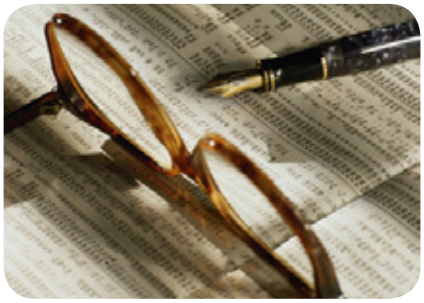
# THE THIRD MISSION

## An Overview of University-Industry Collaboration





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# Foreword

*University-industry collaboration has turned from "a welcome development to an absolute necessity."*[1]

This element of university work – what's known as the 'Third Mission' – has made a mark on the make-up of universities across the UK, encouraging an increased propensity towards university and business partnerships and moving institutions away from their 'traditional' educational roles.

Idox – which provides funding access and support to hundreds of clients in the HE and business sector – has published this paper to examine the:

- benefits, barriers and support measures in place for university-industry collaboration;
- strengths and weaknesses of R&D activity in the UK compared to global competitors; and
- key recommendations on what makes a successful partnership – relevant to not only UK-based partnerships but those worldwide too.

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# Introduction

Over the past few years, the role of universities has changed, with an increased focus on providing more than high-quality education and research.

The 'Third Mission' of engaging with society and industry has become increasingly important due to the following challenges:

- A decline in public funding due to the 2012 education reforms and the economic downturn means UK universities are under increased pressure to diversify their income streams to remain financially sustainable.
- In a highly competitive higher education (HE) market, universities have to focus not just on the education but also on the employability of graduates.
- With the introduction of the Research Excellence Framework (REF) – specifically the 'impact' measurable – universities have to ensure that their research has real-world relevance.
- Through research and development (R&D) activities, the HE sector supports the UK's economy, thereby making it essential that UK universities continue to be world leaders in this area at the risk of global competitors catching up.

In response to these challenges, UK universities are utilising their strength in producing world-class research through university-industry collaboration, with a report by Universities UK (UUK)[2] identifying an increase in cross-sectoral collaboration as a key trend in UK research funding.

# Collaboration Benefits

Through collaboration, universities and businesses can mutually benefit from sharing knowledge and expertise that goes beyond new streams of income and providing business solutions. One key presentation[3] from the November 2014 UUK event, *The Benefits of Brussels: Opportunities and Challenges for European Higher Education*, identified the key drivers for universities to collaborate with industry:

- Strengthening the reputation of the university as a brand, and attracting students.
- Strategic positioning.
- Sustainability by establishing long-term cooperation with industry partners.
- Additional funding.
- Space/Infrastructure (e.g. the provision of equipment).

A survey of 22,000 academics found that they perceived a long list of benefits to working with external organisations, so much so that academics are far more likely to approach external organisations directly themselves, rather than depend on university administrative offices.[4]

## Benefits for universities

- New source of income
- Opportunity to demonstrate research expertise and raise profile and increase visibility – not only in the UK but globally
- Ability to deliver high-class, innovative research solutions with a real-world impact – important for the next REF (believed to be in 2020)
- Access to industrial capabilities and resources
- Ability to keep teaching and learning at the cutting edge of research
- Improve graduate employability by developing 'real world' links
- Create career development and secondment opportunities for students and researchers

## Benefits for businesses

- Access to cutting-edge research knowledge
- Introduction to new research infrastructures and/or research services
- Development of new techniques and skills
- Improved profitability and productivity
- Improved business/production systems and market share
- Opportunity to identify potential future employees
- Positive environmental impact

## Alternative university-industry interactions

Not all university-industry R&D collaborations involve new products and process innovation. A report by the National Centre for Universities and Business (NCUB)[5] draws on statistics from a 2013 study[6] (see Fig. 1) which considered the reasons for university-business interactions and found that businesses source knowledge for a much wider range of business functions than innovation. These include the development and provision of service, marketing and sales activities, human relations management, and logistics.


**Source:** Hughes and Kitson (2013)

**Fig. 1** Percentage of UK businesses citing different interaction pathways with the university

# Strengths and Weaknesses

The benefits of university-industry collaboration reach far wider than just the partnerships themselves. Research excellence and innovative outputs are also essential to the UK's global economic position.

In January 2014, the Government produced an assessment of the strengths and weaknesses in the UK's science and innovation system.[7]

## Key strengths

- **Knowledge assets** – world-class research institutions; high proportion of international research collaborations.
- **Structure and incentives** – competitive funding driving excellence; strong formal and informal networks; effective university collaboration with R&D intensive businesses; modern intellectual property regime.
- **Broader environment** – open and competitive markets; attractive to multinational corporations; strong public interest in science and technology.

