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# THE INNOVATION CHALLENGE

A NEW APPROACH TO  
RESEARCH FUNDING



## **Acknowledgments**

We are grateful for all the comments, contributions, feedback and case study examples we received from universities and stakeholders while preparing this report.

**million+ is a university think-tank,  
working to solve complex problems  
in higher education through research  
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million+  
90 London Road  
London SE1 6LN

Phone 020 7717 1655  
Twitter: @million\_plus  
info@millionplus.ac.uk  
www.millionplus.ac.uk

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Successive governments in the UK have lauded the role of research in creating economic growth. Investment in innovation is valued to the extent that the science and research budget has been ring-fenced in cash terms since 2010 when most other areas of government spending have been significantly reduced or removed altogether. For government, research remains a significant strand of its strategy to grow the UK economy.

In spite of these ambitions, the UK invests proportionately less in research and development than the OECD or European Union averages. Not only have we fallen short of targets set a decade ago, we are heading in the opposite direction. Between 2011 and 2012 the UK's expenditure on research and development decreased by 3% in real terms. This reduction was the result of a decline in the value of government expenditure but also a decline in business and industry investment.

There have been other developments since 2010. In spite of the fact that internationally and nationally excellent research has been fostered and can be found in all universities, a smaller and smaller number of universities now receive the lion's share of the annual £5.5bn investment which taxpayers provide for research and development. If we want to solve the challenges of tomorrow's world, research funding cannot be a zero sum game for institutions with research degree awarding powers.

As the economy recovers, government has a new opportunity to step up to the innovation challenge and ensure that the research capacity in all of our universities is fully exploited, businesses small and large are supported in product development and innovation and students get a fairer deal in terms of the research funding that their institutions receive.

**Professor Michael Gunn**  
Vice-Chancellor,  
Staffordshire University  
Chair, million+

**Pam Tatlow**  
Chief Executive, million+

## Executive Summary

The UK is world renowned for its higher education sector and its universities and with good reason. In addition to the high quality of teaching, evaluation of the UK's research output has found excellent research of international standing in all universities. This world-class reputation has not always translated into the innovation needed to support the economy and new and emerging businesses. Instead, investment in research and development (R&D) has been declining in real terms.

This report investigates the scale of investment of the UK in science and innovation compared to other countries, reviews the history and the impact of the models by which university research funding has been distributed and sets out recommendations for a new approach to ensure that the UK steps up to the innovation challenge.

### Key findings

> **The UK Government invests less in research and development than the leading 22 OECD countries, as a percentage of GDP**

> **The UK has a low level of private investment in research lying 19th of OECD countries in terms of private sector investment in research and development as a percentage of GDP**

> **In 2012-13, 25% of the UK's total recurrent research funding was allocated to five universities, 50% to twelve universities and 75% to 31 universities; the remaining 130 universities shared 25% of recurrent research funding**

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### Recommendations

- The UK Government should increase its investment in science and innovation and set a target to be in the top ten of OECD countries by the end of the next Parliament in 2020
- New approaches are needed to ensure taxpayer investment in research is more widely distributed so that businesses, wherever they are located, can benefit from the expertise of research staff and so that students get a better deal
- The UK Government should continue to fund excellent research wherever it occurs in universities but amend the criteria to avoid critical mass thresholds excluding smaller units of researchers from funding allocations
- Funding for 2\* research should be restored and an expanded science and innovation budget deployed to invest in research of national significance
- All universities with research degree-awarding powers which currently do not benefit significantly from other taxpayer research funding should be guaranteed funds to invest in research infrastructure and staff capacity
- A new stream of funding should be established to support translational research in universities which receive less research funding from the Funding and Research Councils
- The importance of investing in STEM subjects is accepted but under-investment in social science and research associated with the creative industries must be addressed
- Account should be taken of the impact of government investment strategies in research on the institutional unit of resource available to invest in the student experience

# Investment in Science and Innovation in the UK

## Introduction

In 1963, the Robbins Report<sup>1</sup> on universities in the United Kingdom identified four main “objectives essential to any properly balanced system (of higher education): instruction in skills; the promotion of the general powers of the mind so as to produce not mere specialists but rather cultivated men and women; to maintain research in balance with teaching, since teaching should not be separated from the advancement of learning and the search for truth; and to transmit a common culture and common standards of citizenship.”<sup>2</sup>

The vision of the Robbins Report of the purpose of universities was backed by government criteria which institutions applying for taught degree-awarding powers (TDAP)<sup>3</sup> and research degree-awarding powers (RDAP)<sup>4</sup> were required to meet. However two separate streams and systems of investment were subsequently developed for teaching and research.

In 2004, following a decade when it was widely accepted that although student numbers had increased, investment in teaching and research had declined, the Labour Government set out a new Framework for Science and Innovation for the 2004-2014<sup>5</sup> period. Treasury's expectations that an increase in public investment would be linked with growth and increased productivity were clearly set out:

*‘Harnessing innovation in Britain is key to improving the country’s future wealth creation prospects...(Britain) must invest more strongly than in the past in its knowledge base, and translate this knowledge more effectively into business and public service innovation. Securing the growth and continued excellence of the UK’s public science and research base will provide the platform for successful innovation by business and public services.’*

Following the 2010 election, the Coalition government radically changed the system of funding teaching in England commencing with new entrants to university programmes in 2012. The government also introduced a new industrial strategy and backed a series of initiatives such as Catapult Centres designed to help businesses to adopt, develop and exploit innovative products and technologies.<sup>6</sup> In comparison, the framework for investment in science and innovation remained relatively unchanged although levels of investment have declined in real terms. However, since 2010 Ministers have pursued policies which have led to the further concentration of research funding in a small number of universities even though there has been no review of research quality, raising questions about the government’s commitment to support research capacity and excellence in all universities in which it is found.

## The UK and its competitors

The Treasury target in the UK’s 2004-2014 Science and Innovation Framework was to increase total UK research and development from 1.9% of GDP to 2.5% of GDP by 2014.

Far from hitting this target, the Office of National Statistics (ONS) figures confirm that the UK’s expenditure on R&D decreased by 3% between 2011 and 2012 and that business sector investment decreased by 2% in the same period.<sup>7</sup> In comparison to the UK, other governments have been more successful in attracting private sector research and development and score more highly than the UK in innovation measures.

<sup>1</sup> The text of the Report is available here: <http://www.educationengland.org.uk/documents/robbins/robbins1963.html>

<sup>2</sup> Anderson, Robert (March 2010). “The ‘Idea of a University’ today”. *History & Policy* (in English). United Kingdom: History & Policy.

<sup>3</sup> The award of TDAP gives UK higher education providers the right to award bachelor’s degrees with honours and other taught higher education qualifications up to levels 6/7 of *The framework for higher education qualifications in England, Wales and Northern Ireland*, and up to levels 10/11 in the Scottish Credit and Qualifications Framework.

<sup>4</sup> The awards of RDAP gives UK higher education providers with TDAP the right to award doctoral degrees and master’s degrees where the research component (including a requirement to produce original work) is larger than the taught component when measured by student effort. These are higher education qualifications up to levels 7/8 of *The framework for higher education qualifications in England, Wales and Northern Ireland*, and up to levels 11/12 in the Scottish Credit and Qualifications Framework.

<sup>5</sup> Available at: [http://webarchive.nationalarchives.gov.uk/20130129110402/http://www.hm-treasury.gov.uk/spending\\_sr04\\_science.htm](http://webarchive.nationalarchives.gov.uk/20130129110402/http://www.hm-treasury.gov.uk/spending_sr04_science.htm)

<sup>6</sup> For more on catapult centres see: <https://www.catapult.org.uk/#>

<sup>7</sup> <http://www.ons.gov.uk/ons/rel/rdit1/gross-domestic-expenditure-on-research-and-development/2012/stb-gerd-2012.html>

The 'state of play' was confirmed by the Right Honourable Dr Vince Cable, Secretary of State for Business Innovation and Skills, – in July 2014 when he acknowledged that:

*"...the UK's total investment in R&D – both public and private – has been relatively static at around 1.8% of GDP since the early 1990s and stood at 1.7% of GDP in 2012, the last year for which we have data. In contrast, the US alone spends around £250 billion (2.8% of GDP) on R&D per annum. China increased its R&D by 28% in 2009 and 15% in 2010, to roughly £125 billion (1.8% of GDP), and South Korea doubled its expenditure between 2003 and 2011 to around £35 billion (4.0% of GDP). France and Germany have consistently invested substantially more than 2% of their GDP in R&D, with aspirations to increase this to 3% or more. **Public sector support for innovation is harder to compare, but such data as exist suggest that UK funding is at the lower end of the scale (million+ emphasis)."***<sup>8</sup>

A decade on from the launch of the 2004 Science and Innovation Framework and in advance of a UK general election in 2015, it is timely to review the merits of the UK's system for funding research, the decisions which have been made in respect of its distribution and the impact of these decisions on universities, students, graduates and the businesses and innovation systems that this taxpayer investment was intended to benefit.

