

The Innovation Revolution

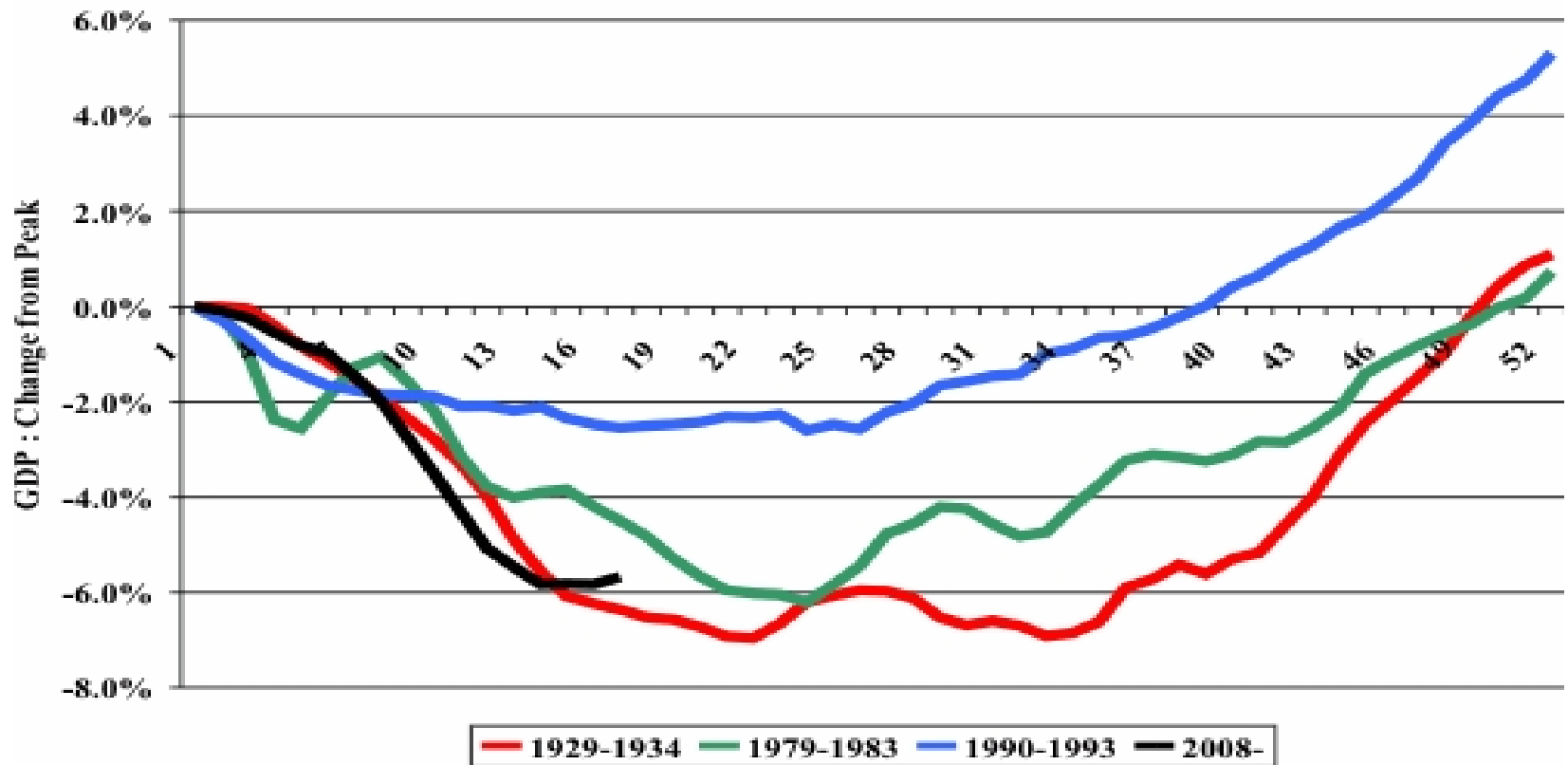
Will Hutton

Presentation to the Strategy Unit