## Key weaknesses

- **Money** – low levels of public and private R&D investment and support; short-term focus of capital markets; issues in access to finance for innovative growth companies.
- **Talent** – relatively low, basic skills; insufficient domestic human capital (domestic STEM talent and Masters/PhD graduates working in research); below-average management skills.
- **Innovation outputs** – average-to-low levels of new-to-market innovations; low number of innovative SMEs.

## Facts and figures

### The good news

- The UK is home to world-class universities and one of the most productive of high-class research, accounting for 9.5% of downloads, 11.6% of citations and 15.9% of the world's most highly-cited articles.[8]
- The UK is second only to the US in academic research – as measured by the volume and quality of citations.[9]
- In 2011-12, the higher education sector contributed 2.8% of UK Gross Domestic Product, generated over £73 billion in output and accounted for 2.7% of all UK employment.[10]
- The Government announced a £5.9 billion capital investment in science and innovation from 2016-2021.[11]
- The budget of Innovate UK (formerly the Technology Strategy Board) has been increased to more than £500 million for 2015-16.[12]
- The ring-fenced £4.6 billion per annum funding for science and research programmes has been protected in cash terms from 2011-2016.[13]
- The UK is ranked second behind Switzerland in the 2014 Global Innovation Index (a measure of the world's economies for their innovation capabilities and outputs), and fourth for university-industry collaboration by the World Economic Forum survey 2014-15 (behind Switzerland, the United States and Finland respectively).[14]
- Research collaborations are on the rise within the HE sector as well as between universities, charities and businesses. Income from research-based interactions has risen steadily over the last decade, surpassing £2 billion in 2012-13.[15]
- Charities spend 80% (over £1 billion) of their R&D resources in university research, and account for over 20% of UK university research grants and contracts.[16]

The HE Business and Community Interaction (HE-BCI) Survey[17] shows an increase in income earned by Higher Education Providers from business and community sources in 2013/14 from the previous year (2012/13):

| Source | 2012/13 (£) | 2013/14 (£) |
|---|---|---|
| Collaborative research involving public funding | 963,027 | 1,143,879 |
| Contract research | 1,137,900 | 1,193,255 |
| Consultancy contracts | 408,155 | 441,858 |
| Facilities and equipment related services | 143,004 | 162,926 |
| Continuing Professional Development (CPD) and Continuing Education courses | 653,401 | 679,076 |
| Regeneration and Development programmes | 172,171 | 180,606 |
| Intellectual Property (including sale of shares in spin-offs) | 86,649 | 131,117 |

## The bad news

- Public and private R&D expenditure in the UK is low compared to international competitors.
- The UK is still behind rest of world in R&D activities and the underfunding of the 'Third Mission' is hindering progress. Sam Jones, Head of Communications at University Alliance noted:

**"Our small and medium-sized enterprises (SMEs) are a driving force of innovation in our economy and responsible for half of new jobs created. But they spend much less time on R&D activities than our global competitors. Alliance universities are using their connectedness, research expertise and business collaborations to increase the innovative capacity of SMEs and investment in private funds in research and development. But this element of university work – what's known as the 'Third Mission' – is massively underfunded."**[18]

- Data from the 2013 UK Innovation Survey showed that only 2% of responding businesses ranked universities and other HEIs as 'high importance' sources of information for innovation.[19]
- R&D expenditure as a percentage of GDP declined in 2012 (from 1.77% in 2011 to 1.72%) – with decreases in both business and government investment. This is well below the EU-28 provisional estimate of 2.06%.[20]

- According to the EU Innovation Scorecard, an assessment of the innovation performance of EU Member States – the UK's performance is slipping: from fifth position in 2010 to eighth position in 2014. The UK's pattern of spending contrasts to the growth seen in R&D spend in other OECD and EU countries. Therefore, not only is the UK's investment in R&D relatively low in international terms, it is also declining.[21]
- There is an increase in the concentration of research funding across institutions. In 2013-14, institutions in the fifth quintile (the upper 20% of the funding distribution) received 75% of all mainstream quality-related funding from the funding councils, compared to 73% in 2010-11. Some institutions in the first quintile which had received small grants in 2009-10 lost access to Research Council funding altogether two years later.[22]
- The UK performance in the G7 group (consisting of the UK, Canada, France, Germany, Italy, Japan and the United States) is also relatively poor on the levels of R&D expenditure. Only Italy and Canada invest less in R&D as a proportion of GDP.[23]
- The ring-fencing of the science and research budget has resulted in a real-terms decline in the value of research grants allocated or awarded to institutions. In 2012-13, universities received £1.94 billion in recurrent research grants from the four funding councils. Compared to 2009-10, this corresponds to a decrease of £30 million in cash terms, and £248 million in real terms.[24]
- The amount of research grants and contracts awarded has decreased. In total, the reductions amount to a fall in core research funding to the HE sector of £75 million in cash terms and £467 million in real terms over the three years considered (2010-11, 2011-12 and 2012-13).[25]
- In 2012, UUK estimated that by the end of the spending period 2014-15, universities will have absorbed real-terms cuts in research funding cuts of around £600 million.[26]
- The UK ranked seventh globally in the number of patent applications made by UK-based applicants, amounting to nearly 50,500 applications in 2012.[27] There was a substantial gap between the UK and the countries above it. China made over 560,000 applications in that year, earning the top country position.

