University of Oxford

Submission to Dowling review call for evidence. March 2015.

1. What experience do you have of establishing, participating in or supporting long-term research collaborations between business and academia?

The University of Oxford has a rich history of establishing and maintaining fruitful research collaborations with businesses, a range of case studies of these partnerships can be found here: http://partnership.ox.ac.uk/category/case-studies/

We have scores of research collaborations with business, as well as extensive interactions through consulting, technology transfer and executive education (as reported annually via the Higher Education Business Community Interaction Survey). This engagement with businesses in all sectors and of all kinds in the UK and overseas involves staff and students in all our Academic Divisions (Humanities; Mathematical, Physical and Life Sciences; Medical Sciences; and Social Sciences) and with researchers in the museums and collections, the Bodleian Libraries and Continuing Education.

To give some sense of the outcomes from this research collaboration, of the 73 Impact case studies submitted to REF2014 by Oxford’s departments of engineering, mathematical, physical, and life sciences, 26 (35.6%) described economic and societal benefits resulting from collaborative work between Oxford researchers and their partners in industry. A further 12 case studies (16.4%) described activities leading directly to the spin-out of companies which have had measurable impact.

Our work with business is founded on the excellence of the research and research underpinned by public funds, especially through (HEFCE) QR, the UK Research Councils and the European Commission, and extensive support from charities. Engagement with industry and the application of ideas is facilitated by Research Council research grants and impact acceleration funding, HEIF and Innovate UK funds. Public funds leverage significant business and private investment and in-kind support, and vice-versa.

The University’s science park at Begbroke offers opportunities for the co-location of research activities with science-based industries. The Begbroke Incubator is being expanded and the Churchill Bioescalator built (both supported from the City Deal) in response to increased demand from our partners and to further develop new and innovative ways to engage.

2. What are the key success factors for building productive, long-term research partnerships between business and academia and how do these vary across sectors and disciplines?

Relationships at multiple levels

At their core these partnerships are founded on personal relationships between usually a researcher and a key individual in the business organisation, often built over a decade or more. In large companies, relations need to be embedded at all levels, at VC/CEO level as well as those researchers active in the collaboration, and both sides should take a team approach as these actions help ensure that the relationship and collaboration can endure despite staff movements. Relationships at
working level are vital to ensure higher level aspirations are underpinned by genuine technical synergy and academic interest. Trust is key.

**Clarity of objectives**

There needs to be clarity of (compatible) objectives (both at the strategic level and working project level), as well as clarity on IP matters. The principles need to be established and agreed by all sides early in the process to ensure common understanding. Recognising what each party is looking for and ensuring that both parties are clear about the benefits for them from any collaborative activity, from the outset and on an ongoing basis, is crucial.

**Frequent communication**

Frequent communication, which aims to maximise openness and transparency, is key to any long term relationship. This can be structured according to the needs and working styles of both parties and can range from light touch interactions via industry representatives on advisory committees to more intensive engagement.

The Oxford Man Institute is an example of effective co-location, in this case of University staff and students with Man Group researchers and staff; which allows both structured and serendipitous interactions, a range of flexible collaborations and data sharing.

**Tailored approaches for different sectors**

There is a great variety in the interactions between universities and partners across sectors. Research intensive sectors such as pharmaceuticals and aerospace will have strong interactions across supply chains with potentially large investments by global companies. In contrast, the service sectors such as financial or environmental services tend not to fund research at universities, and the creative industries and third-sector are looking for more holistic engagement. They do not rely on a pipeline of products in the same way and therefore there is a requirement for academics to interact with operational and creative elements of the business. Their interaction with universities is likely to be more through the recruitment of highly qualified individuals and tapping in to expert knowledge and advice. Different approaches will be required when working to develop longer term collaborations with SMEs, rather than big business.

