

Written Evidence submitted by the University of Southampton to the House of Commons Business, Innovation & Skills Select Committee

Inquiry into Business-University Collaboration

1. The University of Southampton welcomes the opportunity to comment on the issue of Business-University Collaboration. Southampton is a research-intensive university where industry provides a significant part of our turnover and where we have dedicated mechanisms for working with companies of all sizes. Many of our industrial partnerships have been built over decades.
2. Our views on the questions of the inquiry are set out below.

Q1. What are the key strengths and weaknesses of the UK's innovation system in relation to business-university collaboration?

3. There are many strengths to the UK's innovation system.
4. The UK has some strong business-focused universities, like Southampton, who have both dedicated staff specializing in working with businesses, and a large number of other staff who bring their expertise to bear on industrial projects and problems where needed. Systems and structures within the university mean that businesses of different types and sizes can interface easily with those who have the skills and/or technology to address their needs. For example, many universities, including Southampton, have dedicated Industrial Units providing consultancy, access to facilities and testing services to SMEs to address their immediate innovation needs.
5. UK universities also have a strong record in establishing and incubating spin-outs. The SETsquared incubator for example (a partnership between the universities of Bath, Bristol, Exeter, Southampton and Surrey) was ranked as the fourth best in the world in the 2013 UBI Index¹ of global incubators. Many UK universities, including Southampton, have a track record of successful spin outs, and alternative routes to market such as licensing technology.
6. Through a combination of incentives to both universities and businesses, successive governments have encouraged collaboration between the universities and business to try and make it both easier and in their interests. There has been a substantial shift in culture over the last 25 years to one where many universities, including Southampton, see working with business as a core element of what they do. The Technology Strategy Board (TSB) has a key role to play in this, particularly in addressing the "Valley of Death" of funding Technology Readiness Levels which traditionally fall between those which universities would fund and those which business would fund themselves. However, we would like to see a greater level of dialogue between the TSB and technology-intensive, business-focussed universities.
7. The Government is making progressive improvements to the innovation system. For example, it is investing in the e-Corp program, to increase the probability of

¹ <http://ubiindex.com/global-top-list-2013/>

successful commercialisation of academic and other early stage research and to increase the spinout of high potential new companies. The University of Southampton is working with TSB, HEFCE, and the SETsquared Partnership to develop and pilot this program. It will build upon the concepts of the highly successful NSF I-Corp program in the USA and several other entrepreneurial programs from the UK. Under the e-Corp Program, research organisations will put forward ‘prospective’ research programs that hold the potential for commercialisation. These will be assessed, and the ones with the greatest potential will create an entrepreneurial team, including an external mentor possessing the market knowledge, commercial expertise, and industry contacts. Each team will go through intensive entrepreneurial training and then engage in a market investigation and business canvass discovery process, and over a very concentrated period (6 to 12 weeks), the team will engage with the relevant commercial sectors to determine potential commercialisation paths for the technology. If the decision is taken to proceed, the entrepreneurial lead will generally be the key individual taking the technology forward for commercialisation. If the commercialisation route is determined to be a spinout/start-up company, the company will be seen as a prime candidate to move into a university incubator such as SETsquared.

8. One key way of bringing universities and businesses together is through the movement of people. Secondments are a very effective mechanism to increase the absorptive innovation capacity of SMEs (and larger companies), prepare the research leaders of tomorrow and at the same time provide the academics with real insights into the needs and pressures of industry.
9. A weakness in the current system, however, is the uncertain funding situation in the UK at the moment for postgraduate students. This is most acute for postgraduate taught (PGT) students, who could be used intensively in short term projects with business, but for whom there are no sources of funding. For postgraduate research (PGR) students, the move by several research Councils to concentrate funding in Centres for Doctoral Training with specific research themes is a potential strength to generate critical mass, but perhaps at the price of innovation in new and emerging areas.
10. The need to boost STEM talent into industry is also a disturbingly familiar refrain. Increasing the attractiveness of STEM high technology careers to school children is essential if universities are to secure the “raw material” to hone for the benefit of high technology and engineering/science companies. This requires greater government support for initiatives that connect schools, universities and business. Of crucial importance to this outcome is securing the commitment of teachers and the framing of curricula to prioritise STEM with an industrial purpose and goal. The cross-fertilisation of talent and use of placements between schools, industry and HE/FE needs programmatic focus if the UK is to recover ground relative to our industrial competitors.

