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Innovation, regional economic growth, and the UK's productivity problem

Richard Jones
University of Sheffield

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The economic background

The UK's stagnation in productivity growth and regional economic inequality has broken our political settlement

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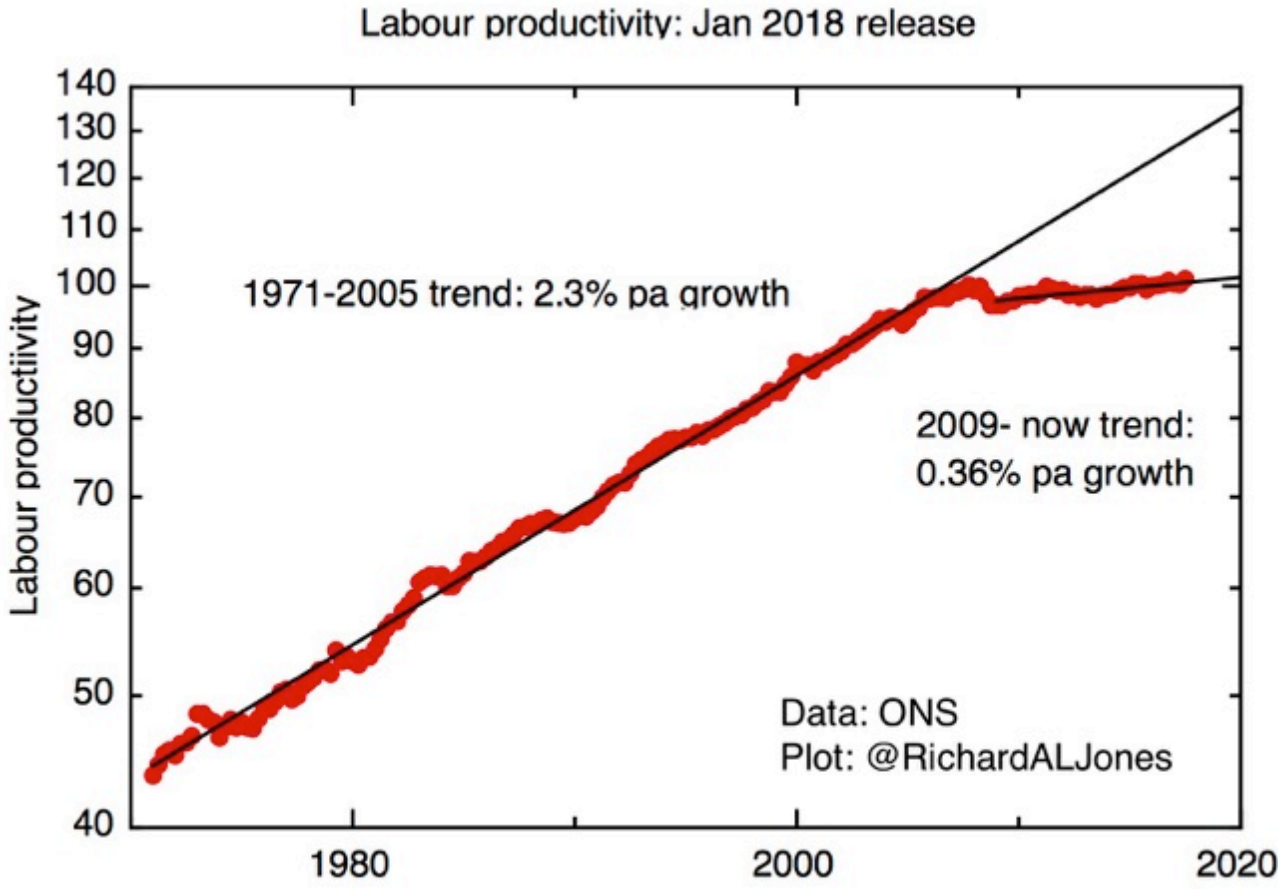
The productivity problem



