

Evidence for the Science and Innovation Strategy 2014 to Funding Councils

University Alliance response, June 2014

Introduction

1. University Alliance is a non-partisan, non-political organisation working to promote, safeguard and sustain the public benefit delivered by universities.
2. University Alliance brings together 22 of the UK's leading innovative and enterprising universities – major institutions combining science, technology and the creative industries with a focus on delivering for the professions, business and the community. Alliance universities are central to the UK's economy, driving growth in new sectors and markets through the delivery of high quality, industry-ready graduates, science and research.
3. Alliance universities have a 'revolving door' approach to business engagement. A key feature of activity is supporting new growth industries and regional development through major partnerships with the likes of Siemens, Hewlett-Packard and GSK, as well as thousands of SMEs. Over 75% of FTSE 100 companies have sponsored their staff to study within an Alliance institution, and our universities have up to 70% of all courses professionally accredited. Nearly half (46%) of all turnover from graduate start-ups comes from businesses started by Alliance graduates.
4. Given the success of Alliance universities' engagement with industry and the innovation ecosystem we are pleased to be able to contribute to this consultation process in development of the Government's Science and Innovation strategy. We provide examples of Alliance activities throughout the report, and would be pleased to work further with review teams to demonstrate the key role of Higher Education institutions within the Science and Innovation ecosystem.

Benchmarking the UK

Investment levels

5. The UK punches above its weight in terms of the efficiency and productivity of its research base but areas of our overall innovation performance lags behind many of our key competitors, as outlined below. The UK's investment in R&D and innovation is also well below average amongst competing nations and significantly lower than OECD and EU averages as Tera Allas's recent report for BIS has shown.
6. To achieve economic prosperity by means of the knowledge economy, innovation activities need sufficient and sustained funding. Government funding for university-business collaboration leverages other funds and generates profit - there is strong evidence that increasing public investment also increases private investment in R&D (where the UK is weak) - for every £1 spent by the government on R&D, private sector R&D output rises by 20p per year in perpetuity. By failing to invest sufficiently, we are not maximizing the leverage of private investment.

Benchmarking innovation performance

7. Many international comparators show the UK is successful at innovation and connectivity. It is ranked third behind Switzerland and Sweden in the 2013 Global Innovation Index, and tends to perform particularly well on business-university collaboration indicators (as outlined below). For other parts of the innovation system, however, the UK performs less well comparatively. The European Commission's Innovation Union Scoreboard measures whole system performance in innovation, and defines the UK as an 'innovation follower' – ranking eighth out of all member states (9th across Europe including non-members) and lying outside of the top group of 'innovation leaders' (Sweden, Germany, Denmark and Finland). The UK's growth performance is the second lowest at only 0.5% - well below the EU average of 3.7%. Over time, innovation performance among Member States is converging, and the UK must make efforts to maintain and improve its innovation performance.
8. The Innovation Union Scoreboard shows that the UK is performing relatively well (and is growing) in terms of the 'Enablers' indicators – that is to say research base and research-business interfaces, but there are challenges according to indicators measuring 'innovators' (typically high rates of firms involved in innovation activities – ranking 21st), 'intellectual assets' (ranked twelfth) and 'firm investments' (seventh) – with relatively weak performance and declines in growth amongst 'sales share of new innovations' and 'SMEs with product and/or process innovations'. Tera Allas's report marked out similar weaknesses in the system.
9. There is a role for HEIs to play here, particularly around increasing the innovation capacity of SMEs and increasing the domestic talent supply of graduates and research postgraduates to exploit science and innovation. There are also challenges around recognising co-creation of knowledge activities and the encouragement of public-private co-authored papers. Throughout this written response we offer recommendations for increasing the performance against these indicators, particularly around HEI's support of SME innovation and the talent base.
10. We support the development and use of more sophisticated indicators that better capture the impact of universities' innovation activities, to augment pure research metrics.

Key challenge: Recognise excellence throughout the system

11. There has been increasing recognition of the diversity and complexity of the role of universities in the UK's innovation system, and the emphasis on co-creative activities in an 'open innovation' environment. This more nuanced understanding of the processes, feedback loops better appreciates the range of activities that are involved in innovation including the full spectrum of university research from basic to applied. As the Government develops its Science and Innovation strategy this more nuanced perspective should help ensure that activities at all stages of the innovation process are incentivised and supported.