Q2. How competitive is business-university collaboration in the UK against relevant international comparators?

11. Different countries approach this issue in different ways. In Germany, for instance, the collaboration between business and universities is more limited, because German

universities are more focussed on basic research whilst there is a strong network of national applied research centres (Fraunhofer), who work extremely closely with business. The Fraunhofers are clearly very effective in what they do, but would not translate directly into the UK system as UK universities cover the whole spectrum from basic to applied research. That said, building Fraunhofer-type applied research centres within UK universities would be a real possibility, and Fraunhofer themselves are starting to open centres in, or partner with, UK universities – including Southampton.

12. In the USA there are more examples than in the UK of really close relationships between companies and universities, with academics doing ongoing consultancy for companies alongside their other duties, and students more often being employed in company facilities. This is in part due to a longer culture of working in collaboration and effectively blurring the boundaries between the university and the companies.

Q3. What are the strengths and weaknesses of the Catapult Centre model of business-university collaboration? What areas of research should future Catapult Centres focus on?

13. The Catapult Centres model concentrates resource in a narrow field with a small group of participants. This is both a strength and a weakness, allowing greater resources and potentially generating critical mass around some areas, but at the expense of funding to allow innovation in other technologies and the development of other opportunities which may emerge. This goes back to the age-old debate of whether the Government should be picking winners. Our view is that there is no problem picking winners as long as it's winners that you pick, at least in the large majority of cases.
14. In terms of future areas, if the government is going to pick winners then it should stick to them – so if the Eight Great Technologies are the priorities, then they should be the priorities for Catapults too. But we note that the UK is not uniformly strong in all of those technologies – some we start as global leaders or at least world class, others we may struggle to really beat the competition given our starting point. Robotics and Autonomous Systems is one where the UK has a few niche areas of expertise, but Japan and the USA are way ahead of the UK in commercializing technologies.
15. Whenever a technology list is created, there will always be areas left out. But some technologies not on the list may be ones where the total global market is slightly less than the 8 great technologies, but the UK has a chance to take a much bigger stake in that market. Photonics might be in this category.
16. In all cases, Catapult Centres should have one or more research-intensive universities at their heart. Most do – although the Transport Systems Catapult currently does not, and we would recommend that the Transport Systems Catapult seeks out one or more universities with whom to partner. There are several UK universities, including Southampton, with strong research interests in this area.

Q4. What steps can be taken to improve the uptake of Knowledge Transfer Partnerships (KTPs), particularly among SMEs?

17. The KTP scheme provides one of the most effective and impactful mechanisms of sustained knowledge transfer between Universities and company partners. That said, the KTP system is hampered by restrictive and unnecessary bureaucracy, unfortunate difficulties with modes of application (particularly the online version), and a lack of advisor support. All of these points need to be addressed if SMEs are to be encouraged to engage, though there remains a high degree of interest in KTP, especially in engineering-focused industries. A return of shorter timeframe projects (akin to the old sKTP scheme), with quick setups and higher degrees of flexibility would be helpful in encouraging uptake of the scheme in the SME arena. Such flexibility might include applications requiring less extensive information on company accounts for such projects, and affordability should not be so draconically policed. In addition, company partners keen on KTPs should not be penalised by diminished grant rates for follow-on projects; instead they should be rewarded for their engagement and commitment, and could be used as exemplars of the power and impact of KTPs.

Q5. Recent BIS analysis found that the UK exhibits “a sustained, long-term pattern of under-investment in public and private research and development and publicly funded innovation”. How does this affect business-university collaboration in the UK?

18. For universities and businesses to collaborate successfully in research and innovation, there needs to be credible investment on both sides, in terms of both time and money. The less that one or other party can offer, the less likely the partnership can deliver transformative innovation. In the UK university system, the funding from QR (allocated by formula following the RAE [now REF]) plays an important role in this. It is deliberately not tied to specific existing projects, and it is an important source of money for universities to draw on to create new partnerships. But the level of QR has been frozen for some time and it is becoming increasingly irrelevant in this space. Funding for some Research Council grants requires having industrial partners – but these larger, long term projects tend to suit larger companies only.

19. All in all you get what you pay for.

20. There are of course good examples of large, long term university/industry partnerships, such as the new £140M engineering campus at the University of Southampton, involving major funding from both the University and engineering multinational Lloyd's Register (LR). LR are moving their global research headquarters to the University of Southampton's campus, in what we believe is the UK's largest university/business collaboration. High technology multinational companies such as Rolls Royce maintain high levels of investment and collaboration in UK universities (23 of its 32 University Technology Centres are in UK universities, including 2 in Southampton).