September 23rd 2009



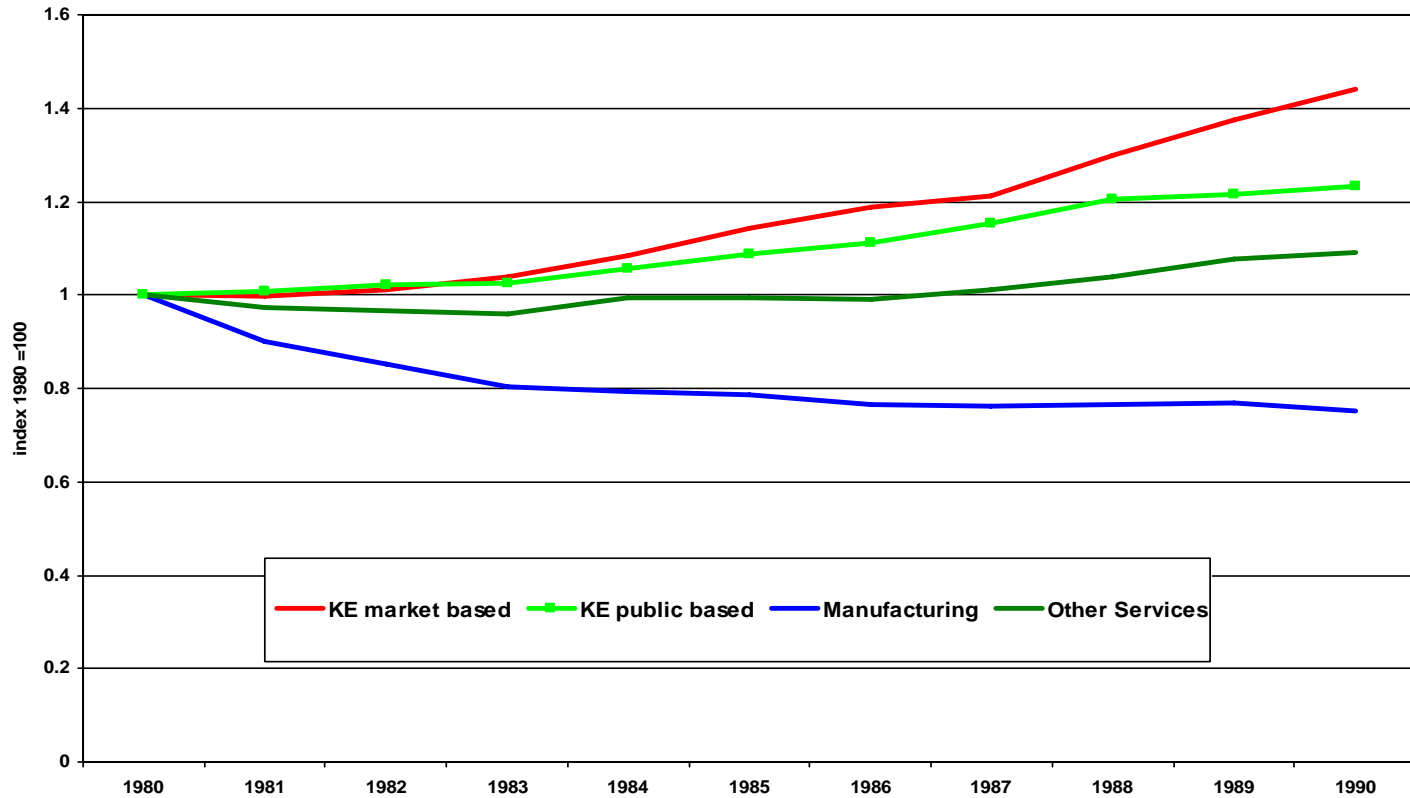
How bad is the recession and how fast might we recover?

