HIGHER EDUCATION FUNDING COUNCIL FOR ENGLAND

Impact of the REF on UK Research

David Sweeney

25th September 2014

The Royal Society

‘No-one can predict the 21st century counterparts of quantum theory, the double helix and the internet. But there is little doubt that advances in science and technology will continue to transform the way we live, create new industries and jobs, and enable us to tackle seemingly intractable social and environmental problems.’

The British Academy

‘The quest for a better, deeper, more valuable life has always been at the heart of the Humanities and Social Science. They seek to illuminate the human condition and explain how economies, cultures and societies function. In addition to the intrinsic value of this quest, the insights it generates can guide – and promote – reasoned political and public discourse, by bringing fresh knowledge and ideas to the fore.’

The government's Plan for Growth

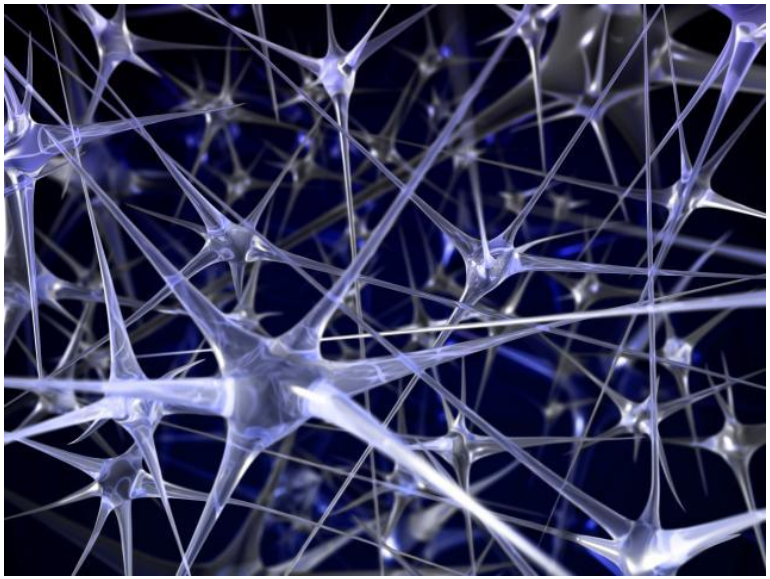
'The overriding priority of this government is to return the UK economy to balanced, sustainable growth…that is more evenly shared across the country and between industries.'

'Higher education is central to growth and the UK has one of the most successful higher education systems in the world.'

hefce

National Objectives (1)

- Intellectual leadership in the development of new knowledge
  - ‘International Comparative Performance of the UK Research Base’– ‘better than world average in all subject fields based on field-weighted citation impacts
  - ‘Well-rounded portfolio’

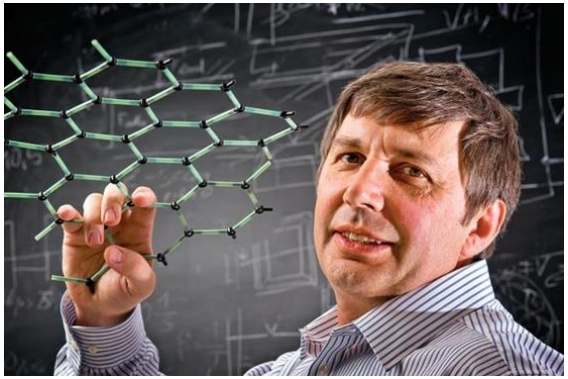


National Objectives (2)

- Optimal Contribution to Society from that new knowledge – ‘Impact’ and Innovation
    - Culture change & broad engagement of universities/academics
    - Greater investment from business, not just to capture cash but to support shared objectives
- ‘when do we want it?’ – Now, of course, but recognizing that is based on past investment.

National Objectives (3)

- Develop highly-skilled individuals who will take forward the challenge of developing and applying new knowledge



What is excellence in research?

- Codifying excellence
- Published outputs (of different kinds) at the heart of quality assessment
- Peer judgement is the main tool
- Sophisticated quality system developed on top of that
- RAE/REF assessment similar
- Both use concepts of significant, orginality and rigour

Dimensions of excellence

- Originality - Prizes for coming first, plaudits for coming second, nothing for coming third
- Rigour – replicable, recorded, thorough, deep
- Significance
- Framework can be constraining as well as enabling
- System appears to work well for the development of new knowledge- adaptation for contribution to society is not yet proven but being tested
- Impact – reach, significance, economic contribution?


International Comparative Performance of the UK Research Base – 2013
A report prepared by Elsevier for the UK's Department of Business, Innovation and Skills (BIS)
SciVal
ELSEVIER
Department for Business Innovation & Skills
BIS ANALYSIS PAPER NUMBER 03
Insights from international benchmarking of the UK science and innovation system
A report by Tera Allas
JANUARY 2014
4. Structures and incentives
2. Tale
3. Knowledge assets
1. Money

Five Key Messages

- The UK punches above its weight as a research nation
- The UK research base is well-rounded and impactful
- The UK is a focal point for collaboration and mobility
- The UK exhibits strong cross-sector knowledge exchange
- The UK research base shows potential vulnerability

The UK is a highly productive research nation

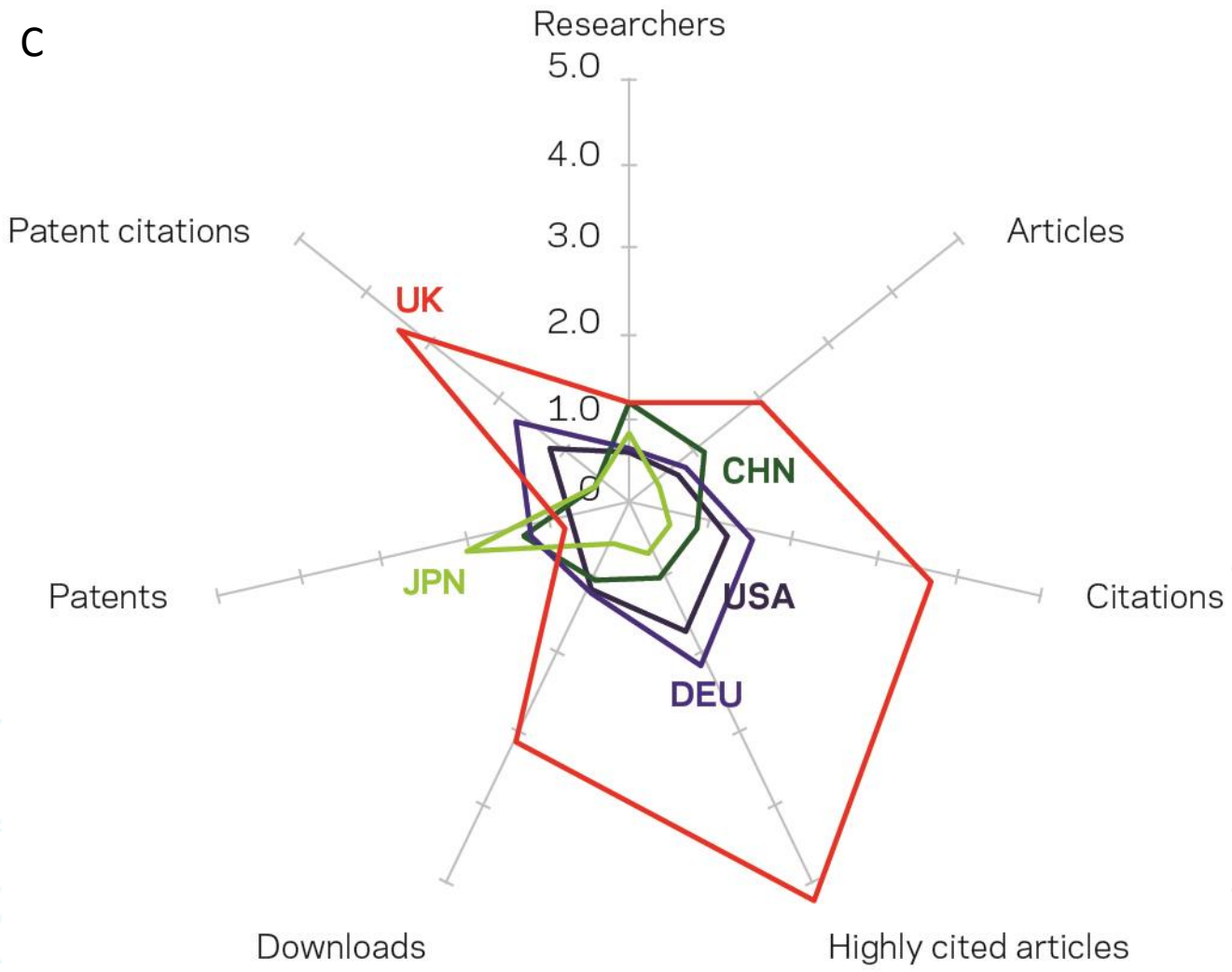
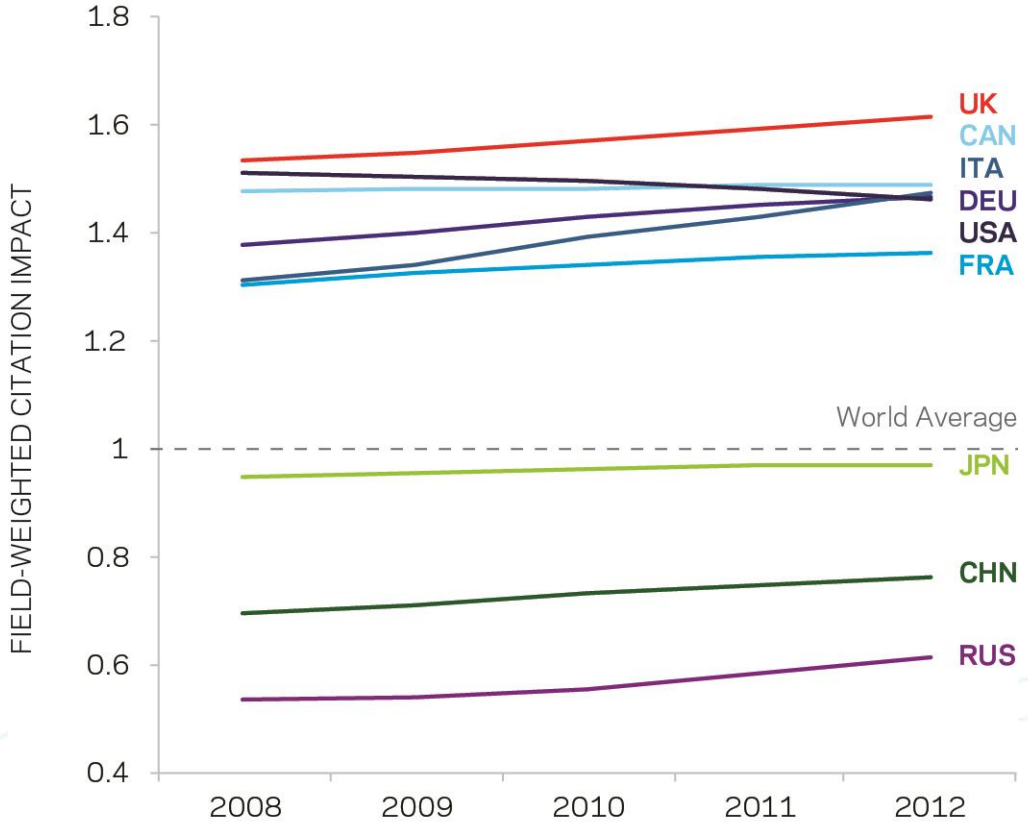


Figure 1.1 — Key input and output indicators for the UK and four key comparator countries (China, Germany, Japan and the US). **Panel C**: Relative share of key input and output indicators per unit GERD.

