

Higher Education Rising to the Challenge: Expectations for Research and Researchers

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The Context

‘Whether it is attacks on the value of a degree, problems with the tuition fees system, senior staff being overpaid, or problems with international students, universities are this summer’s scapegoat of choice.’

The Context

‘Fast-expanding universities have helped blow out the national debt and it is only fair they contribute to budget saving’

The Context

‘Research is about discovery, but it also needs to be about directly tackling some of the issues we face’

‘Taxpayers expect to see how their investment in research is paying dividends’

‘We want to keep universities focused on research that has wider economic and social benefits’

The Context

‘And we are not fulfilling our potential if, despite having scientists and universities renowned the world over, we cannot turn their ideas into the products and services on which the industries of the future will be built.’

‘We must invest more in turning brilliant discoveries into practical products’

A Scientist Says

- Need to increase funding for fundamental scientific research
- The UK lags behind most of the world in terms of its research and development spending.
- It is vital that innovations developed at Universities are commercialised successful
- balance between fundamental and industrially driven scientific research
- the loss of EU funding will send UK research over a cliff edge

What is the vision for Research

‘It’s about us’

‘It’s about them’

Basic Research Definition - OECD

‘Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use **in view**’

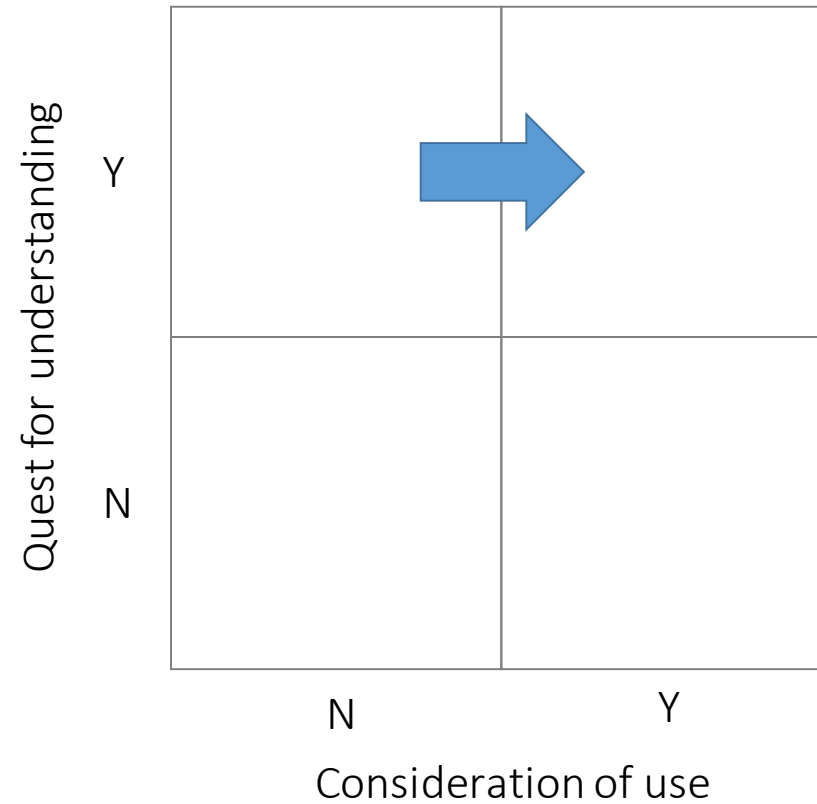
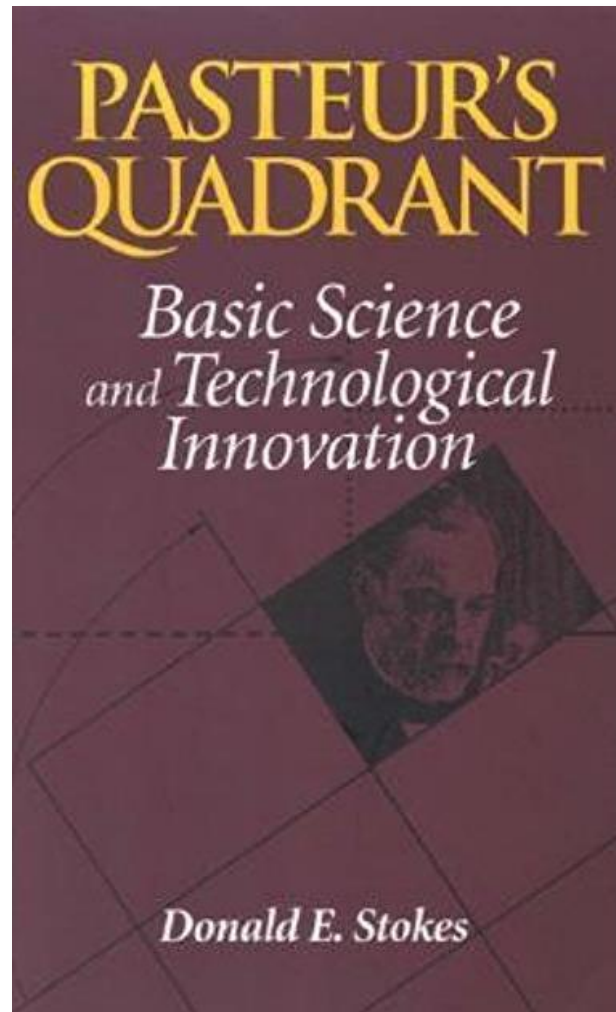
‘Applied research is... directed primarily towards a specific practical aim or objective