The Profile of the Depression: Months from the Start of the Depression



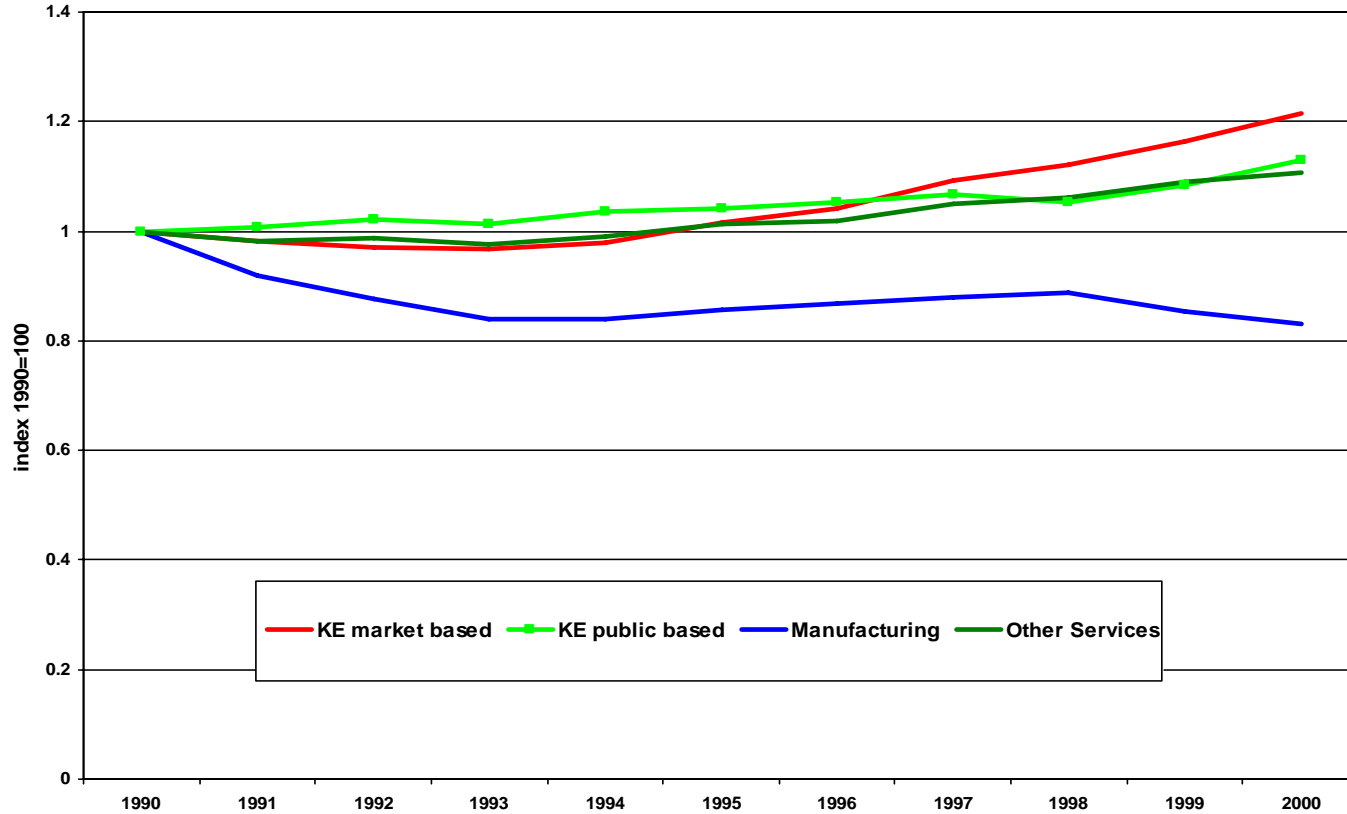
Knowledge economy and the 1980s recession and recovery

total employment, EU KLEMS database definition 1980=100. KE market based is telecoms, high tech, business, financial, and cultural services; KE public based is education and healthcare.



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The recovery – the knowledge economy as driver



- Traditional answer to what is wealth generation? Combining land, labour and capital by firms to create goods and services
- However production has to be responsive to demand. Demand in all societies moving up Maslow hierarchy of need. In advanced economies increasing bias away from “productivist” and “transactional” to “experiential” modes of delivery.
- From the firm as a web of transactional contracts (wages, rents, dividends) to firm as a social institution (tacit knowledge, employee engagement, ownership commitment, co-production of business model , growing importance of “ intangibles”)
- Innovation always important. Now key driver of step changes in wealth generating capacity

