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Supporting Excellence with *Impact*: The European Experience

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President and Vice Chancellor

www.le.ac.uk

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Science delivers

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"For every £1 spent by the government on R&D, private sector R&D output rises by 20p per year in perpetuity, by raising the level of the UK knowledge base"

Haskel et al. 2014

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"Evidence shows that much of recent productivity gains come from innovation and that, on average, those countries that invested more in research and innovation (R&I) before and during the crisis have been the most resilient during the economic downturn"

European Commission 2014


EUROPEAN COMMISSION

Brussels, 10.6.2014
COM(2014) 339 final

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

Research and innovation as sources of renewed growth

{SWD(2014) 181 final}

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"Science is more essential for our prosperity, our health, our environment and our quality of life than it has ever been before"

President Obama

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But investment in Science is under threat

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Science funding is constantly debated

- Recent ‘attack’ on social science in the US house reminds us that politicians may undervalue some ‘science’
- The €80 billion EU Horizon 2020 budget was smaller than the equivalent FP7 budget
- President Junker’s European Fund for Strategic Investment may reduce the H2020 budget further by €2.7bn
- National investment in science varies considerably across Europe, with the UK falling below 0.5%

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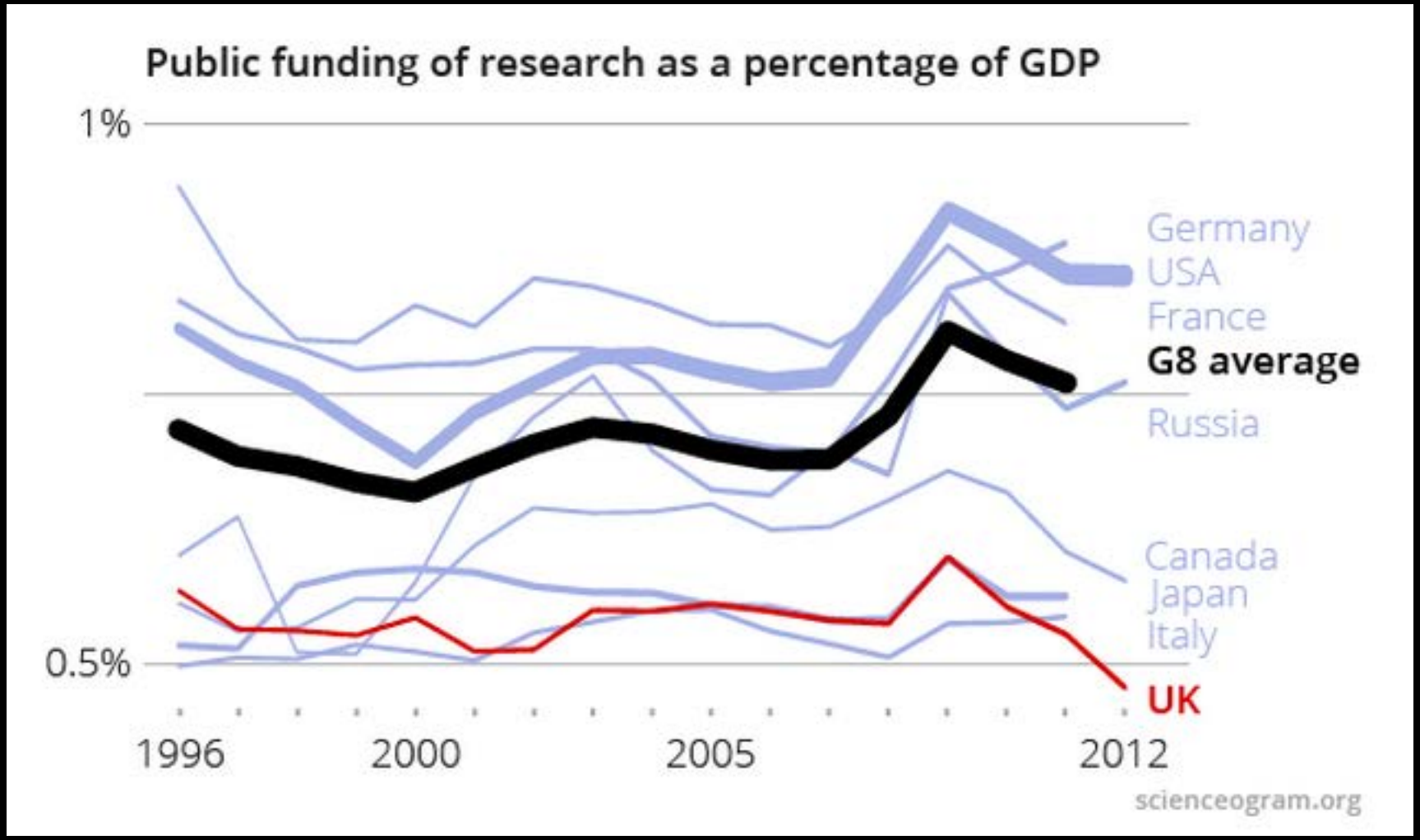

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Does economic austerity force us to reassess the value of science?