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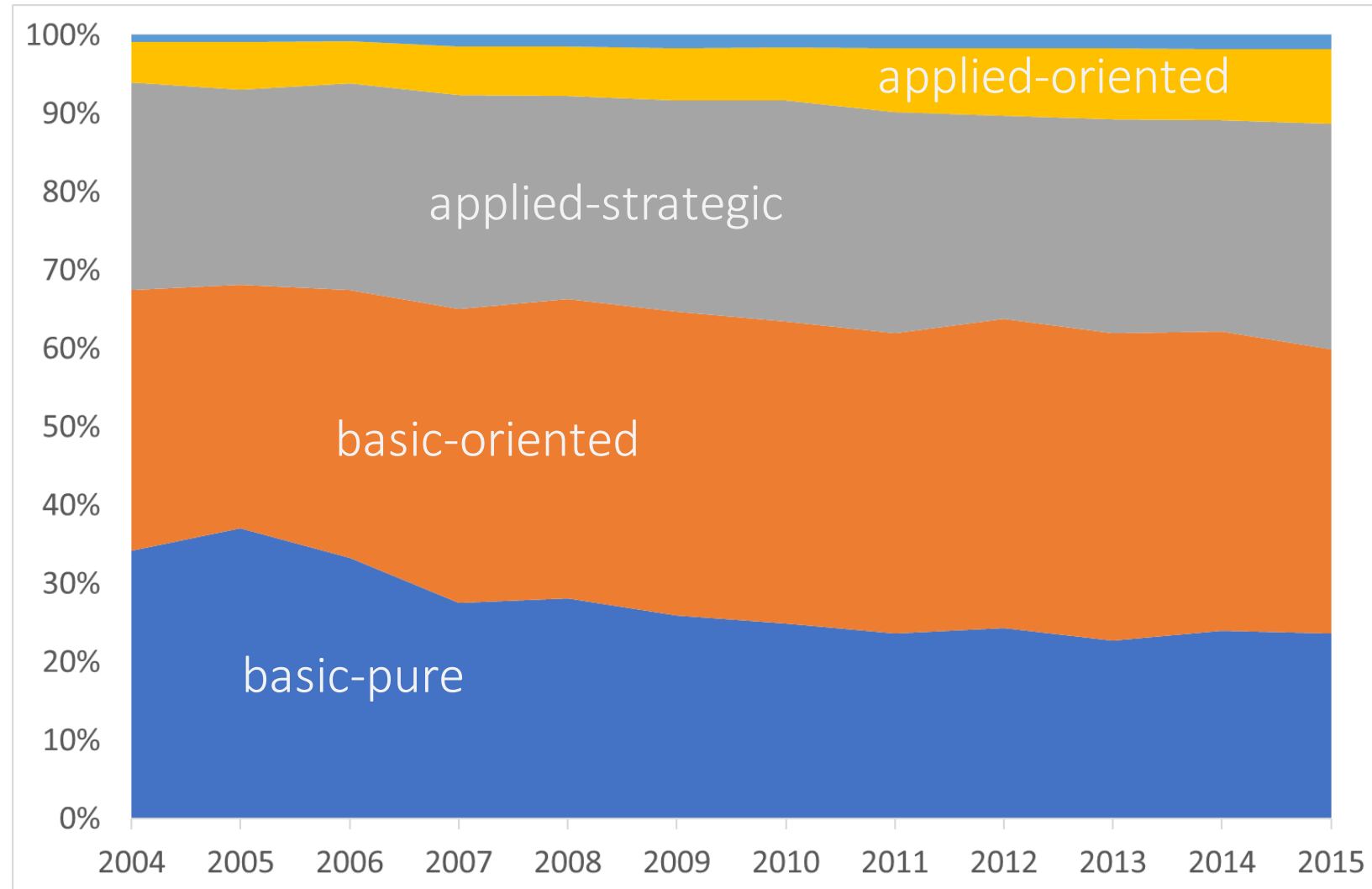
Examples of Basic Research Outcomes