21. HEIF also has a role to play – see following question.

Q6. Will the changes to Higher Education Innovation Funding (HEIF), proposed in the Witty Review, be successful in increasing university engagement with innovative SMEs?

22. The University of Southampton's experience of HEIF has been overwhelmingly positive, and the recommendation in the Witty Review to increase funding for HEIF is welcomed, although we note that in its response, the Government has been unable to commit to any additional funding.
23. Unlike Catapult Centres, which are focussed on specific technologies and locations, HEIF remains very egalitarian, with a total of 98 universities receiving some allocation, and the top 23 universities, including Southampton, capped at the maximum level (£2.85M). This may not be the most effective way of spending the money.
24. HEIF has already been crucial in helping deliver the University of Southampton's support to innovative SMEs in a variety of mechanisms. Amongst UK Universities, Southampton ranks 1st for consultancy income (£23.1m), 3rd for income from SMEs (£8.9m) and 8th in new investment in its spin outs (£16.9m), and our HEIF allocation has been critical in attaining this level.
25. The SETSquared partnership, the world's 4th best University Incubator, would not have been created without HEI Funding. SETSquared is the Enterprise Partnership of Bath, Bristol, Exeter, Southampton and Surrey Universities. It has been running for over 10 years, has created over 1,000 companies, with a 90% survival rate and raised more than £1bn of funding. The partnership's support, staff and activities are primarily funded from HEIF. Invited member firms make a small contribute as part of their membership of the incubation programme.
26. A recent partnership event called Accelerating Growth highlighted the achievements of some of the firms and the wider partnership, and there are a number of case studies of companies and jobs created as a result of HEIF funding. These include:
 - Karus Therapeutics, raised over £9.6m of investment, 15 jobs created
 - PrimerDesign, exporting to over 120 countries, 19 jobs created
 - RedLux, world beating non contact 3D ultraprecision measurement, 8 jobs created
27. Further details and examples can be found at: <http://www.setsquared.co.uk/info-industry/10-years-accelerating-growth>.
28. HEIF also supports a number of our focussed "Industry Sector" initiatives. In the Southampton Marine and Maritime Institute and Aerospace Sector Team, HEIF money helps support Collaboration Manager roles which underpin engagement and help deliver the major co-investment headquarters and technology centres with Lloyd's Register and Rolls Royce, as mentioned under Question 5. It has also enabled significantly greater engagement with SMEs. A recent aerospace event on autonomous systems attracted 70 SMEs that are being cultivated for collaboration opportunities. In addition to major (technology) corporate partners, where the technology / research field is more leading edge, we have the example of the Zepler Institute industry Collaboration Manager role working in the area of nano-electronics, photonics and quantum technologies. This HEIF funded role is able to work flexibly

to advise companies and help deliver new collaborations with many of our local photonics cluster companies, such as Covesion (involved in laser crystals high volume manufacturing).

29. HEIF's flexibility is a great strength, and enables universities to strongly leverage complementary funding schemes from the European Union, Research Councils and Technology Strategy Board, amongst others. For example, Symetrica, a highly successful University spin out (now employing nearly 30 staff and with a US subsidiary group), has combined both spin-out and incubation support and SME collaborative engagement – which is only possible through HEIF's flexible basis. This has enabled the company to further expand its gamma ray detection beyond homeland security and into new medical imaging opportunities.
30. HEIF has made a substantial impact to the interactions of universities with both SMEs and larger companies. The Witty Review recommends that HEIF allocations are reviewed to sharpen the incentive to engage with innovative SMEs. Clearly, the interactions with SMEs are crucial, but we would be concerned if that was wholly at the expense of working with larger companies.
31. In summary, HEIF money has been critical in allowing the University to create numerous fit for purpose channels to engage a very large number of companies of different types. The University having the discretion to create local 'engagement solutions and channels' is significantly more efficient than responding to knowledge and experience requirements for several, different funders. Consequently, in order to increase the quality of and successful outcomes from SME interactions, we believe HEIF institutional investment profile should be concentrated for Universities who have established such successful infrastructure and finely tuned processes and have been able to demonstrate these highly-leveraged outcomes, with some funding to enable a next tier of Universities to follow the practice of those leading the way.

