

# UK research helping to drive economic growth

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# The problem as stated in official reports

- “... a very large aggregate of smaller English businesses is carried on in a stupidly conservative fashion, with antiquated machinery, traditional modes of conduct, and methods which ignore the scientific advances of recent years.”
- “numerous cases in which members of the the small band of British scientific men have made revolutionary discoveries in science; but yet the chief fruits of their work have been reaped by businesses in Germany and other countries , where industry and science have been in close touch with one another.”

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*Mosely Commission, The Times, leading article, 28 November 1902*
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*A. Marshall, Industry and Trade, Macmillan, 1919*

# What we know and what we don't know

- Complex relation between R&D and growth but broad consensus indicates a rate of return in range 20-50%
- Higher education R&D demonstrated to contribute to productivity growth – innovation more widely contributes c.70% of growth in labour productivity
- Studies carried out at macroeconomic level – much more difficult to measure returns on a specific programme of activity
  - Timing, attribution and additionality
- Little known about scale of economic benefits from indirect effects e.g. inward investment, regional economies, policy changes, health of population.....



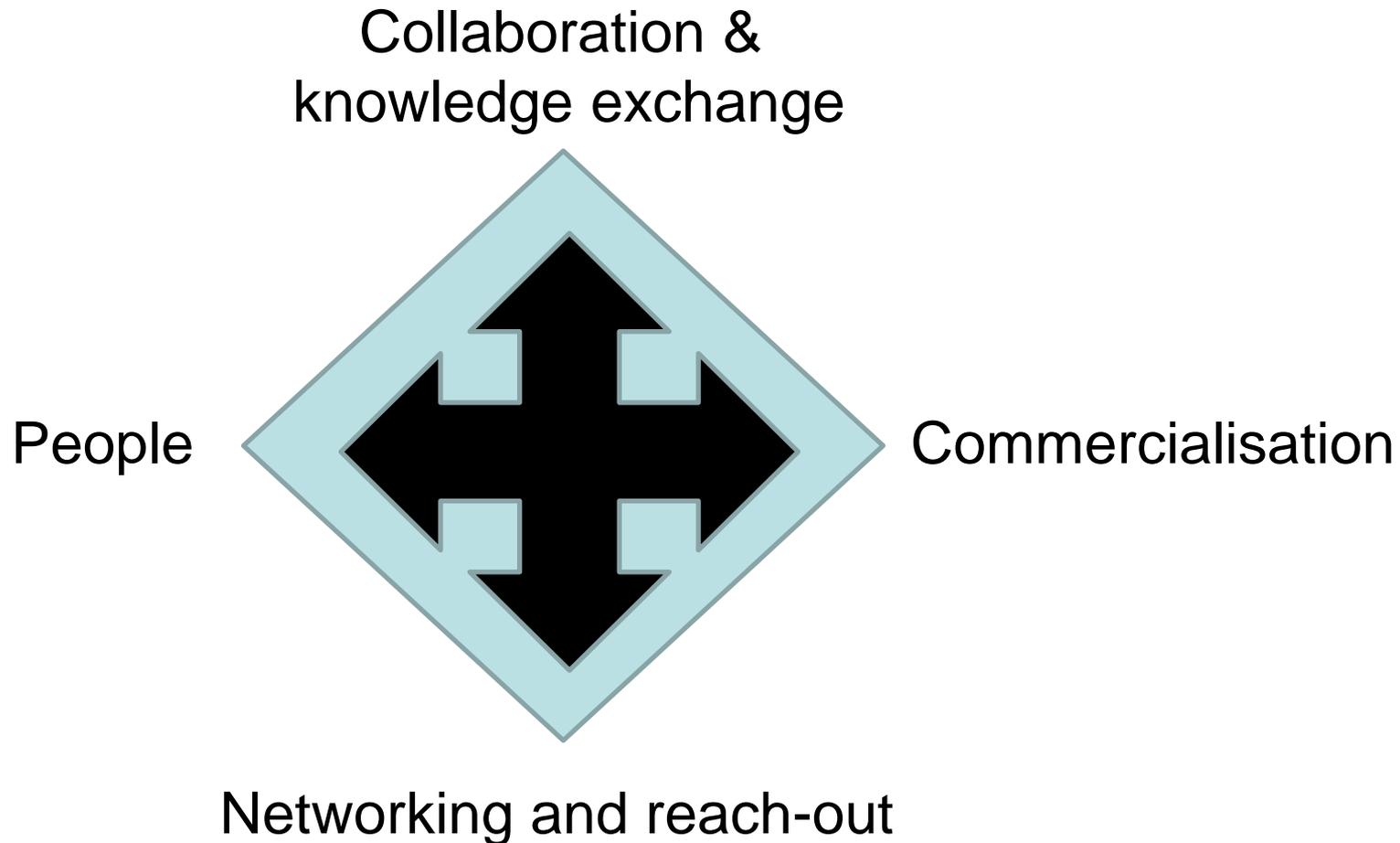
# The spending paradox

- Cuts in response to shorter –term financial pressure erodes the ability to invest in recovery and growth
  - Public spending rose from 35% of GDP in 2000 to 39% in 2007 but in 2010 had risen to 45%
  - ‘Flat cash’ settlement for research gives slow erosion of resource budget inside the ring-fence and capital declining to around 45% of 2010 baseline
  - Weakness of bank lending and venture capital inhibiting investment in new business ideas
    - British Venture Capital Association in 2010 recorded that out of £8.2 billion VC and Private Equity Investment only £10m spent on seed capital and £46mon start-ups