- Seismology, Vulcanology and Meteorology
 - Health Research
 - History, Languages and Comparative Theology
 - Philosophy
-
- ‘Without any particular application or use in view?’

Pasteur's Quadrant



Balanced research portfolio



Source: Office for National Statistics, SET statistics 2015

<https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/datasets/scienceengineeringandtechnologystatisticsreferencetables>

Are our arguments really sound?

- Global Definitions of academic research excellence are self-referential
- Reputation basis can be a very selective subset of research
- Serendipitous benefits as a justification for the whole of 'basic research' – 20% more?
- Control of research directions
- Societal acceptance of scientific breakthroughs

Are we over-reading the problem?

- Higgs-Boson
- Gravitational Waves
- Fermat's Last Theorem

- Defensive?

Evidence-based case for fundamental research

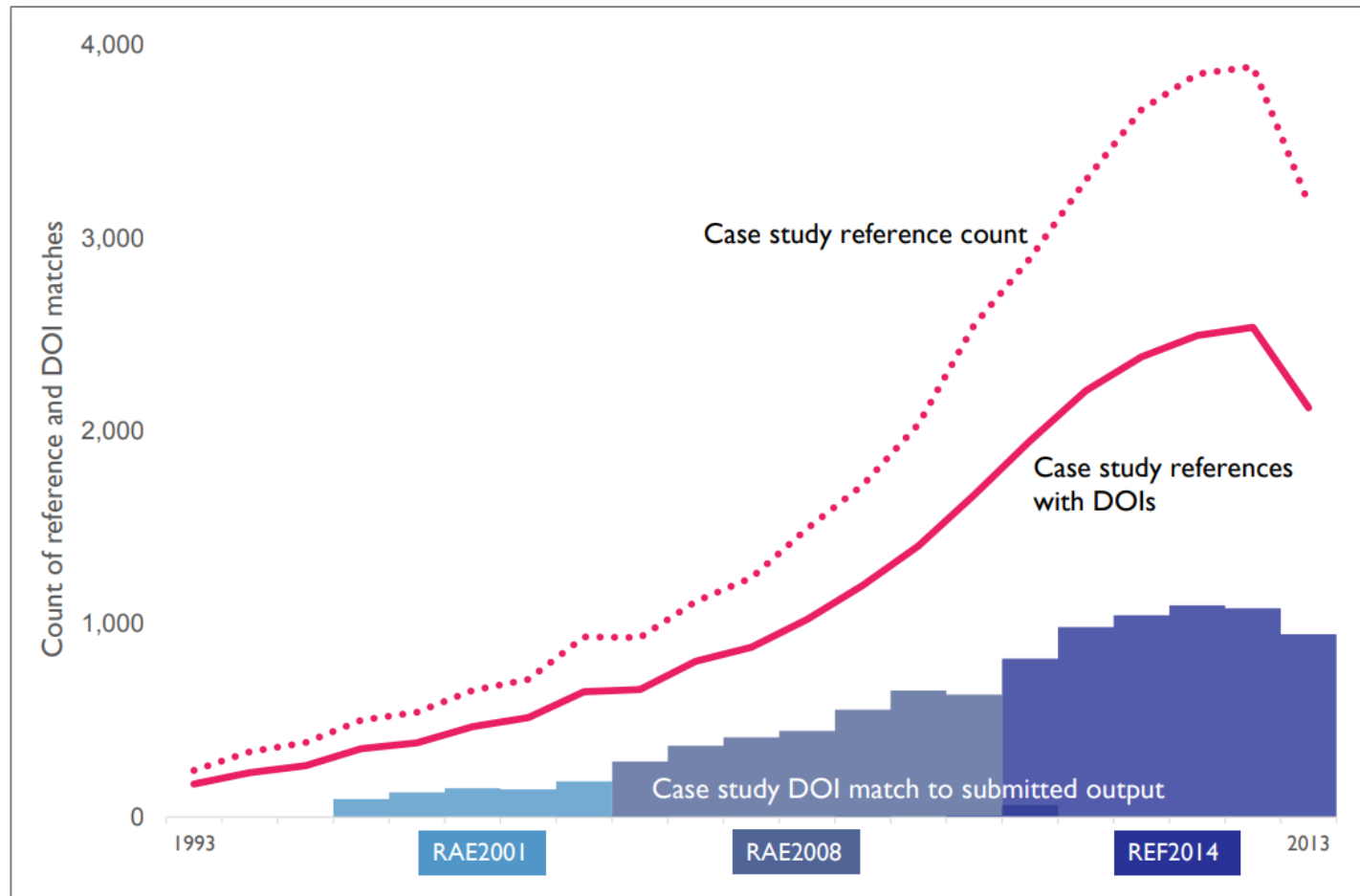
- Tying specific outcomes back to underpinning work
- Our partners respect the value of and need for fundamental work
- Diversity of ideas essential to research – Salter & Martin
- Outcomes happen where fundamental research flourishes