## > The UK Government invests less in research and development than the leading 22 OECD countries, as a percentage of GDP

The rationale for supporting innovation in business and industry through research programmes has been recognised by governments with developed higher education and university systems and used to justify public investment in research and development (R&D). However, the UK has not kept pace with many other nations. It continues to invest less in R&D than the Organisation for Economic Cooperation and Development (OECD)<sup>9</sup> average, when taken as a percentage of gross domestic product (GDP). The UK's gross domestic expenditure on research (GERD) has lagged behind many other competitor countries as a percentage of GDP.<sup>10</sup>

Between 2008 and 2012, the UK was outside the top 10 OECD countries' investment in GERD as a percentage of GDP – lying in 16th place each year. Both government and private investment were less than the OECD average and the averages for the EU 15 and EU 28 countries.<sup>11</sup> Unlike many of the countries that were ahead of it in levels of R&D investment, the UK decreased its investment between 2008 and 2012 (the most recent year for which the OECD has produced data).

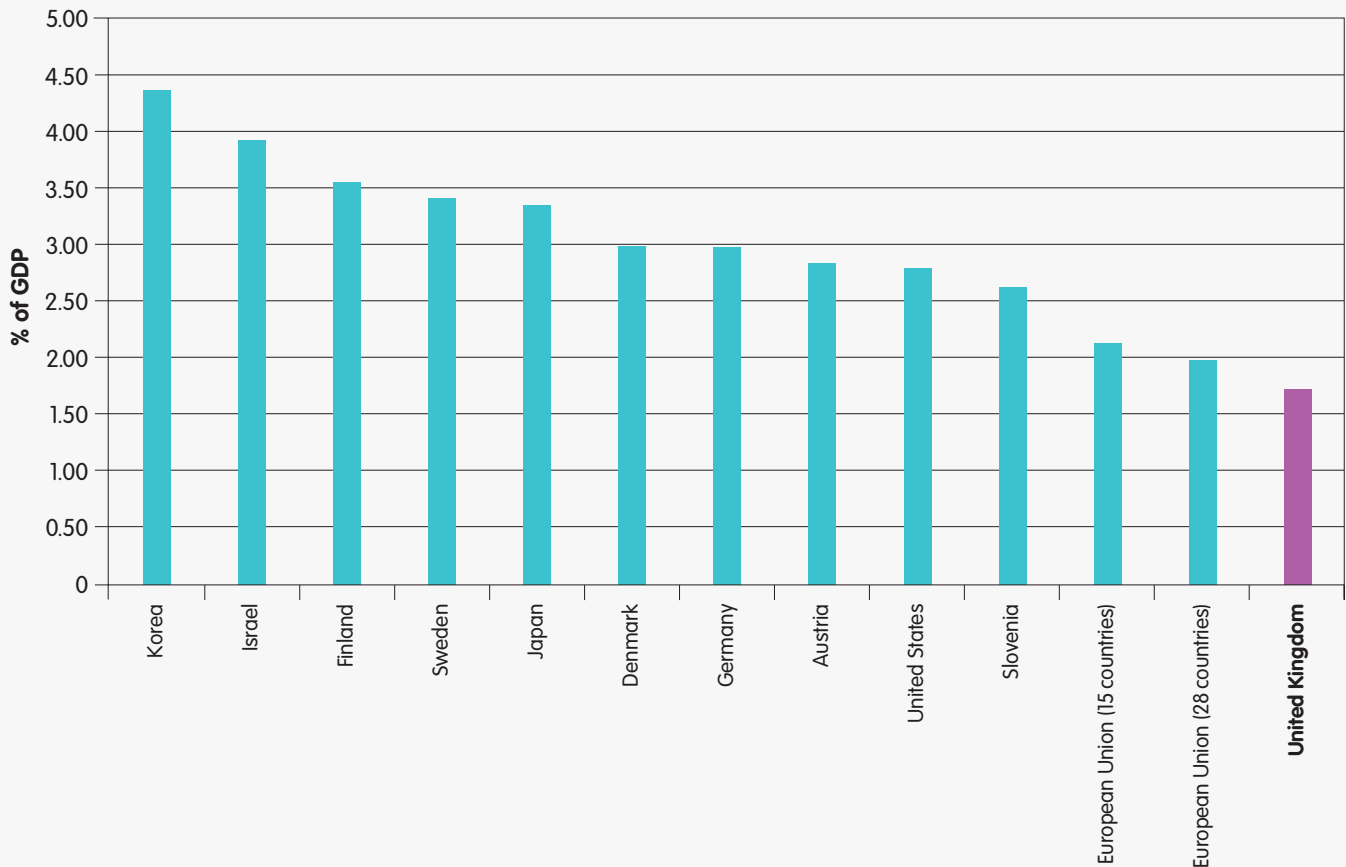
**"Unlike many of the countries that were ahead of it in levels of R&D investment, the UK decreased its investment between 2008 and 2012 (the most recent year for which the OECD has produced data)."**

<sup>8</sup> See <https://www.gov.uk/government/speeches/innovation-and-the-uks-knowledge-economy> for the full transcript of the speech  
<sup>9</sup> <http://www.oecd.org/>

<sup>10</sup> From <http://stats.oecd.org/#>: Gross domestic expenditure on R&D (GERD) is one of the most widely used measures of innovation inputs. It reflects a country's R&D efforts and investments and its potential for generating new knowledge. Many OECD and non-OECD countries target a certain level of GERD intensity to help focus policy decisions and public funding. Data are drawn from the OECD Main Science and Technology Indicators (MSTI) Database which aims to reflect the level and structure of efforts in the field of science and technology and is based on harmonised national R&D surveys.

<sup>11</sup> EU 15 and EU 28 refer to the average of particular groups of EU countries. EU 15 refers to the countries in the EU prior to the accession of 10 new countries in 2004. The EU15 comprised the following 15 countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom. EU 28 refers to the number of countries in the Union at July 2013.

Figure 1: Gross expenditure on research as a % of GDP 2008-2012<sup>12</sup>



Source: <http://stats.oecd.org/>

Figure 1 highlights the OECD's analysis of the top ten countries according to GERD investment as a percentage of GDP. The UK is behind competitor countries in public investment in research and development.

The low overall investment in research in the UK compared to other OECD countries is no surprise when looking at the low levels of investment