Meanwhile, Japan and the USA followed in second and third place with each over 480,000 and 460,000 applications respectively. The first European country in the league was Germany in fifth place with nearly 179,000 applications, 3.5 times the UK number.

The decrease of public investment into R&D is reflected in the UK's global economic rankings. The World Economic Forum states that economies that rank highly are those able to develop, attract and retain talent as well as consistently introduce new products and services to market. The analysis of the World Economic Forum's Global Competitiveness Rankings 2014-15[28] stressed the importance of effective collaboration between all sectors is to help raise productivity and competitiveness. Despite scoring in the top five for university-industry collaboration in the 2014-15 rankings, the UK placed only ninth overall.

Similarly, in The Global Innovation Index (GII) 2014[29], the UK came second overall, but for university-industry collaboration, was placed only fifth (behind Singapore, the US, Finland and Switzerland respectively). The report noted the correlation of decreased R&D support and global growth:

**"As of 2013, a fall in the growth of public R&D support, coupled with the continued hesitancy of company R&D expenditures, seemed to be leading to slower overall growth of total R&D expenditures worldwide; this is the case especially in high-income countries. If indeed future-oriented policies aimed at stimulating innovation and new sources of growth are not widely pursued, hopes for sustained global growth could be dashed."[30]**

# Global Competition

Whilst the statistics show the UK is managing to retain its status as one of the world-leaders in research, its static investment in R&D activities – through the dual support system and the ring-fenced science and research budget, and effective decrease in real terms – is allowing competitor countries who are investing more of their GDP into R&D to catch up.

The UK has not adopted the EU's Europe 2020 'growth strategy for the coming decade' target which has set an objective of 3% of GDP to be spent on R&D by 2020. As this target is embedded in the national targets of many EU countries, the UK Government has been urged to follow suit or risk falling behind competitor countries.[31]

R&D investment in the UK has been relatively static at around 1.8% of GDP since the early 1990s.[32] Between 2010 and 2014 GDP investment decreased from 1.77% to 1.72, the lowest it has been since 2004.[33] In contrast, the US alone spends around £250 billion (2.8% of GDP) on R&D per annum. China increased its R&D by 28% in 2009 and 15% in 2010, to roughly £125 billion (1.8% of GDP), and South Korea doubled its expenditure between 2003 and 2011 to around £35 billion (4.0% of GDP).[34] France and Germany have consistently invested substantially more than 2% of their GDP in R&D, and have aspirations to increase this to 3% or more, above the EU target.

A report by the Science|Business Innovation Board[35] highlighted the agenda for the modernisation of Europe's higher-education systems, which has made it a priority to strengthen the links between higher education, research and business to drive innovation. The report states that creating more strategic industry-university partnerships would substantially improve Europe's climate for innovation.

## Country profiles

What are other countries doing to encourage and develop R&D investment and activity?

### Germany

- The 2015 federal budget for education and research increased by around €1.2 billion to €15.3 billion, compared with 2014. Over the entire parliamentary term, an extra €3 billion will be spent on research, particularly the Excellence Initiative and the Pact for Research and Innovation. This equates to German research institutions having 5% more money to spend in 2015 and 3% more in each of the years to follow.[36]
- There is strong investment in publicly-funded innovation initiatives. The annual budget of Germany's network of 67 Fraunhofer Institutes is €2 billion.[37]
- Federal spending on R&D increased by 71% between 2000 and 2013.[38]
- About one third of German R&D investment comes from public sources and two thirds from private sources – a distribution that has remained fairly stable over the last decade.[39]
- The Higher Education Pact 2020 aims to create additional university places in response to a rising number of students at German universities.
- The High-Tech Strategy 2020 aims to create lead markets, intensify cooperation between science and industry, and improve the general conditions for innovation. The Strategy has been aligned with the Europe 2020 Strategy to ensure that national and European research and innovation policies are closely allied.[40]
- The strategy of the Federal and Länder Ministers of Science for the Internationalisation of Higher Education Institutions in Germany focuses on policy goals in nine different fields of action. These include improved outward mobility, taking steps to make it more attractive to study in Germany, attracting students and academics from abroad, expanding international research cooperation and creating cross-border programmes.[41]
- A high level of third-party funding raised by universities from the private sector is an indicator of a strong link between business and academic research in Germany.