Q7. What has been the effect of including commercial 'impact' criteria in REF assessments, and should the weighting increase to 25% as suggested in the Witty Review?

32. It is too soon to see the results of including "impact" criteria in the REF, as commercial outputs from collaborations take some time to come to fruition. Whilst universities have taken extremely seriously the task of identifying and describing those impacts in the REF submission made at the end of 2013, many of them relate to collaborations and partnerships developed well before the introduction of "impact" criteria. This will not be true for the next REF, however, and long term universities are likely to take the issue of the impact of research much more into account from the start, particularly if the results of the current REF show that these criteria have had a profound effect on the rankings of universities. We do not see that a small change in the percentage from 20% to 25% will make a substantive difference to this overall trend, however.
33. It is worth noting that if the amount of money allocated in QR under the REF process continues to decline in real terms, the usefulness of this as a lever to alter behaviour diminishes.

Q8. Will the Government's focus on the 'eight great technologies', as described in the industrial strategy, help to attract inward investment?

34. It is too early to say yet whether this is succeeding, although we welcome the consistency of the message and the fact that investment is being made in showcasing British technological capability. However, the Government need to build clusters around these technologies, and do more to pinpoint British expertise within what (in some cases) are fairly broad technology areas. In certain parts of these technology areas, e.g. in some enabling technologies, Britain leads the world; in others, we will struggle to make an impression on (for example) the USA. A focus on the broad eight great technologies may make it more difficult to differentiate the UK from its international competitors - such a differentiation may be easier at enabling technology level lower in the supply chain.

Q9. To what extent is this focus compatible with and complementary to the European Strategy for Key Enabling Technologies?

35. The eight great technologies are for the most part broad themes positioned high in the value chain. Enabling technologies are embedded lower in the value chain, and they can be seen as enabling the great technologies. The original Policy Exchange report on 'eight great technologies' makes many references to the technologies behind the eight great areas, but these enabling areas are not highlighted and the danger is they will not therefore be supported. To get maximum impact it is essential to connect and recognise the interdependence of great and enabling technologies, so that support for each can leverage off and feed the other.

36. University developed technology impacts at all levels in the supply chain and thus on both enabling and great technologies. A balance in support is required to foster development and commercialisation to foster full supply chain growth.

Q10. Are Local Enterprise Partnerships (LEPs) (and their counterparts in the rest of the UK) investing as much as they could in innovation and R&D?

37. No, and there are a number of issues which are holding them back:

- LEPs were originally established without the expectation that they would be disbursing significant amounts of funding. Many have struggled to adapt to this role, and are often underfunded to carry it out, and with constant pressure to move quickly, they have not always been as strategic as they might have been.
- The geographical cover of LEPs is much smaller than the old RDAs, and the amount of money they have to spend is smaller - and often tied up with quite local political considerations. The highly localised focus of LEPs also means innovators and R&D intensive companies who frequently focus on global markets/ customers have little motivation to engage with their LEP.
- The whole drive for LEPs to compete against each other for funding has meant that collaboration between different LEPs is much more limited than it should be.

Q11. How can LEPs, universities and Government encourage greater regional R&D investment?

38. Universities and LEPs can and are working together on encouraging regional R&D investment, as part of their economic plans. If the Government can arrange that funding for LEPs moves to a slightly more stable footing – with less time spent chasing large numbers of small pots – more time can be focussed on this. However, some LEPs are probably too small. The University of Southampton for example supports companies in the nearby region – but the nearby region contains four separate LEPs, and whilst the Vice-Chancellor is on the Board of the Solent LEP, it is not cost effective for us to engage in depth with all four. The more that can be done to encourage cross-LEP collaboration, the better.

Q12. How should LEPs direct their allocation of European Structural and Investment Funds in order to maximise increases in R&D output?

39. Different parts of Government are sending multiple signals to LEPs about how to spend this money, as a replacement for money which in past would have been allocated centrally. The economic plans which each LEP has produced go some way to identifying priorities, but often the drive for local authority colleagues on the LEP is to secure basic funding for housing, transport etc which has been cut elsewhere. As a result LEPs can lack the expertise to fully understand the impact of technology-orientated R&D and how to increase it.

Q13. To what extent will the new University Enterprise Zones encourage business university collaboration?

40. We think that they could have a significant effect. However, they are just a pilot, and we were disappointed that only 8 cities were allowed to bid. We hope that the opportunity to create University Enterprise Zones is rolled out across the country.