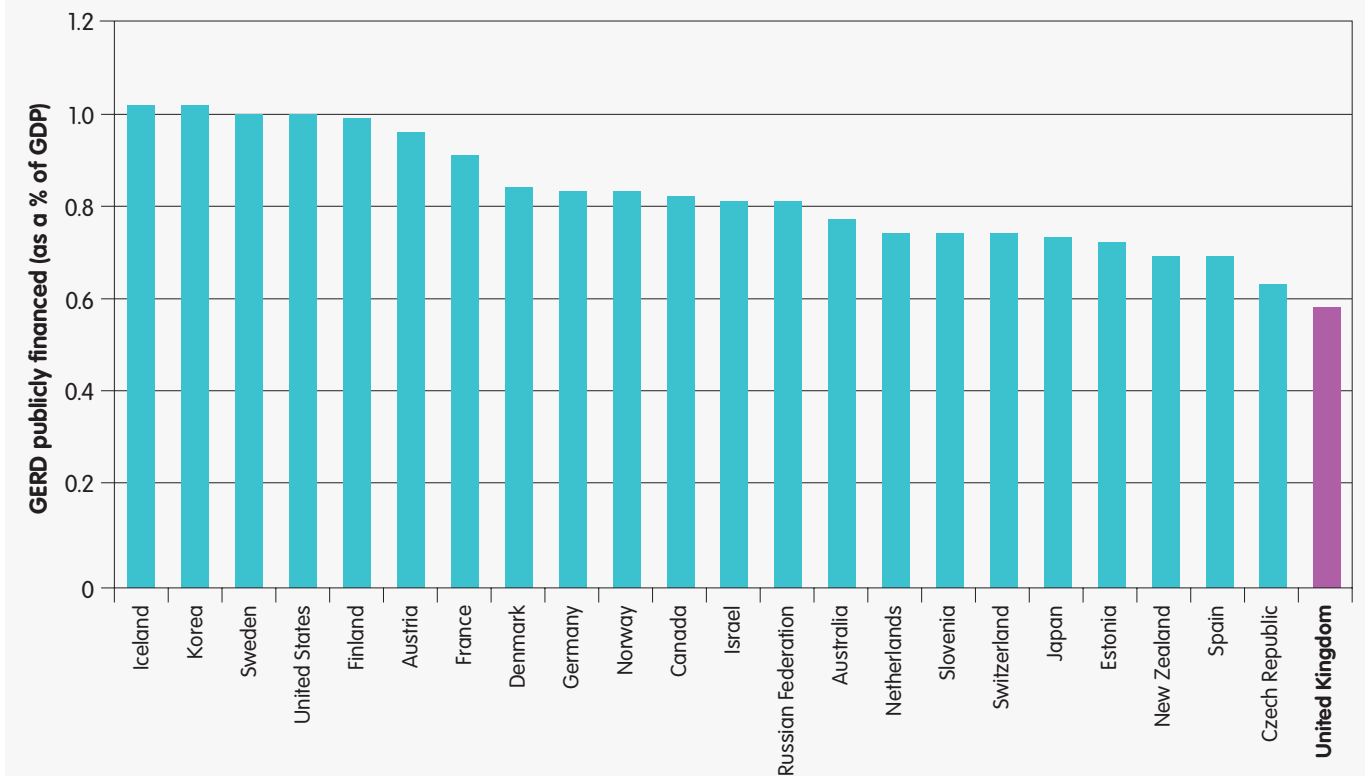
by government. Public investment in R&D stood at 0.59% of GDP<sup>13</sup> (based on 2012 figures). In comparison, the percentages of public investment for the United States and Germany stood at 1.01% and 0.84% of GDP respectively. On this measure, the UK was 23rd in the OECD rankings and Figure 2 shows a number of governments investing a far higher percentage of GDP in research and development.

<sup>12</sup> From <http://stats.oecd.org/#>: Gross domestic expenditure on R&D (GERD) is one of the most widely used measures of innovation inputs. It reflects a country's R&D efforts and investments and its potential for generating new knowledge. Many OECD and non-OECD countries target a certain level of GERD intensity to help focus policy decisions and public funding. Data are drawn from the OECD Main Science and Technology Indicators (MSTI) Database which aims to reflect the level and structure of efforts in the field of science and technology and is based on harmonised national R&D surveys.

<sup>13</sup> From <http://stats.oecd.org/>: Gross domestic expenditure on R&D (GERD) is financed by various sources: business enterprises (industry), government (public), higher education, private non-profit institutions (PNPs) and foreign funds (abroad). In the country profiles of the OECD Science, Technology and Industry Outlook 2012, public funding of GERD encompasses financing by the government and higher education sectors. It reflects public commitment to R&D relative to the size of the country. It is expressed as a percentage of GDP. Data are based on harmonised national R&D surveys and drawn from the OECD Research and Development Statistics (RDS) Database which provides detailed information on a range of R&D statistics.



Figure 2: GERD publicly financed (as a % of GDP)<sup>14</sup>



Source: <http://stats.oecd.org/>

### Business investment in innovation

**> The UK has a low level of private investment in research and according to OECD data lies 19th in terms of private sector investment in research and development as a percentage of GDP**

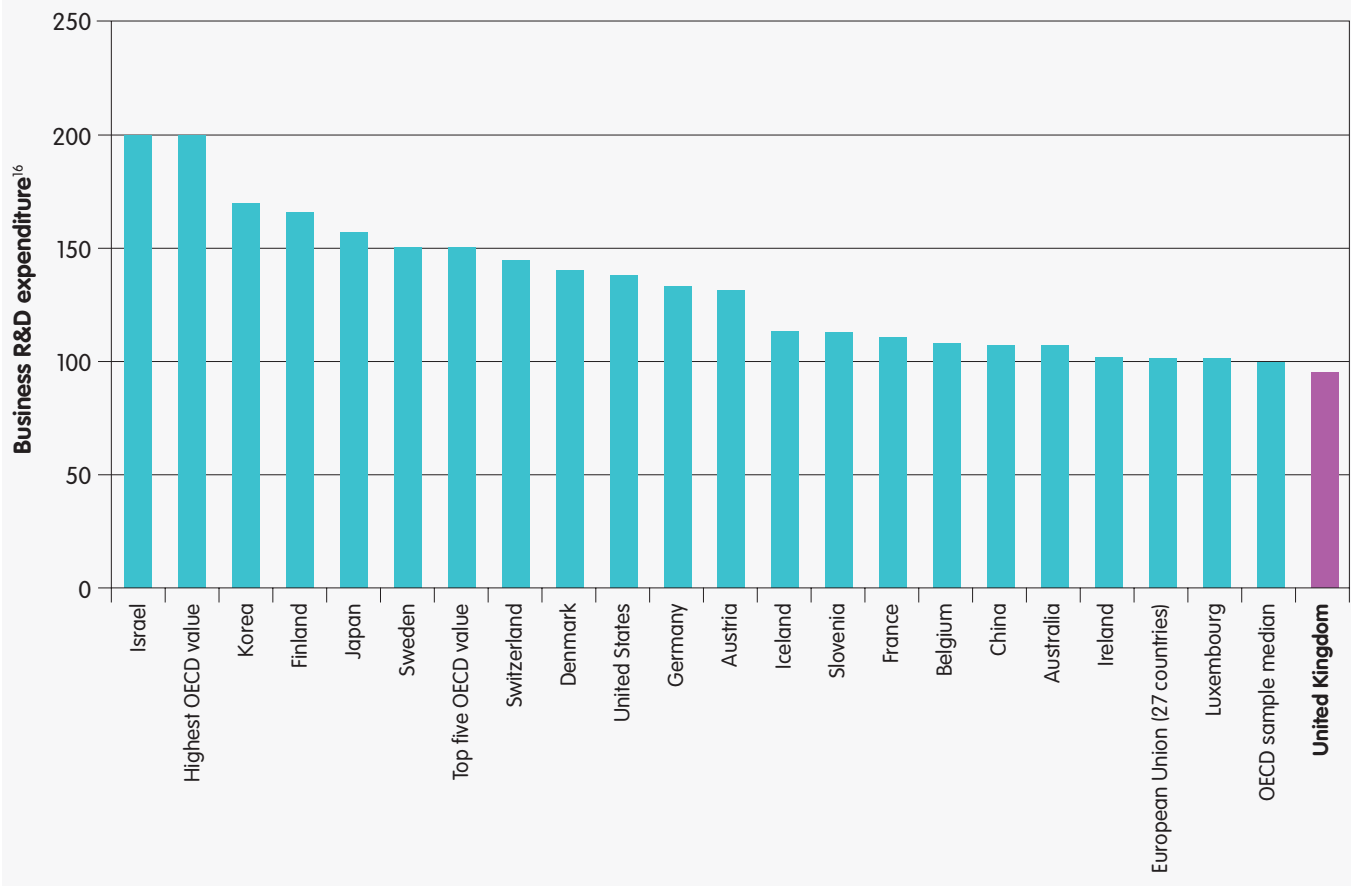
As well as the percentage of GDP figures provided in Figures 1 and 2, the OECD creates a normalised index of performance relative to the median values in the OECD area. The OECD

suggests this data can be used to compare the efforts of the private sector in supporting innovation in each country.

Industry and business tend to support applied and translational research that is linked to new products and services rather than the original research funded by government through universities.

<sup>14</sup> From <http://stats.oecd.org/>: Gross domestic expenditure on R&D (GERD) is financed by various sources: business enterprises (industry), government (public), higher education, private non-profit institutions (PNPs) and foreign funds (abroad). In the country profiles of the OECD Science, Technology and Industry Outlook 2012, public funding of GERD encompasses financing by the government and higher education sectors. It reflects public commitment to R&D relative to the size of the country. It is expressed as a percentage of GDP. Data are based on harmonised national R&D surveys and drawn from the OECD Research and Development Statistics (RDS) Database which provides detailed information on a range of R&D statistics.

