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The Changing State of Knowledge Exchange

UK Academic Interactions with External
Organisations 2005 -2015



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Executive Summary

Introduction

This report updates the analysis of the largest ever survey of UK academic engagement with external organisations, which was undertaken by the Centre for Business Research in 2008/9 and which covered the period 2005-2008. This original web-based survey attracted over 22,000 responses and the latest survey has received 18,177 responses - these are the two largest research and knowledge exchange surveys ever completed of a national Higher Education System.

The Context of the Surveys

The two surveys were conducted in different contexts - both for the educational sector and for the wider economy. The number of UK academics carrying out research rose between the two survey periods although the balance of full and part-time staff and the proportion doing research remained broadly similar. Academic involvement in knowledge exchange during the second survey period was, however, taking place in a more constrained macroeconomic environment with lower levels of business investment. Both private sector business R&D expenditure and HEI R&D expenditure were, nevertheless, higher in the second survey period.

Universities reported enhanced support for knowledge exchange between the two survey periods and external sources of income related to knowledge exchange rose. Government support for knowledge exchange in England was higher in the second survey period although its pattern was redirected towards the more research-intensive universities. There is some evidence that a smaller proportion of innovating businesses reported collaborative activities with universities during the second survey period than during the first and that fewer of them reported universities as a knowledge source for innovation. These changes in the overall environment must be borne in mind when comparing the results of the 2008/9 and 2015 surveys.

Survey Respondents

The survey was directed at all research or teaching active members of staff at UK higher education institutions (HEIs). In total more than 130,000 academics were surveyed and 18,177 complete responses received, which corresponds to a response rate of 14%. A comparison of response rate by discipline based on department membership shows that the response rate is lowest for arts and humanities with 12.4 % and highest in engineering and material science with 15.4%. The respondents comprised: staff in teaching positions

(lecturer, senior lecturer, reader or professor), which are normally permanent appointments (73% of respondents); those working in research roles as research fellows (18%); research or teaching assistants or technicians (3%); tutors or teaching fellows (4%); and emeritus or honorary posts following retirement (4%).

Teaching, Research and Other Activities

Almost all surveyed academics are involved in research and 89% took part in some teaching activity. An analysis of the pattern of activity by job role shows that administrative activities assume greater significance for those in lecturer, senior lecturer and professor employment roles compared to those in research roles. Outreach activities rise notably with seniority; those in more senior academic positions are more likely to have the resources and knowledge required to engage with external partners and are potentially more attractive for external partners.

Time commitments also differ by disciplinary field: research time is highest in biology, chemistry and veterinary science and lowest in the arts and humanities. The teaching time commitments are correspondingly higher in the latter disciplinary groups. The time spent on knowledge exchange with external organisations varies less across the disciplinary groups but is highest in engineering and materials science followed by social sciences. Women spent somewhat less time in research and more time on teaching and administrative tasks compared to men.

Research Orientation

We asked academics to characterise the primary motivation of their research in terms of three categories. These were: pursuit of fundamental research (the Bohr quadrant); pursuit of pure applied research (the Edison quadrant); and (recognising the interplay between basic and applied research) pursuit of user-inspired research (the Pasteur quadrant). Overall, 26% of academics considered their research motivation as primarily basic; 26% as primarily user-inspired basic; and 43% as pure applied. A very small proportion (5%) indicated that their research motivation could not be captured by these categories.

In terms of research time: 32% is spent on basic research; 27% on user-inspired basic research; and 41% on applied research. Shares differ by disciplines: in the arts and humanities, academics report spending 51% of their research time on basic research; in physics and mathematics, this share is 44%. In contrast, those in the health sciences spend close to 60% of their research time on applied research.

Research Application

The survey showed that 67% of respondents consider that their research is of relevance for non-commercial external organisations, and 41% stated that it had been applied in a non-commercial context. Approximately 37% consider their

research is of commercial interest to businesses and 19% state that it had been applied in a commercial context, and less than 14% consider their research to have no relevance for external organisations. The importance of commercial application depends on the disciplinary field. In health and in the social sciences, three-quarters of academics consider that their research is of relevance to the non-commercial sector and more than 45% in both disciplines report that it has been applied by non-commercial organisations. In engineering and materials science: 80% of respondents consider that their research is of relevance to business and industry and 50% report that it has been applied in a commercial context.

Research Commercialisation

A direct indicator of commercial application is the extent to which academics are involved in patenting, licensing and spin-off activities. Overall, 6% of academics have taken out a patent; 3% have taken out a license; and 3% have formed a spin-out in the three years prior to the survey. The importance of these mechanisms varies significantly by discipline: for instance, 22% of respondents in engineering and materials science have taken out a patent in the last three years. As may be expected, these forms of commercialisation are relatively low in social sciences and the arts and humanities.

People-Based, Problem-Solving and Community-Based Modes of Interaction

There is increasing recognition that the rich resources of the university can be used in a variety of communities and sectors, and address a variety of problems through a wide range of engagement activities. The survey identified 27 modes of interactions grouped into three categories: people-based, problem-solving and community-based.

The survey shows very high levels of interactions with external organisations through people-based activities - 88% of respondents are involved in at least one of these activities. Highly used activities include: conferences, networks, invited lectures, sitting on advisory boards, placing students with external organisations, and training employees for external organisations.

The survey also shows high levels of interactions through problem-solving activities. The most used mechanisms here are joint publications, joint research and the provision of informal advice on a non-commercial basis; each reported by 45% to 48% of respondents. These are followed by consultancy services, participation in research consortia, hosting of external personnel and contract research, with around 30% of respondents involved in each.

The survey also shows that there is substantial interaction between universities and the community, through activities such as public lectures and school projects.

Interacting with the Private, Public and Third Sectors

The 2009 survey of academics showed that interactions with the public and third sector are more widespread than interactions with the private sector, especially in health sciences, education, humanities and the social sciences. These findings are confirmed in the latest survey.

The survey shows that just over 30% of academics interact with private businesses: interactions are most widespread amongst academics in engineering and materials science where more than 50% of respondents report some engagement in the last three years. There is also a high share of respondents reporting interactions in disciplines outside the sciences including the social sciences (29%) and the arts and humanities (22%).

Overall, 35% of respondents interact with the public sector: the disciplines with the highest share are social sciences and health sciences (45%). The share of respondents involved with the public sector is lowest in engineering and materials science and in biology, chemistry and veterinary science (just over 21%).

Engagement with the third sector (activities with charitable and voluntary organisations) are more prevalent than engagement with the private and public sectors: with 41% of academics having engaged with the third sector during the past three years. Disciplines with a high share of respondents reporting engagement include social sciences (49%), arts and humanities (49%) and health sciences (48%). In comparison, only 18% of respondents from engineering and materials sciences engage with the third sector.

Creating Partnerships: How Interactions Develop

One of the main organisations to act as an intermediary is a university's technology transfer office (TTO). The survey shows that 40% of respondents had some contact with their TTO (or related organisation) in the past three years. A further 17% are aware that such services exist but had no contact in the last three years, whereas 43% are unaware that these types of services are available or believe such services not to be available at their institution.

There is significant variation by discipline, with the highest level of contact amongst engineers (60%) and biologists, chemists and veterinary scientists (49%). The lowest percentage of academics with TTO contact is amongst academics from health sciences (37%) and the arts and humanities (30%). A lack of awareness of the services of a TTO was highest in arts and humanities (47%) followed by physics and mathematics, social sciences and health sciences (40-42% in each). These results for the arts and humanities may be connected to their greater involvement via other institutional support routes, connected for example with public engagement and media related activities (TNS, 2015).

The TTO was the least frequently cited initiator of knowledge exchange. Conversely, the most frequently cited initiators were: individuals associated with the external organisation

(cited by 83%); the actions of academics approaching external organisations (72%); followed by mutual actions (70%).

Public and Charitable Funding Bodies

Public and charitable funding bodies also play a role in enabling interactions with external organisations through targeted knowledge exchange funds and programmes or as part of their grant requirements. The survey asked academics to provide information on which public or charitable funding bodies had provided support for their external interactions during the past three years.

Approximately 50% of respondents said that they did not receive external support from public or charitable funding agencies for their engagement with external organisations. Research Councils provided outreach funding to 31% of those that engage with private, public and third sector organisations this was the most frequent source followed by charities.

The Motivations for External Engagement

Academics have a variety of motivations to engage with external partners. Many of the main motivations are concerned with developing research including: gaining insights in the area of their research; keeping up to date with research in external organisations; and testing the practical application of research. The results apply across all disciplines, but these motivations are more prevalent in engineering and materials science followed by social sciences. Motivations to improve teaching are not as strong as those for research but approximately half of respondents engage with external organisations to gain access to knowledge that will further their teaching. Another important motivation is furthering the institution's outreach mission. Conversely, motivations that were concerned with financial or commercial gains were generally considered as unimportant.

Impact of External Engagement

In addition to motivations, the survey asked about impact. The results show that external interactions are helpful in relation to research: giving new insights; leading to new contacts; and leading to new research projects; only 10% of respondents consider it to have had very little or no impact.

External engagement can also provide benefits for teaching although, in general, those reporting positive teaching effects are fewer than those reporting positive research effects. Major positive impacts include: changes in the way teaching material is presented; changes to course programmes; and improved reputation. Only 28% report that it had no or very little impact on their teaching.

Constraints: Barriers to External Engagement

There are a range of factors that hinder or limit external interactions. The most frequently cited constraints for the sample of respondents as a whole are: a lack of time, (identified by 53% of respondents); bureaucratic hurdles within the university (23%); a lack of resources (21%);

insufficient rewards (20%); and the difficulty of identifying partners (17%). In contrast, cultural differences and legal barriers regarding IP, reasons regularly mentioned in the literature, are not considered substantial constraints; although these may be highly important for those interactions such as patenting and licensing which, although relatively less frequent, do involve IP and other related contractual issues.

The Role of the Academy: The Perspective of Academics

How academics perceive the role of universities in society and the economy may significantly influence their interactions with external organisations. Respondents were asked to indicate the extent to which they agree to a series of statements about university external relationships. The results show that most academics agree that academic freedom is of fundamental importance. Furthermore, in general, academics believe that higher education has a key role to play in increasing the competitiveness of business in the UK; but that recently universities have gone too far in attempting to meet the needs of industry to the detriment of their core teaching and research roles. Respondents are ambivalent about the statement that UK business does not have the capacity to use academic research effectively.

Comparison of the 2008/9 and 2015 Surveys

The 2015 survey allows for some comparisons to be drawn with the results from the 2008/9 survey. The comparisons are based on an analysis of responses of a matched set of academics.

This matched analysis shows there has been a decline in commercialisation: in 2008/9, 8% of academics reported that they had taken out a patent and 6% had licensed their research, compared to just 6% and 4% respectively in the more macro-economically constrained 2012-15 period. The biggest difference is in the share of respondents that had formed or run a consultancy, which was 15% in 2008/9 and only 7% in 2015. Overall 14% of academics in the 2015 sample report some kind of commercialisation activity compared to 22% in 2008/9. These differences are observed across disciplinary fields, seniority levels and gender. They are consistent with the deterioration in the macroeconomic environment preceding the second survey dampening such activities.

The analysis of people-based, problem-solving and community-interactions shows that the relative importance of various interaction types has remained stable between the 2008/9 and 2015. There was a minimal decline in the share of respondents reporting people-based and problem-solving engagement through at least one of the modes and a modest increase in community-based engagement.

The majority of research motivations have remained unchanged, but there has been a small increase in the importance of teaching motives. The objective to further one's

institution's outreach mission, however, has experienced the largest increase from just 44% of respondents in 2008/9 to 62% in 2015. The inclusion of impact case studies in the 2014 Research Excellence Framework (REF2014) may be one factor in this change along with the greater emphasis in supporting knowledge exchange by universities.

Although academics may engage slightly less in some modes of interaction in the period 2012-2015 compared to 2005-2008, the evidence suggests that their efforts may have become more strategically focussed and specialized than they were in the past. The strengthened emphasis on impact in both research and excellence funding may have encouraged this and may also have encouraged academic staff to feed their external experience into their other work roles.

Institutional Differences

The type of institution may be instrumental in deciding how much, and with whom, academics engage due to their differing research and teaching foci. Whereas academics at top-decile research universities spend about 50% of their time on research, those at post-1992 institutions spend just 25% on research and relatively more time on teaching and administrative tasks.

These differences in work focus may impact the type and amount of engagement activities. For instance, academics at top-decile research-intensive universities are more likely to generate patents and to licence out their research. In terms of non-commercial forms of engagement it is specialist institutions that show the highest share of academics involved in at least one mode of interaction in each of the three broad categories. Top-decile research universities have the lowest share, though differences with other non-specialist institutions are small.

Regional Differences

Regional differences in the type of engagement activities are generally small, although Northern Ireland stands out as the region with the highest level of engagement - albeit engagement that is primarily with the public and third sectors.

The Geography of Engagement

Engagement activities may have different spatial dimensions. The survey shows that extra-regional problem-solving and people-based activities are used by more academics compared to local or intra-regional activities. Community-based activities have a greater local focus in all fields as they are less well suited to interactions with distant partners and locality plays an important role when searching for partners. For people-based and problem-solving activities, activities can be transferred across regions more easily; and external organisations and academics may both look beyond their region to find the best-suited partner.

Preface

Introduction

This report updates the analysis of the largest ever survey of UK academic engagement with external organisations which was undertaken by the Centre for Business Research in 2008/9 and which covered the period 2005-2008. This original web-based survey attracted over 22,000 responses (Abreu et al., 2009). Since the original survey, there has been a continued debate about the role of universities in driving economic growth and the extent to which collaboration between the academic and non-academic sectors is a fundamental enabler of this role. Since the results of the survey were first published there have been over a dozen related inquiries into, and reports on, this topic. Many of these have cited or drawn upon the results of the survey. (Docherty et al., 2012; Heseltine, 2012; Wilson, 2012; House of Commons Select Committee on Science and Technology, 2013; Witty, 2013; BIS, 2011 2014a 2014b 2014c 2014d; Hauser, 2010 2014; NCUB, 2014; Dowling, 2015).

The 2008/9 study highlighted the multifaceted role of the university and provided evidence of a “third mission” that is inclusive of all publics (public, civic and business) and research areas (humanities, social and natural sciences). Accordingly, since the 2009 report a series of publications by the core survey team have paid attention to the impact of research across all disciplines (not just STEM) and on public and third sectors effects. They have also analysed the link between research excellence (measured through the Research Assessment Exercise and Research Council funding) and third mission activities (Hughes and Martin, 2012; Hughes and Kitson, 2012 2013; Hughes et al., 2011 2013a 2013b; Hughes, 2014).

The new survey for 2015 covers the period 2012-2015 and was conducted between March and October 2015. The survey was directed at all research or teaching active members of staff at UK HEIs and 18,177 completed questionnaires have been returned corresponding to a response rate of 14%. In the 2008/9 round 22,170 complete questionnaires were returned - a response rate of 17%. These are the two largest research and knowledge exchange surveys

ever completed of a national Higher Education System. The large and representative sample sizes permit robust estimates of the UK research and knowledge exchange landscape and of important changes in it over time. The new survey explores the themes first analysed in 2009 with a number of questions enhanced to enable deeper quantitative analysis of the intensity as well as incidence of external knowledge exchange pathways. The themes covered in both surveys relate to: work roles and their recognition by the university; the balance between basic and applied research; the range, depth and frequency of external knowledge exchange interactions and how they are initiated; and the motivations and constraints experienced by academics when engaging in knowledge exchange activities. Comparisons are made across HEIs grouped by research characteristics and by geography.

The 2015 survey was designed to produce results which were as comparable as possible with the results from the first survey. This allows an assessment to be made of changes in each of the dimensions discussed above between three-year periods prior to the dates of the two surveys (i.e. between 2012-2015 and 2005-2008).

UK Economic and Higher Education: Background Trends 2005-2015

In interpreting the results of both surveys, and of comparisons between them, it is important to consider the changes in the number of academics and changes in the research and knowledge exchange environment in which they were operating during the periods covered by the surveys (UUK, 2014).

The Changing Size of the Academic Population

Exhibit 1 charts the percentage of full-time and part-time academic staff over the period 2005/6 to 2013/14 and an index of the total of full and part-time staff over the same period. The total number of academic staff rose over the period so that there were approximately 18% more academics in the second survey period than in the first survey period; and the proportion of part-time staff rose slightly over this period.

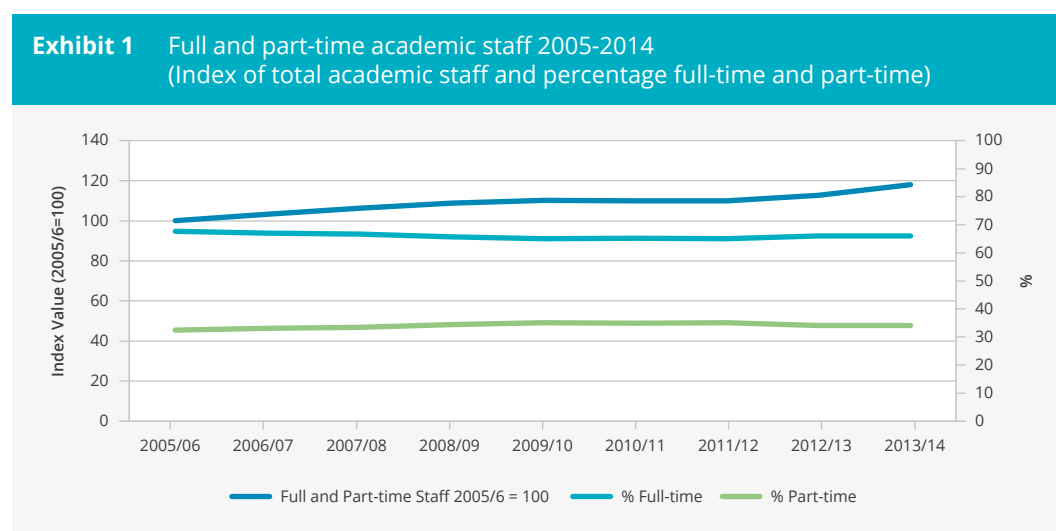
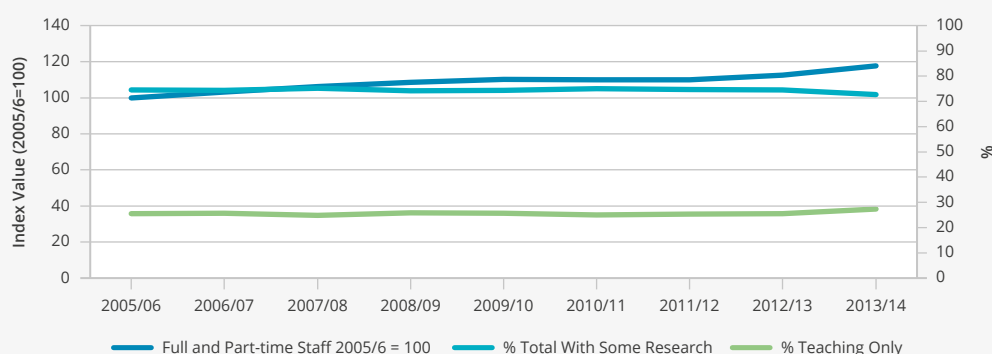


Exhibit 2 provides a breakdown of those academic staff into the percentage teaching only and the percentage either carrying out research only or teaching and research. The proportion doing teaching only rose slightly between the two survey periods while the percentage doing some research fell

slightly from around 75% to around 73%. The total academic staff carrying out teaching and research therefore rose over the period with relatively little change in the proportion of full or part-time staff or in the proportion doing research. A separate analysis (not shown here) also reveals that there was little change in staff student ratios over this period so that the proportion of time available for research and knowledge exchange could have been expected to have remained broadly the same.

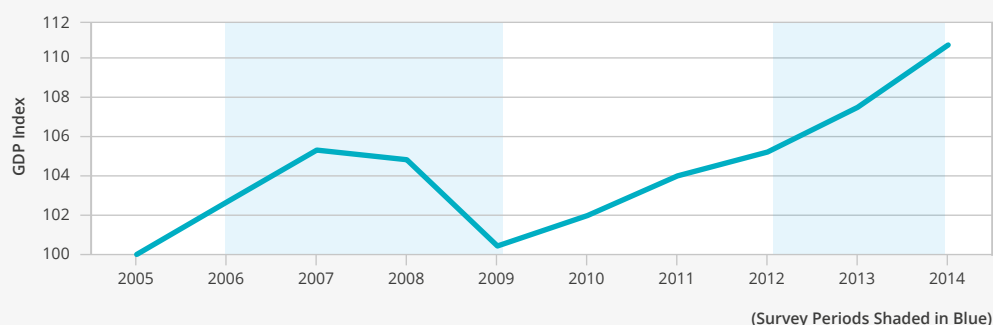
Exhibit 2 Change in full and part-time academic staff (2005/6=100) and percentage of staff with teaching only roles and percentage of staff with some research role



Macroeconomic Background¹

A significant difference between the two survey periods is to be found in the contrasting macro-economic conditions in which they occurred. Exhibit 3 shows the path of real output in the UK economy measured in terms of gross domestic product (GDP). In this Exhibit, and in Exhibits 4-8 which follow, the two survey periods are shown shaded in blue. Exhibit 3 shows that UK output fell dramatically in 2008-9 in the aftermath of the global financial crisis. Knowledge exchange activities before then were, however, being conducted in a relatively buoyant economy. The second survey took place after a long period of slow recovery from the recession which followed the financial crisis. To the extent that private sector business interest in knowledge exchange is related to business expectations, then we might expect the demand to be lower in the second survey period than in the first. One way of looking at this is to consider trends in investment by the private sector.

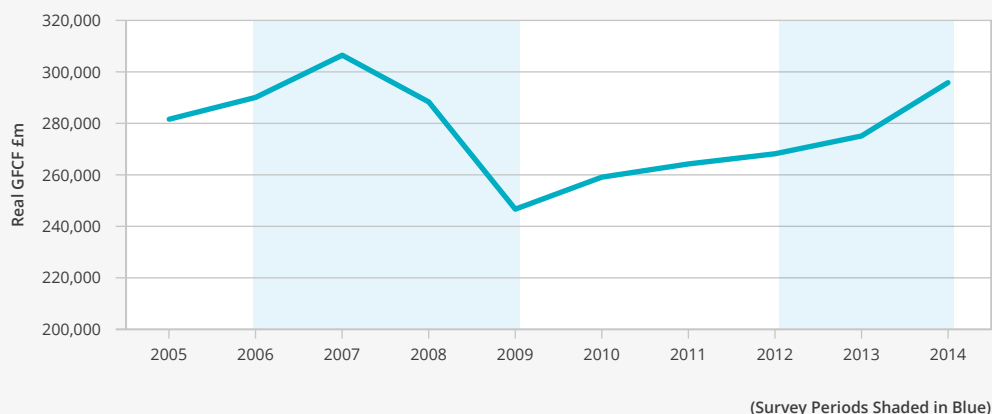
Exhibit 3 Real gross domestic product index (2005=100)



¹ The data in Exhibits 3-8 are drawn from UK Office of National Statistics on line sources.

Exhibit 4 shows investment measured as real Gross Domestic Fixed Capital Formation (GFCF) from 2005 to 2015. Investment collapsed at the end of the first survey period and had still not regained the levels of 2006/7 by the beginning of 2015. If we compare total investment (in real terms) in the 3 year period 2006Q1 to 2009Q1 with total investment in the second three year survey 2012Q1 to 2015Q1 there was a fall of approximately 3.5%. This decline in investment may have led to some fall off in private sector demand for knowledge exchange activities associated with the introduction of new equipment embodying new technologies.

Exhibit 4 Real annual gross fixed capital formation 2005-2014



A more direct indicator of the demand for knowledge exchange is investment in business R&D. Exhibit 5 shows trends in business enterprise expenditure on R&D along with the similar data for R&D expenditure by the HEI sector and the Research Council laboratories. Business enterprise R&D was slightly higher in the second survey period and so was HEI R&D whereas R&D in the Research Councils, own laboratories and institutes fell slightly. Exhibit 6 plots the similar data for the government and private non-profit sector: in both cases R&D was lower in the second than in the first period. The combined impact of the changes shown in Exhibit 5 and 6 was that R&D expenditure was slightly higher in the second survey period than in the first period.

Exhibit 5 Annual UK real R&D expenditure by performing sector: Business Enterprise, Higher Education and Research Councils (2013 prices)

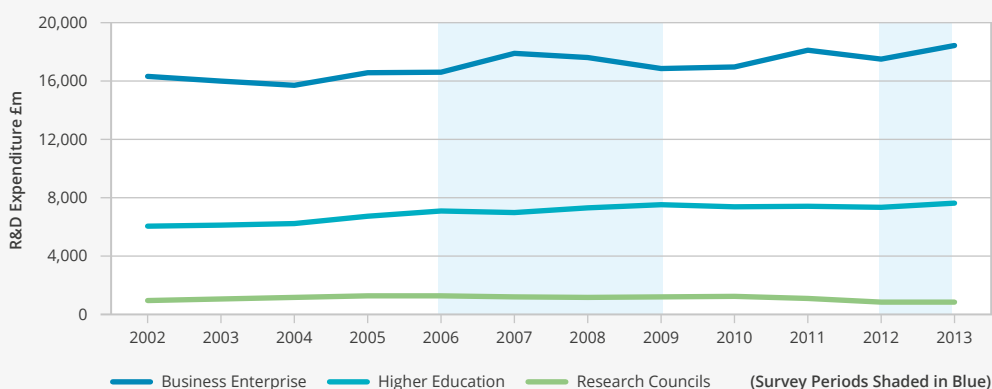


Exhibit 6 Annual UK real R&D expenditure by sector: Government and Private Non-Profit (2013 prices)

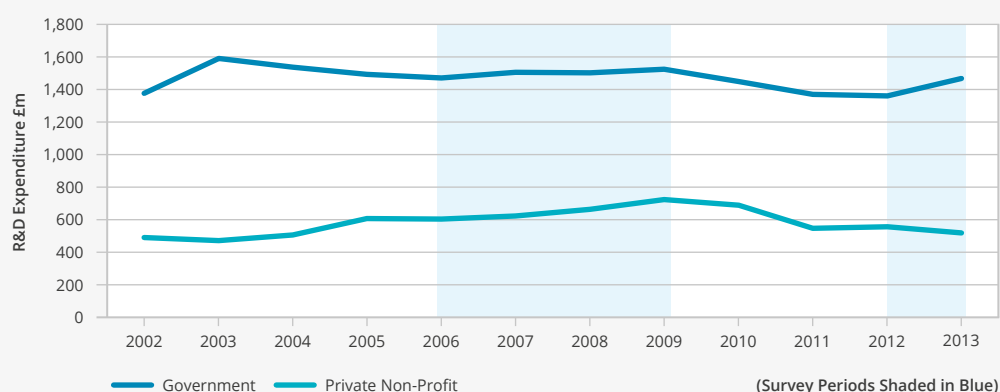
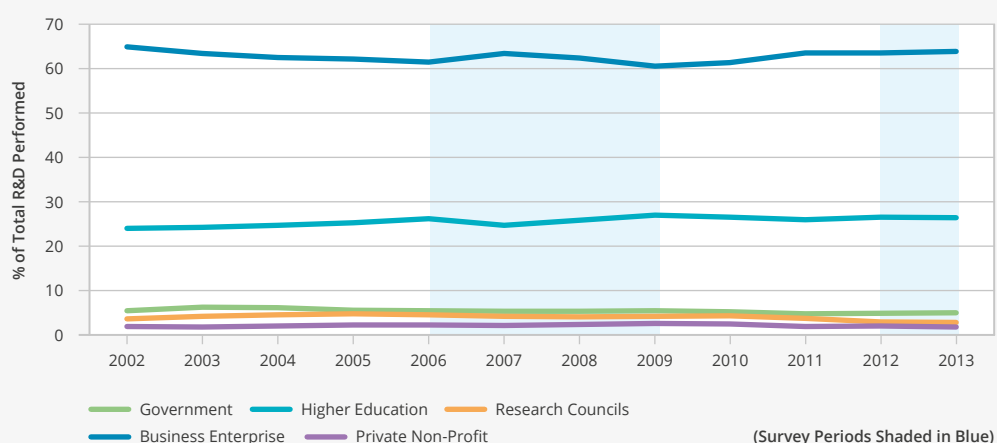


Exhibit 7 shows the outcome of these trends in terms of the share of UK R&D accounted for by each of the sectors analysed in Exhibits 5 and 6. Broadly speaking the share of higher education and business enterprise R&D were roughly the same for the years for which data can be compared whilst the Research Council element fell. Another proxy for potential demand for research outputs and knowledge exchange by the private sector is the share of higher education R&D expenditure that it funded. Exhibit 8 provides this data alongside an analysis of the other sources of funding for higher education R&D. These sources include the primary funders in the dual support system for funding UK HEI research and development (HERD) namely the research and funding councils.

Exhibit 7 Share of total annual R&D by sector of performance 2002-2013

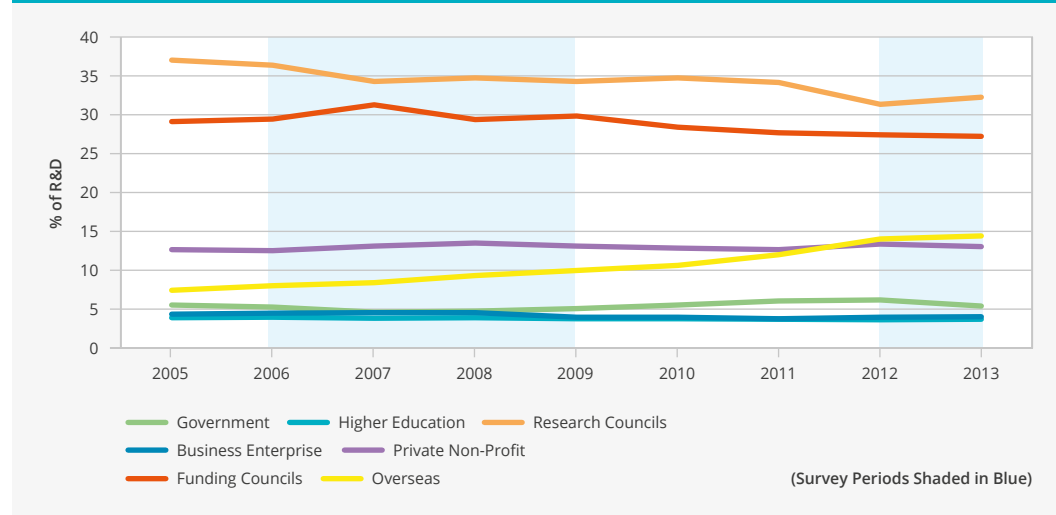


There was a slight decline in business enterprise funding from around 4.5% in the period 2005-2008 to approximately 4% in the years 2012 and 2013. This suggests there might be a slightly lower demand for research output and knowledge exchange activity from the private sector in the second survey period.

It is notable that the proportion of funding for HEI R&D accounted for by the Research Councils and the Funding Councils was significantly lower in the second survey period. The counterpart to this was a significant rise in the share of funding for UK HEI R&D expenditure which came

from overseas largely through EU research and programme funding. Overseas funding rose from £264K in 2005/6 to £687K in 2013/4. To the extent that this is associated with knowledge exchange and flows of activity to exploit research to overseas entities this might imply a change in the direction of UK knowledge exchange activity away from the UK.

Exhibit 8 Percentage of annual Research Councils and Higher Education (HERD) R&D expenditure by funding source (2005-2013)



Support for Knowledge Exchange and University External Interactions: Funding Councils,² Research Councils and Innovate UK

The surveys of 2008/9 and 2015 took place against an evolving set of policy mechanisms designed to support university-industry relationships and more general university links with external organisations. These were set within a more general evolution of science and innovation policy emphasising the role of universities (Hughes, 2015; UK-IRC, 2014). Prior to the 2008/9 survey major government sponsored reviews of innovation and science policy took place in 2003, 2004, 2007 and 2008 with subsequent reviews in 2011 and 2014. There were also numerous other related inquiries and reviews just prior to and contemporaneous with the 2015 survey. (DTI 2003; HM Treasury, 2003, 2004; Sainsbury, 2007; DIUS, 2008; BIS, 2011, 2013, 2014a, 2014b, 2014c, 2014d; Hauser, 2010, 2014; Docherty et.al., 2012; Heseltine, 2012; Wilson, 2012; House of Commons Select Committee on Science and Technology, 2013; Witty, 2013; NCUB, 2014; Dowling, 2015).

The upshot of these reviews and policy developments has been the emergence and reform of a wide range of mechanisms with the direct intention or capacity to support increased university interactions with external organisations and private sector industrial connections in particular. The most directly relevant of these in the specific context of knowledge exchange and university interactions with external organisations are those relating to the funding bodies, the Research Councils and Innovate UK.

² University funding in the UK is provided by the Higher Education Funding Council for England (HEFCE), the Scottish Funding Council (SFC), the Higher Education Funding Council for Wales (HEFCW) and in Northern Ireland directly by their Department for Employment and Learning. We use the terms "funding bodies" and "funding councils" interchangeably in this report to refer to these four bodies taken together.

The four UK higher education (HE) funding bodies for England, Scotland, Wales and Northern Ireland and the seven UK Research Councils provide support for university research under the so-called Dual Support System (Hughes et al., 2013a). The two components of this system are a 'backward looking' block grant from the UK HE funding bodies and a 'forward looking' element based on grant applications to the UK Research Councils. The first component is based on an assessment of past research quality across a pre-defined range of 'units of assessment' covering all subject areas. Universities get a block grant which includes a significant proportion based on a formula using both numbers of researchers submitted and the assessed quality of their research and (from 2015-16 since REF2014) its impact beyond the strictly academic. Broadly speaking universities may allocate the block grant across their university research activities in any way they wish. It therefore provides universities with some strategic discretion in funding chosen areas of research, contributes to the full economic cost of research funded by Research Councils, charities and others, and provides HEIs with the flexibility to respond quickly to emerging opportunities/research partnerships. The second component is a 'forward looking' element based on competitive bidding by researchers to Research Councils. In recent years this bidding process has been redesigned to include specific consideration and identification of "Pathways to Impact" for the outputs of the research.

The Dual Support System has been augmented for English universities since 2008 by consolidating so-called 'third stream support' into a single instrument in the form of Higher Education Innovation Funding (HEIF). Since 2008 this has taken the form of a block grant calculated on a formula basis which has changed over time and has had the effect of increasing the allocation of support to research intensive institutions (Ulrichsen 2015).³ Schemes with similar intent have been introduced by the other three funding bodies.

Innovate UK (formerly The Technology Strategy Board) was formed in 2007 as a non-departmental public body (NDPB). It is intended to fund activities to enhance innovation productivity and economic growth and to be business led in its approach to the science and university base. It has been estimated that around 30% of its total grant funding goes to partners in the HEI research base and around 60% of the projects it funds involve HEI collaboration. It has also been estimated that virtually all UK HEIs and a significant number of public sector research institutes and other science-based institutes are involved in business-related work on Innovate UK projects.

The overall support landscape focussing on the funding bodies, the Research Councils and Innovate UK prior to the 2015 survey is shown in Exhibit 9 (Hughes, 2015).

The UK HE funding body information in Exhibit 9 is limited to the Higher Education Funding Council for England. Support for Welsh, Scottish and Northern Ireland universities is excluded because they have slightly different mechanisms to HEFCE for the allocation of funding and its relationship with university-industry collaborative activity (Hughes et al., 2013).

The data shows that in the years 2013-14, of the £1.9 billion funding provided by HEFCE the vast majority was allocated on the basis of the Research Assessment Exercise 2008 (RAE2008) (so-called Quality-Related or QR research funding).⁴ It is important to note that as part of the overall funding to support research, universities may use QR funding alongside other funds to strategically enhance their capacity and resources to undertake external interactions in addition to specific impact related funding elements. This aspect may have been enhanced prior to the 2015 survey because the formal introduction of impact case studies as part of the evaluation

³ The allocation formula in 2008 was 40% based on size/number of academics plus 60% based on "performance" demonstrated by external income generated from working with business and others (without prejudice as to whether it is research related or not). The formula was changed in 2011 to focus reward only the performance element, thus removing the size element.

⁴ Of £1.6bn resource available for QR around £1bn was allocated by reference to the RAE2008, of the remainder £198m was allocated by reference to charity research income, £63m by reference to business research income and £235/240m to support PhD supervision.

process in the REF2014 assessment would have been known to inform resource allocations from 2015 onwards. For the REF2014 20% of the assessment (and of the mainstream QR funding allocation since 2015) to a university has been based on the assessment of impact, primarily through impact case studies designed to demonstrate the impact of research carried out up to 15 years prior to the assessment date.

Exhibit 9 Support for University Research and External Interactions:
The Dual Funding System and Innovate UK (£m p.a.)

Agency/Scheme	(£m)
Higher Education Funding Council for England*	1892.2
<i>of which</i>	
Quality related (QR) research funding	1558.0
Higher Education Innovation Funding (HEIF)	160.0
Catalyst Fund	37.6
UK Research Partnership Investment Fund	136.6
Research Councils**	2688.0
Innovate UK (formerly The Technology Strategy Board)***	412.2
Collaborative R&D Projects	172.9
Knowledge Transfer Networks	15.2
Knowledge Transfer Partnerships	16.9
Catapult Centres	121.3
Biomedical Catalyst	30.0
Innovation Vouchers	3.5
Innovation and Knowledge Centres	1.9
* 2013–14. Excluding capital grants for English universities and all recurrent and capital funding for Scottish, Welsh and Northern Ireland universities by their respective funding bodies. ** 2012-13 *** 2013-14	

Source: Hughes (2015) based on Witty (2014), Appendix 1, Technology Strategy Board (2014), data supplied by HEFCE and author's own calculations based on HEFCE, HM Treasury and HMRC data.

In addition to this general effect specific “third stream” HEFCE funding in support of impact is represented by HEIF. HEIF funding amounted to £160 million in 2013-14.

Although HEIF funding was forecast to fall year on year in real terms after 2011 it was still forecast to be higher in real terms in the second survey period compared to the first. It is important to note, however, that the formula for allocating HEIF funding across English universities was altered for the period after 2011. HEIF support became more concentrated across fewer institutions during the second survey period. Thus the number of HEIs in receipt of HEIF was reduced to 99 in 2015

from 129 in 2011. Medium and low research intensive HEIs were the most affected. Additionally, the cap on the funds that the most research intensive HEIs could be awarded was raised. The net result of the formula change and the cap change (whether intended or not) was that the support awarded became more skewed towards the most research-intensive institutions. The top 40, in terms of intensity, accounted for 43% of all funding in 2010/11 but shifted to over 66% in 2011/12 when the new allocation rules for the period 2011-2015 were introduced (Ulrichsen, 2015). These changes may have affected the cross-HEI pattern of knowledge exchange activities between the two surveys and reduced support for academics in a significant number of institutions.

Taken as a whole, these results for HEIF suggest that academics in the research-intensive English universities were as well or better supported during the second survey period compared to the first period. Universities ranked in the lower research-intensive categories typically had a higher funding per academic than those universities ranked in the top six and also than those ranked in the high group until 2011 after which the latter overtook them. The relatively low ranking of the top six universities in terms of HEIF support per academic reflects the allocation process which (even after the change of 2011) places a cap on the total HEIF support which they can receive.

By the time of the 2015 survey HEIF funding was augmented by £37.6 million for the HEFCE Catalyst Fund (formerly Strategic Development Fund) over 2013/14 and £136.6 million for the UK Research Partnership Investment Fund (UKRPIF).⁵ The Catalyst Fund is designed to generate collaborations between university departments and other external funders. This has included co-investments with local enterprise partnerships that have made loans in support of HEFCE funding and with business partners linked to UK industrial policy strategy. UKRPIF introduced in 2012 is intended to encourage universities to accelerate private co-investment in university research infrastructures and to support university strategic research partnerships with external organisations. It is funded by BIS and administered by HEFCE. A university with proposals for large long-term capital projects which can leverage double from private sources the amount of funding provided by HEFCE, and which can demonstrate a record of research excellence may obtain awards in the range of £10-35 million. For the first two rounds of UKRPIF (funding from 2013-14 to 2014-15) twenty projects with a final commitment of funds of over £300 million had been put in place with £855 million leveraged from business and charities.

The seven UK Research Councils in 2012-2013 provided £2.7 billion worth of funding for university research. This funding has included increasing support for external interactions included in the research grant award itself and for research conducted collaboratively with external organisations. Moreover in the period between the 2008/9 survey and that of 2015 the Councils have increasing research funding linked to sectors and technologies identified, for example, in the UK Industrial Strategy. This has included research programmes carried out in partnership with Innovate UK which are discussed further below.

Specific Research Council funding has also been made available to universities to support activities designed to encourage and enhance the impact of previous and current research. For example, four Creative Industry Knowledge Hubs have been funded by the Arts and Humanities Research Council (AHRC) in England and Scotland as part of their wider research and knowledge exchange activities in this important area. In addition universities are now eligible for Impact Acceleration Account (IAA) or similar funding based on their past record of success in obtaining Research Council funding irrespective of the mode by which that funding was achieved, whether responsive or otherwise. These are designed to enhance external interactions and the impact of research. All Research Councils now also produce an annual Impact Report and have adopted a Pathways to Impact approach to the identification of external interaction and knowledge

⁵ By the time of the 2015 survey a £200 m of RPIF funding to 2017 had been announced by government, but a smaller figure would actually have been spent by the HEIs and therefore allocated by HEFCE.

exchange in their grant application process (see, for example, EPSRC, 2011; ESRC, 2011; AHRC, 2010; STFC, 2011; NERC, 2011; BBSRC, 2011; MRC, 2011 and their reports in subsequent years). The upshot has been a significant increase in knowledge exchange supporting expenditure by the Research Councils.⁶ For example, in the three years prior to the 2008/9 survey, AHRC estimates show that KE expenditure averaged around £2m per annum whilst in the three years prior to the 2015 survey it averaged around £7m. On the same basis the Engineering and Physical Sciences Research Council (EPSRC) calculate that KE funding averaged £8.4m p.a prior to 2008/9 survey and £11.0m p.a. prior to the 2015 survey. In the case of the Natural Environment Research Council (NERC) the estimated corresponding three year average figures were £3.6m p.a. and £10.3m p.a.

Innovate UK is intended to support innovation which is business led and has strong programme links to the science base. Its annual budgets and commitment to HEI interaction grew between the two academic surveys (Hughes, 2015). The most important activity is focussed around collaborative R&D, which had a £173 million budget in 2013-14. These projects encourage collaboration between large and micro-companies and academic partners where the object is to develop new products, processes and services.

The second most important funding stream relates to Catapult Centres. This is a major new programme which was established in October 2011 and therefore post-dates the 2008/9 survey. By 2013-14, £121 million had been committed in support of seven Catapult Centres with more in the pipeline. The Knowledge Transfer Partnership Programme, which had a budget of around £17 million in 2013-14 funds placements of individuals, principally of PhD and post-graduate students, in small and medium-sized enterprises (SMEs). There were more than 700 projects in the portfolio at the end of 2013-14 but the numbers of supported placements fell between the 2008/9 and 2015 surveys (Dowling, 2015).

In addition to the Knowledge Transfer Partnership Scheme, Innovate UK also operates a Knowledge Transfer Network Scheme. This is focussed on encouraging co-operation across technology sectors, principally between UK-based businesses. Although its focus is on business co-operation, there is opportunity for connection into the science base.

Innovate UK has also co-funded a number of joint activities with the Research Councils which post-date the 2008/9 survey. Innovate UK and the Medical Research Council have collaborated on the Bio-Medical Catalyst. This is designed for the exploration and evaluation of early stage scientific ideas through to commercial applications. Academics and any UK Small and Medium-sized Enterprise (SME) can apply, either individually or in collaboration. Subsequent to the data shown in Exhibit 9 for the Bio-Medical Catalyst, an Agri-tech Catalyst was introduced by Innovate UK with support from the Biotechnology and Biological Sciences Research Council (BBSRC) and the Department for International Development (DfID) as part of the UK Strategy for Agricultural Technologies. It supports the 'proof of concept' development of near-market agricultural innovations. In a similar vein an Industrial Biotechnology Catalyst was launched by Innovate UK in partnership with the BBSRC and the EPSRC to support R&D for the processing and production of materials, chemicals and bioenergy through the sustainable exploitation of biological resources. Finally an Energy Catalyst was launched in 2014 by Innovate UK in collaboration with the EPSRC and the Department of Energy and Climate Change (DECC).

The Innovation Vouchers Scheme operated by Innovate UK is specifically designed to link external knowledge providers including HEIs to SMEs. It was launched in 2012. SMEs are awarded vouchers to place contracts with HEI with a focus on agri-food, open data, the built environment,

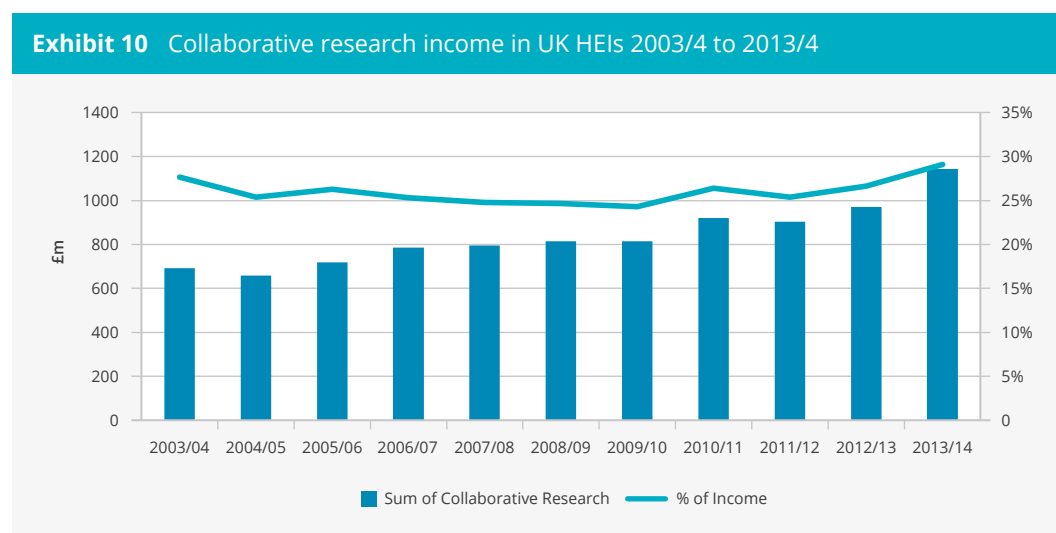
⁶ Total Research Councils' support for Knowledge Exchange is difficult to measure because it may be included, for example, as a component of research grant awards as well in dedicated separate KE spend. The estimates shown in the following sentences may therefore underestimate total KE support spend and its upward trend.

cyber-security, and energy, water and waste. Finally Innovate UK has provided support funding for Innovation and Knowledge Centres in collaboration with the Research Councils to allow academic researchers and business to work on emerging commercialisation opportunities from new technologies. They are intended to sit between HEIs and the new catapult Centres.

Taken as a whole this review of funding body, Research Council and Innovate UK programmes and changes between the two survey dates suggest an enhanced emphasis and degree of support for HEI interactions with external organisations. This could be expected to offset any downward pressure on external interactions arising from macroeconomic and private sector demand side trends. The increased strategic focus involving Innovate UK and the adoption of Pathways to Impact approach may also have led HEIs and academics to a more strategic focus or specialization of their own efforts in response to funding opportunities offered by the funding bodies, the Research Councils and Innovate UK.

Higher Education-Business and Community Interaction Measurement

Finally we can turn to trends in the range of business and community interaction activities captured in the Higher-Education Business and Community Interaction Survey (HEBCIS; the latest data ends in 2014). It is relevant to note that trends in the data may be biased upwards if there has been a greater incentive for universities to capture this information over time and if they have also developed a greater capacity to collect it. The actual extent of this is however not known. The latest HEBCIS (HEFCE, 2015) shows that there was a substantial increase in total investment in knowledge exchange by: large businesses; the public and third sector organisations; and by individuals. There was also an increase, from a relatively low level of income, from SMEs. A range of other collaborative income including collaborative research, contract research, consultancy, equipment and facilities continuing professional development, and regeneration and intellectual property also rose between our two survey periods. Exhibit 10 shows, for example, the increase in collaborative research income in real terms between the two survey periods as well as the increase in its share of total external income for research received by HEIs in the UK.