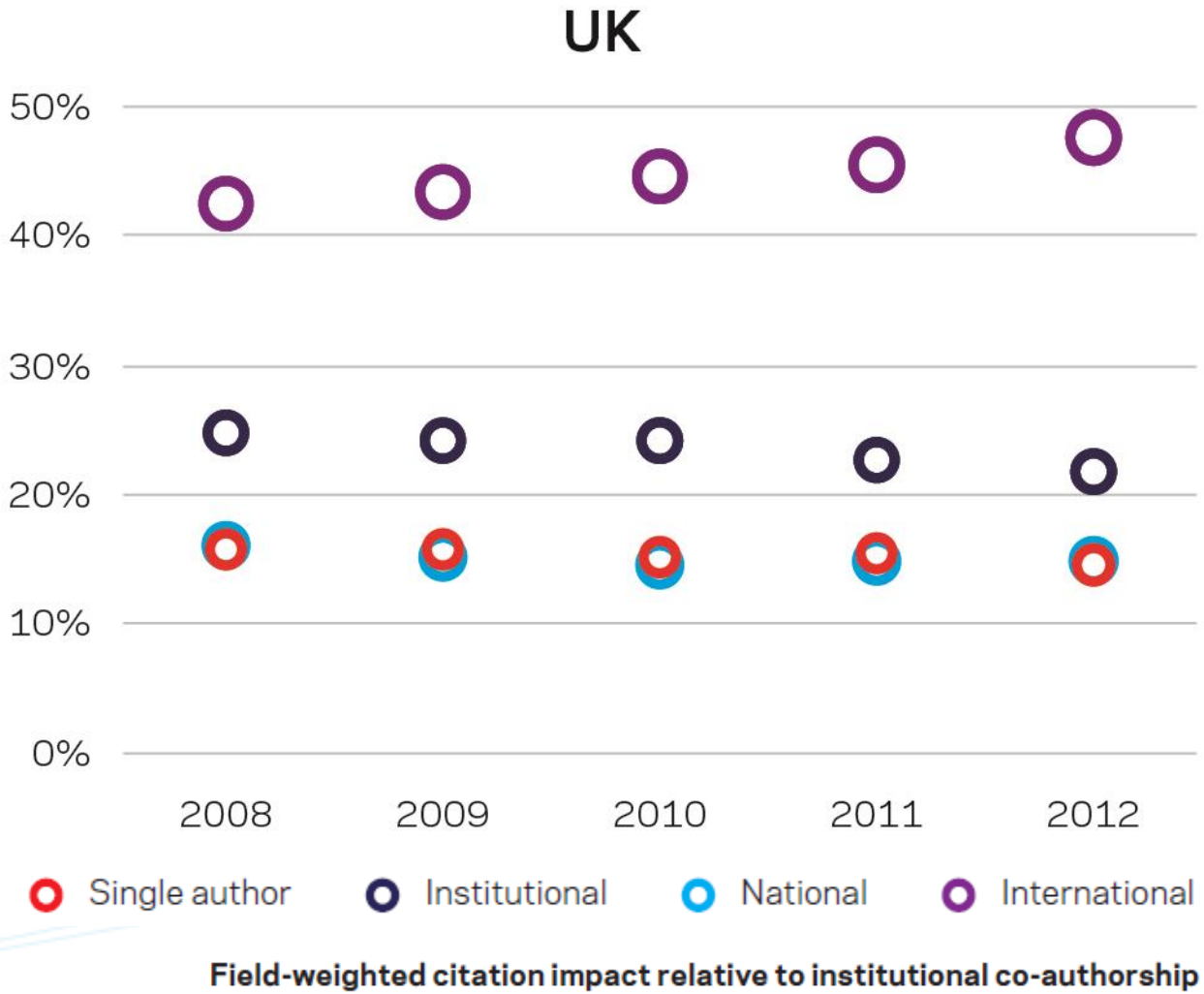
The UK ranks first amongst comparators on research quality



	2008	2012	Change 2008-12	CAGR 2008-12	UK Rank 2008	UK Rank 2012
UK	1.53	1.61	0.08	1.28%	-	-
G8	1.28	1.28	0.00	-0.04%	1	1
EU27	1.23	1.28	0.05	1.04%	5	6
OECD	1.09	1.07	0.02	-0.58%	7	8
World	1.00	1.00	-	-	8	9

Figure 4.6 — Field-weighted citation impact for the UK and comparators, 2008-2012. UK ranking in the World is amongst 76 countries with at least 1,000 articles in 2012, which includes all 41 OECD countries and accounts for 98.8% of the global article output.

UK researchers are highly internationally collaborative



Field-weighted citation impact relative to institutional co-authorship

Country	Single author	Institutional	National	International
UK	84%	100%	120%	161%

Figure 5.1 — Share of articles for the UK by co-authorship type, 2008-2012. Bubble size is proportional to field-weighted citation impact.
Table 5.1 — Field-weighted citation impact of single-authored, nationally- and internationally- co-authored articles relative to institutional co-authorship for the UK, 2012.

The UK is a well-rounded research nation

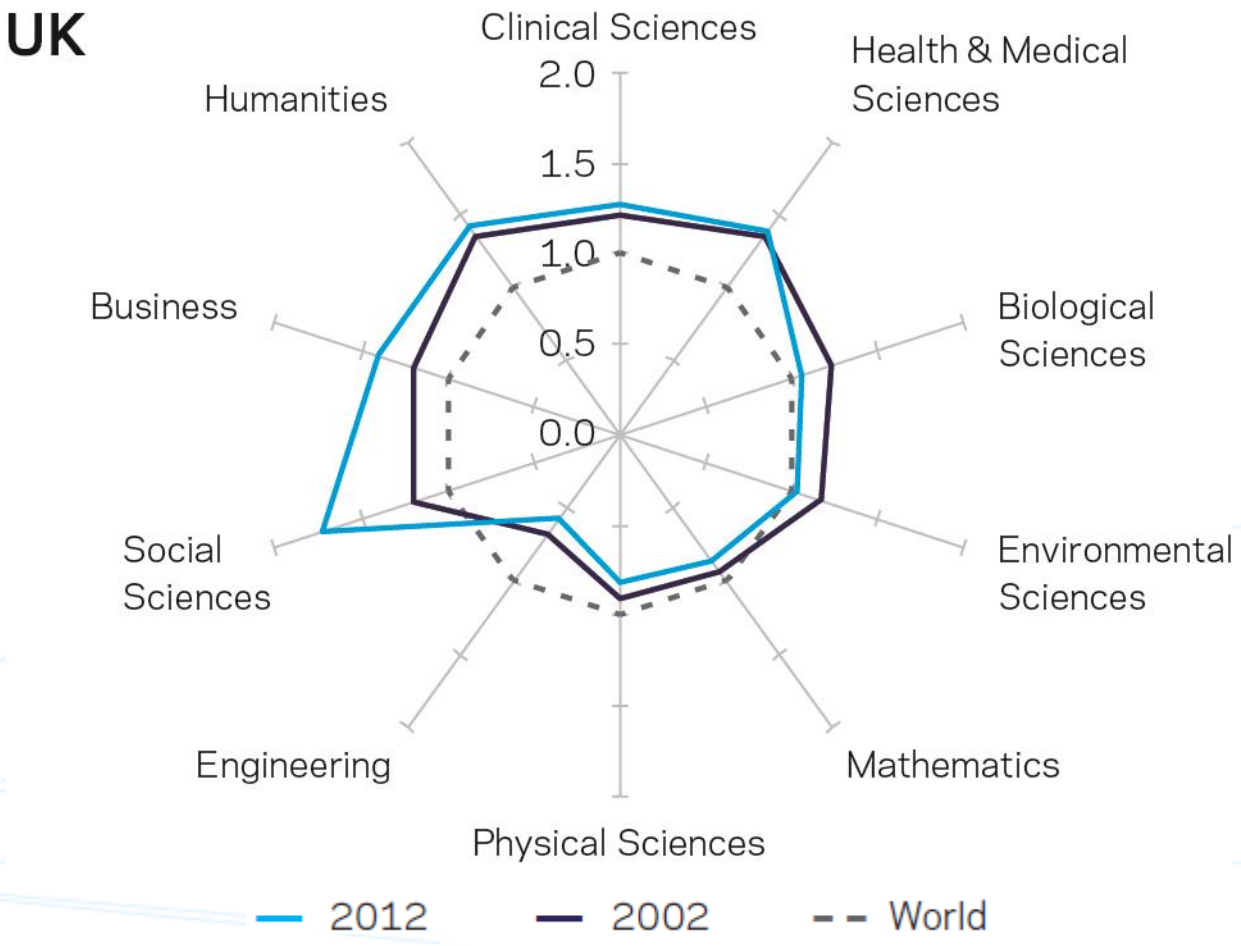


Figure 4.3 — Activity Index for the UK across ten research fields in 2002 and 2012. For all research fields, an Activity Index of 1.0 equals world average share in that particular research field. For Humanities, the baseline is defined with respect to OECD countries rather than to the world.