## France

- In 2010, the French Government introduced a €35 billion state-funded 'National Investment Programme' to stimulate competitiveness. €19 billion was allocated to projects in higher education and research and another €16 billion to maintaining industrial competitiveness, and promoting sustainable development.
- France's network of 34 Carnot Institutes is funded by a public endowment of €1.3 billion.[42]
- The network of 71 Innovation Clusters were awarded €2.7 billion in state funding between 2008 and 2012. Over 6,500 companies and more than 800 foreign-owned entities belong to these clusters.[43]
- Between 2006 and 2010, 4,600 collaborative projects received more than €3.6 billion in state funding.[44]
- The 'Excellence Initiative' (IDEX) aims to create 10 campuses that bring together leading institutions to compete with the best universities in the world.
- In 2014, it was announced that funding of €2 billion would be allocated for the creation of new regional university research centres, under a second wave of IDEX, to add to the eight already in existence.[45]

## Denmark

- In 2006, Denmark restructured its public research base, merging the existing 25 universities and public research institutes into just eight universities and three research institutions. It is intended that two-thirds of Denmark's public research and university education will take place at these three new universities.
- In December 2012, the Danish Government launched a national innovation strategy to deliver national growth and new jobs. It supports a more goal-oriented approach for creating innovative solutions to global societal challenges and enhanced knowledge transfer between research institutions and companies.[46]

- The Strategy contains 27 specific initiatives, which include:
    - Establishing a startup scheme aimed at graduates who want to start their own company. Graduates will receive advice and financing for up to a year in connection with launching their own company.
    - Strengthening knowledge cooperation and innovation in education through recognition and attractive career paths for researchers and educators.
    - Strengthening the innovation and business-oriented competences of PhD students. A greater share of PhD students should be in contact with private enterprises and thereby gain innovation experience during their PhD. More PhD students will also be supported in finding employment in the private sector.

## Sweden[47]

- The 2008 Research and Innovation Bill provided the biggest increase in research funding in Swedish history, 15 billion Swedish Krona over four years.
- Sweden has a national R&D target of 4% GDP – well over the EU28 standard of 3%.
- Sweden raised its public R&D budget by 3.2% in 2011 and another 4.5% in 2012.
- All major R&D intensive firms in Sweden increased their R&D investments between 2009 and 2011.
- The Budget Bill for 2013 contained a measure related to increasing the number of researchers in the form of an additional €5.4 million to create a clear career track for younger researchers.

## Finland

- The annual budget of Finland's national innovation agency, TEKES, is around €550 million.[48]
- Total R&D expenditure (combining public and private R&D spending) decreased to 3.78%

of GDP in 2011 (3.87% of GDP in 2010), despite which, is still the highest value in the EU and close to Finland's national target for 2020 of 4%.[49]

- The Research and Innovation Policy Guideline sets out measures to improve the quality and effectiveness of Finnish Education, Research and Innovation (ERI) in order to promote Finland's prosperity and competitiveness. The report's objectives are that by the year 2020, the proportion of 30–34-year-olds who have a university degree will be 42% and the proportion of dropouts in the 18–24 age group will remain under 8%. In addition, the report advocates increasing the ratio of R&D employees with a doctorate to 20% (compared to 14% in 2009).[50]
- The Development plan for Education and Research 2011-2016 aims to increase research cooperation and mobility between business enterprises, higher education institutions and research institutes across sectoral boundaries:
    - Academy Project funding is designed to promote the quality and diversity of research and its capacity for renewal. It provides researchers with an opportunity to carry out scientifically ambitious research, to achieve new breakthroughs and to engage in high-risk research, simultaneously encouraging inter-sectoral mobility.
    - Strategic Centres for Science, Technology and Innovation (SHOKs) are a unique cooperation platform for innovative companies and spearheading research. The SHOKs engage in intensive and long-term work to achieve shared goals.[51]

## Austria[52]

- Austria has set a national R&D intensity target of 3.76%, one percentage point above the performance in 2011 and the third highest national target among EU Member States. In the past decade, R&D intensity in Austria has progressed faster than the EU average – reaching 2.75% in 2011.