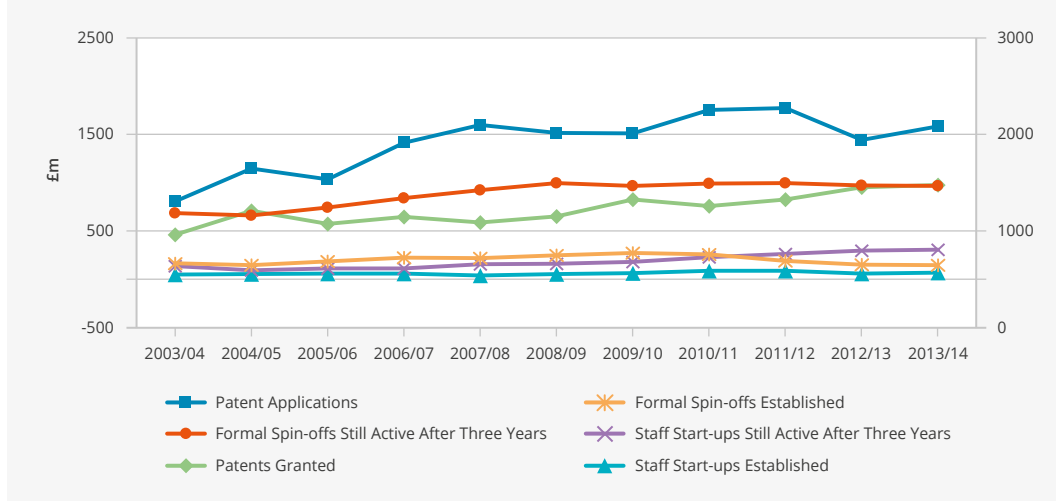


Source: HEBCIS 2015 Higher Education-Business and Community Interaction Survey 2013-4; own calculation.

Exhibit 11 shows trends in patent applications and patents granted as well as numbers of start-ups and spin-offs, and the numbers of them remaining active after three years. The exhibit shows that there was little change in the number of patents applied for between the

two periods. However the number of patents granted rose. There is also some evidence of an increase in the quality of spin-offs and start-ups over time since the proportion surviving after three years was higher in the second period than in the first.

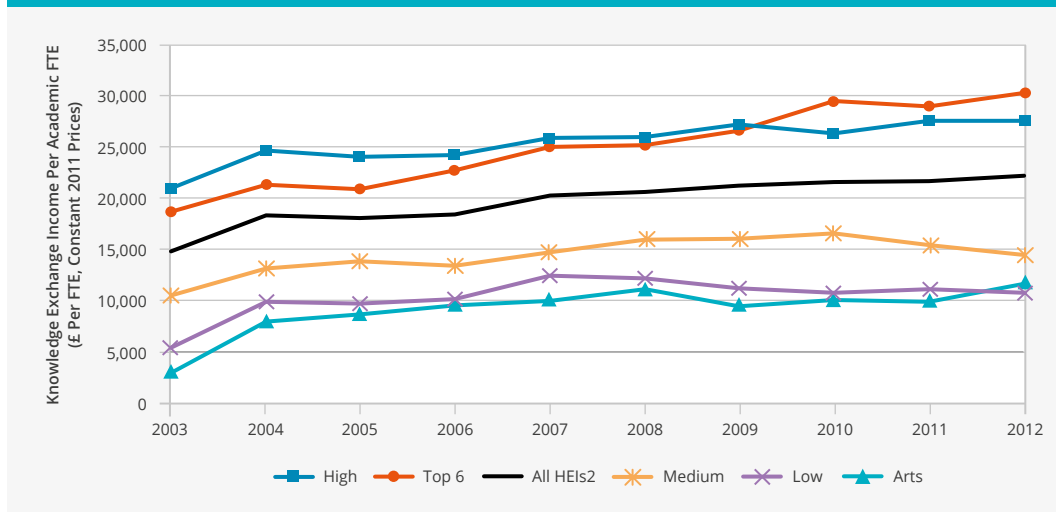
Exhibit 11 Number of Start-ups, Spin-offs and patents in UK HEIs



Source: HEBICIS 2015 Higher Education-Business and Community Interaction Survey 2013-4; own calculation.

Given that the academic population increased between our survey periods it is useful to look at knowledge exchange income per academic full-time equivalent member of staff. This is shown in Exhibit 12 for English universities where the solid black line shows a steady increase in such income for all HEIs taken together. The top six research-intensive universities and the high-intensity University cluster also show an increase. The medium intensive and low intensive universities show a decline in income per full-time equivalent member of staff. There is little difference between our survey periods in terms of knowledge exchange income per member of staff in the arts institutions.

Exhibit 12 Real Knowledge Exchange income per FTE academic FTE 2003-2012: English universities



Source: Ulrichsen 2015 Knowledge exchange performance and the impact of HEIF in the English HE sector HEFCE.

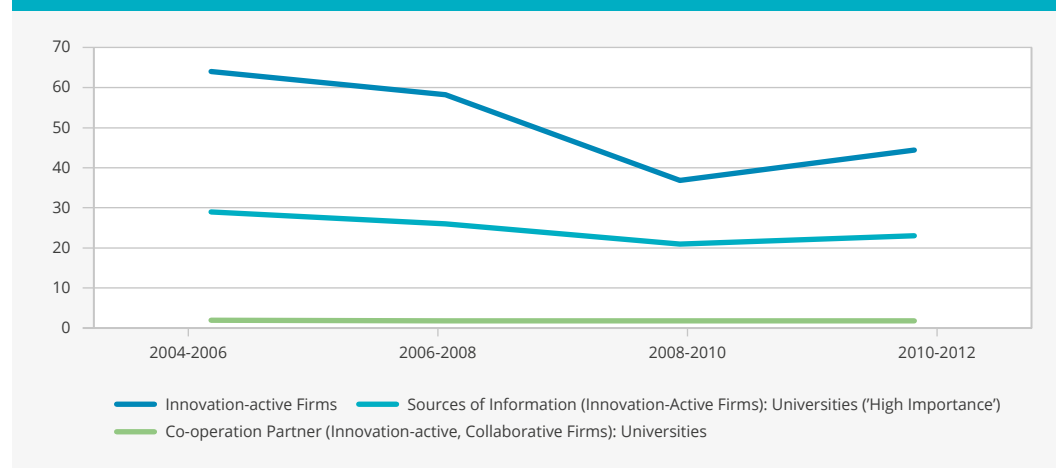
The HEBICIS report also shows that UK Universities have increased their commitment to support knowledge exchange. They have, for instance, attempted to provide greater incentives for academics to engage such as insurance to indemnify staff and the introduction of required trust contracting systems for business consultancy, as well as by enhancing enquiry points and assistance for SME inquiries. The report shows that the overall impact of these changes has been mixed. Thus the proportion of universities reporting that there were some incentives in place but with barriers remaining increased between the two survey periods. Within that, however, the proportion of universities reporting strong positive signals to staff to engage increased.

Finally it is worth noting our earlier finding that there was a significant drop in public sector support for people based interactions through the Knowledge Partnership Programme which locates postgraduate student research projects within small and medium-sized companies. The number of such placements fell from over 1000 per year in 2007 to just over 600 in 2014 (Dowling, 2015).

Innovation and Knowledge Exchange

A further way of capturing demand side changes in knowledge exchange activities by universities is to consider the extent to which businesses cite universities as sources of information for innovation, or changes in the extent to which they engage in collaborative activities with universities. Exhibit 13 draws on the UK community innovation survey (CIS) results to shed light on this. The exhibit presents data on the number of innovation active firms; the importance of universities as an information source for innovation; and their involvement in collaborative activities with business. Each of these indicators shows a decline between the two survey periods although it should be noted that data for the second period is not available beyond 2012.

Exhibit 13 University co-operation and importance of universities as a source of knowledge for innovation (% of firms) - 2004-2012



Source: UK Innovation Surveys 2007 - 2013; own calculation.

In summary, the number of UK academics carrying out research rose between the two survey periods and the balance of full and part-time staff and the proportion doing research remained broadly similar. Academic involvement in knowledge exchange during the second survey period was, however, taking place in a more constrained macroeconomic environment with lower levels of business investment. Both private sector business R&D and HEI R&D were, nevertheless, higher in the second survey period.

Business sector funding of HEI R&D fell slightly and UK public funding fell substantially between the two survey periods with overseas funding filling the gap. Universities reported enhanced support for knowledge exchange between the survey periods and external sources of income related to knowledge exchange including collaborative and contract research were higher in the second period. Government support for knowledge exchange in England was higher in the second survey period although its pattern was redirected towards the more research-intensive universities. There is, finally, some evidence that a smaller proportion of innovating businesses reported collaborative activities with universities during the second survey period than during the first and that fewer of them reported universities as a knowledge source for innovation.

These changes in the overall environment must be borne in mind when comparing the results of the 2008/9 and 2015 surveys.

Main Results of the 2015 Survey

01

Section 1.1

Introduction

This chapter gives a summary of the main 2015 survey, the results of which are primarily concerned with the period 2012-15. The survey was directed at all research or teaching active members of staff at UK higher education institutions (HEIs). In total, more than 130,000 academics were surveyed and there were 18,177 completed questionnaires - a response rate of 14%. Detailed information on survey method and response can be found in Annex A: Survey Method and Response Bias.

Staff in teaching positions (lecturer, senior lecturer, reader or professor), which are normally permanent appointments, account for 73% of survey respondents; 18% of respondents work in research roles as research fellows; 3% are research or teaching assistants or technicians; 2% are employed as tutors or teaching fellows; and 4% of respondents hold emeritus or honorary posts following retirement. The age distribution of the respondents is skewed towards older academics with 41% of respondents aged 50 years or older and just 4% under 30. In terms of gender, 42% of respondents are women. A comparison with the full academic population can be found in Annex A: Survey Method and Response Bias.



18,177

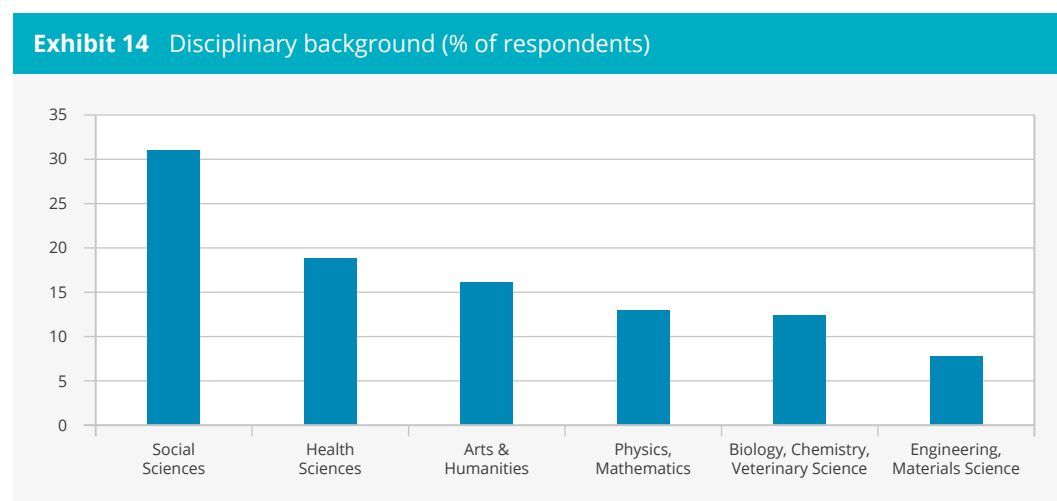
COMPLETED QUESTIONNAIRES



42%

FEMALE RESPONDENTS

The survey asked respondents to select one of 36 disciplinary areas, corresponding to REF2014 units of assessment. We have grouped these into six broad categories which are used throughout the report. Exhibit 14 shows the distribution of respondents by these broad subject categories. The social sciences represent the largest category followed by health sciences. Engineering and materials science is the smallest category. This subject distribution corresponds to HESA cost centre distributions with the exception of arts and humanities which are slightly underrepresented in the survey. A detailed comparison with the full academic population and HESA statistics can be found in Annex A: Survey Method and Response Bias.



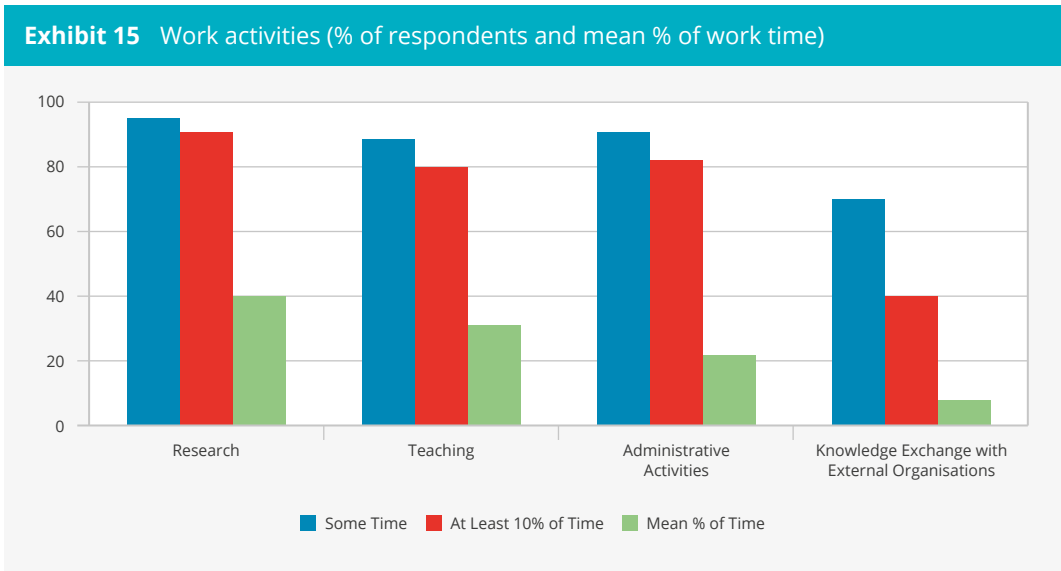
To interpret subject, seniority and gender differences across other survey items it is also of importance to understand how these characteristics interact. For example, the distribution of seniority differs between disciplines and by gender (see Annex Exhibit D1) as women are on average in more junior positions compared to men. The share of research fellow positions is highest in science fields and lowest in arts and humanities and the social sciences. By contrast the share of respondents in lecturer positions is higher in these two fields. The share of women is also higher in health science and lowest in engineering and materials science. This needs to be kept in mind as it could mean that for example some of the gender and seniority differences found in the survey may be due to subject area variations.

Section 1.2

Work Roles and Research Direction

Teaching, Research and Other Activities

Over the past two decades there has been a discussion of how the two traditional roles of the university - teaching and research - have been complemented by a 'third mission' that emphasises outreach and economic and societal impact. Academic staff are encouraged to engage with external organisations and to report this engagement. In addition, academic staff take on a series of administrative tasks for example as committee member, course director or department head. Survey respondents were asked how much of their time they spend in each work role: teaching, research, administrative and knowledge exchange activities and the Results are reported in Exhibit 15. The blue bars report spending some time in each activity; the red bars show results when at least 10% of time is spent on that activity. Almost all surveyed academics are involved in research and 89% took part in some teaching activity. A separate analysis reported in Annex Exhibit D2 shows that, as might be expected, the share of academics reporting teaching activity is higher for those in employment contracts covering teaching or teaching and research (teaching fellow, lecturer, senior lecturer, reader and professor). For these groups it was over 97% of respondents, whereas the proportion of staff involved in teaching amongst those employed in research roles is under 65%. Moreover, 90% of respondents are involved in administrative tasks and 70% report some outreach activities.



The access to - and opportunities for - external interactions differ with the academic job roles of academics. An analysis of the pattern of activity by job role (see Annex Exhibit D2) shows, as might be expected, that administrative activities assume greater significance for those in lecturer, senior lecturer and professor employment roles, where more than 97% are involved in administration; whereas only around 76% of those in research roles are. Outreach activities rise

notably with seniority increasing from just over 63% to 82% of respondents when comparing the research fellow group with professors. Those in more senior academic positions are more likely to have the resources and knowledge required to engage with external partners and are potentially more attractive for external partners.

Many academics report only minor involvement in each task. If we look only at those academics who report spending at least 10% of their work time on each of the four tasks, the equivalent of half a day a week, we see that 90% engage in research for a substantial part of their time, 80% in teaching, 82% in administration. In addition around 40% of academics report spending more than 10% of their time on outreach. If we look at the mean percentage of time spent on each these activities we get a clearer picture of relative importance. Thus we find that 40% of time is spent on research activities, 31% on teaching related activities, 21% on administrative tasks and 8% on outreach.

Annex Table D2 provides a breakdown of the mean percentage of time spent on each activity by age, seniority, gender and discipline. As can be expected, research time is highest for those in research fellow positions, where it accounts for almost 74% of time spent while they only have minimal teaching and administrative duties. Professors still spend 41% on research. Academic staff in lecturer or senior lecturer positions, instead, spend less than 30% of their time on research, but 42% on teaching. Emeritus or retired honorary fellows spend more than 50% of their time on research and only have minimal administrative duties. They are also the group with the highest average percentage of time spent on knowledge exchange (14%) followed by professors (10%).

Time commitments also differ by disciplinary field. Research time is highest in biology, chemistry and veterinary science where it accounts for 53% followed by physics and mathematics with 49%, and lowest in the arts and humanities with 30% of time spent. This is consistent for all levels of seniority. The time spent on knowledge exchange with external organisations is highest in engineering and materials science (10%) followed by social sciences (9%). Women spent somewhat less time in research and more time on teaching and administrative tasks compared to men, even after accounting for different levels of seniority.

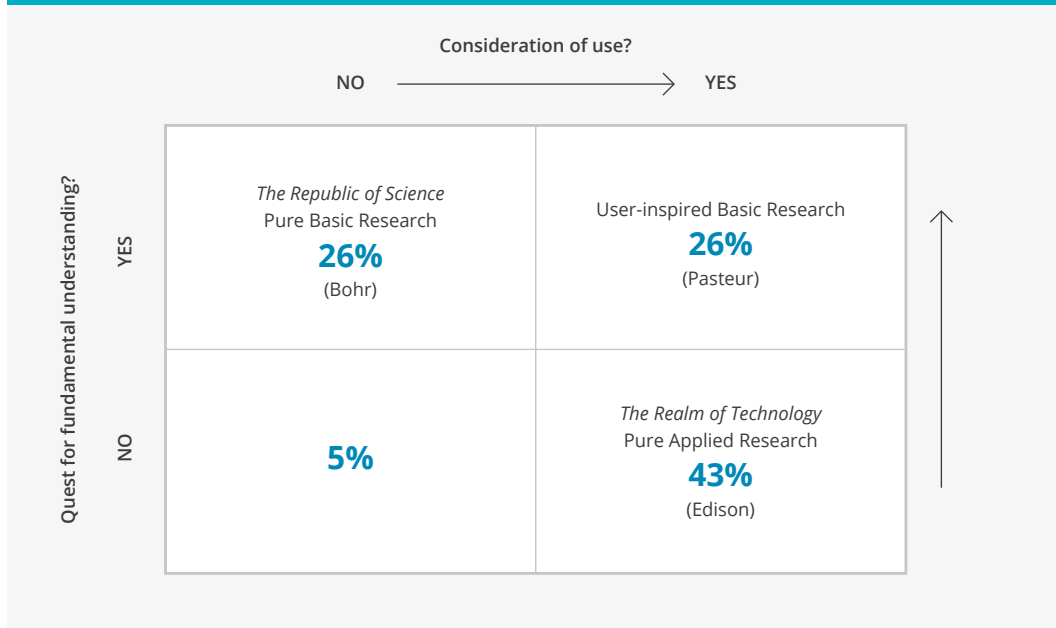
Research Orientation

The ability to engage with research users may be influenced by the type of research academics pursue. Academics pursuing more applied, experimental or user-oriented research lines may engage more with external organisations as they may be more motivated by - and are better placed to address issues of - near to market applications. Academics motivated to pursue fundamental research may have fewer incentives - and fewer opportunities - to engage. However, basic and applied research efforts do not develop in isolation - problems encountered in applied research can feed back into basic research efforts and vice versa ('Pasteur' type researchers). This interplay between the pursuit of fundamental understanding and of its application is represented in Exhibit 16.

We asked academics to characterise the primary motivation of their research in terms of three categories. These were pursuit of fundamental research (the Bohr quadrant); pursuit of pure applied research (the Edison quadrant); and (recognising the interplay between basic and applied research) pursuit of user-inspired research (the Pasteur quadrant).⁷ The results, which are shown in Exhibit 16, show that overall: 26% of academics considered their research motivation as primarily basic; 26% as primarily user-inspired basic; and 43% as pure applied. A very small proportion (5%) state that their research motivation could not be captured by these categories: this may be because they consider they do all three types and cannot choose between them. It is striking that around three quarters of academics fall into the user-inspired or pure-applied quadrants. There are, however some important differences in this pattern across disciplines as shown in Exhibits 17-19.

⁷ We provided characterisations of each combination of pure, applied and user-inspired research activity using definitions based on the Frascati Manual (OECD, 2003, pp. 77-79).

Exhibit 16 Research motivation



Source: Adapted from Stokes (1997) and Dasgupta and David (1994).

It may not be surprising that the proportion of academics in the pure basic quadrant is particularly high in physics and mathematics (39%), but it is highest in the arts and humanities (42%). In all subject areas, over 50% of academics described their research as primarily motivated by considerations of use and hence falling into the user-inspired and pure applied quadrants. Academics in the health sciences, engineering and materials science and the social sciences, in that order, are the most likely to consider their research as purely applied- almost two thirds in the case of health sciences and 60% in the case of engineering and materials science. Finally, involvement in user-inspired basic research is lowest in health science and arts and humanities, but this does not differ much across other disciplines. If we take applied research and user-inspired basic research together they form the dominant mode of research activity in all disciplines. Thus, even in the case of arts and humanities and physics and mathematics, less than 50% considered their research as basic. The largest share of respondents unable to classify their research according to the three categories is found in arts and humanities (13%). This applies to all seniority levels and all areas of arts and the humanities.

Exhibit 17 Basic research (% of respondents)

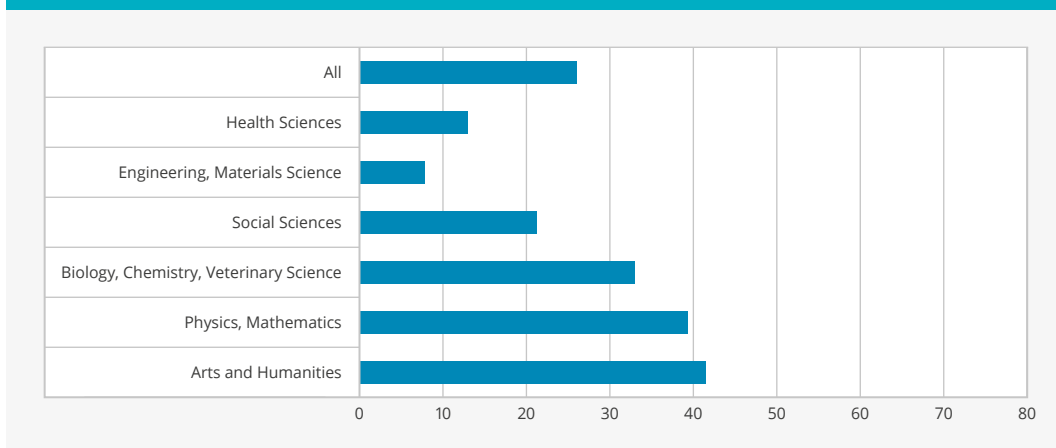


Exhibit 18 Pure applied research (% of respondents)

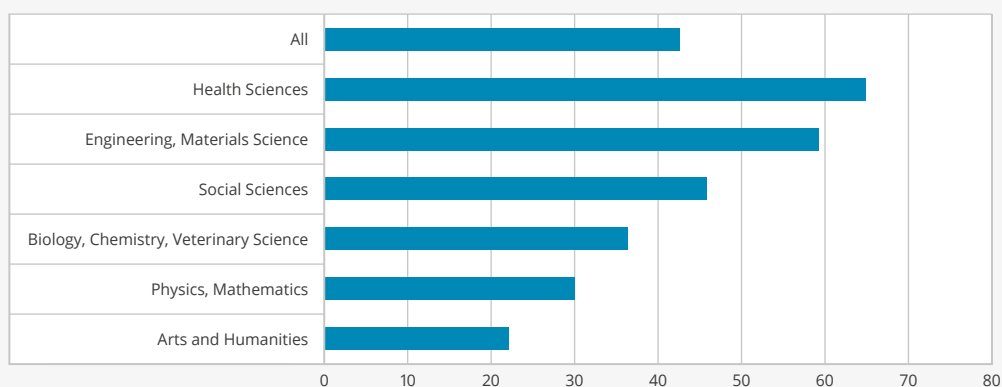
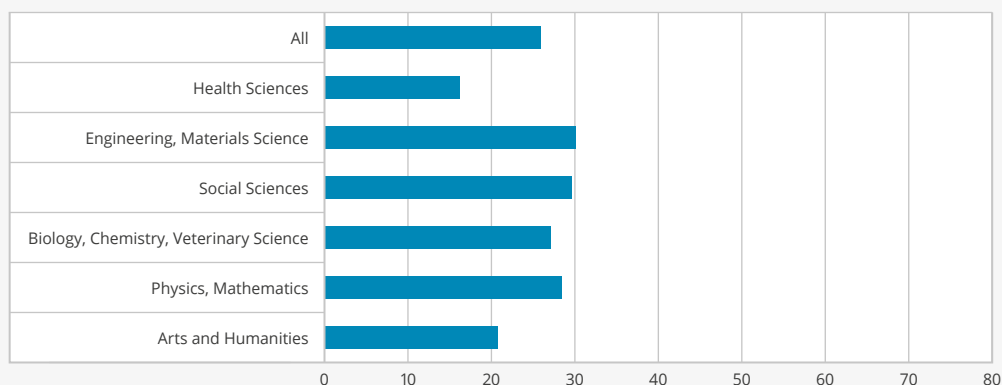


Exhibit 19 User-inspired basic research (% of respondents)

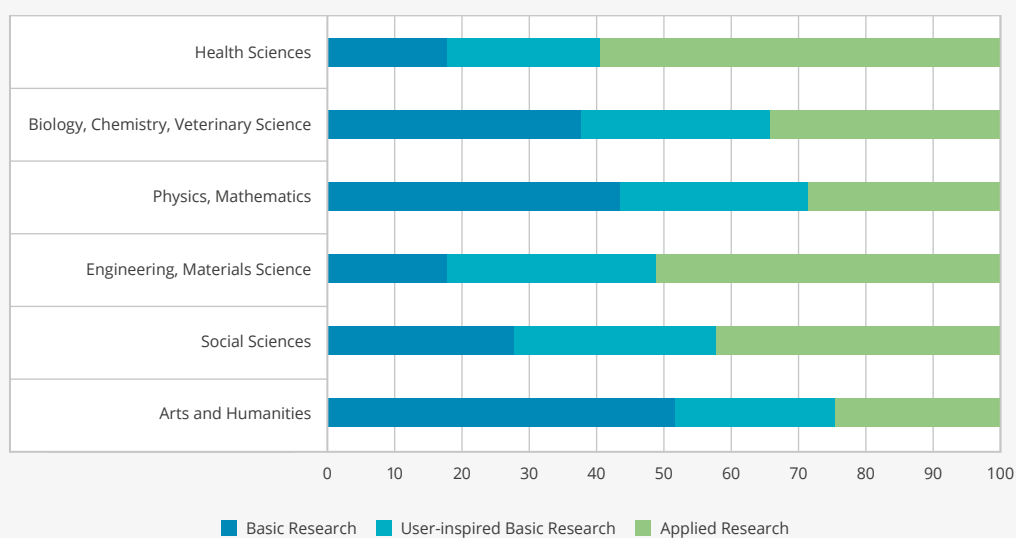


We asked respondents who classified themselves according to one of the three primary motivation categories to indicate the percentage of their research time spent on average on basic, applied and user-inspired basic research activities. The results are reported in Exhibit 20 and in Annex Exhibit D3. On average, 32% of research time is spent on basic research, 27% on user-inspired basic research and 41% on applied research. The shares differ by disciplines and follow a pattern similar to the analysis in terms of primary motivation: in arts and humanities academics report spending 51% of their research time on basic research; in physics and mathematics, this share is 44%. In contrast, those in the health sciences spend close to 60% of their research time on applied research; this share is more than 50% in the case of engineering and materials science; and 42% in the social sciences. This split by research time also shows that those who consider their work to be primarily applied still spend 8% of their research time on more basic research tasks and 17% on user-inspired basic research; those that primarily engage in basic research still spend on average 7% of their time on applied research and 11% on user-inspired basic research; finally, those that primarily identify their research as user-inspired spend 21.5% on pure basic research and 17% on applied research tasks (see Annex Exhibit D3).

An analysis of the pattern of research focus by seniority and gender (see Annex Exhibit D3) shows that women and those on research-only contracts are more likely to characterise their research as applied and to state that a larger share of their time is spent doing applied research (45%, compared to 38% for men and 39% for teaching staff).

In the discussions of survey responses in the following sections, in addition to providing crosscuts by discipline, seniority and gender, we will also refer to crosscuts in terms of research orientation.

Exhibit 20 Proportion of research time spent on basic, user-inspired basic and applied research (% of research time)



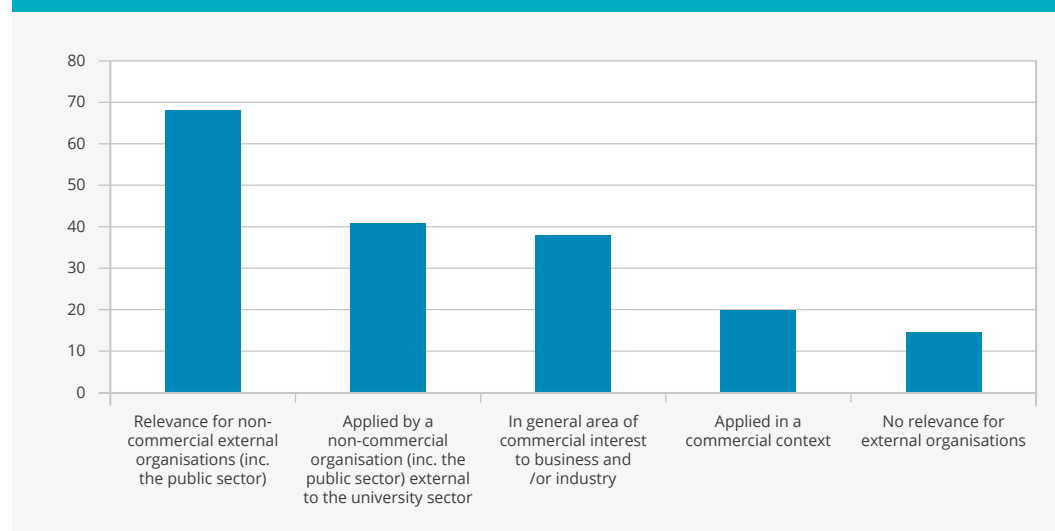
Section 1.3

External Interactions and Commercialisation

Research Application

Discussions of the application and impact of research have largely focussed on commercial application in the science and engineering disciplines. However, as the 2009 survey has illustrated, a large amount of external interaction is carried out outside those disciplines and with the non-commercial sector. The survey, therefore, asked respondents whether their research was of potential commercial or non-commercial (including public-sector) interest and whether it had been applied in a commercial or non-commercial context (see Exhibit 21).

Exhibit 21 Relevance of research (% of respondents)



The survey showed that 67% consider their research to be of relevance for non-commercial external organisations, and 41% stated that it had been applied in a non-commercial context. Approximately 37% consider their research to be of commercial interest to businesses and 19% state that it had been applied in a commercial context, and less than 14% consider their research to have no relevance for external organisations.

Splitting the sample by subject area (Annex Exhibit D4) confirms that the importance of commercial application depends on the disciplinary field. In health and in the social sciences, 77% and 74% respectively state that their research is of relevance to the non-commercial sector and more than 45% in both disciplines report that it has been applied by non-commercial organisations. In the arts and humanities these shares are 68% and 35% respectively. In engineering and materials science, commercial application is more prevalent: 80% state that their research is of relevance to business and industry and 50% that it has been applied in a commercial context. In physics, mathematics, biology, chemistry and veterinary science, commercial and non-commercial application are equally relevant at about 50 to 60%.

Further analysis in Annex Exhibit D4 shows that those subject areas where academics report the least applied research are also more likely to state that their research has no relevance for external organisations (24% of respondents in arts and humanities and in physics and mathematics). Overall, 31% of respondents primarily engaged in basic research state that their research is of no relevance to external organisations, while this is only the case for 4% of those primarily conducting applied research. This means that around 70% of those primarily carrying out pure basic research believe it has relevance to external organisations. In this context, it is important to note that of those academics recording themselves as primarily engaged in pure basic research around 62% spent some proportion of their time on user-inspired or pure applied research and the mean per cent of their research time they spent doing this was 11% and 7%.

Research Commercialisation

A more direct indicator of commercial involvement and a common measure in innovation surveys is the extent to which academics are involved in patenting, licensing and spin-off activities (reported in Exhibit 22 to Exhibit 25). The importance of these mechanisms varies significantly across industries and research fields. Moreover, income from these mechanisms accounts for a relatively small proportion of the external income of universities. They have, nevertheless, featured prominently in the assessment of the knowledge exchange capabilities of universities. Exhibit 22 shows that 22% of respondents in engineering and materials science have taken out a patent in the last three years. They were followed by just under 15% in biology, chemistry and veterinary science. As may be expected, patenting is of little or no relevance in social sciences and the arts and humanities. A very similar pattern emerges in Exhibit 23 and in Exhibit 24 which examine whether research outputs had been licensed to a company and whether or not respondents had formed a spin-out company in the last three years.

All of these exhibits show that while the social sciences and arts and humanities may have fewer opportunities appropriate for patenting, licensing and research based spin-out formation, these mechanisms nonetheless occur in these disciplines. This is particularly true for the formation or running of a consultancy linked to research in the last three years. This is the most important form of commercial activity for social scientists, although once again engineering and materials science are even more active in this form of commercialisation (see Exhibit 25). The recent support of social enterprises, for example through the HEFCE Social Enterprise Award, shows that there is potential for social sciences and arts and humanities to engage in entrepreneurial activities and that HEIs recognise the importance of supporting such activities outside STEM subjects.

Exhibit 22 Taken out a patent in the last three years (% of respondents)

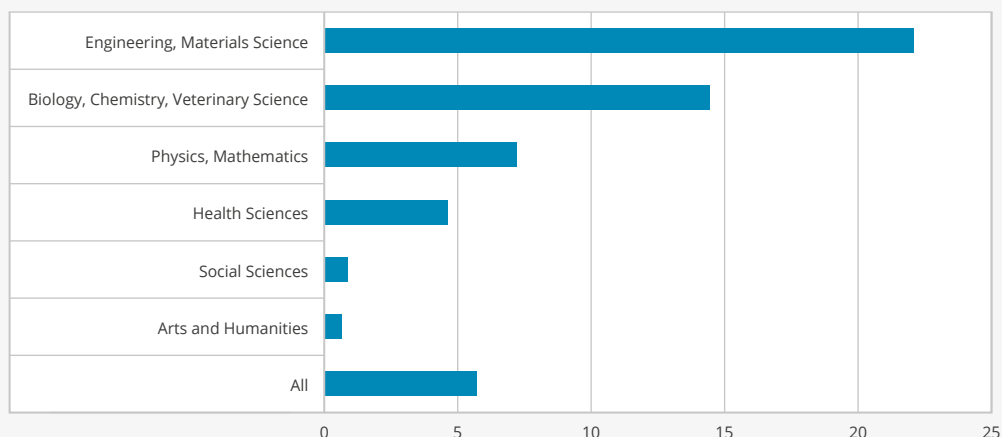


Exhibit 23 Licensed research outputs to a company in the last three years
(% of respondents)

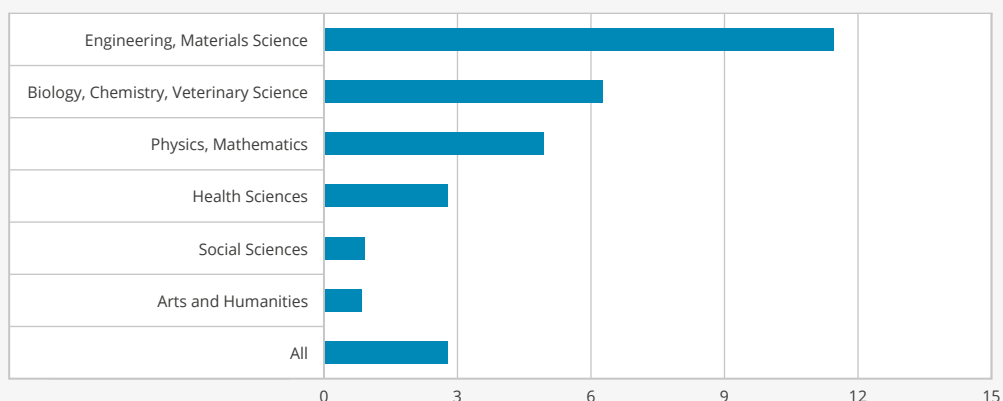


Exhibit 24 Formed a spin-out company in the last three years (% of respondents)

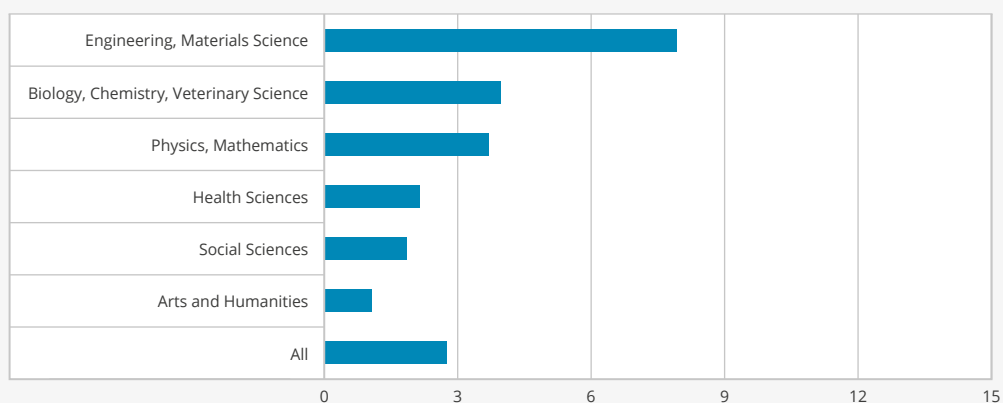
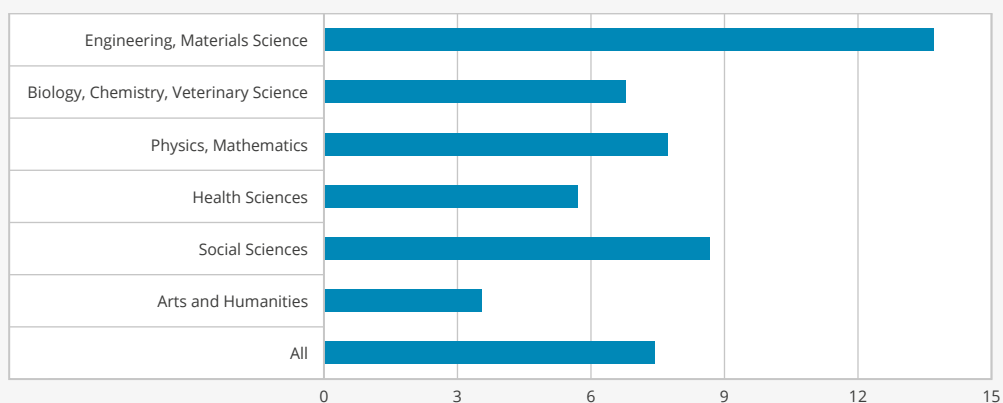


Exhibit 25 Formed or run a consultancy via research in the last three years
(% of respondents)



An analysis of commercialisation activities by seniority and gender, reported in Annex Exhibit D5, shows that men are more likely to report commercial involvement than women. Professors are also more commercially engaged than those in less senior positions. For example, almost 10% of men state that they took out a patent, compared to less than 4% of women; 11% of professors took out a patent compared to 3% of lecturers and 6% of research staff. As could be expected, the share of researchers involved in patenting is lowest for those that primarily work in basic research though even here some patenting occurs (4%). These patterns are similar across other commercialisation activities.

People-based, Problem-solving and Community-based Modes of Interaction

There is increasing recognition that the rich resources of the university can be used in a variety of communities and sectors, and address a variety of problems through a wide range of engagement activities (Hughes and Kitson, 2012).

The survey identified 27 non-commercial modes of interactions grouped into three categories - people-based, problem-solving and community-based - and asked respondents to indicate which of these modes of interactions they had actively used in the previous three years. People-based modes of interactions are concerned with networking with and provision of education services to professional external organisations; problem-solving activities include joint and commissioned research; and community-based activities with exchanges with the general public and the voluntary and cultural sector.

People-based activities have long been a focus of public policy. Starting in 1997 HEFCE made funds available for higher education development projects, including regional development and knowledge exchange activities, student and employer engagement and life-long learning. In 1999 the government set-up the Higher Education Reach-Out to Business and the Community (HEROBC) Fund, the University Challenge Fund (UCF) and the Science Enterprise Challenge (SEC) to encourage knowledge exchange with external organisations. These and related HEFCE initiatives were consolidated into HEIF with the goal of building knowledge exchange capacity and enable its successful delivery. Another long running initiative now administered by Innovate UK is the Knowledge Transfer Partnership (KTP) scheme. Under the scheme a graduate works for a firm usually for a two year period on a specific knowledge-transfer project. The knowledge to be exchanged originates within a qualifying research institution, typically a university. The students are jointly supervised by staff in the company and in the faculty at the university concerned. The firms are typically small and medium sized enterprises (Hughes, 2015). Long established Research Council collaborative doctoral studentships (CASE studentships and CDAs) have also supported people based links.

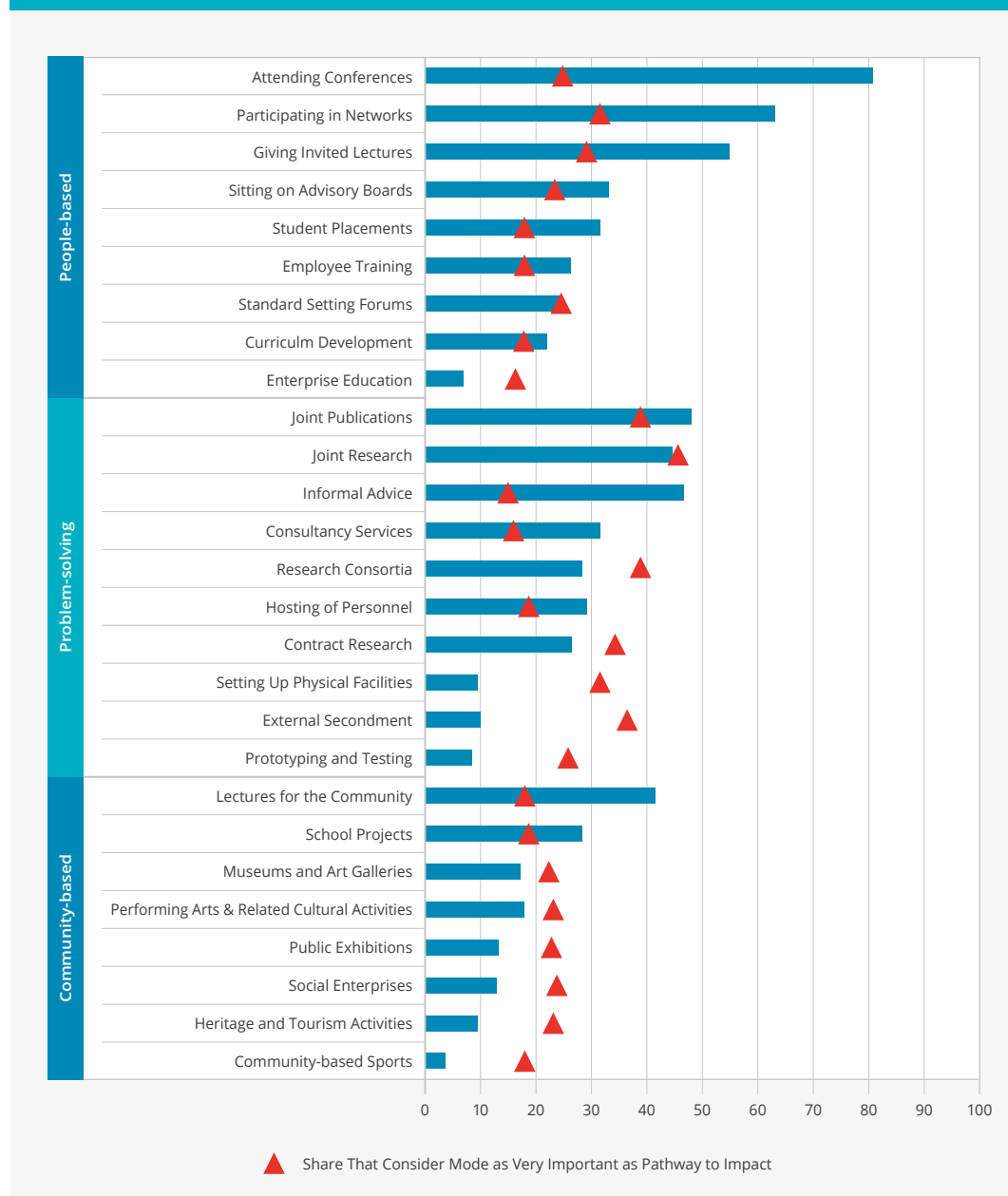
Exhibit 26 shows that there are very high levels of interactions with professional external organisations through people-based activities and especially through conferences, networks, and invited lectures. Almost 88% of respondents are involved in at least one of these activities (each is individually used by 55-80% of academics). This is followed by sitting on advisory boards, placing students with external organisations, and training employees for external organisations. A further 25% of respondents were involved in standard setting forums which are a crucial mechanism for shaping and developing pathways of innovation activity. Approximately 22% of the surveyed academics involve external organisations in curriculum development and around 7% provide enterprise education. This result indicates the significant extent to which conventional modes of academic interaction – such as the dissemination of research at conferences, the education of students and people exchange through work placements - are important forums for interactions with external organisations.

Respondents engaged in people-based activities were also asked to indicate how important each activity was as a pathway to impact on a 5-point Likert scale - where 5 is very important and 1 is

unimportant. On average all activities were rated as 'important' ranging from 3.5 to 4 (see Annex Exhibit D6). This is not surprising, since if academics did not think they were important they would presumably not be willing to spend time doing them. More informative is the share of users who rate activities as 'very important', indicated by a red triangle in Exhibit 26. This share is highest for participation in networks and invited lectures at around 30%. The lowest share of users considering activities as of high importance, were found for teaching based activities such as curriculum development, student placements and enterprise education (all at less than 20%).

Exhibit 26 also reports the engagement of academics in problem-solving activities with external organisations which are primarily research-based collaborative activities. Such activities may be expected to be important in enabling the translation of research into commercial application. Some of these activities are financed or sponsored by partnering external organisations as academics are encouraged to seek funding outside their university, but many are supported with public funds, for example EU sponsored research consortia or collaborative Research Council grants.

Exhibit 26 Non-commercial forms of engagement used in the last three years (% of respondents)



The most used mechanisms relating to problem-solving interaction are joint publications, joint research and the provision of informal advice on a non-commercial basis; each reported by 45% to 48% of respondents. These are followed by consultancy services, participation in research consortia, hosting of external personnel and contract research, with around 30% of respondents involved in each. Prototyping and testing, external secondment and setting up physical facilities are used by far fewer academics. It is important to note that many of these activities do not occur in isolation but in combination within the same project or in sequence across more than one project.

All problem-based activities are considered as important as pathways to impact, with highest importance given to joint research activities. More than 45% of those engaged in joint research consider it as 'very important'. Lowest importance is given to informal advice and consultancy, considered as 'very important' by fewer than 17% of those involved, perhaps due to the lack of a direct research link. It is worth noting that whilst not frequently identified as a very important form of interaction it is a frequently used form of interaction. This suggests that although it represents a frequent way for establishing contacts and may lead to further interactions involving either people-based exchange or other problem-solving interaction it involves less resource commitment and by itself is not regarded as substantively important as other pathways.