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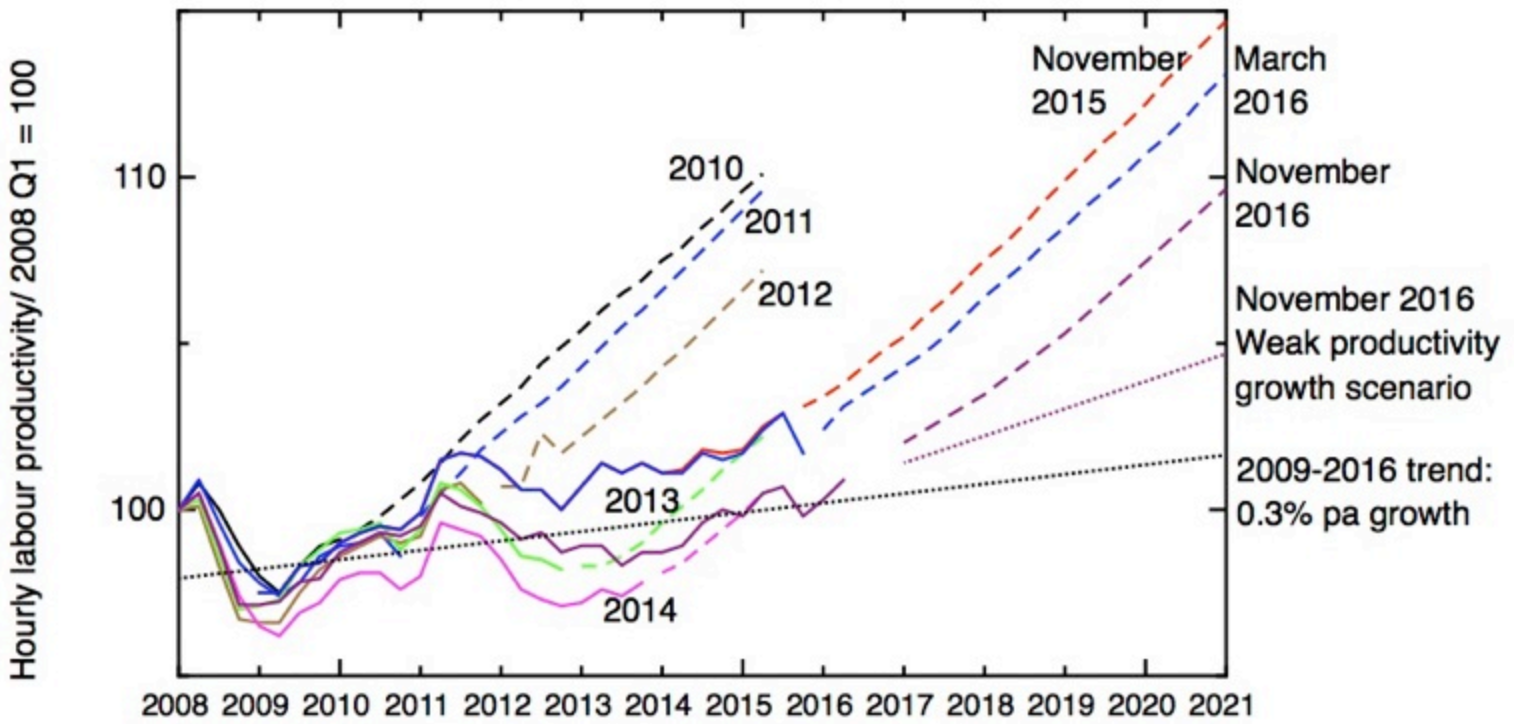
Waiting for the upturn



The Office of Budgetary Responsibility Chart of Doom. Autumn 2017 budget

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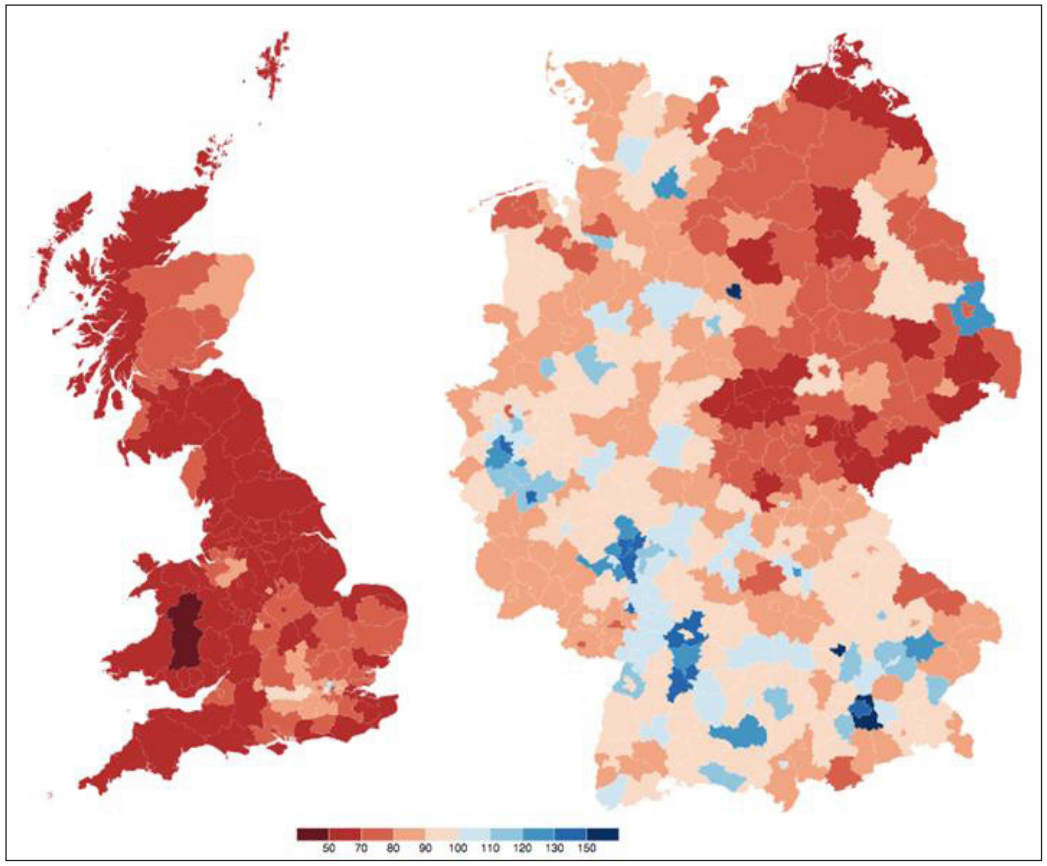
The UK – Portugal, with Singapore glued onto the bottom right corner



- Most of the UK is below average in wealth and productivity
- Outside the SE, productivity levels are comparable with E. Germany or S. Italy

GVA per hour at NUTS 3 region level in 2014, with Germany's overall productivity set to 100

Bernick, S., Davies, R., and Valero, A. (2017) 'Industry in Britain – An Atlas', Centre for Economic Performance Special Paper No.34 http://cep.lse.ac.uk/pubs/download/special/cepsp34.pdf

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Our productivity problem is an innovation problem

- Poor productivity growth not primarily due to sectoral shifts or capital shallowing…
- …but a cross-sector problem of *total factor productivity*
- Failing innovation, in the broadest sense
- Low R&D intensity is part of the story

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What the 2.4% R&D intensity target means

Not ambitious by developed world standards, but will be a stretch from our current position

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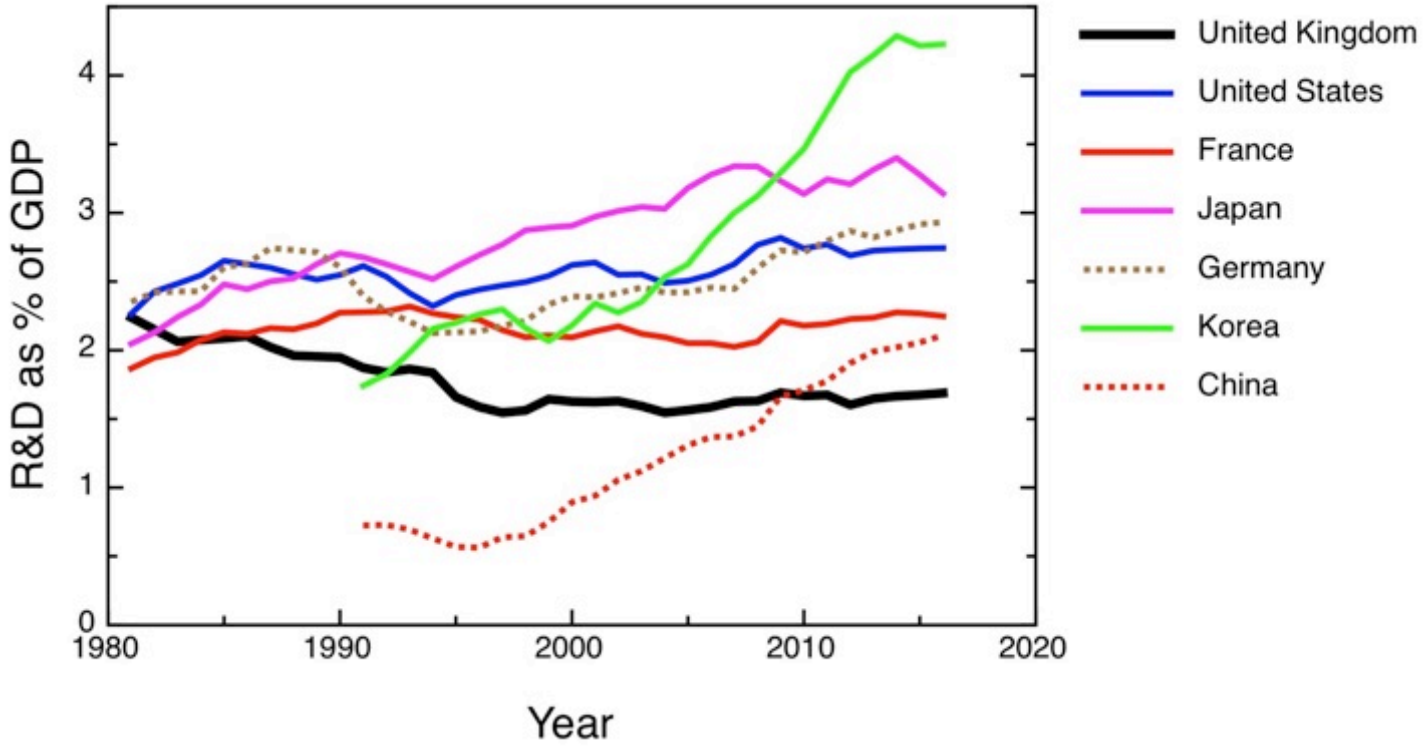
The UK's long decline in R&D intensity



Research intensity of selected countries, expressed as gross expenditure on research and development as a percentage of GDP.

Data: OECD main science and technology indicators, August 2015.

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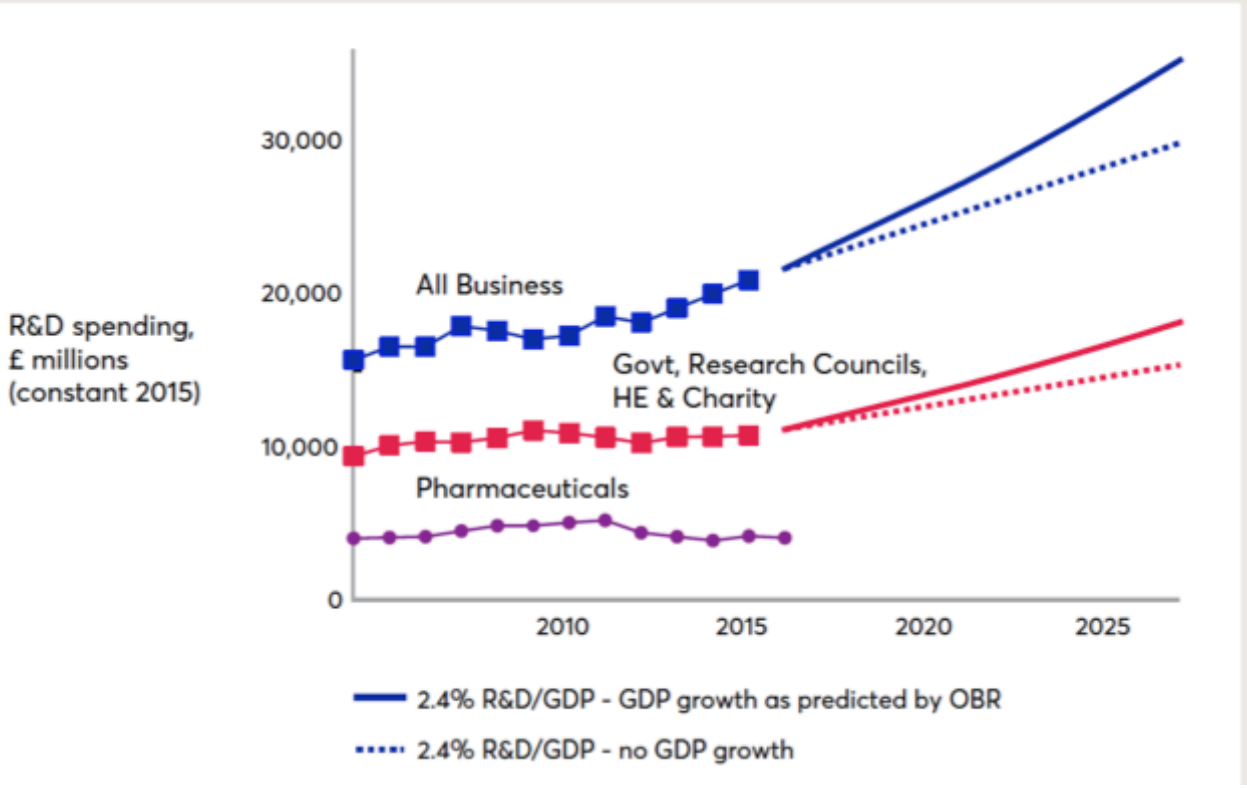
A steep growth trajectory is needed