Academic performance and impact performance



Source: Analysis of REF 2014 results

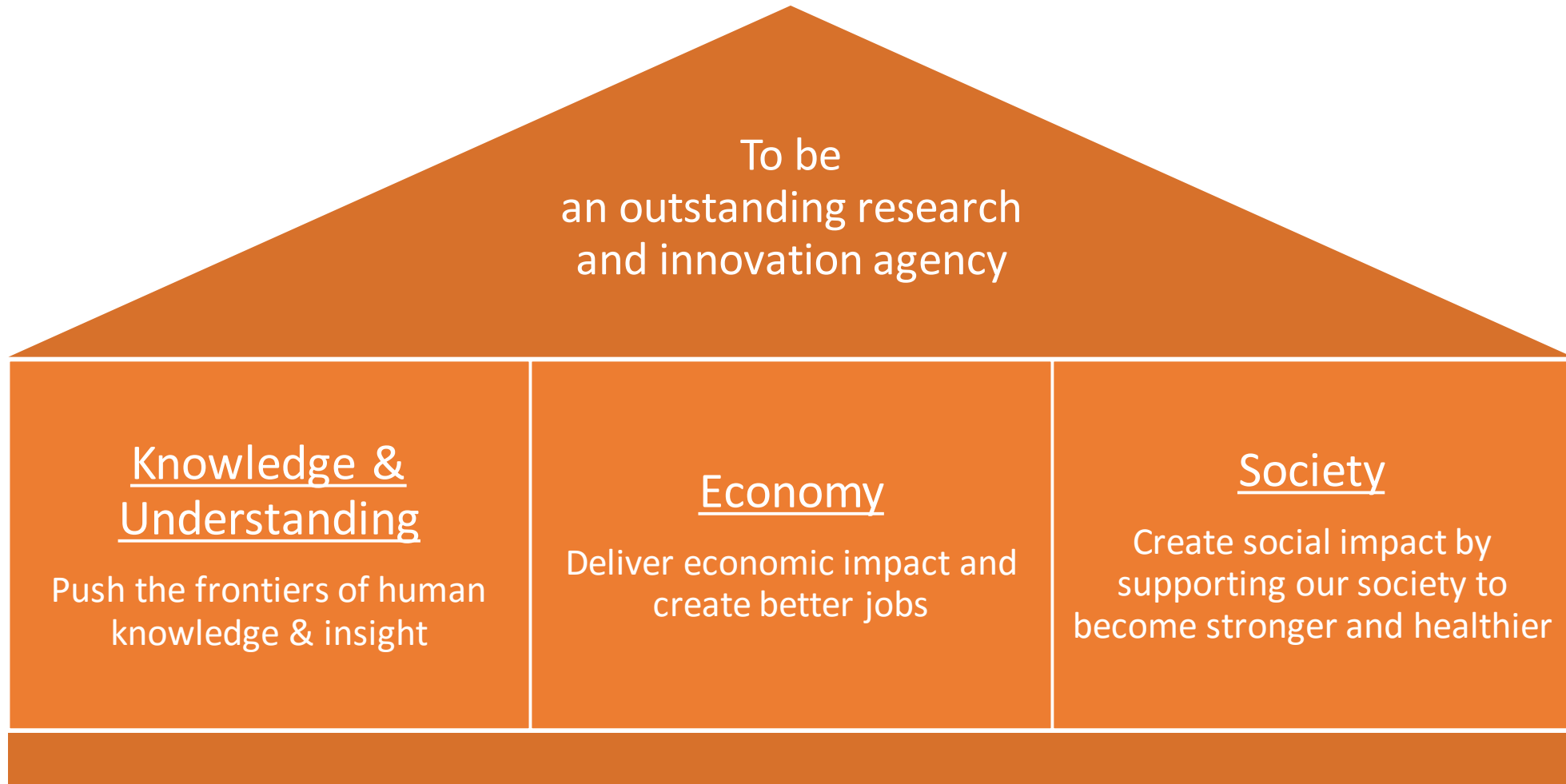
Underpinning research was also submitted for outputs assessment



Source: Digital Science 2016. Publication patterns in research underpinning impact in REF2014.

http://www.hefce.ac.uk/media/HEFCE,2014/Content/Pubs/Independentresearch/2016/Publication_patterns_in_research_underpinning_impact_in_REF2014/2016_refimpact.pdf

The vision for UK Research and Innovation



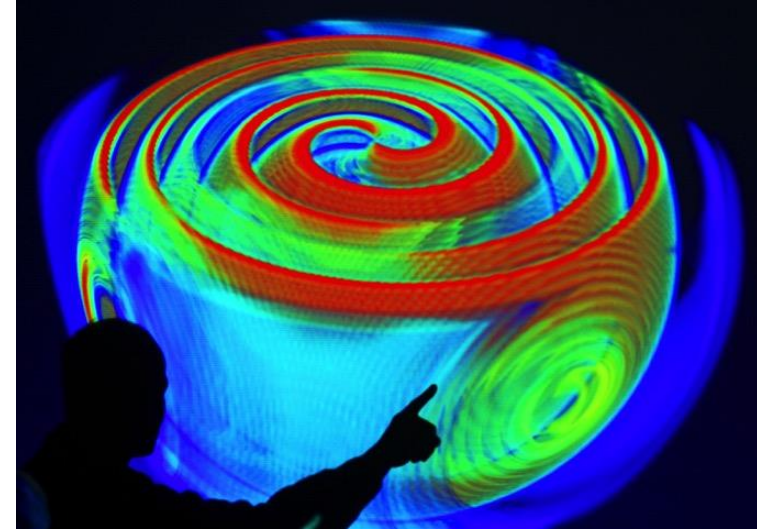
Tackling important problems

- Fundamental questions
- Needs of society – working with government
- Advancing the UK economy
- Research and innovation as a key element of UK's place in the world



