater contribution to the success of the economy.

Skills for innovation

55. The region scores lower than the national average on business start-up and levels of business innovation. Growing an innovation culture is therefore a key part of the region's strategy for delivering sustainable economic growth in Yorkshire. Investment in higher level skills, complemented by and aligned with investment in technology and innovation, is crucial for the region to recover from the recession and to emerge from it stronger.
56. The **White Rose Health Innovation Partnership** (HIP) is an excellent example of where a large-scale skills investment is fostering innovation in technologies, methodologies and practices within the healthcare technologies sector in Yorkshire. The region is at the forefront of the UK's latest advances in healthcare, making it one of the most important regions for the healthcare technology industry and one of the fastest growing nationally.
57. CPD4Health is a higher level skills training and development social enterprise spun-out of the £5m Hefce investment in the White Rose HIP, which is an innovation platform between UK and US universities, UK NHS Trusts and industry to dramatically accelerate the rate at which innovative technologies, methodologies and practices reach the medical and healthcare sectors. With additional investment from Yorkshire Forward, CPD4Health specialises in 'open access' high quality master classes and be spoke educational programmes for individual organisations. These events range from specialist topics such as wireless technology, risk management in orthopaedics, health technology assessment and electronic product design for medical devices through to broader, but equally essential skills sets of leadership and team management.



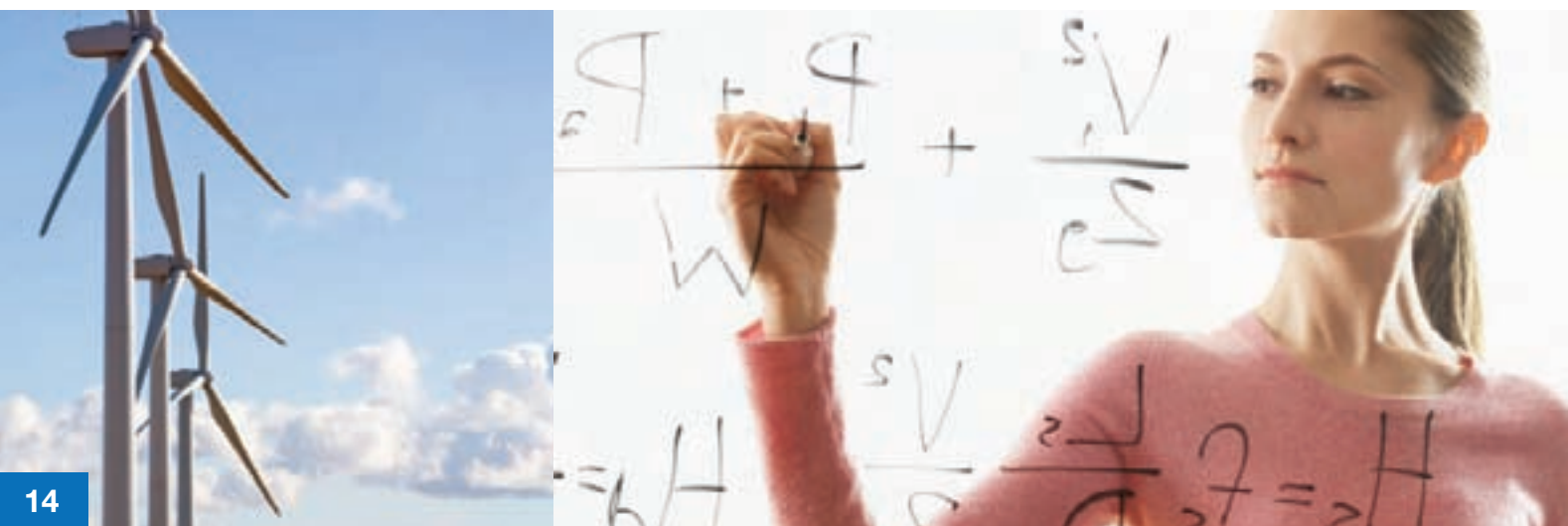
Harnessing graduate talent

58. The critical mass of higher education in Yorkshire and Humber helps to attract over 200,000 students including over 23,000 from overseas into the region, with the region's HE sector producing around 55,000 graduates per year, 30,000 of which are first degrees. This represents over 10% of the total number of graduates produced each year by the UK and the region has the highest graduate retention rate in the UK of students who come to the region to study.
59. The impact of the recession on graduate retention and employment in the region has yet to be fully quantitatively assessed. A survey recently commissioned by Yorkshire Universities on destinations following graduation for the classes of 2008 and 2009 indicates that undereffective graduate utilisation and graduate underemployment, with real implications for other workers and job seekers, is a greater challenge for the region than graduate retention and rates of graduate unemployment.
60. Targeted interventions have been jointly developed by Yorkshire Forward and the region's universities to respond to the impact of the recession on graduate employment opportunities and form sustainable measures as part of the region's longer term strategy for retaining and utilising its graduate talent effectively, positioning the region for a strong recovery.
61. Providing excellent value for money for the public sector investment, Yorkshire and Humber is the only region to have developed a single response to deliver internships through its consortium of university careers services and **Graduates Yorkshire**, a regional graduate recruitment business and universities' spin out. The consortium is a solid, whole region, inclusive partnership, with an unbroken track record of delivering successful collaborative projects dating back to 1996.
62. The region's universities careers services, with support from Hefce and Yorkshire Forward, will deliver 180 internships by September 2010 and a **graduate internship and work readiness programme**, supported directly by Yorkshire Forward, led by Graduates Yorkshire will realise a further 60 internships by March 2010 with plans in place to deliver a significantly higher number of internships if further funding can be secured. The internship programmes in Yorkshire are open to any business but are particularly targeted at those in a growth sector, the emerging green economy or businesses who have been particularly badly hit by the recession, such as manufacturing. They are an excellent way for graduates to gain valuable hands-on experience and for employers to benefit from the talent on offer in the region.
63. As part of the ECIF project, 10 **research internship placements** have also been created for recent University of Leeds graduates wishing to pursue a career in research. The internships are based within university research groups which are actively working with the business community and have the potential to continue into further opportunities such as knowledge transfer partnerships and with businesses involved in the regional internship scheme. The internships cover a range of research areas including engineering, healthcare technologies and alternative energy.
64. The recent Yorkshire internship initiative with the Federation of Small Businesses will build on good internship practice in the region and will support the region's SMEs to recruit more graduates coming out of region's universities.



Forward look

- 65.** Yorkshire's strong regional identity, its clear understanding of needs and opportunities, and the highly collaborative and mature relationship between universities and with Yorkshire Forward, positions the region well to make sound decisions for the future. In doing so, there is a firm commitment to translate national policy priorities into regional circumstances. For the next phase of the YF-YU Alliance, our energies will focus on four key industrial sectors – advanced engineering and manufacturing, low carbon economy and alternative fuels, healthcare industries, digital and new media – to create new industries, jobs and opportunities to drive the region's economy. These are all areas where the region has the critical mass, both in the capacity and diverse capabilities, to be leading innovation nationally. Equally important, there is a shared vision between all the Vice Chancellors, and with Yorkshire Forward, to find collaborative way of harnessing expertise across institutions in these areas.
- 66.** The wider question of future regional and sub-regional structures aside, what remains clear is the importance of a longer-term strategic focus and role of the key enablers – universities, sector-leading/anchor businesses and development organisations like Yorkshire Forward – investing together to drive growth and generate wealth. This cannot be achieved in isolation or without creating the right conditions for partnership and collaboration – shared goals, trust built over time and sufficient resources. Against a background of economic challenge, it is more important than ever that the regional perspectives that have developed in Yorkshire and Humber are not distracted by uncertainties about either structure or policies. It remains important to continue to better align investment in high-quality, often world-leading, expertise and facilities, attract knowledge-intensive businesses and collaborate/co-invest with industry. This needs to be supported by decision-making located at an appropriate level and retaining the strategic investment role accorded to RDAs.
- 67.** Importantly, securing the flexibility of universities to collaborate and co-invest, will require significant funds. Hefce's Higher Education Innovation Fund is, for example, vital both for co-investment with Yorkshire Forward's 'single pot' funds and as eligible match funding for European Regional Development Funds (ERDF) and other funding streams. Maximising the investment opportunities offered by ERDF could be facilitated further if there were to be a clear commitment by government departments to facilitate the effective use of national public funds as a match funding for ERDF. Indeed finding appropriate 'match' is the major constraint on universities utilising ERDF to the fullest extent to benefit economic transformation.
- 68.** Our aspirations for the region are, of course, broader, and we will continue to work in partnership to improve quality of life, in support of educational achievement and in accessing higher education, working with individuals and employers to upgrade the skills of those in work, enabling graduates to find high quality rewarding jobs and encouraging them to be enterprising, entrepreneurial and innovative, and preparing for the future by investing in new industries.
- 69.** Finally, although the context in which recent decisions have been made about additional student numbers are well understood, both the universities and Yorkshire Forward are anxious to see this cap lifted as soon as possible. The evidence about the economic and social value, both to individuals and more collectively, are well documented in those countries with higher participation rates than the UK. This is the very time that a financial stimulus for higher education – based on increasing student numbers (including postgraduates) to prevent joblessness and to support R&D to prepare for the economic upturn – is crucial. Both Yorkshire Forward and the region's universities are absolutely committed to such ambitions and they look to Government to support them in this endeavour.