Figure 6.2: Growth in R&D spending needed to reach the 2.4 per cent R&D intensity target by 2027.



Increase required between 2015 & 2027

£22 bn/pa total
£14 bn/pa private
£7 bn/pa public

Already announced public sector increase:
£2.3 bn/pa

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What 2.4% means

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Speech

Britain's new unique selling point (USP): the go-to place for science and innovation

Speech by Science Minister Sam Gyimah at the opening of the Schrödinger Building, Oxford Science Park.

Published 6 July 2018
From: Department for Business, Energy & Industrial Strategy and Sam Gyimah MP

"The increase we are aiming for would represent the equivalent of 4 new Rolls-Royces, 4 new GSKs and 4 new Oxford Universities, together with making Manchester and Birmingham as R&D-intensive as the East of England. And a new Tech City for good measure. In short, it represents a transformation of the economy for the better."

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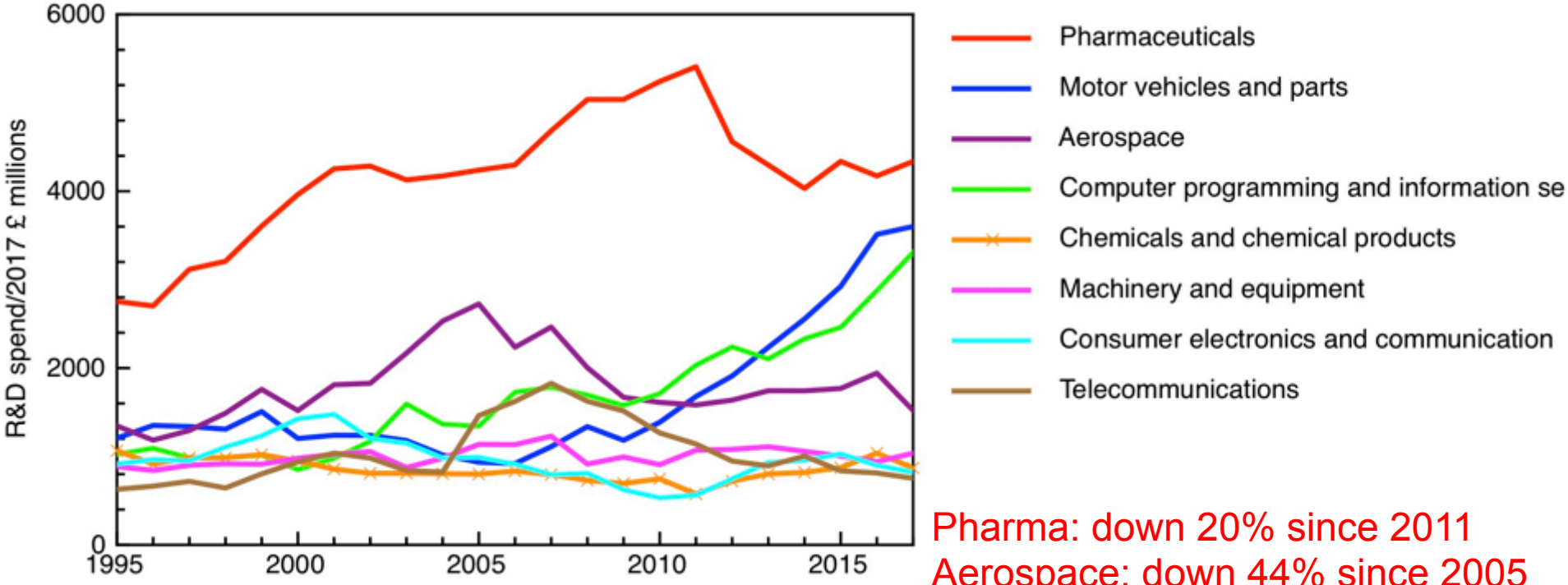
Where's business putting its R&D?