Is the value of science taken for granted in academia?

How much academic research is truly valuable?

How should we measure the public value?

How should we publicise the public value?

Should we measure ‘impact’ and, if so, how?

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Is the confidence in science starting to wane?

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"Last year researchers at one biotech firm, Amgen, found they could reproduce just six of 53 "landmark" studies in cancer research… In 2000-10 roughly 80,000 patients took part in clinical trials based on research that was later retracted because of mistakes or improprieties"

Economist 2013

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"One reason is the competitiveness of science… Nowadays verification (the replication of other people's results) does little to advance a researcher's career. And without verification, dubious findings live on to mislead"

Economist 2013

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"A study using mice has uncovered a possible cause of Alzheimer's disease… The research has been heralded as offering hope of finding new treatments for dementia"

Guardian, April 15 2015

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"The caveat, however, is that these Alzheimer's patients are mice. We are a long, long way from discovering if what's good for rodents is good for us… Do we overhype cutting-edge research?"

Guardian, April 17 2015

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We need to think carefully about how we conduct and report science

- Reproducibility is a series issue and how we value and fund such work needs careful attention
- We also need to reflect on how we engage with the media
- Climategate was an interesting lesson

Do we need a *Traffic Light System* for reporting results, signposting the stage a scientific discovery has reached?

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How have governments and funding agencies responded?

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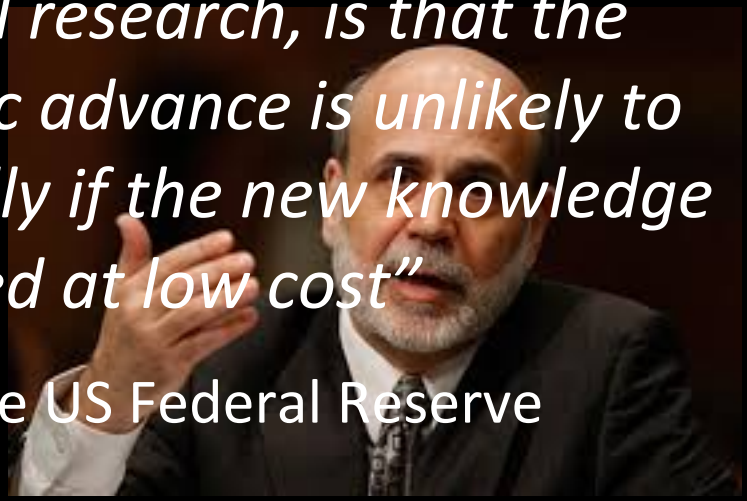
"The primary economic rationale for a government role in R&D is that, absent such intervention, the private market would not adequately supply certain types of research. The argument, which applies particularly strongly to basic or fundamental research, is that the full economic value of a scientific advance is unlikely to accrue to its discoverer, especially if the new knowledge can be replicated or disseminated at low cost"

Ben Bernanke, former chairman of the US Federal Reserve



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One question is, what should the balance between publically funded pure and applied research be?

- Is the common distinction between pure and applied research helpful?
- Much research is at the interface
- Applied research often applies both basic and applied input to real world problems in imaginative new ways
- And many researchers are drawn to their disciplines because they want to make a difference

<u>Is the binary divide between pure and applied research helpful?</u>

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Another question is, what should the balance between 'bottom-up' and 'top-down' research be?