Infrastructure

Optimise the existing research and innovation ecosystem with open competition

12. HEIs are the largest research provider in the UK. Research excellence is found throughout the higher education sector. The diversity of our world leading research base (the UK boasts internationally recognised research strength in over 400 fields) sustains and supports our international competitiveness, capitalising on the spread of excellence. Excellence in generating successes in enterprise and entrepreneurialism should also be recognised, since these represent a key part of the research and innovation ecosystem.
13. Open innovation requires open competition, however. The evidence for funding excellence wherever it exists is well established¹ and this principle is an important pillar of the UK's dual funding system for research. The UK should continue its policy of selectively distributing research funding, based on quality, in order to continue to drive the quality and impact of UK research and secure the future health of the UK research base. In a difficult fiscal environment it is essential that these existing principles are maintained because they have "enabled the Government and funding bodies to maximise the return from the limited public funds available for ... research".²
14. However, there are examples of public funding streams where these principles are not being followed, particularly around doctoral training - with implications for the future workforce and skills base. Research Council policy to fund 'fewer, larger, longer awards' in response to efficiency pressures has meant that some important funding streams supporting postgraduates and knowledge exchange activities are no longer open to all HE Research Institutions. Concerns and the implications of uncompetitive funding for doctoral students are outlined further below under 'Skills'.
15. Another example of uncompetitive funding is Impact Acceleration Accounts (IAAs), which some Research Councils have allocated 'based on the size of Research Organisations' recent research funding history'.³ Calculating eligibility by previous funding allocation within a Research Council context is misleading, as it does not reflect excellence in a diversity of research activities - an open competition for IAAs would recognise excellence throughout the system in realising impact in research.

Increase investment where there is demonstrable impact – HEIF

16. As discussed above, the UK has a well-performing university-business interface. However, there is a need to increase the innovative capacity of SMEs. SMEs are the driving force of innovation in the UK economy. Innovation was responsible for two-thirds of productivity growth between 2000 and 2007. It was the common defining feature of the fastest growing 6% of businesses between 2002 -2008. These businesses generated half of all new jobs created during this time and were predominantly SMEs.⁴

¹ [L. Aston and L. Shutt \(2009\). *Concentration and diversity: understanding the relationship between excellence, concentration and critical mass in UK research*. University Alliance and Evidence Ltd \(2011\). *Funding research excellence: research group size, critical mass & performance*. University Alliance](#)

² www.rae.ac.uk/Pubs/2004/01/rae0401.doc

³ <http://www.esrc.ac.uk/collaboration/knowledge-exchange/opportunities/ImpactAccelerationAccounts.aspx>

⁴ S. Shanmugalingam et al (2010). *Rebalancing Act*. NESTA

17. Nevertheless, SME spend on innovation is low. The research base and anchor institutions have an important role to play in increasing the innovative capacity of SMEs.⁵ Funding for innovation and collaboration between universities, businesses and the third sector must remain a priority and be extended further, by implementing Sir Andrew Witty's recommendation to increase HEIF to £250 million.⁶ HEIF is a critical stream of funding for stimulating business-university collaboration, particularly useful for innovation activities involving SMEs including process as well as technological innovation.
18. At £160 million HEIF is a relatively small – but critical - stream of funding, and its impact far outweighs its size. As the principal dedicated funding stream that allows universities to work innovatively with local SMEs, HEIF has enabled universities to support innovation in growth sectors and it provides an excellent return on government investment - every pound of HEIF gives a gross return of £6.30 in additional Knowledge Exchange (KE) income, a proxy for the impact on the economy.⁷ However, this is likely to represent an underestimate of the total economic and social benefits.
19. Alliance universities have a diverse income portfolio and obtain less than 50% of their income from core public funding. HEIF is a critical funding stream for our universities, which are committed to growing income from private sources to achieve significant impact, working in partnership with business to realise important investment and growth. For example:
- a. **Plymouth University** is using HEIF to multiply the impact of their innovative Growth Acceleration and Investment Network (GAIN) platform. In partnership with the public and private sectors the University connects people, ideas and capital to accelerate the growth, and development of knowledge based businesses. GAIN links their research and teaching expertise with more than 500 high growth businesses, encompassing 32,000 staff and a turnover of £2.7billion.
 - b. At the **University of Huddersfield**, 50 per cent of their HEIF allocation has been used to establish a series of initiatives to grow the University's KE and commercialisation activities with external bodies. These key collaborative relationships ultimately lead to long term R&D programmes, delivering income generation and gearing for both partners including a £7.6m partnership with Borg Warner with leveraged RGF and inward investment from Borg Warner's US arm, and a £20m partnership with the Rail Safety and Standards Board. Huddersfield is attracting inward investment and upskilling workforce through strategic collaboration.
 - c. The **University of Portsmouth** has used HEIF funding to open up the testing facilities within the Institute of Marine Sciences and School of Earth and Environmental Sciences, linking these to businesses through the University's Environment Network, UPEN. It also used HEIF funding to establish the cross-faculty Centre for Operational Research and Logistics, bringing together multidisciplinary research expertise on the science of data and the science of decision making and working with different industrial sectors and academic partners. Recent projects include: an EU-funded project to find ways of more efficiently configuring the supply chain of offshore wind farms in order to reduce the per unit electricity generation costs; working with

⁵ University Alliance (2011). *Growing the future: universities leading, changing and creating the regional economy*

⁶ Sir Andrew Witty (2013). *Encouraging a British Invention Revolution*, (Recommendation 4).