Asking fundamental questions

- Host defence mechanisms
- Structure of the cell
- Gravitational waves
- Materials science
- Poverty measurement
- Hokusai



Needs of society

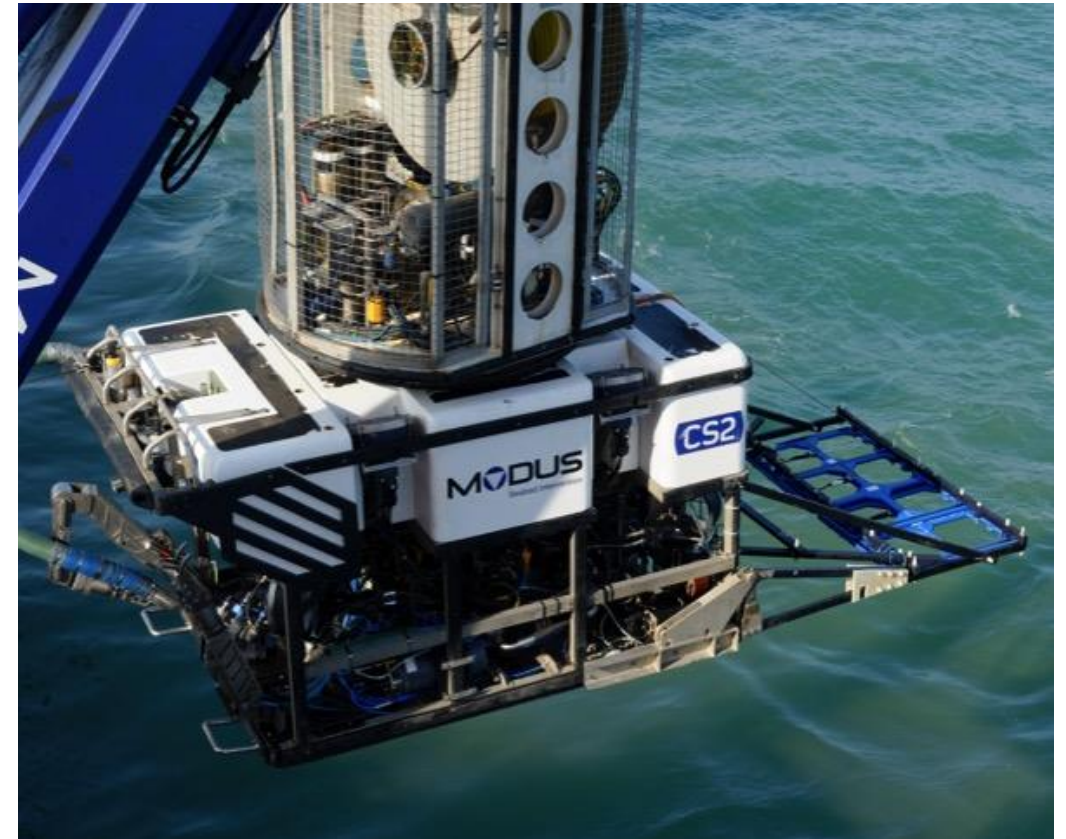
- Hydrology and meteorology
- Air quality
- Infectious diseases
- Ageing
- Security
- Economy



Advancing the UK economy

Industrial Strategy Challenge Fund

- First wave of challenges includes:
 - Batteries
 - Pharmaceutical advanced manufacturing technologies
 - Robotics in hazardous environments
- Second wave announced later this year



The UK's place in the world

Global Challenges Research Fund

- Focus areas:
 - Equitable access to sustainable development
 - Sustainable economies and societies
 - Human rights, good governance and social justice

Global research: e.g. ALMA



Conduct of research

Issues

- Reproducibility
- Openness
- Communication of research and innovation
- Careers
 - Diversity
 - Right incentives



The EI Pilot metrics vs. Research England (HE-BCI) metrics compared

- cash support from end-users ✓
- total HERDC research income ~~(specified categories)~~ ✓
- ratio of ARC Linkage grants to ARC Discovery grants ✗
- research commercialisation income ✓
- co-supervision of HDR students by research end-users ✗
- co-authorship of research outputs with research end-users ✗
- co-funding of research outputs with research end-users ✓
- patents granted ✓
- citations in patents to traditional research outputs ✗ (*co-application with industry*) ✓
- in-kind support from end-users ✓
- the proportion of total open access research outputs ✗