Figure 3: Business research and development expenditure<sup>15</sup>



Source: <http://stats.oecd.org/>

Countries that do well in this area of investment do so because business and industry are able to build on a strong pattern of government investment in the research base and infrastructure. Given the low level of investment by the UK government in R&D (see Figure 2), it is no surprise that the UK's performance in this area compared to other OECD countries

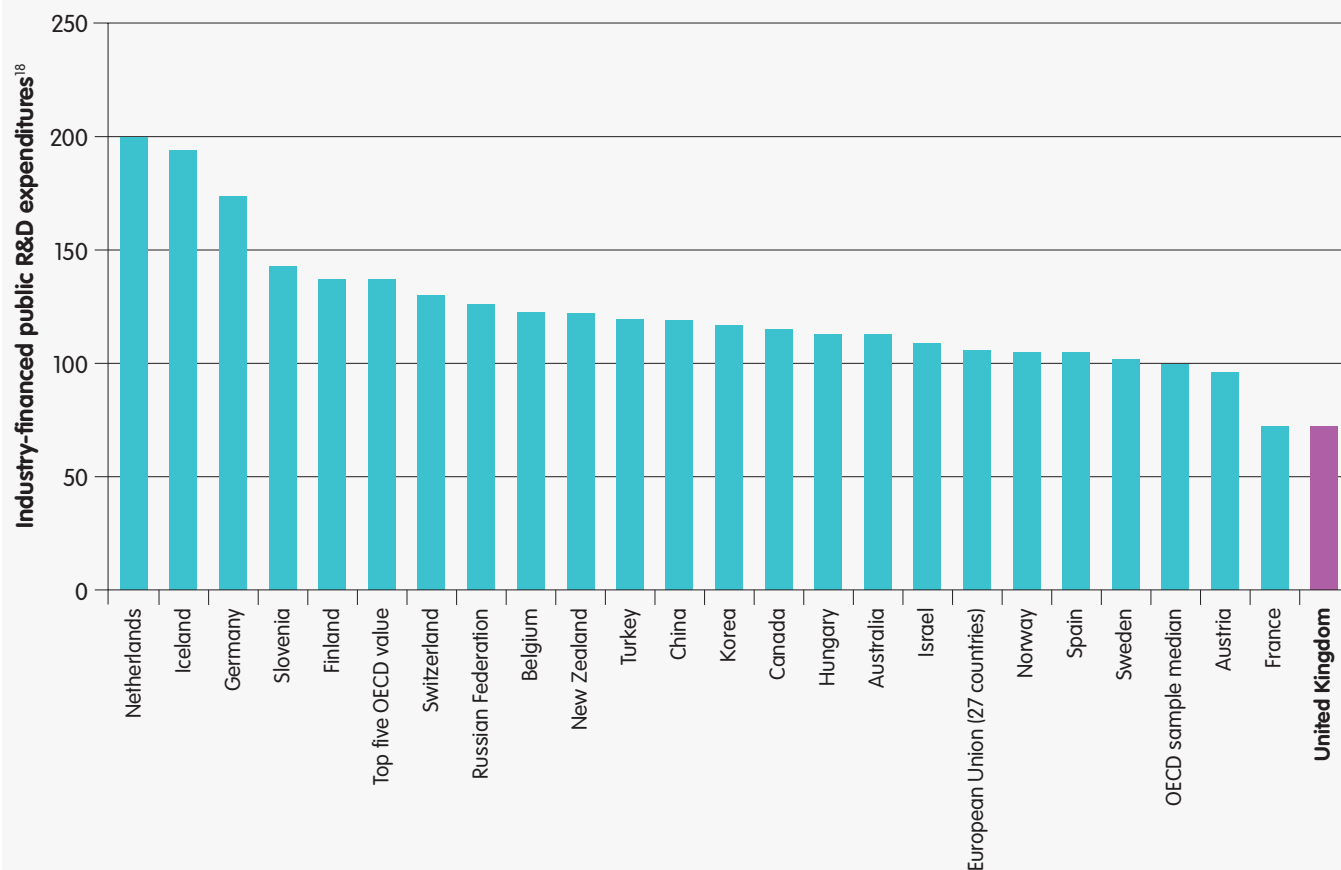
is well below the OECD average and the EU 27 average as outlined in Figure 3.

The OECD also presents data on the public research and development expenditure that has been funded by industry. This can be taken as a further measure of the investment in innovation in countries. Businesses and industry will fund research in universities that supports them in

<sup>15</sup> From <http://stats.oecd.org/>: Business enterprise expenditure on R&D (BERD) accounts for the bulk of R&D activity in most OECD countries. It is frequently used to compare countries' private-sector efforts on innovation since industrial R&D is more closely linked to the creation of new products and production techniques and mirrors market-oriented innovation efforts. Data are drawn from the OECD MSTI Database and are based on harmonised national R&D surveys and national accounts. The data in the table are taken from 2010 or the latest year available.

<sup>16</sup> Unit of measure used: Normalised index of performance relative to the median values in the OECD area (Index median = 100).

Figure 4: Industry-financed public R&D expenditures<sup>17</sup>



Source: <http://stats.oecd.org/>

bringing products and services to commercial markets. The government’s role in creating the right conditions – sufficient research investment in universities, appropriate tax incentives and voucher schemes, support for knowledge exchange and transfer – is crucial. Figure 4 confirms that the UK is behind most OECD countries, the OECD average and the EU 27 average.

### Recommendation

- The UK Government should increase its investment in science and innovation and set a target to be in the top ten of OECD countries by the end of the next parliament in 2020

<sup>17</sup> From <http://stats.oecd.org/>: Direct funding of public research by industry takes the form of grants, donations and contracts and influences the scope and orientation of public research, generally steering it towards more applied and commercial activities. The share of public R&D expenditure financed by industry is the domestic business enterprise sector’s contribution to the intramural R&D expenditures of the higher education (HERD) and government (GOVERD) sectors. Data are drawn from the OECD MSTI Database and are based on harmonised national R&D surveys and national accounts. The data in the table are taken from 2010 or the latest year available.

<sup>18</sup> Unit of measure used: Normalised index of performance relative to the median values in the OECD area (Index median = 100).

## Missed opportunities for growth

In our previous report, *Smarter Regions Smarter Britain* (2014),<sup>19</sup> we outlined how universities can play a significant role in delivering economic growth. Universities are extremely well placed to support strategies that promote sustainable and balanced growth and job creation in the regions.

Investing in higher education makes economic sense and will generate significant impact across the regions. Supporting universities and businesses to collaborate, to translate research for commercial purposes and to invest in innovation will have significant positive impacts on the economy.

It is crucial to bear in mind the diversity of university and business relationships and the need for small businesses and the not-for-profit sector to access high quality research and support on a local and regional basis.

The way in which government provides investment for the research base determines the extent to which universities can respond to the needs of national and regional stakeholders as well as to new and emerging markets and supply chains. The impact of research funding policies upon regional capacity and growth appears to have been given little thought by government. As Figure 5 shows, there are stark difference in the growth achieved by London and the South East compared to other regions in England.

It is time for a new approach in particular to funding the translational research which business and SMEs need to help them bring products to market, innovate and respond to changing technologies and demands.

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### Recommendations

- A new stream of funding should be established to support translational research in universities which receive less research funding from the Funding and Research Councils
- The importance of investing in STEM subjects is accepted but under-investment in social science and research associated with the creative industries must be addressed

**“Universities are extremely well placed to support strategies that promote sustainable and balanced growth and job creation in the regions.”**

<sup>19</sup> Available at: <http://www.millionplus.ac.uk/research-policy/reports/latest-reports/research-report-smarter-regions-smarter-britain-boosting-regional-growth-through-universities>

**“Supporting universities and businesses to collaborate, to translate research for commercial purposes and to invest in innovation will have significant positive impacts on the economy.”**

**University of Bolton:  
Smart Hybrid Fibre for Harvesting  
Energy from Sun, Wind and Rain**

Bolton developed a fibre for use in smart textile applications that are exposed to the elements such as sun, wind and rain: the fibre is capable of converting such elements into usable electrical energy. The multiple award-winning technology has a vast spectrum of use: from wearables, sails, building facades, tyres, artificial trees, carpets to name a few. A new company FibrLec was established to commercialise the technology and the creation of a British manufacturing plant that will employ over 50 staff and export globally is in the pipeline. While it is difficult to estimate the total market for such a broad platform technology, £1m has been spent by FibrLec from the technology's development through to prototype stage.

**London South Bank University:  
Fighting illegal downloads:  
Faber Music**

LSBU and Faber Music collaboratively developed and implemented a digital platform and innovative approach to address business data management challenges. Faber Music needed to embrace the latest digital technologies in order to support musicians in licensing their work and to counter the dissemination of illegal sheet music by enabling top-quality, value-for-money licensed equivalents to be available. The platform generated a new revenue stream for Faber Music. The research also provided an electronic distribution model which gave the company wider reach, lowered distribution costs and increased their customer base and international reach.