⁷ Tomas Coates Ulrichsen (April 2014). *Knowledge Exchange Performance and the Impact of HEIF in the English Higher Education Sector*, Report for HEFCE

Xyratex (a manufacturer of large scale network storage solutions and High Performance Computers) to develop predictive maintenance systems for their disk drives and storage solutions, which has led to two US patent applications; and the development of a Virtual Engineer - a maintenance and operational management programme for future food packaging with Stork Food and Dairy Systems.

20. Commitment to long-term and stable HEIF investment is welcomed. However to ensure improving returns on HEIF funding, we need to ensure that HEIF allocations are calculated according to its key objectives. The formula for HEIF does not currently recognise the full range of innovation activity. HEIF needs to incentivise universities to continually improve their contribution to innovation and growth, particularly through their work with SMEs.
21. HEIF currently double weights university interactions with SMEs. This weighting should be increased both to incentivise this activity but also to recognise the larger resource required to facilitate interactions with larger numbers of SME partners. High levels of engagement and innovation with SMEs do not necessarily translate into high levels of HE-BCI income. Some measure of levels of SME engagement in quantity (rather than straight econometrics) and scaling – given that this is a policy priority at all levels – would be extremely useful and a strong indicator of how universities are actively engaging with LEP and local growth agendas.
22. Reforming the calculation of HEIF to also recognise success in improving returns on HEIF funding, the creation of graduate spin-out companies, and other SME activities with significant local impact, will ensure that universities develop fundamental, long-term and sustainable commitments to driving growth through SMEs. University-led growth will also drive improvement in regions which currently underperform in innovation, and lead to more equally-distributed growth across the UK.

Supporting colocation

23. The benefits of colocation of university and business capital (physical and human) are well known. Many universities are already actively involved in the development of Enterprise Zones. Physical proximity encourages the integration of researchers and businesses, developed in harmony with local economic strategy and is incentivised by fiscal means. We welcome the Government’s commitment to realising the key role of universities within this by announcing the University Enterprise Zone (UEZ) scheme, which supports capital investment and the development of strong local partnerships between universities, LEPs and other partners. The pilot stage of the scheme is limited with eligibility restricted to the 8 Core Cities. We would hope that this will provide an opportunity for the approach to be tested with the potential for it to be extended in the future.

Making the most of connectivity within the system - SMEs

24. Existing capacity, such as exists within Alliance universities which have strong relationships with SMEs in targeted industries and technologies, should be leveraged to increase engagement with this constituency. These institutions are already proving that partnerships with smaller institutions are possible and that excellent research and strong existing university-business relationships are helping to generate business-led innovation. Alliance universities are committed to improving innovation amongst SMEs and are developing mechanisms for sharing resources and capital with businesses.

- a. For example, as part of the **University of Salford** the major research facility in MediaCity UK connects the BBC and the Digital and Creative Industries sector to international academics and industry research specialists with the aim of generating £25m investment in research over the next eight years. Salford also runs the ERDF Energy Hub, a unique project allowing regional SMEs to engage with leading academics and state-of-the art world class facilities, aiming to support 140 regional SMEs in the development of new technology, products and systems that reduce the carbon emissions from existing properties. ERDF funding has allowed the University to build a unique facility, Salford energy house, the world's first and only full size house within a laboratory.
- b. The **University of Portsmouth** shares market intelligence with SMEs and engages in strategic discussions about the big commercial opportunities for innovation and sales and development links to Asia. SMEs also benefit from opportunities to network and present to local business leaders at showcase events around key sector themes such as creative industries, environment, healthcare innovation, high end manufacturing, infrastructure and logistics, and security.
- c. The **University of Plymouth** is harnessing its marine expertise for economic growth through its new Marine Innovation Centre (MarIC), established to optimise the interface between the University and Marine Sector SMEs. The Centre promotes the industrial uptake and commercialisation of the University's research and world-class facilities, links businesses to the Growth Acceleration and Investment Network (GAIN) and improves SME performance by stimulating innovation and the successful exploitation of new ideas. The project has a total cost of £1.97m (of which £880K ERDF) – match-funded by the University – and £200K from industry. The funded period runs from October 2012 to June 2015 by which point the Centre aims to become fully sustainable. MarIC aims to provide 190 business assists over the lifetime of the project and expected results include the creation of 93 new jobs, 41 additional firms involved in business clusters or networks, 37 SMEs launching new or improved products, and 26 gross jobs created in environmental sectors. The project is expected to deliver a gross increase in GVA of £3.726m and a gross safeguarded GVA of £1.674m.
- d. **Teesside University's** Centre for Construction Innovation and Research operates as a high level network resource in the Construction sector (one of the 11 key industries in the Industrial Strategy) – a role also recognised by the MD of Niven Architects, a current KTP partner, who cited this as likely to be the most valuable long term benefit of the KTP. The group works with clients involved across all 7 RIBA Plan of Work Stages, and in doing so it is able to foster commercial opportunities and research collaborations between businesses, often acting as the initiator to introduce potential partners. Another example of added connectivity leading to further innovation is the Centre's bringing together of two SMEs: SEAMS Ltd, who provide analytics software and services to utilities, power & energy, transport, public sector, and manufacturing sectors; and Space Group, who currently provide BIM technologies and services, architectural services, manufacture and assembly of low-cost/energy buildings and skills to the construction market. The SMEs have been selected by the Technology Strategy Board to progress a full Collaborative R&D proposal under the Digitising the Construction Sector Competition.
- e. **Coventry University's** Knowledge Exchange and Enterprise Network (KEEN) is a business improvement programme, part-funded by ERDF, designed to help West