Appendix: further exemplars from the region

(a) Centres of Industrial Collaboration

The project (2003-2008) aimed to create a network of sustainable business-focused centres within the region's universities and received £9.8 m support including approx £1m ERDF. The Centres of Industrial Collaboration (CICs) were set up to help businesses by transferring skills and technology from universities to small and large companies, encouraging greater levels of industrial innovation, research & development.

The key objective was to exploit Yorkshire and Humber's well developed science base, leading to a dramatic improvement in regional competitiveness and productivity. CICs stimulate a greater understanding of technology commercialisation within the academic research community and within SMEs. Fourteen CICs were accredited, with expertise from local universities covering the region's priority industrial sectors. The main criterion for the centres was scientific excellence, as evaluated by the Research Assessment Exercise (5 or 5* RAE score) or potential (3a or 4 RAE), coupled with a good track record in knowledge transfer to, and engagement with, the region's industrial base. Host universities for each CIC received £600k over three years, to build sufficient commercial income to become self-sustaining. Since funding finished, ten CICs continue to operate as originally envisaged.

The main innovative feature of this project belongs in the fact that no subsidies were provided to companies to enable them to work with the research groups, and no funding was provided to the academic research groups to fund technical work. The funds covered the incremental costs of providing a professional business – university interface and promoting their services to business. By not grant funding the research work, the CICs were able to generate a culture change within regional businesses to see that R&D has a value in itself, and is something worth spending their own money on.

The project was developed and implemented by the Innovation Team at Yorkshire Forward. Although the focus of the RDA is on improving the regional economy, CICs are encouraged to engage with companies, universities and other knowledge and technology based organisations nationally, Europe-wide and internationally, with a view of raising the profile of the region, universities and the CIC programme. Central funds are used to encourage the CICs to work together as a network. This interdependence improved the chances of success of the individual CICs through cross referrals, joint working and a higher profile.

Seven years on, the CIC initiative has paid off handsomely in terms of more sales, entrance to new markets, and business expansion for hundreds of firms. During the funding period, CICs collaborated on more than 1,700 projects with businesses, work worth some £40m, resulting in the creation or safeguarding of more than 1300 jobs for the region.

Successes to come out of the programme included the world's most tarnish resistant silver, the first needle-free injection system to be prescribed by the NHS, the most realistic flowing water ever seen in computer games and Marks & Spencer's new environmentally-friendly sandwich packaging.

Fourteen CICs, covering various areas such as biomaterials & tissue engineering, particles, polymer green chemistry, engineering design, environmental technologies, pharmaceutical innovation, wireless technologies were developed in three phases with various research departments of the region's universities. Out of the fourteen centres developed, ten are still operating commercially post-funding.

The culture change within the region's universities has also meant that universities have used the CIC model internally to develop their own technology transfer programmes, resulting in faculty business development managers operating in a much more commercial manner.

A critical aspect of the CIC initiative was provoking culture change in regional universities. Marketing, market research, developing pricing policies and negotiating and competing for profitable contracts are not normal aspects of university life. Placing CICs within high profile departments makes a significant contribution to the development of a more commercial outlook.

The CIC initiative is increasingly being seen as a model of good practice in the UK and internationally, and was recently short-listed for the IRE European Innovation Scheme Award where it was praised for its impact on the region and the sustainability & adaptability for use in other regions across Europe. It won the EU's RegioStars award for technological innovation leading to economic growth in 2008, against seventy one applicants. Alan Johnson, former Secretary of State for Education and Skills, credited the CICs as "leading the way in transferring knowledge by promoting much more effective linkages between universities and business".

Further incentives derive from climate change and global low carbon treaties and targets and the initiative can also derive benefit from the fact that some CICs were focused on relevant issues, including Green Chemistry and Environmental Technologies, based at the Universities of York and Hull with commercial engagement, technical support and facilities to transfer knowledge to businesses and for businesses to investigate feasibilities of products and processes.