- The Austrian RTI Strategy 'Realising potentials, increasing dynamics, creating the future – Becoming an Innovation Leader' defines Austria's strategic and operational goals and priorities at promoting research, technology and innovation over this decade. Austria's objective is to be among the most innovative countries in the EU.
- The multi-annual work programme 'Austria. A story of success' sets out the targets for research and innovation in the coming years. This includes the creation and improvement of career prospects for young people and fostering the development of outstanding young researchers, as well as individual talents and career paths through an additional 2,500 doctoral and post-doctoral positions.

# REF Impact

The Research Excellence Framework (REF) assesses the UK's 154 HEIs according to the quality, breadth and impact of their research and knowledge exchange and is used to allocate the HEFCE quality-related research funding. The framework, and in particular the growing importance of showcasing real-life 'impact', has had an effect on the type of research universities undertake. HEIs must be able to demonstrate the impact of their research, defined as:

**"an effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia."[53]**

'Impact' accounted for 20% under the 2014 REF and with speculation that this could be increased to 25% in the next REF (believed to be in 2020), universities have an increased need to build relationships outside of the HE sector – particularly with industry – in order to generate real-world research relevance.

In an interview with Times Higher Education[54], several academics noted a change in views in collaborating with industry. Jon Hunt, deputy director of the Research Development and Support Office at the University of Bath, stated that universities are now keener to work with industry, and that this had, in-part, been driven by the funding councils and the REF:

**"The messages coming out of all the funding bodies are taking us into a more collaborative space. It has had a significant [effect] not just on how you address impact, but also being able to justify why businesses should work with us and apply for funding through [the European Union's programme] Horizon 2020, for example."**

Taraneh Dean, Director of Research at the University of Portsmouth, added that the impact agenda, not necessarily just the REF, has brought a 'significant shift' from academics being seen as a 'provider of knowledge for industry' towards 'a situation where both parties engage in the co-creation of knowledge and the generation of collective impact from it'.

## Criticisms

The Business-University Collaboration Report[55] warned that changes to funding structures, such as the Research Excellence Framework, could shift resources away from the fundamental research which underpins, and is considered a strength of, the UK's innovation system.

The Russell Group also cautioned that further increases to the weighting assigned to the Impact criterion could 'create perverse incentives' for universities to 'discourage fundamental research of a novel and high-risk nature'.[56] It is believed that if the weighting was increased further, universities might be inclined to alter their strategies accordingly, posing a threat of diluting basic research.

There are also concerns that the REF will homogenise research efforts and encourage universities to take on more research activity than they can manage.[57]

# Bridging the Gap – Graduate Employability

An increasingly important factor of university-industry collaboration is the opportunities it creates for students to gain on-the-job skills which help them look more attractive to employers when they graduate. Higher tuition fees, a tough job market and high competition for placements on graduate employment schemes, have meant students are looking for real value for money when it comes to studying at university; simply gaining a degree qualification is no longer enough. Dr Stephanie Maloney, Head of Research and Andrew Stevenson, Director of Research & Enterprise at the University of Lincoln, noted:

**"Collaboration is key – universities need to establish and sustain strategic partnerships with other HEIs/businesses locally, nationally, internationally to raise their profile and increase visibility, leveraging collaborative funding to maximise the impact of high-class research, improving graduate employability and creating secondment opportunities for early career researchers."**[58]

The importance of industry collaboration in terms of graduate employability is demonstrated in the following reports:

- A YouGov survey of 300 managers found that 83% believe that for the UK to be competitive in the global economy, the skills gap needs to be bridged. The main way of achieving this is believed to be through greater collaboration between HE and industry.[59]
- Businesses that employ graduates have been found to be on average 30% more productive. There is also evidence that in 2014, 37% of those recruited into graduate jobs by a group of 100 graduate employers had successfully completed a work placement at this employer.[60]

In a speech given at the NCUB 2012 annual lecture, Martin Sorrell, Chief Executive of WPP discussed graduate employability and threats for the UK economy.

**"World-class talent undoubtedly resides in UK institutions but whilst our graduates have all the necessary qualifications, many are shocked to find that they are still unemployable after a demanding three to four years of hard work. Simply put, they look impressive on paper but in the workforce are a far cry from the types of employees many companies would find if they handpicked them elsewhere, including abroad."**

**"If we want to set ourselves above and beyond competitive countries, business and academia should work hand in hand to balance the talent we already have with the inventiveness provided by our businesses."**[61]

## Graduate employability schemes in Europe

It is evident that practical training and work placements are key elements in enhancing graduates' employability. Data suggests that students who participated in practical training before graduation are more likely to find jobs than their counterparts without relevant work experience.