There are many factors at play. From our experience we would highlight the following barriers and ways these can be overcome:

**The academic landscape**

Initial contact with a university can be confusing, and IP approaches by universities can at times be seen to be too defensive. Oxford recognises the need to counter these perceptions, and is working to improve systems to make clear where skills and expertise in specific areas lies, and to be more flexible to potential collaborators’ IP requirements, to reach a workable solution for both sides to adopt. Our partnerships website has been developed to help potential partners find out about what
Oxford can offer: [http://partnership.ox.ac.uk/](http://partnership.ox.ac.uk/). Increasingly, professional knowledge exchange officers in universities (some HEIF funded) are able to help broker collaborations. We are especially keen to create opportunities for businesses to connect directly with early-career researchers and junior academics to build relationships based on often small initial steps.

**Absorptive Capacity**

Individual businesses need to have sufficient internal skills and knowledge to establish and benefit from interactions with universities and to understand enough about the process of research and its longer timeline.

**Time for networking**

Networks are crucial to establish, maintain and enhance long-term research collaborations. These take time. Businesses need to support their staff to lead or be involved in such networks, as do universities.

**Support for ‘proof of concept’ work**

Within the much talked about ‘valley of death’ (see Harris et al) we would highlight how vital proof of concept (POC) work often is in achieving greater value from university-industry collaboration.

4. What barriers do academics and universities face in developing long-term research collaborations with businesses and how can these be overcome?

There are different motivations, drivers, and time scales of activity in academia and business, which can create barriers to collaboration. Through networking and closer joint working an enhanced understanding of the other’s motivations can be developed, and progress made. Long term relationships between academics/research groups and named industrial contacts will start, grow, and become successful if: (i) the academic has the time, inclination, persistence, and industry knowledge, and (ii) there is a coordinated university professional services support structure. Academics need peer- recognition and reward (incl. in recruitment and promotion, funding panels, publication channels and the REF) for developing long-term research collaborations with businesses.

Using a range of approaches is a good way to enhance understanding and build relationships: (i) secondments can be part rather than full time which can ensure the individual is continually aware of developments at both organisations; (ii) co-location of activities on the same site - such as occurs at Oxford’s Science Park at Begbroke - has achieved many successes: through the use of shared facilities ideas and information can flow; and (iii) strategic partnerships such as the University has with BP or with Bayer on Women’s Health.

These longer term strategic research relationships require funding for teams to negotiate and support the collaboration. They also bring larger investment from business.

The VAT complications when industry co-invests in university buildings should urgently be revisited by government.
We would like to see major UK funders of industry-academia collaborative delivery programmes working more closely with universities on identifying pre-competitive priorities for innovation funding. Bringing business and academia together in shaping funding priorities should increase awareness of the interests and benefits of large scale collaborations.

Strong local research collaboration should be prioritised in LEPs. A good local example is attracting funding from BIS, awarded via the Strategic Economic Plan, for the Oxford Centre for Applied Superconductivity in 2014. The main concentration of the UK’s commercial superconductivity activity is local to Oxford. The investment has enabled long term pre-existing relations between two University departments, three major companies (including those spun out from the University), STFC and numerous local SMEs to be formalised, and joint pre-competitive research objectives identified.

Universities and industry need to reach sensible agreements on price. Similarly all parties need to be better at reaching appropriate arrangements in relation to intellectual property, having regard to the charitable objects of UK universities. UK industry, having been party to the development of the Lambert toolkit for universities and companies that wish to undertake collaborative research projects with each other, needs to accept the model agreements to reduce transaction costs and avoid costly delays in finalising contracts.

Support for consortia and networks

A key UK strength is the multi-disciplinary approach of research consortia, which provides novel thinking and exploitation opportunities to develop. Initiatives to foster the development of multi-disciplinary consortia or industry clubs are effective. More support is required to enable networks to be established and develop so that other potentially valuable UK research sectors can flourish through greater collaborative research.

Higher Education Institution funding

The Research Councils’ core research grant and fellowship programs provide important opportunities for long-term research collaborations with business and other types of organisations.

Research Council funding offers vital support for postgraduate research education and training involving linkages with industry (incl. through DTPs, DTCs, industrial doctorates and other studentships).