Midlands based SMEs increase their profitability and achieve growth. KEEN offers a level of flexibility to companies who are yet to realise their full potential, made possible through the transfer of knowledge into the business via a recent graduate who is recruited to work full-time on a growth project, developed in association with the university, for between 6 to 24 months. SME WB Timber Innovations' new product Rapod benefitted from University expertise in architecture, civil and structural engineering, building services, 3D computer modelling and marketing and work is being undertaken with Coventry University's Serious Games Institute (SGI) to develop software which will allow customers to design their own pod – developing the product further. Through collaboration with Coventry University, the Rapod project has secured European Design Registration and the project is due for launch at the Grand Designs Live Exhibition. Rapod were also recently shortlisted as a finalist for an MEBC (Midlands Environmental Business Company) Business Success Award. Their office range was recognised for the Low Carbon Innovation Award for providing a high quality, innovative and affordable solution for people wanting to work from home. Two examples of **Coventry University's** successes using ERDF funds to help SMEs innovate and raise the innovation capacity of their local environment are cited in the recent European University Association report on universities and smart specialisation.⁸

25. University Alliance welcomes the activities of facilitating bodies – in particular new initiatives by the Technology Strategy Board and NCUB - to develop brokerage systems which are helping SMEs get the most out of our research and innovation ecosystem, including access to equipment as well as research and business expertise.

Strengthening and developing the key role of the Technology Strategy Board

26. The Technology Strategy Board is a well-established and proven support system for securing commercial benefits derived from university research and other activities, with effective mechanisms including innovation vouchers, Knowledge Transfer Partnerships and the Catapult Centres. We would strongly recommend that these mechanisms not be replicated in new support systems, rather more be made of the Technology Strategy Board by strengthening its funding and ability to support research and innovation by the proposals here.

Catapults

27. We continue to support the Catapult Centre model of business-university collaboration as it develops and grows. However, in order for Catapult centres to be recognised as a mark of excellence in the UK and to achieve world-leading innovation, they must seek to incorporate the best research and researchers and therefore ensure that any single geographical 'hub' has well-established links with pockets of genuine research excellence across the UK. As part of a national science infrastructure, existing Catapults need to become more open and collaborative so that resources are shared for maximum economic benefit.
28. This includes excellence in working with SMEs. Existing partnerships, capacities and networks based in HEIs should be leveraged by Catapult centres to access SMEs and engage them further with capacity-building. By identifying strengths across the system

⁸ European University Association (2014). *Report on Joint EUA-REGIO/JRC Smart Specialisation Platform Expert Workshop: The Role of Universities in Smart Specialisation Strategies*, pp. 29-30.

including in SME engagement, Catapult centres could improve this area of their interaction with business, achieving high impact in a shorter time than acting alone.

KTPs

29. KTPs have a proven track-record in delivering economic growth on the back of Government investment and are widely considered to be effective and productive means for knowledge exchange. They have enabled critical business engagement to develop knowledge, commercialise innovation and power new industries. They allow businesses to build capacity and capability, exploit their potential and obtain a return on the investment in publicly funded research.
30. The centrality of research to KTPs is key to their success. However, innovation for many SMEs is not necessarily driven by pure research. A wider recognition and definition of what innovation means and different forms of research would help more SMEs to engage, as **Teesside University's** Knowledge Exchange Internships model, supported through ERDF, has shown.⁹ More promotion of the KTP model and benefits, as well as more flexibility in the system, would help widen its take-up amongst SMEs.
31. Greater flexibility in the KTP scheme would allow universities and business partners to adapt the programme to specific needs, including around researcher development. For example, short KTPs have a very useful place in the scheme – they are an excellent way for students to gain post-graduation commercial experience as well as providing smaller firms with incentives to employ graduates. There should also be an option to lengthen some KTPs to enable a student to both register for and complete a higher degree, preferably a PhD.
32. A framework that enables groups of smaller firms to come together to undertake jointly sponsored KTPs could also increase SME engagement. In the initial phase this could be tested through European funding bids, in light of the Horizon2020 emphasis on SMEs.
33. University Alliance would offer support to the Technology Strategy Board to help investigate these proposals further.