Pharma: down 20% since 2011
Aerospace: down 44% since 2005
Telecoms: down 59% since 2007

ONS BERD Nov 2017 release
Deflated with GDP deflators

Auto: up 290% since 2006
Programming: up 290% since 2000

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Place-based research and innovation policy

The UK's regional concentration of R&D (especially public sector) is extreme and must be corrected

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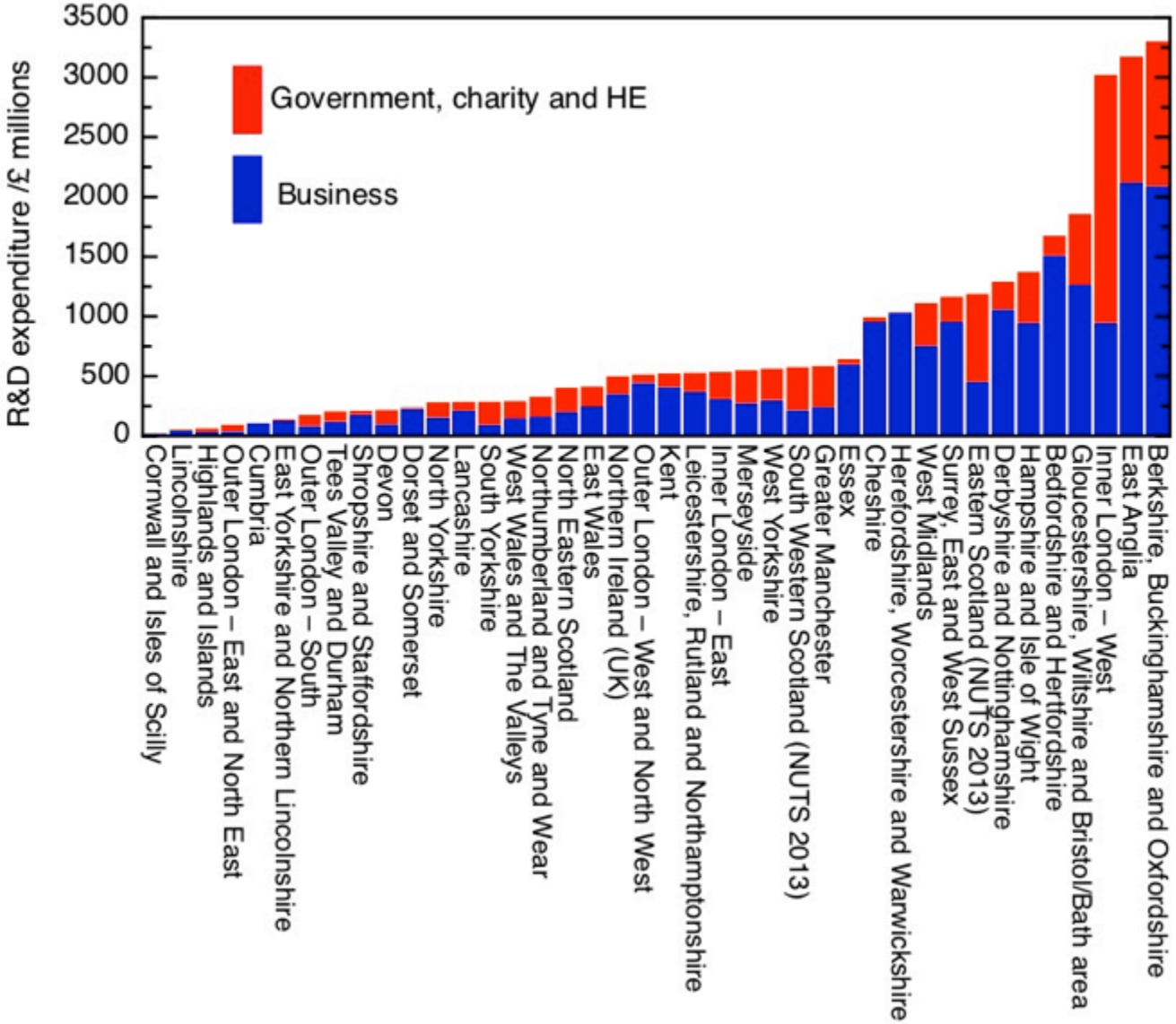
The long tail of places that do little R&D



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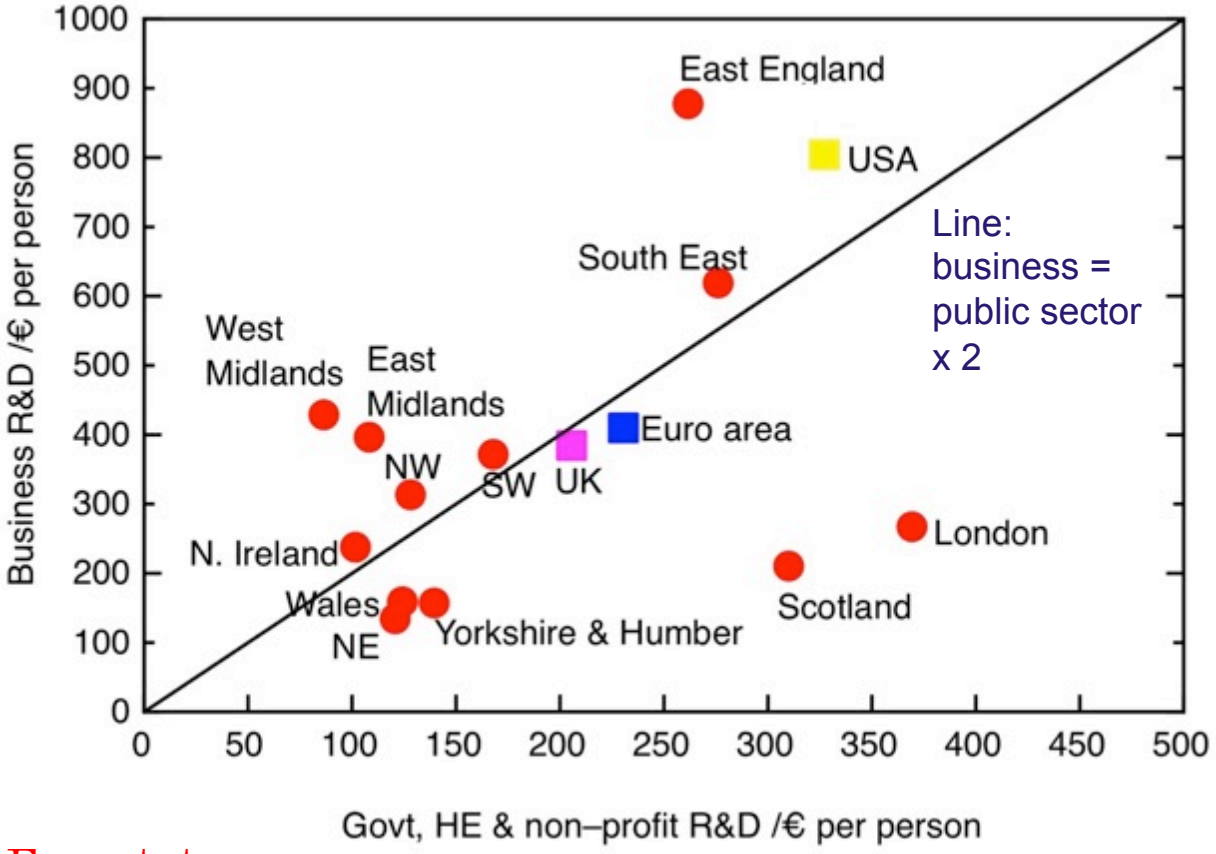
The mismatch between where government and private sector do R&D