HEFCE HEIF funding is critical to the support of university-business research collaboration. HEIF 5 at Oxford has been used, for example, to support business partnering teams which provide an easy interface for companies and assemble multidisciplinary groupings relevant to company needs; seed-fund collaborative projects, for example with the creative industries, tourism bodies and the National Trust; co-fund a skilled IP rights Management Team; foster social enterprises; offer training in enterprise development and entrepreneurship; work more closely with the LEP; and develop new

5. How effective are current incentives, policies and funding streams for promoting this type of collaboration? How could these be improved in order to scale up the range and impact of collaborations being undertaken nationally?
ways of profiling how Oxford can (and does) work with business – see e.g. the Innovation and Partnership site; [http://partnership.ox.ac.uk/](http://partnership.ox.ac.uk/)

Impact Acceleration Accounts (IAA) - from six of the seven Research Councils - provide valuable funding to encourage researchers to explore relationships with a wide range of external organisations. Oxford’s EPSRC IAA has e.g. funded £2M of projects, which leveraged £1M of direct and in-kind funding from sources external to the University. The projects have 61 discreet industrial/end-user partners, 24 (39%) of which are new collaborations. The block grant mechanism provides stability for medium term planning (the change from one to three year allocations was very welcome), and has allowed risks to be taken in experimenting with new models for forging collaborations. A recent example is the appointment of Impact Acceleration Engineers who offer dedicated impact support to a research group across multiple external partners to facilitate industrial access to research. IAA funding helps universities to take on projects for industry benefit which we would otherwise not be able to afford, especially where the resulting IP is generating revenue for UK plc but not directly for universities.

University-industry research collaboration is a welcome key priority within Horizon 2020.

Innovate UK has developed a range of collaborative support programmes. Catapults are benefitting significantly from a recent emphasis on closer university involvement. It would be good to see much more emphasis on the cultural and heritage and tourism sectors (their contribution to the UK economy and quality of life is often overlooked; see [AHRC report](https://ahrc.ac.uk/)).

The IPO’s Fast Forward funding scheme is an excellent example of a government agency working within its own remit to encourage innovation at the university business interface. Other government agencies and departments should be encourages to follow this example and pilot funding schemes in their own area designed to encourage innovative collaboration.

Across this plethora of support, there is a need to consider a greater level of joined up thinking and action across government to support collaborative activities between HEIs and businesses. The range of funding opportunities and criteria offered by government departments and quangos, each with subtly different purposes and assessment criteria can be complex to navigate, and often in competition with each other. We would urge much better signposting of support schemes to avoid opportunities being lost or resources wasted on navigation.

6. How can progress under the Industrial Strategy be harnessed to stimulate collaboration between businesses and researchers in the UK?

The 2014 Science and Innovation Strategy highlighted the importance of science and innovation to the growth of the economy, underpinned by ‘five pervasive themes of excellence, collaboration, agility, place, and openness’.

Government has done much to establish the UK as a place for research-led innovation through the protection of the science vote in previous funding rounds. Public funding at internationally competitive levels for university research, research training and knowledge exchange/impact is vital for the UK’s future.
Prioritisation of specific themes such as the Eight Great Technologies has enabled significant advances in certain prescribed areas. This is welcome for these particular sectors, but thought must also be given to maintaining the general high quality science which is helping to realise significant impact (a point made strongly in the REF 2014 Panel Overview Reports).

Support for LEPs is a valuable way of maximising regional growth especially in areas with strong innovation. Oxford is a key partner with the Oxfordshire LEP and the relationship is helping forge new partnerships with businesses across the region. If it is proposed that more of the funding to support science and innovation be devolved to regions, careful consideration of the benefits and risks should be carried out ahead of formal consultations to decide on the best model(s).

7. Which models of collaboration have proved most successful for stimulating SME engagement with the research base in the UK? What additional action needs to be taken to strengthen UK performance in this area?