Among the countries with available data of the proportion of students participating in practical training or work placements, participation is among highest (100%) in Finland, where all first-cycle polytechnic courses include at least a three-month work placement period, and practical training is compulsory for some university degrees. Participation is also high in Lithuania, Latvia and Italy.[62]

Many countries provide financial incentives to higher education institutions and employers to increase the number of available traineeships. In the UK, HEFCE has run a number of funding programmes designed to help businesses find the skills they need and help graduates find the skills that lead to employment, e.g. internship schemes for undergraduates and graduates.[63]

Other incentives in the rest of the EU include:[64]

- **Bulgaria** – the 'Student placements' project aims to ensure practical training in a real working environment is available and is open for both full-time and part-time students. Funding is provided for the remuneration of students, academic mentors from universities and mentors from the employer.
- **Croatia** – the Employment Promotion Act (2012) provides an opportunity for employers to contract, up to a total of 12 months, higher education graduates with no prior work experience. During this period, employers are exempt from paying any taxes and other contributions (health insurance, etc.) for these employees, and trainees receive a monthly fee of approximately €200.
- **Lithuania** – the National Study Programme incentivised practical training, through which support is provided for the hands-on training of students in private and public enterprises, institutions and organisations. The goal is to develop the entrepreneurial skills of students as well as to create partnerships between HEIs and various social partners.
- **Poland** – a programme was launched in 2013 aimed at supporting higher education institutions in providing internships for students. The funds are granted through a competitive procedure between institutions that have created the best training programmes in conjunction with industry.

# Barriers

Despite the wide array of benefits that university-industry collaboration provides, the Government has stated that there are still too many businesses that are not 'reaping the rewards' of business-university collaboration.[65]

An NCUB report[66] observed that whilst Britain's universities have world-class expertise to hand, only a small percentage of UK businesses cite universities as their principal source of information for innovation: 3% of SMEs and 2% of larger businesses. In the UK, engagement is traditionally concentrated in the hands of a few very large companies and the small number of industrial sectors in which they operate. Small and medium sized businesses, employing fewer than 250 people, accounted for only around 3.5% of the total R&D spend in the UK in 2009.[67]

So, what are the main barriers that prevent businesses from benefiting from collaboration with universities?

The top five barriers hindering innovation capacity, from the perspective of businesses, were considered to be:[68]

1. A shortage of financial resources and access to finance.
2. A shortage of skills in innovation management.
3. Insufficient use of public procurement to foster innovation in SMEs.
4. A shortage of skills to manage intellectual property.
5. Weaknesses in networking and co-operation with external parties.

Partnerships also run into barriers after a potential collaboration has been identified and they are in the initial discussion phase. The reasons why university-business collaborations may not progress beyond this stage include:[69]

- The needs of business do not align with the mission and strategy of the university and expectations of outcomes may differ.
- Universities operate on longer-term commitments than the timescales required by business. Sometimes this is down to the bidding cycle for external funding.
- Universities may lack the skillset or the facilities to meet the needs of business.
- The two parties may not agree on a suitable price for the service. This is particularly the case in the context of full economic costing (fEC) in research collaboration.
- Failure to agree ownership of the intellectual property that may be generated: despite significant progress since the publication of the Lambert Intellectual Property agreements, this is still reported as a significant issue in some negotiations.
- Contrasting views on the management of indemnities and liabilities between prospective partners, viewed as being an increasing problem.

# Best Practice

A report by the Science|Business Innovation Board analysed feedback from executives and academics involved in industry-university partnerships and set out the agreed core elements needed to make a partnership work well. Key lessons and recommendations were:[70]

## University leadership

- Universities need to make industry-university partnerships a strategic priority and communicate the goals and benefits regularly to the entire faculty.
- The necessary resources should be provided to allow engagement with industry without undercutting basic research.

## Long-term strategic partnerships with built-in flexibility

- There is an increasing trend for fewer, more strategic partnerships that aim higher, receive greater funding and last longer.
- Long-term strategic partnerships focus the university's creativity and talent on enabling future innovations that can be taken to market by industry and deliver benefits to society within five to 10 years.

## A shared vision

- The first step to a healthy partnership is assessing the core academic strengths of the university and the core research competence of the business to identify promising opportunities for collaboration.
- Universities and businesses should ensure they select the type of possible partnership – strategic, operational or transactional – that best fits their needs.