Research capability and impact

Dual support and autonomy are essential

34. The autonomy of institutions has been shown to have a direct correlation with the quality of a system, with the UK recognised as being distinct in both its level of autonomy and its quality.¹⁰ Autonomy remains key to the approach adopted in Alliance universities allowing them to manage their position within various markets, operate flexibly in response to drivers and opportunities, be responsive to both threats and opportunities and to focus resource on their key strengths within an increasingly dynamic higher education environment.¹¹

⁹ <http://www.tees.ac.uk/sections/business/KEI.cfm>

¹⁰ [P. Aghion et al \(2008\). *Higher aspirations: An agenda for reforming European universities*. Bruegel Blueprint Series, V.](#)

¹¹ L. Aston & L. Shutt (2010). *Efficiency, leadership & partnership: an approach that delivers shared economic priorities*. University Alliance.

35. Maintaining excellence in a broad range of subject areas and research activities will future-proof the UK research/innovation ecosystem in a rapidly changing world. As Government acknowledges, predicting future market changes is an inexact science and we need to make sure we are future proof by allowing growth sectors to thrive – this is why the dual funding system for research, which includes the flexibility for universities to invest in new areas, remains critical.

Balance of research activities

36. As outlined above, open innovation requires open competition and it is vital that research excellence – in all its forms – is supported wherever it is found, for the benefit of the regions and the national economy. Any further concentration of research funding could jeopardise the UK research base and the future high skilled workforce.

Changing culture in impact

37. With a long tradition (over 150 years) of expertise in combining engineering and technology, design and the creative industries together with the professions, Alliance universities promote an environment that fosters innovation with impact. It is clear that impact criteria in the REF and RCUK bids have incentivised changing behaviours more widely in the sector – encouraging a closer relationship within the institution between research and enterprise, and amongst early career researchers to consider more fully the implications and utility of publicly-funded research when developing research plans. Continued and extended commitment to recognising the social and economic benefits of research is welcomed.

Successful models and characteristics of government support

38. Evidence suggests that the human factor is crucial in helping with absorptive capacity and knowledge exchange,¹² and therefore support systems that promote the movement of people between industry and academic environments are to be encouraged. Strong links with business and industry are a central focus of Alliance universities. They have found that the most successful approach is one where business links and engagement are embedded across a range of university activities, not least through their staff who have a powerful combination of industry and academic experience. Alliance universities work closely with employers to provide over 50% of year-long work placements and lead over one-third of all UK knowledge transfer partnerships. By operating a ‘revolving door’ attitude towards business, staff and students are encouraged to move between both throughout their careers.

¹² Daniel Tzabbar, Barak S. Aharonson, and Terry L. Amburgey (March 2013). “When Does Tapping External Sources of Knowledge Result in Knowledge Integration?,” *Research Policy* 42, no. 2, pp. 481–494, doi:10.1016/j.respol.2012.07.007; Vitae, RCUK, and CBI, *The Future of the UK Research Base and Implications for the Professional and Career Development of Researchers*; AHRC and NESTA, *Arts and Humanities Research and Innovation*.

Skills for science and innovation

Good business-university collaboration is producing job ready graduates

39. Despite a persistent and dominant public narrative to the contrary, universities are delivering high-quality job-ready graduates for businesses of all sizes. They are achieving this through strong institutional-level partnerships which engage employers and universities across a range of activities. University Alliance's forthcoming *report Job Ready: Universities, Employers and Students Creating Success* collects compelling evidence from employers' perspectives whose graduate recruits are central to their innovation capability.¹³
40. Many organisations lack the capacity or 'organisational slack' for innovation and therefore funding to support undergraduates, graduates and postgraduates into businesses should be available at all levels. **Nottingham Trent University** is placing over 300 graduates into SMEs, some benefitting from financial support through ERDF, but demand is currently outstripping funding.
41. Enterprise culture should be embedded across universities, including within postgraduate degrees. Vitae's 2013 report *What do Researchers Do?* suggests that 'doctoral degree experience seems to prepare [PhDs] better for employment than for self-employment or entrepreneurship'. Only 5% doctoral graduates are self-employed three and a half years after graduation, a lower figure than Masters and good first degree holders (8% and 9% respectively). However, 52% have considered self-employment or setting up their own business.¹⁴ Alliance Universities have a strong track record of nurturing graduate entrepreneurialism - 46% of all turnover from graduate spin-outs comes from Alliance universities – and we would be pleased to convene best practice workshops in developing graduate entrepreneurialism.