UK research quality continues to rise despite decreasing article share

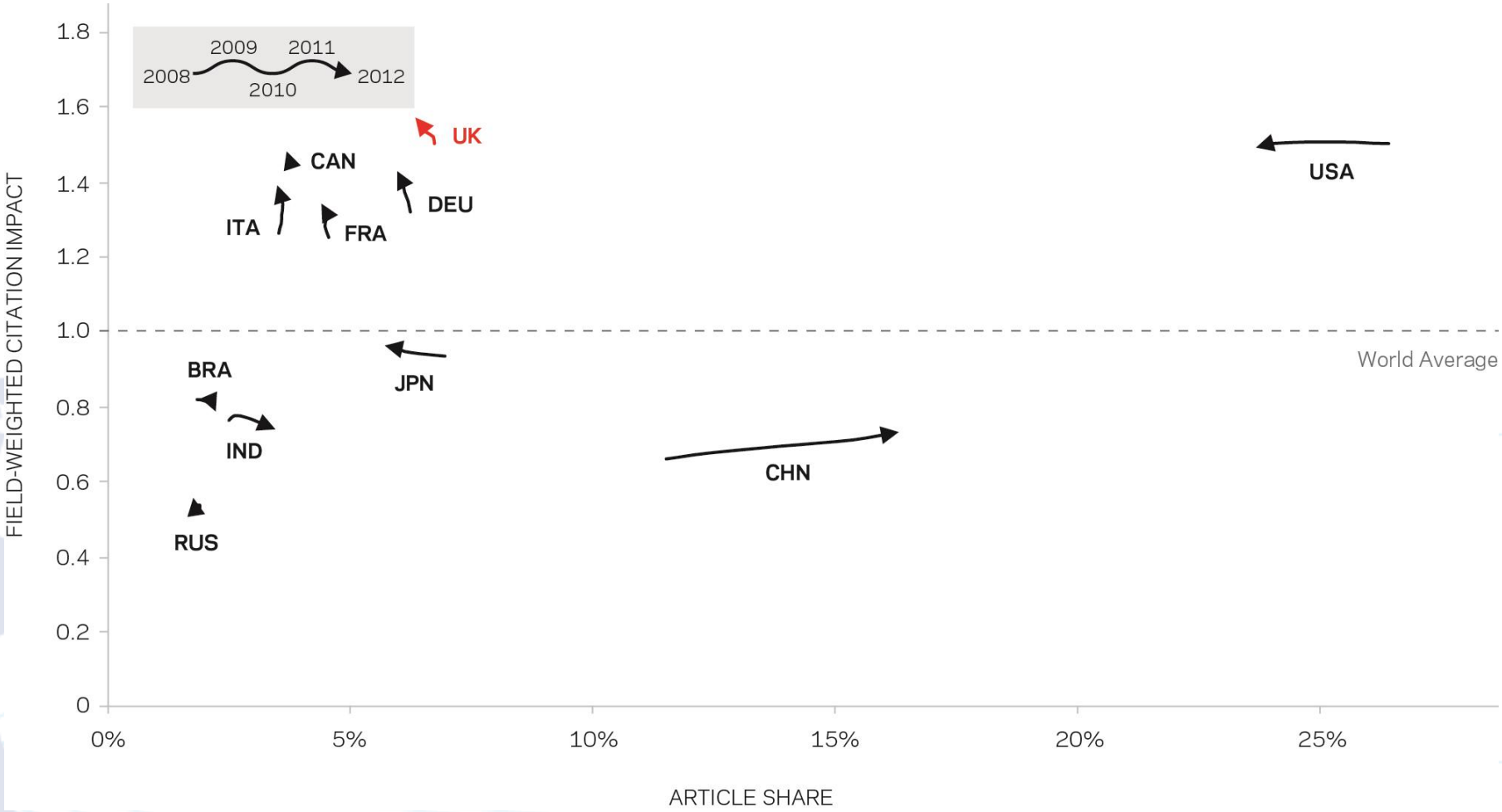


Figure 1.2 — Article share and field-weighted citation impact, 2008-12. **Panel A**: The UK and comparator countries.

UK research quality is world-leading in most research fields

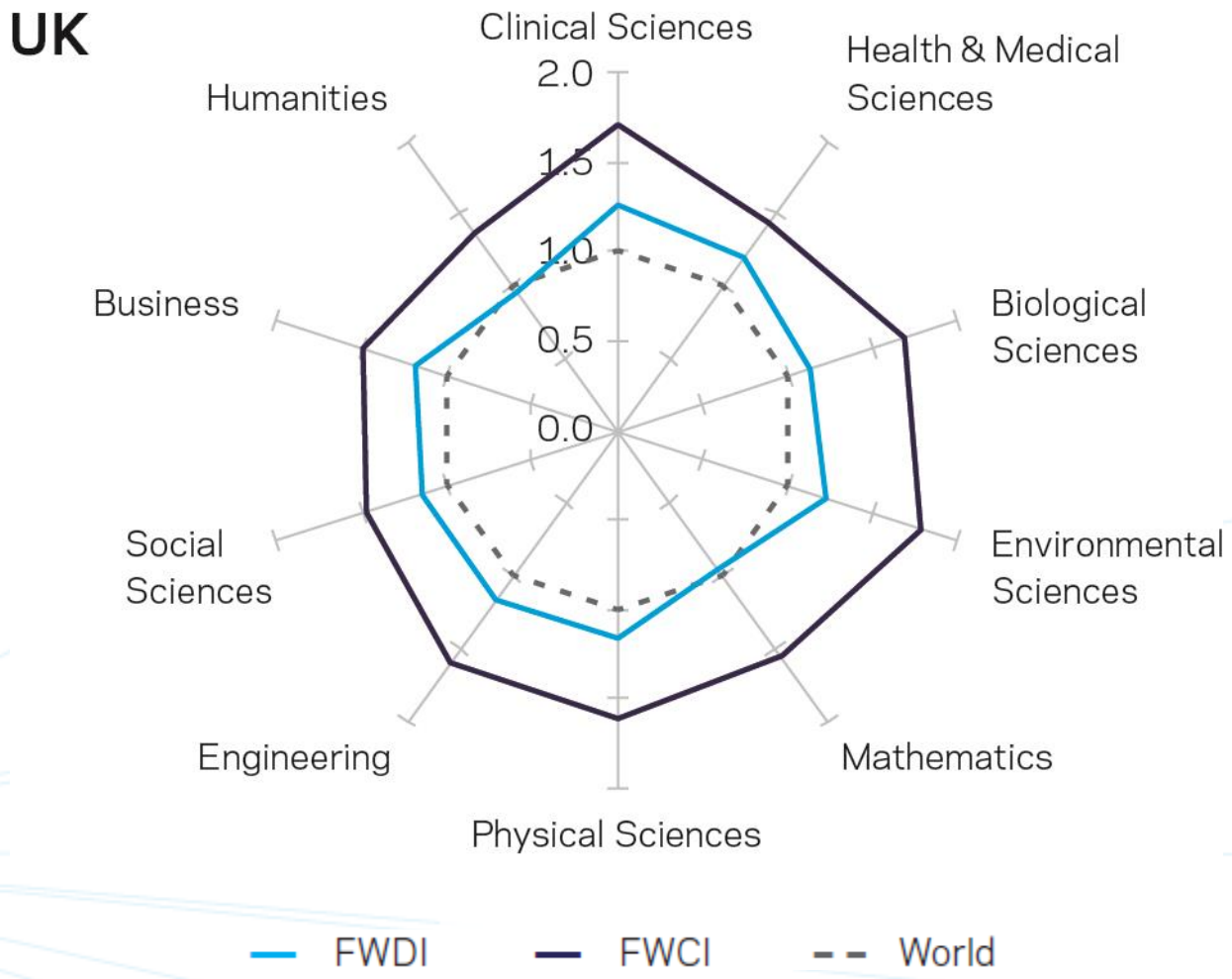
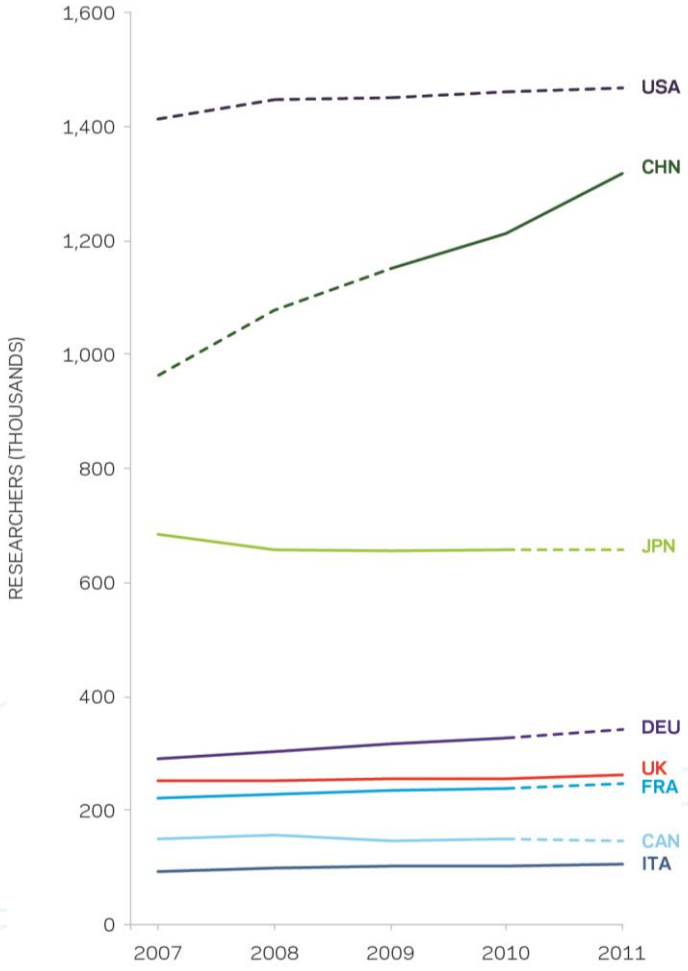


Figure 4.13 — Field-weighted citation impact (FWCI) and field-weighted download impact (FWDI) for the UK across ten research fields in 2012. For all research fields, a field-weighted citation or download impact of 1.0 equals world average in that particular research field.

The UK researcher population size is broadly stable



	2007	2011	Change 2007-11	CAGR 2008-12	UK Rank 2007	UK Rank 2011
UK	252,651	262,303	9,652	0.9%	-	-
G8	3,575,711	3,676,886	171,389	2.9%	5	4
EU27	1,426,665	1,598,054	101,175	0.7%	2	2
OECD	6,078,149	6,282,519	204,370	0.8%	6	6
World	6,480,364	6,734,433	254,069	1.0%	6	6

Figure 3.1 — Researchers for the UK and comparators, 2007-11.