Exhibit 26 also reports community-based activities that have not traditionally been a focus of knowledge exchange policy. However, in recent years the UK government has shifted its attention towards communities and public engagement. The 2008 consultation paper 'A Vision for Science and Society' called for "high-quality science engagement with the public on all major science issues" (DIUS, 2008: 6). It recognised the public's need for early stage research information and stressed that it wanted to provide "people of any age with access to scientific resources and information" (DIUS, 2008: 8). In 2008, the UK funding bodies and RCUK launched a public engagement pilot scheme that awarded four year grants 'Beacons for Public Engagement' to six regions in the UK. As part of the initiative the National Co-ordinating Centre for Public Engagement (NCCPE) was established in 2008. The cross-Research Council Connected Communities programme supporting work with community partners and organisation was launched in 2012. HEFCE further launched a Social Enterprise Award (SEA) in 2012 to support universities in developing a structure for social ventures. RCUK sponsored a second round of public engagement initiatives, Public Engagement with Research Catalysts, which started in 2013 supporting six UK universities for a two year period. Their focus was specifically on engagement with the wider community and voluntary sector in the regions. The role of cultural and related factors in regional and local growth have also been analysed using the 2009 academic survey results and a related survey of public sector arts and cultural organisations (Hughes et al., 2013, 2014).

Exhibit 26 shows that there is substantial interaction between universities and the community through activities such as public lectures and school projects, with about 41% and 29% respectively stating that they engaged in these activities in the past three year; 13% provided public exhibitions. Again all activities are considered as important as pathways to impact by those using them, though to a lesser extent than problem-solving or people-based activities. On average about 20% of those engaged in community-based activities consider them as 'very important'.

Chapter 2 of this report gives a more detailed breakdown of engagement by subject area and reports various intensity measures. Overall, we can conclude that with the exception of arts and humanities, community-based activities are less widely spread than other types of non-commercial engagement. This may be due to existing university structures and cultures that inhibit public engagement (BIS, 2010) and echoes similar findings in a recent study of public engagement activities in UK universities (TNS, 2015).

Section 1.4

Partners: Interacting with the Private, Public and Third Sectors

Traditionally there has been an emphasis on collaboration with industry and business, particularly in science and engineering, where it is argued to improve corporate innovation and competitiveness. In recent years this attention has shifted towards engagement that is inclusive of all publics (including the public and third sector) and all research areas (including humanities and social sciences). The 2009 survey of academics indicated that whilst business interactions are important, there is also a high degree of external engagement in disciplines outside of science and engineering. In addition it showed that interactions with the public and third sectors are more widespread than interactions with the private sector especially in health sciences, education, humanities and the social sciences. These findings are confirmed in this survey.

Exhibit 27 shows that just over 30% of academics interact with private businesses: interactions are most widespread amongst academics in engineering and materials science where more than 50% of respondents report some engagement in the last three years. There is also a high share of respondents reporting interactions in disciplines outside the sciences including the social sciences (29%) and the arts and humanities (22%).

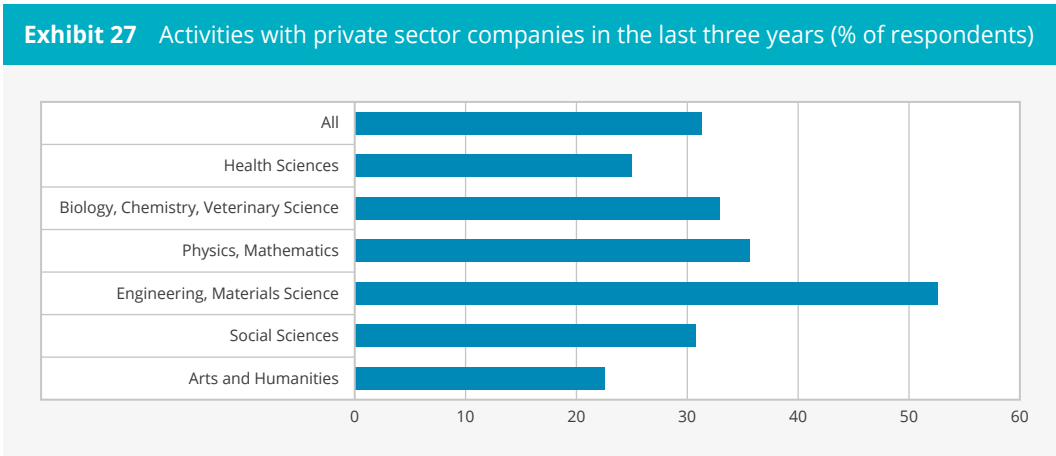


Exhibit 28 reports the proportion of respondents engaged with public sector organisations during the past three years; overall, 35% of respondents interact with the public sector. The disciplines with the highest share are social sciences and health sciences (45%). The share of respondents involved with the public sector is lowest in engineering and materials science and in biology, chemistry and veterinary science (just over 21%).

Engagement with the third sector (activities with charitable and voluntary organisations) are more prevalent than engagement with the private and public sectors: with 41% of academics having engaged with the third sector during the past three years (Exhibit 29). Disciplines with a high share of respondents reporting engagement include social sciences (49%), arts and humanities (49%) and health sciences (48%). In comparison, only 18% of respondents from engineering and materials sciences engage with the third sector. This represents only one-third of the share of engineering academics who report involvement with the private sector.

Exhibit 28 Activities with public sector organisations in the last three years
(% of respondents)

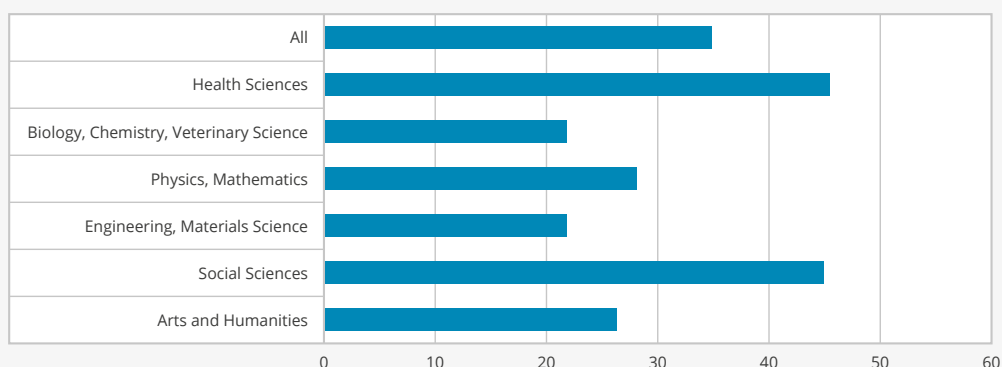
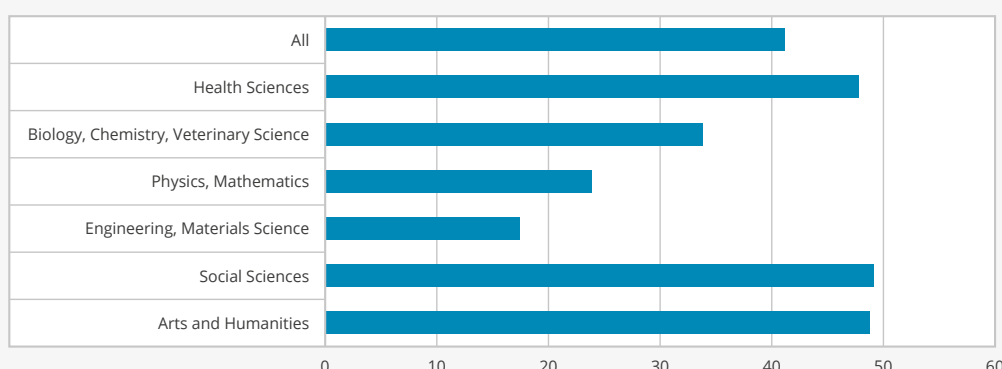


Exhibit 29 Activities with charitable or voluntary organisations in the last three years
(% of respondents)



Annex Exhibit D8 reports additional statistics: as expected, engagement with external sectors is lower for those primarily involved in basic research and is higher for senior academic staff. The higher engagement of senior academics and those in applied fields of research can be seen for all three partners. Additionally, we find a difference between men and women with regard to the sectoral engagement: women are less likely to engage with business and are more likely to engage with the third sector compared to men. These differences remain when we allow for differences in seniority or disciplinary distribution.

It is important to note that 29% of those who reportedly spent some time doing outreach (Section 1.2: Work Roles and Research Direction) failed to specify any of the three partners. Also, 36% of those that reported interacting through people-based, problem-solving or community-based activities (Section 1.3. External Interactions and Commercialisation) did not report a partner. This may be because they only identify an external organisation where they consider the activity very important. Or it might suggest that academics may have difficulty in classifying their external organisation contact to one of the three categories. This could be, for example, because the external organisations were non-governmental public bodies such as the Research Councils, or statutory corporations such as the BBC and Ofcom. Chapter 2 of this report gives a more detailed breakdown of engagement type by sector and sheds more light on the type of activities undertaken with different sectors.

Section 1.5

Creating Partnerships: How Interactions Develop

University Technology Transfer Offices

Intermediary organisations have repeatedly been pointed out as crucial for effective knowledge exchange. One of the main organisations to act as an intermediary on which policy has focussed is a university's technology transfer office (TTO) or consultancy office. These are particularly beneficial in providing contractual frameworks for the interaction between academics and external partners especially where monetary exchanges are concerned. In interpreting our results in this section it is important to note that the perceived view of TTOs has often been associated with technology and science base connections and commercialisation. Other more widely drawn patterns of external interaction may be covered by public engagement bodies in some universities and may be more important for some disciplinary fields such as in the arts and humanities (TNS 2015).

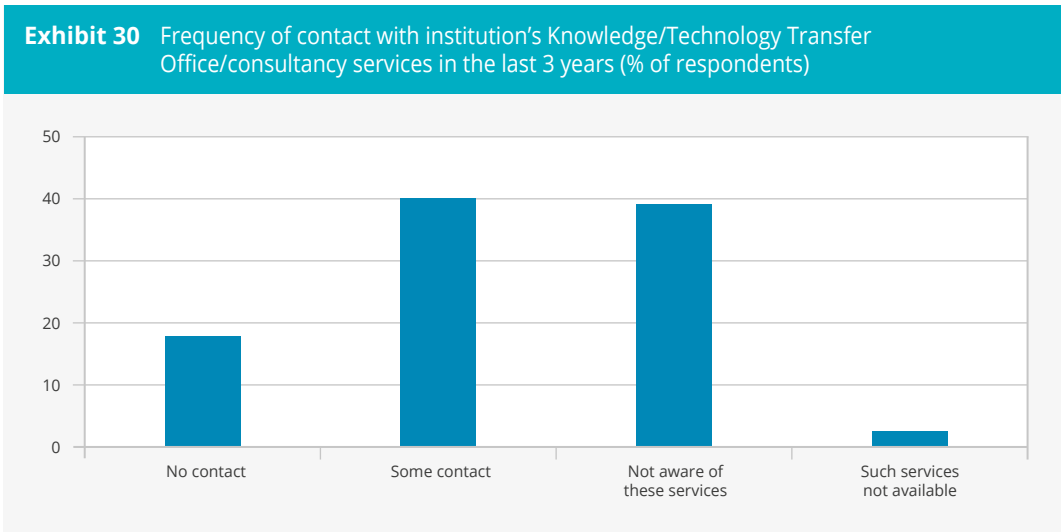


Exhibit 30 shows that 40% of respondents had some contact with their TTO (or related organisation) in the past three years. A further 17% are aware that such services exist but had no contact in the last three years, whereas 43% are unaware that these types of services are available or believe such services not to be available at their institution.

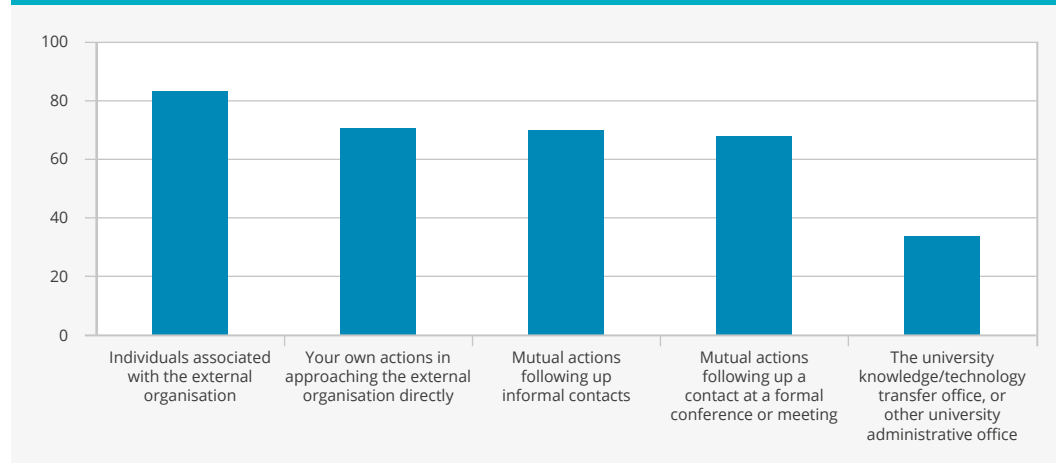
Annex Exhibit D9 reports differences across disciplines, seniority, gender and research orientation. These statistics show that there is significant variation by discipline, with the highest level of contact amongst engineers (60%) and biologists, chemists and veterinary scientists (49%). The lowest percentage of academics with TTO contact is amongst: academics from health sciences (37%); and arts and humanities (30%). A lack of awareness of the services of a TTO was highest in arts and humanities (47%) followed by physics and mathematics, social sciences and health sciences (40-42% in each). Academics in the arts and humanities most often state that their institution does

not have a TTO or related services. The general level of lack of awareness is surprising since the HEBGIS survey shows that only 13 universities in the UK report that they do not have any subsidiary companies or distinct departments of the organisations responsible for business & community interactions. However most of these are specialist art institutions. This and the generally lower use and awareness of TTOs by arts and humanities may reflect the greater use of other institutional support functions including in particular via public engagement administrative programmes and the provision of such support at a Faculty rather than central level (TNS, 2015 pp 44-51). Our overall survey results suggest nevertheless a considerable degree of ignorance amongst academics about the central knowledge exchange support structure of their institutions.

There are further significant variations by seniority and research activity. Those employed as research fellows or research assistants are less often aware of TTO services (53% amongst research fellows and 66% amongst research assistants), while awareness and use of these services is highest amongst professors (only 20% are not aware and 61% have used TTOs). Those describing their research as basic are also least often aware of TTO services (43%) and least likely to have used them (only 32%) compared to those undertaking research that is applied or user-inspired (35% are not aware of services and 46% have used services). Moreover, 45% of women state that they are not aware of TTO services compared to 35% amongst men and only 35% state that they have used them compared to 44% of men.

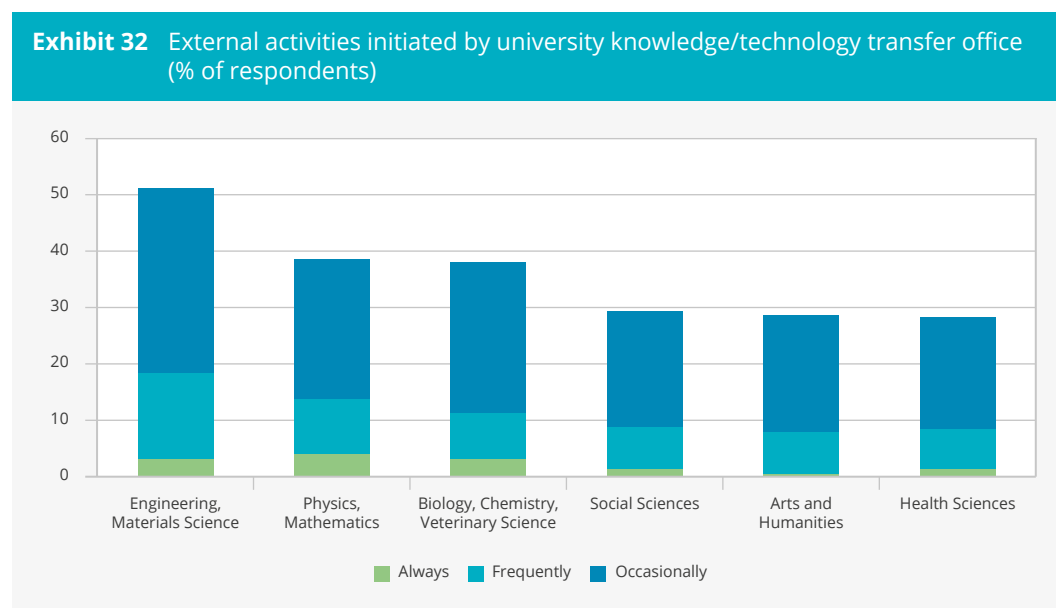
It is important to consider the extent to which TTOs are involved in initiating contact between academics and external organisations. Respondents that had some engagement through people-based, problem-solving and community-based activities with private, public or third sector organisations in the past three years were therefore asked how these interactions had been initiated. Respondents could identify multiple initiators and state whether they had always, frequently or occasionally initiated interactions. This could be through the university administration, including the TTO, or individual personal contacts. Exhibit 31 shows that the most frequently cited initiator were individuals associated with the external organisation, cited by 83% of respondents as at least occasional initiators. The least frequently cited initiator was the university with 32%. Furthermore, the initiatives of academics and mutual interactions are also important for initiating external relationships.

Exhibit 31 Ways in which external activities were initiated (% of respondents)



This evidence suggests that members of external organisations who act as ‘boundary spanners’, may be more important for initiating links between academics and external organisations than knowledge-transfer professionals based in the university. Also, as we saw above, many of the interactions used by academics are people-based or informal and may not require contractual and transactional services offered by the university. A TTO or a related service provider is likely

to play a greater role where interactions require a significant legal or contractual component as is the case in commercial activities and in university-business interactions. It may therefore play a greater role in more applied disciplines. Exhibit 32 reports the use of university initiated external engagement by discipline and shows that it is highest in engineering and materials science, with 52% of respondents reporting at least occasional use. As we saw above, academics in engineering are the most likely to engage in patenting, licensing and generating spin-outs compared to academics from other disciplines. They are also most likely to engage in interactions with private businesses. Annex Exhibit D10 provides additional analysis, showing that subject differences for other initiators are less pronounced. Interestingly, research staff are slightly more likely to have benefitted from the TTO than more senior academics, although the differences are very small.

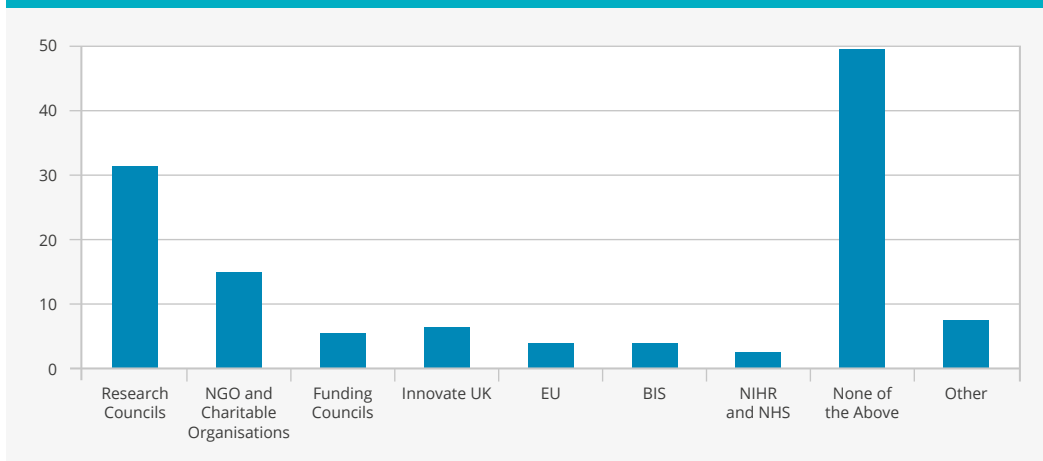


Public and Charitable Funding Bodies

Public and charitable funding bodies also play a role in enabling interactions with external organisations through targeted knowledge exchange funds and programmes or as part of their grant requirements. The survey therefore asked academics to provide information on which public or charitable funding bodies had provided support for their external interactions during the past three years. In interpreting the responses to this question it is important to note that in addition to being offered a long list of possible sources respondents could also nominate additional sources of support which have been coded and included in the analysis which follows. Exhibit 33, which provides an overview of the responses, shows that approximately 50% of respondents said that they did not receive external support from public or charitable funding agents for their engagement with external organisations. This may be indicative of a lack of awareness of where funding for knowledge exchange originates, 31% of respondents that engage with private, public and third sector organisations report that Research Councils provided them with outreach funding. This was the most frequent source followed by charities with 15%. Funding Councils and Innovate UK supported 6% of respondents. The EU, BIS and NIHR or NHS funded fewer than 4%. The latter two are however specialist health funding agencies and are therefore not as widely relevant as other sources.

It is important to note that while Research Councils Funding Councils, Innovate UK and BIS were prompted, only three charities were explicitly named and EU and NIHR/NHS were actively provided by respondents. The 'other' category includes government departments, local innovation agencies and a range of other public and overseas agencies each of which was cited by a small number of respondents.

Exhibit 33 Public and charitable funding body support for external activities (% of respondents)



The importance of funding for external engagement differs by disciplinary field. Exhibit 34 provides a comparison by discipline of respondents that report support through Research Councils, those that received other types of support (solely or in addition to Research Council funding) and those that received no support (see also Annex Exhibit D11 for detailed shares). It shows that the share of those that did not receive support for their interactions with external partners is highest in health sciences and arts and humanities (>55%) and social sciences (50%). Research Council funding is particularly important in engineering and materials science and in physics and mathematics where 53% and 46% respectively report some outreach support. In health science other funders are more often named and in biology, chemistry and veterinary science, social sciences and in arts and humanities, Research Councils and other sources are equally important. The share of respondents reporting financial support is highest for professors and for research fellows (Annex Exhibit D11).

Exhibit 34 Public and charitable funding body support for external activities by disciplinary field (% of respondents)

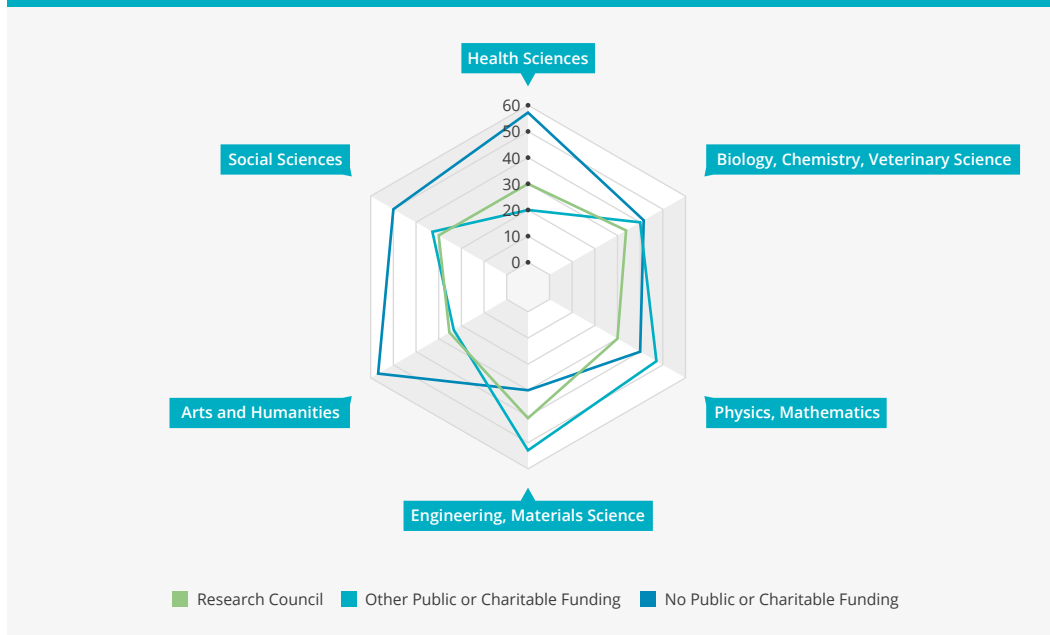
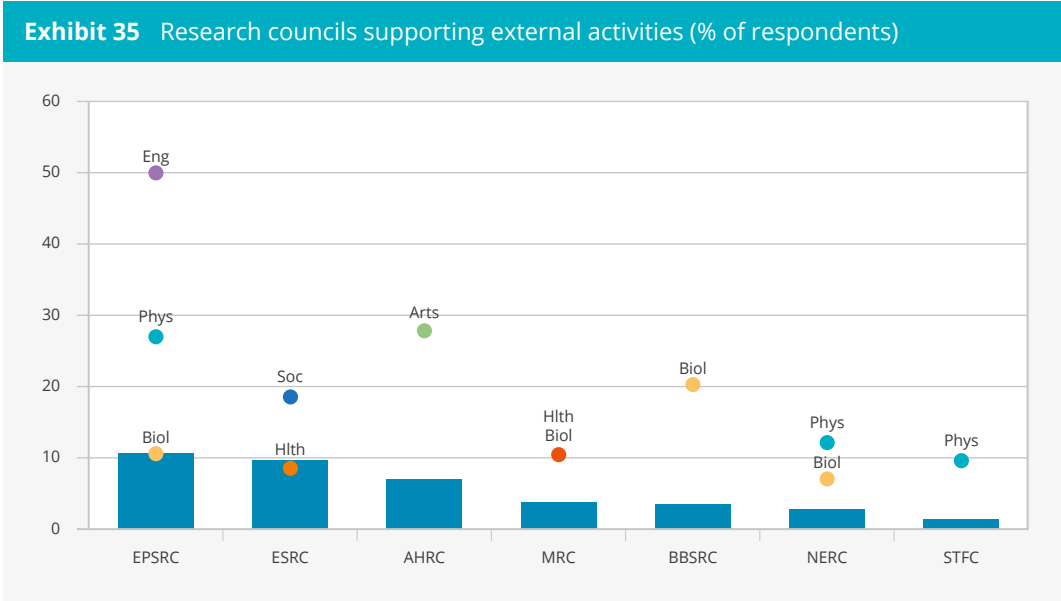


Exhibit 35 provides a more detailed split into different Research Councils that enabled external interactions. The bars in the graph show that a larger share of respondents benefitted from EPSRC or Economic and Social Science Research Council (ESRC) funding (10.4 and 9.5% respectively) compared to other Research Councils. The important role of the EPSRC as the largest of the Research Councils is not surprising, but the ESRC has been on the forefront in championing funds for external engagement for example through the ESRC Science Festival and more recently following the example of EPSRC the use of Impact Acceleration Accounts. Also the AHRC has a record of offering follow-on funding for impact and engagement being acknowledged by 6.9% of respondents. Of course the share of respondents benefitting from each Research Council depends on the size of the respective disciplinary field. Exhibit 35 therefore also shows in the form of dots the share of respondents that received Research Council support for external interactions in the subject areas relevant to each council.



Key: Arts – Arts and Humanities; Biol – Biology, Chemistry and Veterinary Science; Eng – Engineering and Material Science; Hlth – Health Sciences; Phys – Physics and Mathematics; Soc – Social Sciences.

The graph shows that the EPSRC benefitted 50% of academics in engineering and materials science and 26% of academics in physics and mathematics. The AHRC is named as supporter of external interactions by 28% of those in arts and humanities. The ESRC is named by 18% of those in the social sciences and the BBSRC by more than a fifth of those in biology, chemistry and veterinary science. The BBSRC is of great importance to those in biology but not to subject areas beyond. MRC, NERC and the Science and Technology Facilities Council (STFC) benefit 7 to 12% of academics in relevant subject areas. Annex Exhibit D12 further shows that all Research Councils have supported knowledge exchange activities in all disciplinary areas. This is perhaps indicative of interdisciplinary collaboration supported through Research Councils. Chapter 2 of this report gives an additional breakdown of engagement by funding source shedding light on the types of activities benefitting from Research Council funding.

Section 1.6

The Impacts and Constraints of External Engagement

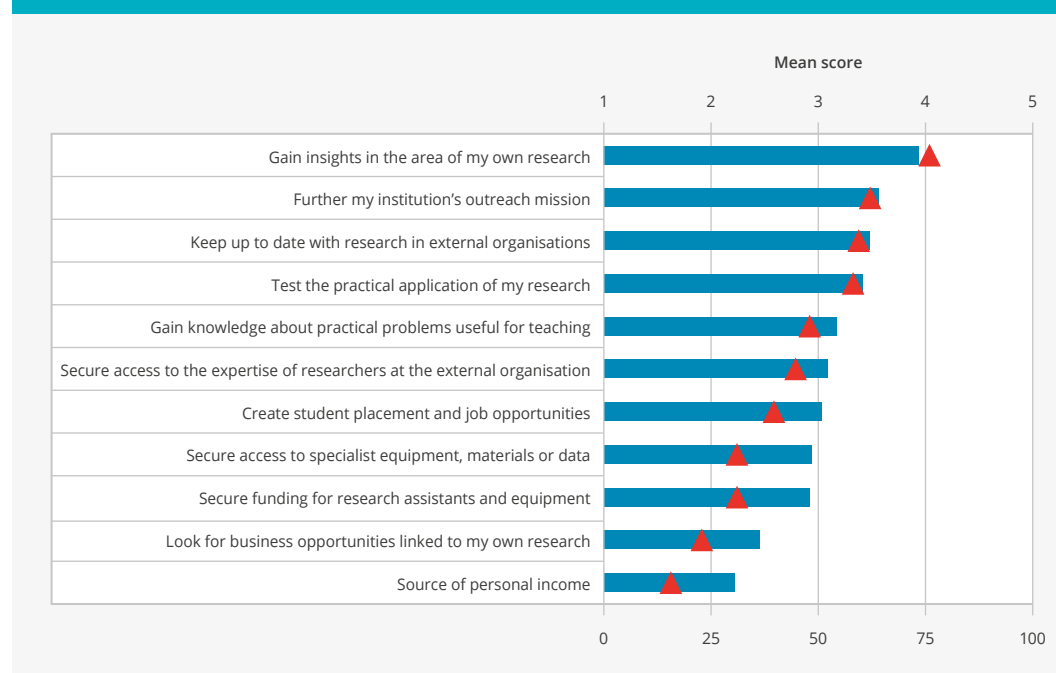
Motivations and Objectives for External Engagement

In order to create the right incentives for academics to engage with external organisations it is important to understand their motivations. The survey therefore asked respondents who had some engagement through people-based, problem-solving and community-based activities with private, public or third sector organisations in the last three years to score a range of motives on a 5-point Likert scale - where 5 is very important and 1 is completely unimportant.

Exhibit 36 shows the mean score for each motivation (blue bars) as well as the share of respondents who consider these important or very important motivations (red triangle). We can observe that the main motivations to engage with external organisations are concerned with developing the research activities of academics. This includes gaining insights in the area of their research (3.9) which is considered as important by 77% of respondents; keeping up to date with research in external organisations (3.5); and testing the practical application of their research (3.5), rated as important by 58% of respondents.

Teaching objectives score slightly lower at around 3: around 49% of respondents engage to gain access to knowledge that will further their teaching.

Exhibit 36 Importance of motivations for activities with external organisations (mean score and % of respondents)



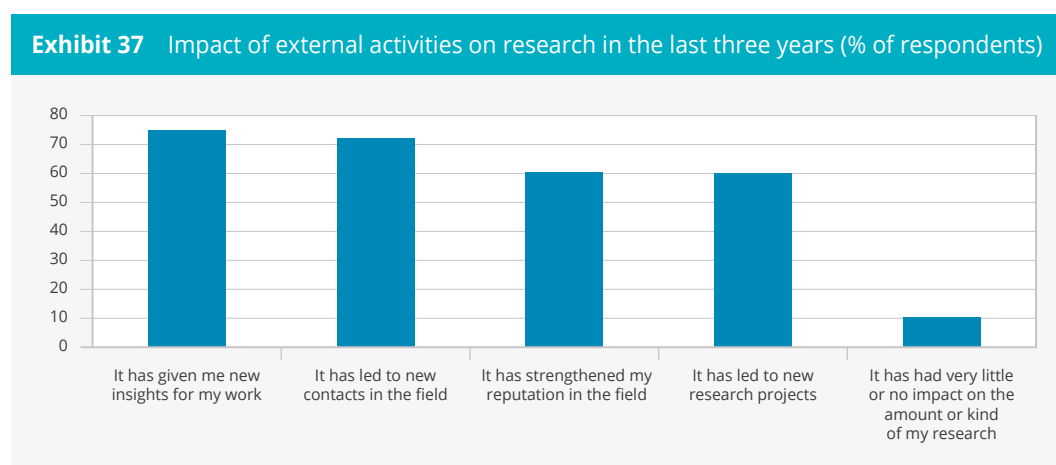
Another important motivation is furthering the institution's outreach mission (3.6), clearly indicating that outreach is perceived as an important activity by many academics. Conversely, motivations that were concerned with financial or commercial gains such as: personal income (2.3) and business opportunities (2.5) were considered unimportant: only 15% and 24% respectively considered these important motives.

There are some differences by discipline and by research activity reported in detail in Annex Exhibit D13. Academics in engineering and materials science rank all motivations higher than academics in other disciplines – from helping their research to pecuniary benefits. Furthermore, those engaged in applied or user-inspired basic research are more likely to state that they engage with external organisations to benefit their research compared to those primarily engaged in basic research. An analysis by seniority also yields some interesting results. Those in research roles rate research and equipment motivations higher compared to the mean, whereas those in lecturer, senior lecturer or reader positions stress teaching and student placement motivations. There are no large differences by gender, however.

Impact of External Engagement

To understand if external engagement brought the desired results, the survey also asked about their impact on research and teaching. External engagement could help develop new lines of research, especially research close to the needs of society, and could help academics to better react to teaching requirements. Both would help to increase the economic impact and relevance of research and teaching. Respondents that had engaged with private, public or third sector partners in the last three years were therefore asked about the impact these involvements had on research and teaching.

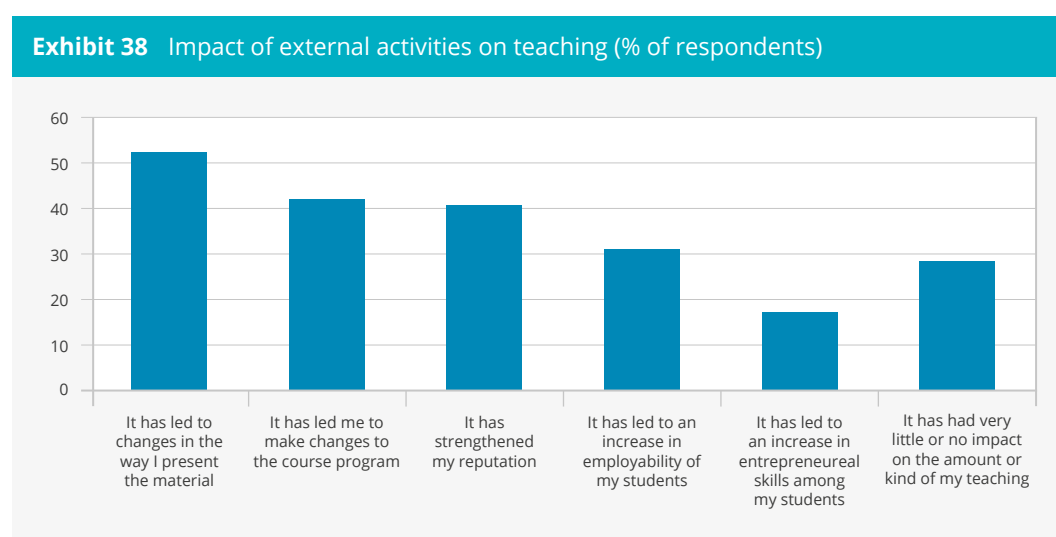
The results show that external interactions are perceived as helpful in relation to research. As shown in Exhibit 37, 75% of research active respondents who engage with external organisations state that it has given them new insights into their research work; 73% that it led to new contacts in the field; 60% that it led to new research projects; and only 10% consider it to have had very little or no impact.



Annex Exhibit D14 shows that the results apply across all disciplines, but that the positive impact on research is strongest in engineering and materials science followed by social sciences. Amongst respondents in engineering and materials science, 69% state that it led to new projects. Furthermore, benefits to research are stronger for academics engaged in user-inspired or applied research compared to those engaged in basic research (21% of the latter report little or no impact).

External engagement can also provide benefits for teaching. In general those reporting positive teaching effects are fewer than those reporting research effects. Exhibit 38 shows that 53% of respondents that do some teaching and are engaged with external organisations state that it has led to changes in the way they present teaching material. A further 43% report that it led them to make changes to their course programmes. The effect on student employability and skills, however, is only limited. Finally, 28% report that it had no or very little impact on their teaching.

There are some differences across discipline reported in Annex Exhibit D15. The strongest impacts on teaching can be found for academics in the social sciences, engineering and materials science and arts and humanities. In social science, for instance, 60% changed their material and 51% their course programme. Those in engineering and materials science instead stress student employability more than those in other subject areas (40% of respondents). Teaching impact is also higher amongst those involved in applied research, where only 24% report little or no impact. Impact on teaching is also higher for those in teaching fellow, lecturer or senior lecturer position, i.e. those groups that provide most teaching.

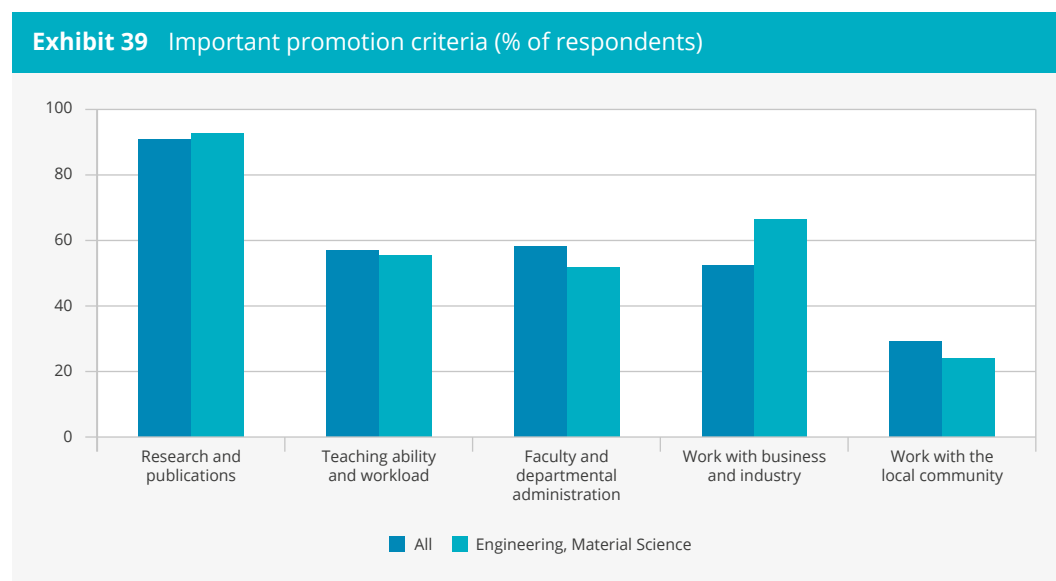


These survey results suggest that engagement with external organisations strengthens the two core missions of academics – research and teaching. From this perspective engagement is not a ‘third mission’ but a central element of the existing roles of the university, i.e. teaching and research.

An important motivational question is whether there is recognition for external organisation activities in promotion and career processes. The survey therefore asked respondents to indicate the importance of a range of factors relating to criteria for promotion and career advancement at their institution on a 5-point Likert scale - where 5 is very important and 1 is completely unimportant. The share of academics considering these criteria as important (values 4 and 5) is reported in Exhibit 39.

Research related criteria are considered important for promotion and careers by more than 90% of respondents. Administrative work and teaching are all considered important by a similar share of academics at around 56%. Remarkably, business engagement is also considered as important by half of respondents, thus almost by as many as teaching. In contrast, work with the local community is rated as important by just 30% of respondents. This may be associated with the fact that fewer academic staff interact through community-based activities. Unless non-commercial forms of engagement enter promotion considerations it may be difficult to motivate academic staff to devote time to such activities.

There are differences in importance by subject area, as reported in Annex Exhibit D16. In engineering and materials science, engagement with business is considered important for careers by 68% of respondents, whereas it plays a much smaller role in other disciplines. It is thus considered as more important than teaching within engineering and materials science. This may explain why commercialisation and engagement with business are more common amongst engineering academics. Administrative tasks are considered of higher importance by those in the arts and humanities (68%). The importance of local community engagement is highest in health sciences, where 38% consider it an important criterion. Further, those considering their research as more applied also give more importance to external engagement as promotion criteria than those in basic areas of research.

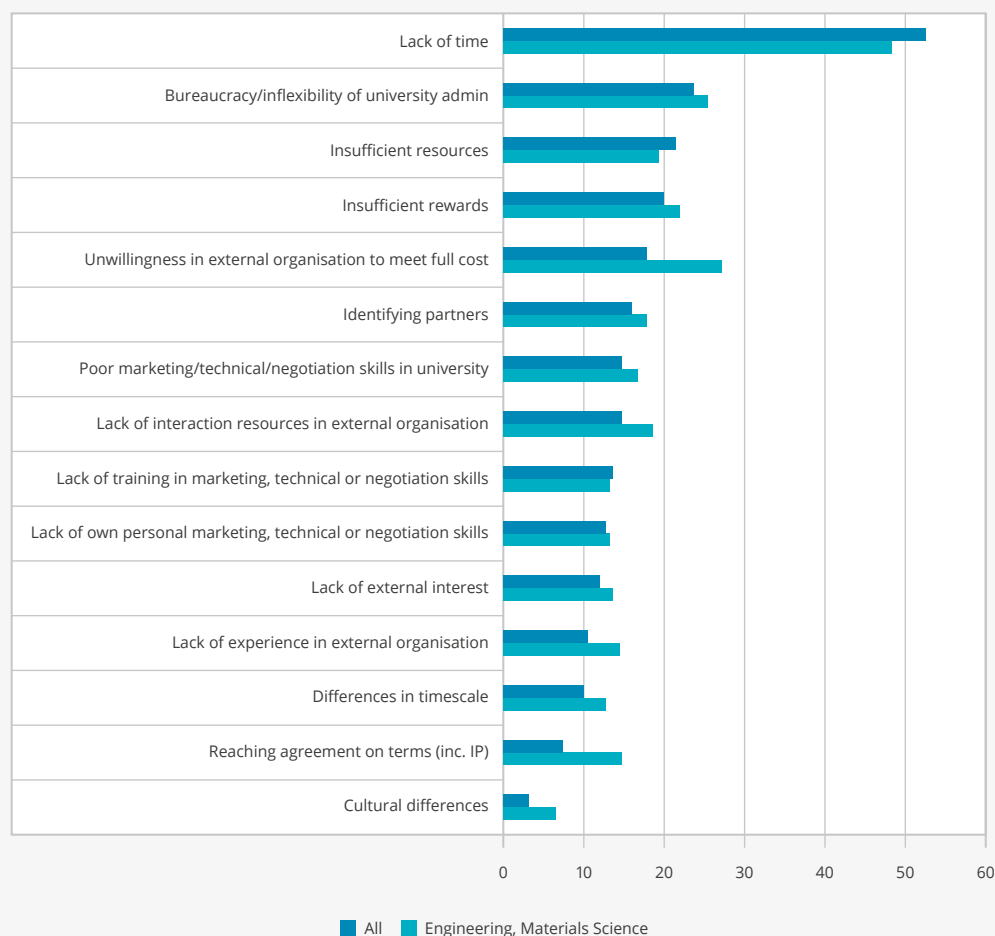


Constraints: Barriers to External Engagement

The survey results show very high degrees of external engagement amongst academics in the UK but there are a range of factors that hinder or limit external interactions. Exhibit 40 reports the importance of various factors that constrained or prevented interactions with external organisations over the last three years. Factors were measured on a 5-point Likert scale - where 5 is highly constraining and 1 is not constraining (values 4 and 5 represent substantial constraints experienced by academics). The share of academics reporting these constraints are shown in Exhibit 40. These results include both those respondents who reported no interactions with external organisations and those who did report some interactions.

Exhibit 40 shows that the most frequently cited constraints for the sample of respondents as a whole are: a lack of time (53%); bureaucratic hurdles within the university (23%); a lack of resources (21%); insufficient rewards (20%); and the difficulty of identifying partners (17%). In contrast, cultural differences and legal barriers regarding IP, reasons regularly mentioned in the literature, are not considered substantial constraints; although these may be important for those interactions that do involve IP and other related contractual issues, which as we have seen are relatively infrequent activities and vary by discipline. For instance, as shown in Exhibit 40, 14% of academics from engineering and materials science (the discipline with the highest propensity to generate patents, licences, and spin-outs) consider IP and related issues as a barrier. Additionally, if we look at those that have taken out a patent in the last three years, we see that 15% of these report that IP issues constrain engagement with external partners, compared to just 6% of those who do not report taking out a patent.

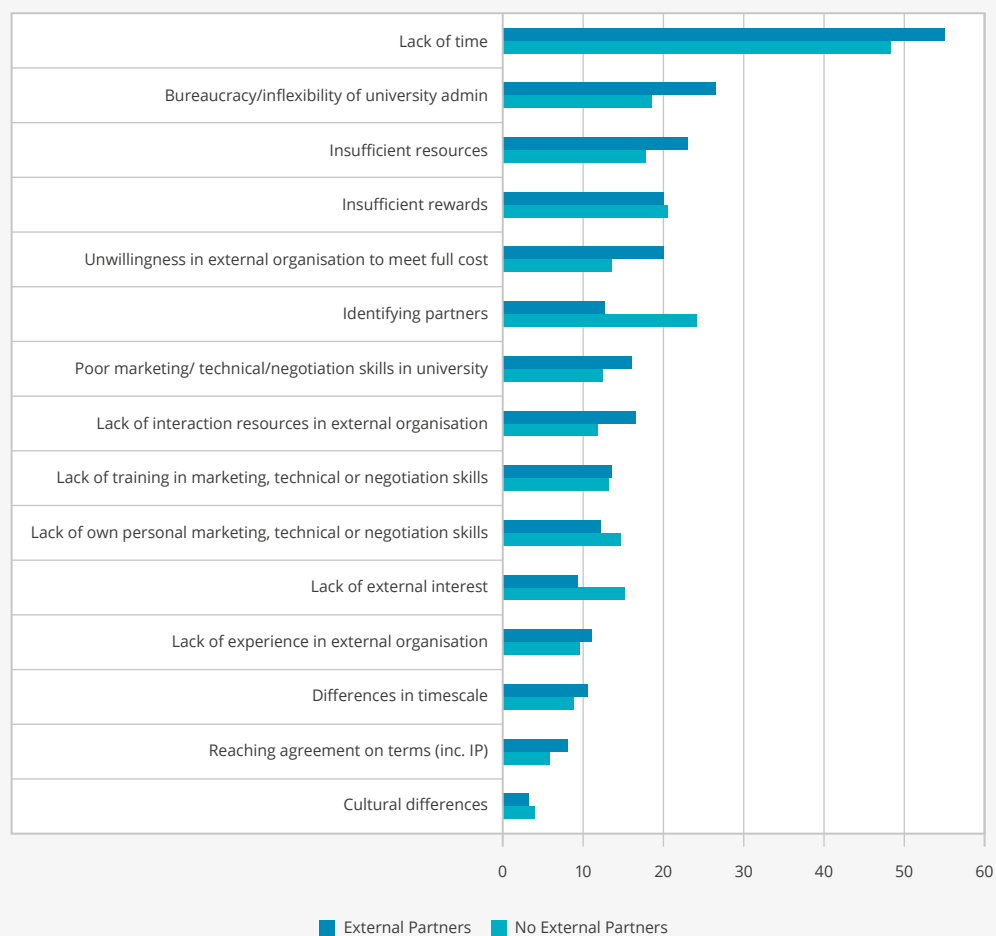
Exhibit 40 Substantial constraints on interactions with external organisations
(% of respondents)



This suggests that the pattern of constraints may be related to whether or not engagement with external organisations took place. In Exhibit 41 we therefore compare responses of those that have interacted with private, public or third-sector organisations with those that have not, and find that non-interacting academics are more likely than those with external partners to state that they lack the skills to interact with externals (15%), that external organisations lack interest (15%) and that they find it difficult to identify partners (24%). These constraints are often associated with searching and finding external connections. Actively engaged academics, on the other hand, are more likely to identify financing (24%), bureaucracy (26%), and own lack of time (55%) as interaction constraints. These constraints are more focussed on making external interactions work.

Additional analyses showing differences by seniority, gender, subject area and research orientation are reported in Annex Exhibit D17. They show that most constraints and especially the lack of time, lack of resources and insufficient rewards are felt more by those in lecturer, senior lecturer, and reader positions, perhaps due to their high teaching commitments and research pressures. Those in research-only contracts feel these constraints much less, for example only 31% of research fellows report time constraints. Also, some differences by research orientation are worth mentioning. Academics involved in more basic research are more likely to report difficulties in identifying partners and a general lack of external interest compared to those doing more applied research.