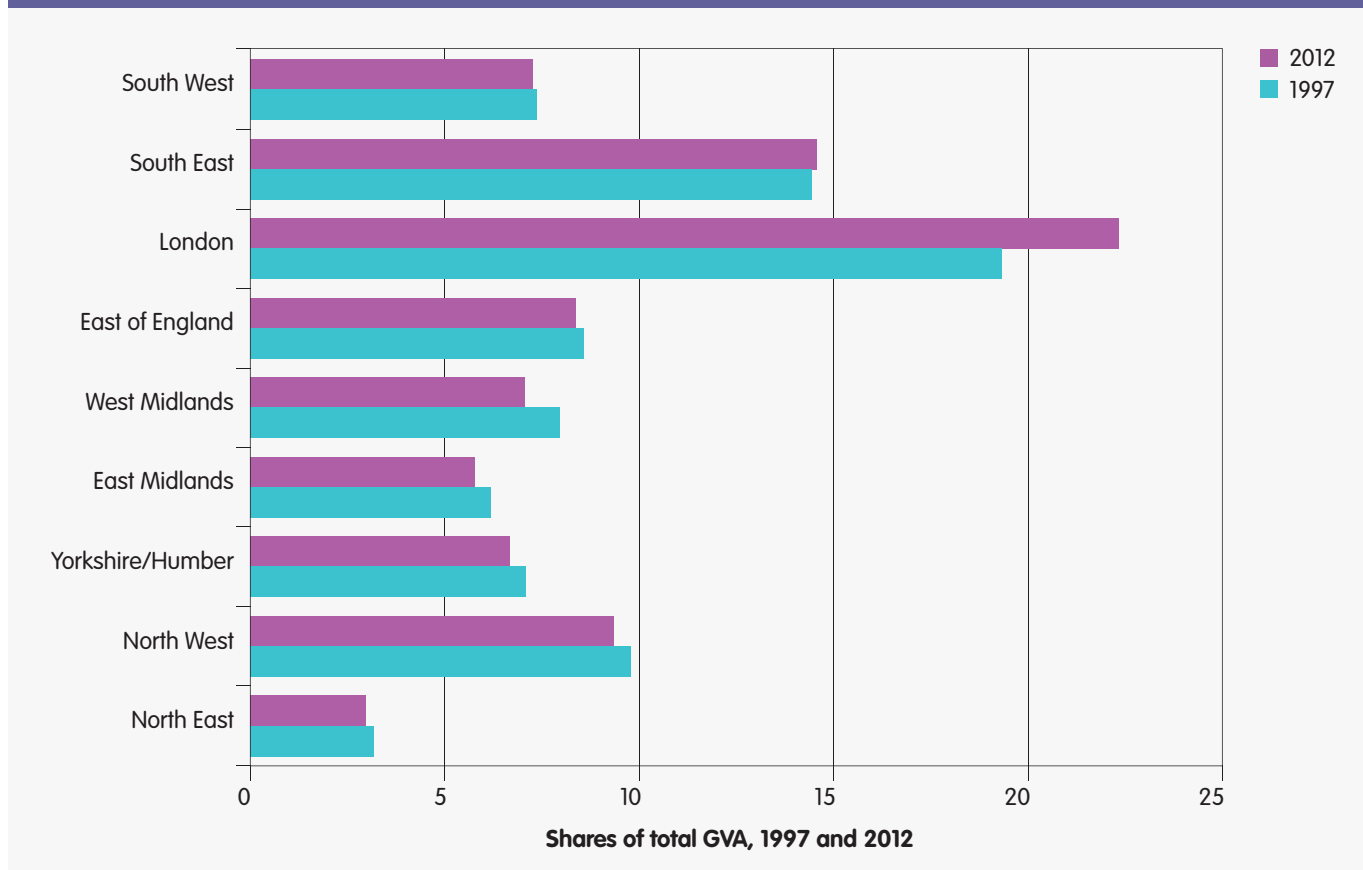
**Staffordshire University:  
Aynsley China Research and impact  
via Flux Stoke-on-Trent**

As a result of a KTP research project for Aynsley China Ltd, Staffordshire established the Flux ceramics spin-out company. Since 2010 Flux has produced award-winning design that has been successful in terms of both sales and valuable contribution to contemporary tableware. In addition, it caught the attention of numerous national newspapers and magazines. Flux is sold via a broad spectrum of outlets and has been showcased in the British Embassy in Bern and at prestigious trade fairs. The research has created opportunities for MA Ceramic Design students also.

**University of Sunderland: Improving clinical  
outcomes in the treatment of the ‘superbug’  
bacterial pathogen – *Pseudomonas aeruginosa***

Research in collaboration with a multi-disciplinary team resulted in a new chromogenic substrate for the rapid detection and specific identification of the bacterial pathogen *Pseudomonas aeruginosa*. This ‘superbug’ threatens many thousands of hospital patients annually leading to poor clinical outcomes and increased risk of mortality. bioMérieux adopted the technology for a new product, ChromID® P which was launched in the EU, USA and Australia: Sunderland's research supports the company's commercial position as leaders in this field.

Figure 5: Share of GVA growth for English regions, 1997 and 2012



Source: ONS, Regional Growth Value Add (Income Approach), December 2013<sup>20</sup>

**“The impact of research funding policies upon regional capacity and growth appears to have been given little thought by government.”**

<sup>20</sup> <http://www.ons.gov.uk/ons/rel/regional-accounts/regional-gross-value-added-income-approach-/december-2013/stb-regional-gva-2012.html#tab-Regional-GVA-estimates-analysis>

## Research funding in the UK: the current system

### Quality-Related Research funding

The preferred research funding policy of successive UK governments is referred to as the dual support system. A significant part of this system relates to the direct grant provided by the four funding councils<sup>21</sup> to universities. This is based on an assessment of the quality of a selection of research submitted by universities on a periodic basis. The assessment of research quality is undertaken by peer review and until 2009 was referred to as the Research Assessment Exercise (RAE). As a result of Treasury concerns that the increase in investment provided by the 2004-14 Science and Innovation Framework would not produce the gains in growth envisaged under the RAE system, a consultation on the latter was undertaken in 2006.<sup>22</sup>

The Research Excellence Framework (REF) replaced the RAE in 2010 and is being used to assess the quality of research for the period 2008-2013 with the outcomes due at the end of 2014.<sup>23</sup> This will then inform the UK funders' allocation of recurrent research investment from the 2015-16 financial year onwards.

The new REF takes some account of the impact of research but many elements of the old RAE system have been retained. Because of the link with a quality assessment, this direct grant to universities from the Funding Councils is referred to as Quality-Related (QR) research funding, or sometimes recurrent research funding.

In 2012-13 approximately £1.5bn of taxpayer money was invested in QR research funding for universities in England. However, the purpose of QR funding and the formula used to allocate it after quality assessments have been undertaken have changed over time, and have been subject to ministerial intervention.

These interventions have impacted on the resource available in universities to support research and progress government ambitions to promote economic growth via science and research investment. They have also impacted on the unit of resource and facilities available for students and businesses. Since 2010 a funding system, already geared towards the concentration of funding in a small number of universities, has become even more concentrated. The disadvantages of this approach were identified by Universities UK in 2009.

**“While concentration of research activity supports excellence, it also has implications for the health and dynamism of the research base as a whole. If the result of concentration in the system is that most research is carried out by a small number of institutions, this could be at the expense of research diversity, in terms of the number and type of institutions able to support significant levels of research activity in different disciplines.”<sup>24</sup>**

<sup>21</sup> The four funding councils are: the Higher Education Funding Council for England (HEFCE), the Scottish Funding Council (SFC), the Higher Education Funding Council for Wales (HEFW) and the Department for Employment and Learning in Northern Ireland (DELNI).

<sup>22</sup> <https://www.education.gov.uk/consultations/index.cfm?action=conR esults&consultationId=1404&external=no&menu=3>

<sup>23</sup> Background on the REF changes are available at: <http://www.ref.ac.uk/background/proposals/>

<sup>24</sup> UUK 'Monitoring research concentration and diversity: changes between 1994 and 2007' pub 2009.

## Research funding in the UK: the current system continued

### The Research Councils

The second aspect of the dual funding system is the funding made available to the seven Research Councils<sup>25</sup> by the Department for Business, Innovation and Science (BIS). In 2012-13 Research Council funding amounted to approximately £1.5bn. Funding for the Research Councils varies across the different Councils – from approximately £780m for the Engineering and Physical Sciences Research Council to £98m for the Arts and Humanities Research Council (2015/16 figures).<sup>26</sup> The Councils award grants on the basis of peer review of projects and research on the basis of competitive bids. However, the focus of Government policy since 2010 has been one of more selectivity and funding concentration. As a result even though research users are now included on Research Council panels the allocation of Research Council funds has followed a similar pattern of concentration.