UK researchers are highly internationally mobile

Migratory
Moves with stays of 2 years or more

Transitory
Moves with stays of less than 2 years

Sedentary
No movement

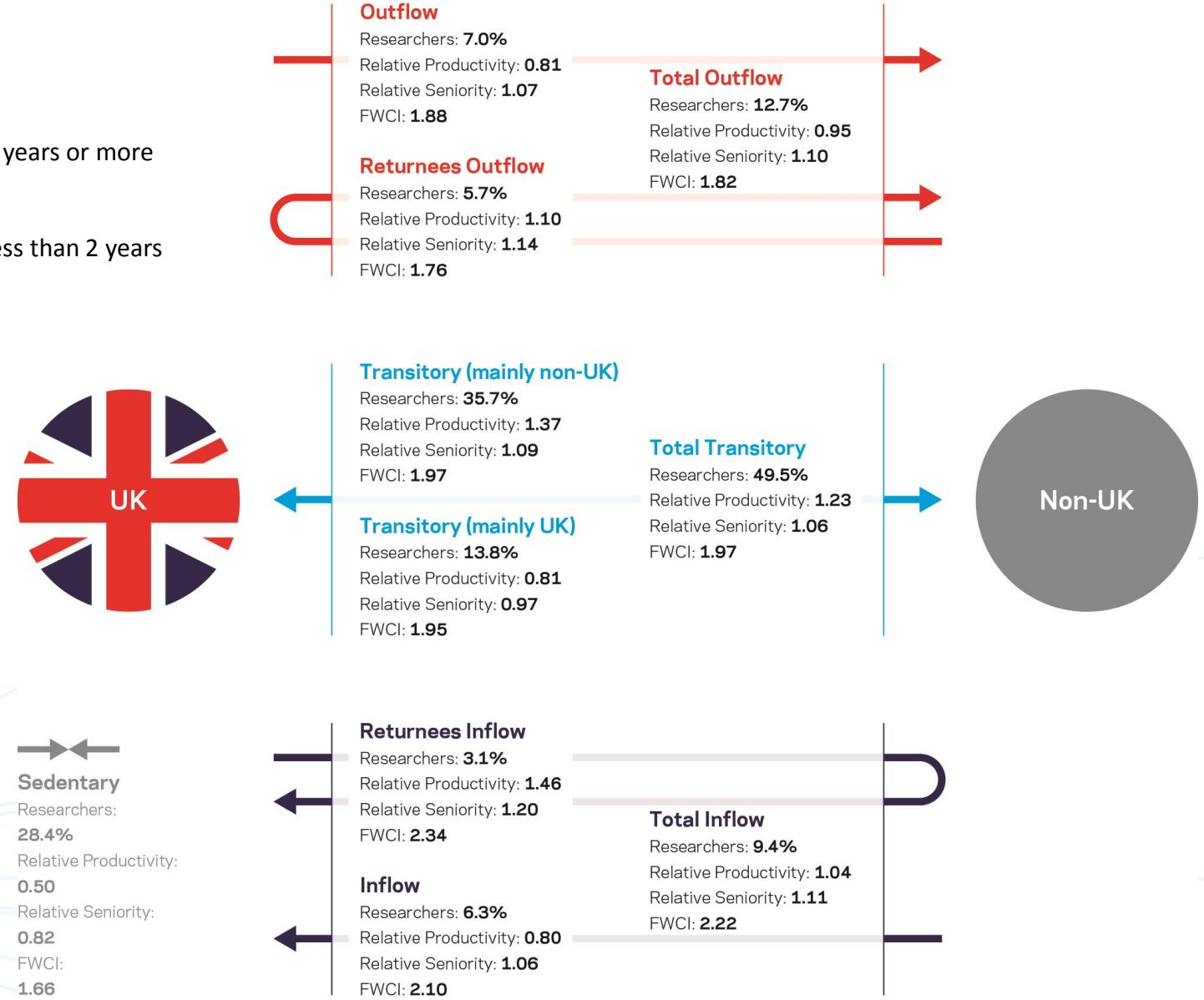
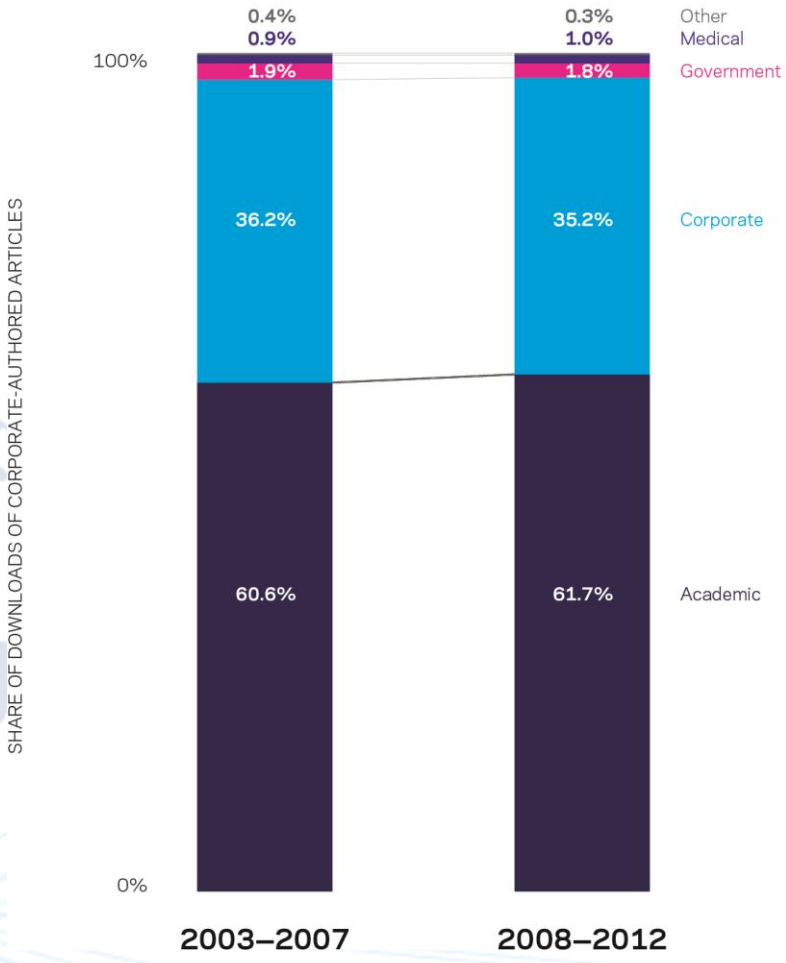


Figure 3.4 — International mobility of UK researchers, 1996-2012. This analysis is based on Scopus author data and is restricted to a set of 265,579 active UK researchers. UK researchers are defined as authors that have listed a UK affiliation on at least one publication in Scopus during the period 1996–2012, and active researchers are defined as those authors with at least 1 article in the latest 5-year period (2008–2012) and at least 10 articles in the entire 17-year period (1996–2012), or those with fewer than 10 articles in 1996–2012, but at least 4 articles in 2008–2012.

UK academic and corporate users are using each other's articles



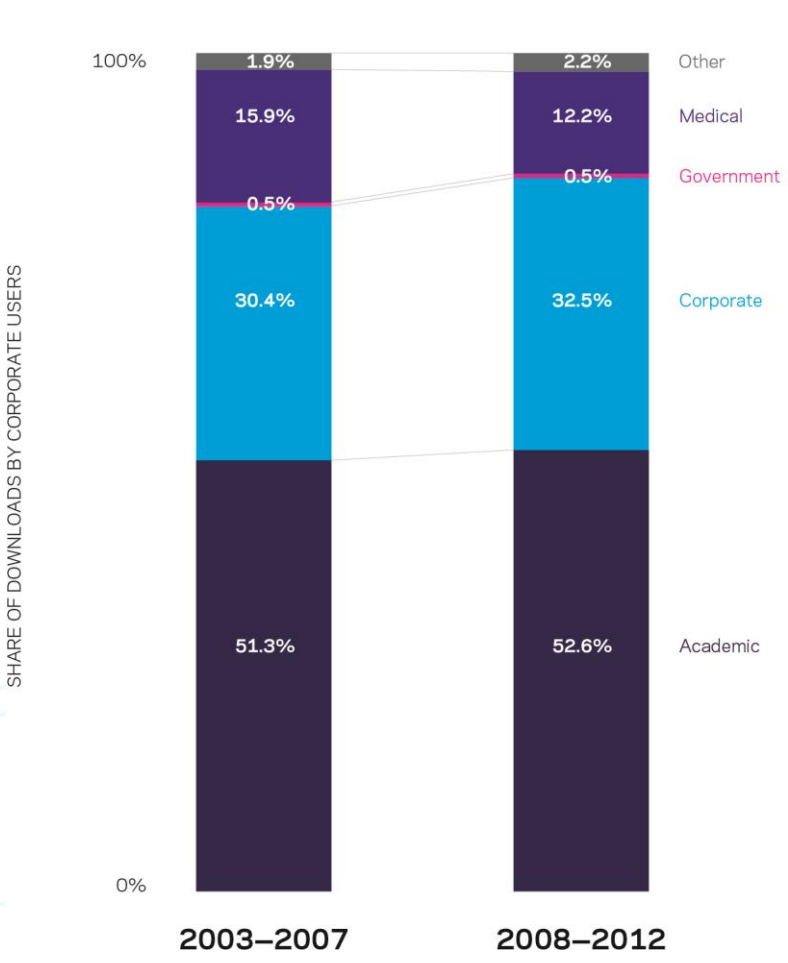


Figure 7.9 — Share of downloads of articles with at least one corporate author by downloading sector, 2003-07 and 2008-12.
Figure 7.10 — Share of article downloads by corporate sector, 2003-07 and 2008-12.

UK researchers show net movement from academia to industry

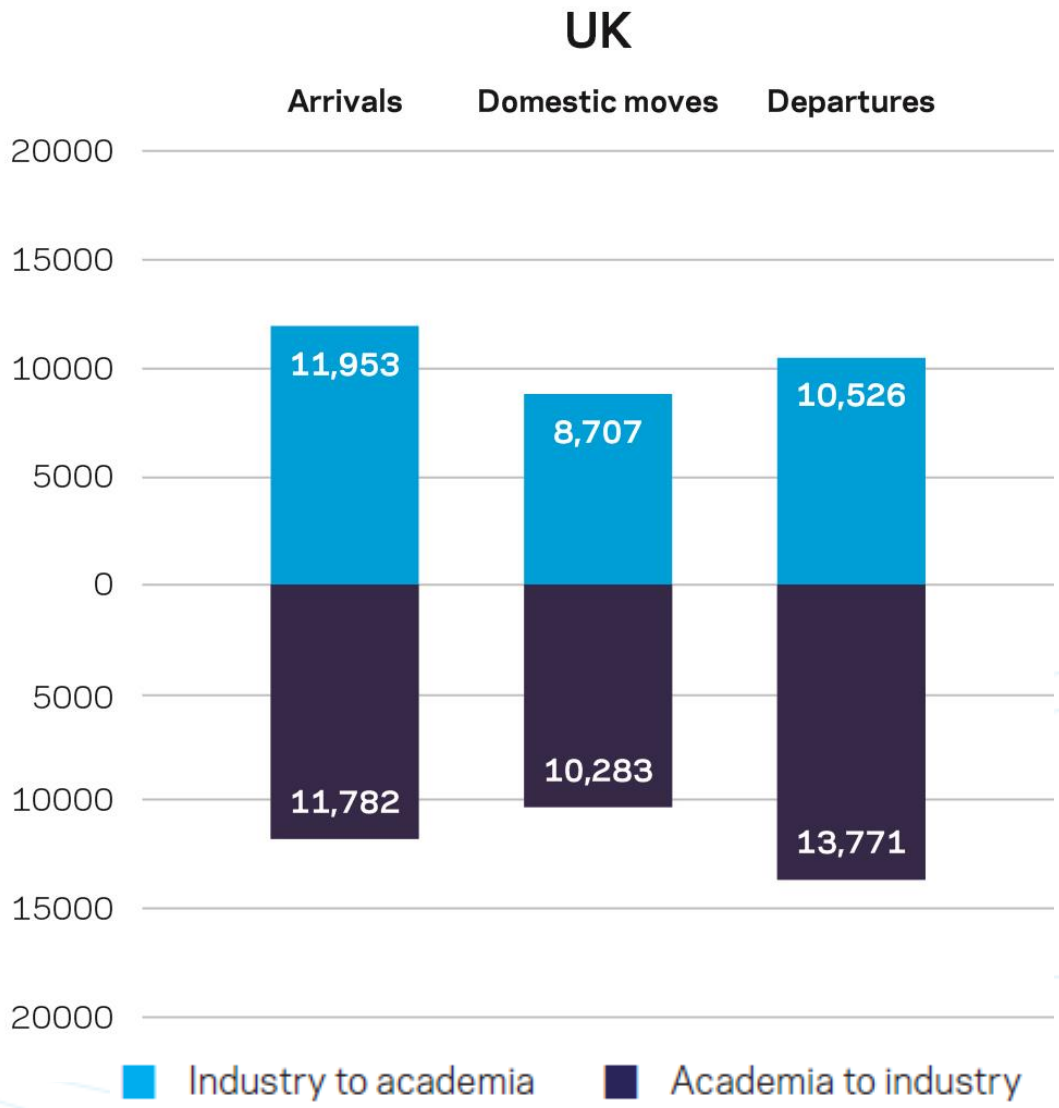


Figure 7.11 — Cross-sector moves of researchers between academia and industry, either domestically or internationally for UK, 1996-2012. This analysis is based on Scopus author data and reflects the number of observed moves, not the number of researchers moving, and so may reflect some researchers moving more than once in this period. Note that the axis maximum/ minimum has been increased for Japan and for the US.