2014 data, Eurostat

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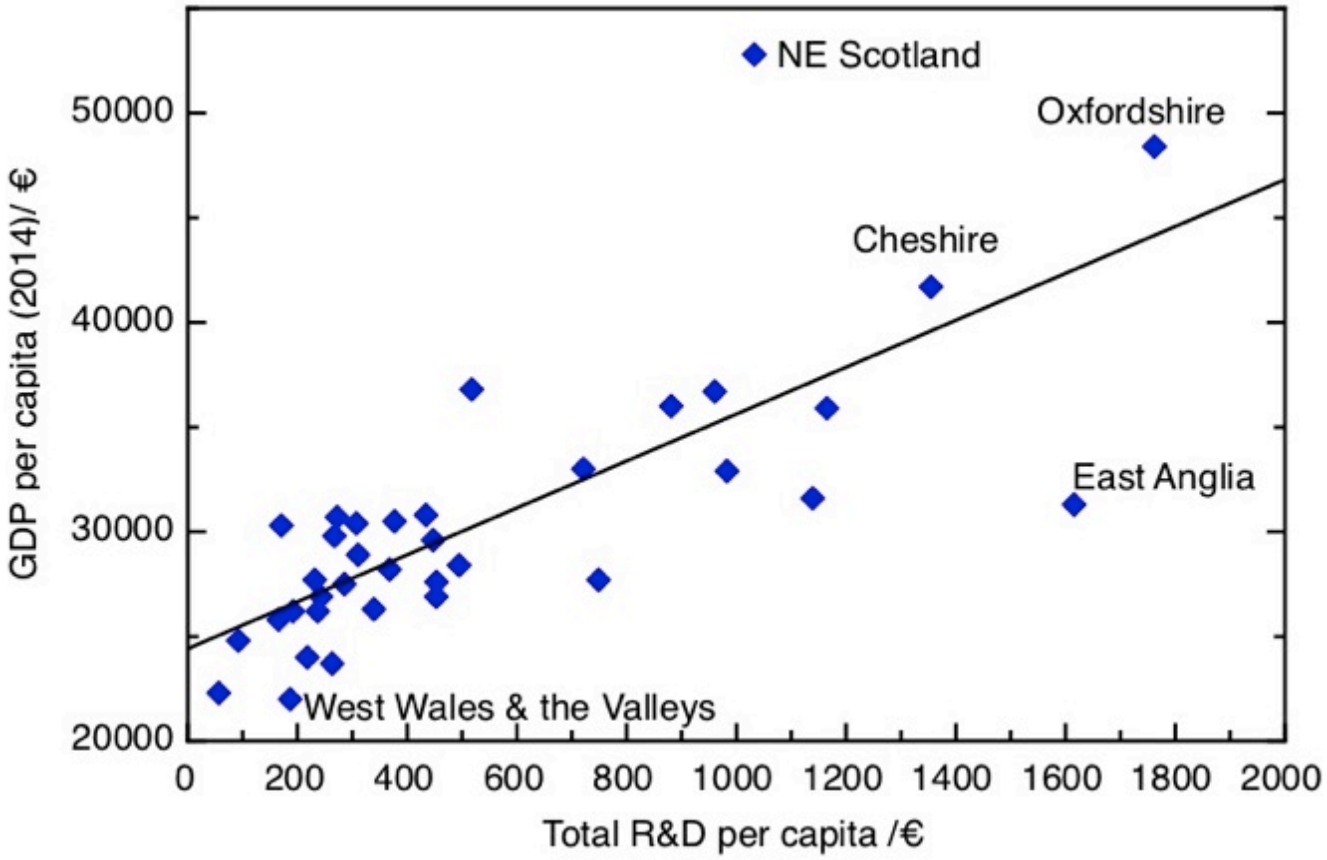
Poorer places do less R&D



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Different strategies for different places?

	Low Business R&D	High Business R&D
Low public R&D	Wales, NI, Yorkshire & Humber, NE Carefully targeted public investment in areas likely to grow business R&D capacity	East Midlands, West Midlands, NW Strong cases for govt investment to support & grow existing private sector capacity
High public R&D	London, Scotland Focus on best VFM for public investment Emphasis on driving up business R&D	East of England What a successful knowledge based economy looks like. Does prosperity spread out to all sub-regions?