Postgraduates, high level skills and future innovators

42. High-level skills are a vital component of our future growth but they are also central to the process of innovation and renewal in the key sectors of our economy. Safeguarding the future pipeline of skills is therefore essential to the future success of the UK economy. Yet there has been a steady drop in taught postgraduates (PGT) in the last two years, falling by 11%. The proportion of home PGT students is also falling within this, representing only 64% of the cohort in 2012/13.¹⁵ The sustainability of postgraduate provision is threatened by a combination of the knock on effects of the new undergraduate fee regime (the full extent of which is still to be seen), a lack of fee loan access at PG level, and research funding concentration for postgraduates, particularly through Block Grants and Doctoral Training Centres.
43. In order to encourage more cross-funding for PGT, the narrative around industry involvement in postgraduate support needs to be changed. Pilot schemes run by three Alliance universities as part of Hefce's £25 million 'lifeboat fund' are innovating around business/professional access, internship models and skills development and are

¹³ University Alliance (2014). *Job Ready: Universities, employers and students creating success*; www.unialliance.ac.uk/jobready

¹⁴ Vitae (2013). *What Do Researchers Do? Early Career Progression*.

¹⁵ HESA, HE Students data.

examples of efforts to change the paradigm around business involvement in sustaining the supply of highly skilled workers in the UK and investing in the workforce.

44. We have particular concerns around funding for doctoral students. Research Councils use a variety of different mechanisms and allocation methods to fund postgraduate study. The majority of funding for PhDs is channelled into block grant awards through, for example, Doctoral Training Partnerships (DTPs), Centres for Doctoral Training (CDTs – also called Doctoral Training Centres - DTCs) and CASE awards. The introduction of block grants and Doctoral Training Centres, coupled with the removal of PhD researchers as a viable cost in other research grants, has closed off Research Council funding for postgraduate researchers (PGRs) for many university departments where excellent research is undertaken. This is despite a House of Lords’ Science and Technology Committee report into higher education in STEM subjects, published in 2012, which noted the importance of maintaining a diverse complement of training mechanisms, recommending that a variety of PhD delivery models be utilised, to ensure that the UK’s current breadth of expertise in science and technology is maintained.¹⁶
45. The EPSRC, the largest funder of DTCs, funded 80 DTCs but at only 28 institutions during its last round. Across its three main schemes, 46 universities are in receipt of postgraduate funding, to the exclusion of excellence in other university departments. Changes have also been made to Industrial CASE studentships (iCASE), limiting iCASE awards to those institutions already in receipt of a Doctoral Training Grant (DTG).¹⁷ Although iCASE awards claim to provide funding ‘for PhD studentships where businesses take the lead in arranging projects with an academic partner of their choice’, businesses in fact only have a limited choice. For the largest funder of postgraduate funding, the EPSRC, this restricts eligible academic partners to 44 HE institutions, disbaring institutions with excellent track records in iCASE studentships and business relationships from the system and preventing them from delivering the benefits of their strong industry relationships and collaborative research training offering to students and other company partners.
 - a. Funding offered by **EDF Energy** for CASE awards to **Oxford Brookes University** could not be leveraged after the changes to EPSRC funding ruled this institution outside of public funding mechanisms for postgraduate training. The same effect was felt for numerous SMEs who had been engaged with the university via Knowledge Transfer Networks.
 - b. **Teesside University** were given ‘exceptional’ dispensation to run an iCASE award from June 2013 with their partner, **TATA Steel**, only after direct intervention by the company, although the university does not hold a DTG. Eligibility for iCASE awards would allow them to build further on the industry collaboration success that they have achieved in delivering KTP projects (41% of Teesside’s KTP projects are graded as ‘outstanding’, compared with less than 10% nationally).
46. The concentration of funding in this way limits the diversity of future high level skills. Supporting postgraduates in only a limited number of research institutions narrows the range of the future skills base, excluding many areas of research expertise in institutions outside of these funding mechanisms. It affects the future health of the research ecosystem as universities are being shut out from experiencing, developing and

¹⁶ <http://www.publications.parliament.uk/pa/ld201213/ldselect/ldsctech/37/37.pdf>

¹⁷ <http://www.epsrc.ac.uk/skills/students/coll/icase/Pages/intro.aspx>

demonstrating capability in these areas. The funnelling effect of both DTGs and iCASE awards also curtails opportunities to involve important strategic business partners – often SMEs – who have strong relationships with those institutions who are currently outside of the DTG system.