Key drivers of the knowledge economy

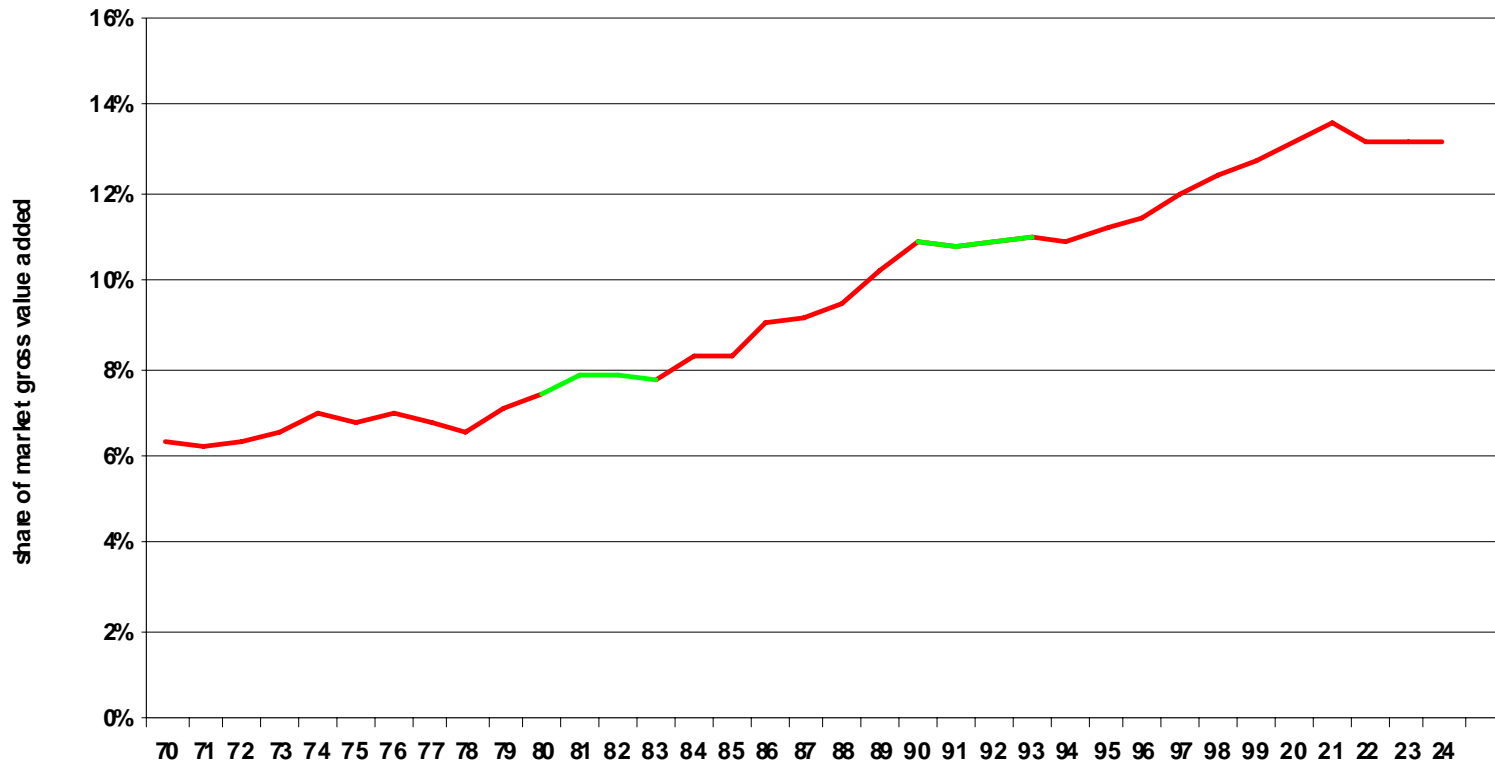


- Growing as proportion of GDP in all western and advanced Asian economies
- Driver One: new technologies, especially General Purpose Technologies(GPTs), create new goods, services, processes and business models with multiple spill-overs.
- Driver Two: shift in demand towards higher value added, experiential services and tech based goods as consumers have become more sophisticated and diversified.
- Note (a) increase in collective consumption of health and education services and (c) business to business transactions
- Globalisation: acting as an accelerator of change on both drivers.
- The “ Great Recession” is temporarily halting these processes, but will resume. However risk of global closure. “We want our own demand”.