Exhibit 41 Substantial constraints on interactions with external organisations by engagement status (% of respondents)

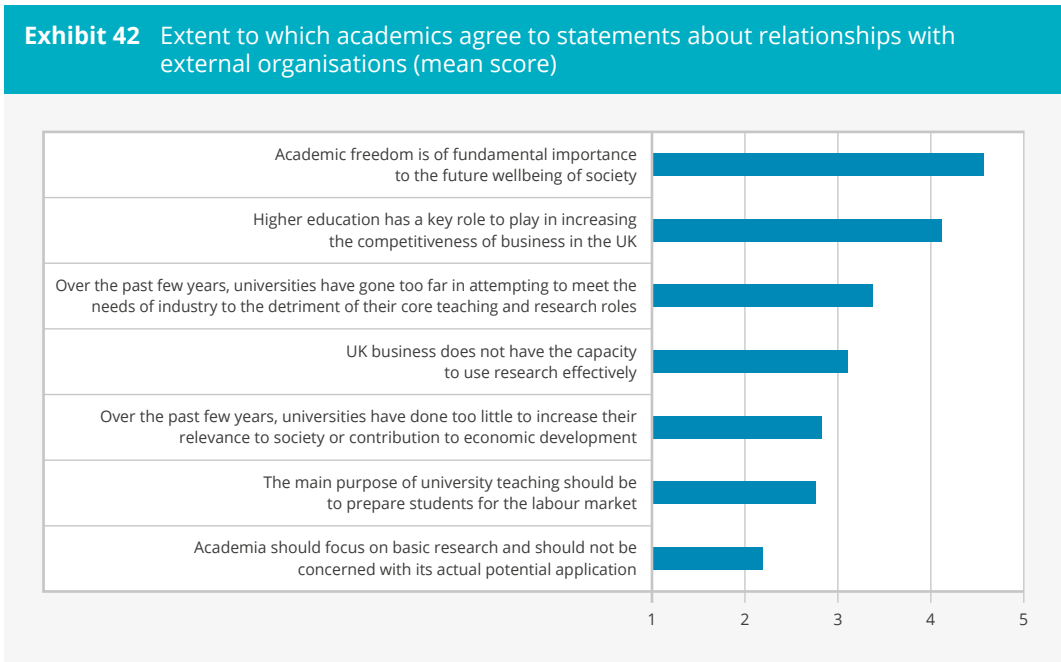


Section 1.7

The Role of the Academy: The Perspective of Academics

How academics perceive the role of universities in society and the economy may significantly influence if, and how, they interact with external organisations. Respondents were, therefore, asked to indicate the extent to which they agree about a series of statements about university external relationships on a 5-point Likert scale - where 5 is strongly agree and 1 is strongly disagree. Exhibit 42 reports the mean scores for each statement.

The results show that most academics agree that academic freedom is of fundamental importance to the future well-being of society- with an average score of 4.5. Furthermore, in general, academics believe that higher education has a key role to play in increasing the competitiveness of business in the UK (4.2); but that recently universities have gone too far in attempting to meet the needs of industry to the detriment of their core teaching and research roles (3.3). Respondents are ambivalent about the statement that UK business does not have the capacity to use academic research effectively (3.1).



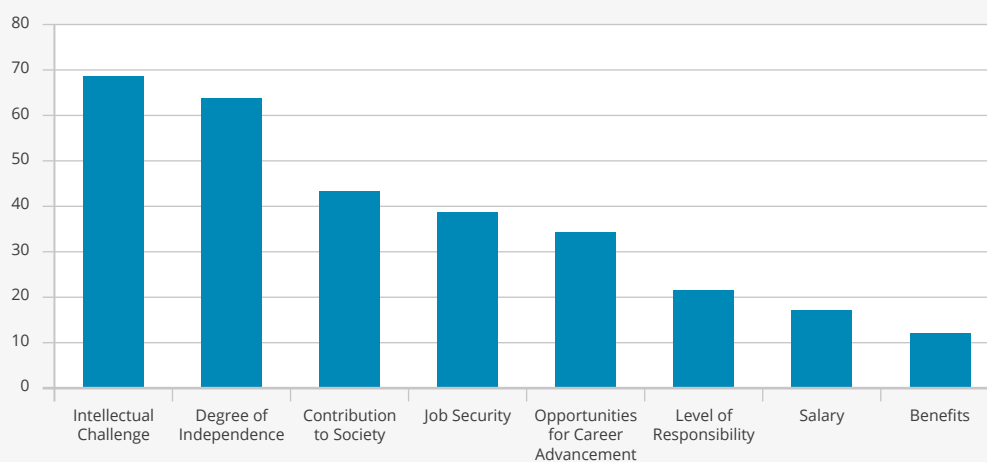
Although the importance of academic freedom is rated highly across all disciplines there are variations in the responses to other statements (see Annex Exhibit D18). Respondents from engineering and materials science are more likely to agree that higher education has a key role to play in increasing the competitiveness of business in the UK (4.5), in particular compared to those from arts and humanities (3.9). Conversely, those in the arts and humanities agree more that universities have gone too far in attempting to meet the needs of industry (3.6, compared to a sample average of 3.3).

Respondents, in general, disagree with the statement that the main purpose of university teaching should be to prepare students for the labour market (2.8); especially in the arts and humanities (2.3). It is notable that, in general, academics do not agree that universities should focus on basic research (and that they should not be concerned with the actual or potential application of their research). Those undertaking more basic research, however, tend to agree more that academics should focus on basic research (3.0) whereas those that are doing applied research do not (1.8) (see Annex Exhibit D18).

The importance of research freedom is further highlighted when academics are asked to indicate the importance to them of various factors relating to their job. Job factors were measured on a 5-point Likert scale - where 5 is very important and 1 is completely unimportant. The share of academics considering job factors as highly important (5) are reported in Exhibit 43. In accordance with prior surveys in the field we find that an intrinsic preference for freedom of research and satisfaction from puzzle solving (Stern, 2004; Stephan, 2012) are rated as highly important by a majority of respondents (68% and 63%) followed by a desire to contribute to society (44%). Pecuniary benefits in terms of financial gains are considered highly important by a minority of respondents (<17%). Other job factors relating to career advancement are rated as important by 35-38%. Responsibility is highly important for only 22% of respondents.

A differentiation by discipline (Annex Exhibit D19) shows that contribution to society is of highest importance for those in the health and social sciences (>50%), the areas that also have more public sector and people-based engagement. Researchers with a more basic research focus have the lowest share of respondents that value pecuniary benefits highly (10%). Those in more basic fields of research also value intellectual challenge higher than those in applied areas of research, while amongst applied scholars more than 50% see contribution to society as an important job factor.

Exhibit 43 Academic job factors considered as very important (% of respondents)



External Engagement - a Detailed View

02

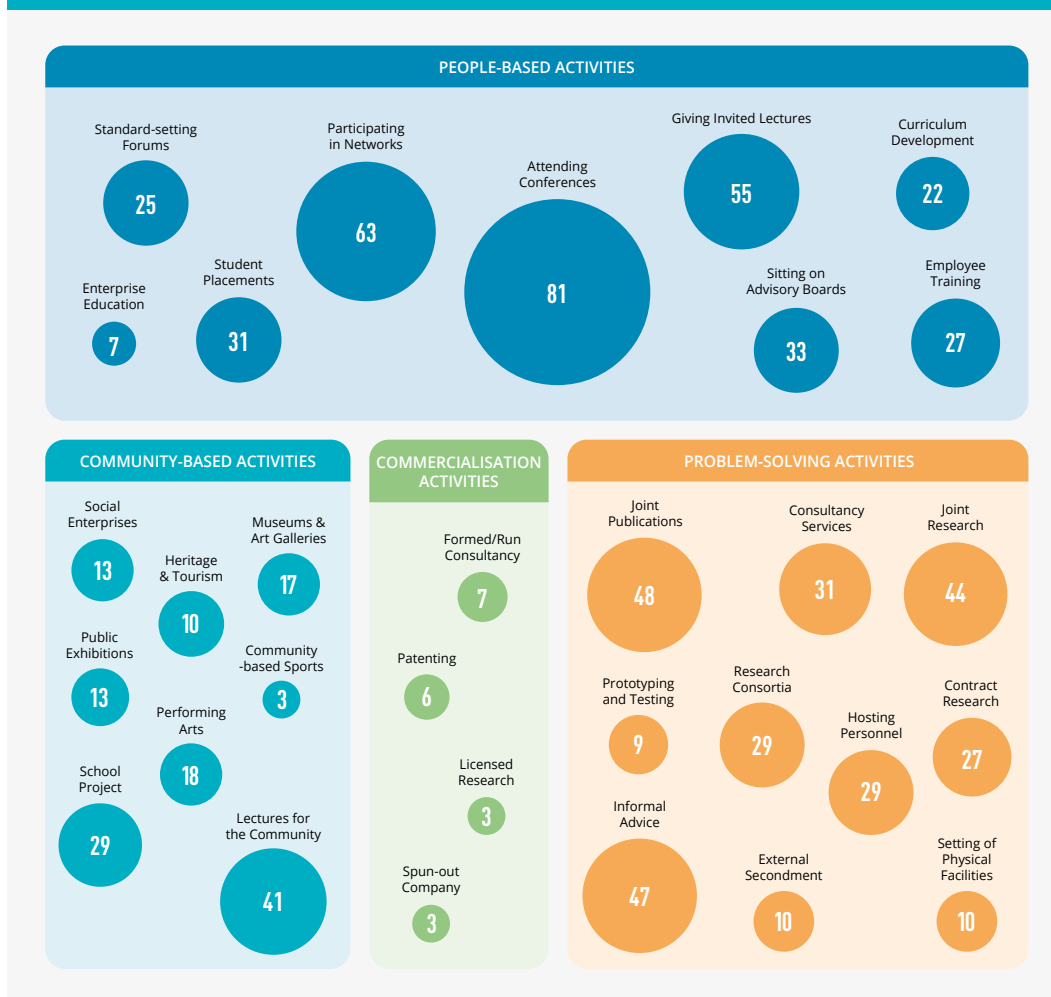
Section 2.1

Comparative Importance of External Interactions and Commercialisation

There is increasing recognition that the rich resources of the university can be used in a variety of communities and sectors, and address a variety of problems. In seeking to identify the patterns of interaction shown by respondents, we grouped possible modes of interaction into three broad categories - people-based, problem-solving and community-based - and asked respondents whether they used any of these modes in the past three years. People-based modes of interactions are concerned with networking with and education of professional external organisations; problem-solving activities with joint and commissioned research; and community-based activities with exchanges with the general public and the voluntary and cultural sector (TNS, 2015). In addition, the survey asked about commercialisation activities, which include licensed research, patenting, spinning-out of a company and the forming or running of a consultancy.

Exhibit 44 shows the percentage of respondents reporting each type of interaction; the larger the balloon, the higher the percentage of respondents reporting that interaction. This representation summarises the results of Section 1.3. External Interactions and Commercialisation of this report, and shows very clearly that commercialisation activities are amongst the least common forms of external knowledge exchange when taken alongside the more frequently reported people-based, problem-solving and community-based interactions.

Exhibit 44 Academic external interaction activity and commercialisation in the last three years (% of respondents)



The dominance of non-commercial interactions is apparent in all disciplinary fields. Exhibit 45 shows the graphic for each of the six disciplinary fields (also reported in Annex Exhibit D7). Clear differences are apparent: the involvement in commercial activities is most frequent in engineering and materials science, followed by biology, chemistry, veterinary science, physics and mathematics. People-based activities are the most frequent type of external interaction in all disciplinary fields, but the balloons are largest in engineering, social sciences and health science.

Problem-solving activities represent the second most frequent form of involvement for all disciplinary fields with the exception of arts and humanities - where community-based activities are more frequent. Problem-solving activities are most common amongst engineering and materials science academics. These are followed by the other STEM subjects except in the case of informal advice and consultancy which are more common in social sciences and the arts and humanities.

Community-based activities involving public lectures and school projects are widespread amongst academics in all disciplinary fields. They are, however, particularly common amongst those in the arts and humanities where 59% state that they gave public lectures and 35% were engaged in school projects.

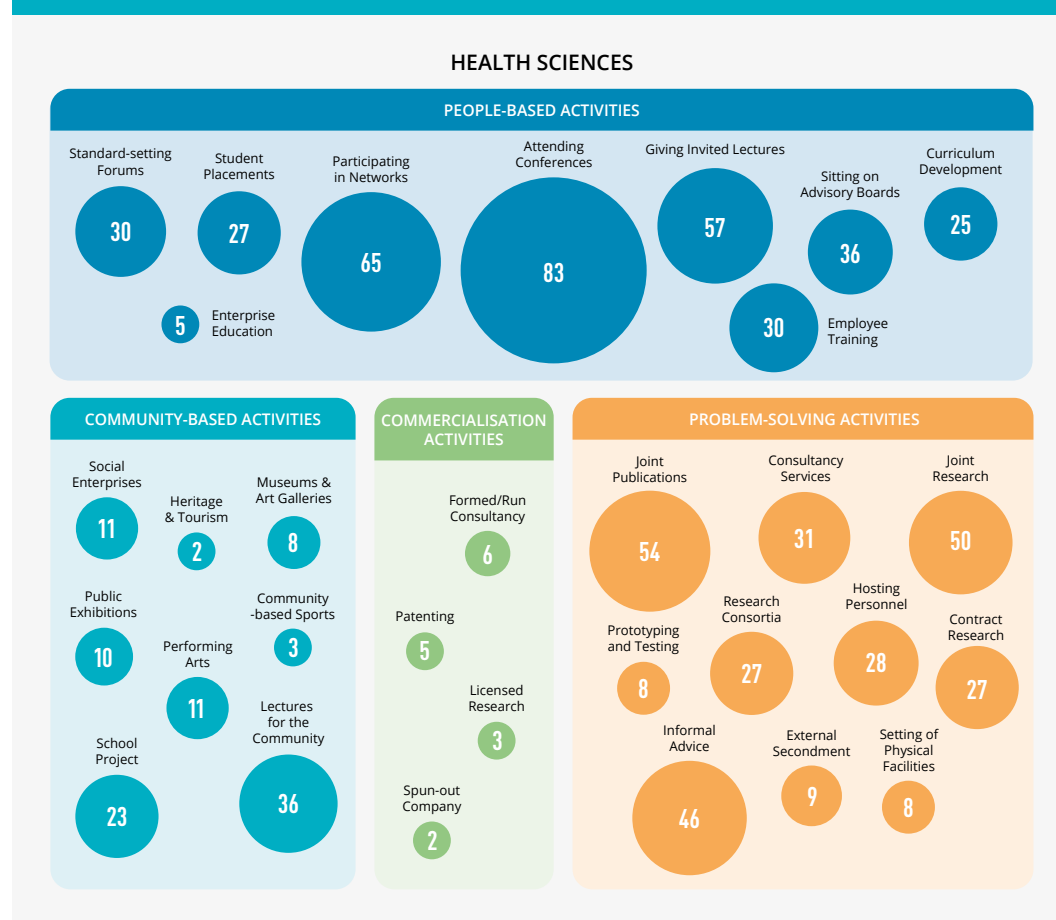
Community-based activities involving museums, performances, and heritage and tourism are also primarily carried out by those in the arts and humanities. More than 40% of respondents from these disciplines are engaged with museums and cultural activities and more than 20% in heritage activities. Involvement with social enterprises is most common in the social sciences where more than 20% state this type of engagement compared to a sample average of 13%.

The importance as well as the frequency of the various engagement channels also differs by disciplinary field (Annex Exhibit D7). People-based activities concerned with presentations and student placements are considered as very important by a larger share of respondents from engineering and materials science. By contrast, curriculum development is considered of highest importance by those in the social and health sciences. People-based activities are generally considered as important by fewer respondents in physics and mathematics and in arts and the humanities.

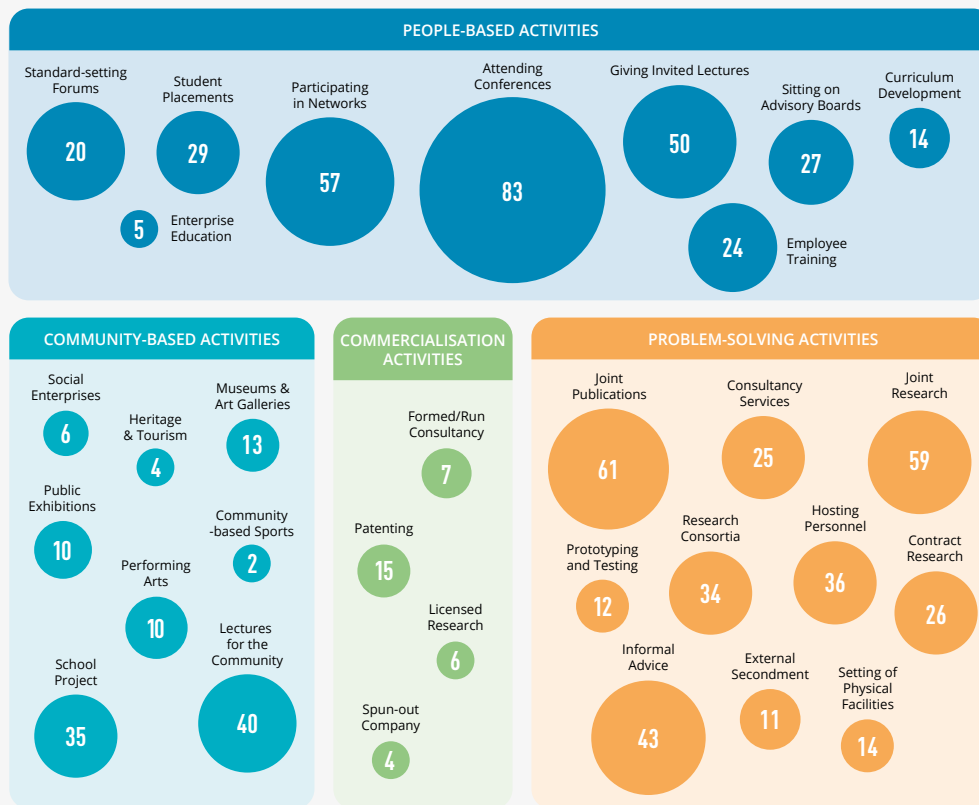
Problem-solving activities around joint or contract research are considered as being of highest importance by those in engineering and materials science, but also by those in biology, chemistry and veterinary science. Informal advice and consultancy is considered of importance by more respondents in the social sciences, though they are still amongst the least important modes of engagement.

Community-based activities, finally, are given the highest importance rating by academics in arts and humanities, with exhibitions and performances being considered as very important pathways to impact by more than 30% of respondents.

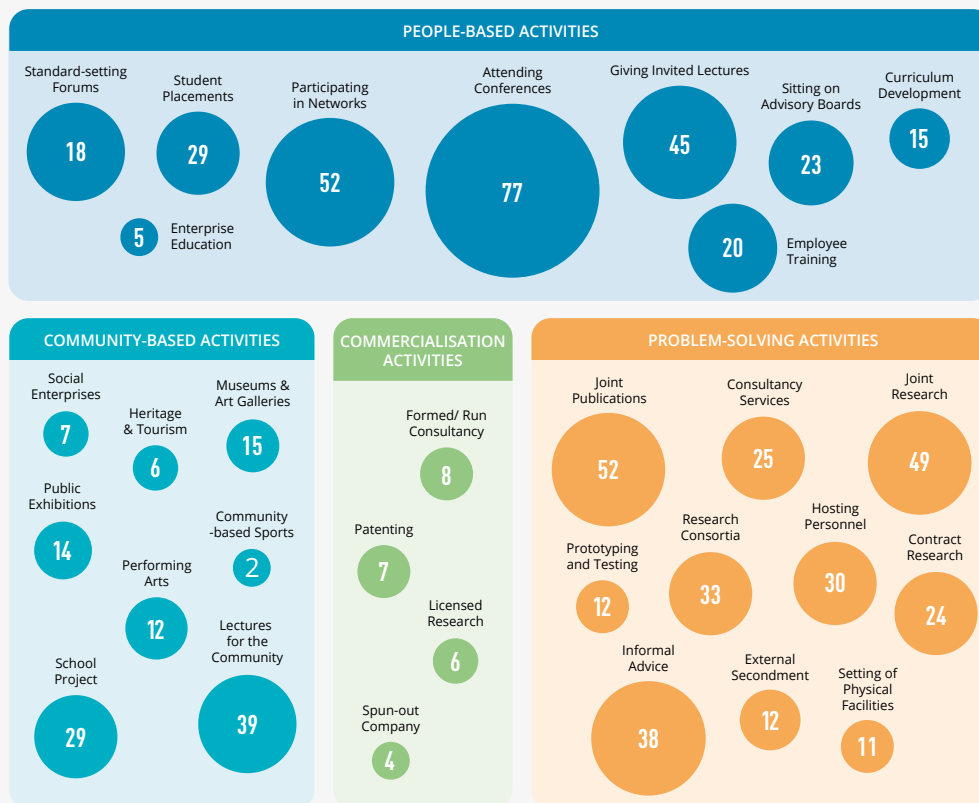
Exhibit 45 Academic external interaction activity and commercialisation in the last three years by disciplinary field (% of respondents)



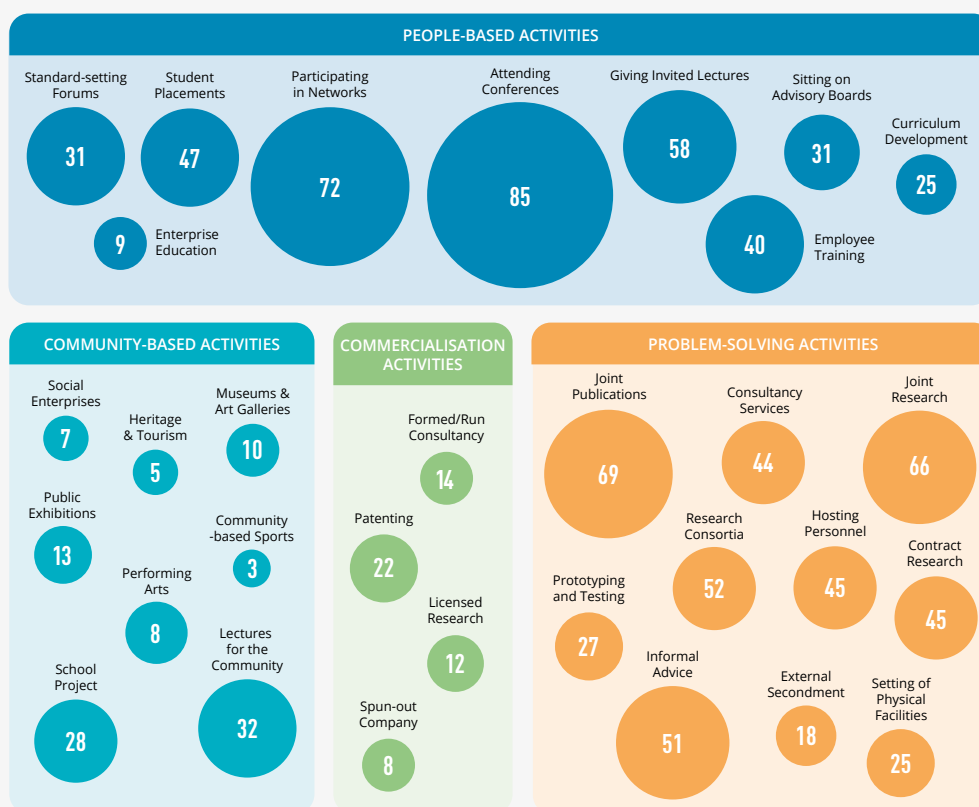
BIOLOGY, CHEMISTRY, VETERINARY SCIENCE



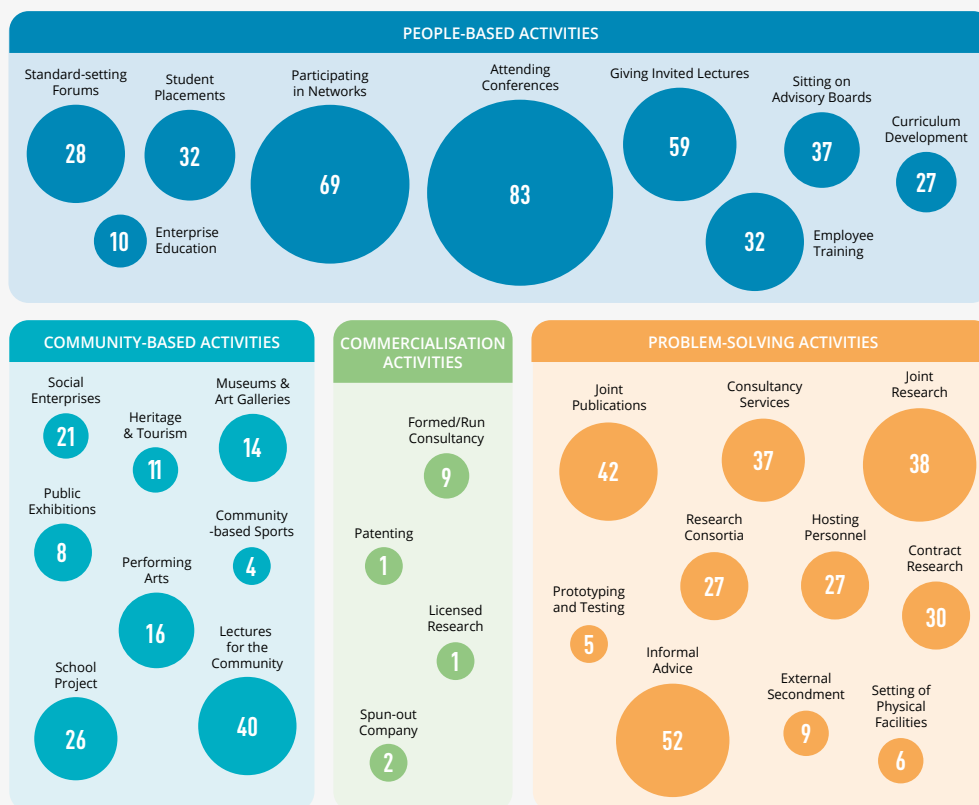
PHYSICS, MATHEMATICS



ENGINEERING, MATERIALS SCIENCE



SOCIAL SCIENCES



Section 2.2

Intensity of External Interactions and Commercialisation

We have analysed the different modes of engagement and commercialisation, one at a time and have shown how frequently many academics use each, how important they are to them and how their use differs by disciplinary field. Academics motivated to engage with external organisations may use several modes of engagement and they may use these modes repeatedly. The intensity of an individual academic's interactions may then be captured by looking both at the variety of engagement modes used as well as by the frequency of their use. It is therefore of interest to measure the intensity of engagement activities in terms of their breadth (number of types of activities reported) and depth (frequency of use of particular types of activities).

Interaction breadth is defined as the ratio of engagement modes used by the respondents to all modes available, regardless of the number of times they are used. A ratio is used to allow for the different number of modes available in each engagement category. Interaction depth measures the extent to which respondents use their chosen engagement modes. It is measured by the sum of the number of times each engagement mode was used divided by the number of used modes. Respondents could choose a number from 0 to 9 and 10 or above to indicate the number of times each mode was used in the past three years. The breadth and depth measures are calculated for each of the four interaction categories: people-based, problem-solving, community-based and commercialisation activities, and for the six disciplinary fields.

To take account of the importance ascribed to each interaction mode by individual respondents, we also present results where the measures of depth and breadth are weighted by how important respondents consider them as a pathway to impact. If a mode is considered 'unimportant' or 'neither important nor unimportant' its value is set to zero; if it is considered to be 'important' it retains its full value. Importance measures were not available for the commercialisation modes and they were therefore all given a rating weight of "1" (equivalent to 'important').

For illustration let us select a professor in the biosciences who during the past three years engaged four times in joint publications with external organisations and twice in joint research. She thus used two different problem-based modes out of the 10 available and is assigned a breadth of 0.2; she uses the two engagement modes six times in total and is thus assigned a depth of 3 (6 divided by 2 modes). The sampled professor considers both channels as highly important for impact, the weighted measures are therefore identical to the unweighted measures in this example case.

Results for all four measures for the full sample are shown in Exhibit 46 and Exhibit 47. Exhibit 46a shows that those in engineering and materials science have the highest breadth of people-based and problem-solving interactions (0.44 respectively, i.e. 44% of all available modes). Those in the sciences are (on average) using just under three modes of people-based interactions (ratio of 0.3) whereas those in the arts and humanities use the least number of problem-solving modes of interactions (2 or ratio of 0.2). The average academic in arts and humanities, however, uses more community-based interactions, with an average of 2.5 modes per academic (ratio of 0.3). Commercialisation plays a much less significant role, as we already showed earlier, and these interactions are used very little by respondents in all fields at a ratio of 0.05 (this equals 1/5 of an interaction).

Once we weight responses by their importance score (see Exhibit 46b) we find that breadth declines across all fields and modes but to a larger extent in community-based activities where the scores are reduced by 40%. This indicates that these modes are used as part of an engagement portfolio, even though they are not considered of high importance, perhaps due to institutional or funding requirements. They retain, however, their important role in the arts and humanities where they are considered as more important and are used more than in other fields.

Exhibit 46 Interaction breadth in the last three years

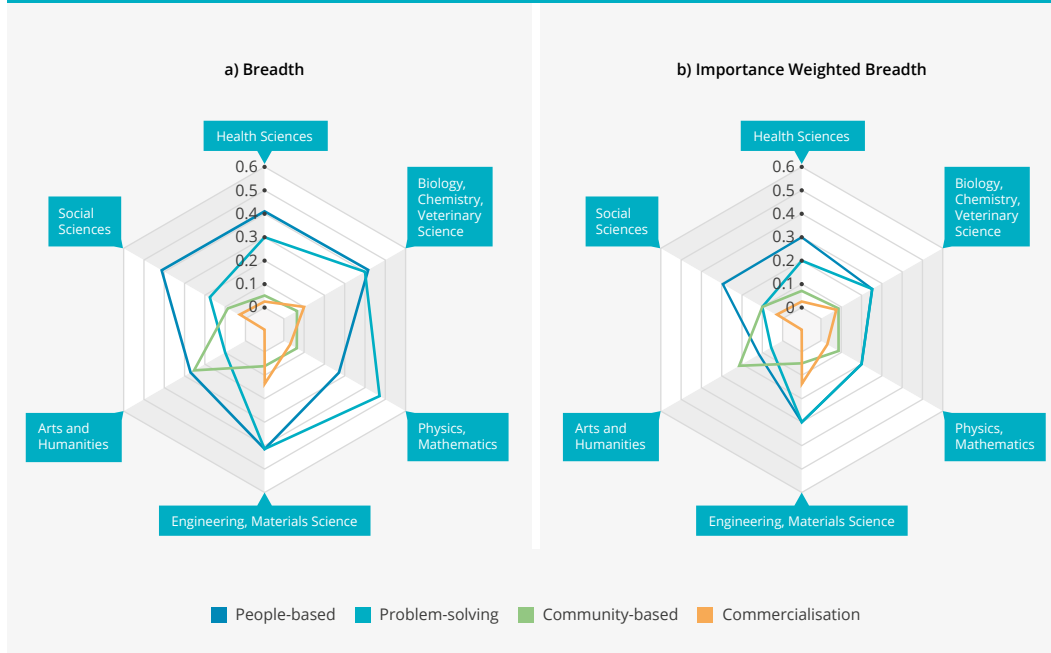


Exhibit 47 Interaction depth in the last three years

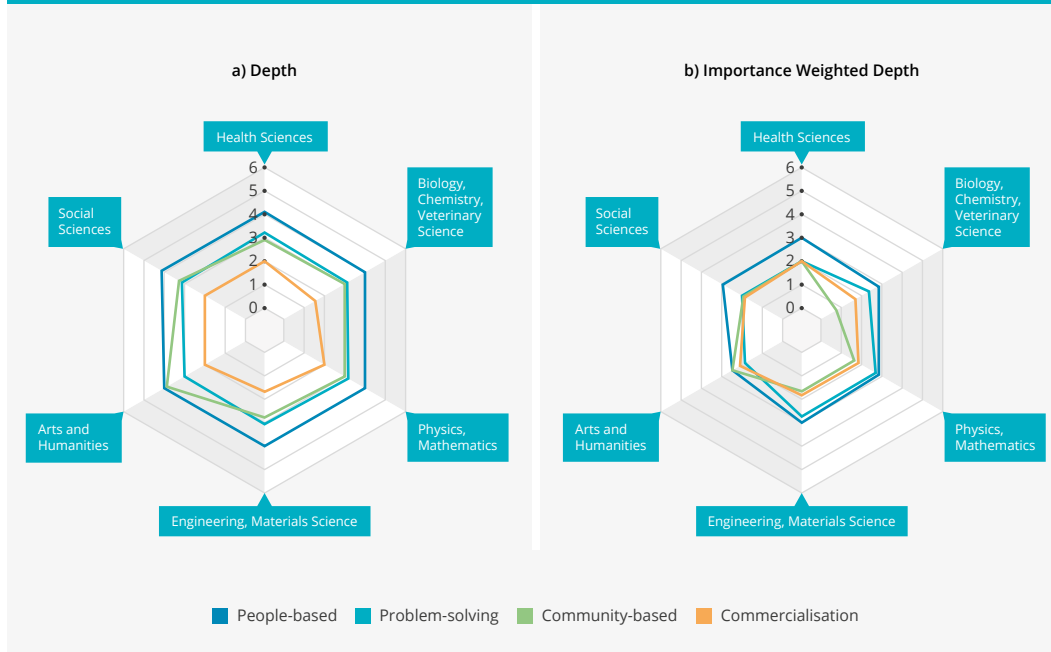
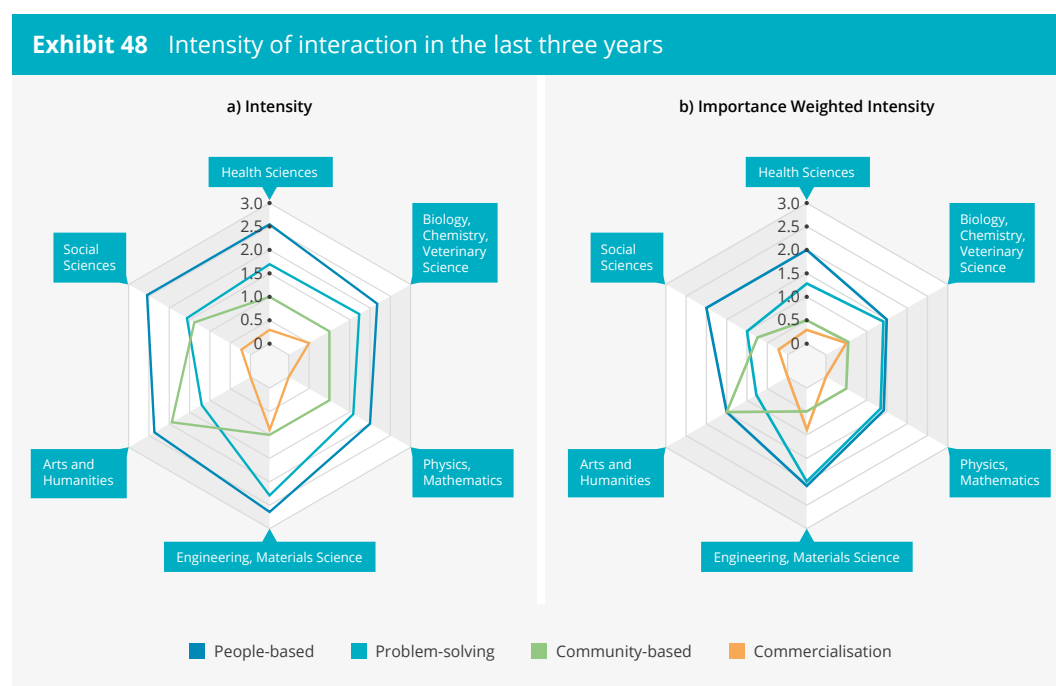


Exhibit 47a shows the depth of different interactions, which ignores all modes that received zero uses. People-based interactions are most frequently used with an average of 4 times per used mode and little variation across disciplinary fields. Problem-solving activities are used slightly less frequently at just over 3 interactions per used mode. Community-based activities are on average used equally as frequently as problem-solving modes; however, they are most often used in the arts and humanities (3.8 times). Commercialisation modes are used less frequently at only 1.8 times per used mode. Overall the diagram representing interaction depth looks very even across disciplines. Additionally, if we weight the depth measure by importance (Exhibit 47b) we again find that it declines across all fields and modes at a rate similar to the breadth measure. Interestingly, the frequency of non-commercial modes gets reduced almost to the level of commercial engagement. This gives a small indication that importance considerations alone do not decide the frequency of interaction.

Finally, we calculated a joint measure of intensity for academic engagement combining depth and breadth. The intensity measure for external engagement is built such that an academic engaging through two channels at least two times is assigned a value of 2, an academic that engages through three channels at least three times a value of 3 and so on. Results are shown in Exhibit 48. For people-based activities we find the highest intensity in engineering and materials science and social sciences with 2.7. The highest community interaction score is 2 in arts and humanities, indicating that on average academics in these fields use 2 channels at least 2 times. The intensity score for commercial activities is highest in engineering and materials science with 0.8. Again we weight the measure by perceived importance with familiar results (Exhibit 48b).

Overall, people-based and problem-solving activities are of similar intensity in science and engineering; and health and social science look similar with a stronger people-based focus. Finally, art and humanities is the field where community interactions have a higher intensity than problem-solving activities. It is the breadth of interaction that differs most by disciplinary field and interaction activity, whereas the depth of interaction is very similar across measures. This becomes particularly apparent once we combine the two measures into a measure of intensity. The importance weight does not have a strong impact on the overall results, leading us to conclude, that importance considerations only partially affect variety of modes and their frequency. However, it becomes apparent that importance considerations affect variety of modes more than their frequency.



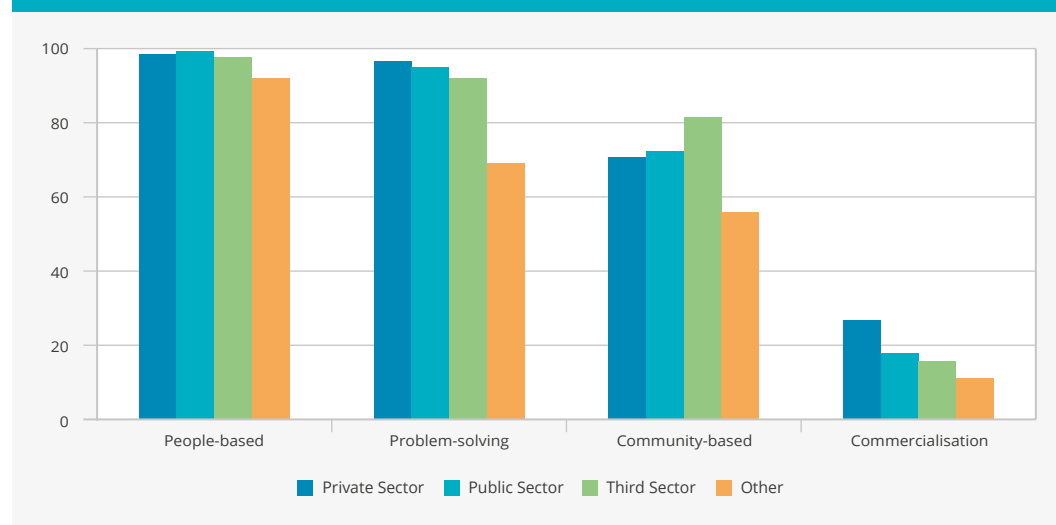
Section 2.3

External Interactions, Sector of Engagement and Funding

Different engagement modes may be used to interact with different sectors and may benefit from different types of funding. This section reports how these various elements interact.

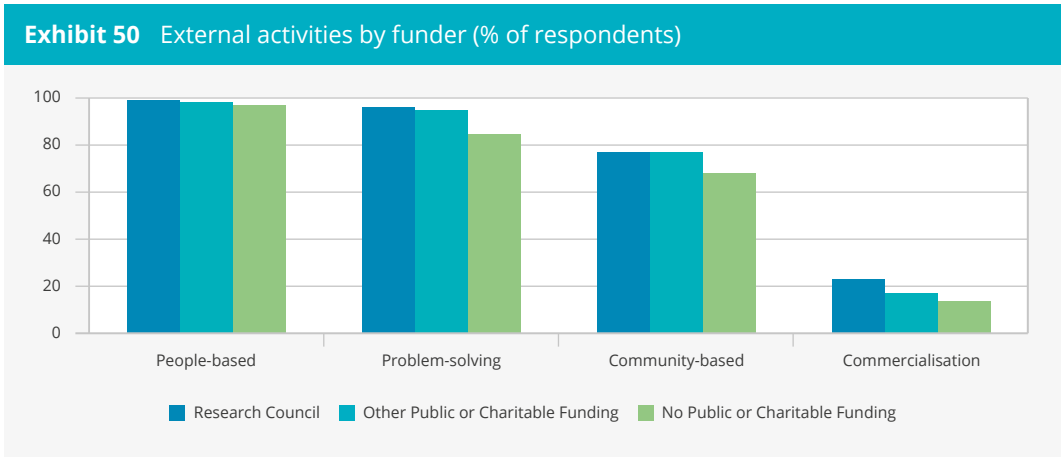
Exhibit 49 reports the share of academics reporting public, private or third sector engagement by type of used engagement mode (excluding those respondents that do not use the engagement mode). This exhibit needs to be read with caution, as the survey did not directly link activities with sector partners. The shares given here are thus just an approximate indicator for the types of activities undertaken with different sectors. As 38% of those using non-commercial engagement forms did not specify a partner we also include a category “Other”. The relatively large group reporting “Other” may reflect respondents’ uncertainty about classifying their collaborating organisations into one of the three categories offered or because they used more than one.

Exhibit 49 Engagement activities and sector engagement (% of respondents)

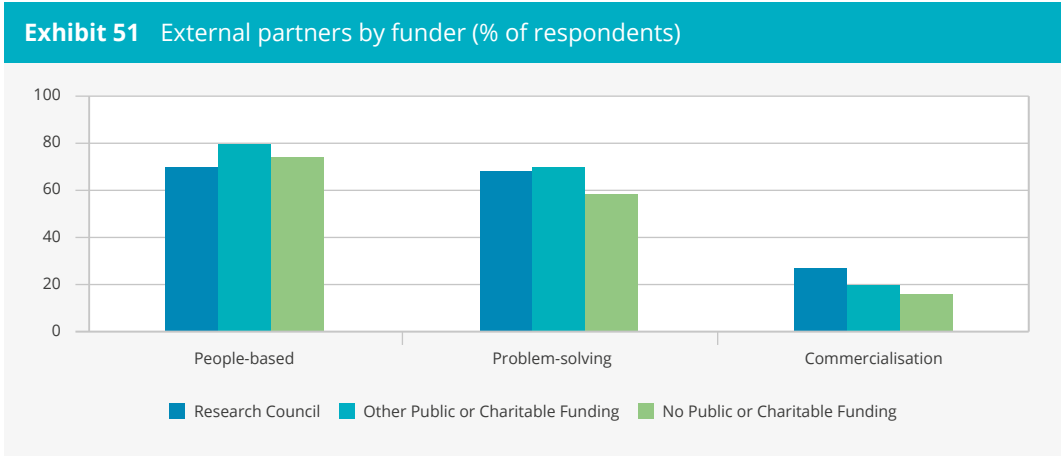


Amongst those that engage through people-based activities a similar share reports engagement with the three different sectors. A more detailed breakdown (see Annex Exhibit D6) reveals that those reporting employee training and student placements are more often reporting engagement with the private sector, while advisory boards and standard setting forums are more often associated with public sector engagement - but overall differences are very small. Those using problem-solving activities generally report engagement with the private or public sectors. Informal advice is the one channel associated equally strongly with all three sectors. In the case of prototyping and testing and setting up of physical facilities a larger share of respondents report private sector engagement. Not surprisingly, those reporting community-based engagement are also more likely to report engagement with third sector partners, while commercialisation is more closely linked to private sector engagement. A forth unnamed sector is of relevance across all areas external engagement.

As a next step we plot the three non-commercial engagement measures and the commercialisation measure for those that receive Research Council support for their external engagement; those that receive other public or charitable support in the absence of Research Council funding; and those that report no support. The results are shown in Exhibit 50 and by subject area in Annex Exhibit D12. The exhibit shows that there are no large differences between academics that receive Research Council support and those that receive only other public or charitable funding in terms of engagement through people-based, problem-solving and community-based activities. However, those that report some Research Council support are more likely to report commercialisation activities: nearly 24% of those reporting Research Council support engaged in some IP or spin-out activity. This is confirmed for all subjects but is most pronounced in physics and mathematics and in engineering and materials science.



If we repeat this analysis for the type of sector engagement (Exhibit 51), we find that those stating that they benefitted from Research Council funding are also more likely to have private sector partners. Third sector involvement, however, is less common amongst those that report Research Council support. Here other funding sources are more important or it may not involve any funding at all. A comparison by subject area further shows that in the health and social sciences and in arts and humanities those reporting Research Council funding are more often reporting third sector engagement compared to those that do not receive Research Council funding. For those in physics and mathematics, social sciences and in arts and humanities Research Council support is also associated with public sector partners. Overall, this may indicate that Research Council support is of greater importance for more resource intensive forms of engagement.



Comparison of 2008/9 and 2015 Surveys

03

Section 3.1

Introduction

Introduction

The 2015 survey allows for some comparisons to be drawn with the results from the 2008/9 survey. This permits an assessment to be made of changes in external engagement in the six years since the first survey was completed. Both surveys collected data on interaction for a three year period prior to the survey date, i.e. to 2012-2015 for the 2015 survey round and 2005-2008 for the 2008/9 survey round. In the 2015 survey we observe a decline in the response rate compared to the 2008/9 survey round. This may reflect post-REF fatigue or more general resistance to surveys by academics given the increasing reporting and monitoring of the outcomes of research.

In our introduction to this report we outlined a number of changes in the overall environment that must be borne in mind when we compare the results of the 2008/9 and 2015 surveys. We recap them briefly here. Academic involvement in knowledge exchange during the second survey period was taking place in a more constrained macro-economic environment with lower levels of business investment. There is also some evidence that a smaller proportion of innovating businesses reported collaborative activities with universities during the second survey period than during the first, and that fewer of them reported universities as a knowledge source for innovation. Both private sector business expenditure R&D and HEI expenditure on R&D were, nevertheless, higher in the second survey period. Business sector funding of HEI R&D expenditure however fell slightly and UK public funding of HEI R&D expenditure fell substantially between the two survey periods with overseas funding filling the gap. Universities reported enhanced internal support for knowledge exchange between the survey periods and external sources of income related to knowledge exchange including

collaborative and contract research were higher in the second period. Government support for knowledge exchange in England was higher in the second survey period although its pattern was redirected towards the more research-intensive universities. Moreover support for people-based knowledge exchange through the Knowledge Transfer Partnership programme declined. There was, however, a higher degree of Funding Council and Research Council support for external interactions. This was incentivized by the inclusion of impact case studies in the 2014 REF and was embedded in the adoption of the Pathways to Impact approach adopted by the Research Councils grant applications process and in the introduction of Impact Acceleration Account and related programmes to enhance external connections. This was accompanied by enhanced focus and strategic direction connected with collaborative sector programmes between Innovate UK and the Research Councils.

Taken as a whole these changes between the two survey dates suggest an enhanced emphasis and degree of support for HEI interactions with external organisations. This could be expected to offset any downward pressure on external interactions arising from macroeconomic and private sector demand side trends. The increased strategic focus involving Innovate UK and the adoption of Pathways to Impact approach may also have led HEIs and academics to a more strategic focus or specialization of their own efforts in response to funding opportunities offered by the Funding Councils, the Research Councils and Innovate UK.

Comparison Methodology

Our comparisons between the 2015 and the 2008/9 survey results are based on an analysis of responses by a matched set of academics. Matching allows comparisons between the two survey periods whilst controlling for change in the sample in terms of subject, age or gender which may co-vary with measures of knowledge exchange.⁸

Here we employ exact matching on subject area, gender, age group, institution and seniority grouping. In addition we use Mahalanobis distance to match by work activity (i.e. whether the respondents are involved in research or teaching) and by research orientation (basic, user-inspired or applied). The algorithm uses matching with replacement, which permits the same 2008/9 respondent to be matched to multiple 2015 respondents. In total 10,217 respondents (56%) were matched and are used in this analysis.