47. The concentration of doctoral training, particularly in STEM, into fewer institutions also raises questions about the diversity of PhD supervisors that are involved in the delivery of training. There are pressures for PhD students to come out fully formed in research, knowledge exchange, public engagement skills, etc., but the existing PhD format – and the restricted number of delivery outlets - may not be optimally designed to help PhD students fulfil their full potential. For example, it is possible that we are not making the most of senior academics – currently outside of the funding system - with relevant expertise and skills, including those from outside of academia, in supervisory roles for PhD students, to act as advocates for the wider skills bases required of doctoral researchers.
48. Consideration of how industry sponsored training programmes might be encouraged should be part of this to ensure that we are supporting a future research base that has the skills to link effectively with business.

STEM diversity

49. There is widespread acceptance of a chronic underrepresentation of diversity within STEM subjects and careers, for which the recent CaSE report on improving diversity in STEM offers constructive and welcome recommendations.¹⁸ University Alliance is one of the 176 signatories of the ‘Your Life’ campaign to encourage diversity including through inspiring more young people to study maths and physics. We will continue to act as Higher Education advisers as the campaign develops, and have recently signed the Women into Technology and Engineering Compact, which aims to support a step-change in how women and girls are encouraged to consider technology and engineering careers and the subject choices or vocational pathways that lead to them. Furthermore 86% of our members are signed up to the Equality Challenge Unit’s Athena Swan Charter.¹⁹

Research-business interface

50. The UK performs well in international comparisons of business-university collaboration. UK has ranked second for university-business collaboration in the annual Global Innovation Index for the last two years.²⁰ According to the World Bank, the UK remains the best place to do business in the EU and the G8. The 2011 European Cities Monitor,²¹ where 500 business leaders were surveyed, found that some of the most important features for business location decisions included education, highly skilled labour and technology infrastructure.
51. The UK needs to be proactive in maintaining its status as a leading innovative economy. Other countries are making business-university collaboration a priority. A dominant theme emerging from workshops in Vietnam and Indonesia that University Alliance has

¹⁸ CaSE (2014). *Improving Diversity in STEM*.

¹⁹ <http://www.ecu.ac.uk/our-projects/athena-swan-charter>

²⁰ <http://www.globalinnovationindex.org/>

²¹ Cuhman and Wakefield (2011). *European Cities Monitor 2011*

recently undertaken with the British Council showed that this is a top priority for these emerging economies, both in employability and research agendas. Other developed economies are also making concerted efforts to improve in this area, including Australia, who are looking to the UK to learn lessons.

52. It is not only in technology where University research helps businesses innovate, but in processes and services. Among others, the **University of Salford**'s KTPs provide many examples of this, including innovations in processes at Dyer Environmental Controls, Create Construction and Moneyline; and services innovations at Brook Manchester, Moneyline, and Greater Manchester Fire and Rescue Service.²²
53. Universities have a significant and unique role to play as leaders within their localities. As anchor institutions they are often the only institutions with the scale and local connectedness to drive economic growth and shape the physical environment. LEPs can harness this leadership role by capitalising on individual universities' links and networks with other local players and businesses, and HEIs are heavily involved in LEPs across the country. Our understanding is that 35 out of 39 LEP boards have a VC or equivalent university personnel representing local HEIs (including 9 representatives from Alliance universities). Alliance universities have been in the business of meeting local economic need for over 100 years, many being established during the industrial revolution to meet the demands of the then new industries. They very often have a deep understanding of the industrial and commercial strengths of the region as a result of their close links with business.
54. In their 2012 review of LEP area economies, the LEP Network,²³ found that the highest performing and significantly improving LEP areas have high levels of employment and productivity, based on competition, enterprise, innovation, investment and skills. University personnel in some LEPs have been centrally involved in the development of Strategic Economic Plans and ESIF strategies. Alliance universities are reporting high levels of convergence with LEP innovations strategies in Strategic Economic Plans. HEIs should continue to be encouraged to co-develop skills strategies. Universities are also well placed to facilitate LEP collaborations across regional boundaries, enabling businesses and universities construct the infrastructure in which both enterprises can flourish.
 - a. Both **Oxford Brookes University** and the University of Oxford have been working very closely connected with the Oxfordshire LEP during negotiations for the Oxford City Deal, the SEP (Strategic Economic Plan) and the ESIF (European Structural Fund) distribution. A key part of the LEP's innovation strategy involves ESF and ERDF money and a board (involving university personnel) will distribute funds once they have been released.
 - b. The **University of Salford** is heavily involved with the Greater Manchester LEP, and has supported the development of the GM LEP strategy. The University also has representatives sitting on key boards within the LEP, including Low Carbon, which is fundamental in ensuring that the University is engaged and driving the innovation within GM low carbon and energy sector. The University is also very well connected and works with key organisation that supports the LEP, including UKTI Northwest,