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Regeneration through innovation and skills – Sheffield's AMRC story

Focus on translational research & skills at all levels, driving inward investment by international firms at the technology frontier & upgrading the existing business base

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How can universities help rebuild regional R&D capacity?

University of Sheffield Advanced Manufacturing Research Centre with Boeing

AMRC ADVANCED MANUFACTURING RESEARCH CENTRE / The University Of Sheffield.

The AMRC recipe

- Partnerships with firms at the international technology frontier – Boeing, Rolls Royce
- Advanced Manufacturing builds on existing regional business capabilities
- Focus on translational research
- Knowledge Exchange from university research
- Diffusing technology across industry sectors

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How it works

- Attracting inward investment with the innovation & skills offer
- Developing existing industry base
- Technology diffusion takes place through people
  - Skills at all levels – apprenticeships through to MBAs & PhDs

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McLaren partnership

- McLaren Automotive to open purpose-built production facility next to the University of Sheffield's Advanced Manufacturing Research Centre (AMRC)
- More than 200 new jobs to be created with £100 million boost to the UK's economy - reshoring production to the UK
- New facility to be based in the UK's first Advanced Manufacturing Innovation District
- Ongoing partnership between McLaren and the University of Sheffield's Advanced Manufacturing Research Centre led to development of McLaren's new Composites Technology Centre

“

- We evaluated several options to achieve this objective but the opportunity created by the AMRC at the University of Sheffield was compelling. At the AMRC, we have access to some of the world’s finest composites and materials research capabilities, and I look forward to building a world-class facility and talented team at the new McLaren Composites Technology Centre.

- Mike Flewitt, CEO, McLaren Automotive.

AMRC
ADVANCED MANUFACTURING RESEARCH CENTRE

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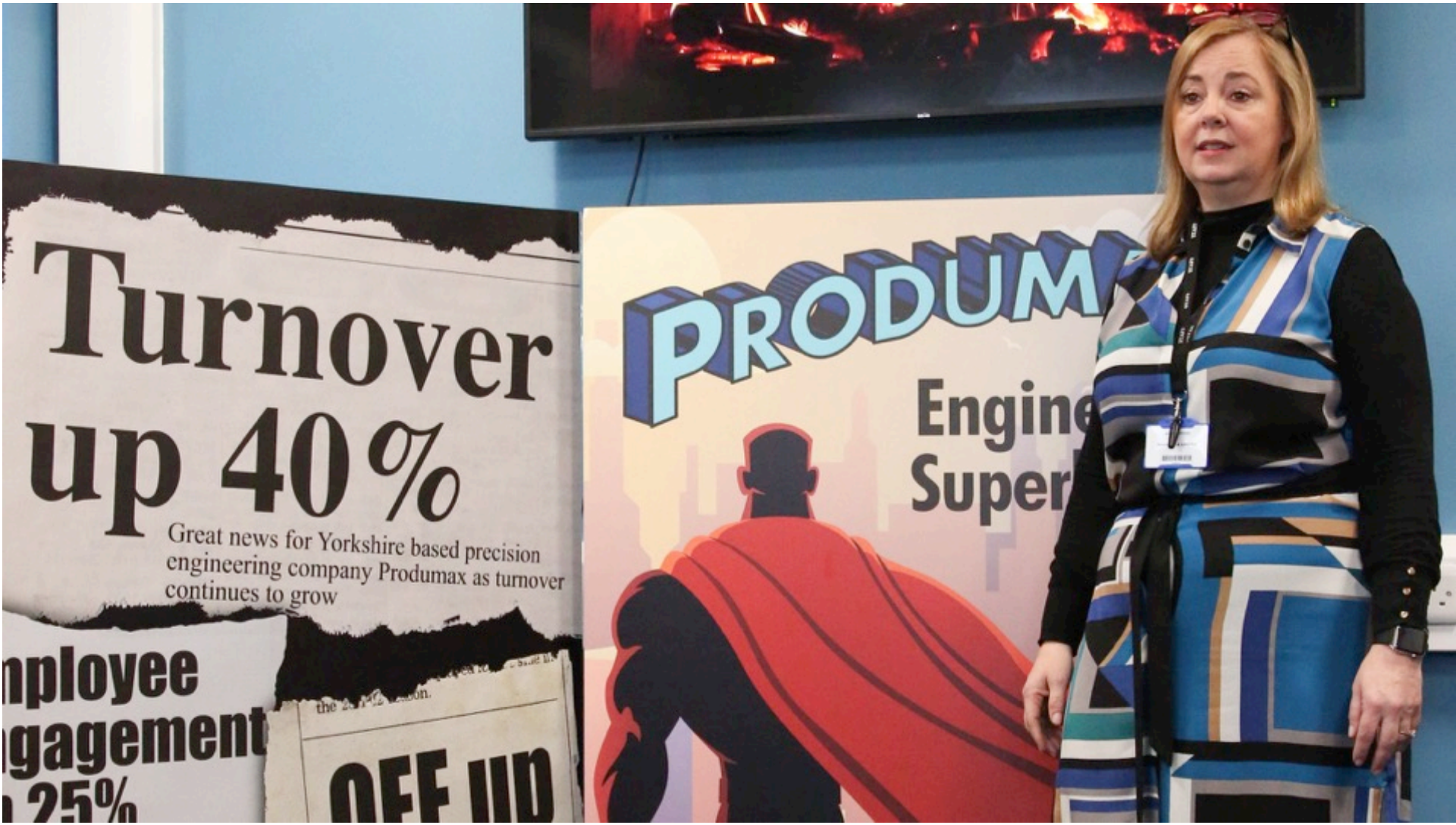