Key next steps will include demonstrator facilities to achieve transformational change:

Carbon Capture and Storage

Major carbon emitting businesses in the region combining to develop the whole CCS pipeline; with businesses and universities collaborating on appropriate capture and storage processes and Yorkshire Forward developing the case for the combined transportation and whole project view.

Yorkshire Biorefinery Facility

Consortium of Fera, University of York, Science City York including Humber and Yorkshire chemical industry networks to build a scale-up pilot facility extracting useful high added value materials from plants and crops for healthcare, pharmaceutical, personal care and nutraceuticals markets, also including next generation biomass technologies for energy and fuels. Business users would be able to make product samples for commercial investigation and develop new biotechnology processes and collaborate with universities directly or via Technology Strategy Board and EU FP7 grants.

Institute of Product and Process Development (IPPD)

This is a jointly funded project between University of Huddersfield (Innovative Physical Organic Solutions (IPOS) and University of Leeds (Institute of Process Research and Development (IPRD)) to combine expertise with business networks and provide access to new low carbon process synthesis routes for companies via scale up pilot units.

Innovation Networks

Business challenge led, for future proofing business strategic growth by providing access to cross sector, multidisciplinary technology and supply chain opportunities, collaborative R&D, innovation exchange and events etc. The Formulation Innovation Network, for example, responds to lower carbon product lifecycles, and processes, fewer ingredients and targeted effects, initially for the pharmaceutical and personal care sectors. This builds on the success of the Particles CIC at University of Leeds and the Pharmaceutical Innovation CIC at the University of Bradford. It also delivers the national Chemistry Innovation Knowledge Transfer network's (CIKTN) formulation objectives to the much wider UK business community.

Nanofactory

This is an ERDF funded collaboration of Universities of Bradford, Huddersfield, Leeds, Sheffield, Sheffield Hallam and York to enable businesses access expertise and equipment (including technical support) to commercialise nanoscale technologies from surface characteristic measurement to devices.

Business adoption of best practices

CO2sense, a new company, wholly funded by Yorkshire Forward developed from Future Energy Yorkshire, Carbon Action Yorkshire and Resource Efficiency Yorkshire works with the top 100 businesses in the region plus businesses large and small, mentoring, advising and accessing the right innovation or practice solution for them. This provides a ready business base for University/business collaborations as do the various business network groups e.g. Water, Chemicals, Food.

(c) Collaboration with businesses

Other examples of the region's strengths in engineering, renewables and sustainability research include:

The **Sheffield-Siemens Wind Power Research Centre (S²WP)** is the first of its kind in the UK focused on developing the most reliable, innovative and efficient wind turbine generators that will be at the forefront of future onshore and offshore wind power systems. The University of Sheffield was chosen following Siemens long-term partnership with the University's Department of Electronic and Electrical Engineering, which includes the Electrical Machines and Drives Group.

The **Total Environment Stimulator Flume Facility** at the Deep in Hull offers modelling of the dynamics of fluid and sediment transfer under a wide range of environmental conditions, including wave, tidal flow and rainfall. Recently it has been used to validate results as part of the EPSRC-funded Supergen Wind Energy Technologies Consortium.

Centre for Computational Fluid Dynamics at the University of Leeds is one of the largest CFD centres in the UK and it is a European Centre of Excellence in CFD. The Centre has leading edge capability in CFD research in energy related areas, receives substantial funding through the EU and UK, and has a very strong track record of working with industry. The centre has capacity to carry out large wind farm aerodynamic modelling as well as noise analysis from wind turbines.

Recent focus has been in the development of high efficiency, low noise and flexible small sized Vertical Axis Wind Turbine (VAWT) technology, undertaking cutting-edge research to improve aerodynamic performance through novel design concepts and using an integrated advanced physical and numerical modelling technique.

Other research areas include developing predictive capabilities for the stability management of offshore wind turbine foundation and structures under complex current and wave conditions, including wave and subsea current and sediment transport modeling. Use of CFD modelling of scour of the seabed around the subsea structures may provide substantial insight into the stability issues associated with turbine foundations and other seabed installations.

The University of Bradford's **Environmental and Infrastructure Engineering Research Group** covers a range of activities that aim to study the issues associated with the provision of built infrastructure and how this can interact with the environment and society. The research group has two main themes: environment and infrastructure, which are strongly linked by the issues surrounding sustainability in the natural and built environment and also the requirement to provide technologies to address the needs of such systems to adapt to climate change and reduce their impact on the environment.