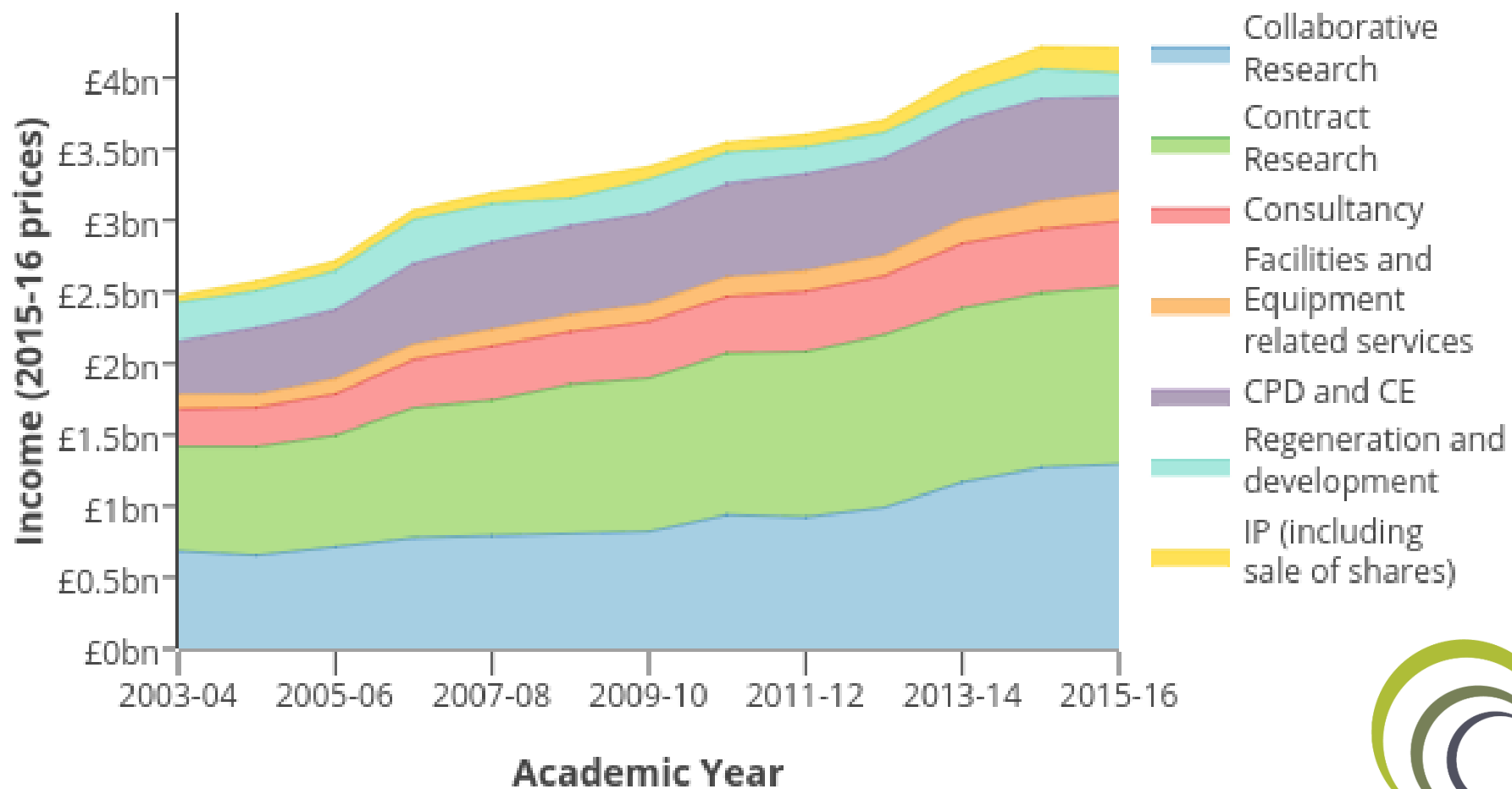
HE-BCI metrics cont...