- Incorrectly assumed that bottom-up schemes will always produce basic outputs, while top-down schemes will always produce applied outputs
- Bottom up schemes often fund applied research

<u>How steers are decided in 'top-down' schemes is crucial</u>

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Excellence with ‘impact’

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"Although there is substantial agreement between organisations over established metrics such as publications and patents, there is a need for more effort to capture outputs that are more difficult to quantify, but give a more holistic picture of research output (such as influences on policy and practice)"

European Science Foundation 2012

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Impact: instrumental, conceptual or capacity building

Academic impact *is the demonstrable contribution that excellent research makes to scientific advances, across and within disciplines, including significant advances in understanding, method, theory and application*

Economic and societal impact *is the demonstrable contribution that excellent social and economic research makes to society and the economy, of benefit to individuals, organisations and nations*

Not about predicting impact, but resourcing pathways through user engagement

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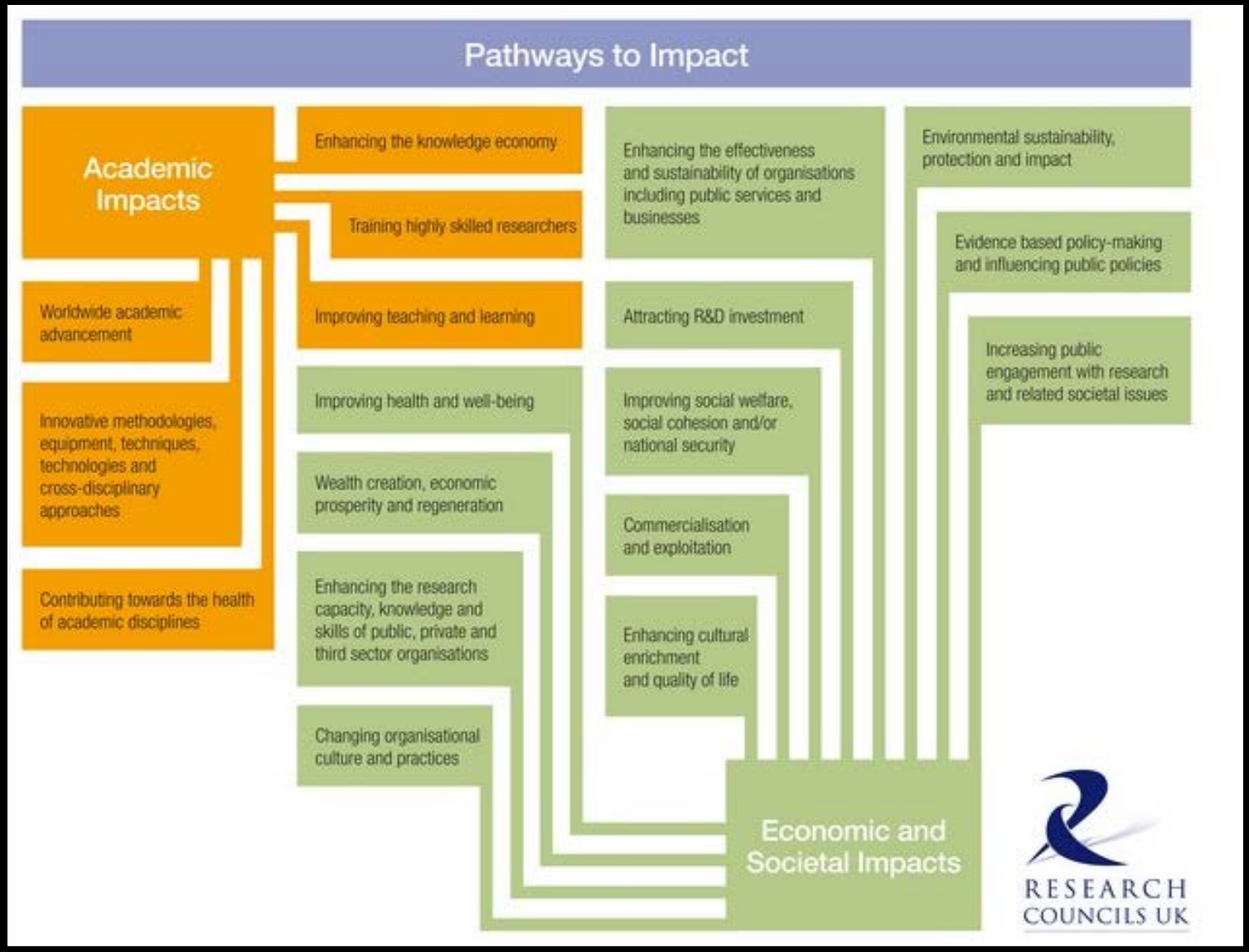