SMEs work on shorter timescales than multi-national conglomerates or research intensive universities. Given cash constraints in SMEs, it is unrealistic to expect them to fund long term far-from-market funding programmes within a university; leveraged funding (Innovate UK, Launchpad, Horizon 2020 and Research Councils) really does help to lower the cost and risk to SMEs. Similarly, day-to-day interactions through using space at university science parks can also encourage collaborations.

Knowledge Transfer Partnerships (KTPs) are an important funding stream to enable businesses to work with HEIs; and a particularly appealing model for SMEs. They offer a good opportunity to develop initial ideas that can then grow into bigger collaborations with more diverse team involvement.

Oxford University’s Centres for Doctoral Training (CDTs), funded by the Research Councils, have a significant number of SMEs as collaborative partners. This is a relatively new avenue for collaboration between Oxford and SMEs, and offers exciting possibilities for long-term collaboration.

The City Deal includes support for vouchers that SMEs can ‘spend’ in universities, often through the use of research facilities. Whilst this has had limited take up in Oxford to date, there is evidence from other universities that this can be a successful approach for SMEs to develop a greater awareness of the work in HEIs.

The Network Navigators model is effective in Oxfordshire: experienced and connected individuals in nine specialist sectors, who advise and connect people in business. This works well for enterprise new to Oxfordshire and seeking connectivity, given the region’s high-tech profile, the high standing of Universities in innovation and the workforce, and the LEP being a suitable size for individuals to cover the region.

Internships are proving a particularly successful vehicle for University collaboration with SMEs. Our doctoral students or post-doctoral researchers spend extended periods working with an SME, through which each party can develop a greater understanding of a project in an area of interest to both. Successful internships can often lead to permanent employment with the SME and as importantly secure or enhance longer-term engagement and collaboration.
SME spinouts or start-ups from the university, or those created privately by our staff or students, often become long-term research partners with the University. The University and the LEP are working to encourage more of these SMEs to stay and grow in the region.

More funding for the early stages activities (like Innovation vouchers, shorter KTPs, internships and proof of concept work) is required, alongside more promotion and uptake of them within universities, which would be strengthened by more training in entrepreneurship.

Catapults need to foster not only research contract-style links with SMEs but also find ways for SMEs to benefit from longer-term research collaborations; some are tending to ‘play safe’, leaning more to the innovative reuse of known technologies rather than helping SMEs co-generate or access more inventive and ground-breaking research ideas.

8. Which approaches/sectors/organisations – in the UK or internationally – would you identify as examples of good practice in business-university collaboration with the potential to be applied more widely?

Oxford provided detailed examples to the [review of business-university collaboration led by Sir Tim Wilson](#); please contact us if you would like a copy.

Within Oxford, we would identify our bilateral long terms strategic engagements with BP and the Man Group as exemplars. Our SGC (Structural Genomics Consortium) is an example of best practice in open innovation, with all its research output available to the scientific community with no strings attached, and the creation of an open collaborative network of scientists in hundreds of universities around the world and in nine global pharmaceutical companies, it has benefited both academia and industry and provided leverage for funders.

More generally, industry clusters/business clubs in the universities have been successfully deployed in many countries to address the pre-competitive research needs of a particular sector. This has either taken the form of subscription models with a defined scope for the club, or that of the Fraunhofer Institute model, where a large proportion of funds come from individual contract research. A successful business club model is the oil and gas sector’s Joint Industry Programmes (JIPs). Each company contributes to a pre-competitive research programme that yields solutions for the sector.

The UK research councils should continue to invest in schemes that promote long-term industry-academic research collaboration - e.g. BBSRC’s FLIP (secondment from company to HEI), Industrial Partnership Awards and LINK funding are good examples.

UKTI should continue to engage with HEIs and their LEP partners to assist in attracting new business to the UK through the promotion of capability and expertise that reside at HEIs, and to inform universities of the interests of UKTI’s target companies. Attracting large multinationals to the UK is highly competitive in the globalised market and the UK needs to have very strong offers via UKTI and LEPs.