²² More details can be found at http://www.salford.ac.uk/_data/assets/pdf_file/0008/224999/KTP-Publication-Final.pdf

²³ www.lepnetwork.org.uk

MIDAS – Greater Manchester’s Inward Investment Organisation, Greater Manchester India Steering group and Greater Manchester China Forum. To support this engagement with both the public and private sector organisations, Salford has adopted a key account management approach to ensure that their relationships with SME community add value and deliver what industry wants, when.

55. Universities are ideally placed as regional hubs for enterprise. While London and the South East are often perceived to be a magnet for businesses and talent, our universities and their student networks are enabling graduates to start and grow their businesses in every region across the UK – drawing on their connections with their local community.
- a. The **University of Lincoln’s** £37.5M collaborative venture with Siemens and their supply chain demonstrates the large financial benefits of a university-coordinated strategy with local and industry partners. The partnership resulted in the building of a new Engineering School, generated a wide portfolio of research projects (over £2M since 2010) with immediate commercial benefit, retention of over 1,000 jobs in the UK and further expansion of Siemens’ business with the creation of a further 50 jobs. As well as leveraging investment from Siemens, the collaboration brought in £3.2M of public grant, £1.8M ERDF and £1.4M Single Programme funding. The School and the activity around it underpins the Greater Lincolnshire LEP’s focus on Engineering as a priority sector for the area. It also provides a critical conduit to draw in TSB funding to businesses throughout the supply chain. Beyond the key strategic partnership with Siemens, the Engineering School has already engaged with over 400 engineering businesses and organisations – undertaking commissioned research (including with Marks & Spencer and Mitsubishi), Knowledge Transfer Partnerships, and access to part-time degrees (income totalling £1.6M in the first 3 years and growing rapidly). The school is actively driving local and regional cluster event activities (e.g. IMECHE, IET and the Institutes of Physics and Combustion) and leveraging investment through a portfolio of European-funded projects on aircraft and airport energy technologies.

SMEs

56. As described above, SMEs are the driving force of innovation in the UK economy. The UK’s innovation performance as measured by the Innovation Union Scoreboard showed a marked increase thanks to increases in innovative SMEs collaborating with others during 2009 and 2010.²⁴
57. The examples cited above demonstrate how Alliance universities’ connectivity and expertise are driving economic growth through increasing local SME innovativeness.
58. The Witty Review recommended that “Universities should put in place a single point of entry for SMEs that ‘triages’ their needs and directs them to the relevant part of the university. This point of entry should also look to drive up SME demand and engagement, and work with external partners across the locality, as well as within the university.”²⁵ Although HE-BCI data shows that over 90% of universities (and all Alliance universities) have a single point of contact for SMEs, and are innovating in SME engagement models, there is more work to be done to engage SMEs. We have suggested reforms to HEIF that

²⁴ European Commission (2014). *Innovation Union Scoreboard*, p. 70.

²⁵ Research published by the Institute of Directors and Universities UK in 2011.

would further extend universities' ability to support and increase the innovation levels of SMEs.

59. Although it is important that healthy returns are realized on public investments, it is important to point out that some innovation activities are more expensive than others. Engaging with numerous SMEs, for example, uses more resource than fewer collaborations and contracts with large businesses. Nevertheless the impacts of engaging with small businesses (in terms of human resource, percentage increases to profits, etc) may not equal those on large corporations in purely financial terms. High levels of engagement and innovation with SMEs do not necessarily translate into high levels of income (with implications for HE-BCI results and, subsequently, HEIF). Some measure (and recognition) of levels of SME engagement in quantity – given that this is a policy priority at all levels – would be extremely useful and a strong indicator of how universities are actively engaging with LEP and local growth agendas.

Government industrial strategies

60. We are broadly supportive of the approach that Government has set out in its industrial strategy. Within this we are particularly pleased that they are increasingly recognising the value of the Creative industries within our economy – punching well above its weight generating £8 million an hour, contributing £71.4 billion GVA and providing 1.68 million jobs in 2012.²⁶ Further work needs to be done to embed support for this industry within the wider strategy not only recognising the value of the sector in its own right but also the value it adds to other sectors. For example, in universities the design process is being applied to many different disciplines and creating innovative solutions to the great environmental, social and economic challenges that society faces.²⁷

²⁶ HM Government (2014). *Industrial Strategy, Government and industry in partnership, progress report*

²⁷ [University Alliance \(2014\), *Design & Creating the Future. Designers, Universities & Research*](#)