Exhibit 52 provides a descriptive overview over the seniority, age, gender and subject composition of the matched sample compared to the full sample of 2015. The age and seniority distribution is very similar between the matched and full sample, with a slight overrepresentation of professors and research fellows compensated for by fewer research assistants and Emeritus/retired staff. The matched sample contains a higher share of academics in the health sciences and a lower share in the arts and humanities. The lower matching success in the arts may be due to low response rates at some specialist institutions and hence fewer academics to sample. The higher shares for professors and research fellows may on the basis of our previous univariate analyses raise and lower knowledge exchange in the matched sample compared to the full sample. The lower representation of women and higher representation of arts and humanities also have potentially offsetting effects the latter lowering and the former raising knowledge exchange activity. Overall, the sample seems well constituted to allow good comparisons between the two survey periods. These differences between the full and matched samples nevertheless need to be borne in mind when evaluating the results of this section.

⁸ The algorithm to match academics across the two surveys uses exact and Mahalanobis distance measures. This is a preferred method for matching as it is highly effective in eliminating co-variate bias. It has the caveat that if many individuals cannot be matched, new biases may arise. However, it has been shown that the method works well when used on broad ranges of a variable (for example age categories instead of exact age as is the case in our survey) and when there are relatively few covariates (Stuart, 2010).

Exhibit 52 Sample characteristics full and matched 2015 survey (% of respondents)

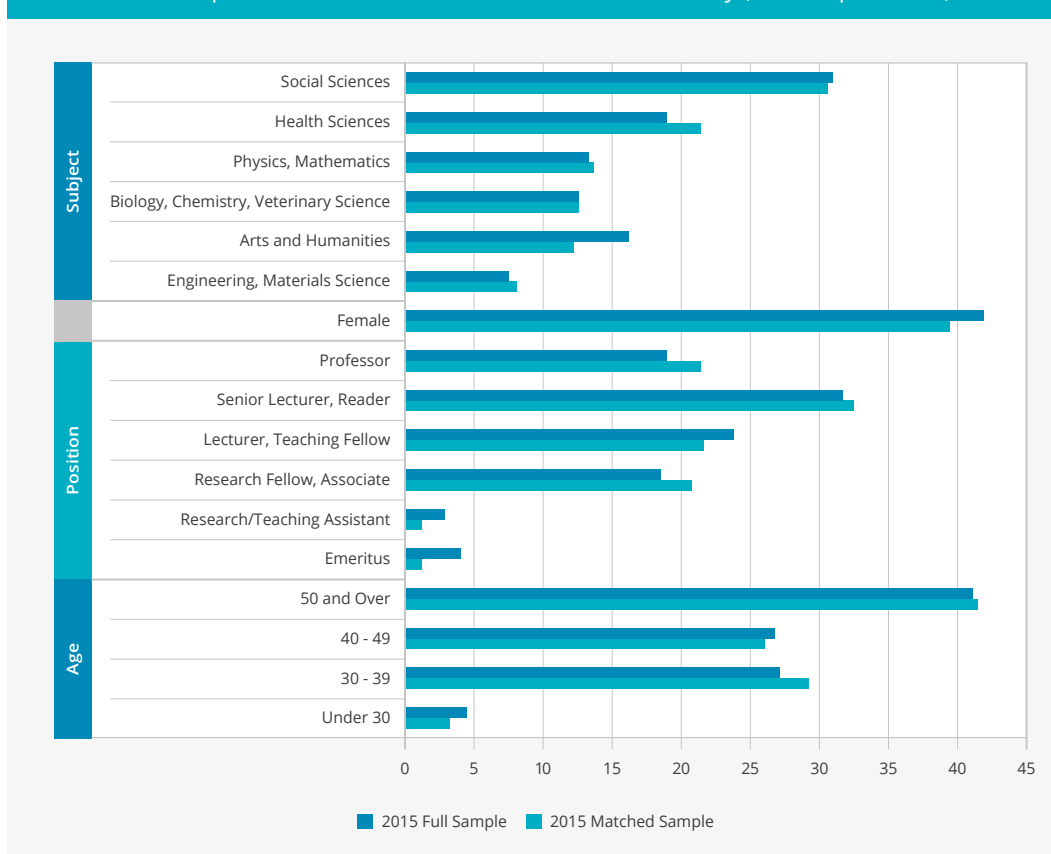
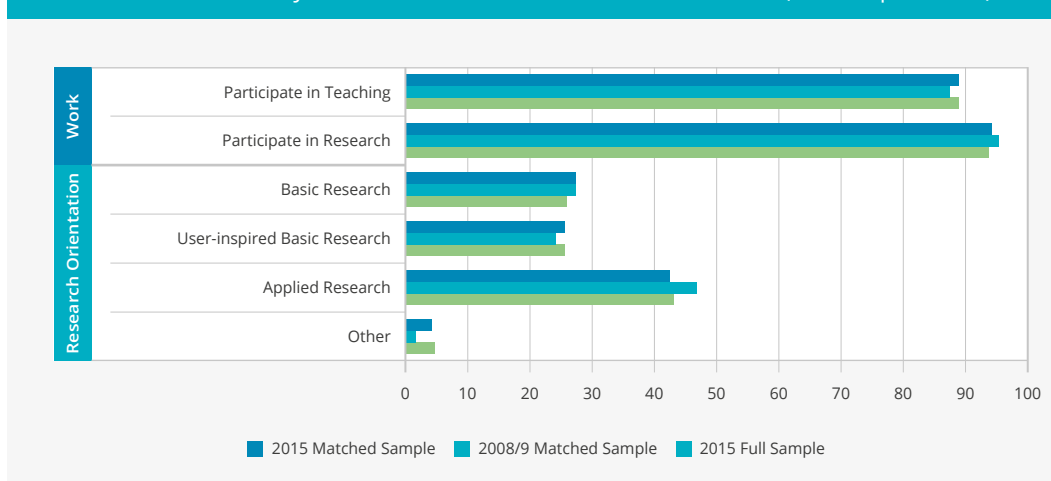


Exhibit 53 shows the difference in the distribution of work activity and research orientation, which were used as additional matching criteria. The Exhibit shows that there is a good match between the two samples and that the matched 2015 sample is representative of the full sample in terms of both criteria. Thus, even though just 56% of the full sample could be matched there is a close correspondence to the full sample in key covariates. The similarities between the full and matched samples are very comforting and will allow us to have some confidence in the comparisons drawn here.

Exhibit 53 Work activity and research orientation 2008/9 and 2015 (% of respondents)



Section 3.2

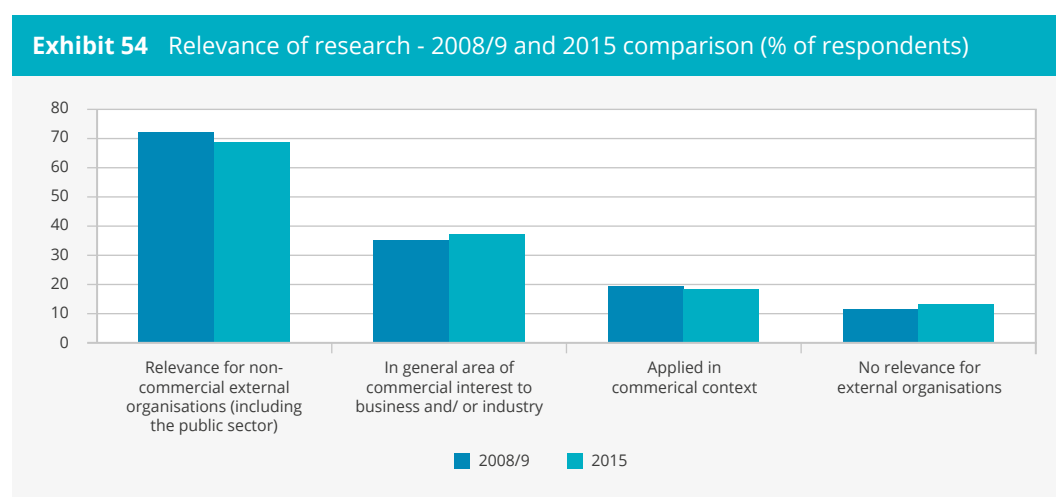
Comparison of External Interactions and Commercialisation

This section will focus on those questions that are comparable between the two surveys and where we observe significant changes. Attitudes regarding the general role of academia have not changed since the last survey and are not reported here in detail. Themes such as partnership initiation and constraints have seen slight changes in question design, however, the overall ranking of different survey items has remained the same as in 2008/9 and are also not reported here.

The Extent of External Engagement

The 2008/9 survey was the first to demonstrate the scale of external interaction carried out across all disciplines and spanning the public and private sectors. The current survey allows us for the first time to see how external engagement has changed over the past six years since the first survey.

Exhibit 54 shows the share of respondents that report external relevance and application of their research in the matched sample. It shows that there has been a slight decrease in relevance for the non-commercial sector. However, there is no change in the relevance and application in a commercial context so that this aspect of assessing external interactions has been maintained despite the changed economic circumstances between the surveys.



These changed conditions have been associated with a decline in commercialisation: in 2008/9 8% of academics reported that they had taken out a patent and 6% had licensed their research, compared to just 6 and 4% respectively in the 2012-15 period. The biggest difference is in the share of respondents that had formed or run a consultancy, which was 15% in 2008/9 and only 7% in 2015 (see Exhibit 55). Overall, 14% of academics in the 2015 sample report any kind of commercialisation activity compared to 22% in 2008/9. These differences are observed across disciplinary fields, seniority levels and gender. They are consistent with the deteriorating macroeconomic environment preceding the second survey, which may have dampened such activities.

Exhibit 55 Commercialisation in the last three years - 2008/9 and 2015 comparison
(mean number used % respondents)

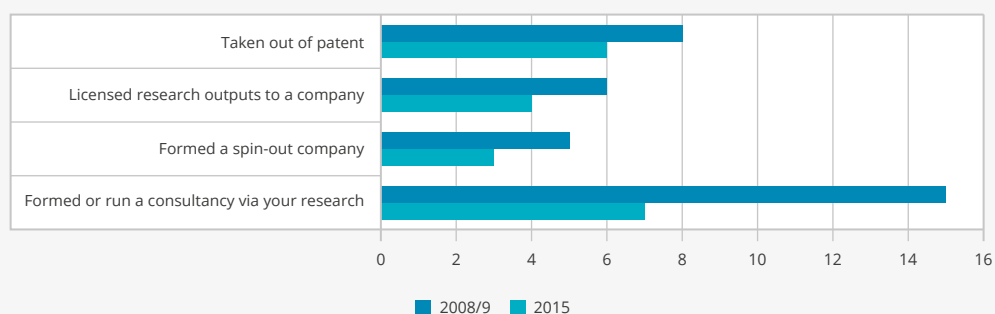
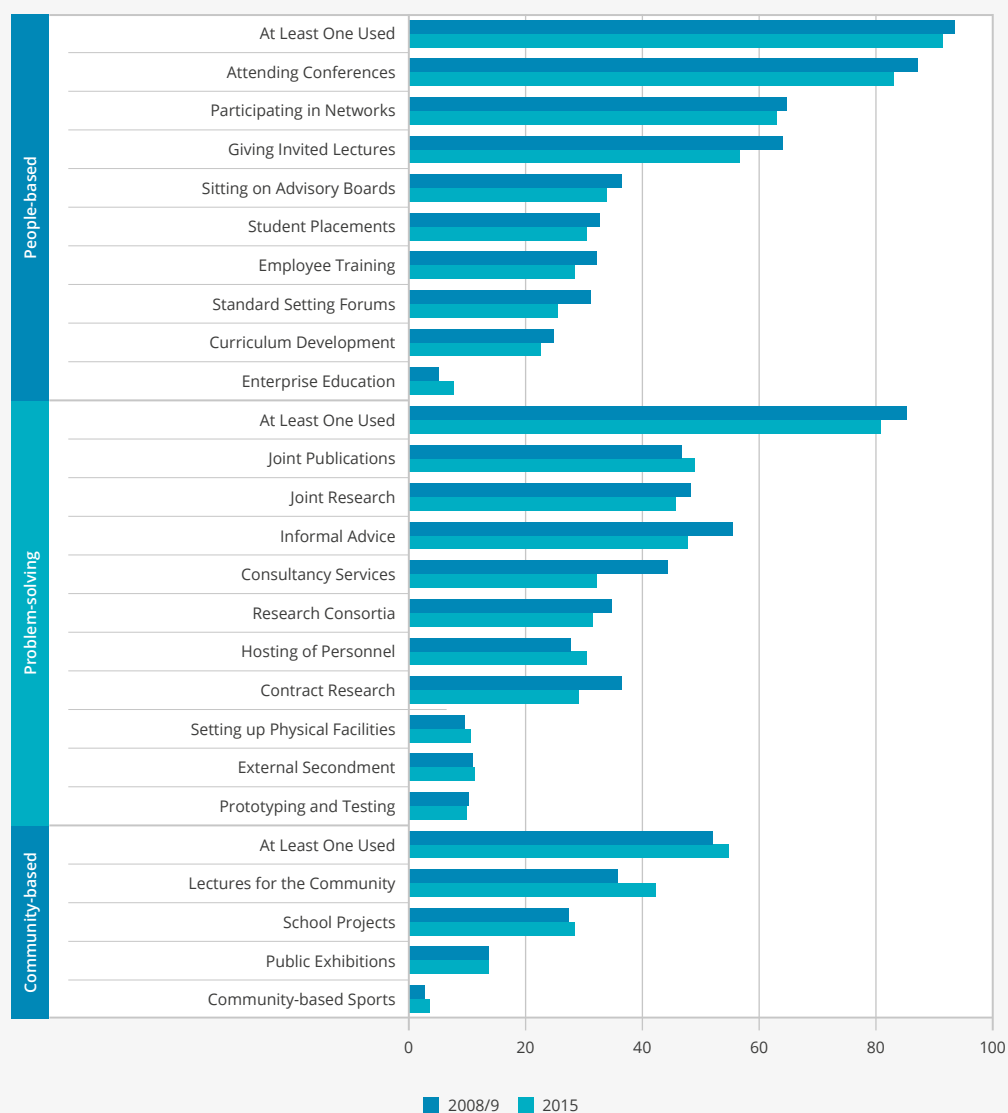


Exhibit 56 Non-commercial engagement activities in the last three years - 2008/9 and 2015 comparison (% of respondents)



The analysis of people-based, problem-solving and community-interactions in Exhibit 56 shows that the relative importance of various interaction types has remained stable between the 2008/9 and 2015. There is a minimal decline in the share of respondents reporting people-based and problem-solving engagement through at least one of the modes and a modest increase in community-based engagement.

However, within each broad grouping there are some significant variations. For example, invited lectures have declined by 8 percentage points and within problem-solving activities, consultancy, informal advice and contract research experience show declines of about 10 percentage points. These latter may once again reflect the changed economic circumstance between the survey periods. In contrast lectures for the community have shown the largest increase, perhaps due to recent public engagement initiatives and the provision of training and guidance supported by the Research Councils and NCCPE but also through local initiatives such as Café Scientifique (www.cafescientifique.org).

A closer look at the average number of different modes used by academics in Exhibit 57 reveals that the breadth of interaction routes has declined for people-based and problem-solving activities. These declines are, however, quantitatively insignificant.

This pattern is true for all subject areas. Exhibit 58 reports the shares of respondents by years and by disciplinary field. The usage of some individual engagement modes has declined. A small decline in people-based and problem-solving activities can be observed in all fields. However the share of academics reporting community-based interactions shows a small increase in all fields with the exception of engineering and materials science. The share of academics engaged in one of the broad non-commercial engagement forms does not differ much between 2015 and 2008/9. This comparison has shown that in both surveys a similar number of academics report engagement with external organisations and they do so through a very similar but slightly fewer number of engagement modes.

Exhibit 57 Non-commercial engagement activities in the last three years - 2008/9 and 2015 comparison (mean number used)

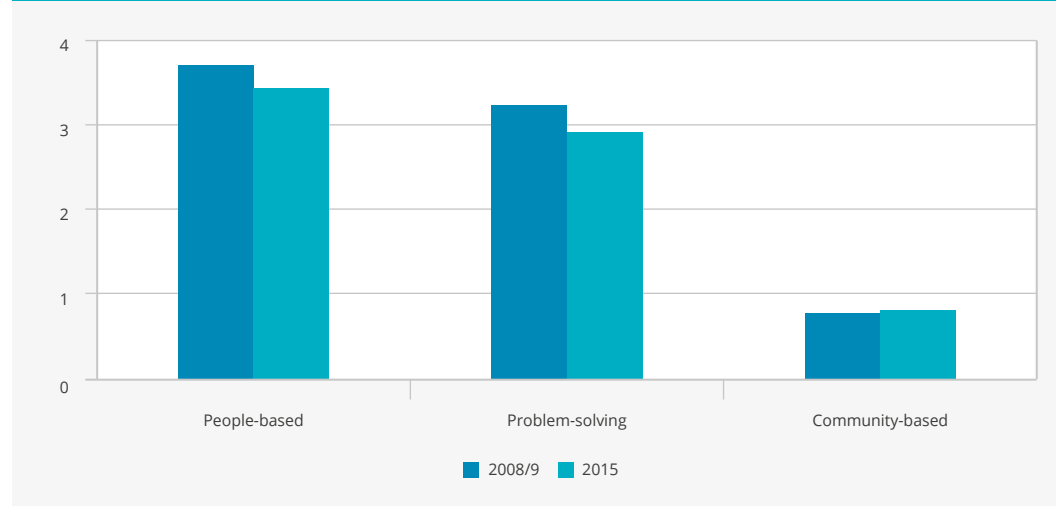
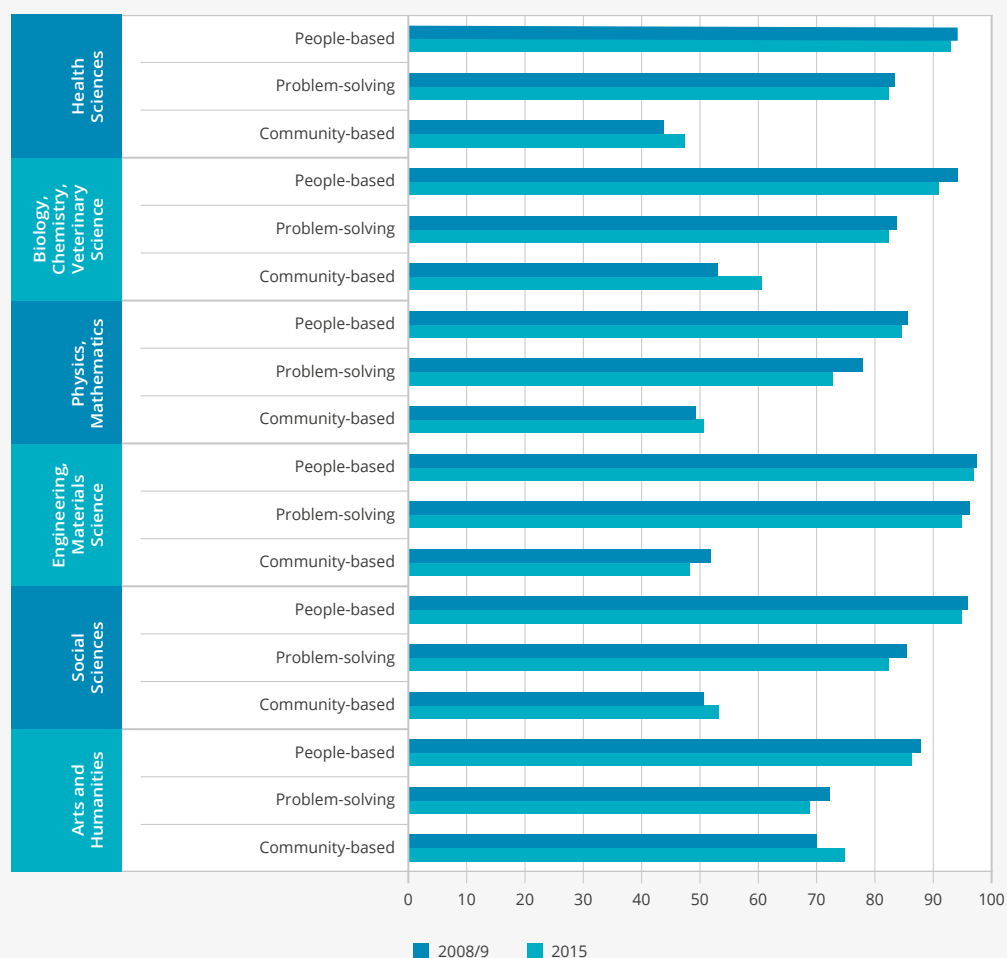


Exhibit 58 Non-commercial engagement activities in the last three years - 2008/9 and 2015 comparison by disciplinary field (% of respondents)

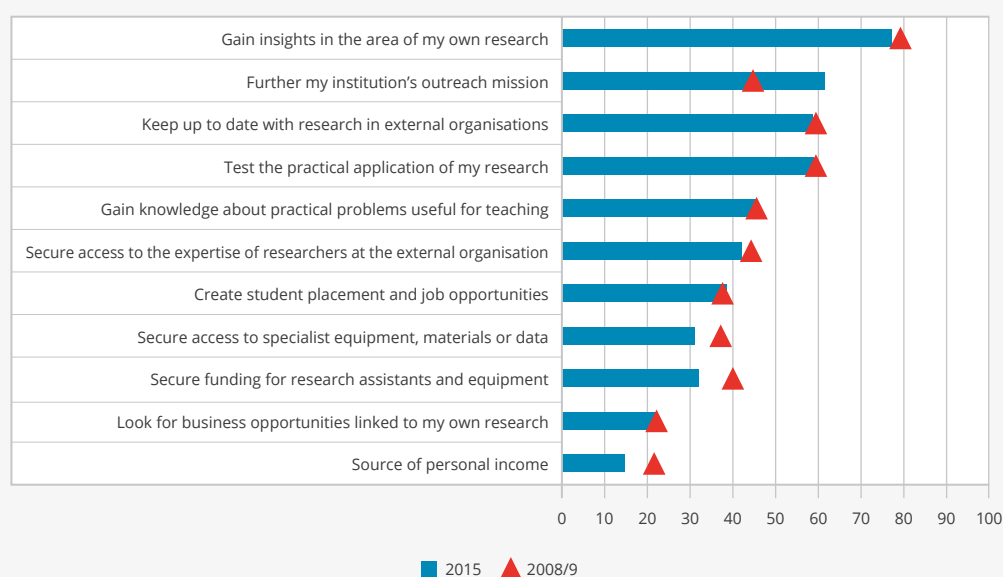


Motivations and Objectives for External Engagement

Universities and funding bodies have been trying to create the right incentives for academics to engage with external organisations. In this context it is important to understand academics' motivations to engage with external partners and whether they have changed over time. Both surveys asked respondents who had some engagement through people-based, problem-solving and community-based activities with external partners in the previous three years to score a range of motives on a 5-point Likert scale - where 5 is very important and 1 is completely unimportant.

Exhibit 59 shows the share of respondents who consider these motives as important or very important (values 4 or 5) for 2015 (blue bars) and 2008/9 (red triangle). The Exhibit shows that the majority of research motivations have remained unchanged, while there has been a small increase in the importance of teaching motives. External engagement as a source of funding for research or personal income has declined compared to the 2009 sample. The objective to further one's institution's outreach mission, however, has experienced the largest increase from just 44% of respondents in 2008/9 to 62% in 2015. The inclusion of impact case studies in the 2014 REF may be one factor in this change along with the greater emphasis in supporting knowledge exchange by universities we noted in the introduction to this report.

Exhibit 59 Important motivations for activities with external organisations (% of respondents)



The Impact of External Engagement

The section above showed that there has been a slight decline in external activity over the past few years. However, while academics may engage slightly less, they may be using this time more effectively than they have in the past. The strengthened emphasis on impact in both research and teaching may also have encouraged academic staff to feed their external experience into their other work roles.

Exhibit 60 Impact of external activities on research in the last three years - 2008/9 and 2015 comparison (% of respondents)



Exhibit 60 reports the share of research active respondents that engaged with private, public or third sector partners that agree with a series of statements regarding the impact of this engagement on research. The comparison shows that a higher share of those engaged in external partnerships feels that these contribute to their research compared to 2008/9. However, external engagements are less likely to result in new projects, again perhaps due to funding restrictions.

Exhibit 61 Impact of external activities on teaching in the last three years - 2008/9 and 2015 comparison (% of respondents)

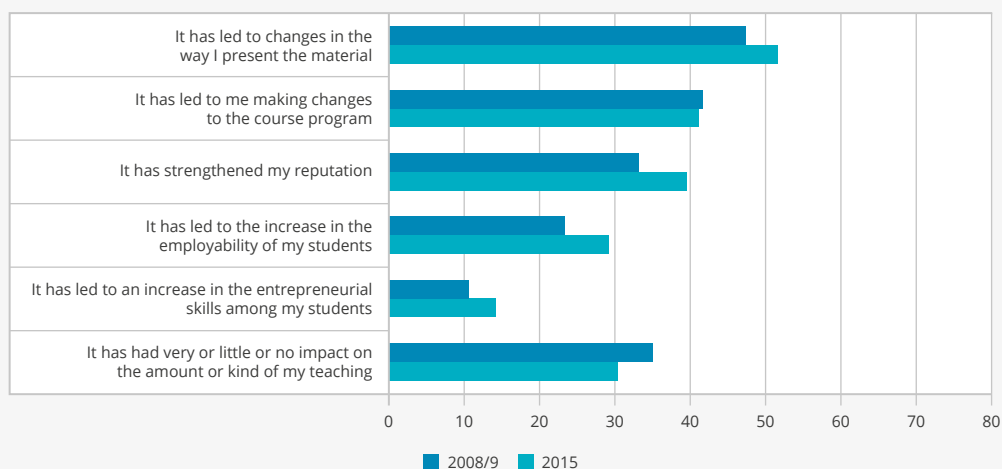
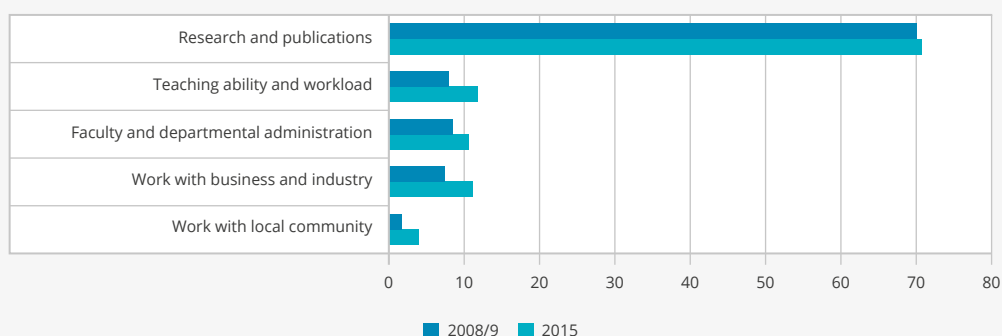


Exhibit 61 reports a comparison regarding teaching impacts and shows that a larger share of respondents feels that external interactions benefit their teaching compared to 2008/9. Specifically student skills and employment are perceived as benefitting more from external engagement compared to the 2009 survey.

Exhibit 62 Highly important promotion criteria - 2008/9 and 2015 comparison (% of respondents)



Finally, this change in impact may also reflect in the importance of external engagement for promotion. The survey asked respondents to indicate the importance of a range of factors relating to criteria for promotion and career advancement at their institution on a 5-point Likert scale. Due to slight changes in question design only value 5 (highest importance) can be compared. Exhibit 62 reports the share of respondents that perceive various promotion criteria as highly important. While there is little change in the share that consider research an important promotion criterion, all other criteria have increased in importance compared to the 2009 sample. Specifically, while just 1.6% felt that work with the local community was highly important in 2008/9, this share is now 4.5% of academics.

The results of this section indeed suggest that academics are more concerned with combining their various work roles. While engagement levels may have declined compared to the 2009 sample, different modes are potentially used more effectively now.

Institutional and Regional Variations

04

Section 4.1

Introduction

Much of the discussion of the role of the university as economic driver has focused on the regional development aspect of this role. It has been argued that links between the science base and regional actors could improve regional economic growth and competitiveness. The Dearing Report (Dearing, 1997) already stressed the importance of universities for “regional and local economic development”, including their contributions to culture and citizenship. Previous studies have also shown that spillovers from universities are localised, and that firms co-locating with universities show increased innovative activity (see Drucker and Goldstein, 2007 for a review).

Previous studies have found that the regional role of the university depends on type of institution as well as regional characteristics. Leading research universities are said to be less engaged than newer institutions, perhaps due to their focus on international reputation and research (Boucher et al., 2003). Universities also contribute more in regions with greater regional control and funding power, and take a more active regional development role in more peripheral regions (Boucher et al., 2003). Additionally, different modes of engagement may be differently suited to intra- or extra-regional needs. In the case of the UK, differences in funding policies in the devolved administrations and the funding modes available to different types of institutions may be reflected in the interaction activity of academics.

This chapter first looks at the variation in survey responses by type of institution and by region. For the institutional analysis universities are split into four groups: (1) research-intensive universities, defined as the top-decile in terms of total research funding received during 2013/14 (as reported to the Higher Education Statistics Agency - HESA), (2) other older universities founded prior to 1992 reforms, (3) post-1992 universities (primarily ex-polytechnics) and (4) specialist institutions mostly with a focus on arts and media, but also including agricultural colleges. For the regional analysis the 9 administrative English “regions”: North East, North West, East Midlands, West Midlands, Yorkshire and the Humber, South East, South West, East of England, and London, and the devolved administrations of Scotland, Wales and Northern Ireland. Section 4.4 compares regional and extra-regional engagement activities by engagement type, subject area, institution type and region.

Section 4.2

Institutional Differences

The type of institution may be instrumental in deciding how much and with whom academics engage due to their differing research and teaching foci. Exhibit 63 shows the time academics at different institutions spent on teaching, research, administration, and on knowledge exchange activities. While academics at top-decile research universities spend about 50% of their time on research, those at post-1992 institutions spend just 25% on research and relatively more time on teaching and administrative tasks. Data from HESA confirms that student-staff ratios are higher at new institutions, with 19 students per staff compared to 13 at top-decile research institutions, leaving less time for research. Time spent on outreach activities does not differ much by type of institution but is slightly higher at post-1992 institutions.

Exhibit 64 additionally reports the amount of research time spent on basic, user-inspired basic and applied research. It shows that those at post-1992 and specialist institutions spend considerably more time on applied research than those in the other older groups of universities, where more time is allocated to basic research.

Much of this may be due to differences in subject area and staff composition, reported in Annex Exhibit D20. Specialist institutions, by definition, have a strong focus in either the arts or in life sciences. New institutions have a strong focus on social sciences and far fewer staff in hard sciences (less than 40% in STEM). They also employ far fewer research-only staff (just 7%) and the bulk of positions are at senior (or principal) lecturer level. By contrast, the top-decile of universities has a focus in STEM with more than 60% of positions in these areas; and a third of respondents are employed on research-only contracts. These differences affect work and research activities but even after controlling for subject area and seniority institution differences remain significant.

Exhibit 63 Work activities (% of time)

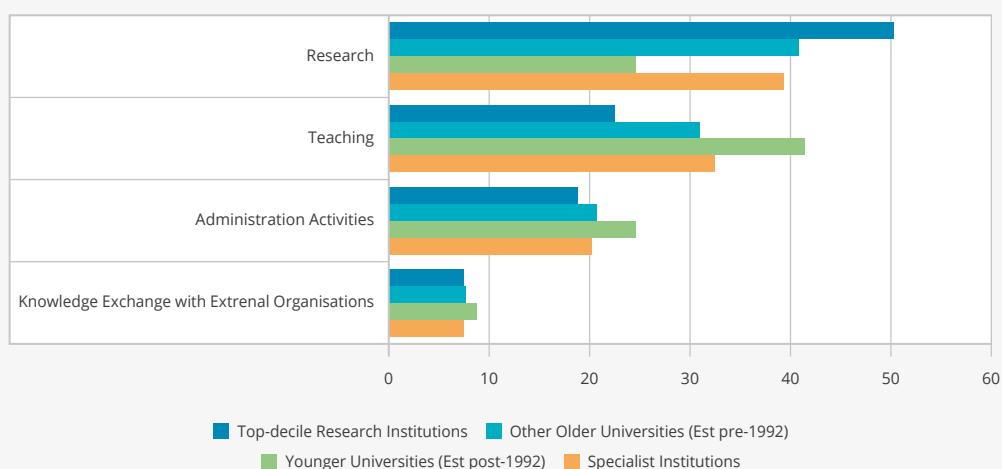
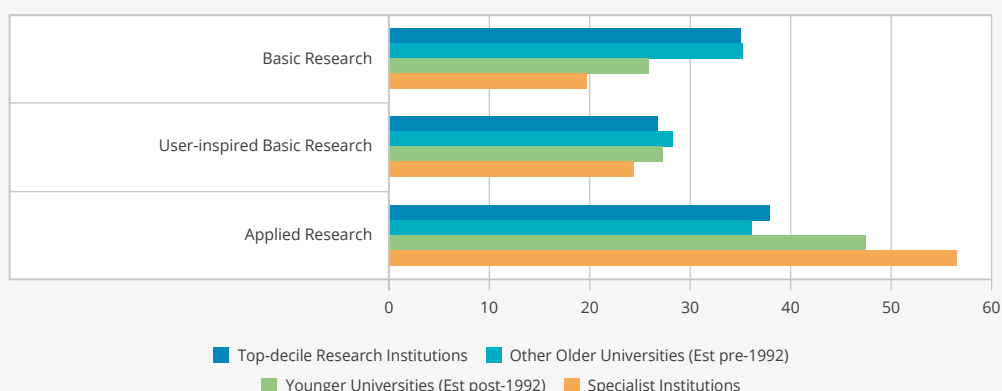
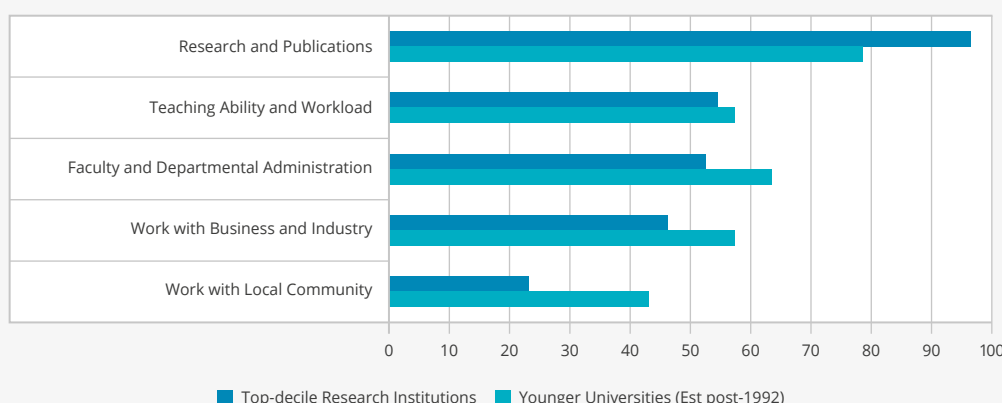


Exhibit 64 Research orientation (% of research time)



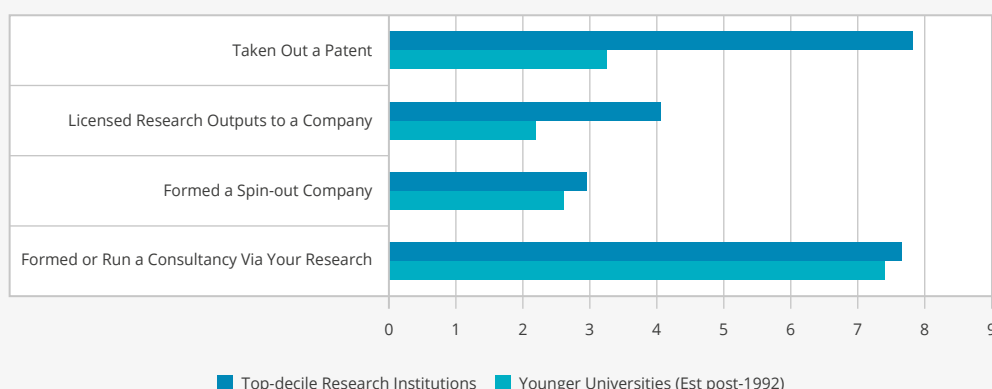
These differences in time allocation for research are reflected in the importance of different promotion criteria at the top-decile research group of universities and at post-1992 universities. Respondents were asked to indicate the importance of a range of factors relating to criteria for promotion and career advancement at their institution on a 5-point Likert scale - where 5 is very important and 1 is completely unimportant. The share of academics considering these criteria as important (values 4 and 5) are reported in Exhibit 65 (see Annex Exhibit D23 for other old and specialist institutions). The Exhibit shows that research is considered important by fewer academics at new universities, while administration and outreach activities are more frequently considered important for promotion.

Exhibit 65 Work activities (% of time)



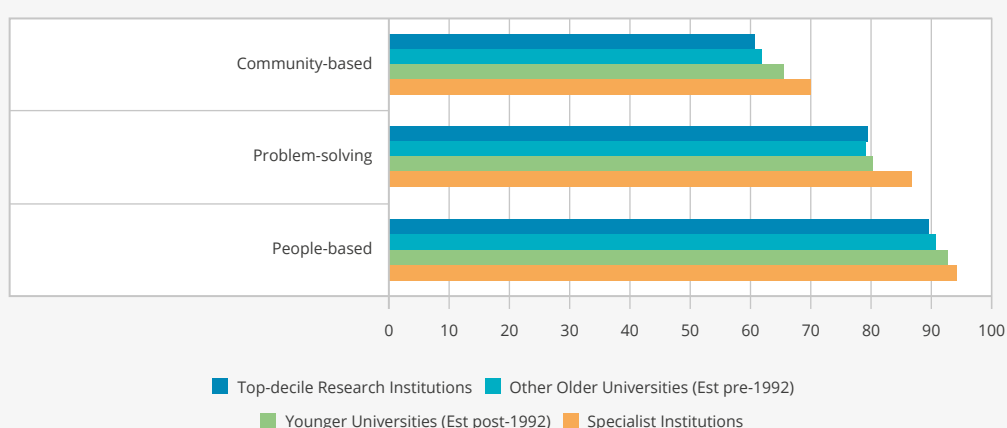
These differences in work focus are likely to be reflected in the type and amount of engagement activities undertaken. In Exhibit 66 we report the type of commercialisation activities undertaken by academics at top-decile research institutions and at new universities (see Annex Exhibit D25 for other categories). While the share of respondents forming spin-offs and/or consultancies does not differ much between the two, those at top-decile research intensive universities are more likely to generate patents and to licence out their research. This may reflect the stronger STEM research focus at these institutions.

Exhibit 66 Commercialisation activities by type of institution (% of respondents)



Looking at non-commercial forms of engagement in Exhibit 67 it is specialist institutions that stand out: they show the highest share of academics involved in at least one mode of interaction in each of the three broad categories. Top-decile research universities have the lowest share, though differences with other non-specialist institutions are small. A detailed breakdown by engagement types can be found in Annex Exhibits D26 and D27.

Exhibit 67 Non-commercial activities by type of institution (% of respondents)



Institutional characteristics may also play a role in the types of partners academics engage with and in the way these partnerships are created. Exhibit 68 reports the share of academics engaging with private, public and third sector partners by type of institution (see also Annex Exhibit D29). The exhibit shows that more academics at new and specialist institutions engage with external partners in these three sectors than is the case for older universities. They are especially more engaged with third sector partners.

Not only the choice of partners but also how these contacts are initiated differs by institution type. While 36% of academics at new institutions with some external partner say that such interactions were at least occasionally initiated by their institution's TTO or similar, this was only the case for 29% of academics at the top-decile research group of universities (see Annex

Exhibit D31). This is also reflected in the share of academics that use their institution's TTO office as shown in Exhibit 69 and more detailed in Annex Exhibit D30. Academics at top-decile research institutions are less likely to have had any contact with such services compared to young universities. However, those at specialist institutions report the lowest use.

Exhibit 68 External partners by institution (% of respondents)

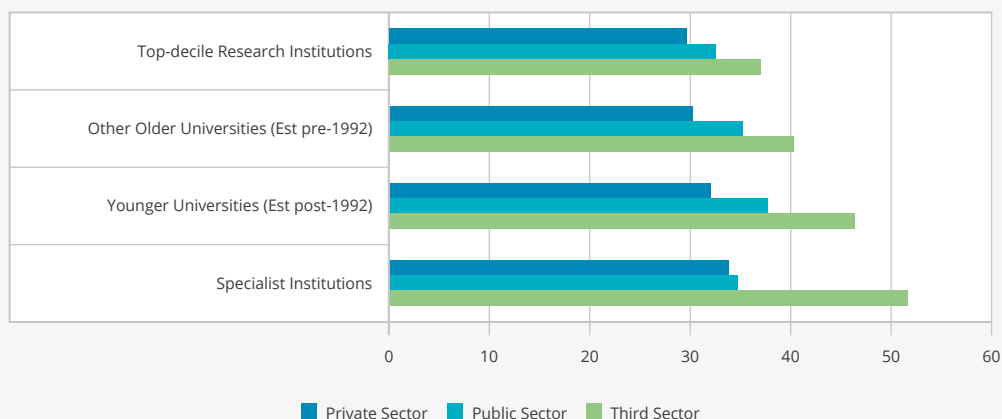
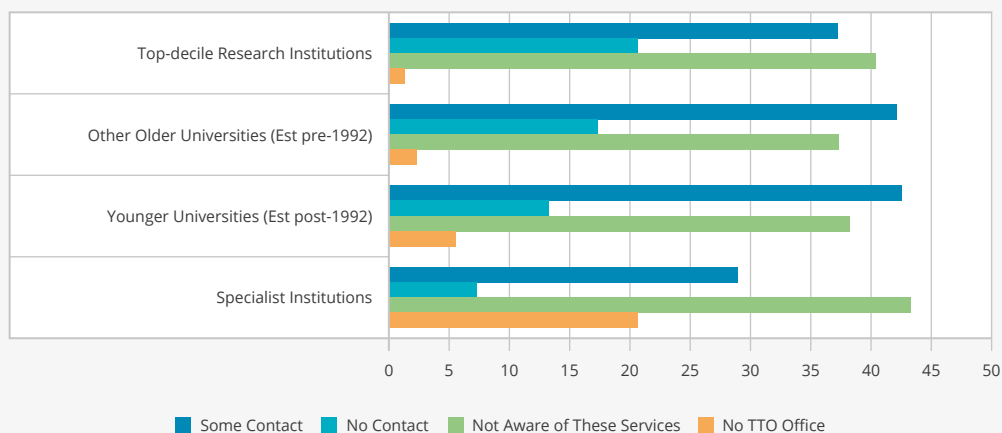


Exhibit 69 TTO contact in the last three years by institution type (% of respondents)



Differences in work and engagement focus are also likely to be reflected in the perceived effect external engagement has on research and teaching, reported in Exhibits 70 and 71 (see Annex Exhibit D34 and D35 for other older and specialist institutions). Interestingly, there is no significant difference in terms of reported research impact between academics at top-decile research and new universities. However, there is a large difference in the share of academics reporting a teaching impact on each of the impact categories. For example, while only 34% of teaching-active academics at top-decile research institutions report that external engagement changed their teaching programme, 55% of those at post-1992 institutions did. In fact, 37% of teaching-active academics at top-decile research institutions report no teaching effect, compared to just 16% amongst those at young institutions.

Exhibit 70 Impact of external engagement on research by type of institution (% of respondents)

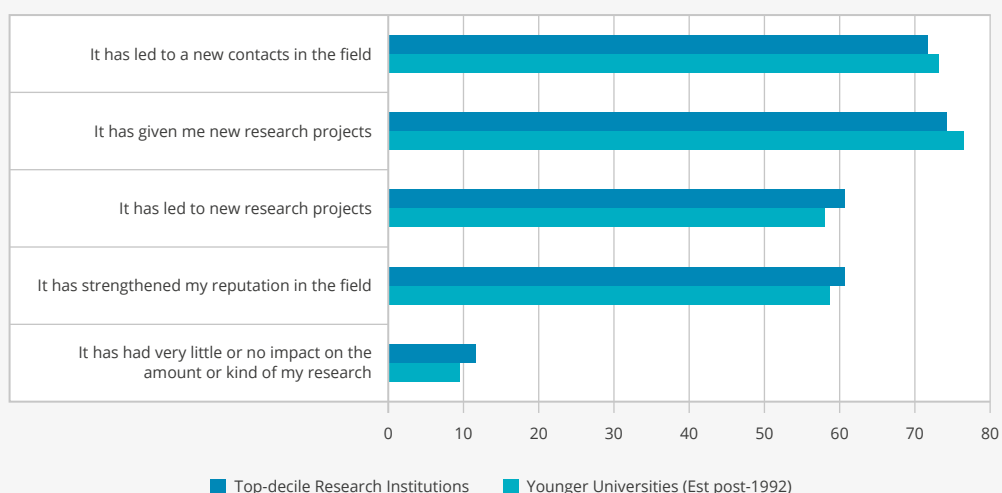
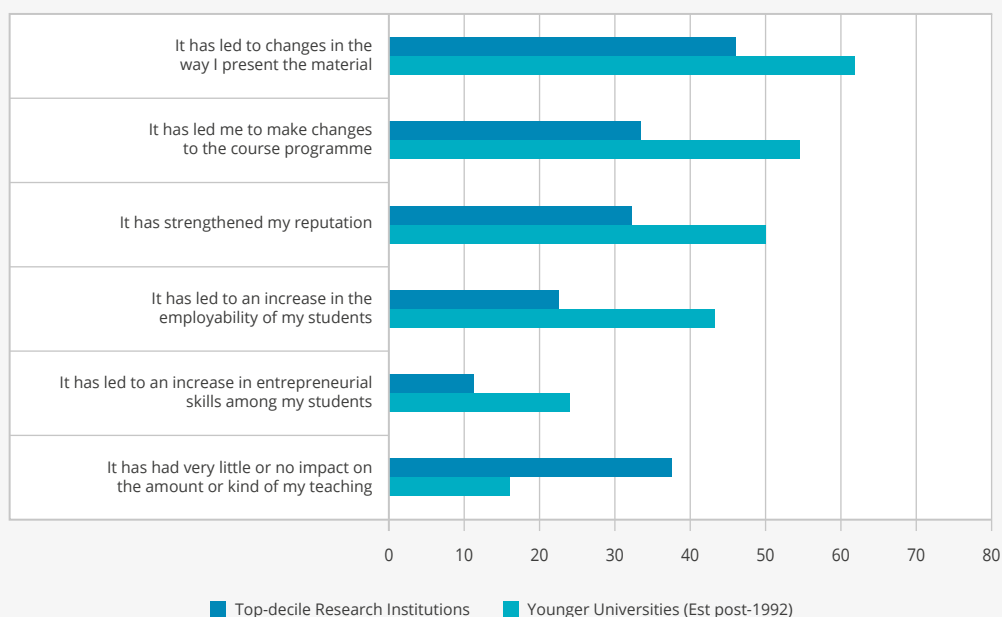


Exhibit 71 Impact of external engagement on teaching by type of institution (% of respondents)

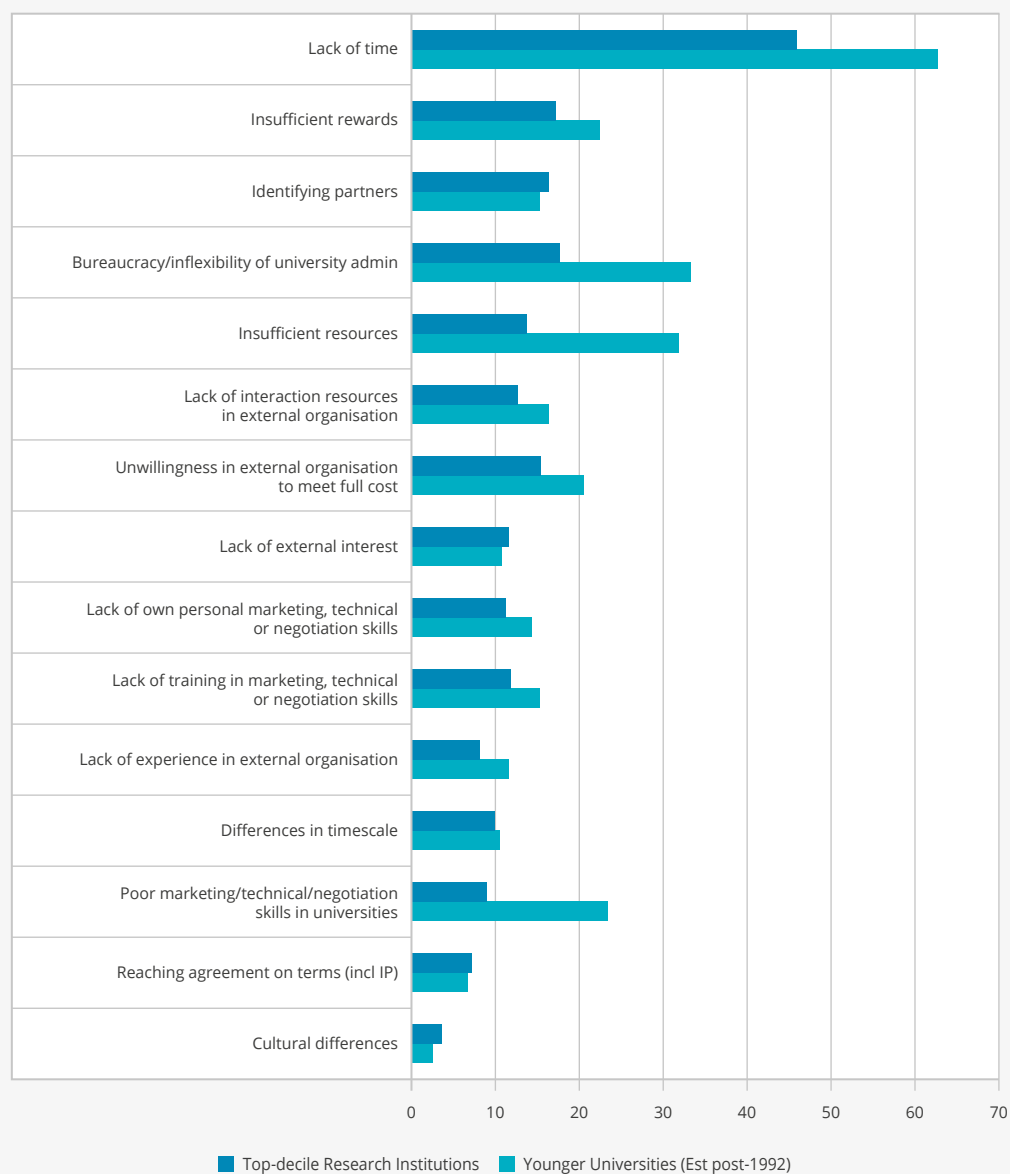


These teaching impact differences are already reflected in the motivations for engagement; with those at new universities saying that gaining teaching knowledge and creating student opportunities are important while those at top-decile research institutions are ambivalent to such teaching goals (see Annex Exhibit D33).