Sheffield Hallam University's Materials and Engineering Research Institute hosts **High Impulse Magnetron Sputtering (HIPIMS)**, a new generation of high performance, vacuum-based coating technology in which the university has played a pioneering role. It produces dense, defect-free, nanoscale ceramic and metal coatings for applications including manufacturing tooling, engine parts, semiconductors, medical implants and many others. There are numerous patents and patent applications involving the HIPIMS technology and the university has successfully transferred its technology to most of the world's manufacturers of PVD coating machines and to end users.

The **Diagnostic Engineering Research Group** at the University of Huddersfield is recognised internationally as one of the world's leading research organisations in the field of plant condition and performance monitoring. The Group specialises in vibro-acoustics, vibro-impacts, instantaneous angular speed and instantaneous electric current analysis, diagnostic model development, signal processing, feature extraction, pattern recognition, sensor development, non-intrusive parameter estimation and model based fault diagnosis. The University of Huddersfield's **Centre for Precision Technologies** is a research group of world renown focussed on research in the field of precision engineering, and is based around the unique "nanolab" facility and a well equipped machine tool research laboratory. The expertise and commercial value of their work is recognised by their hosting of the Precision Centre for Industrial Collaboration (Precision CIC).

In related areas of research, the region offers strengths in sustainability and the built environment including low carbon buildings, collaboration with the construction industry and spatial planning policy, e.g. the **Centre for Built Environment** and Low Carbon Housing Learning Zone (supported by Construction Knowledge Exchange) at Leeds Metropolitan University.

Hallam Energy was formed in 2008 as part of Sheffield Hallam University's commitment to the sustainability agenda, in order to transfer energy engineering knowledge from the Materials and Engineering Research Institute (MERI) into business and organisations with the aim to:

- reduce energy consumption;
- increase energy efficiency and reduce CO2 emissions;
- enhance corporate social responsibility;
- adopt a sustainable approach to business development.

Several institutions host specialist centres combining teaching, research and technology transfer. Examples include:

- Institute of Logistics – University of Hull
- Institute of Pharmaceutical Innovation – University of Bradford
- Huddersfield Microbiology Services – University of Huddersfield
- Centre for Novel Agricultural Products – University of York
- Sorby Nano Investigation Centre in the Kroto Research Institute – University of Sheffield
- Centre for Enabling and Assistive Technology – York St John University

The UK Sport Centre of Excellence at Sheffield Hallam University was appointed under the UK Sport Innovation Partner programme, developing technical innovations for GB elite teams and thus close connections with, and advisory support to, the Olympics in a range of sports. It was part of a successful Sports Studies submission to the capacity in the field of Sports Engineering in the UK, second only to Loughborough's Sports Technology Institute. This is complemented by an extensive range of teaching at an undergraduate and post-graduate level.

One of its activities, SportsPulse was a £6.7M five-year project hosted by Sports Engineering, aimed at stimulating innovation and economic growth in the South Yorkshire sports and leisure sector. Part-funded by ERDF Objective One South Yorkshire, this regional strategic project supported 41 R&D projects, generated over £10m in new business, and created 80 jobs.

(d) Commercialisation

Proof of Commercial Concept Fund

The Fund has developed considerably since the pilot supported by the second round of the Hefce Higher Education Innovation Fund with the Universities of Bradford, Hull and Sheffield Hallam. Out of the 17 projects then supported three have now been spun out after raising over £1m investment; one of these has recently opened a US subsidiary. Its longevity reflecting the reality of getting great research and knowledge converted into saleable products and services.

The Fund evolved into a 'proof of commercial concept' fund, led by business as the arbiter and judge of which projects to support. This evolution is one fully supported by Yorkshire's universities as being the right course to best ensure that only those ideas which have real commercial potential should be supported. The other evolution was that all the region's universities joined the fund partnership, and most recently the Food and Environment Research Agency have also joined, bringing together many of the main generators of new science and technology.

The fund represents a unique co-investment partnership with Yorkshire Forward, for every pound invested by Yorkshire Forward, the universities match on a 50% basis. The grants are modest but vital in getting those new technologies to market. The first licence deals have now been signed with a US Silicon Valley company by one university, £500,000 raised from the Carbon Trust by another, and across all the projects formal partnerships established with over 50 companies from the US, to the UK, Yorkshire and the rest of Europe.



Yorkshire Universities is a member organisation representing all the universities and higher education colleges in the Yorkshire and Humber region:

University of Bradford

University of Huddersfield

University of Hull

University of Leeds

Leeds College of Music

Leeds Metropolitan University

Leeds Trinity University College

University of Lincoln

Northern School of Contemporary Dance

Open University

University of Sheffield

Sheffield Hallam University

University of York

York St John University