Intangibles less affected by recession than physical assets

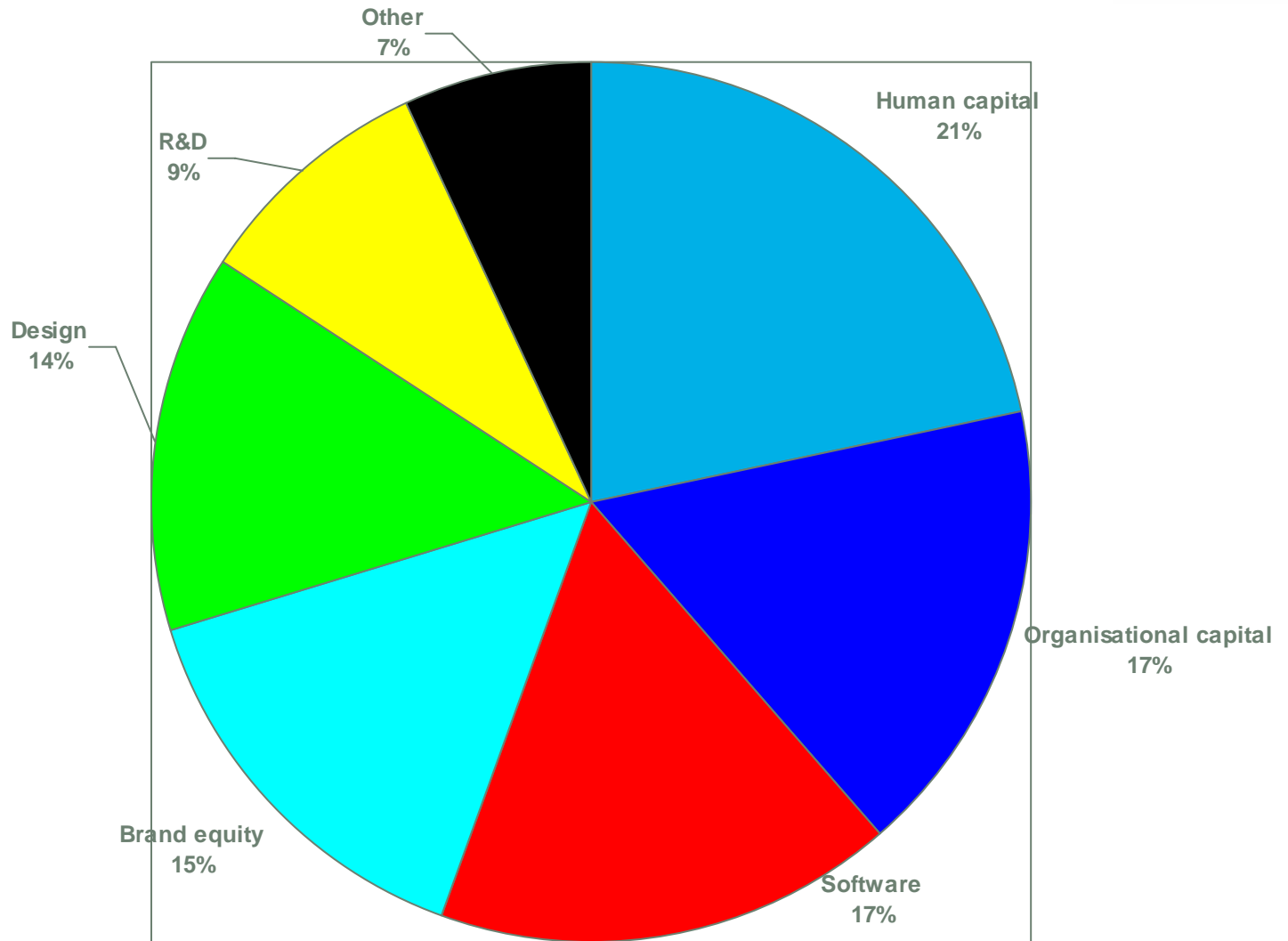
Intangibles investment share 1970-2004

business investment in intangibles as a share of market sector value added adjusted to take account of intangibles. HMT October 2007.