Looking at factors that constrained or prevented interactions with external organisations over the last three years we see that some engagement constraints are perceived by a larger share of academics at new institutions, perhaps due to higher teaching commitments or fewer resources. Constraints were measured on a 5-point Likert scale - where 5 is highly constraining and 1 is not constraining. Values 4 and 5 represent substantial constraints experienced

by academics and are reported in Exhibit 72 (and Annex Exhibit D36 for all four types of institutions). The Exhibit shows that lack of time, poor university management skills and lack of resources are felt much more by academics at new institutions.

Exhibit 72 Substantial constraints on interactions with external organisations by type of institution (% of respondents)

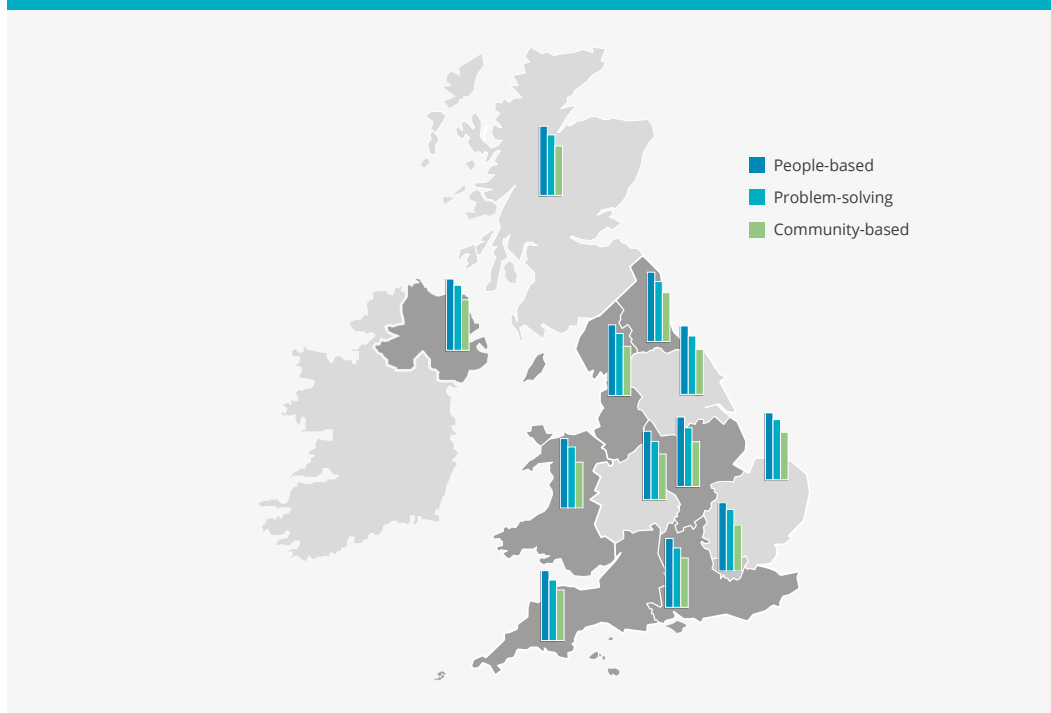


Section 4.3

Regional Differences

In addition to institutional characteristics, regional variations need to be considered. Structural regional differences may enable different types of interactions and may require different types of support. Regional differences may particularly show up in engagement channels, the partnering sectors and in the role of the home institution's TTO or consultancy services. A regional breakdown for other questions is available in Annex D: Supplementary Data Tables.

Exhibit 73 Non-commercial engagement by region and devolved administration (% of respondents)

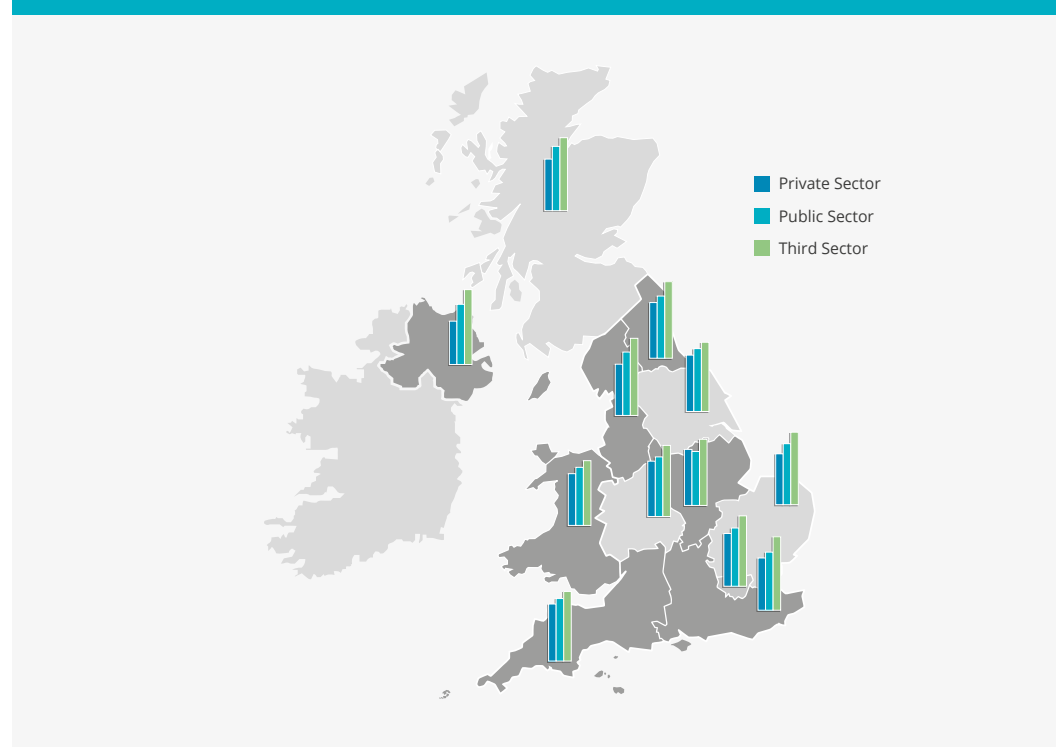


Region	People-based	Problem-solving	Community-based	Total (N)
East of England	88.6	79.7	62.9	1451
East Midlands	92.0	77.8	59.3	1206
London	90.4	81.5	60.9	3462
North East	91.8	79.4	64.7	791
Northern Ireland	94.3	86.0	66.9	335
North West	93.5	82.1	65.1	1551
Scotland	91.5	80.1	65.4	1913
South East	91.2	78.6	65.3	2525
South West	92.5	80.1	67.0	1193
Wales	91.9	80.8	60.7	954
West Midlands	90.5	77.1	60.4	1079
Yorkshire and the Humber	90.6	77.3	59.6	1717

Regional differences in the type of engagement activities are generally small (see Exhibit 73). A similar share of respondents uses the various channels of engagement regardless of region and people-based engagement is the most used channel everywhere (a detailed breakdown is reported in Annex Exhibit D26), although the sector through which these engagements happen may differ.

Exhibit 76 provides a regional comparison of sector of engagement: Private sector engagement is lowest in Northern Ireland and highest in Wales, East England and the Midlands. Public sector engagement is lowest in the East Midlands, where it is less widespread than private sector engagement, and highest in Northern Ireland and Wales. Third sector engagement again is highest in Northern Ireland followed by the North West and lowest in Yorkshire and the Humber and the East Midlands. Differences in sector of engagement are partially due to differences in the types of institutions, subject areas and academic rank of respondents. Nonetheless, we can conclude that Northern Ireland stands out as the region with the highest engagement - albeit engagement that is primarily with the public and third sector.

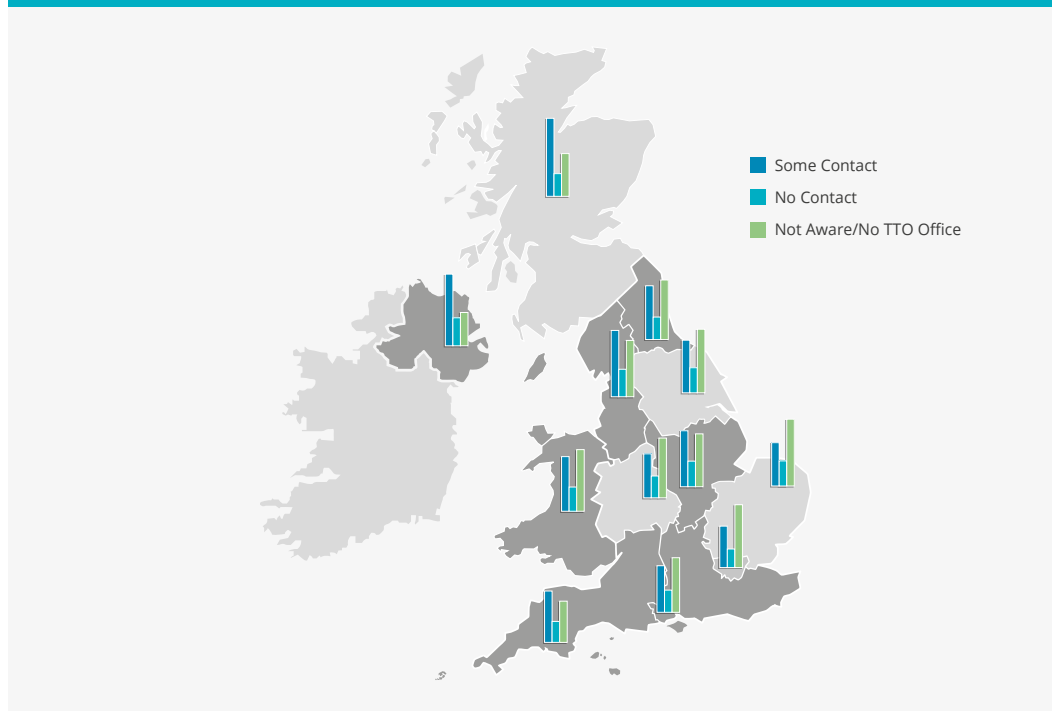
Exhibit 74 External partners by region and devolved administration (% of respondents)



Region	Private Sector		Public Sector		Third Sector	
	%	N	%	N	%	N
East of England	32.9	1353	36.7	1341	40.4	1323
East Midlands	32.7	1142	31.5	1134	38.6	1121
London	29.7	3246	34.5	3231	42.3	3184
North East	30.8	754	34.0	744	41.1	725
Northern Ireland	28.1	324	37.4	321	44.7	320
North West	30.8	1478	36.5	1467	43.7	1450
Scotland	29.9	1809	35.9	1804	39.5	1769
South East	30.1	2403	34.2	2387	42.6	2356
South West	30.5	1146	33.9	1135	42.9	1130
Wales	33.3	910	37.6	900	40.6	892
West Midlands	32.3	1000	34.8	991	41.5	982
Yorkshire and the Humber	30.2	1618	33.9	1616	37.8	1597

The importance of TTO services also differs by region with more than 35% of academics in Northern Ireland stating that their interactions with external partners were at least occasionally initiated by their institution. Northern Ireland also show the highest share of TTO users as reported in Exhibit 75 (and in more detail in Annex Exhibit D30). More than 50% state to have used these services at least occasionally. Similarly high shares are only found for Scotland. Also interestingly, the share of those not aware of such services is lowest in Northern Ireland.

Exhibit 75 TTO contact in the last three years by region and devolved administration (% of respondents)

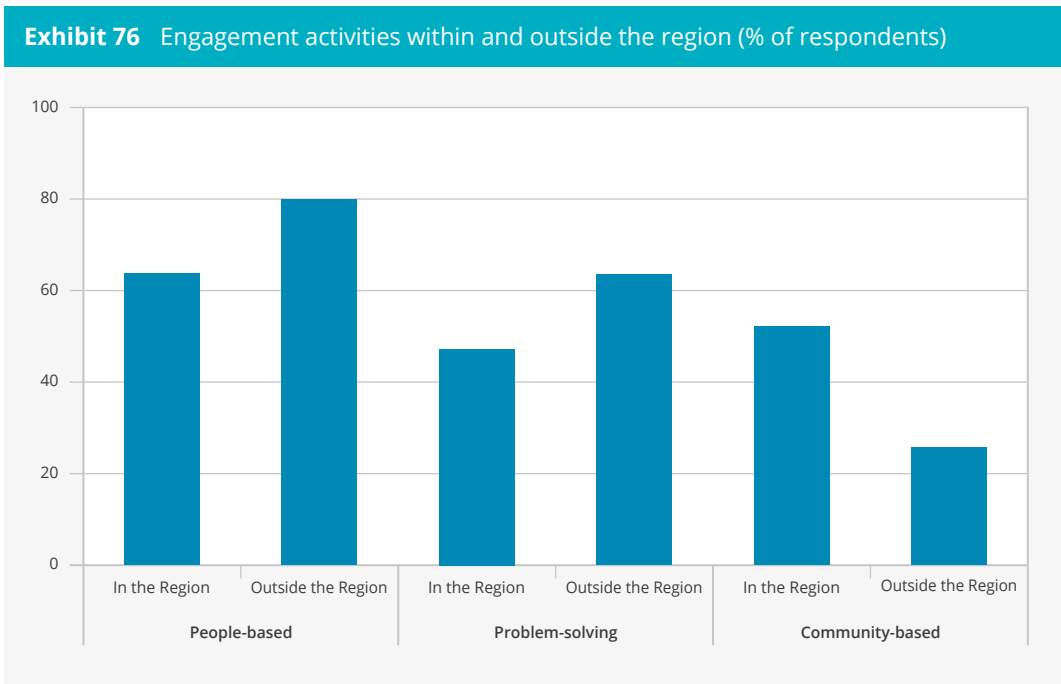


Region	Some Contact	No Contact	Not aware/ No TTO Office	Total (N)
East of England	33.9	18.2	47.9	1406
East Midlands	41.4	19.2	39.4	1184
London	35.0	14.0	51.0	3380
North East	41.0	15.5	43.6	776
Northern Ireland	52.3	22.9	24.8	327
North West	43.7	19.5	36.7	1530
Scotland	51.4	17.9	30.6	1884
South East	38.5	17.2	44.4	2482
South West	45.9	17.2	36.9	1172
Wales	39.9	16.4	43.6	937
West Midlands	36.5	16.3	47.3	1056
Yorkshire and the Humber	38.7	18.3	43.1	1697

Section 4.4

The Geography of Engagement

This section examines the spatial aspect of external engagement looking at different types of engagement, subject areas, universities and regions. We can expect that some engagement activities are more localised than others, especially where they concern community exchanges. The survey asked respondents to indicate whether they had engaged through the various modes of people-based, problem-solving and community-based interactions with local, regional, national or international organisations. Local area was defined as a radius of 10 miles and regions as 12 administrative “regions”: North East, North West, East Midlands, West Midlands, Yorkshire and the Humber, South East, South West, East of England, London, Wales, Scotland, Northern Ireland. Exhibit 76 reports the share of respondents that perform engagement activities with (1) local and regional or (2) national and international organisations. Exhibit 77 to Exhibit 79 report engagement activities by disciplinary field.



The Exhibits show that extra-regional problem-solving and people-based activities are used by more academics compared to intra-regional activities. This is apparent for all disciplinary areas but the differences are smaller for academics in health and social sciences and in arts and humanities. Unsurprisingly, community-based activities have a greater regional focus in all disciplinary fields as they are less well suited to interactions with distant partners and locality plays an important role when searching for partners. For people-based and problem-solving activities, activities can be transferred across regions more easily and external organisations and academics may both therefore look beyond their region to find the best-suited partner.

Exhibit 77 People-based activities within and outside the region (% of respondents)

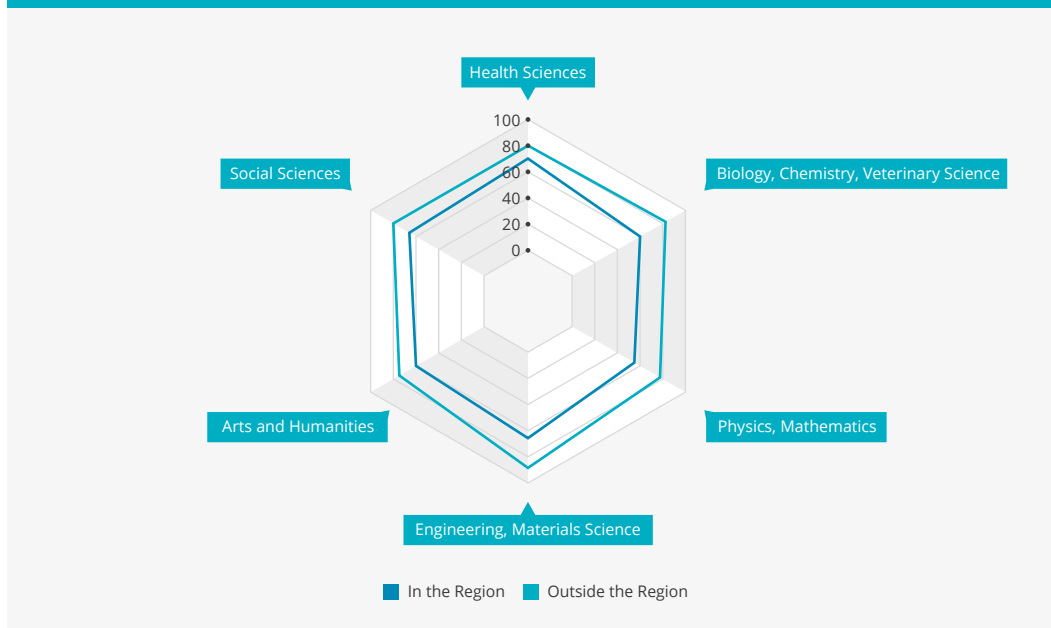
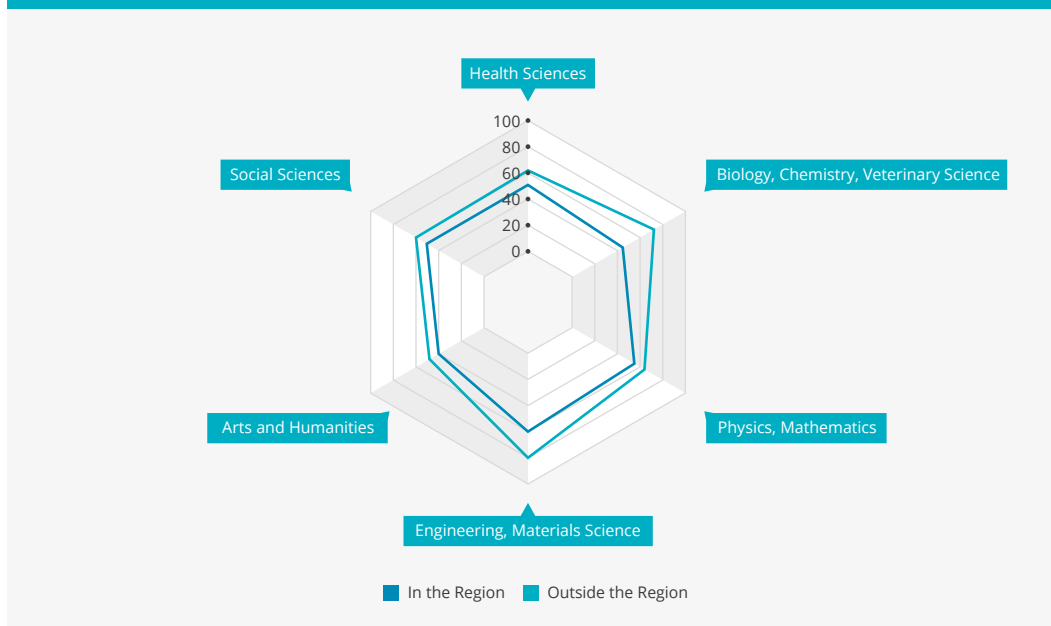


Exhibit 78 Problem-solving activities within and outside the region (% of respondents)



Section 4.2 showed how top-decile research universities and new universities differ significantly in their work and research focus and in their motivations and barriers for external engagement. It can further be expected that top-decile research universities are less focussed on regional needs and may engage less with regional partners. Exhibit 80 reports the share of academics engaged with intra- and extra-regional organisations for the four types of institutions. We can see that academics at younger universities engage in more regional and fewer extra-regional engagement activities compared to academics at top-decile research institutions. The differences can be found for all three types of engagement activities. Specialist institutions

show the highest share of academics with external engagement for all the categories. However, just as above we see that for all universities regional community-based activities are more common than extra-regional ones. This is in line with 2009 results.

Exhibit 79 Community-based activities within and outside the region (% of respondents)

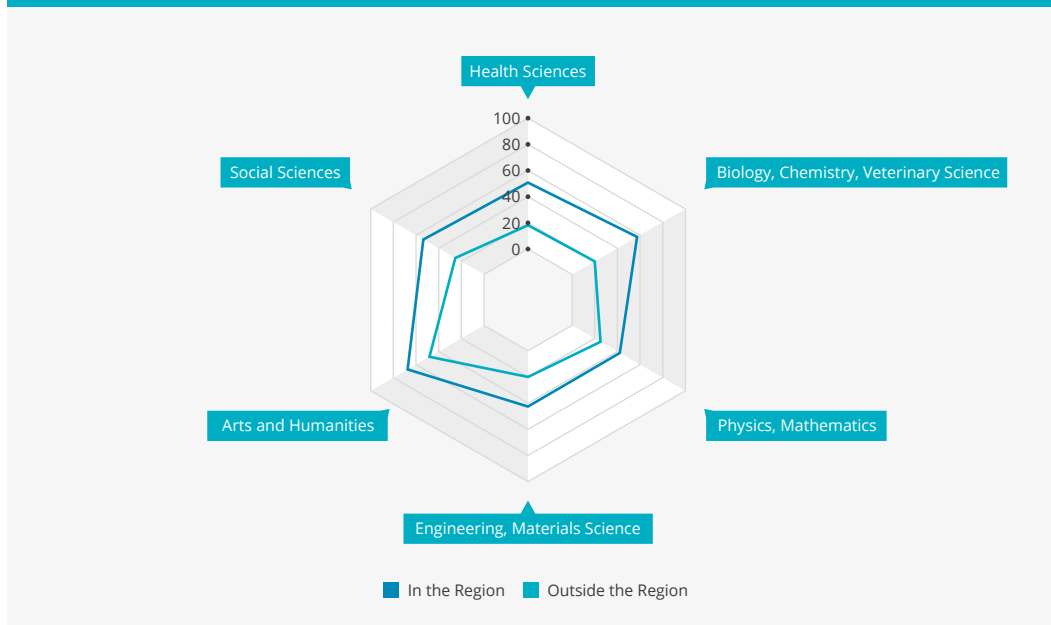


Exhibit 80 Regional engagement activities by type of institution (% of respondents)

Institution Type	People-based		Problem-solving		Community-based		Total (N)
	In the Region	Outside Region	In the Region	Outside Region	In the Region	Outside Region	
Top-decile Research Institutions	58.9	81.8	44.1	67.3	50.4	28.4	6504
Other Older Universities (Est pre-1992)	62.0	80.2	45.7	64.6	51.8	28.4	6086
Younger Universities (Est post-1992)	75.7	76.8	57.5	57.3	59.6	24.2	5004
Specialist Institutions	67.6	82.8	55.6	68.4	58.8	36.5	583

Finally, we investigate whether the spatial focus of different engagement activities differs by region. Exhibit 81 shows that regional engagement activities are of greatest importance in the devolved areas of Northern Ireland, Wales and Scotland. In these regions regional people-based and problem-solving activities are more common than amongst English universities. Only London has similarly high shares of regional engagement. Northern Ireland also has the highest share of regional community-based engagement.

Exhibit 81 Regional engagement activities by region and devolved administration
(% of respondents)

Region	People-based		Problem-solving		Community-based		Total (N)
	In the Region	Outside Region	In the Region	Outside Region	In the Region	Outside Region	
East of England	60.5	79.5	44.0	65.1	50.0	33.1	1451
East Midlands	61.3	81.8	45.3	62.4	50.7	25.5	1206
London	68.6	77.0	54.5	63.2	51.7	28.1	3462
North East	60.8	82.7	45.4	63.5	54.4	27.4	791
Northern Ireland	75.5	81.2	62.4	65.7	61.8	22.4	335
North West	66.9	83.7	48.7	67.8	55.6	28.9	1551
Scotland	69.1	77.8	54.1	61.7	58.5	22.0	1913
South East	62.5	80.6	43.2	65.6	53.7	32.2	2525
South West	64.9	82.5	47.9	64.5	58.7	28.6	1193
Wales	69.4	77.5	53.5	60.3	54.8	22.4	954
West Midlands	60.5	79.4	44.1	62.0	51.7	26.4	1079
Yorkshire and the Humber	60.3	81.1	45.2	62.4	50.6	24.6	1717

This section illustrated that the regional focus of academic engagement activities differs by the type of engagement, type of institution and by region. Subject differences, in comparison are less pronounced, though a stronger regional focus is found for health and social science and for arts and humanities.

These findings confirm that it is important to consider university and regional characteristics when evaluating the impact of universities, at the regional and supra-regional level. The regional role is more strongly embraced by new and specialized institutions that may have a longer history as providers of local education and consultancy. Top-decile research and other older universities may, instead, be more concerned with national and international research rankings and impact than their engagement and regional role. Equally their international reputation, research excellence and expertise may be more frequently sought by national and international external organisations. The devolved regions of the UK with a strong local identity and own funding and administrative control are also shown to have higher levels of engagement and especially regional engagement. The region's ability to foster university engagement may be important here and warrants further analysis.

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Annex A

Survey Method and Response Bias

The Sampling Frame

The sampling frame is all academics holding a university post and active in teaching and/or research in the sample period in all disciplines in all UK HEI. There is no publicly available database which provides contact details for this sampling frame. We therefore proceeded by compiling a list of all UK HEI from data compiled by the Higher Education Statistical Agency (HESA), Universities, UK, the Higher Education Funding Councils of England, Wales, Scotland and the Northern Ireland Department for Employment and Learning. We then manually collected from the websites of all of these institutions a list of all academics active in teaching and/or research listed on the websites in all departments and faculties. This email directory was the sampling frame to which we addressed a web-based questionnaire (Annex B: List of Surveyed Universities reports a list of universities surveyed). Staff at university based research centres and related units were not included in the sampling frame as there was a large amount of duplication between departments and institutes. We also excluded research institutes whose staff were directly funded by the research councils. A separate survey of research institutes will be conducted in January 2016, using a slightly modified survey instrument.

The covering letter accompanying the survey instrument gave full details of the research project, contact details of the research team and the research programme of which the survey was a part. It also included clear routes by which individuals could decline to participate or be prompted. It also guaranteed confidentiality in the treatment of all data collected.

The Survey Instrument

The survey instrument was designed in light of previous research in this area and in accordance with a previous survey round in 2009. The survey instrument was administered using a proprietary survey design and implementation consultant. Because of the scale of the survey which was sent to over 140,000 academics identified in the sampling frame, the survey was conducted in a series of waves. The survey was sent out in batches of 10,000 emails each spread over two days. After the initial e-mail invitation, two prompts were e-mailed the first after 10 days and the second after a further 7 days. The next batch was started after the initial mailing of the previous batch. The first batch of the survey was e-mailed on March 26th 2015. The final reminders for the last wave of emails went out on September 17th 2015.

Response Rates

The original sample frame identified 140,611 email addresses. After excluding some duplicate academics, we were left with 140,312 individuals (Exhibit 79). Of these, 8,422 were undeliverable or returned with the message 'No longer at the institution', and 802 were not eligible, being either students, administrative, visiting staff or retired. Of the total eligible sample of 131,088, we had received 18,339 full responses up to the cut-off date for this analysis,

which was two weeks after the last reminders were sent out⁹. Of these, 162 were students or administrative staff and as such not eligible to participate in the survey. They were therefore removed prior to analysis. The valid response rate for complete responses is thus 13.9%.

In addition 6,633 incomplete responses were received, with respondents answering at least one question regarding their research or engagement activities, but dropping out prior to reaching the final section of the questionnaire. The overall response rate for the survey is thus 18.9%.

Exhibit A1 Academic survey response		
	Total	%
Total Sample*	140,312	
Less:		
No Longer at Institution/Undeliverable	8,422	
Not Eligible	802	
	9,224	
Total Surveyed Sample	131,088	
Not Eligible Responses	162	
Complete Responses	18,177	
Response Rate (Complete Responses)		13.9
Incomplete Responses	6,633	
Total Responses	24,810	
Response Rate (Total)		18.9

* The sample consists of all HEI in England, Scotland, Wales and Northern Ireland.

Test of Significance in Large Survey Samples

In this report we do not present standard tests of statistical significance. This is for simplicity of presentation. In each case, however, differences in responses were tested across different cross-classifications of the data using appropriate parametric and non-parametric methods. All results reported in the main text are statistically significant at the 5% level or better.

With very large samples of several thousand observations the chance of obtaining statistically significant differences is high, even though the actual magnitude of the differences is extremely small. In the discussion in the text therefore we refer to differences which are of a reasonable magnitude and can therefore be considered of economic importance.

The distinction between statistical and economic significance is particularly important when we analyse potential response biases in the dataset. Because the sample sizes are so large, even very small differences between individuals who replied without prompting and those who required prompting are statistically significant.

⁹ The survey remained open after the cut-off date and additional responses could be received until October 31st. In total 276 complete responses were received more than two weeks after the last reminder was sent out. These were not included in this report to allow for consistent survey time windows across survey waves. We do not expect these additional responses to affect the analyses results.

Missing Value Treatment

For varying reasons not all questions were answered by all respondents resulting in missing values in most of the questions. Where appropriate missing values were replaced by hand. This was done for missing gender, subject and position information. In questions containing a Likert scale incomplete answers were replaced with a neither/nor option if at least one question item had been answered. Similarly, questions that asked about usage or existence were replaced with the “no” option if, again, at least one question item had been answered. All other missing values are considered missing at random and excluded in the statistics. In most questions fewer than 5% of responses are missing.

Non-Response Bias

The covering letter and survey instrument made it explicit that we were soliciting returns whether or not an individual had been involved in interactions with external organisations. Nevertheless it is possible in a survey which focuses on external interactions by academics that those individuals who do not take part in such activities may not reply. We could not compare non-respondents directly with respondents; however, we can adopt two strategies to check for non-response bias. First, we compare our sample with aggregate HESA statistics for the academic year 2013/14. Second, we compare those academics who replied without a reminder with those academics who required prompting to respond, and those that completed the survey with those that left incomplete responses.

1. HESA Comparison

Senior staff and men are known to be more likely to interact with external organisations compared to junior staff and women. They may therefore also be more likely to reply to this survey. In addition departments may be less likely to list junior research-only and teaching-only staff, and especially those on temporary contracts may be more difficult to contact due to the time lag between email data collection and survey. In either case this may lead to an overrepresentation of external interactions in our sample. We therefore compare our sample to HESA numbers in terms of positions held by respondents and by gender. In making this comparison it is important to bear in mind that HESA data are known to underestimate the number of professors. We should expect some tendency for the HESA numbers to be lower than those based on self-reported status, even if there was no response bias. We therefore also compare respondents and HESA data to the surveyed sample. Titles of academics were recorded when email addresses were collected, enabling us to identify professors. We also employ a name dictionary to assign gender to names in our original sample. Gender could be assigned to 84% of names with an error rate of less than 0.5%.¹⁰

Exhibit A2 shows the results of our comparison. In terms of seniority the sample of ‘complete’ respondents does indeed have a higher proportion of professors, also compared to the surveyed sample.¹¹ In addition we also compared the age distribution of our respondents with HESA staff data (not reported) and found, as may be expected, a higher proportion of staff above the age of 50 (41% compared to 29% in the HESA data). It is therefore likely that higher levels of interaction will be reported in the aggregate survey results. There is, however, little difference in terms of gender between our respondent sample and HESA statistics with the exception of a slight overrepresentation of female professors. This overrepresentation is also confirmed when we compare with the surveyed sample. The implications for response bias are not straightforward to infer.

¹⁰ Error rate of 0.45% based on a comparison of automatic and self-assigned gender of respondents.

¹¹ Amongst the group of undeliverable we find a higher share of women and those in non-professorial positions (44% and 89% respectively). Still, the total shares as reported in column 2 (CBR surveyed sample) of Exhibit A2 remain almost unchanged when undeliverable are included.

Exhibit A2 Position and gender distribution (in %)

Academic Staff by Position and Gender									
	HESA 2013/14			CBR Surveyed Sample ^a			CBR Respondents (Complete)		
	Female	Male	Total	Female	Male	Total	Female	Male	Total
Professors	22.2	77.8	10.2	20.7	79.3	17.5	26.6	73.4	18.9
Other Grades	47.1	52.9	89.8	45.2	54.8	82.5	45.5	54.5	81.0
Total	44.6	55.4	100.0	40.7	59.3	100.0	41.9	58.1	100.0

Source: HESA Staff Data 2013/14 (<https://heidi.hesa.ac.uk>) and CBR Survey of Academics (2015).

^a Gender was identified for 84% of the surveyed sample, positions for the full sample; both are reported for the surveyed sample of 130,996 academics.

We also compare the disciplinary spread of our respondents with HESA data. When email addresses were collected we also recorded departments or research centres. In the survey we then asked respondents to allocate themselves to a discipline. The HESA data instead is organised by cost centre categories. A comparison is therefore not straightforward to make: First cost centres do not map directly onto disciplinary groupings on websites or self-allocation by academics. Second, within a cost centre grouping, university department, or research centre, academics may be drawn from several disciplines. With these caveats in mind, Exhibit A3 shows that our 'complete' respondents sample is underrepresented in health sciences compared to HESA data. A more detailed cost centre analysis shows that this is underrepresentation stems primarily from clinical medicine, which accounts for 12% of HESA staff but just 3% in our data. The reason for the underrepresentation of clinical medicine may lie in the difficulty of identifying and contacting staff working at NHS hospitals. It may also lie in an overrepresentation of clinical staff (many of which are honorary or adjunct staff at universities) within HESA statistics. A comparison with data from the Medical Schools Council (MSC) who conduct an annual survey on clinical academic staff shows that they estimate the number of clinical academics at 5,646, a quarter of the HESA estimates. If we replace the HESA numbers for clinical practitioners with those from MSC, we no longer find an underrepresentation of health sciences. Instead we observe a slight underrepresentation in engineering and a rather large underrepresentation in the arts and humanities. The lower share of engineering academics may be explained by the interdisciplinary nature of engineering with some academics associating with other sciences instead. In the arts we are underestimating those in the performing and practicing arts perhaps, due to a difficulty in reaching out to practitioners primarily lecturing at art or music schools. If, instead, we compare subject areas of respondents to department spread in our surveyed sample (reported in Exhibit A3) we can see that in most subject areas our respondents are representative of those surveyed, again with the exception of the arts and humanities. This underrepresentation is also confirmed if we look at response rates by university. While the average 'completed' response rate is 13.9% it is less than 7% for some dedicated music and drama universities. The email failure rate is also highest for these institutions (more than 25% for some). A comparison of overall response rate by discipline based on department membership shows that the response rate is lowest for arts and humanities with 12.4 % and highest in engineering and material science with 15.4%.

These limitations must be borne in mind when interpreting the results reported in the main text. The implications for response bias are not straightforward to infer but we can suspect to underestimate the number of non-research active staff.

Exhibit A3 Subject distribution (in %)

Academic Disciplines	HESA 2013/14		CBR Surveyed Sample	CBR Respondents (Complete)	
	Cost Centres	(Cost Centres) MSC 2014 for Clinical Medicine	Departments /Faculties	Departments /Faculties	Self-allocation
Health Sciences	24.4	17.1	18.0	17.1	18.6
Biology, Chemistry, Vet.	10.3	11.3	11.9	11.7	12.8
Physics, Mathematics	10.3	11.3	10.9	11.3	13.3
Engineering, Materials	8.3	9.1	8.9	9.8	7.8
Social Sciences	26.5	29.1	30.8	32.8	31.1
Arts and Humanities	20.2	22.2	19.5	17.4	16.4
Total	100	100	100	100	100

Source: HESA Staff Data 2013/14 (<https://heidi.hesa.ac.uk/>); MSC Survey of Clinical Academics 2014 (www.medschools.ac.uk/Publications/) and CBR Survey of Academics (2015).

2. Respondents Comparison

As a further check we can compare those academics who replied without a reminder with those academics who required prompting to respond. On the assumption that the latter felt the survey to be less relevant to them, we might expect non-response biases to show up in differences between the two groups. An analysis across variables relating to external interactions in the survey sample shows some differences that are statistically significant due to the large sample size, but quantitative differences were very small (shown in Exhibit A4). They suggest that despite no significant difference in the type of research undertaken, there may be a small upward bias in our sample in the estimated level of interactions with external organisations. Some of this effect may be due to the higher share of professors (24% vs. 18%; not reported in table) in the group that did not require a reminder and the higher share of social sciences (33% vs. 29%) in the group that required a reminder. Indeed differences regarding question F turn insignificant once we control for gender, seniority and subject area.

We can further compare those that replied with those that started the survey but did not complete it, if they answered a minimum set of questions. Again, the latter may have felt that the survey is less relevant to them and non-response biases may show up. Exhibit A5 reports differences with regard to complete and incomplete replies. Most academics that dropped out still answered the question about research direction and again we find no large differences. Approximately 70% of incomplete responses still provide information on relevance and external application of their research. Here we find an upward bias in our sample with regard to the interaction with external organisations. However, this effect is due to the higher share of professors in the group that completed the survey (21% vs. 15%; not reported in table), and the higher share of women in the 'incomplete' sample (47% vs. 41%). All differences therefore turn insignificant once we control for gender, seniority and subject area.

Exhibit A4 Response bias analysis – without and after reminder

			Without Reminder (7,504)	After Reminder (10,673)	
(A) If undertaking research, which of the following most closely describes it? (%)	Basic Research	% ticked	26.8	25.9	
	User-inspired Basic Research	% ticked	25.5	26.4	
	Applied Research	% ticked	43.8	43.1	
(B) If undertaking research: It has been applied in a commercial context		% ticked	20.2	18.6	**
(C) If undertaking research: It is in a general area of commercial interest to industry		% ticked	37.7	37.0	
(D) If undertaking research: It has been applied by a non- commercial external organisations		% ticked	44.0	38.2	**
(E) If undertaking research: It has relevance for non-commercial external organisations		% ticked	69.4	65.1	**
(F) If undertaking research: It has no relevance for external organisations		% ticked	12.9	14.2	(**)

Key: ** Statistically significant at the 5% level or better using Chi-Square test.

Note: 93-94% of respondents in both groups are undertaking research. Brackets indicate that differences are insignificant when controlling for confounding factors.

Exhibit A5 Response Bias Analysis – complete and incomplete responses

			Complete Responses (18,177)	Incomplete Responses (6,633)	
(A) If undertaking research, which of the following most closely describes it? (%)	Basic Research	% ticked	26.2	28.4	(**)
	User-inspired Basic Research	% ticked	26.0	24.3	
	Applied Research	% ticked	43.3	42.3	
(B) If undertaking research: It has been applied in a commercial context		% ticked	19.3	17.3	(**)
(C) If undertaking research: It is in a general area of commercial interest to industry		% ticked	37.3	32.8	(**)
(D) If undertaking research: It has been applied by a non- commercial external organisations		% ticked	40.6	36.1	(**)
(E) If undertaking research: It has relevance for non- commercial external organisations		% ticked	66.8	63.6	(**)
(F) If undertaking research: It has no relevance for external organisations		% ticked	13.7	16.1	(**)

Key: ** Statistically significant at the 5% level or better using Chi-Square test.

Note: 94% of complete and incomplete are undertaking research. 6147 of incomplete (99% of research active) answered (A); 4,599 of incomplete (70% of research active) answered (B) to (F); 99% of complete responses that are research active answered (A) to (F). Brackets indicate that differences are insignificant when controlling for confounding factors.

Annex B:

List of Surveyed Universities

England (129)

Imperial College	The University of Exeter
Kings College London	University of Leicester
University of Birmingham	University of Reading
University of Nottingham	University of Sussex
University of Sheffield	University of Bath
University of Southampton	Leeds College of Art
The University of Oxford	Norwich University of the Arts
University College London	Liverpool Hope University
The University of Bristol	Liverpool John Moores University
University of Cambridge	London Metropolitan University
University of Leeds	London South Bank University
University of Manchester	The Manchester Metropolitan University
University of Newcastle-upon-Tyne	Middlesex University
Brunel University	Nottingham Trent University
City University	Oxford Brookes University
Goldsmiths University of London	Sheffield Hallam University
London School of Economics and Political Sciences	Southampton Solent University
Loughborough University	Staffordshire University
Royal Holloway University	The University of West London
University of Liverpool	University of Bolton
University of Durham	University of Chichester
University of Hull	University of Northampton
University of Kent	University of Worcester
University of Salford	Birmingham City University
University of Surrey	University of Central Lancashire
University of Warwick	University of East London
University of York	University of Gloucestershire
Aston University	University of Greenwich
Birkbeck College	University of Hertfordshire
Institute of Education	University of Huddersfield
University of Keele	University of Lincoln
University of Lancaster	University of Bedfordshire
London Business School	University of Portsmouth
The Open University	The University of Sunderland
Queen Mary University of London	Teesside University
The School of Oriental and African Studies	University of the West of England
University of Bradford	University of Westminster
University of Buckingham	University of Wolverhampton
University of East Anglia	York St John University
University of Essex	Roehampton University

The University of Plymouth
 Bishop Grosseteste University
 Cranfield University
 Edge Hill University
 Newman University
 University of Cumbria
 St Mary's Twickenham
 University of Chester
 University of Derby
 Falmouth University
 University Campus Suffolk
 University of St Mark and St John
 University of Creative Arts
 University of the Arts, London
 Courtauld Institute of Art
 Royal College of Art
 Central School of Speech and Drama
 Conservatoire for Dance and Drama
 Royal College of Music
 Guildhall School of Music and Drama
 Royal Academy of Music
 Royal Northern College of Music
 Trinity Laban Conservatoire of Music and Dance
 Leeds College of Music
 Regent's University London

Ravensbourne
 Heythrop College
 University of London, School of Advanced Study
 The Institute of Cancer Research
 Liverpool School of Tropical Medicine
 London School of Hygiene and Tropical Medicine
 St George's, University of London
 Harper Adams University
 Royal Agricultural University
 Writtle College
 Royal Veterinary College
 Anglia Ruskin University
 Bath Spa University College
 Bournemouth University
 University of Brighton
 Buckinghamshire New University
 Canterbury Christ Church University College
 University of Northumbria at Newcastle
 Coventry University
 De Montfort University
 University of Winchester
 Kingston University
 Leeds Beckett
 Leeds Trinity University

Northern Ireland (5)

The Queen's University of Belfast
 Stranmillis University College
 St Mary's University College (Belfast)

Union Theological College
 University of Ulster

Wales (9)

University of South Wales
 Cardiff University
 Glyndwr University
 Cardiff Metropolitan University
 Swansea University

Aberystwyth University
 Bangor University
 University of Wales Trinity Saint David
 Royal Welsh College of Music and Drama

Scotland (18)

University of Edinburgh
(including Edinburgh College of Art)
 University of Glasgow
 Heriot-Watt University
 University of Aberdeen
 University of Dundee
 University of St Andrews
 University of Stirling
 University of Strathclyde
 Abertay University, Dundee

Edinburgh Napier University
 Glasgow Caledonian University
 The Robert Gordon University
 Queen Margaret University, Edinburgh
 University of the Highlands and Islands
 University of The West of Scotland
 Glasgow College of Art
 Royal Conservatoire of Scotland
 Scotland's Rural College

Annex C:

Questionnaire and Disciplinary Groups

The questionnaire was administered online and contained 43 questions. Annex D reproduces below each of its exhibit the survey questions which are analysed in this report and generated the data in each exhibit. Question 1 asked about respondent's main disciplinary area. These were grouped into the six disciplinary categories used throughout this report and are listed in Exhibit C1 below.

Exhibit C1 Question 1: Please indicate your main disciplinary area		
Disciplinary Fields		Number of Responses
Health Science	Clinical Medicine	555
	Public Health, Health Services and Primary Care	872
	Allied Health Professions, Dentistry, Nursing and Pharmacy	1032
	Psychology, Psychiatry and Neuroscience	925
Biology, Chemistry, Veterinary Science	Biological Sciences	1644
	Agriculture, Veterinary and Food Science	275
	Chemistry	404
Physics, Mathematics	Earth Systems and Environmental Sciences	513
	Physics	630
	Mathematical Sciences	591
	Computer Science and Informatics	683
Engineering, Materials Science	Aeronautical, Mechanical, Chemical and Manufacturing Engineering	519
	Electrical and Electronic Engineering, Metallurgy and Materials	436
	Civil and Construction Engineering	233
	General Engineering	228
Social Sciences	Architecture, Built Environment and Planning	379
	Geography, Environmental Studies and Archaeology	492
	Economics and Econometrics	420
	Business and Management Studies	1333
	Law	564
	Politics and International Studies	371
	Social Work and Social Policy	360
	Sociology	412
	Anthropology and Development Studies	172
	Education	855
	Sport and Exercise Sciences, Leisure and Tourism	301
Arts and Humanities	Area Studies	60
	Modern Languages and Linguistics	464
	English Language and Literature	419
	History	525
	Classics	100
	Philosophy	136
	Theology and Religious Studies	103
	Art and Design: History, Practice and Theory	414
	Music, Drama, Dance and Performing Arts	399
	Communication, Cultural and Media Studies, Library and Information Management	358
Total		18177

Annex D

Supplementary Data Tables

Data by seniority, gender, discipline and research orientation

Exhibit D1 Seniority and gender by discipline (% of respondents)										
		Professor	Reader, Senior Lecturer	Lecturer	Research Fellow/ Associate	Research/ Teaching Assistant	Teaching Fellow/ Associate	Emeritus/ Honorary (Retired)	Total (N)	
Gender	Male	24.0	31.0	19.5	16.3	2.3	1.5	5.5	10554	
	Female	12.0	32.8	25.1	20.9	4.2	2.9	2.1	7622	
Discipline	Health Sciences	17.8	31.4	20.6	20.7	3.9	1.9	3.7	3384	58.7 3384
	Biology, Chemistry, Veterinary Science	16.6	26.1	16.5	32.4	3.4	0.9	4.0	2323	36.8 2323
	Physics, Mathematics	20.6	25.8	17.3	27.2	3.9	1.6	3.6	2417	24.1 2417
	Engineering, Materials Science	21.9	27.8	20.3	21.8	3.6	1.0	3.6	1416	16.9 1415
	Social Sciences	19.0	35.8	25.7	10.9	2.2	2.2	4.3	5659	44.6 5659
	Arts and Humanities	19.2	35.5	24.5	9.2	2.6	4.0	4.8	2978	48.1 2978
Total (N)		3446	5769	3969	3312	557	381	743	18177	18176

Questions:

Please indicate your gender

___Male ___Female

What is your position within your institution?