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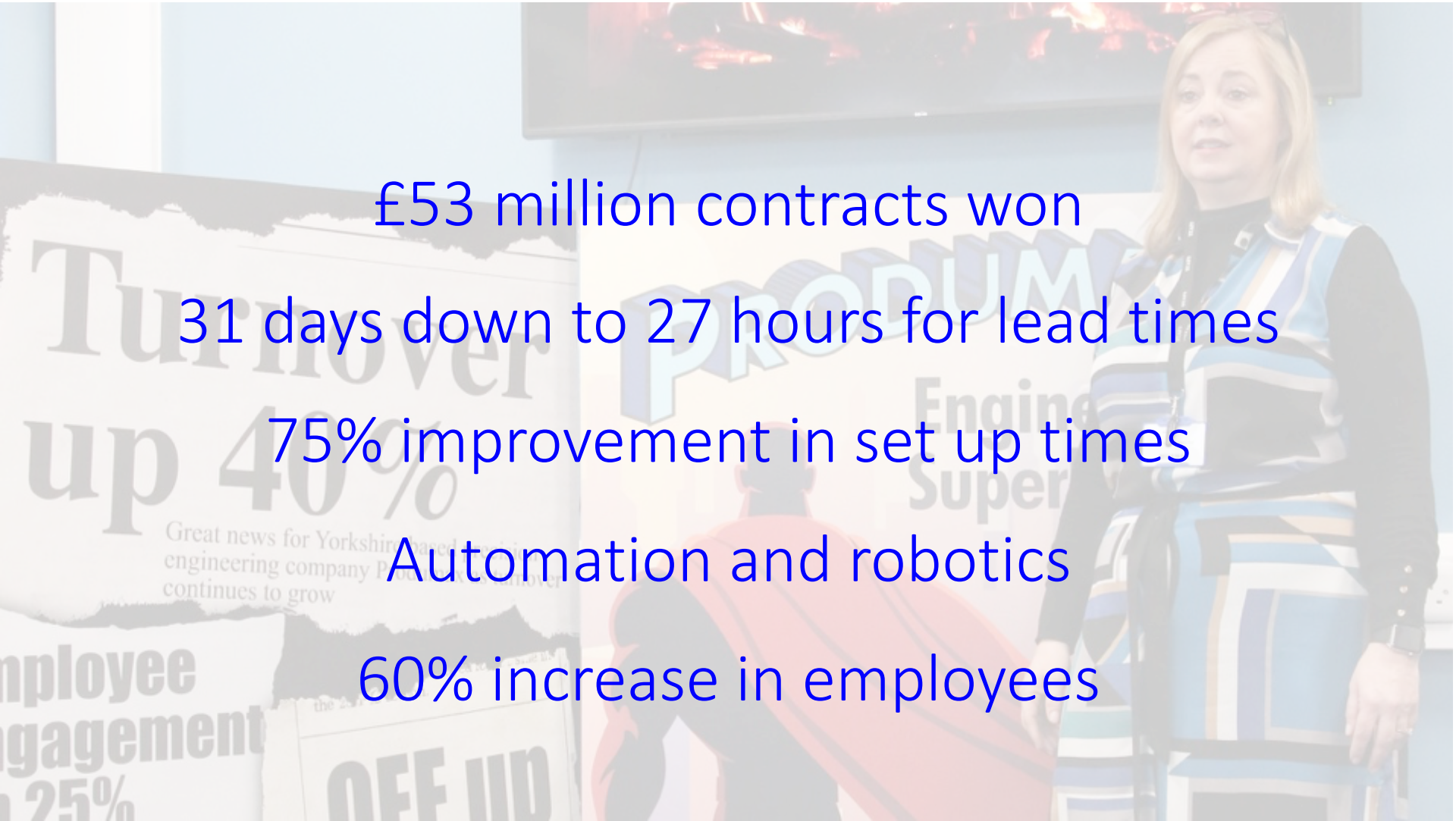

£53 million contracts won

31 days down to 27 hours for lead times

75% improvement in set up times

Automation and robotics

60% increase in employees

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> The University of Sheffield AMRC has been with us since the start of our journey, from the virtual simulation of our factory floor, enabling us to get it right first time and secure employee engagement, through to the adoption of new digital technologies. They are great friends who challenge and support.

Mandy Ridyard, Produmax

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AMRC Apprentice Training Centre

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- 1,300 apprentices
- 700 currently enrolled
- 210 SME manufacturers across the city region
- Boeing, McLaren, Rolls-Royce and Toyota

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"Working closely with the AMRC Training Centre we developed Oliver's higher-level program, integrating a polymer diploma to run alongside his mechanical qualification.

"It was refreshing to work with a team with such a 'can do' attitude, an attribute that is often lacking in training providers who push a 'one size fits all' philosophy."

Ian Cosgrove, head of training at MGB

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Rebuilding the "industrial commons"

- A successful regional cluster draws on a set of collective resources and knowledge – what Pisano & Shih call the "industrial commons"
- Home of the collective knowledge, much of it tacit, that drives innovations in both products and processes.
- A successful "manufacturing commons" is rooted in
  - Large anchor companies & institutions
  - networks of supplying companies,
  - R&D facilities,
  - informal knowledge networks and
  - formal institutions for training and skills.
- Regional economic policy should consciously attempt to rebuild the "industrial commons"

See Pisano, G. P., & Shih, W. C. (2009). Restoring American Competitiveness. Harvard Business Review, 87(7-8), 114–125.

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Local industrial strategies

- Embrace opportunities of new technology, yet work with grain of the existing industry base
- Understand the role of the region in the wider national and global economy
- Focus on growing productivity and creating value, often through exports
- Innovation, skills and growing business R&D
- Regional R&D targets and roadmaps?