A high and rising proportion of UK journal articles are cited in patents

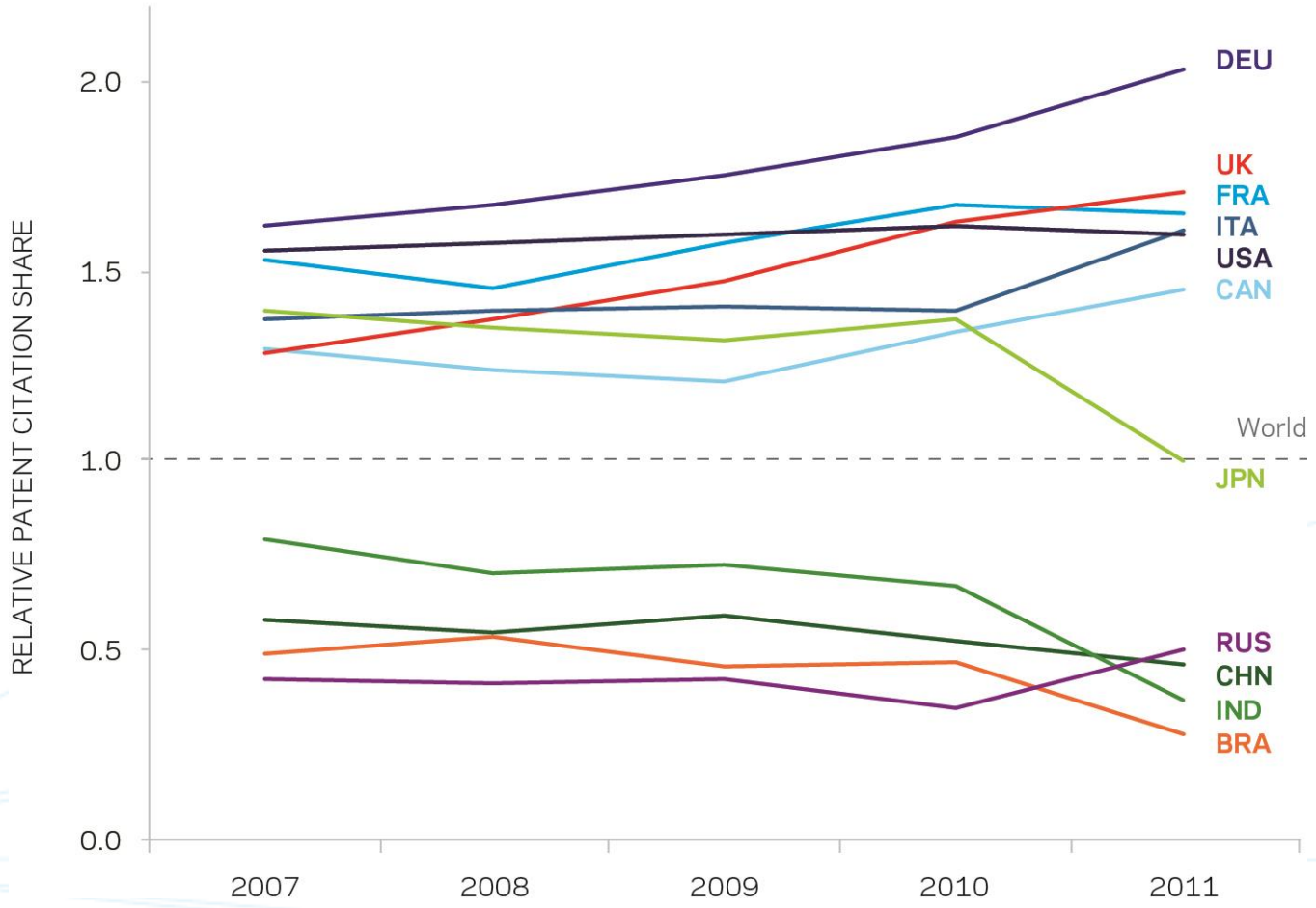


Figure 7.8 — Relative share of 2007-11 patent citations to articles published 2007-11 for the UK and comparators. Each data point corresponds to the share of each country's total journal article output that year that were cited in patents in the period 2007-11, divided by the share of global journal article output that year that were cited in patents in the same period to give a global baseline defined at 1.0.

China continues to increase investment in research

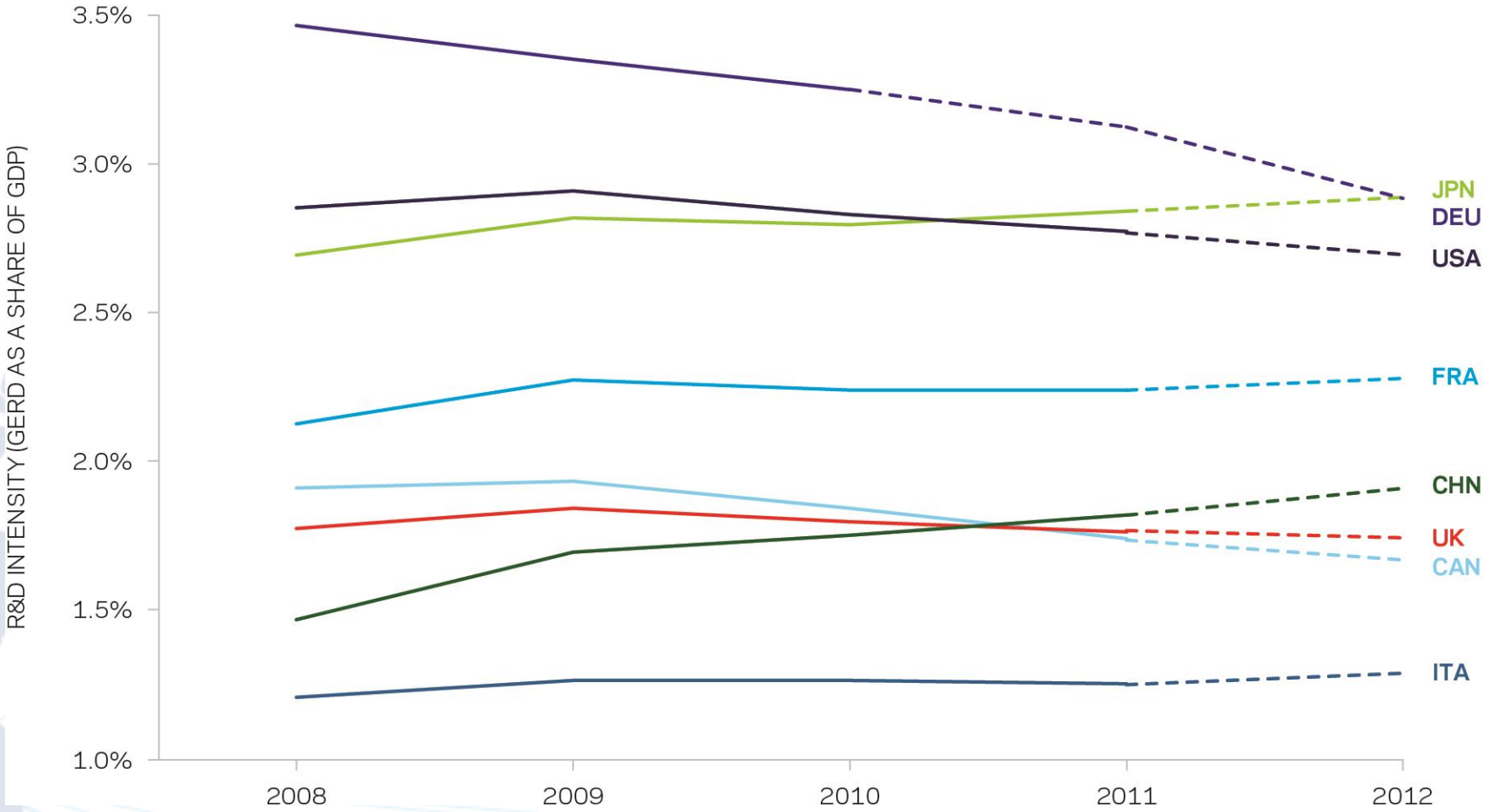
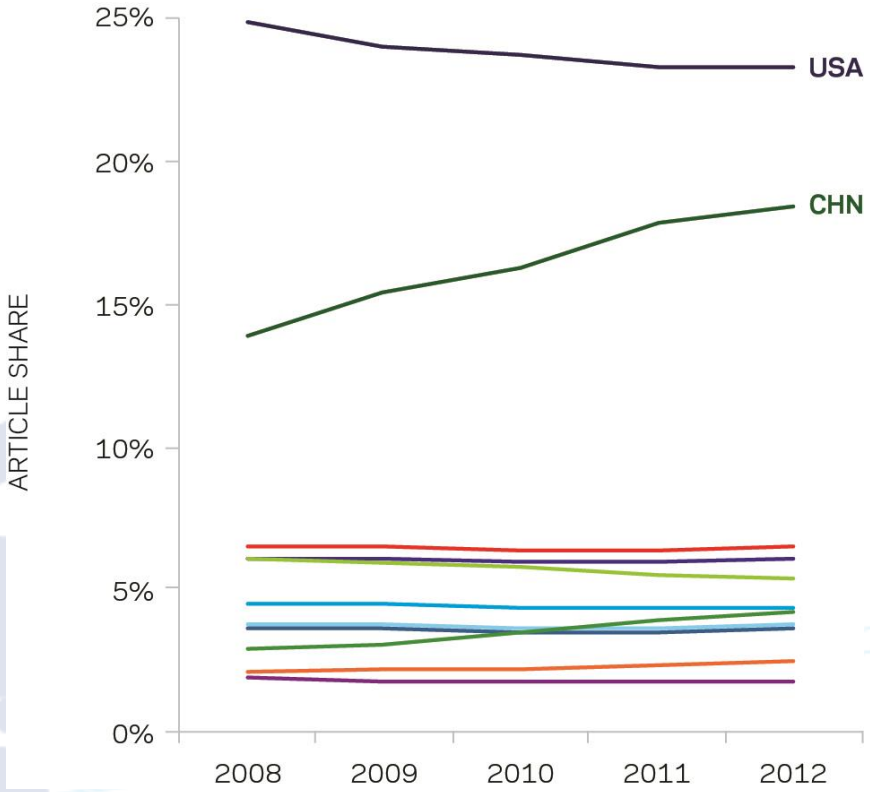


Figure 2.2 — R&D intensity (GERD as a share of GDP) for UK and comparators, 2008-12.