___Professor ___Reader, Associate Professor, Senior Lecturer, Assistant Professor ___Lecturer ___Research Fellow, Research Associate ___Research Assistant, Teaching assistant ___Other please specify

Exhibit D2 Activity by seniority, gender and discipline

		Share of respondents (%)				Average share of time (%)				
		Teaching	Research	Administrative activities	Knowledge Exchange with External Organisations	Teaching	Research	Administrative Activities	Knowledge Exchange with External Organisations	Total (N)
All		89.1	94.3	92.1	71.0	30.9	40.0	21.2	7.9	18070
Position	Professor	94.7	98.9	97.2	82.0	22.9	40.8	26.1	10.2	3418
	Reader, Senior Lecturer	98.7	93.6	98.7	74.0	40.0	27.2	25.2	7.6	5741
	Lecturer	99.1	90.2	97.1	66.3	44.8	27.5	21.7	6.1	3949
	Research Fellow/Associate	61.7	99.4	75.7	63.0	7.9	73.7	10.9	7.5	3305
	Research/Teaching Assistant	61.9	94.1	79.9	57.6	17.8	59.9	15.5	6.8	556
	Teaching Fellow/Associate	97.4	62.2	92.3	57.7	56.7	11.4	24.7	7.1	378
	Emeritus/Honorary (retired)	73.4	92.8	73.4	75.0	22.2	50.2	14.0	13.6	723
Gender	Male	89.9	95.5	91.8	71.4	30.0	41.1	20.8	8.2	10493
	Female	88.0	92.6	92.6	70.4	32.2	38.4	21.8	7.6	7577
Discipline	Health Sciences	87.2	91.9	92.2	73.0	27.0	42.4	22.2	8.4	3366
	Biology, Chemistry, Vet. Science	83.2	95.8	88.3	67.7	23.2	53.0	17.3	6.5	2316
	Physics, Mathematics	83.6	96.4	87.7	62.6	26.0	49.1	18.1	6.8	2404
	Engineering, Materials Science	85.9	95.4	89.6	81.1	27.6	44.2	18.0	10.2	1408
	Social Sciences	92.8	93.8	94.6	74.2	35.5	33.1	22.6	8.8	5626
	Arts and Humanities	94.8	94.3	95.2	67.3	38.2	30.5	24.5	6.8	2950

Question:

Please indicate the percentage of your overall time spent on average over the academic year on each of the following activities (Total 100):

—% Teaching

—% Research

—% Administrative activities

—% Knowledge exchange with external organisations

Exhibit D3 Research orientation by seniority, gender and discipline

		Share of respondents (%)					Average share of time (%)			
		Basic Research	User-inspired Basic	Applied Research	None Applies	Total (N)	Basic Research	User-inspired Basic	Applied Research	Total (N)
All		26.3	26.1	43.1	4.5	17014	32.1	27.2	40.6	16179
Position	Professor	29.0	28.1	40.5	2.4	3368	33.6	28.5	37.8	3279
	Reader, Senior Lecturer	25.5	25.7	43.3	5.5	5367	31.7	27.0	41.1	5047
	Lecturer	27.1	28.3	38.4	6.2	3569	33.4	29.3	37.3	3322
	Research Fellow/Associate	23.1	23.8	50.8	2.3	3279	29.5	24.7	45.8	3193
	Research/Teaching Assistant	22.4	21.4	50.7	5.5	523	27.9	24.7	47.4	498
	Teaching Fellow/Associate	22.3	22.7	41.2	13.9	238	29.4	25.7	44.9	203
	Emeritus/Honorary (Retired)	34.9	23.1	37.6	4.3	670	38.5	25.9	35.6	641
Gender	Male	29.2	26.5	40.7	3.7	10002	34.6	27.4	37.9	9606
	Female	22.2	25.5	46.7	5.6	7012	28.5	26.9	44.6	6573
Discipline	Health Sciences	13.6	17.8	65.0	3.6	3101	18.1	22.6	59.4	2976
	Biology, Chemistry, Vet. Science	33.7	28.4	36.3	1.6	2217	38.2	27.6	34.2	2178
	Physics, Mathematics	39.3	29.1	29.9	1.7	2313	43.8	27.1	29.1	2270
	Engineering, Materials Science	8.4	30.4	59.5	1.7	1341	17.2	32.1	50.4	1318
	Social Sciences	21.3	29.4	45.9	3.4	5262	27.6	29.9	42.5	5047
	Arts and Humanities	41.9	22.6	22.1	13.4	2780	51.0	24.4	24.6	2390
Research Direction	Basic Research						81.9	11.0	6.9	4446
	User-inspired Basic Research						21.5	61.2	17.3	4407
	Applied Research						8.3	16.6	75.1	7318

Questions:

If undertaking research, which of the following statements most closely describes it?

<Filter: Research – Yes>

___Basic research: theoretical, empirical or experimental work, undertaken primarily to acquire new knowledge about the underlying foundation of phenomena or observable facts, without any particular application or use in view.

___User-inspired basic research: theoretical, empirical or experimental work, undertaken primarily to acquire new knowledge about the underlying foundation of phenomena or observable facts, but also inspired by considerations of use.

___Applied research: original investigation undertaken in order to acquire new knowledge directed towards an individual, group or societal need or use.

___None of the above apply to my research

Roughly what proportion of your research time is spent on research described by the following statements? Enter zero, if no time spent (Total 100).

<Filter: Research – Yes; Basic, user-inspired or applied research – Yes>

% Basic research: theoretical, empirical or experimental work, undertaken primarily to acquire new knowledge about the underlying foundation of phenomena or observable facts, without any particular application or use in view.

% User-inspired basic research: theoretical, empirical or experimental work, undertaken primarily to acquire new knowledge about the underlying foundation of phenomena or observable facts, but also inspired by considerations of use.

% Applied research: original investigation undertaken in order to acquire new knowledge directed towards an individual, group or societal need or use.

Exhibit D4 Research statements by seniority, gender, discipline and research orientation (% of respondents)

		In general area of commercial interest to business and/or industry	Applied in a commercial context	Relevance for non-commercial external organisations (including the public sector)	Applied by a non-commercial organisation (including the public sector) external to the university sector	No relevance for external organisations	Total (N)
All		37.4	19.3	66.9	40.7	13.7	16897
Position	Professor	42.8	27.8	69.2	53.5	11.4	3365
	Reader, Senior Lecturer	36.5	19.6	68.4	40.6	14.0	5335
	Lecturer	33.9	14.0	66.3	33.2	15.5	3529
	Research Fellow/Associate	39.6	16.4	64.9	36.9	12.3	3250
	Research/Teaching Assistant	33.2	14.3	63.7	34.9	15.4	518
	Teaching Fellow/Associate	21.5	11.2	59.2	26.6	27.5	233
	Emeritus/Honorary (retired)	34.0	23.8	63.1	44.8	14.2	667
Gender	Male	44.7	24.5	63.7	40.5	14.8	9954
	Female	26.9	12.0	71.5	41.0	12.2	6943
Discipline	Health Sciences	25.6	12.6	77.0	51.2	7.8	3070
	Biology, Chemistry, Veterinary Science	53.7	24.1	59.7	28.4	15.1	2199
	Physics, Mathematics	49.4	24.0	56.6	32.5	24.0	2291
	Engineering, Materials Science	80.3	49.9	43.7	30.7	5.2	1335
	Social Sciences	32.4	15.5	74.0	48.7	8.8	5242
	Arts and Humanities	16.2	11.7	67.9	35.4	24.2	2760
Research Orientation	Basic Research	23.3	9.8	58.2	22.6	31.0	4416
	User-inspired Basic Research	46.4	20.6	71.0	41.3	9.0	4403
	Applied Research	42.7	25.2	71.3	53.1	4.4	7311

Question:

If undertaking research, which of the following statements apply to it? Please indicate all that apply.

<Filter: Research – Yes>

—It has been applied in a commercial context

—It is in a general area of commercial interest to business and/or industry

—It has been applied by a non-commercial organisation (including the public sector) external to the university sector

—It has relevance for non-commercial external organisations (including the public sector)

—It has no relevance for external organisations

Exhibit D5 Involvement in commercialisation activities in the last 3 years by seniority, gender, discipline and research orientation (% of respondents)

		Taken out a patent	Licensed research outputs to a company	Formed a spin-out company	Formed or run a consultancy via your research	Total (N)
All		5.9	3.4	2.8	7.4	16537
Position	Professor	10.8	6.4	5.2	11.2	3196
	Reader, Senior Lecturer	4.9	3.0	2.6	7.5	5247
	Lecturer	3.3	1.8	1.6	5.0	3586
	Research Fellow/Associate	5.9	3.0	2.3	5.9	2995
	Research/Teaching Assistant	3.7	2.8	2.2	2.6	493
	Teaching Fellow/Associate	0.6	1.4	2.0	4.6	348
	Emeritus/Honorary (Retired)	7.1	2.7	2.7	11.9	672
Gender	Male	8.2	4.5	4.0	9.4	9593
	Female	2.7	1.7	1.3	4.6	6944
Discipline	Health Sciences	4.7	2.7	2.2	5.8	3091
	Biology, Chemistry, Veterinary Science	14.7	6.1	4.1	6.8	2170
	Physics, Mathematics	7.3	5.1	3.7	7.6	2184
	Engineering, Materials Science	22.2	11.6	7.7	13.8	1321
	Social Sciences	0.7	0.9	1.8	8.7	5079
	Arts and Humanities	0.5	0.9	1.3	3.6	2692
Research Orientation	Basic Research	3.7	1.5	1.5	3.2	4022
	User-inspired Basic Research	7.3	3.9	3.4	9.1	4046
	Applied Research	7.4	4.7	3.6	10.0	6758

Question:

Have you participated in any of the following in the past three years?

___Taken out a patent

___Licensed research outputs to a company

___Formed a spin out company

___Formed or run a consultancy via your research

___None of the above

Exhibit D6 Engagement in and importance of people-based, problem-solving and community-based interactions in the last 3 years

		% that use mode	% that consider mode very important as pathway to impact	Mean importance of mode as pathway to impact (1-5)	% that use mode amongst those with private sector engagement	% that use mode amongst those with public sector engagement	% that use mode amongst those with third sector engagement	% that use mode amongst those with none of the three sectors
People-based	Attending Conferences	80.8	24.9	3.85	89.6	90.6	88.8	77.6
	Participating in Networks	63.0	30.9	4.00	77.3	80.2	78.1	49.3
	Giving Invited Lectures	55.4	28.4	3.96	69.8	73.6	71.2	41.5
	Sitting on Advisory Boards	32.7	23.7	3.73	43.1	49.2	48.4	19.9
	Student Placements	31.1	18.0	3.48	45.5	41.1	39.4	21.7
	Employee Training	27.2	18.2	3.54	42.9	38.6	33.6	18.0
	Standard Setting Forums	24.9	25.0	3.81	34.5	37.4	33.7	16.5
	Curriculum Development	21.8	18.6	3.50	29.7	31.1	29.6	15.0
	Enterprise Education	7.0	16.7	3.48	13.3	9.9	9.9	3.9
Problem-solving	Joint Publications	48.1	39.2	4.18	61.3	58.8	53.8	41.8
	Joint Research	44.5	45.7	4.30	61.0	57.5	52.1	35.0
	Informal Advice	47.4	15.2	3.54	64.5	67.1	64.2	30.4
	Consultancy Services	31.5	16.6	3.57	50.1	46.2	40.9	19.2
	Research Consortia	29.0	37.8	4.16	44.3	42.7	35.9	19.5
	Hosting of Personnel	29.3	18.3	3.70	42.6	39.8	36.2	21.3
	Contract Research	26.8	34.3	4.09	42.9	41.1	34.1	15.5
	Setting up Physical Facilities	9.7	32.1	3.86	16.5	12.1	11.0	7.5
Community-based	External Secondment	10.0	35.9	4.03	15.8	13.4	11.7	7.6
	Prototyping and Testing	9.0	25.6	3.82	18.1	11.5	10.0	5.6
	Lectures for the Community	41.4	17.4	3.53	49.1	52.2	57.3	32.1
	School Projects	28.6	18.8	3.36	34.3	34.7	38.2	23.0
	Museums and Art Galleries	17.3	21.9	3.66	19.7	20.7	26.8	12.6
	Performing Arts and Related	17.6	22.6	3.53	20.9	22.3	28.0	12.0
	Public Exhibitions	13.4	22.2	3.67	18.0	16.7	19.8	9.2
	Social Enterprises	13.3	22.9	3.69	21.1	23.5	26.7	3.8
	Heritage and Tourism	9.7	22.2	3.66	12.9	13.9	16.8	4.9
	Community-based Sports	3.0	18.6	3.19	4.5	4.5	4.9	1.6
Total (N)		18177	18177	18177	17183	17071	16849	17300

Questions:

___How many times have you engaged in the following people-based (problem-solving, community-based) activities with external organisations within the past three years?

___In relation to your engagement in the following people-based activities, please also indicate how important each of them was as a pathway to impact of your research on external organisations?

___Have you undertaken any people-based, problem-solving or community-based activities with private sector companies (with public sector organisations; charitable or voluntary organisations) in the last three years? <Filter: external engagement -Yes>

Exhibit D7 Engagement in and importance of people-based, problem-solving and community-based interactions by discipline

		% that use mode						% that consider mode as very important as pathway to impact					
		Health Science	Biology, Chem., Vet. Science	Physics, Maths	Eng., Materials Science	Social Science	Arts and Human.	Health Science	Biology, Chem., Vet. Science	Physics, Maths	Eng., Materials Science	Social Science	Arts and Human.
People-based	Attending Conferences	82.7	83.3	76.7	85.1	83.1	73.3	26.3	28.9	25.1	34.1	22.7	19.3
	Participating in Networks	65.2	56.7	51.8	71.5	69.2	58.4	32.9	32.8	28.7	33.0	30.1	29.1
	Giving Invited Lectures	56.8	50.4	45.5	58.4	59.3	56.9	28.3	34.4	27.7	33.1	27.5	24.3
	Sitting on Advisory Boards	36.1	27.1	22.9	30.9	37.4	33.1	27.7	23.4	18.1	24.9	24.0	20.5
	Student Placements	27.5	29.1	29.3	46.6	32.4	28.3	19.3	16.2	16.9	24.0	17.3	15.8
	Employee Training	30.3	24.1	20.0	39.8	32.3	16.1	20.1	17.3	11.1	21.7	18.9	15.9
	Standard Setting Forums	29.7	20.0	18.3	30.7	28.0	19.9	27.1	26.5	22.2	24.4	26.5	18.8
	Curriculum Development	24.6	14.0	15.1	25.5	26.7	19.1	22.4	16.8	14.0	17.4	19.4	15.7
	Enterprise Education	5.3	4.8	4.8	9.5	9.6	6.1	13.6	11.8	12.9	16.3	19.6	16.9
Problem-solving	Joint Publications	54.3	61.1	51.9	68.8	42.3	28.8	40.0	47.8	41.1	44.9	33.5	30.0
	Joint Research	49.9	58.5	48.7	66.4	38.2	25.5	45.8	48.4	46.7	50.5	43.3	39.9
	Informal Advice	46.5	42.6	37.9	50.6	54.2	45.4	16.0	13.4	11.2	12.6	17.5	14.7
	Consultancy Services	30.8	25.0	25.1	44.3	36.6	26.5	16.4	15.5	15.3	15.9	17.8	16.4
	Research Consortia	26.6	33.7	33.0	51.6	27.0	17.9	37.6	43.3	38.9	44.9	34.3	28.8
	Hosting of Personnel	28.2	36.5	29.9	45.1	26.7	22.0	19.7	19.0	20.7	22.6	15.3	15.0
	Contract Research	27.4	26.2	24.4	45.2	30.2	13.1	32.2	35.0	33.3	38.0	35.4	28.2
	Setting up Physical Facilities	8.4	13.9	11.3	25.4	6.1	5.9	28.6	36.5	32.8	39.6	23.3	29.5
	External Secondment	9.4	11.2	11.7	18.1	8.8	6.9	37.9	36.9	36.2	34.4	35.4	33.5
	Prototyping and Testing	7.7	11.9	11.6	27.2	5.1	4.7	25.6	27.8	25.8	25.5	21.7	29.0
Community-based	Lectures for the Community	36.3	39.6	38.6	31.8	39.6	58.7	21.4	16.9	13.7	17.3	16.9	17.4
	School Projects	22.7	35.2	28.7	28.1	26.4	34.7	17.6	15.1	14.4	17.7	22.9	20.0
	Museums and Art Galleries	8.0	12.7	14.8	9.9	14.4	42.6	12.7	15.4	11.6	12.3	19.8	30.7
	Performing Arts and Related Cultural Act.	10.7	9.5	11.5	8.1	15.6	45.1	15.9	14.6	9.3	6.5	19.6	31.7
	Public Exhibitions	10.2	16.4	14.4	13.0	8.3	23.8	18.5	15.7	13.9	12.8	21.7	34.3
	Social Enterprises	11.5	5.5	6.8	7.5	20.9	14.9	22.0	24.0	13.6	13.6	23.9	26.1
	Heritage and Tourism Activities	2.0	4.4	6.4	5.2	11.1	24.6	8.3	16.0	19.9	7.2	21.3	26.9
	Community-based Sports	2.9	2.5	1.8	2.8	4.3	2.0	18.2	14.8	7.5	17.1	20.7	25.0

Questions:

How many times have you engaged in the following people-based (problem-solving, community-based) activities with external organisations within the past three years? Please tick the activities you have engaged in, and where applicable the number of times you have done so.

In relation to your engagement in the following people-based activities, please also indicate how important each of them was as a pathway to impact of your research on external organisations? Please indicate the importance of each statement.

___ Completely unimportant

___ Unimportant

___ Neither unimportant nor important

___ Important

___ Very important

Exhibit D8 Engagement with private, public and third sector in the last 3 years by seniority, gender, discipline and research orientation (% of respondents)

		Activities with private sector companies		Activities with public sector organisations		Activities with charitable or voluntary organisations	
		%	N	%	N	%	N
All		30.8	17183	34.9	17071	41.2	16849
Position	Professor	38.9	3334	47.3	3312	47.3	3272
	Reader, Senior Lecturer	32.4	5510	35.2	5479	44.9	5394
	Lecturer	25.9	3715	29.4	3684	37.2	3638
	Research Fellow/Associate	26.4	3105	28.2	3083	33.4	3043
	Research/Teaching Assistant	23.4	491	28.2	490	32.9	486
	Teaching Fellow/Associate	24.4	332	26.5	332	41.9	334
	Emeritus/Honorary (Retired)	33.3	696	40.1	691	45.3	682
Gender	Male	34.4	9949	33.4	9881	36.2	9750
	Female	25.8	7234	36.9	7190	48.2	7099
Discipline	Health Sciences	25.2	3220	45.4	3206	48.0	3153
	Biology, Chemistry, Veterinary Science	32.5	2213	21.4	2205	33.6	2178
	Physics, Mathematics	35.6	2204	27.8	2191	24.1	2156
	Engineering, Materials Science	52.1	1374	21.5	1355	17.8	1340
	Social Sciences	30.4	5375	45.0	5350	49.2	5292
	Arts and Humanities	22.3	2797	25.9	2764	49.1	2730
Research Orientation	Basic Research	18.8	4090	21.0	4068	31.4	4025
	User-inspired Basic Research	34.4	4280	35.0	4244	39.5	4181
	Applied Research	36.7	7132	44.2	7079	48.1	6993

Questions:

Have you undertaken any people-based, problem-solving or community-based activities with private sector companies (public sector organisations; charitable or voluntary organisations) in the last three years?

<Filter: external engagement –Yes>

___Yes ___No

Exhibit D9 Frequency of contact with institution's Knowledge or Technology Transfer Office (TTO) or consultancy services office within the last 3 years by seniority, gender, discipline and research orientation (% of respondents)

		No contact	Rarely (1-2 times)	Occasionally (3-6 times)	Frequently (7+ times)	Not aware of these services	No TTO office	Total (N)
All		17.1	17.9	12.3	10.1	39.0	3.6	17831
Position	Professor	15.0	20.7	20.2	20.0	20.8	3.3	3383
	Reader, Senior Lecturer	16.0	20.9	14.0	11.9	32.9	4.2	5658
	Lecturer	17.9	16.9	9.9	5.5	45.8	4.0	3895
	Research Fellow/Associate	19.6	13.8	6.6	5.5	52.4	2.2	3251
	Research/Teaching Assistant	16.0	8.4	4.0	2.0	65.5	4.0	545
	Teaching Fellow/Associate	14.4	10.4	4.9	1.4	66.8	2.2	367
	Emeritus/Honorary (Retired)	22.4	14.9	11.1	6.3	41.5	3.8	732
Gender	Male	17.5	18.8	13.5	12.0	34.8	3.3	10349
	Female	16.6	16.5	10.7	7.5	44.9	3.9	7482
Discipline	Health Sciences	18.3	18.0	11.1	7.7	42.3	2.5	3311
	Biology, Chemistry, Veterinary Science	19.5	20.6	14.4	13.9	29.7	1.9	2287
	Physics, Mathematics	19.3	16.3	10.8	11.8	39.5	2.2	2375
	Engineering, Materials Science	14.1	19.9	18.8	20.8	23.8	2.6	1385
	Social Sciences	15.8	18.1	12.7	8.9	40.4	4.1	5548
	Arts and Humanities	16.1	15.3	9.5	5.6	46.9	6.6	2925
Research Orientation	Basic Research	21.6	17.9	9.6	4.9	43.0	3.0	4395
	User-inspired Basic Research	16.3	19.1	14.7	12.2	34.5	3.1	4381
	Applied Research	15.1	18.6	14.1	13.5	34.9	3.8	7204

Questions:

Has your institution got a Knowledge or Technology Transfer Office (TTO) or consultancy services office?

___Yes

___No

___Don't know

How often have you been in contact with your institution's Knowledge or Technology Transfer Office (TTO) or consultancy services office within the past three years?

___Frequently (7+ times)

___Occasionally (3-6 times)

___Rarely (1-2 times)

___No contact

Exhibit D10 Way in which activities with external organisations were initiated by seniority, gender, discipline and research orientation (% of respondents)

		The university knowledge/technology transfer office, or other university administrative office	Individuals associated with the external organisation	Your own actions in approaching the external organisation directly	Mutual actions following up a contact at a formal conference or meeting	Mutual actions following up informal contacts	Total (N)
All		31.8	83.3	71.5	67.5	70.4	10689
Position	Professor	31.6	89.5	73.7	74.6	74.4	2396
	Reader, Senior Lecturer	32.4	83.2	74.2	68.2	72.4	3571
	Lecturer	30.5	79.9	72.0	63.2	68.5	2143
	Research Fellow/Associate	33.5	80.6	66.7	66.5	66.1	1665
	Research/Teaching Assistant	38.8	79.9	63.8	57.5	66.4	268
	Teaching Fellow/Associate	29.2	73.4	68.2	59.9	68.2	192
	Emeritus/Honorary (Retired)	26.7	84.6	59.0	58.6	62.3	454
Gender	Male	34.8	84.5	71.1	68.3	70.5	5974
	Female	28.1	81.8	71.9	66.6	70.3	4715
Discipline	Health Sciences	27.3	82.2	69.6	66.4	68.1	2121
	Biology, Chemistry, Veterinary Science	37.0	83.3	68.0	66.6	64.7	1154
	Physics, Mathematics	38.0	83.3	68.1	66.3	69.1	1182
	Engineering, Materials Science	51.7	86.1	72.4	75.1	72.4	803
	Social Sciences	28.5	83.6	73.2	67.4	71.3	3750
	Arts and Humanities	27.8	83.0	74.2	67.2	75.2	1679
Research Orientation	Basic Research	25.9	80.8	63.3	57.7	65.1	1903
	User-inspired Basic Research	33.5	83.2	72.1	68.2	70.3	2763
	Applied Research	34.1	85.6	74.7	72.8	73.5	5055

Question:

If you have participated in people-based, problem-solving or community-based activities with external organisations over the past three years, have these been initiated by the following?

<Filter: private, public or third sector partners –Yes>

	Never	Occasionally	Frequently	Always
The university knowledge / technology transfer office, or other university administrative office	—	—	—	—
Individuals associated with the external organisation	—	—	—	—
Your own actions in approaching the external organisation directly	—	—	—	—
Mutual actions following up a contact at a formal conference or meeting	—	—	—	—
Mutual actions following up informal contacts	—	—	—	—

Exhibit D11 Public and charitable funding body support for external activities (% of respondents)

		Research council funding	Other public or charitable funding	No public or charitable funding	Total (N)
All		31.4%	29.9%	49.4%	11093
Position	Professor	47.4%	38.4%	34.7%	2489
	Reader, Senior Lecturer	25.5%	28.8%	54.3%	3692
	Lecturer	21.2%	21.0%	62.3%	2224
	Research Fellow/Associate	36.3%	32.4%	41.0%	1753
	Research/Teaching Assistant	30.1%	25.4%	50.7%	272
	Teaching Fellow/Associate	8.3%	15.0%	78.2%	193
	Emeritus/Honorary (Retired)	32.1%	34.3%	46.6%	470
Gender	Male	35.1%	31.7%	46.5%	6243
	Female	26.6%	27.5%	53.1%	4850
Discipline	Health Sciences	20.2%	29.2%	57.3%	2183
	Biology, Chemistry, Veterinary Science	39.0%	34.0%	40.7%	1219
	Physics, Mathematics	46.0%	32.0%	38.0%	1241
	Engineering, Materials Science	53.2%	42.7%	31.1%	847
	Social Sciences	26.0%	27.1%	55.1%	3884
	Arts and Humanities	30.8%	26.4%	49.9%	1719
Research Orientation	Basic Research	32.3%	25.1%	51.6%	1999
	User-inspired Basic Research	38.0%	30.4%	44.3%	2874
	Applied Research	31.0%	33.5%	47.2%	5233

Question:

Which of the following public and charitable funding bodies, if any, have provided support for your interactions with external organisations in the past three years? Please indicate all that apply. <Filter: private, public or third sector partners -Yes>

- | | |
|---|---|
| ☐ Arts and Humanities Research Council (AHRC) | ☐ Leverhulme Trust |
| ☐ Economic and Social Research Council (ESRC) | ☐ The Department for Business, Innovation & Skills (BIS) |
| ☐ Biotechnology and Biological Sciences Research Council (BBSRC) | ☐ Innovate UK (formerly the Technology Strategy Board) |
| ☐ Engineering and Physical Sciences Research Council (EPSRC) | ☐ The Higher Education Funding Council for England (HEFCE), the Scottish Funding Council (SFC),
Department for Employment and Learning (DEL) in Northern Ireland,
the Higher Education Funding Council for Wales (HEFCW) |
| ☐ Medical Research Council (MRC) | ☐ The National Centre for Universities and Business (NCUB, formerly CIHE) |
| ☐ Natural Environment Research Council (NERC) | ☐ Other (please specify) |
| ☐ Science and Technology Facilities Council (STFC) | ☐ None of the above |
| ☐ Wellcome Trust | |
| ☐ Rowntree Foundation | |

Exhibit D12 Research council support for external activities, modes of engagement and partners by discipline (% of respondents)

		All	Health Sciences	Biology, Chemistry, Vet.	Physics, Mathematics	Engineering, Materials Science	Social Sciences	Arts and Humanities
	All	31.4	20.2	39.0	46.0	53.2	26.0	30.8
Support Received from Research Councils	AHRC	6.9	1.0	0.3	2.0	1.3	5.9	27.7
	ESRC	9.5	7.8	0.7	3.9	2.5	18.4	5.4
	BBSRC	3.6	2.9	20.3	3.1	3.4	0.5	0.2
	EPSRC	10.5	2.7	10.2	26.4	49.9	5.1	1.7
	MRC	3.9	10.4	10.5	2.5	2.0	0.8	0.2
	NERC	3.2	0.3	6.8	12.5	4.5	1.9	0.3
	STFC	1.6	0.2	1.8	9.3	3.0	0.1	0.1
Research Council	People-based	98.8	98.4	98.9	98.1	98.7	99.4	98.5
	Problem-solving	95.8	96.8	97.1	95.6	99.3	95.8	90.9
	Community-based	76.5	75.3	77.7	70.9	63.4	75.5	95.8
	Commercialisation	24.3	21.3	32.9	30.3	48.2	15.2	8.3
Other Public or Charitable Funding	People-based	98.6	98.6	96.4	99.0	99.2	99.7	97.3
	Problem-solving	94.3	94.7	94.0	96.5	96.2	96.0	88.3
	Community-based	76.9	64.3	78.6	75.9	68.4	78.0	95.5
	Commercialisation	16.2	12.3	27.2	20.9	34.4	14.5	7.5
No Public or Charitable Funding	People-based	97.3	98.1	97.6	94.9	97.0	98.1	95.6
	Problem-solving	87.3	89.1	90.7	87.3	92.4	88.6	77.8
	Community-based	68.9	59.6	69.8	65.0	53.6	68.6	89.7
	Commercialisation	12.6	10.8	21.4	17.6	24.6	11.4	6.4
Research Council	Third Sector	60.7	74.9	58.0	41.9	27.2	70.0	81.7
	Public Sector	58.5	70.9	43.6	57.0	39.5	73.8	49.9
	Private Sector	56.6	45.9	68.1	69.6	89.5	45.0	35.2
Other Public or Charitable Funding	Third Sector	69.5	72.5	71.6	47.4	35.7	73.9	79.9
	Public Sector	59.8	73.7	42.7	50.5	36.7	68.6	46.8
	Private Sector	46.5	38.6	56.3	68.7	89.1	39.8	36.1
No Public or Charitable Funding	Third Sector	64.5	68.5	61.1	44.0	30.6	65.7	78.7
	Public Sector	50.2	63.6	33.9	42.6	28.5	56.0	36.1
	Private Sector	43.5	34.2	53.3	55.9	78.0	42.3	37.4

Questions:

—How many times have you engaged in the following people-based (problem-solving, community-based) activities with external organisations within the past three years? Please tick the activities you have engaged in, and where applicable the number of times you have done so.

—Have you undertaken any people-based, problem-solving or community-based activities with private sector companies (with public sector organisations; charitable or voluntary organisations) in the last three years? <Filter: external engagement -Yes>

—Which of the following public and charitable funding bodies, if any, have provided support for your interactions with external organisations in the past three years? Please indicate all that apply. <Filter: private, public or third sector partners -Yes>

Exhibit D13 Motivations for participating in activities with external organisations by seniority, gender, discipline and research orientation (mean value)

		Test the practical application of my research	Gain insights in the area of my own research	Keep up to date with research in external organisations	Secure access to specialist equipment, materials or data	Secure access to expertise at external organisation	Gain knowledge about practical problems useful for teaching	Create student project and job placement opportunities	Source of personal income	Secure funding for research assistants and equipment	Look for business opportunities linked to my own research	Further my institution's outreach mission	Total (N)
All		3.46	3.89	3.52	2.84	3.15	3.24	3.07	2.26	2.82	2.52	3.59	10767
Position	Professor	3.55	3.94	3.49	2.75	3.16	3.02	2.87	2.14	3.04	2.44	3.65	2436
	Reader, Senior Lecturer	3.40	3.85	3.53	2.79	3.11	3.44	3.32	2.22	2.81	2.54	3.67	3587
	Lecturer	3.37	3.85	3.51	2.82	3.06	3.50	3.32	2.29	2.69	2.52	3.59	2155
	Research Fellow/ Associate	3.67	4.03	3.63	3.14	3.40	2.88	2.64	2.38	2.78	2.62	3.49	1679
	Research/Teaching Assistant	3.44	3.91	3.59	3.02	3.25	3.11	2.64	2.42	2.57	2.55	3.37	264
	Teaching Fellow/ Associate	2.84	3.29	2.98	2.50	2.70	3.59	3.23	2.45	2.19	2.41	3.58	187
	Emeritus/Honorary (Retired)	3.39	3.69	3.46	2.73	3.06	3.03	2.76	2.45	2.82	2.48	3.29	459
Gender	Male	3.50	3.84	3.48	2.85	3.13	3.19	3.05	2.31	2.92	2.60	3.57	6040
	Female	3.41	3.95	3.57	2.82	3.18	3.31	3.10	2.19	2.69	2.43	3.62	4727
Discipline	Health Sciences	3.51	3.84	3.52	2.86	3.20	3.12	2.91	2.15	2.84	2.38	3.56	2117
	Biology, Chemistry, Vet. Science	3.52	3.73	3.51	3.23	3.46	2.97	3.18	2.22	3.26	2.80	3.58	1181
	Physics, Mathematics	3.54	3.77	3.49	2.96	3.24	3.08	3.12	2.22	3.11	2.73	3.54	1202
	Engineering, Materials Science	3.98	4.04	3.86	3.38	3.53	3.41	3.43	2.57	3.62	3.25	3.60	820
	Social Sciences	3.41	3.99	3.54	2.67	2.99	3.44	3.01	2.29	2.57	2.42	3.58	3774
	Arts and Humanities	3.14	3.83	3.33	2.55	2.97	3.19	3.11	2.22	2.43	2.23	3.70	1673
Research Orientation	Basic Research	2.93	3.60	3.19	2.59	2.96	2.86	2.86	2.09	2.57	2.19	3.49	1921
	User-inspired Basic Research	3.59	4.03	3.55	2.92	3.21	3.24	3.05	2.26	2.91	2.55	3.55	2794
	Applied Research	3.73	4.05	3.70	2.96	3.28	3.34	3.10	2.30	2.96	2.67	3.65	5112

Questions:

If you have participated in people-based, problem-solving or community-based activities with external organisations, which of the following were your motivations and objectives? Please indicate the importance of each statement (only answered if external partner was specified).

<Filter: private, public or third sector partners –Yes>

___Completely unimportant

___Unimportant

___Neither unimportant nor important

___Important

___Very important

Exhibit D14 Impact of external activities on research by seniority, gender, discipline and research orientation (% of respondents)

		Research Impact					Total (N)
		Led to new research projects	Strengthened my reputation in the field	Given me new insights for my work	Led to new contacts in the field	Very little or no impact	
All		59.7	60.9	75.5	72.9	10.3	10242
Position	Professor	68.3	72.6	78.6	74.9	8.2	2405
	Reader, Senior Lecturer	59.3	60.0	75.4	73.4	10.0	3387
	Lecturer	54.1	53.5	73.4	71.5	12.5	1965
	Research Fellow/Associate	59.5	57.6	75.9	74.5	9.5	1688
	Research/Teaching Assistant	49.4	47.0	74.3	69.5	12.4	249
	Teaching Fellow/Associate	43.8	44.6	70.2	61.2	19.8	121
	Emeritus/Honorary (Retired)	52.7	61.4	69.6	62.8	14.8	427
Gender	Male	60.9	61.8	73.8	71.8	10.7	5797
	Female	58.2	59.7	77.8	74.3	9.9	4445
Discipline	Health Sciences	60.6	60.0	73.0	71.7	10.2	1989
	Biology, Chemistry, Veterinary Science	63.0	58.7	64.7	70.0	13.9	1137
	Physics, Mathematics	60.1	55.7	71.3	66.8	13.8	1164
	Engineering, Materials Science	69.0	67.4	78.2	75.1	6.9	780
	Social Sciences	58.2	61.9	80.6	75.9	8.1	3572
	Arts and Humanities	55.0	61.8	76.8	72.9	12.2	1600
Research Orientation	Basic Research	45.1	49.9	63.8	61.8	20.6	1934
	User-inspired Basic Research	61.7	60.5	77.9	74.4	8.3	2793
	Applied Research	66.1	66.1	79.8	77.4	6.6	5109

Question:

In the last three years, what impact has your involvement in people-based, problem-solving or community-based activities with external organisations had on the amount and kind of research that you do? Please indicate all that apply.

<Filter: Research - Yes; private, public or third sector partners -Yes>

Exhibit D15 Impact of external activities on teaching by seniority, gender, discipline and research orientation (% of respondents)

		Teaching Impact						Total (N)
		Led me to make changes to the course programme	Strengthened my reputation	Led to changes in the way I present the material	Led to an increase in the employability of my students	Led to an increase in entrepreneurial skills among my students	Very little or no impact	
All		43.0	40.7	52.9	31.8	16.7	27.8	9739
Position	Professor	37.5	40.0	45.9	28.6	14.2	33.5	2280
	Reader, Senior Lecturer	51.8	46.1	57.6	39.0	20.8	21.8	3543
	Lecturer	48.3	40.7	57.5	34.2	17.9	22.0	2136
	Research Fellow/Associate	19.3	24.5	43.5	12.6	7.1	46.6	1091
	Research/Teaching Assistant	23.8	25.0	45.9	11.6	6.4	41.9	172
	Teaching Fellow/Associate	48.1	48.6	61.2	45.4	26.2	16.4	183
	Emeritus/Honorary (Retired)	37.4	43.4	51.8	27.2	14.4	28.4	334
Gender	Male	42.1	41.0	51.6	32.7	17.6	28.6	5483
	Female	44.1	40.2	54.6	30.6	15.6	26.8	4256
Discipline	Health Sciences	38.2	39.6	49.8	21.3	10.0	33.9	1893
	Biology, Chemistry, Veterinary Science	26.5	29.3	40.6	24.8	10.9	41.4	1034
	Physics, Mathematics	34.4	30.3	45.9	32.5	16.2	34.4	1020
	Engineering, Materials Science	42.9	42.4	54.4	40.1	21.5	22.8	706
	Social Sciences	51.3	45.2	59.6	35.2	18.4	21.5	3493
	Arts and Humanities	46.6	45.1	53.9	37.3	23.0	23.7	1593
Research Orientation	Basic Research	29.6	28.6	39.9	22.2	10.7	42.2	1798
	User-inspired Basic Research	43.2	37.5	52.2	31.4	15.3	29.4	2557
	Applied Research	46.2	45.3	57.2	33.5	18.7	23.6	4512

Question:

In the last three years, what impact has your involvement in people-based, problem-solving or community-based activities with external organisations had on the amount and kind of teaching that you do? Please indicate all that apply.

<Filter: Teaching - Yes; private, public or third sector partners -Yes>

Exhibit D16 Criteria given high weight by institution with regard to career advancement and promotion by seniority, gender, discipline and research orientation
(% of respondents)

		Teaching ability and workload	Faculty and departmental administration	Research and publications	Work with business and industry	Work with the local community	Total (N)
All		56.1	56.8	90.5	50.5	30.3	17812
Position	Professor	61.9	62.6	95.4	51.6	27.5	3385
	Reader, Senior Lecturer	50.9	56.9	87.0	51.5	31.1	5688
	Lecturer	55.3	57.3	88.3	49.8	31.8	3892
	Research Fellow/Associate	59.5	50.4	94.2	49.4	29.5	3232
	Research/Teaching Assistant	58.6	52.3	90.0	49.0	37.2	541
	Teaching Fellow/Associate	51.2	57.6	88.2	48.5	30.0	363
	Emeritus/Honorary (Retired)	60.6	57.0	92.3	47.5	27.0	711
Gender	Male	55.4	89.9	89.9	50.1	26.5	10327
	Female	58.7	91.4	91.4	51.1	35.4	7485
Discipline	Health Sciences	56.1	53.5	91.9	52.1	37.6	3303
	Biology, Chemistry, Veterinary Science	51.8	49.2	93.2	54.1	24.6	2282
	Physics, Mathematics	56.7	52.2	92.1	52.6	22.9	2362
	Engineering, Materials Science	54.8	50.4	91.9	67.6	24.5	1388
	Social Sciences	56.1	59.3	88.8	45.0	30.9	5554
	Arts and Humanities	59.7	68.3	88.3	46.5	33.8	2923
Research Orientation	Basic Research	56.0	58.2	91.9	43.7	25.0	4384
	User-inspired Basic Research	56.9	56.5	92.1	52.0	29.5	4372
	Applied Research	56.9	55.8	90.9	54.2	32.5	7215

Question:

With regards to career advancement and promotion, how much importance do you believe your institution gives to the following criteria? Please indicate the importance of each statement.

___Completely unimportant

___Unimportant

___Neither unimportant nor important

___Important

___Very important

Exhibit D17 Substantial constraints on interactions with external organisations by seniority, gender, discipline and research orientation (% of respondents)

		Lack of time to fulfil all university roles	Insufficient rewards	Identifying partners	Lack of own personal marketing, technical or negotiation skills	Lack of training in marketing, technical or negotiation skills	Lack of external interest	Cultural differences	Differences in timescale	Lack of interaction resources in external organisation	Lack of experience in external organisation	Unwillingness in external org to meet full cost	Bureaucracy/ inflexibility of uni admin	Poor marketing/ technical/ negotiation skills in uni	Insufficient resources	Reaching agreement on terms (inc IP)	Total
All		52.5	20.1	16.9	12.3	13.4	11.8	3.3	10.1	14.7	10.3	17.7	23.3	14.7	21.3	6.8	17579
Position	Professor	51.6	15.6	11.4	7.7	7.9	11.1	2.4	10.6	16.2	10.5	21.2	23.0	14.7	19.0	8.7	3355
	Reader, Senior Lecturer	65.3	24.5	19.0	13.5	14.4	12.6	3.4	11.4	16.9	11.2	20.4	30.0	19.7	27.0	7.7	5638
	Lecturer	61.7	23.3	20.0	14.5	16.4	11.8	3.2	9.3	13.6	9.6	16.3	23.5	14.7	23.3	5.4	3846
	Research Fellow/ Associate	31.2	16.5	17.9	13.4	14.4	11.7	4.2	9.9	13.0	10.2	12.8	15.8	8.5	14.0	5.9	3158
	Research/ Teaching Assist.	29.9	13.6	13.1	12.9	13.2	12.1	3.6	8.3	10.0	8.6	11.1	12.9	7.9	13.8	5.0	521
	Teaching Fellow/ Associate	47.3	16.5	15.7	12.0	14.3	10.9	2.5	7.0	10.4	7.6	11.8	18.8	11.5	19.9	4.8	357
	Emeritus/ Honorary (Retired)	20.0	10.5	8.8	7.2	9.2	9.5	4.0	5.0	9.1	7.8	15.2	14.6	10.1	13.2	5.5	704
Gender	Male	49.4	21.2	16.7	11.1	11.5	13.1	3.5	9.5	13.9	10.1	18.5	23.4	15.1	20.0	7.4	10186
	Female	56.9	18.5	17.2	13.9	15.9	10.1	3.0	10.9	15.7	10.6	16.5	23.3	14.2	22.9	6.0	7393
Discipline	Health Sciences	49.8	16.7	14.9	14.8	17.7	9.2	2.5	9.4	14.5	10.6	16.4	22.4	12.8	19.4	7.3	3265
	Biology, Chemistry, Vet. Sci.	46.1	18.5	21.4	13.8	15.7	13.8	3.1	7.1	12.2	8.1	18.9	21.1	12.9	18.4	8.5	2261
	Physics, Mathematics	47.3	18.9	20.7	12.3	10.8	14.0	4.0	9.8	11.1	8.4	14.4	17.5	11.2	14.5	6.8	2322
	Engineering, Materials Sci.	48.6	21.5	17.2	12.7	13.2	13.0	5.9	12.4	19.0	14.0	27.9	25.8	15.7	19.7	14.3	1366
	Social Sciences	58.2	22.4	14.5	11.0	11.7	10.2	3.1	11.5	15.8	11.2	18.3	28.4	17.9	26.7	5.5	5484
	Arts and Humanities	56.1	20.9	17.2	10.7	11.9	14.0	3.0	9.7	15.8	9.7	14.5	20.0	14.8	21.5	4.1	2881
Res. Orient.	Basic Research	50.9	20.5	24.2	13.1	13.7	17.3	3.8	8.5	12.1	9.1	12.7	16.7	11.4	16.7	4.5	4317
	User-inspired Basic Research	56.6	20.7	17.9	12.8	13.7	12.3	4.0	11.6	15.6	10.9	19.7	23.9	14.5	21.5	8.1	4326
	Applied Research	51.0	19.3	12.6	11.7	13.0	8.5	2.9	11.0	16.4	11.3	20.7	26.9	16.8	23.6	8.2	7119

Question:

Have the following factors constrained or prevented your interactions with external organisations over the past three years? Please indicate on a scale of 1-5, where 1: not constraining at all and 5: highly constraining.

(Slider bar from 1-5)

Exhibit D18 Extent to which academics agree to statements about relationships with external organisations by seniority, gender, discipline and research orientation (mean score)

		Academia should focus on basic research and should not be concerned with its actual or potential application	Academic freedom is of fundamental importance to the future wellbeing of society	Higher education has a key role to play in increasing the competitiveness of business in the UK	The main purpose of university teaching should be to prepare students for the labour market	UK business does not have the capacity to use research effectively	Over the past few years, universities have gone too far in attempting to meet the needs of industry to the detriment of their core teaching and research roles	Over the past few years universities have done too little to increase their relevance to society or contribution to economic development	Total (N)
All		2.26	4.54	4.15	2.75	3.12	3.27	2.82	17936
Position	Professor	2.30	4.64	4.30	2.63	3.24	3.15	2.68	3404
	Reader, Senior Lecturer	2.24	4.55	4.16	2.78	3.15	3.29	2.84	5704
	Lecturer	2.28	4.52	4.07	2.81	3.07	3.37	2.84	3910
	Research Fellow/Associate	2.20	4.45	4.12	2.76	3.02	3.21	2.86	3270
	Research/Teaching Assistant	2.06	4.38	4.04	2.82	3.00	3.25	2.94	546
	Teaching Fellow/Associate	2.09	4.42	4.09	2.85	3.06	3.24	3.00	369
	Emeritus/Honorary (Retired)	2.59	4.65	4.17	2.65	3.30	3.34	2.84	733
Gender	Male	2.40	4.59	4.24	2.71	3.18	3.27	2.80	10413
	Female	2.06	4.47	4.04	2.80	3.05	3.26	2.84	7523
Discipline	Health Sciences	1.84	4.39	4.17	2.94	3.07	3.09	2.89	3335
	Biology, Chemistry, Vet. Science	2.43	4.51	4.35	2.89	3.07	3.23	2.75	2297
	Physics, Mathematics	2.63	4.60	4.30	2.69	3.15	3.29	2.68	2383
	Engineering, Materials Science	2.17	4.40	4.53	3.22	3.25	3.02	2.84	1393
	Social Sciences	2.09	4.57	4.07	2.73	3.15	3.24	2.95	5581
	Arts and Humanities	2.65	4.71	3.86	2.30	3.10	3.64	2.62	2947
Research Orientation	Basic Research	2.97	4.69	4.00	2.48	3.12	3.61	2.59	4409
	User-inspired Basic Research	2.29	4.61	4.19	2.69	3.17	3.31	2.77	4404
	Applied Research	1.82	4.44	4.25	2.91	3.10	3.04	2.95	7255

Question:

The following are statements about relationships between higher education institutions and external organisations. To what extent do you agree or disagree with them?