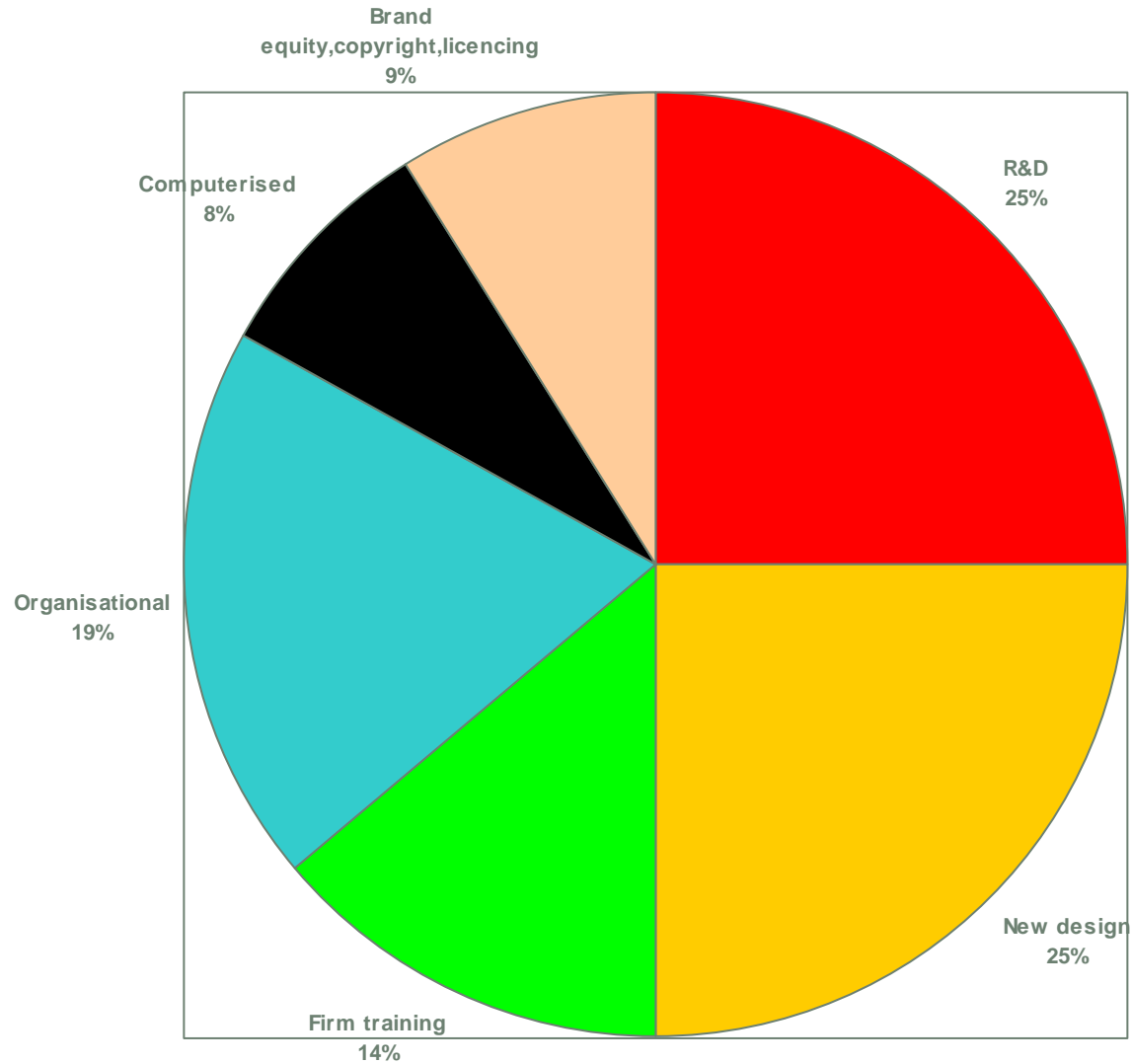
UK Business Spending on Intangibles in 2004