- Strategic partnerships run for five to 10 years and need a broad, flexible agreement. The knowledge produced by the collaboration is likely to influence the university's future research and teaching and a company's strategy.
- Operational partners have a research project with a division or a particular R&D lab and run for one to three years. They can be valuable for building ties that lead to a strategic partnership.
- Transactional partnerships are lesser interactions, such as an executive agreeing to teach a course, which may lead to doing more and bigger projects together in the future. These, too, can ultimately lead to a strategic partnership.

## Crossing boundaries

- Collaborations only work well when they are managed by people who cross boundaries easily and who have a deep understanding of the two cultures they need to bridge. They need multidisciplinary individuals who are mentors and bridge-builders.

## Cross-fertilisation of ideas

- Universities should create opportunities for academics and company researchers and executives with shared interest to come together and develop a dialogue. Informal exchanges over lectures or seminars that bring both sides together can spark conversations and lead to new relationships.
- To understand the key scientific and technology questions companies are seeking to answer, universities should create advisory boards of executives from selected industry sectors which are well positioned to develop partnerships.

## Intellectual Property (IP)

- The role of IP tends to be over-emphasised. Businesses tend to walk away from universities that have too inflexible an approach to IP.

- Universities seeking to form partnerships with industry to modernise teaching and learning should not insist on protecting IP that comes out of that research. The key benefit to the university is the impact on teaching and learning from industry-based projects.

## A multidisciplinary approach

- Dependent upon the ability of university and industry experts, setting up a multidisciplinary institute on campus in partnership with industry can help break down traditional academic departments and drive a new multidisciplinary culture. Universities seeking to develop partnerships with industry risk losing projects if they are not willing to embrace a multidisciplinary approach to research.

## Quality not quantity

- Successful and productive partnerships take time to develop. Businesses and universities should avoid trying to measure the value of an industry-university partnership in metrics such as papers published or patent applications filed. The quality and nature of scientific breakthroughs vary, and volume does not automatically equate with value. Focus should be on quality instead of quantity of output.

## The 21st century university

- To enable bold, innovate partnerships between industry and universities, the mission of the research university needs to be redefined. Today's universities are largely based on a model of higher education developed over 100 years ago. The university in the 21st century should be viewed not just as a generator of ideas but as a source of knowledge and competence that can benefit society.

# Partnership Support

## Innovate UK

Innovate UK is the UK's innovation agency. It works to support and connect innovative businesses through a mix of people and programmes to accelerate sustainable economic growth.

It provides a variety of support programmes that directly enable or rely on effective collaborations between business and universities. These include: Catapults; Catalysts; Collaborative R&D; Innovation & Knowledge Centres; Innovation Vouchers; Feasibility Studies; The Knowledge Transfer Network (KTN), and Knowledge Transfer Partnerships (KTP). Around two thirds of the business-led projects Innovate UK invests in involve academic partners.[71]

## Catapults

Established in 2010, Catapults help connect businesses with the UK's research and academic communities[72]. There are currently seven Catapults, the first opening in 2011, with a further two planned.

Catapults engage with the research base by providing access to:

- Strategic relationships and formal partnerships with research base stakeholders.
- Joint programmes and projects with the research base and business.
- People and skills development including studentships; secondments; and continual professional development.
- Shared equipment and facilities.

An inquiry into business-university collaboration[73] found that the feedback on the Catapults was generally positive and that they 'have great potential', but that the system was still very new and needed time and space to 'settle'.

In the Government response to the inquiry,[74] the report stated that whilst there is already a large number of industry-university interactions taking part in the Catapults, more work would be needed to help stimulate further collaboration. The cross Catapult forum on Research Base liaison will be examining best practice on interaction with universities around:

1. Strategic relationships.
2. Joint programmes and projects.
3. Developing people and skills.
4. Access to capability.
5. Informing policy and future research agendas.

The Government response also stated that one of the near-term objectives of the Catapult programme and the Research Councils will be to increase the level of people-exchange between academia and the Catapults. The vast majority of which will be working directly with industry projects.

## Visibility and Communication

Communication and ease of access to expertise has been discussed as a big factor in why businesses do not engage with universities. A NCUB report found that nearly three-quarters of all small businesses they spoke to were not even aware of the opportunities available to them in universities. For the small percentage that were aware, they were often limited by not knowing who to speak to within the university, the responsiveness of the university to submitted requests and simply finding the time to engage with universities in the first place.[75]

These concerns were also echoed in another report which found that most respondents agreed that the single, most positive step the Government could take to improve business-university collaboration would be to ensure that the existing support was visible, clear and coordinated, using 'targeted action to improve information rather than unconstrained funds'.[76]

The Government has responded to these concerns and has agreed that more can be done to make business-university collaboration opportunities more visible and simpler to improve the ease of communication between the two sectors.