China's investments show in output volumes but not (yet) in quality



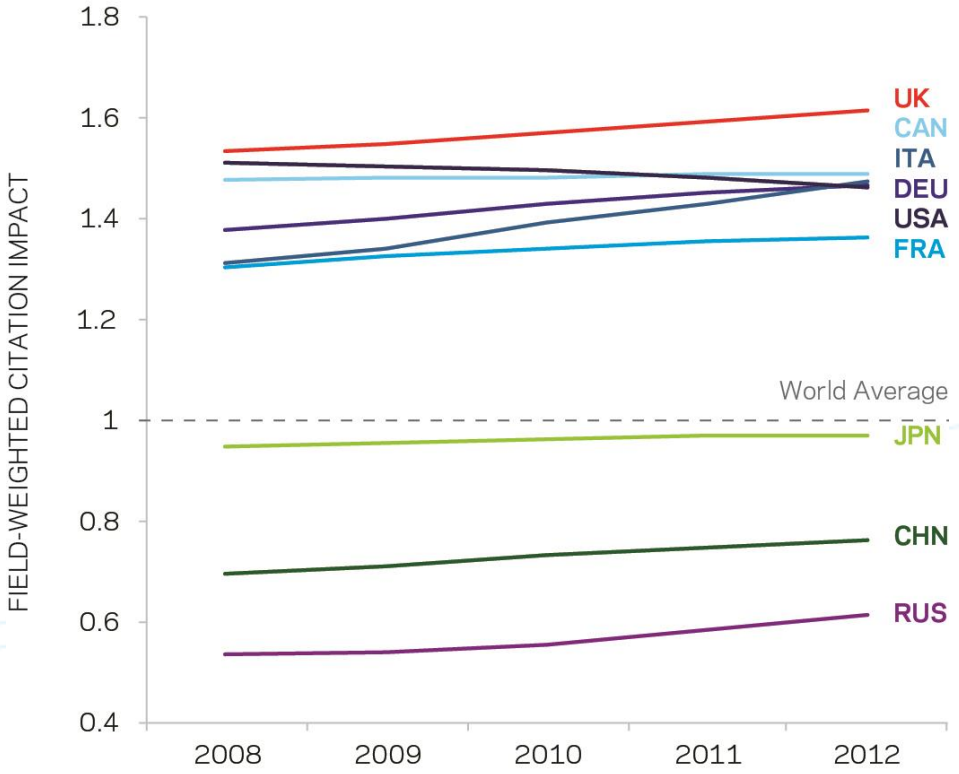
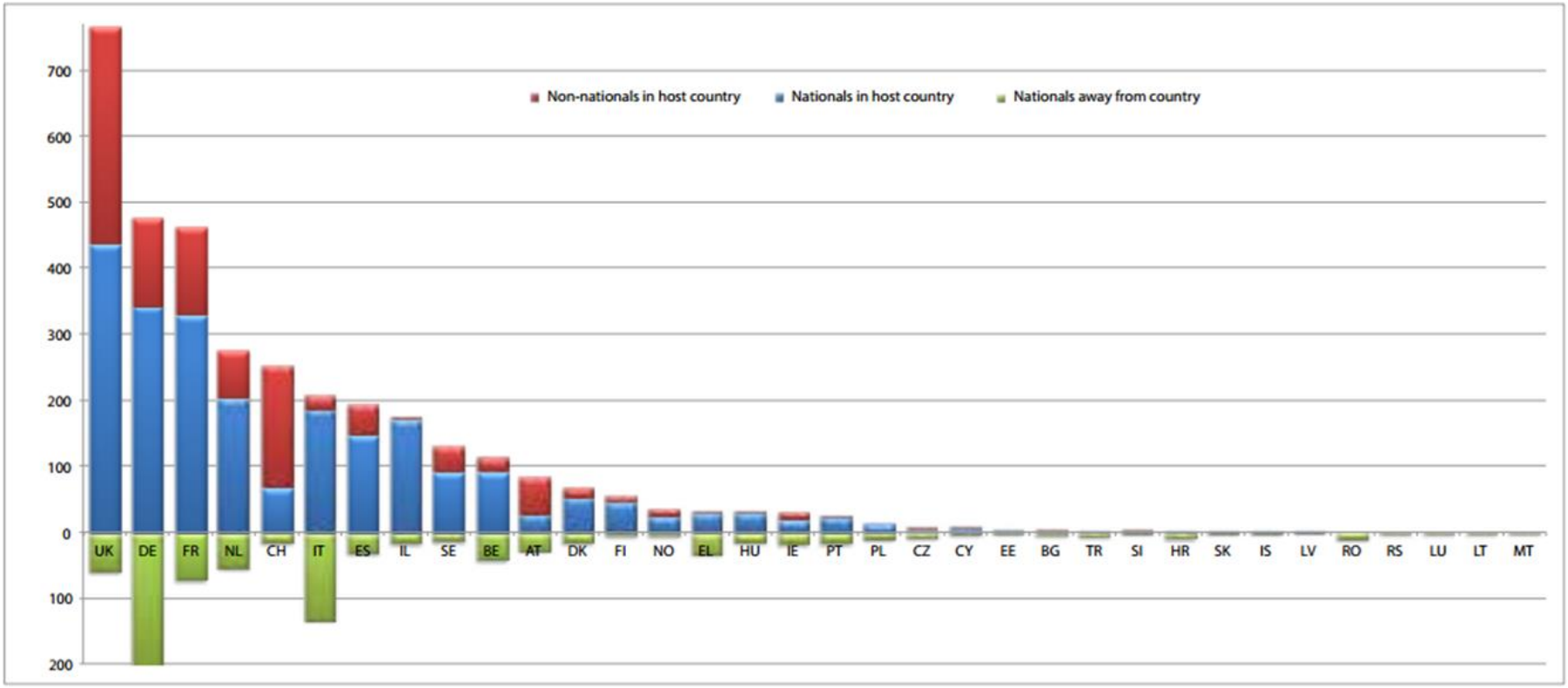


Figure 4.1 — Share of world articles for the UK and comparators (also Brazil, India and Russia), 2008-2012.
Figure 4.6 — Field-weighted citation impact for the UK and comparators, 2008-2012.

European Research Council (from annual report 2012)

Figure 15: **Country of Host Institution and origin of grantees**



Other statistics of success

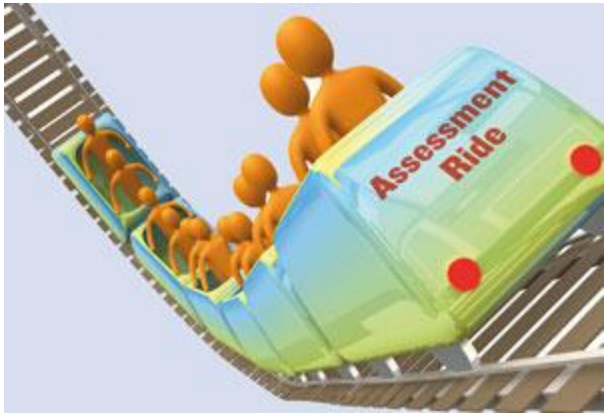
- Knowledge Exchange statistics which demonstrate:
  - we are doing progressively better
  - we are on a par with the US
- Impact depends on business and society, not just the research base
- weaknesses in absorptive capacity need to be discussed in terms improving engagement and societal understanding rather than just adjustments to the research base
- Why are we successful – people, mobility investment, academic freedom – Aghion work

A successful UK research base

- 11 UK universities in the World Universities Ranking Top 100 (second only to US)
- UK attracts 15% of all international doctoral students (second only to US)
- 3rd in G8 (behind US and Germany) for production of PhD qualifiers
- UK produces more publications and citations per pound spent on research than other G8 nations
- With 0.9% world population we have 3.2% of R&D expenditure, 4.1% of researchers, we produce 6.9% of world publications, receive 11.6% of citations and 15.8% of citations with highest impact.

Current Strategy

- Performance-based funding –
  - Past success is a good guide to future success in a stable environment with long cycles
  - A mixture of metrics, peer judgement and expert advice to determine past and future ‘excellence’
- Public funding to unlock private funding
- Investing in people and facilities
- Investing in ‘infrastructure’ and projects
- Investing now for long-term success
  e.g. e-infrastructure, graphene

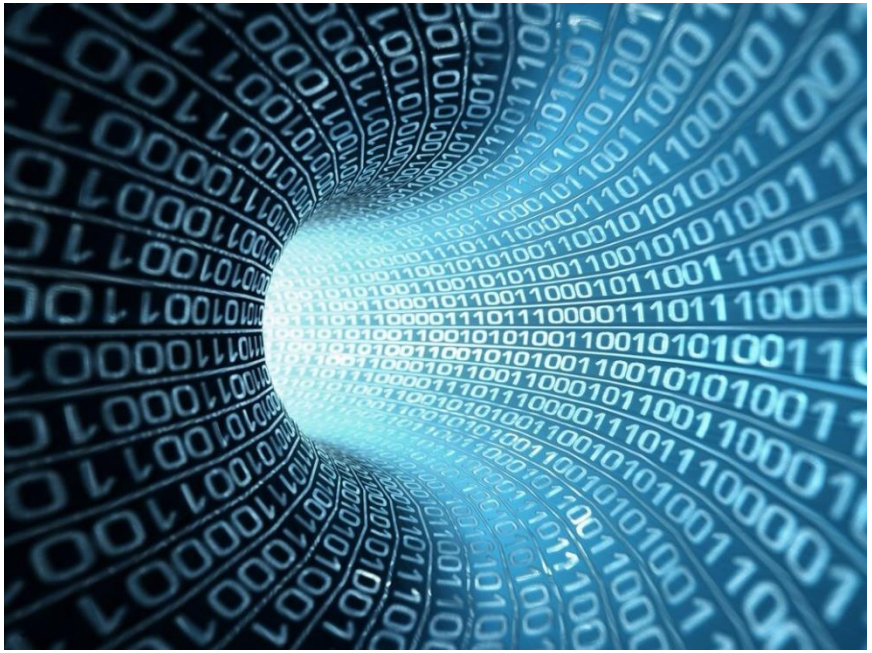


Industrial Strategy

- Automotive
- Aerospace
- Life Sciences
- Higher Education
- Professional Business Services
- Energy
- Construction

Key General Purpose Technologies

- Big Data
- Space
- Robotics and Autonomous Systems
- Synthetic Biology
- Regenerative Medicine
- Agri-science
- Advanced Materials
- Energy



Haldane Principle

- The government identifies strategic priorities
- The research community chooses its own projects within relevant fields, and those are funded on the basis of quality as assessed by peer review

HEFCE

- Largest single research funder
- However one of a number of significant players
- The only funder with broad disciplinary coverage
- The only funder concerned strategically with all universities for research and knowledge exchange - ‘Excellence wherever it is found’
- We have the largest research assessment system in the world
- We are the main agents of the UK’s three distinctive characteristics
  - Highly selective performance-based funding
  - Our universities as the main delivery agents for research
  - Emphasizing the importance of the impact of research