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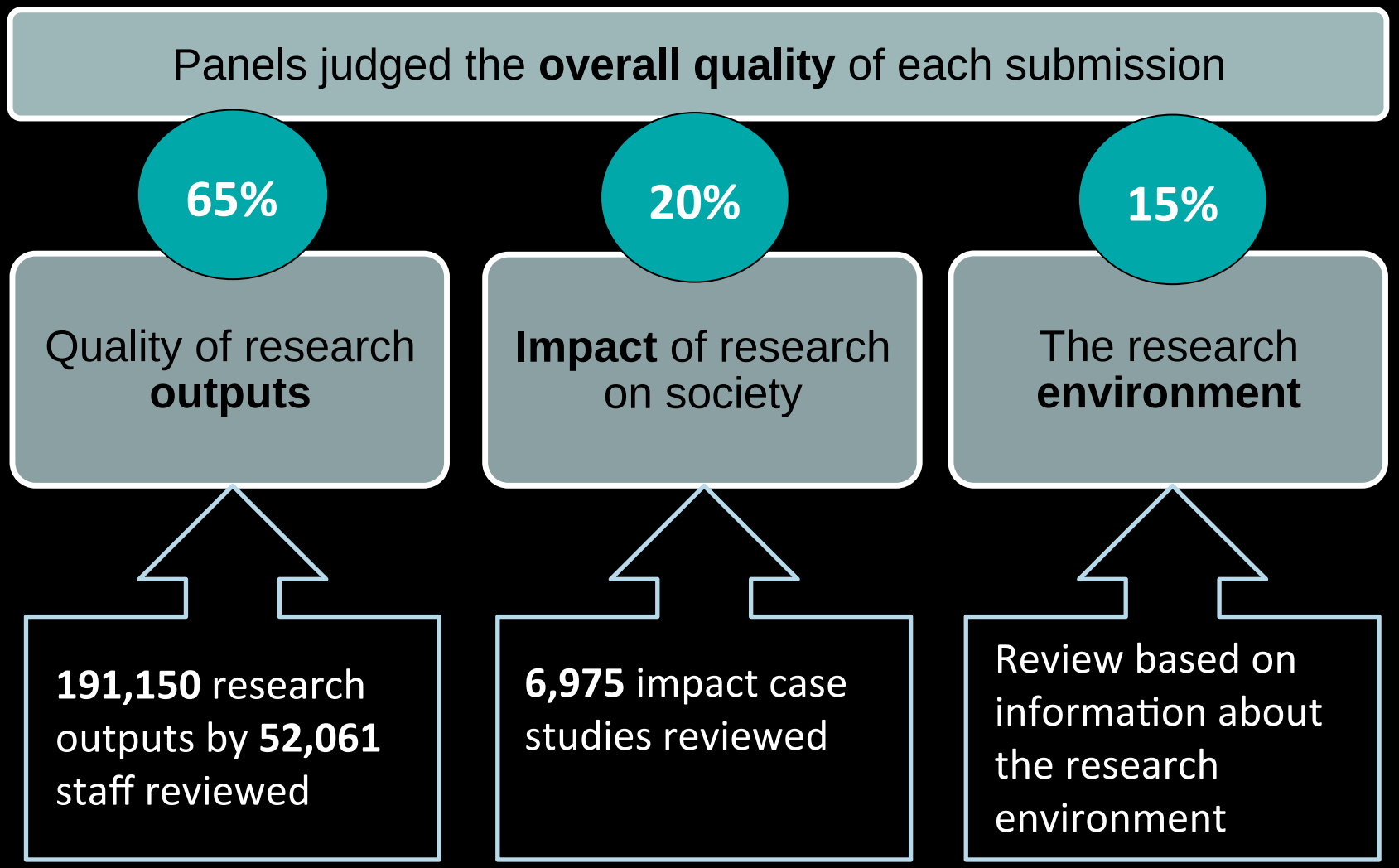