___Strongly disagree

___Somewhat disagree

___Neither agree nor disagree

___Somewhat agree

___Strongly agree

Exhibit D19 Academic job factors considered as very important by seniority, gender, discipline and research orientation (% of respondents)

		Salary	Benefits	Job security	Opportunities for career advancement	Intellectual challenge	Level of responsibility	Degree of independence	Contribution to society	Total (N)
All		16.6	12.8	37.6	34.5	67.8	21.8	63.6	44.4	17950
Position	Professor	15.2	12.1	31.0	24.8	78.7	27.8	75.4	48.5	3401
	Reader, Senior Lecturer	17.9	13.7	39.3	34.0	67.6	21.9	67.5	45.3	5711
	Lecturer	17.3	13.6	41.0	37.1	65.4	19.3	62.6	44.0	3918
	Research Fellow/Associate	15.6	12.1	39.7	44.1	61.8	19.7	51.4	40.1	3268
	Research/Teaching Assistant	18.8	13.6	40.0	43.1	57.2	18.3	43.1	42.9	552
	Teaching Fellow/Associate	18.4	11.4	37.0	33.2	57.6	18.6	46.2	43.0	370
	Emeritus/Honorary (Retired)	10.5	9.7	25.9	21.2	71.9	19.5	64.2	42.2	730
Gender	Male	16.0	12.3	36.1	31.3	67.9	20.2	63.3	40.5	10417
	Female	17.4	13.6	39.8	38.9	67.7	24.0	64.1	49.8	7533
Discipline	Health Sciences	19.3	14.0	38.9	37.6	63.6	23.0	59.1	50.8	3337
	Biology, Chemistry, Vet. Science	14.6	11.1	42.2	39.1	67.9	23.3	60.8	36.4	2296
	Physics, Mathematics	13.2	11.0	36.5	31.8	71.9	19.1	63.7	31.5	2384
	Engineering, Materials Science	19.7	15.6	38.9	41.0	64.1	24.7	62.5	40.7	1394
	Social Sciences	17.4	14.0	35.7	33.5	67.4	21.3	66.2	50.2	5589
	Arts and Humanities	14.8	10.8	36.7	28.5	71.8	20.8	66.7	44.8	2950
Research Orientation	Basic Research	13.9	10.9	38.2	32.2	73.8	20.2	68.3	32.9	4411
	User-inspired Basic Research	15.7	12.9	37.6	36.2	72.6	22.4	67.1	45.1	4397
	Applied Research	18.5	14.4	37.5	37.6	65.1	22.7	61.5	51.5	7266

Question:

When thinking about your job as an academic, how important is each of the following factors to you? Please indicate the importance of each statement.

___Completely unimportant

___Unimportant

___Neither unimportant nor important

___Important

___Very important

Data by institution type and region

Exhibit D20 Seniority and gender by institution type and region (% of respondents)

		Professor	Reader, Senior Lecturer	Lecturer	Research Fellow/ Associate	Research/ Teaching Assistant	Teaching Fellow/ Associate	Emeritus/ Honorary (retired)	Female	Health Sciences	Biology, Chem., Vet. Sci.	Physics, Maths	Engin. Materials Science	Social Sciences	Arts and Human.	Total (N)
Institution Type	Younger Uni (Est post- 1992)	12.5	54.2	22.2	5.8	1.4	1.0	2.9	46.0	18.8	5.5	8.8	6.3	42.6	18.1	5004
	Older Uni (Est pre- 1992)	22.1	25.3	25.5	16.6	2.9	2.8	4.7	41.0	15.5	12.9	14.7	7.8	33.0	16.1	6086
	Specialist Inst.	17.7	30.2	23.7	20.1	3.1	1.5	3.8	48.4	19.4	28.6	4.1	1.0	12.2	34.6	583
	Top-decile Inst.	21.1	20.6	17.9	29.1	4.5	2.3	4.5	39.1	21.3	16.9	16.3	9.5	22.2	13.7	6504
Region	East of England	17.4	26.1	21.4	24.7	2.9	1.3	6.3	40.3	14.7	12.5	14.6	11.5	30.8	15.8	1451
	East Midlands	15.0	42.6	22.1	13.5	2.2	1.2	3.4	39.6	15.4	13.4	10.0	9.7	33.3	18.2	1206
	London	20.7	29.3	18.2	21.5	3.7	2.2	4.4	43.8	22.4	12.4	13.3	6.1	30.0	15.7	3462
	North East	21.0	34.4	18.2	19.3	1.6	3.0	2.4	41.3	15.2	14.3	14.3	7.7	33.9	14.7	791
	Northern Ireland	20.3	18.2	41.2	14.3	1.5	1.2	3.3	44.2	23.9	11.0	11.6	8.1	31.0	14.3	335
	North West	20.7	33.2	24.7	15.3	1.7	1.2	3.3	41.5	23.5	13.1	11.5	6.5	30.7	14.6	1551
	Scotland	19.7	22.1	27.8	18.7	4.9	3.3	3.6	40.9	14.0	17.9	16.1	9.5	27.2	15.3	1913
	South East	18.9	35.1	18.4	17.4	3.1	1.9	5.2	42.7	15.2	10.2	14.9	6.0	33.5	20.2	2525
	South West	16.8	33.5	18.9	20.4	4.4	2.3	3.6	43.2	20.8	13.1	13.7	8.6	25.8	17.9	1193
	Wales	17.9	32.5	24.1	16.9	3.4	1.6	3.7	41.5	24.0	14.6	10.8	7.1	28.3	15.2	954
	West Midlands	18.4	39.7	20.9	11.3	2.0	3.5	4.3	40.6	20.5	10.3	13.7	8.1	34.5	13.0	1079
	Yorkshire and the Humber	18.6	32.9	24.5	16.8	2.2	2.0	3.1	41.7	17.1	10.9	11.2	8.2	35.5	17.1	1717

Exhibit D21 Activity by institution type and region

		Share of Respondents				Average Share of Time				
		Teaching	Research	Administrative activities	Knowledge exchange with external organisations	Teaching	Research	Administrative activities	Knowledge exchange with external organisations	Total (N)
All		89.1	94.3	92.1	71.0	30.9	40.0	21.2	7.9	18070
Institution Type	Younger Universities (Est post-1992)	95.6	90.9	96.7	74.3	41.1	25.1	25.0	8.8	4972
	Older Universities (Est pre-1992)	88.4	94.5	91.4	70.4	30.7	41.1	20.5	7.8	6041
	Specialist Institutions	92.2	89.6	92.9	72.5	32.7	39.4	20.4	7.5	578
	Top-decile research institutions	84.5	97.0	89.2	69.0	23.1	50.3	19.1	7.5	6476
Region	East of England	88.3	94.9	90.6	72.2	26.6	43.3	21.4	8.7	1440
	East Midlands	91.5	92.8	93.9	69.3	34.9	35.0	22.5	7.5	1200
	London	87.9	95.7	91.7	73.4	28.0	43.4	20.4	8.2	3437
	North East	88.3	96.2	91.0	64.8	29.3	41.4	21.6	7.7	787
	Northern Ireland	91.9	96.1	94.9	73.4	36.0	37.7	19.2	7.1	334
	North West	89.5	94.5	92.3	72.6	32.5	37.2	21.8	8.5	1538
	Scotland	87.7	94.1	91.9	73.4	29.6	41.7	20.7	8.1	1900
	South East	89.5	95.5	92.0	69.9	31.2	40.3	21.0	7.5	2515
	South West	88.7	93.9	91.2	70.2	30.9	41.8	20.1	7.1	1186
	Wales	88.1	91.9	93.2	73.9	32.8	37.0	21.7	8.5	950
	West Midlands	92.4	91.3	93.6	69.0	35.0	34.2	23.0	7.9	1072
	Yorkshire and the Humber	89.7	92.2	92.2	66.6	33.2	37.4	21.9	7.6	1708

Question:

Please indicate the percentage of your overall time spent on average over the academic year on each of the following activities (Total 100):

—% Teaching

—% Research

—% Administrative activities

—% Knowledge exchange with external organisations

Exhibit D22 Research orientation by institution type and region

		Share of Respondents					Average Share of Time			
		Basic research	User-inspired basic research	Applied research	None applies	Total (n)	Basic research	User-inspired basic research	Applied research	Total (N)
All		26.3	26.1	43.1	4.5	17014	32.1	27.2	40.6	16179
Institution Type	Younger Universities (Est post-1992)	18.7	24.5	51.0	5.8	4526	25.5	27.4	47.0	4241
	Older Universities (Est pre-1992)	29.5	28.4	37.9	4.2	5702	35.1	27.9	36.9	5441
	Specialist Institutions	14.2	18.1	60.6	7.0	513	19.7	23.9	56.4	477
	Top-decile Research Institutions	29.9	25.7	40.7	3.6	6273	35.1	26.6	38.2	6020
Region	East of England	28.7	25.4	42.1	3.8	1364	34.4	26.2	39.4	1306
	East Midlands	25.2	24.6	46.0	4.2	1113	29.9	27.0	42.8	1063
	London	25.1	25.6	44.1	5.1	3282	31.4	27.2	41.5	3106
	North East	27.8	27.9	40.5	3.7	755	33.6	27.9	38.5	726
	Northern Ireland	24.9	27.1	46.1	1.9	321	30.7	27.3	42.0	314
	North West	24.0	26.2	45.5	4.3	1454	29.6	28.5	41.9	1387
	Scotland	27.1	26.9	41.8	4.2	1785	32.5	27.7	39.8	1702
	South East	29.6	27.1	38.2	5.1	2402	36.0	27.0	37.1	2270
	South West	24.9	27.2	43.5	4.3	1112	31.5	27.1	41.4	1059
	Wales	23.7	24.3	47.0	5.0	873	29.8	26.4	43.9	824
	West Midlands	26.0	23.4	46.1	4.5	978	32.1	25.5	42.5	926
	Yorkshire and the Humber	25.8	26.8	43.1	4.3	1575	31.1	28.0	40.6	1496

Questions:

If undertaking research, which of the following statements most closely describes it?

—Basic research: theoretical, empirical or experimental work, undertaken primarily to acquire new knowledge about the underlying foundation of phenomena or observable facts, without any particular application or use in view.

—User-inspired basic research: theoretical, empirical or experimental work, undertaken primarily to acquire new knowledge about the underlying foundation of phenomena or observable facts, but also inspired by considerations of use.

—Applied research: original investigation undertaken in order to acquire new knowledge directed towards an individual, group or societal need or use.

—None of the above apply to my research

Roughly what proportion of your research time is spent on research described by the following statements? Enter zero, if no time spent (Total 100).

—% Basic research: theoretical, empirical or experimental work, undertaken primarily to acquire new knowledge about the underlying foundation of phenomena or observable facts, without any particular application or use in view.

—% User-inspired basic research: theoretical, empirical or experimental work, undertaken primarily to acquire new knowledge about the underlying foundation of phenomena or observable facts, but also inspired by considerations of use.

Exhibit D23 Criteria given high weight by institution with regard to career advancement and promotion by institution type and region (% of respondents)

		Teaching ability and workload	Faculty and departmental administration	Research and publications	Work with business and industry	Work with the local community	Total (N)
All		56.1	56.8	90.5	50.5	30.3	17812
Institution Type	Younger Universities (Est post-1992)	57.2	63.4	78.9	57.7	42.8	4916
	Older Universities (Est pre-1992)	56.2	55.4	95.0	49.0	26.5	5959
	Specialist Institutions	58.3	61.0	79.3	49.4	31.5	569
	Top-decile Research Institutions	55.0	52.6	96.3	46.4	24.0	6368
Region	East of England	55.0	53.4	90.9	45.2	25.2	1421
	East Midlands	56.8	56.0	88.0	57.2	34.3	1189
	London	59.2	55.4	91.2	46.1	27.0	3376
	North East	54.0	56.2	93.1	53.1	31.0	781
	Northern Ireland	52.4	54.9	91.2	62.5	36.3	328
	North West	57.4	58.7	88.9	55.0	37.5	1516
	Scotland	47.0	51.5	93.4	55.9	29.6	1877
	South East	57.8	59.4	92.0	44.2	27.4	2484
	South West	53.3	56.3	89.8	52.5	30.7	1168
	Wales	56.9	57.1	85.3	53.1	34.5	934
	West Midlands	60.5	60.5	86.9	54.4	35.0	1054
	Yorkshire and the Humber	57.5	61.6	90.9	49.4	29.6	1684

Question:

With regards to career advancement and promotion, how much importance do you believe your institution gives to the following criteria? Please indicate the importance of each statement.

___Completely unimportant

___Unimportant

___Neither unimportant nor important

___Important

___Very important

Exhibit D24 Research statements by institution type and region (% of respondents)

		In general area of commercial interest to business and/or industry	Applied in a commercial context	Relevance for non-commercial external organisations (including the public sector)	Applied by a non-commercial organisation (including the public sector) external to the university sector	No relevance for external organisations	Total (N)
All		37.4	19.3	66.9	40.7	13.7	16897
Institution Type	Younger Universities (Est post-1992)	35.2	18.8	66.3	42.3	11.6	4479
	Older Universities (Est pre-1992)	37.1	20.0	66.9	40.4	14.7	5670
	Specialist Institutions	37.6	22.0	65.3	48.7	11.1	513
	Top-decile Research Institutions	39.2	18.9	67.5	39.2	14.6	6235
Region	East of England	43.5	22.5	64.4	36.5	15.0	1355
	East Midlands	39.9	22.3	65.9	40.7	12.8	1105
	London	36.3	17.0	68.1	41.1	12.4	3263
	North East	36.6	17.3	64.6	40.5	14.9	751
	Northern Ireland	33.4	18.4	65.0	39.7	10.3	320
	North West	36.1	17.2	66.9	42.5	12.9	1451
	Scotland	38.9	20.6	65.8	41.0	14.0	1774
	South East	34.6	18.3	68.8	41.6	15.8	2375
	South West	38.6	21.5	69.1	42.3	13.4	1105
	Wales	38.2	20.7	66.1	43.7	13.5	865
	West Midlands	37.5	20.2	66.0	37.7	14.7	971
	Yorkshire and the Humber	36.2	19.7	66.8	39.8	13.1	1562

Question:

If undertaking research, which of the following statements apply to it? Please indicate all that apply.

___It has been applied in a commercial context

___It is in a general area of commercial interest to business and/or industry

___It has been applied by a non-commercial organisation (including the public sector) external to the university sector

___It has relevance for non-commercial external organisations (including the public sector)

___It has no relevance for external organisations

Exhibit D25 Involvement in commercialisation activities in the last 3 years by institution type and region (% of respondents)

		Taken out a patent	Licensed research outputs to a company	Formed a spin-out company	Formed or run a consultancy via your research	Total (N)
All		5.9	3.4	2.8	7.4	16537
Institution Type	Younger Universities (Est post-1992)	3.3	2.3	2.6	7.4	4566
	Older Universities (Est pre-1992)	6.1	3.4	3.1	6.9	5544
	Specialist Institutions	3.9	3.4	0.9	7.9	535
	Top-decile Research Institutions	7.8	4.1	2.9	7.7	5892
Region	East of England	7.3	3.4	3.3	9.3	1292
	East Midlands	4.9	3.5	2.5	6.5	1089
	London	6.2	3.3	2.6	8.8	3107
	North East	5.4	3.2	3.9	6.9	740
	Northern Ireland	7.6	5.4	3.5	6.7	314
	North West	6.2	3.3	2.6	6.8	1445
	Scotland	5.8	4.1	3.3	5.8	1749
	South East	5.3	2.9	2.4	7.9	2309
	South West	4.7	3.1	2.6	5.9	1076
	Wales	7.5	3.7	4.8	7.6	881
	West Midlands	5.3	2.8	2.4	6.8	971
	Yorkshire and the Humber	5.2	3.1	2.3	6.6	1564

Question:

Have you participated in any of the following in the past three years?

___Taken out a patent

___Licensed research outputs to a company

___Formed a spin out company

___Formed or run a consultancy via your research

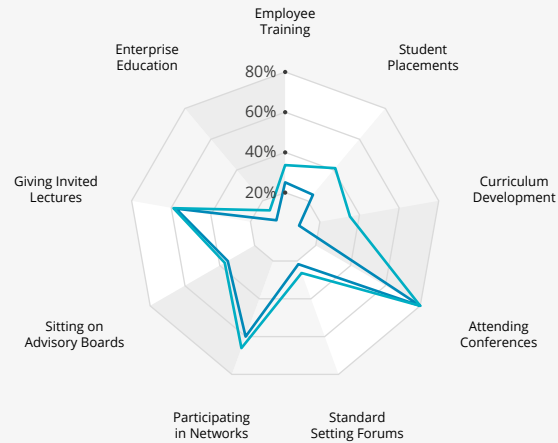
___None of the above

Exhibit D26 Involvement in non-commercial engagement activities in the last 3 years by institution type and region (% of respondents)

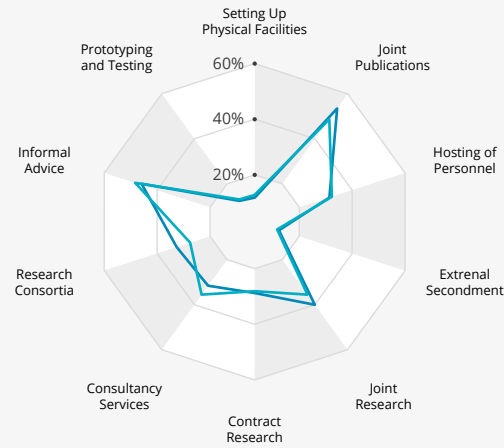
	Younger univ. (Est post-1992)	Older univ. (est pre-1992)	Specialist institutions	Top-decile research inst.	East of England	East Midlands	London	North East	Northern Ireland	North West	Scotland	South East	South West	Wales	West Midlands	Yorkshire and the Humber
Attending Conferences	80.9	80.8	82.7	80.5	78.3	82.0	80.4	82.2	83.0	82.5	81.8	80.8	82.5	79.4	78.5	79.7
Participating in Networks	68.9	62.0	68.8	58.7	58.2	61.9	60.6	63.1	66.9	67.0	65.4	61.8	65.7	66.1	62.2	63.8
Giving Invited Lectures	54.9	55.0	62.8	55.5	54.7	52.1	58.7	53.7	56.7	57.6	54.5	57.5	55.0	52.1	52.1	52.4
Sitting on Advisory Boards	34.3	32.3	38.6	31.3	33.0	31.6	34.4	32.7	40.0	34.4	31.3	32.0	33.5	33.2	31.0	29.7
Student Placements	42.8	28.8	36.4	23.7	28.7	31.9	26.4	30.5	38.2	35.5	33.0	28.2	33.5	34.4	34.3	33.2
Employee Training	33.2	25.9	32.2	23.3	31.5	27.1	27.1	25.5	27.2	31.5	25.9	23.6	25.0	26.4	32.4	26.1
Standard Setting Forums	29.8	23.6	31.6	21.8	23.6	25.2	26.1	24.5	29.3	28.6	26.1	23.0	22.4	24.7	26.6	21.7
Curriculum Development	33.1	19.8	27.6	14.4	22.1	22.3	20.5	20.0	28.4	24.0	23.3	19.0	20.6	22.9	27.4	20.4
Enterprise Education	11.1	5.8	7.5	4.8	6.7	6.5	6.9	7.2	8.4	8.1	6.6	5.7	5.7	9.0	8.6	7.3
Joint Publications	44.0	47.9	57.8	50.4	48.4	46.4	52.1	48.3	52.2	48.6	47.6	46.8	48.3	46.3	44.8	44.5
Joint Research	39.3	44.7	52.0	47.5	43.1	42.0	46.5	42.9	47.5	46.4	45.8	42.3	46.6	45.6	42.3	42.7
Informal Advice	51.2	46.4	53.0	44.9	45.9	45.9	49.4	47.4	47.5	50.3	47.5	47.4	46.9	46.0	45.8	45.0
Consultancy Services	35.8	30.6	33.6	28.8	33.7	32.2	32.8	28.2	32.5	32.6	29.7	31.6	29.8	29.6	29.9	31.7
Research Consortia	24.8	30.4	34.6	30.4	26.9	27.5	29.5	31.4	35.2	31.1	31.7	29.0	26.7	28.9	25.4	27.7
Hosting of Personnel	29.9	28.7	39.6	28.5	30.5	26.8	31.5	25.8	34.0	30.8	32.4	27.3	29.8	27.9	29.9	24.6
Contract Research	26.5	27.2	22.8	26.9	26.9	27.3	25.8	29.1	28.4	27.5	29.2	23.8	27.2	30.4	24.1	27.1
Setting up Physical Facilities	10.0	9.4	11.0	9.5	9.8	9.2	8.9	10.5	14.3	12.1	10.5	8.4	8.0	11.9	10.8	8.0
External Secondment	9.3	10.3	12.2	10.1	10.1	8.8	11.1	8.8	10.4	9.4	11.2	9.3	9.4	10.9	9.8	9.3
Prototyping and Testing	9.1	8.5	10.1	9.2	8.1	9.5	8.2	10.2	8.4	9.7	9.8	7.8	9.0	11.1	8.5	9.7
Lectures for the Community	39.5	42.4	43.1	41.7	44.0	38.2	40.2	43.9	46.6	42.5	41.4	43.9	44.3	38.8	38.8	37.7
School Projects	31.7	28.2	30.7	26.5	28.3	27.6	25.2	31.0	33.7	32.9	31.4	29.1	30.2	28.0	29.5	25.6
Museums and Art Galleries	18.0	16.6	24.4	16.8	14.4	15.5	17.8	18.3	13.7	20.8	18.8	19.4	18.6	16.7	14.4	13.8
Performing Arts and Related Cultural Activities	20.5	16.7	29.2	15.1	14.9	15.2	19.2	18.5	17.9	16.8	17.7	18.1	19.9	17.6	17.5	16.2
Public Exhibitions	12.4	13.2	22.8	13.5	11.5	13.0	12.9	13.5	14.6	13.9	16.5	13.5	14.8	14.7	11.8	11.2
Social Enterprises	20.3	12.5	12.2	8.7	12.1	12.4	12.3	14.7	17.3	15.0	13.3	11.8	15.2	15.4	13.6	13.2
Heritage and Tourism Activities	12.9	10.0	13.6	6.5	7.9	10.7	7.3	12.1	12.5	9.2	11.9	10.1	11.7	10.3	9.3	9.4
Community-based Sports	4.6	2.5	2.9	2.2	2.2	2.4	2.5	2.7	4.8	3.2	3.3	2.7	3.3	4.1	4.0	3.0

Exhibit E27 Involvement in non-commercial engagement activities in the last 3 years for new and top institutions (% of respondents)

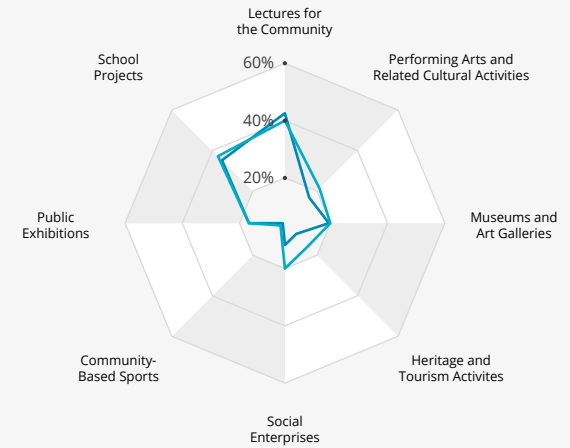
a) People-based Engagement



b) Problem-solving Engagement



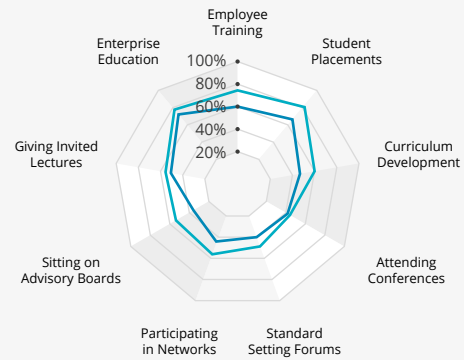
c) Community-based Engagement



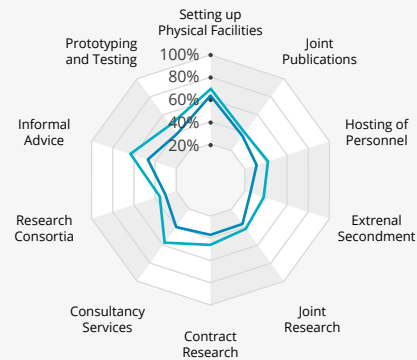
■ Top-decile Research Institutions ■ Younger Universities (Est. post-1992)

Exhibit E28 Regional and extra-regional involvement in non-commercial activities in the last 3 years for new and top institutions (% of respondents)

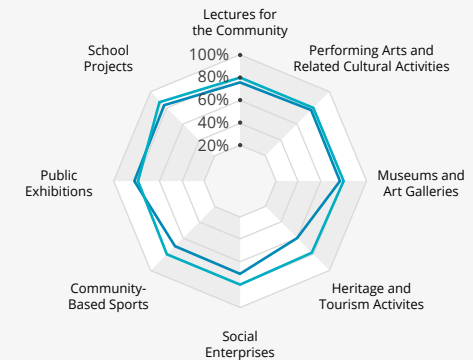
a) Regional people-based Engagement



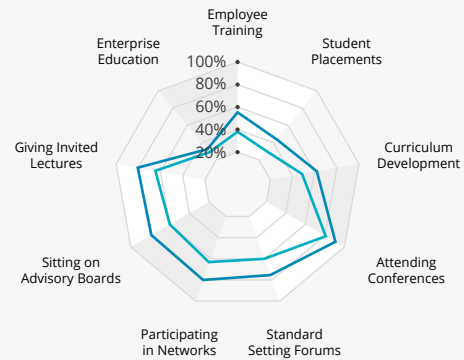
b) Regional problem-solving Engagement



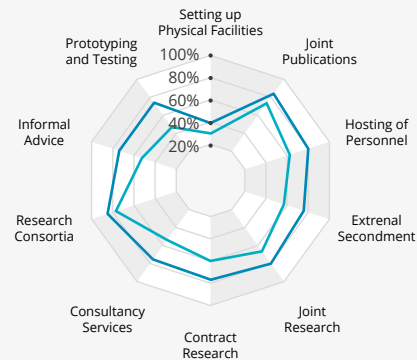
c) Regional community-based Engagement



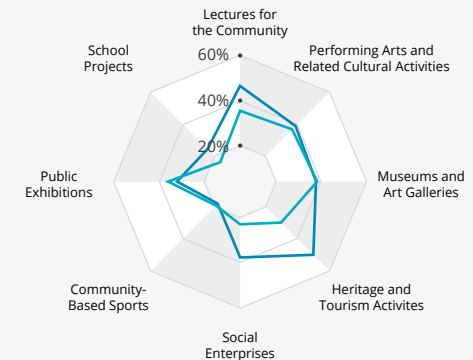
d) Extra-regional people-based Engagement



e) Extra-regional problem-solving Engagement



f) Extra-regional community-based Engagement



■ Top-decile Research Institutions ■ Younger Universities (Est. post-1992)

Exhibit D29 Engagement with private, public and third sector in the last 3 years by institution type and region (% of respondents)

		Activities with private sector companies		Activities with public sector organisations		Activities with charitable or voluntary organisations	
		%	N	%	N	%	N
All		30.8	17183	34.9	17071	41.2	16849
Institution Type	Younger Universities (Est post-1992)	32.4	4788	37.5	4750	46.5	4677
	Older Universities (Est pre-1992)	30.2	5732	34.9	5683	40.3	5612
	Specialist Institutions	34.2	561	35.1	559	52.0	550
	Top-decile Research Institutions	29.8	6102	32.7	6079	37.0	6010
Region	East of England	32.9	1353	36.7	1341	40.4	1323
	East Midlands	32.7	1142	31.5	1134	38.6	1121
	London	29.7	3246	34.5	3231	42.3	3184
	North East	30.8	754	34.0	744	41.1	725
	Northern Ireland	28.1	324	37.4	321	44.7	320
	North West	30.8	1478	36.5	1467	43.7	1450
	Scotland	29.9	1809	35.9	1804	39.5	1769
	South East	30.1	2403	34.2	2387	42.6	2356
	South West	30.5	1146	33.9	1135	42.9	1130
	Wales	33.3	910	37.6	900	40.6	892
	West Midlands	32.3	1000	34.8	991	41.5	982
	Yorkshire and the Humber	30.2	1618	33.9	1616	37.8	1597

Questions:

Have you undertaken any people-based, problem-solving or community-based activities with private sector companies (public sector organisations; charitable or voluntary organisations) in the last three years?

___Yes ___No

Exhibit D30 Frequency of contact with institution's Knowledge or Technology Transfer Office (TTO) or consultancy services office within the last 3 years by institution type and region (% of respondents)

		No contact	Rarely (1-2 times)	Occasionally (3-6 times)	Frequently (7+ times)	Not aware of these services	No TTO office	N
All		17.1	17.9	12.3	10.1	39.0	3.6	17831
Institution Type	Younger Universities (Est post-1992)	13.4	18.9	12.9	11.0	38.4	5.5	4903
	Older Universities (Est pre-1992)	17.5	18.2	13.4	10.7	37.8	2.3	5977
	Specialist Institutions	7.5	9.6	8.6	10.7	43.1	20.5	571
	Top-decile Research Institutions	20.5	17.5	11.2	8.9	40.3	1.7	6380
Region	East of England	18.2	14.8	10.3	8.8	43.6	4.3	1406
	East Midlands	19.2	19.5	11.7	10.2	36.7	2.8	1184
	London	14.0	15.9	10.6	8.5	45.9	5.2	3380
	North East	15.5	18.7	11.1	11.2	42.0	1.5	776
	Northern Ireland	22.9	24.2	15.3	12.8	19.9	4.9	327
	North West	19.5	19.7	13.9	10.1	34.1	2.7	1530
	Scotland	17.9	21.6	16.1	13.7	28.4	2.2	1884
	South East	17.2	16.8	12.0	9.7	41.2	3.2	2482
	South West	17.2	19.1	13.3	13.5	33.8	3.1	1172
	Wales	16.4	18.2	12.3	9.4	41.2	2.5	937
	West Midlands	16.3	14.9	12.3	9.3	42.0	5.2	1056
	Yorkshire and the Humber	18.3	18.0	12.0	8.7	39.4	3.7	1697

Questions:

Has your institution got a Knowledge or Technology Transfer Office (TTO) or consultancy services office?

___Yes ___No ___Don't know

How often have you been in contact with your institution's Knowledge or Technology Transfer Office (TTO) or consultancy services office within the past three years?

___Frequently (7+ times)

___Occasionally (3-6 times)

___Rarely (1-2 times)

___No contact

Exhibit D31 Way in which activities with external organisations were initiated by institution type and region (% of respondents)

		The university knowledge/technology transfer office, or other university administrative office	Individuals associated with the external organisation	Your own actions in approaching the external organisation directly	Mutual actions following up a contact at a formal conference or meeting	Mutual actions following up informal contacts	Total (N)
All		31.8	83.3	71.5	67.5	70.4	10689
Institution Type	Younger Universities (Est post-1992)	35.7	82.4	76.6	68.8	73.4	3156
	Older Universities (Est pre-1992)	31.3	83.1	71.4	66.8	69.0	3570
	Specialist Institutions	32.3	84.8	69.1	67.7	73.9	375
	Top-decile Research Institutions	29.0	84.2	67.2	67.2	68.8	3588
Region	East of England	28.8	84.6	69.7	66.9	68.4	844
	East Midlands	33.6	81.5	73.6	66.5	70.7	696
	London	30.5	84.3	68.2	68.1	70.8	2012
	North East	32.0	82.7	72.4	72.6	74.3	463
	Northern Ireland	36.7	83.1	73.9	67.1	66.7	207
	North West	33.4	84.0	73.9	70.2	72.4	952
	Scotland	34.3	86.7	72.4	68.4	70.8	1104
	South East	29.2	83.1	71.9	66.9	70.0	1511
	South West	33.3	81.9	73.3	65.4	72.0	703
	Wales	33.9	83.9	74.1	67.6	72.5	564
	West Midlands	34.1	80.7	70.0	67.2	68.9	659
	Yorkshire and the Humber	31.0	80.3	71.4	64.5	67.0	974

Question:

If you have participated in people-based, problem-solving or community-based activities with external organisations over the past three years, have these been initiated by the following?

<Filter: private, public or third sector partners –Yes>

	Never	Occasionally	Frequently	Always
The university knowledge / technology transfer office, or other university administrative office	—	—	—	—
Individuals associated with the external organisation	—	—	—	—
Your own actions in approaching the external organisation directly	—	—	—	—
Mutual actions following up a contact at a formal conference or meeting	—	—	—	—
Mutual actions following up informal contacts	—	—	—	—

Exhibit D32 Public and charitable funding body support for external activities by institution type and region (% of respondents)

		Research council funding	Other public or charitable funding	No public or charitable funding	Total (N)
All		31.4	29.9	49.4	11093
Institution Type	Younger Universities (Est post-1992)	18.0	27.1	60.3	3274
	Older Universities (Est pre-1992)	35.6	30.3	46.3	3689
	Specialist Institutions	27.5	39.6	47.3	389
	Top-decile Research Institutions	39.2	30.9	43.2	3741
Region	East of England	32.3	29.1	49.6	900
	East Midlands	27.4	29.3	52.4	723
	London	29.2	31.7	49.7	2088
	North East	34.4	31.1	48.6	486
	Northern Ireland	28.0	36.5	48.3	211
	North West	33.1	32.2	46.9	979
	Scotland	36.1	30.3	45.0	1139
	South East	30.1	27.8	51.0	1575
	South West	36.0	27.7	47.2	733
	Wales	30.0	30.3	51.1	587
	West Midlands	27.1	29.2	53.1	671
	Yorkshire and the Humber	32.3	27.6	50.2	1001

Question:

Which of the following public and charitable funding bodies, if any, have provided support for your interactions with external organisations in the past three years? Please indicate all that apply. <Filter: private, public or third sector partners -Yes>

- | | |
|---|---|
| ☐ Arts and Humanities Research Council (AHRC) | ☐ Leverhulme Trust |
| ☐ Economic and Social Research Council (ESRC) | ☐ The Department for Business, Innovation & Skills (BIS) |
| ☐ Biotechnology and Biological Sciences Research Council (BBSRC) | ☐ Innovate UK (formerly the Technology Strategy Board) |
| ☐ Engineering and Physical Sciences Research Council (EPSRC) | ☐ The Higher Education Funding Council for England (HEFCE), the Scottish Funding Council (SFC),
Department for Employment and Learning (DEL) in Northern Ireland,
the Higher Education Funding Council for Wales (HEFCW) |
| ☐ Medical Research Council (MRC) | |
| ☐ Natural Environment Research Council (NERC) | ☐ The National Centre for Universities and Business (NCUB, formerly CIHE) |
| ☐ Science and Technology Facilities Council (STFC) | ☐ Other (please specify) |
| ☐ Wellcome Trust | ☐ None of the above |
| ☐ Rowntree Foundation | |

Exhibit D33 Motivations for participating in activities with external organisations by institution type and region (mean value)

		Test the practical application of my research	Gain insights in the area of my own research	Keep up to date with research in external organisations	Secure access to specialist equipment, materials or data	Secure access to the expertise of researchers at the external organisation	Gain knowledge about practical problems useful for teaching	Create student project and job placement opportunities	Source of personal income	Secure funding for research assistants and equipment	Look for business opportunities linked to my own research	Further my institution's outreach mission	Total (N)
All		3.46	3.89	3.52	2.84	3.15	3.24	3.07	2.26	2.82	2.52	3.59	10767
Institution Type	Younger (Est post-1992)	3.42	3.89	3.59	2.79	3.10	3.57	3.39	2.24	2.75	2.67	3.74	3175
	Older (Est pre-1992)	3.48	3.89	3.51	2.84	3.15	3.18	2.98	2.25	2.85	2.49	3.57	3579
	Specialist Institutions	3.47	3.85	3.68	2.92	3.30	3.31	3.14	2.45	2.74	2.50	3.71	381
	Top-decile Research Inst.	3.47	3.88	3.45	2.88	3.18	3.02	2.87	2.26	2.85	2.43	3.48	3632
Region	East of England	3.48	3.86	3.51	2.85	3.09	3.13	2.92	2.38	2.79	2.53	3.51	863
	East Midlands	3.47	3.88	3.52	2.88	3.14	3.31	3.15	2.24	2.88	2.67	3.58	706
	London	3.51	3.96	3.58	2.85	3.24	3.23	2.97	2.43	2.85	2.53	3.55	2020
	North East	3.52	3.91	3.51	2.76	3.09	3.25	3.13	2.09	2.80	2.42	3.64	469
	Northern Ireland	3.64	3.98	3.73	3.05	3.33	3.36	3.19	2.28	2.91	2.61	3.67	207
	North West	3.48	3.91	3.58	2.86	3.15	3.26	3.12	2.13	2.83	2.49	3.65	963
	Scotland	3.44	3.88	3.54	2.92	3.18	3.25	3.13	2.14	2.90	2.49	3.66	1108
	South East	3.43	3.85	3.50	2.81	3.16	3.22	3.00	2.29	2.76	2.50	3.61	1517
	South West	3.42	3.83	3.38	2.78	3.06	3.16	3.11	2.20	2.81	2.54	3.54	709
	Wales	3.49	3.93	3.51	2.91	3.18	3.29	3.21	2.22	2.76	2.53	3.63	574
	West Midlands	3.39	3.79	3.51	2.82	3.10	3.44	3.20	2.28	2.82	2.61	3.67	655
	Yorkshire and the Humber	3.36	3.85	3.43	2.70	3.06	3.23	3.09	2.16	2.73	2.46	3.57	976

Questions:

If you have participated in people-based, problem-solving or community-based activities with external organisations, which of the following were your motivations and objectives? Please indicate the importance of each statement (only answered if external partner was specified).

<Filter: private, public or third sector partners -Yes>

___Completely unimportant

___Unimportant

___Neither unimportant nor important

___Important

___Very important

Exhibit D34 Impact of external activities on research by institution type and region (% of respondents)

		Led to new research projects	Strengthened my reputation in the field	Given me new insights for my work	Led to new contacts in the field	Very little or no impact	Total (N)
All		59.7	60.9	75.5	72.9	10.3	10242
Institution Type	Younger Universities (Est post-1992)	58.0	58.9	77.1	73.1	9.6	2928
	Older Universities (Est pre-1992)	59.8	61.5	75.8	73.5	10.6	3416
	Specialist Institutions	61.2	68.5	76.4	77.6	7.3	343
	Top-decile Research Institutions	61.0	61.1	73.9	71.6	11.1	3555
Region	East of England	59.5	60.4	73.9	69.7	11.5	835
	East Midlands	60.9	59.0	75.3	73.2	9.9	668
	London	60.3	64.2	77.4	75.4	9.4	1945
	North East	60.8	60.1	75.8	71.1	10.8	454
	Northern Ireland	60.0	57.5	78.5	79.5	8.5	200
	North West	60.6	61.5	75.1	74.8	10.1	909
	Scotland	62.9	62.4	73.6	74.8	11.5	1037
	South East	57.0	60.6	76.0	71.2	10.5	1464
	South West	60.8	59.8	74.4	70.0	11.5	676
	Wales	63.2	59.4	75.3	73.0	8.5	530
	West Midlands	54.0	58.8	73.8	71.4	11.8	602
	Yorkshire and the Humber	58.2	57.9	76.4	71.1	10.0	922

Question:

In the last three years, what impact has your involvement in people-based, problem-solving or community-based activities with external organisations had on the amount and kind of research that you do? Please indicate all that apply.

<Filter: Research - Yes; private, public or third sector partners -Yes>

Exhibit D35 Impact of external activities on teaching by institution type and region (% of respondents)

		Led me to make changes to the course programme	Strengthened my reputation	Led to changes in the way I present the material	Led to an increase in the employability of my students	Led to an increase in entrepreneurial skills among my students	Very little or no impact	Total (N)
All		43.0	40.7	52.9	31.8	16.7	27.8	9739
Institution Type	Younger Universities (Est post-1992)	54.7	49.9	62.1	43.8	24.6	15.8	3031
	Older Universities (Est pre-1992)	40.5	38.7	50.3	28.7	14.3	30.4	3210
	Specialist Institutions	43.6	45.6	56.7	35.7	20.4	23.2	353
	Top-decile Research Institutions	34.2	33.2	46.3	22.9	11.1	37.3	3145
Region	East of England	36.4	39.6	53.1	29.0	16.3	31.0	786
	East Midlands	42.4	40.2	51.9	32.5	16.2	26.0	649
	London	41.3	42.1	53.9	27.7	16.8	28.4	1812
	North East	43.6	35.3	52.7	35.3	18.9	28.9	408
	Northern Ireland	46.6	43.5	55.4	38.3	24.4	22.3	193
	North West	45.6	40.4	53.5	35.0	15.2	26.6	868
	Scotland	44.5	41.3	49.7	32.6	14.9	28.7	990
	South East	40.7	40.2	50.5	28.6	14.3	30.0	1389
	South West	42.3	38.1	49.1	31.1	17.3	31.4	643
	Wales	49.3	40.2	54.3	36.8	19.4	25.9	505
	West Midlands	46.0	45.6	59.0	34.3	18.3	20.9	607
	Yorkshire and the Humber	45.7	39.7	55.8	35.9	18.8	25.9	889

Question:

In the last three years, what impact has your involvement in people-based, problem-solving or community-based activities with external organisations had on the amount and kind of teaching that you do? Please indicate all that apply.

<Filter: Teaching - Yes; private, public or third sector partners -Yes>

Exhibit D36 Substantial constraints on interactions with external organisations by institution type and region (% of respondents)

		Lack of time to fulfil all university roles	Insufficient rewards	Identifying partners	Lack of own personal marketing, technical or negotiation skills	Lack of training in marketing, technical or negotiation skills	Lack of external interest	Cultural differences	Differences in timescale	Lack of interaction resources in external organisation	Lack of experience in external organisation	Unwillingness in external org to meet full cost	Bureaucracy/ inflexibility of univ admin	Poor marketing/ technical/ negotiation skills in univ	Insufficient resources	Reaching agreement on terms (inc IP)	Total (N)
All		52.5	20.1	16.9	12.3	13.4	11.8	3.3	10.1	14.7	10.3	17.7	23.3	14.7	21.3	6.8	17579
Institution Type	Younger (Est post-1992)	62.7	22.9	15.9	13.4	15.3	10.6	2.6	10.4	16.5	11.8	20.4	33.3	23.6	31.4	6.6	4866
	Older (Est pre-1992)	51.7	20.7	18.5	12.5	13.2	12.9	3.3	10.0	15.2	10.8	17.7	21.5	13.2	20.3	7.3	5887
	Specialist Institutions	48.4	17.6	9.8	11.4	13.2	6.6	2.7	7.8	12.1	8.7	17.4	22.8	16.4	23.0	4.4	562
	Top-decile Research Inst.	45.8	17.5	16.9	11.3	11.9	12.3	3.9	10.1	13.1	8.8	15.5	17.4	9.2	14.1	6.8	6264
Region	East of England	46.6	16.8	16.3	12.3	12.2	12.8	4.5	10.2	13.9	11.3	17.0	21.1	13.4	19.8	6.6	1385
	East Midlands	54.1	22.2	19.4	14.8	16.0	13.2	3.1	10.1	15.6	11.0	19.8	25.3	14.4	21.7	7.4	1171
	London	48.7	18.9	15.8	12.2	13.5	10.5	2.5	8.5	12.8	9.0	16.1	20.6	14.7	19.8	7.0	3315
	North East	56.4	21.4	17.0	10.9	10.8	12.7	4.3	11.9	14.7	10.2	17.1	27.0	15.3	22.2	6.6	771
	Northern Ireland	63.2	27.1	17.3	15.2	14.3	10.0	2.1	8.5	14.0	14.0	17.3	31.0	20.1	26.7	9.7	329
	North West	56.8	21.5	15.7	11.9	14.0	12.3	3.2	11.6	15.6	11.0	17.8	27.3	16.1	23.1	7.7	1514
	Scotland	51.7	19.1	18.2	11.9	12.6	13.6	4.4	9.5	15.2	10.4	17.9	21.3	12.8	19.8	7.0	1855
	South East	52.2	20.8	16.8	12.2	13.3	11.4	3.1	10.4	14.5	10.0	17.3	22.3	13.6	19.7	6.6	2451
	South West	55.0	22.0	17.6	12.0	12.8	11.4	2.4	11.4	16.6	10.6	19.4	24.5	16.9	23.6	7.2	1146
	Wales	52.9	18.3	16.0	11.7	15.2	9.8	2.8	8.4	15.0	10.0	17.1	25.8	15.3	21.4	5.9	932
	West Midlands	56.5	21.2	17.1	11.1	12.4	11.6	3.6	10.2	15.0	9.6	18.4	25.0	16.8	25.4	7.2	1042
	Yorkshire and the Humber	53.3	19.4	17.7	12.9	13.6	12.4	3.7	11.3	15.9	10.6	18.9	23.3	14.4	21.3	5.2	1668

Question:

Have the following factors constrained or prevented your interactions with external organisations over the past three years? Please indicate on a scale of 1-5, where 1: not constraining at all and 5: highly constraining.

(Slider bar from 1-5)

Exhibit D37 Extent to which academics agree to statements about relationships with external organisations by institution type and region (mean score)

		Academia should focus on basic research and should not be concerned with its actual or potential application	Academic freedom is of fundamental importance to the future wellbeing of society	Higher education has a key role to play in increasing the competitiveness of business in the uk	The main purpose of university teaching should be to prepare students for the labour market	UK business does not have the capacity to use research effectively	Over the past few years, universities have gone too far in attempting to meet the needs of industry to the detriment of their core teaching and research roles	Over the past few years universities have done too little to increase their relevance to society or contribution to economic development	Total (N)
All		2.26	4.54	4.15	2.75	3.12	3.27	2.82	17936
Institution Type	Younger Universities (Est post-1992)	2.05	4.47	4.17	2.95	3.15	3.24	2.95	4933
	Older Universities (Est pre-1992)	2.33	4.57	4.13	2.71	3.15	3.31	2.79	6013
	Specialist Institutions	2.12	4.50	4.28	2.83	3.02	3.21	2.95	571
	Top-decile Research Institutions	2.37	4.57	4.16	2.63	3.09	3.25	2.73	6419
Region	East of England	2.35	4.56	4.20	2.69	3.12	3.26	2.81	1426
	East Midlands	2.24	4.51	4.19	2.82	3.13	3.29	2.81	1197
	London	2.29	4.58	4.15	2.74	3.12	3.28	2.86	3404
	North East	2.28	4.55	4.15	2.71	3.15	3.22	2.81	785
	Northern Ireland	2.17	4.47	4.31	3.15	3.21	3.38	2.95	331
	North West	2.17	4.50	4.15	2.77	3.15	3.24	2.81	1532
	Scotland	2.30	4.55	4.13	2.79	3.11	3.35	2.76	1897
	South East	2.34	4.58	4.10	2.61	3.08	3.29	2.77	2498
	South West	2.23	4.54	4.16	2.73	3.14	3.23	2.77	1177
	Wales	2.13	4.49	4.18	2.88	3.12	3.22	2.91	938
	West Midlands	2.20	4.50	4.19	2.87	3.14	3.21	2.84	1058
	Yorkshire and the Humber	2.18	4.49	4.14	2.75	3.14	3.20	2.80	1693

Question:

The following are statements about relationships between higher education institutions and external organisations. To what extent do you agree or disagree with them?

___Strongly disagree

___Somewhat disagree

___Neither agree nor disagree

___Somewhat agree

___Strongly agree

Exhibit D38 Academic job factors considered as very important by institution type and region (% of respondents)

		Salary	Benefits	Job security	Opportunities for career advancement	Intellectual challenge	Level of responsibility	Degree of independence	Contribution to society	Total (N)
All		16.6	12.8	37.6	34.5	67.8	21.8	63.6	44.4	17950
Institution Type	Younger Universities (Est post-1992)	18.8	13.6	38.6	34.2	61.8	21.0	61.8	48.4	4944
	Older Universities (Est pre-1992)	16.8	13.5	38.5	34.4	69.3	22.1	65.2	43.2	6012
	Specialist Institutions	18.6	11.8	34.2	36.3	62.8	19.8	56.6	49.0	576
	Top-decile Research Institutions	14.5	11.7	36.4	34.7	71.5	22.3	64.2	42.1	6418
Region	East of England	15.3	13.1	34.3	34.0	71.1	22.8	64.1	42.1	1428
	East Midlands	17.3	12.2	39.4	33.8	65.0	19.3	61.9	41.4	1199
	London	18.6	14.5	36.2	37.8	70.3	22.6	64.8	46.6	3403
	North East	13.4	11.9	36.5	32.8	67.7	19.9	64.0	43.4	784
	Northern Ireland	17.3	14.2	45.5	37.9	58.8	23.3	58.8	47.0	330
	North West	15.4	11.0	38.8	33.6	67.1	20.7	65.4	46.0	1528
	Scotland	15.0	12.2	40.1	34.8	67.4	23.4	63.1	44.6	1897
	South East	16.7	13.5	36.5	32.9	69.7	22.3	65.5	44.4	2502
	South West	16.2	11.6	34.8	32.6	67.5	21.1	63.6	44.8	1180
	Wales	16.3	11.8	40.6	33.9	61.7	20.9	61.2	43.7	943
	West Midlands	18.8	14.1	37.5	36.2	67.9	23.2	63.9	42.5	1059
	Yorkshire and the Humber	16.3	12.0	39.4	32.5	65.8	19.9	60.6	43.8	1697

Question:

When thinking about your job as an academic, how important is each of the following factors to you? Please indicate the importance of each statement.

___ Completely unimportant

___ Unimportant

___ Neither unimportant nor important

___ Important

___ Very important