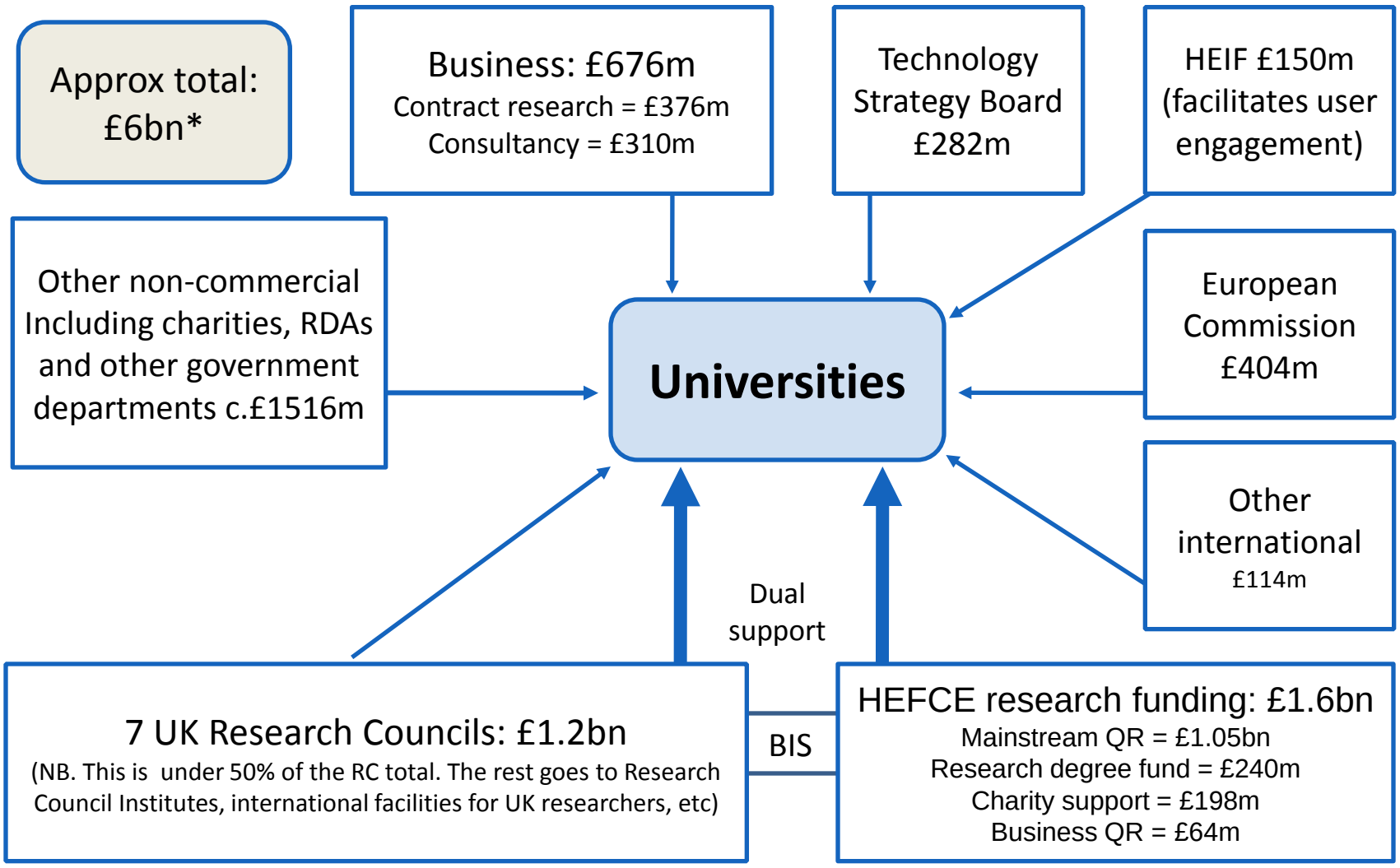
Our Instruments

- Research Assessment – the REF, addressing both national objectives
- Core Funding – QR (£1.6bn), driven by REF and other quality measures (largest and most efficient research funder)
- Skills pipeline funding for Research – PGT, PGR
- Targeted investments – Catalyst Fund, UKRPIF, (aligned with partners)
- Information and Regulation – Concordats, Open Access

What is our Funding For?

- The priorities of universities and academics - unhypothecated
- Including support of new areas of work, early career researchers, infrastructure, staff between grants, dissemination, career development….
- Rewards excellence, rewards below-cost research for charities and business
- Support doctoral students
- University Museums, Galleries and Collections. Research Libraries of national and global signficance

Research funding flows to HE



* This is an estimate. Excludes informal flows, funding in kind and other funding streams that universities themselves may channel into research.

The grass is not always greener…

- ‘The Obama administration, constrained by spending caps imposed by Congress, suggested on Tuesday a federal budget for 2015 that would mean another year of cuts in the government’s spending on basic scientific research’ 5th March 2014
- ‘The president’s FY15 budget does disappointingly little to close the nation’s innovation deficit,’ - the Association of American Universities 2014

Challenges for Research

- Concentration/Selectivity
- Research Focus – Disciplinary, Knowledge v Impact, Major Projects
- Interdisciplinary/Multidisciplinary
- Collaboration v Competition or Collaboration & Competition
- Replication/Triangulation
- Integrity
- Return on Investment – Funding also Capital v Recurrent
- Public Approval

UK Distinctiveness

- Charity Funding
- Stable Funding
- Academic Freedom
- Academic Mobility
- Performance-Based Funding
- Universities as the major focus

Impact Definitions

- Definition: ‘Research impact is the demonstrable contribution that research makes to the economy, society, culture, national security, public policy or services, health, the environment, or quality of life, beyond contributions to academia.’
- REF definition: ‘Effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life beyond academia’

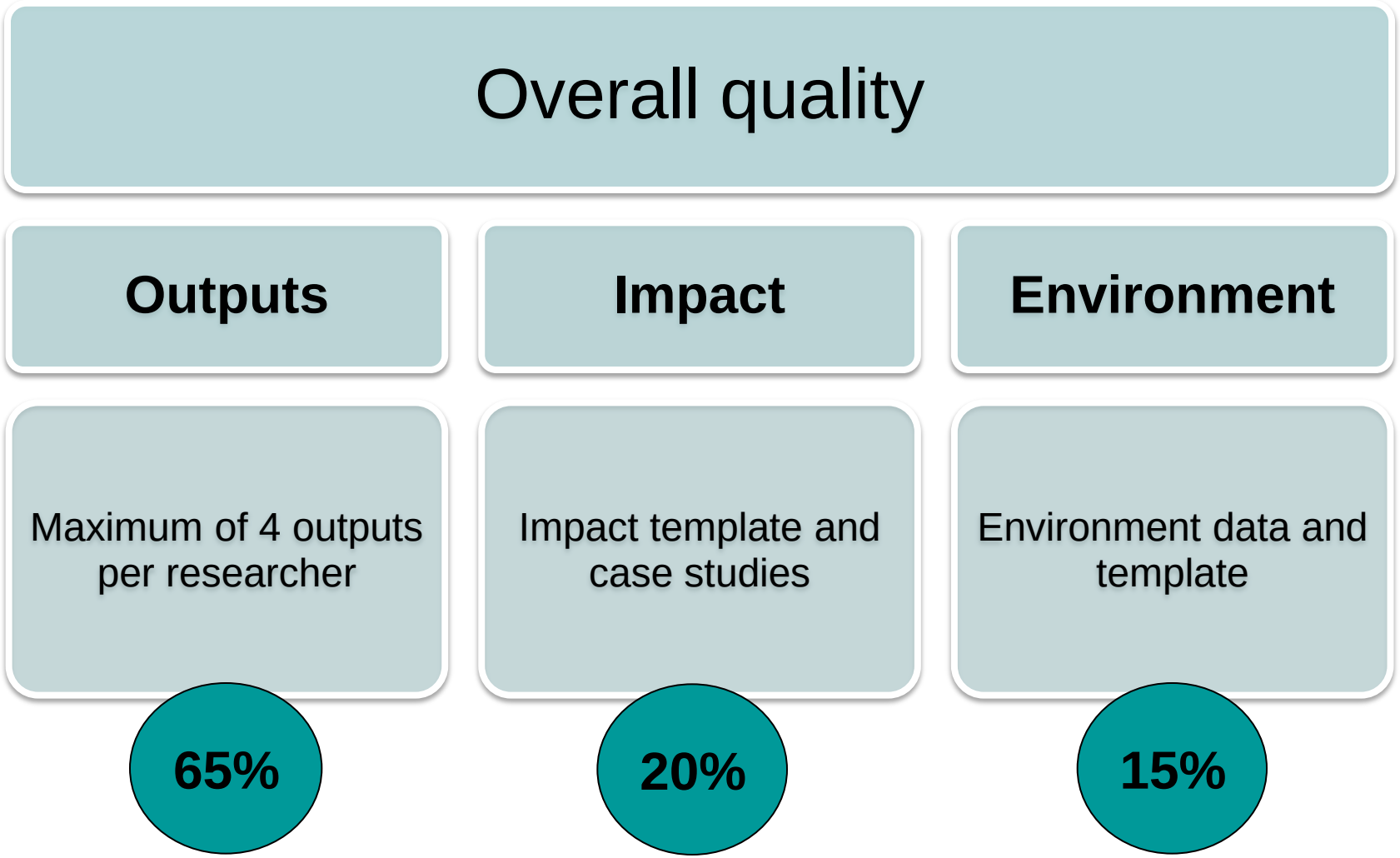
Research Contribution

- Our starting point is that an optimal research assesment submission should include a portfolio of excellent research **and** build on that excellent research to deliver benefits which contribute to society.
- Contribution must be linked to high quality research
- Assessed at the level of whole units (not individual outputs or researchers)
- Equally demanding standards to the assessment of outputs

hefce

Overview:

The assessment framework

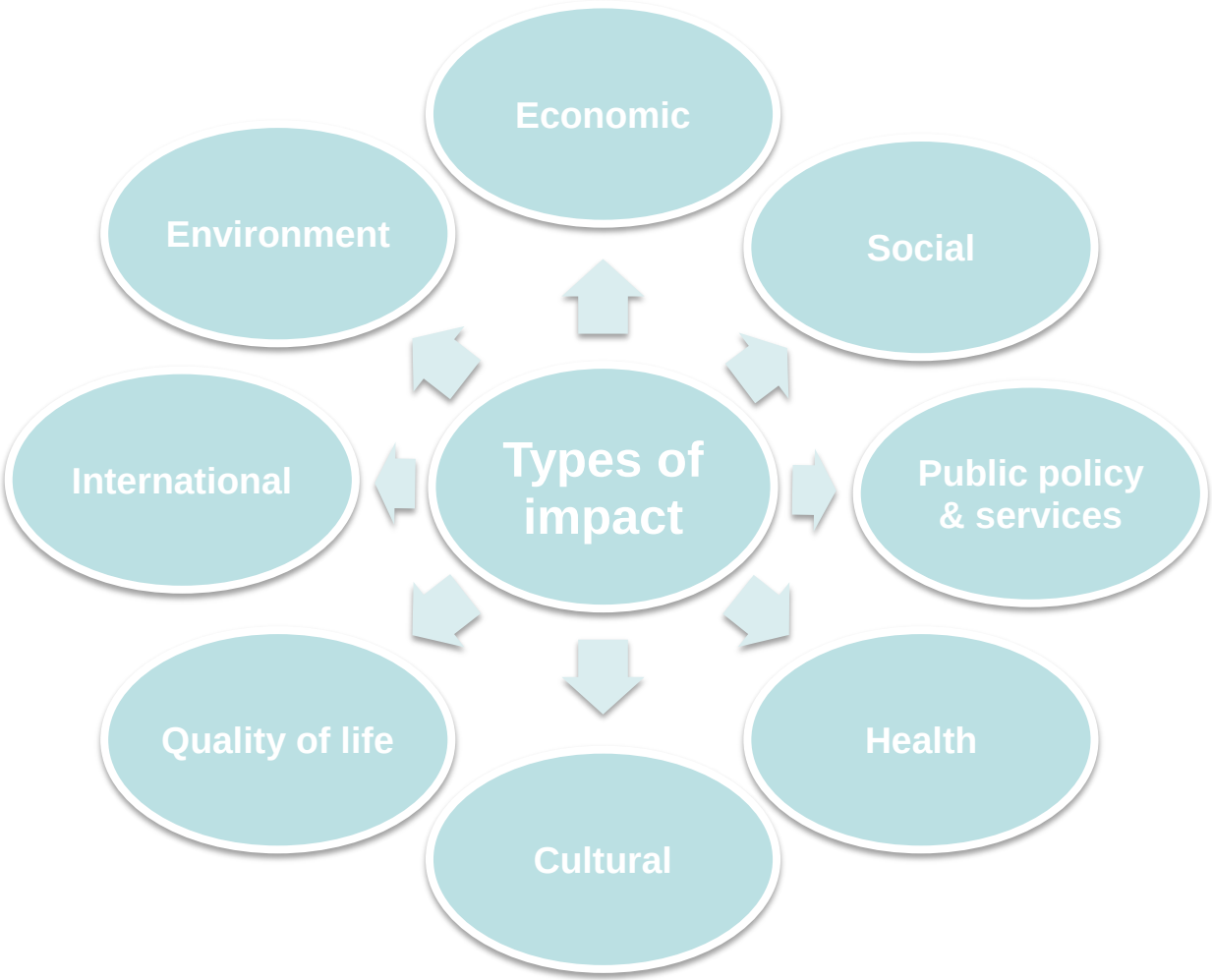


Assessing quality – 'Impact Agenda'

To identify and reward the contribution that high quality research has made to the economy and society:

- Making these explicit to the Government and wider society
- Creating a level playing field between applied and theoretical work but recognising only impact based on excellent research
- Encouraging institutions to achieve the full potential contribution of their research in future
- Intellectually coherent with the historical purposes of universities

A wide view of impact



hefce

Impact: Definition for the REF

- An effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia
- Impact **includes** an effect, change or benefit to:
  - The activity, attitude, awareness, behaviour, capacity, opportunity, performance, policy, practice, process or understanding
  - Of an audience, beneficiary, community, constituency, organisation or individuals
  - In any geographic location whether locally, regionally, nationally or internationally
- It **excludes** impacts on research or the advancement of academic knowledge within HE; and impacts on teaching or other activities within the submitting HEI

REF Case Studies: Outcomes

- Universities and academics galvanized due to the importance of REF
- 6975 case studies
- Many focused on the long-term contribution of research to society
- Teasing out the way in which impact arises
- Offering every discipline the opportunity to make its case in its own terms
- Stunning opportunity to build multi-disciplinary work into an exercise based around disciplines – although you may be doing that better
- Evaluation by Rand Europe now underway

Myths and Anxieties

- Some impact is negative (Yes, but Panels can handle).
- All research must have impact (No).
- Only economic impact counts (No).
- The best impact does not come from the best research (Perhaps but we need to know that).
- Arts and Humanities cannot demonstrate impact (No).
- Impact cannot be ‘measured’ (Yes, but it can be assessed)
- It takes time for happen (Yes, so allow for it).
- The expectation of impact is a threat to academic freedom (No).
- Impact will become an industry (Only if you let it be so).
- Measures will become targets (Depends if you own the agenda),

Challenges

- Assessing impact isn't perfect – but we can learn and make it better
- There will be opposition from vested interests - uncomfortable change for university leaders and for acdemics
- We don't have enough to offer to make it worthwhile
- Our traditional purposes will be eroded and …..
- Our research policies are already optimal – perhaps we will indeed discover that
- We can do the same thing with a few simple metrics

Challenges of assessment

- ***Time lags*** – we will look at impacts that are evident during from REF period (2008-2012), underpinned by research over a longer timeframe
- ***Attribution*** – case studies to tease out how the research *contributed* to the impacts
- ***Limitations of metrics*** – expert panels will *assess* rather than *measure* impact; indicators to be used as supporting evidence
- ***Corroboration*** – scope for third party verification, and expert panels to judge credibility of the evidence

hefce

Assessment criteria

- Expert panels to assess benefit in terms of their ‘reach’ and ‘significance’
- All panels to include substantial user representation – we suggest user members focus on the impact element, with reviewing outputs as ’optional’

This is not about

- Quantifying impact
- Focusing narrowly on economic impact
- Assessing impact of every researcher or output
- Trying to predict future impact
- Discouraging curiosity-driven research
- Trading-off impact and excellence

hefce

Culture and society

A Impacts on society, culture and creativity: Impacts where the beneficiaries are individuals, groups of individuals, organisations or communities whose knowledge, behaviours or practices have been influenced

B Impacts on society, culture and creativity Impacts where the beneficiaries may include individuals, groups of individuals, organisations or communities whose knowledge, behaviours, creative practices and other activity have been influenced

C Impacts on creativity, culture and society: Impacts where the beneficiaries are individuals, groups of individuals, organisations or communities whose knowledge, behaviours, practices, rights or duties have been influenced

D Civil society Influencing the form and content of associations between people or groups to illuminate and challenge cultural values and social assumptions.

D Public discourse Extending the range and improving the quality of evidence, argument and expression to enhance public understanding of the major issues and challenges faced by individuals and society.

D Cultural life Creating and interpreting cultural capital in all of its forms to enrich and expand the lives, imaginations and sensibilities of individuals and groups.

Economic and commercial

A Commercial impacts: Impacts where the beneficiaries are usually companies, either new or established, or other types of organisation which undertake activity that creates wealth

A Economic impacts: Impacts where the beneficiaries are usually the NHS or private health care or agricultural activity

B Economic impacts Impacts where the beneficiaries may include businesses, either new or established, or other types of organisation which undertake activity that may create wealth

C Economic, commercial, organisational impacts: Impacts where the beneficiaries may include new or established businesses, or other types of organisation undertaking activities which create wealth

D Economic prosperity Applying and transferring the insights and knowledge gained from research to create wealth in the manufacturing, service, creative and cultural sectors.

Health and welfare

A Health and welfare impacts:
Impacts where the beneficiaries are individuals and groups (both human and animals) whose quality of life has been enhanced (or potential harm mitigated)

B Health impacts
Impacts where the beneficiaries may include individuals (including groups of individuals) whose health outcomes have been improved or whose quality of life has been enhanced (or potential harm mitigated) through the application of enhanced healthcare for individuals or public health activities

C Health and welfare impacts:
Impacts where the beneficiaries are individuals and groups (human or animal) whose quality of life has been enhanced (or harm mitigated) or whose rights or interests have been protected or advocated

Public policy and services

A Impacts on public policy and services: Impacts where the beneficiaries are usually government, public sector, and charity organisations and societies, either as a whole or groups of individuals in society, through the implementation of policies

C Impacts on public policy, law and services: Impacts where the beneficiaries are usually government, public sector and charity organisations and societies, either as a whole or groups of individuals in society through the implementation or non-implementation of policies, systems or reforms

B Impacts on public policy and services Impacts where the beneficiaries may include government, non-governmental organisations (NGOs), charities and public sector organisations and society, either as a whole or groups of individuals in society

D Policy making Influencing policy debate and practice through informed interventions relating to any aspect of human or animal well-being

D Education Influencing the form or the content of the education of any age group in any part of the world where they extend significantly beyond the submitting HEI.

D Public services Contributing to the development and delivery of public services or legislation to support the welfare, education, understanding or empowerment of diverse individuals and groups in society, including the disadvantaged or marginalised.

Environment

A Impacts on the environment:
Impacts where the key beneficiary is the natural or built environment

B Impacts on the environment
Impacts where the key beneficiaries are the natural environment and/or the built environment, together with societies, individuals or groups of individuals who benefit as a result

C Impacts on the environment:
Impacts where the key beneficiaries are the natural, historic and/or built environment, together with societies, individuals or groups of individuals who benefit as a result

Practitioners and services

A Impacts on practitioners and services:
Impacts where beneficiaries are organisations or individuals, including service users involved in the development of and delivery of professional services

B Impacts on practitioners and professional services
Impacts where beneficiaries may include organisations or individuals involved in the development of and delivery of professional services

A Production impacts:
Impacts where the beneficiaries are individuals (including groups of individuals) whose production has been enhanced

C Impacts on practitioners and professional services:
Impacts where the beneficiaries may include organisations or individuals involved in the development and/or delivery of professional services and ethics

Impact: Submissions

Impact template (REF3a)

- Sets out the submitted unit's general approach to enabling impact from its research
- One template per submission – with a page limit depending on the number of staff submitted
- Covers the period 1 Jan 2008 to 31 Jul 2013
- Contributes 20% to the impact sub-profile

Case studies (REF3b)

- Specific examples of impacts that were underpinned by the submitted unit's research
- The number of case studies required depends on the number of staff submitted
- Impacts during 1 Jan 2008 to 31 Jul 2013; underpinned by research since 1 Jan 1993
- Contributes 80% to the impact sub-profile

Impact: Template (REF3a)

- The unit's approach to enabling impact from its research:
  - Context for the approach
  - The unit's approach during 2008-2013
  - Strategy and plans for supporting impact
  - Relationship to the submitted case studies
- Provides additional information and context for the case studies, and can take account of particular circumstances that may have constrained a unit's selection of case studies
- To be assessed in terms of the extent to which the unit's approach is conducive to achieving impact of 'reach and significance'

Impact: Case studies (REF3b)

- In each case study, the impact described must:
  - Meet the REF definition of impact
  - Have occurred between 1 Jan 2008 and 31 July 2013 (can be at any stage of maturity)
  - **Be underpinned by excellent research (at least 2* quality) produced by the submitting unit between 1 Jan 1993 to 31 Dec 2013**
- Submitted case studies need **not** be representative of activity across the unit: pick the strongest examples

Impact: Case studies (REF3b)

- Each case study is limited to 4 pages and must:
  - Describe the underpinning research produced by the submitting unit
  - Reference one or more key outputs and provide evidence of the quality of the research
  - Explain how the research made a ‘material and distinct’ contribution to the impact (there are many ways in which this may have taken place)
  - Explain and provide appropriate evidence of the nature and extent of the impact: Who / what was affected? How were they affected? When?
  - Provide independent sources that could be used to verify claims about the impact (on a sample audit basis)

HIGHER EDUCATION FUNDING COUNCIL FOR ENGLAND

Thank you for listening

d.sweeney@hefce.ac.uk