Between 2009-10 and 2012-13, the funding available from the seven Research Councils (and the Royal Society, British Academy and Royal Society of Edinburgh) to universities across the UK decreased in total by 3%. For the majority of institutions, funding decreased by far more (11%) in the same period while a small minority of institutions saw funding increase by nearly 2%.

In 2012-13, three quarters of the funding available from the Research Councils and national academies was shared by 22 institutions.

### Higher Education Innovation Fund (HEIF)

In addition to the dual support system, the Government established the Higher Education Innovation Fund (HEIF) in England in 2001 to provide a further stream of funding. This was designed to support and develop a broad range of knowledge-based interactions between universities and the wider world to add economic and social benefit to the UK.

Funding for HEIF increased to £238m for the 2006-08 period and allocation moved from a competitive to a formulaic basis, with a cap on the total amount per institution to enable a more equitable and wider distribution. HEIF is allocated as part of HEFCE's support for knowledge exchange. In the 2014-15 allocations to institutions funding had been reduced to £150m.<sup>27</sup> In 2011 the Coalition Government asked HEFCE to review the formula. At the time million+ noted:

"It appears that the agenda of greater selectivity which is being applied to research funding is being transferred to HEIF funding without any clear or persuasive cost-benefit analysis or evidence base to demonstrate that this is the most effective use of taxpayer funding. This undermines the purpose of HEIF, will reduce the probability of new interventions on a more geographically dispersed basis and will discriminate against some strategically important sectors of the economy such as the creative industries."<sup>28</sup>

**"In 2012-13, three quarters of the funding available from the Research Councils and national academies was shared by 22 institutions."**

<sup>25</sup> The 7 Research Councils are: Engineering and Physical Sciences Research Council, Biotechnology and Biological Sciences Research Council, Medical Research Council, Economic and Social Research Council, Arts and Humanities Research Council, Natural Environment Research Council, Sciences and Technology Facilities Council.

<sup>26</sup> 2015-16 figures announced by the Department for Business, University and Skills in February 2014: <https://www.gov.uk/government/publications/science-and-research-funding-2015-to-2016>

<sup>27</sup> Details of HEFCE's grant allocations can be found on its website at: <http://www.hefce.ac.uk/whatwedo/invest/institns/annalocns/>

<sup>28</sup> million+ *HEIF Consultation*, April 2011.



Following the government's intervention, the HEIF formula was amended. As a result, some universities saw significant reductions in HEIF funding in 2011-12 while others were excluded from HEIF on the grounds that the value of the relevant activities did not meet a minimum income threshold. In comparison, institutions which benefited significantly from HEFCE and Research Council funding have received additional HEIF allocations. This approach undermines the potential for new initiatives and is a further example of policies that concentrate resources into a smaller number of institutions.

### Technology Strategy Board

The Technology Strategy Board (TSB) was set up in England in 2006 as an independent non departmental public body. Its current role as the UK's innovation agency is to stimulate innovation, working with business and other partners, in order to accelerate economic growth. Its budget for 2013/14 was £440m.<sup>29</sup> The TSB has a number of different investment tools in its remit to achieve its aims, including Catalysts and Catapult Centres and innovation voucher schemes. While TSB investment does offer a significant contribution to the UK's research funding, specific priorities and the large size of schemes restricts access to funding by smaller and medium sized enterprises (SMEs) and some parts of the higher education sector. There is less scope for the creative industries compared to STEM research. The tendency is to direct priorities rather than encourage responsive mode applications (i.e. where the research activity and scope is determined by the applicant rather than the funder).

An innovation voucher scheme was established to connect businesses with experts, including university researchers, to support innovation and growth. However, despite being small sums of funding per voucher (£5000) the scheme requires businesses to bid for funding on the basis of centrally determined priorities. The latter are focused on STEM industries, excluding SMEs focused on creative or service oriented activities.

The creative industries are dominated by SMEs, micro businesses and owner-managers and are widely acknowledged to be one of the UK's most successful and fastest growing sectors. However, neither the TSB's innovation vouchers scheme nor the Government's industrial strategy have identified this sector and the SMEs which operate within it as a priority.

### Scotland

Partial support of knowledge transfer that excludes some institutions is an English trait. The funding environment for knowledge exchange and transfer in Scotland takes a much more inclusive approach to supporting this area of university activity. From academic year 2014-15, all Scottish higher education institutions will receive baseline support from the Scottish Funding Council – £140,000 per annum.<sup>30</sup> This is through two grant programmes – Knowledge Exchange Grant and Knowledge Transfer Grant. Institutions receive £70,000 through both programmes, with further knowledge transfer grant funding available on a formulaic basis.

### International and European partnerships

Taxpayer investment in the research activities of universities adds value in a number of ways. Research and knowledge exchange activities are international and researchers and universities across the sector collaborate with other researchers, research teams and institutions on a global basis. Universities also compete for research funding made available via the EU budget in the context of the Framework Programmes, now renamed Horizon 2020. The funding awarded to UK universities from the EU has increased by 53% since 2009-10. In 2012-13 UK institutions received approximately £690m in EU grants and contracts.<sup>31</sup> This is in contrast to UK funding for research, which has been held at flat cash levels since 2009-10 – which is effectively a £1.1 billion cut in funding by 2015-16 owing to the impact of inflation.

<sup>29</sup> Further information about the Technology Strategy Board is available at: <https://www.innovateuk.org/about-us>

<sup>30</sup> Details of the Scottish Funding Council's research and knowledge exchange funding support for institutions from academic year 2014-15 are available at: <http://www.sfc.ac.uk/communications/Announcements/2014/IndicativeUniversityFundingDecisions2014-15.aspx>

<sup>31</sup> million+ analysis of HESA Finances 2009-10 to 2012-13.

## Changing the research assessment goalposts

Unlike many competitor countries, including the United States, the UK's elaborate system of research assessment has dominated research activity for over 25 years. Every four or five years, huge efforts are put into assessing the quality of the research conducted by universities, with a view to influencing the amount and patterns of investment in research from the four UK funding bodies. In 2008 the then government adopted the principle of funding excellence wherever it was found. However, the definition of excellence has been subject to change, meaning that we have seen a pattern of hyper-concentration of research funding into fewer universities.

### A brief history of research assessment

Whilst there were precursors to it in the 1980s, in RAE 1992, the descriptors used in the ratings of research referred to "excellence" across all points of the scale. It was a 5 point scale that rightly acknowledged "international excellence" as best, but also accepted that it was possible for there to be excellent research across the whole sector, albeit with different levels of recognition.<sup>32</sup> For RAE 1996, "excellence" was referred to in exactly the same manner. A new top level was introduced to provide scope to rate units of assessment where the majority of research was "internationally excellent" (5\*). This laid the foundation for an assessment scale which favoured concentration.<sup>33</sup>

RAE 2001 continued to refer to "excellence" throughout the ratings scale, but also clearly stated one of the key funding consequences of the exercise was that "institutions conducting the best research (should) receive a larger

proportion of the available grant so that the infrastructure for the top level of research in the UK is protected and developed."<sup>34</sup>

RAE 2008<sup>35</sup> again made significant changes in how assessed research was classified, with quality profiles classifying research according to four levels. An overall assessment for a unit of assessment was not provided.

One of the key changes came in the language used to describe the classifications – no longer were "excellence" or "excellent" used as descriptive words, except at one of the levels. Crucially these policies have resulted in research of national significance being no longer recognised for funding. Since 2010 research classified at 2\* (i.e. internationally recognised in terms of its originality and significance) has also been marginalised. As a result, there has been a year by year reduction in the amount of research funding allocated to the majority of universities, which, in practice, is a reduction in government investment in the majority of students studying at UK universities.

**Table A1: Overall quality profile: Definitions of starred levels**

Four star	Quality that is world-leading in terms of originality, significance and rigour.
Three star	Quality that is internationally excellent in terms of originality, significance and rigour but which falls short of the highest standards of excellence.
Two star	Quality that is recognised internationally in terms of originality, significance and rigour.
One star	Quality that is recognised nationally in terms of originality, significance and rigour.
Unclassified	Quality that falls below the standard of nationally recognised work. Or work which does not meet the published definition of research for the purposes of this assessment.