# Linking it together – four key flows in the innovation ecosystem

- People
  - Having the right skills and talents, retaining the best graduates from our education system, critical mass in labour markets for creative people
- Finance
  - Investment in research, support from banks for growth companies, seed capital, venture funding, enabling investment in infrastructure (physical and intangible)
- Services
  - Infrastructure and associated services for innovation including incubators, science parks, digital connectivity, business support, access to equipment for testing etc.
- Knowledge
  - Flow of ideas, IPR and opportunities emerging interactively from universities, hospitals, RTOs, business R&D, creative sector

# Flows channelled through four principal dimensions of university-business links



# Collaboration & KE

- What is it?
  - Company sponsors research or works within collaborative public programme
  - Also consultancy, development of instruments, software..
- Key challenges & opportunities
  - SME engagement beyond narrow high tech sector
  - Open innovation as corporate R&D comes under cost pressure
  - At same time risk of reduced absorptive capacity
  - World Economic Forum ranks UK university-industry collaboration 2<sup>nd</sup> in world
  - Highest share of business R&D income from overseas but...



# Example

- BP establishing \$100 million BP International Centre for Advanced Materials

- Will lead research aimed at advancing the fundamental understanding and use of materials across a variety of energy and industrial applications.

“Hub and spoke” structure, with ‘hub’ located within The University of Manchester’s Faculty of Engineering and Physical Sciences, which has core strengths in materials, engineering, characterisation, collaborative working, and a track record of delivering breakthrough research and engineering applications that can be deployed in the real world.

- “Spokes” and other founder members, all world-class academic institutions, are the University of Cambridge, Imperial College London, and the University of Illinois at Urbana-Champaign.

# Commercialisation

- What is it?
  - Licensing and formation of spin-outs from intellectual property
  - Incubation and provision of infrastructure such as science parks, hosting corporate R&D
- Key challenges & opportunities
  - Venture funding issues driven by difficulty in finding exits and high risks faced by new companies
  - Demand-side measures including procurement giving young firms a road to the market
  - Spin-off counts available but a very poor measure
  - CBR shows low penetration among academics

# Example



- Spin-off founded in 2001
- Bulk manufacture of cadmium-free quantum dots
- For next generation of TV screens, lighting and solar panels
- Exports and partnerships to major Asian firms
- First products using QDs on market next year
- AIM listed and now capitalised c. £120m
- Employs 62 people

# People

- What is it?
  - Ultimately the flow of trained people into the economy, through employability, sponsorship, business-focussed education, continuing professional development, mobility...
- Key challenges & opportunities
  - Student enterprise growing but does not reach enough of the population
  - Little intersectoral mobility



# Example - Venture Further annual business plan competition

## Winner - Cav-Form

John Wade (U/G) - B.Eng  
Civil Engineering (1st Year)

*The system offers a method of constructing a cavity wall, eliminating the requirement of a backing block, saving on cost of the blocks, labour and materials. The greatest benefit however relates to the environment. The system delivers huge savings in terms of carbon reduction in construction.*



# Networking and reach-out

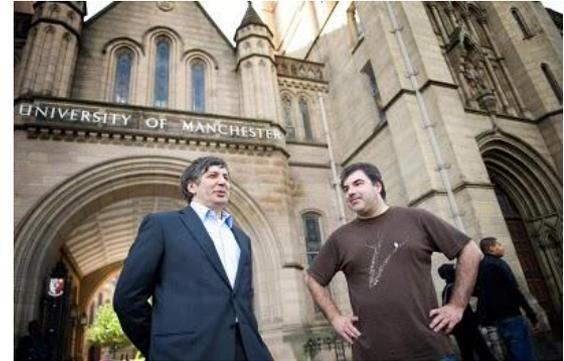
- What is it?
  - Wide variety of personal and institutional contacts with informal knowledge exchange and problem-solving
  - Spatial, sectoral and regional partnerships
- Key challenges & opportunities
  - Often contains the seeds of wider collaboration
  - Entry ticket to networks and conduit to external knowledge
  - Low transaction costs make this available to much wider population of firms

# Example of networking - Universities attract world's greatest researchers to the UK

Around 10.5% of our academics come from outside the UK

Nearly 40% of our publications are internationally co-authored

A window on the world for business and culture



# Conclusions

- Time has prevented examination of economic contribution through cultural sectors, social enterprises etc but these are major part of the picture
- UK has an excellent university base not only in the research it performs but in its capabilities to contribute to economic growth
- Activity needs to be upscaled – some scope through wider engagement of academics but order of magnitude change only possible through large growth in student enterprise activities
- We need our supply side to be nurtured but the real bottlenecks are in framework conditions for enterprise and on the demand-side