- Infrastructure and support data (e.g. provision of incubator space)
- Collaborative & Contract research, Consultancy
 - By Large business, SME and Public/third sector
- Provision of CPD/CE courses
- Knowledge transfer partnerships (with Innovate UK)
- Regeneration and Development – capturing institution's role in local area
- Specialist equipment and facilities use by businesses
- Spin-offs, Start-ups, graduate start-ups and social enterprises
 - Number, number surviving 3+ years, employment, external investment
- IP: Licences – value and volume (software, non-software), sale of shares
- Public & Community engagement (free and charged-for):
 - Academic staff time, attendees



**Research
England**

HE-BCI metrics cont...



**Research
England**

Ratings – a good idea?

El Pilot scale:

- Mature/High
- Emerging/Medium
- Limited/Low

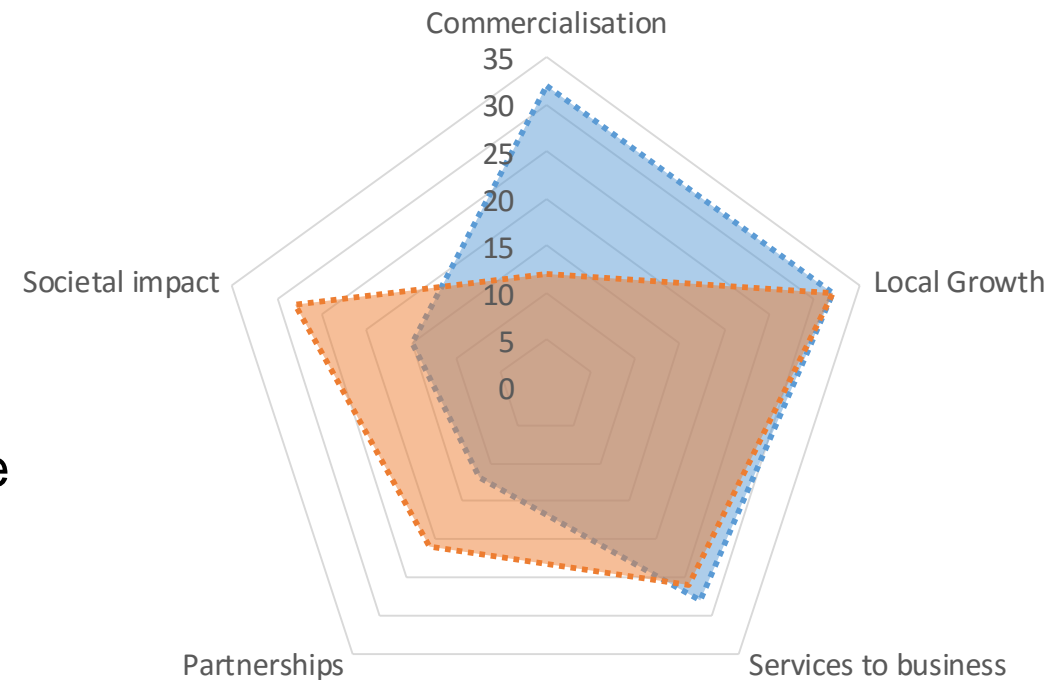
HEFCE TEF:



- Are the metrics robust enough to support ratings linked to reputation or funding?
- Simplicity vs. 'dumbing down'?

Initial thoughts on the English KEF

- Annual, institutional-level metrics
- Broad range of perspectives: Balanced scorecard approach
- Primary audience: business
- Low cost/burden: no narrative or peer review
- Sophisticated clusters of institutions by type
- Benchmarking within clusters
- Contextual normalisation
- Identification and reward of over-performance
- Potential link to funding (currently c. AUS\$250m pa.)



What works in one place....

- Winning government support – how far will you go?
- Winning business support – the interface
- Research portfolio which is nationally focussed as well as globally focussed
- Policy interventions and funding interventions
- Owning the vision