Source: REF2014 – Assessment framework and guidance on submissions (July 2011)

<sup>32</sup> See [http://rae.ac.uk/1992/c26\\_92.html#annexc](http://rae.ac.uk/1992/c26_92.html#annexc)  
The top two ratings – 4 and 5 – required that national excellence be present in virtually all areas of research. The third rating – 3 – required "research quality that equates to attainable levels of national excellence in a majority of the subareas of activity, or to international level in some." Bands 1 and 2 were for national research excellence in no areas, or in up to half the areas of activity.

<sup>33</sup> See [http://rae.ac.uk/1996/c1\\_96.html#annexc](http://rae.ac.uk/1996/c1_96.html#annexc)

<sup>34</sup> See <http://rae.ac.uk/2001/AboutUs/>

<sup>35</sup> See <http://rae.ac.uk/aboutus/quality.asp>

# “These changes to the funding calculations have reduced public investment in research in a large number of universities, despite them being assessed as producing research that is recognised as internationally excellent.”

## The impact of redefining excellence

The four national funding councils used the results from RAE 2008 to allocate funding to the relevant universities in 2009-10. Following the May 2010 election, the distribution formula was amended so that more funding was targeted at 4\* research<sup>36</sup> by ‘steepening the slope’. For 2011-12, the weighting applied to 2\* research was reduced and as a result less funding went to universities that had produced such internationally recognised research. In 2012-13, the funding formula was adjusted again.

This had the impact of increasing recurrent research funding to universities in the Russell Group by 0.27% overall, while the funding to all other universities fell by 3.5%. When the weighting attributed to 2\* research was reduced in 2011-12, the change in funding was 0.34% and -4.02% respectively. However, this then prompted significant declines in funding to modern universities – those that have gained title since 1992 and where the majority of HE students study. The change in weight attributed to 2\* research meant that between 2010/11 and 2011/12 research funding in modern universities fell by 8.32%.

The impact of this reduction of funding was magnified even further in 2012-13 when the funding councils removed the 2\* rating from the calculations altogether. This increased the amount of research funding going to Russell Group universities by 2.4%, but reduced investment in research at all other universities by 2.64%. Again, the decrease in research funding investment in modern universities was more significant – a reduction in one year of 7.28%.

In RAE 2008, research intensive universities were assessed as having 62% of research at 3\* or 4\* level, but by 2012/13, they were in receipt of 68% of the funding council recurrent research and 71% of the total amount of funding available from the funding councils and research councils combined. In contrast, modern universities, which received very modest levels of public investment for research, were assessed as having 9% of research at 3\* and 4\* but only received 0.07% of funding council recurrent research in 2012/12, and 5% of the total funding council and research council allocations.<sup>37</sup>

<sup>36</sup> The ratios for 2\*, 3\* and 4\* research changed from 1:3:7 to 1:3:9 respectively.

<sup>37</sup> million+ analysis of HESA Finances 2012-13.

## Changing the research assessment goalposts continued

Over the four year period between 2009-10 and 2012-13, research funding has increased by just over 3% across the Russell Group but the total allocated to all other universities has reduced by 10%. Across the UK countries, only Scotland has seen an increase in this period.<sup>38</sup> The other three countries have all seen a reduction in research funding: in England of 1.94%, in Wales of 5.10% and in Northern Ireland of 6%. However, the most significant declines of any group of institutions are those suffered by modern universities - a reduction of almost 17% between 2009/10 and 2012/13. This is all without any re-assessment of the quality of research.

**> In 2012-13, 25% of the UK's total recurrent research funding was allocated to five universities, 50% to twelve universities and 75% to 31 universities; the remaining 130 universities shared 25% of recurrent research funding<sup>39</sup>**

### London South Bank University: Fitflop Ltd

LSBU's Sports and Exercise Science Research Centre (SESRC) was asked to design a footwear technology that increased lower limb muscle stability. After several attempts at a prototype, a design was approved and tested then Microwobbleboard technology was created. Since 2008, Fitflop have sold 22 million pairs of shoes, growing from 17 employees then to 160 in 2012. The brand has grown to a multi-product international manufacturer and retailer. It has a presence in 58 countries, and each shoe sold includes an acknowledgment of LSBU's role in the development of the footwear.

### Recommendation

- New approaches are needed to ensure taxpayer investment in research is more widely distributed so that businesses, wherever they are located, can benefit from the expertise of research staff and so that students get a better deal

These changes to the funding calculations have reduced public investment in research in a large number of universities, despite them being assessed as producing research that is recognised as internationally excellent.

These policies, and the greater use of critical mass thresholds and restrictions on doctoral training centres by the Research Councils, have wide-ranging impacts. Funding for research infrastructure has fallen in the majority of universities. The capacity for universities to deploy research staff to work with business and on projects and areas of social benefit and of wider societal interest has been reduced at the very time that the economy has been struggling to return to growth.

### Middlesex University: Argentium Silver research

Argentium is a sterling silver alloy with unique properties and has inspired jewellers to develop designs retailing in over 1220 British high street shops. Middlesex's research showed that Germanium possessed many properties in alloy with silver: fire scale elimination; high tarnish resistance; precipitation hardening and simple heat-hardening properties; increased ductility; increased thermal and electrical resistance (making alloys suitable for welding and laser forming); and environmental advantages (associated with not having to remove, or plate over, fire scale). This research has contributed to the total tonnage of the new alloy shipped which is quite difficult to estimate but around 40 tonnes of Argentium are currently being sold annually making a significant contribution to the specialist market for a unique silver alloy.

<sup>38</sup> Though its increase of 2.94% it is still less than the increase in total funding received by Russell Group universities.

<sup>39</sup> million+ analysis of HESA Finances 2012-13.

“Taxpayer funding has also been concentrated geographically, notwithstanding the need to promote innovation in cities and sub-regions on a wider basis and outside the ‘golden triangle’ of institutions in England.”

**University of Bedfordshire:  
Safeguarding young people affected  
by sexual violence and exploitation**

Child protection policy and practice has largely ignored young people’s experiences of child sexual exploitation (CSE) and peer-on-peer violence. Law enforcement and child protection responses are not integrated, resulting in oversimplified interpretations of young people’s victimhood and criminality. Bedfordshire has the only research centre in Europe exclusively targeting these problems *The International Centre: Researching Child Sexual Exploitation, Violence and Trafficking*. The centre: works with four UK children’s charities to prevent CSE; directs funding to CSE practitioners by coordinating 23 trusts and runs a ‘CSE research forum’ which engages over 500 practitioners and researchers. It also enables CSE victims to gain internships and employment and offers skill development opportunities. Research findings have been used to: create tools for all English Local Safeguarding Children’s Boards and to evaluate service provision within Scottish, Irish and English governments.

**Anglia Ruskin University:  
Recovery from ill mental health**

Anglia Ruskin’s research into the betterment of ill mental health has been used to inform the development of services to support the recovery of patients, by enabling regional users of mental health services to return to or gain employment or education. As a result of the research between 2008 and 2013, 396 service users have gained employment and 427 are in education.

## Changing the research assessment goalposts continued

Taxpayer funding has also been concentrated geographically, notwithstanding the need to promote innovation in cities and sub-regions on a wider basis and outside the 'golden triangle' of institutions in England.<sup>40</sup> Rarely mentioned, but of equal importance, is the fact that the distribution of research funding directly impacts on the resources and facilities available to students. For all of these reasons, the next government must adopt a new approach to the research funding that taxpayers provide.

### Recommendations

- The UK Government should continue to fund excellent research wherever it occurs in universities but amend the criteria to avoid critical mass thresholds excluding smaller units of researchers from funding allocations
- Funding for 2\* research should be restored and an expanded science and innovation budget deployed to invest in research of national significance

### Bath Spa University: Alcohol, culture and public policy

The research into British drinking culture undertaken by the School of Heritage and Cultural Industries has shaped regional and national alcohol policy in both England and Scotland. Research into the historical and political perspectives on alcohol consumption in the UK formed the basis of evidence to the Health Select Committee and a subsequent report that concluded Government had the capacity to influence drinking behaviours. In addition collaborative work with Alcohol Focus Scotland on the 'Rethinking Alcohol Licensing' project contributed to amendments to the 2005 Licensing Act.

### University of East London: Pedagogical research across public and political spheres funded by Engineering and Physical Sciences Research Council (EPSRC)

EPSRC's project: '*Game Theory and Adaptive Networks for Smart Evacuations*' involved collaborative work with policy officials from the Cabinet and Home Offices, local authorities, and the US Department of Homeland Security. The project focused on the implications of new media such as Twitter and Facebook on disaster education in a large-scale evacuation. The EPSRC project has informed emergency policy, planning and practice at city-wide levels across the nation.