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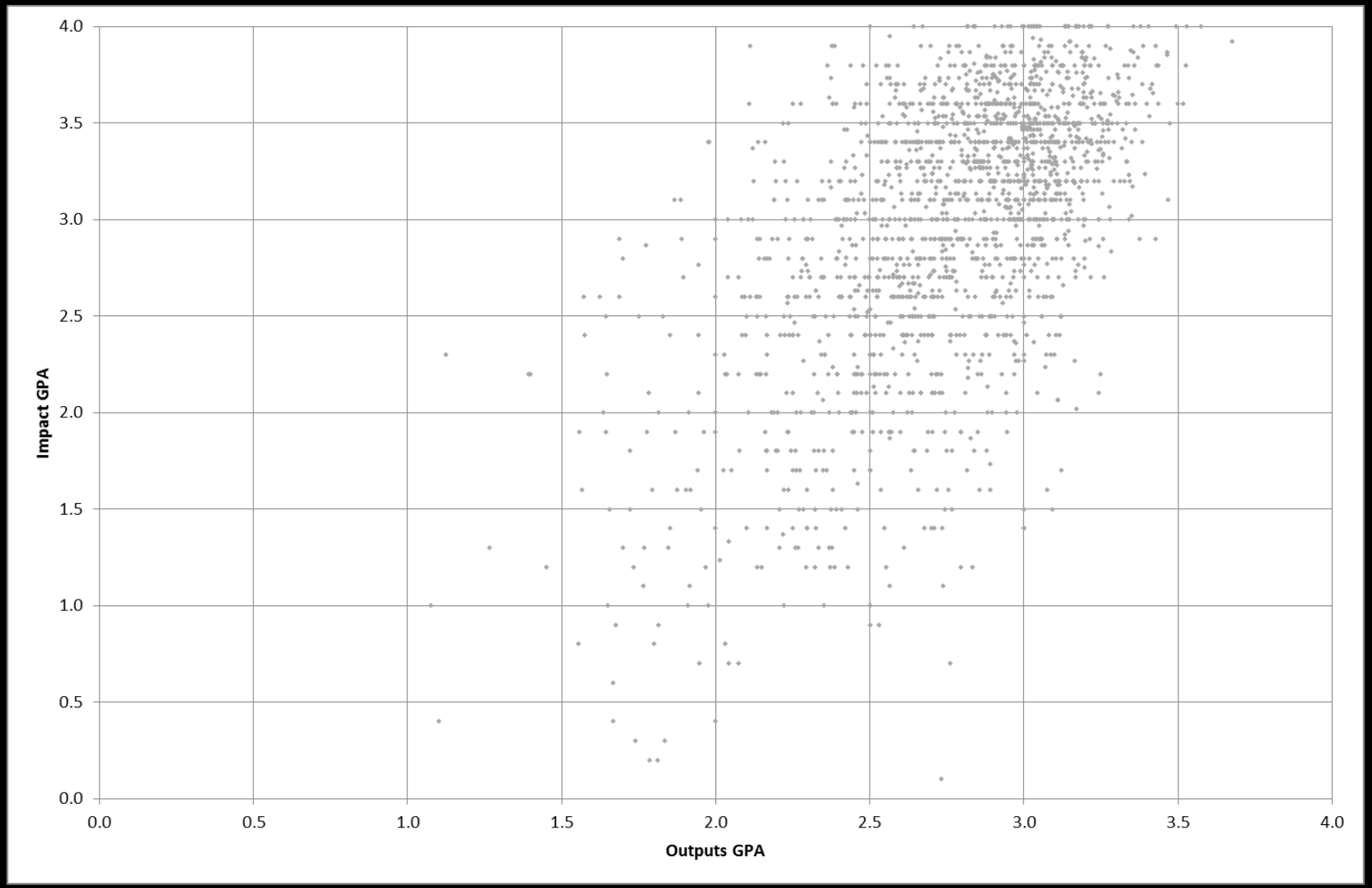
Impact and output scores related, but not perfectly



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Impact is not only technological

- The language of NASA's Technology Readiness Levels (TRLs) continues to be adopted uncritically
- Innovation is far more inter-disciplinary
- Research is vital at every stage of the innovation system
- 79% of the UK economy is 'service industry' and the Creative Economy alone grew 6.0% 2011-12 (0.7% UK)

<u>Need to change the culture and language of innovation recognising more than STEM skills are required</u>

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Third generation (3g) mobile phone license auction

- Previous sales had used a 'beauty contest' approach
- Paul Kemperer's theoretical work on risk evaluation and game theory (ESRC ELSE Centre)
- Auction predicted to raise £2.5 billion
- Actually raised £22.5 billion (2.5% of GNP)

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Conclusion

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- Should we measure ‘impact’ and, if so, how?
- Do we need a Traffic Light System for reporting results, signposting the stage a scientific discovery has reached?
- Is the binary divide between pure and applied research helpful?
- How steers are decided in ‘top-down’ schemes is crucial
- Not about predicting impact, but resourcing pathways through user engagement
- Need to change the culture and language of innovation, recognising more than STEM skills are required