The three initiatives which aim to improve the access to research information are:

1. **Research Council UK's Gateway to Research** – launched in 2013, it provides a single entry point of access to information on what the Government funds, and the outcomes of that research. The website is aimed at innovative SMEs, enabling easy access to information about current and past research projects. Government has heard that while this platform was 'fit for purpose' and 'quite a useful tool', it could take 'time and effort' to navigate, which risks putting off SMEs.[77]

2. **Collaborative online platform** – In response to the Government's promise to create a new online platform to improve the accessibility of research and expertise, the NCUB is developing a collaborative online platform which joins up university research and expertise with the needs of business. This service will help to pair up local businesses with the institutions and researchers that can support them. David Docherty, CEO of the NCUB, described the service as an 'eBay for intellectual property'.[78]

3. **Single point of contact** – there are mixed opinions from universities on the utility of a single contact point. University Alliance supported the approach. However, some universities preferred to establish their own 'sector-based gateways' instead. The Government continues to encourage universities to ensure they have a single point of entry for SMEs. Latest figures, measured by the HE-BCI survey for 2012-13 show that 89% of institutions do have the presence of an enquiry point for SMEs, and UK university collaboration with external partners including business has risen 45% in real terms since 2003-4 and continues to grow, reaching £3.6 billion in 2012-13.[79]

## University Enterprise Zones (UEZ)

An initiative to create University Enterprise Zones (UEZs) was launched in 2014. These zones provide spaces for small businesses and facilities for sharing knowledge with universities. The evidence the Government received about UEZs consistently reported that it was too early to evaluate the initiative, but warned that the funding pool (£15 million) was very low, and that the pilots lack 'many of the incentives' found in established Enterprise Zones. Concerns were also raised about the rules regarding who could apply to take part in the UEZ pilot, such as geographical restrictions or potential difficulties in submitting cross-LEP bids. The government has been urged to 'ensure that [UEZs] become part of the long-term regional and national infrastructure' and to investigate 'how they overlay with things like city deals and with the economic development plans of LEPs'[80]

## Higher Education Innovation Funding (HEIF)

The HEIF is provided by the HEFCE to support and develop knowledge-based interactions between universities and colleges. HEIF is used to support business engagement by hiring business support staff and securing the time of relevant academics.

The Government reported that the fund has been successful in delivering a return on the public investment in knowledge exchange, with £6.30p gross additional income generated for universities from every £1 invested over the period 2003-2012.[81]

There have been calls for more money for the fund. Sam Jones, Head of Communications at the University Alliance said:

**"As Sir Andrew Witty's review highlighted last year, higher education innovation funding (HEIF) must be increased if we are serious about supporting our small and rapidly innovating companies so that they can fulfil their potential in helping our economy to grow."**

**HEIF also needs to be channelled those universities who are demonstrating excellence in SME engagement by increasing the weighting for these activities during the allocation process. This would incentivise this activity more widely, maximise existing hubs of SME connectedness and recognise the larger commitment required to develop these crucial (but resource-consuming) interactions with larger numbers of SME partners."**[82]

## Horizon 2020

Horizon 2020 is the EU's programme for research and innovation. It will run from 2014-2020 as the successor to the Seventh Framework Programme (FP7), bringing together all existing EU research and innovation funding, including the Framework Programme for Research, the innovation-related activities of the Competitiveness and Innovation Framework Programme and the European Institute of Innovation and Technology. The programme will focus on the following three priorities:

1. **Excellent Science** – strengthening the EU's world-class excellence in science.
2. **Industrial Leadership** – fostering industrial leadership to support business, including SMEs.
3. **Societal Challenges** – innovation and tackling societal challenges to respond directly to the challenges identified in the Europe 2020 strategy by supporting activities covering the entire spectrum from research to market.

In addition, a number of priorities will be addressed across and within all three pillars, including:

- Gender equality and the gender dimension in research.
- Social and economic sciences and humanities.
- International cooperation.
- Fostering the functioning and achievement of the European Research Area and Innovation Union, as well as contributing to other Europe 2020 flagships (e.g. the Digital Agenda).

The total budget for the implementation of Horizon 2020 will be almost €78.6 billion.

# Support from Idox

Idox is Europe's leading provider of funding and policy information. We are experts in helping organisations identify, secure and manage grant funding.

We have been working with universities and businesses for some 30 years, supporting them to become more competitive.

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  www.open4learning.co.uk

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