**“Rarely mentioned, but of equal importance, is the fact that the distribution of research funding directly impacts on the resources and facilities available to students.”**

<sup>40</sup> The golden triangle is an unofficial term used to refer to the universities of Oxford and Cambridge as two points of the triangle, with the London School of Economics, University College London, King's College London and Imperial College forming the third point.

## Impact of hyper-concentration of funding

### Inequity for students

The greatest inequity in the unit of resource available in institutions arises from policies which have promoted hyper-concentration of research funding. Research enjoyed higher levels of capital and revenue investment for a decade when compared to the investment allocated to higher education teaching. The latter often had to accommodate additional student numbers or new initiatives. Since 2012 direct grant for teaching funding has been replaced by student loans with a series of other reductions in specific funding streams.

Research funding supports not only research activities but also facilities such as learning resource centres, laboratories and other resources.

It is therefore surprising that universities that have been awarded both taught and research degree-awarding powers have no guarantee of investment from the public purse to support their research infrastructure and research-informed teaching and learning.

The overall level and distribution of taxpayer investment in science and innovation therefore raises fundamental questions for students, businesses, universities and government.

Since 2012 the government in England has adopted two fundamentally different approaches to the funding of the activities to which Robbins referred. On the one hand a free market approach has been applied to teaching funding with private higher education providers incentivised

### Middlesex University: Flood Hazard Research Centre

Middlesex University's research centre has more than 40 years of accrued research knowledge and data which has helped inform decision making on schemes that have saved the UK billions of pounds in flood damages and protected hundreds of thousands of people. The centre also does vital work on flood plan management in relation to climate change and coastal erosion. The research has saved the UK £3bn with a host of overseas projects (e.g. in Bangladesh) with substantial positive cost benefit ratios.

### University of Bolton: A new biomaterial fibre developed for wound dressings

In the UK chronic wounds need careful maintenance and represent a significant burden to some 200,000 patients and the NHS. The impact of the multifunctional biomaterial developed at the University of Bolton is highly significant in providing simultaneous management of such wounds. Sumed International, the exclusively licenced company is currently producing the fibre in Taiwan and processing it into dressings to be sold in the UK and worldwide. With the anticipated fibre products Sumed believes sales of \$250m – \$500m can be achieved.

to enter the market and the deregulation of all student numbers in 2015. On the other hand, the policies applied to research are at risk of creating a 'closed shop' approach to funding.

By concentrating research funding into a small number of institutions, policy makers are contradicting the principle that research excellence should be funded wherever it is found. Removing investment from institutions that are producing research of national and international quality undermines the resources available for students in institutions which have been most successful in widening access to higher education.

## Impact of hyper-concentration of funding continued

In 2012-13 there were 2,340,275 higher education students (undergraduate and postgraduate) in UK universities. 536,440 were studying at postgraduate level. The amount of recurrent research funding allocated to UK universities was £1,944,369,000, an average of £831 across all students, or £3625 for postgraduate students. However, despite more students being taught at modern universities at both undergraduate and postgraduate levels, the average recurrent research investment was only £127 for all students or £661 for postgraduate students. This compares to corresponding figures of £2353 and £8136 across the 24 Russell Group universities. The investment per postgraduate student in modern universities is around 12 times less than in Russell Group universities, despite far larger numbers of students.

This matters because mainstream QR research investment is not targeted at individual academics or research projects. Universities use it to support a wide variety of activities that maintain and improve their research environment and other facilities.

### Recommendation

- Account should be taken of the impact of government investment strategies in research on the institutional unit of resource available to invest in the student experience

### Risks to the strength of research infrastructure and capacity

The strength of the UK's research base relies on creating an environment whereby academics have the opportunity to develop and hone their skills as they progress through their career. A policy of hyper-concentration potentially limits the opportunities for researchers producing work of international standing to develop into world leading researchers.

#### University of Sunderland: Expanding the donor pool for kidney transplantation

Research undertaken by the University of Sunderland with the Newcastle Hospital's Transplant Unit led to the authorisation of two new transplant processes and has resulted in the much needed expansion of the kidney donor pool. This has led to a new device being created and adopted for the retrieval of human kidneys for transplant from Category II donors. Since 2012, kidneys removed due to small renal tumours are now available for transplant.

#### University of East London: Interventions improving the wider factors of health and wellbeing via Well London Project

This scheme was delivered by an alliance of seven public and voluntary sector organisations with the University being the sole academic partner. UEL was responsible for the design, management and delivery of Well London's community engagement and development strand, and for the whole-programme evaluation. Their primary research informed the design of health improvement interventions delivered through the £73 million project. Its findings have driven Big Lottery funding priorities, contributed to parliamentary debates on health, guided Local Government and led to the commission of new services and delivery approaches by health authorities.



By reducing investment in such a large number of institutions the government risks harming the strength of the research base and reducing long-term capacity. The base of the pyramid needs to be strong, stable and sustainable in order to support a research environment that enables work of world-leading quality in all universities.

In recent years, there have also been limited opportunities for universities to secure publicly-backed capital investment for their research owing to a focus on large scale projects and an overwhelming requirement to provide match-funding.

This lack of investment in university infrastructure is likely to impact on the long term capacity of institutions to maintain internationally recognised research in some disciplines and limit opportunities to compete for external funding.

#### London Metropolitan University: International Children's Law

London Metropolitan University's research explores the issue of international family law disputes and in particular how the law affects those involved in such cases. The research has had an extensive impact among lawyers, mediators, judges and families. The stimulus for the research was realisation that there was a pressing need for closer professional collaborations in order to deliver improved outcomes for affected families.

Research infrastructure across the sector will be at risk, especially if the policy of flat-cash funding settlements continues into the next spending round after 2015. In light of the new policies on open access to research findings, all universities will also need to invest significantly in institutional infrastructure.

In contrast announcements by the Scottish Government confirm the importance of every university conducting research and contributing to economic growth and development. Scottish Ministers are committed to investing in all universities to support research capacity, and have instructed the Scottish Funding Council to consider how it can fund new and emerging areas of research excellence.<sup>41</sup>

Government policy for research investment in English universities, however, is more narrow-minded. In short, England runs the risk of investing heavily in the roof, but neglecting the walls of its research output and base.

#### Recommendation

- All universities with research degree-awarding powers which currently do not benefit significantly from other taxpayer research funding should be guaranteed funds to invest in research infrastructure

**“The base of the pyramid needs to be strong, stable and sustainable in order to support a research environment that enables work of world-leading quality in all universities.”**

<sup>41</sup> As confirmed in paragraph 24 of the Letter of Guidance from the Cabinet Secretary for Education and Lifelong Learning to the Chair of the Scottish Funding Council on 31 July 2014. See [http://www.sfc.ac.uk/web/FILES/About\\_the\\_Council/SFC\\_letter\\_of\\_guidance\\_2015-16.pdf](http://www.sfc.ac.uk/web/FILES/About_the_Council/SFC_letter_of_guidance_2015-16.pdf)

## Conclusion

On every measure the UK lags behind its competitors in investment in research and development but additional public funding is only part of the answer. When compared to the Nordic and other countries where universities with research degree-awarding powers are funded to undertake research and translational research is highly valued, the UK risks being stuck in a rut. Definitions of research excellence have been narrowed. More taxpayer funding for research has been channelled to fewer and fewer universities. The talents of university staff and students and the capacity of universities to work with businesses, SMEs and the public sector in the UK and overseas are not being exploited to the full.

In Scotland there is a growing recognition that a new strategy is required, that new disciplines and emerging research areas should be valued and that all universities are part of the solution to the country's ambitions.

In comparison in England, research funding is increasingly seen as 'a closed shop'. This limits opportunities for business and the not-for-profit sector to access excellent research from universities in their localities but it also creates more inequity in the unit of resource for students who are entitled to access research facilities and research informed teaching in whichever university they choose to study.

The consequences of policies which have resulted in the hyper-concentration of research funding are clearly set out in this report but we also outline a series of recommendations and lay down a challenge to the political parties as they prepare their 2015 general election manifestos. If the next government is to step up to the innovation challenge and address imbalances in regional growth, it will need a new approach to research funding. These recommendations set out in detail how growth by research can support the regeneration of Britain.





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university agenda

**million+**

90 London Road  
London SE1 6LN

Phone 020 7717 1655  
Twitter: @million\_plus  
info@millionplus.ac.uk  
www.millionplus.ac.uk