Source: HM Treasury, October 2007



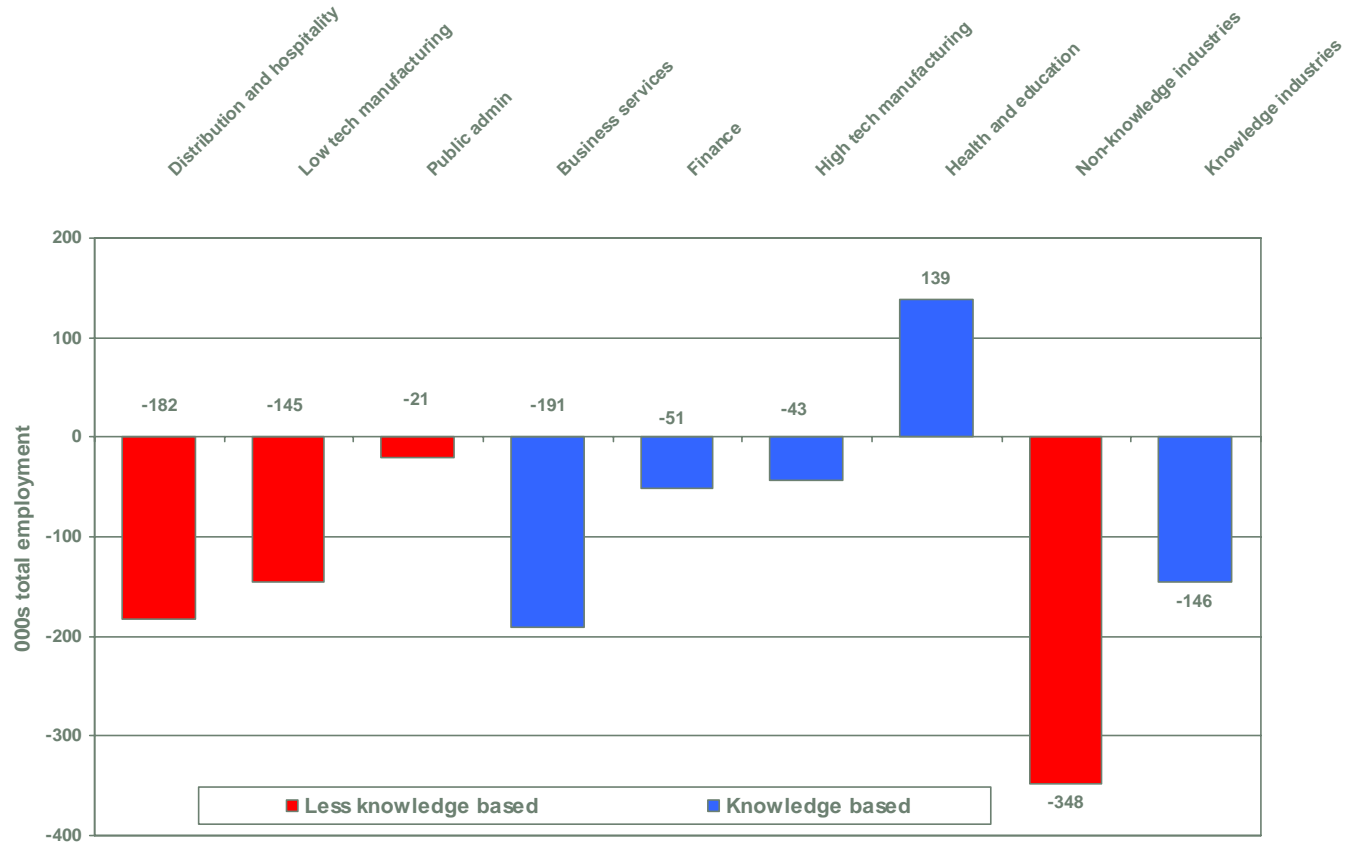
Manufacturing investment in intangibles in 2004

Note: brand equity 8 per cent, copyright and licencing is 1 per cent.. Source: BERR (2008) Economics Paper No.2, p35.



Impact of the recession on the UK's knowledge economy in 2008-2009

All figures GB employees, seasonally unadjusted Mar 2008-Mar 2009, ONS. OECD definitions of high tech manufacturing and knowledge intensive services.

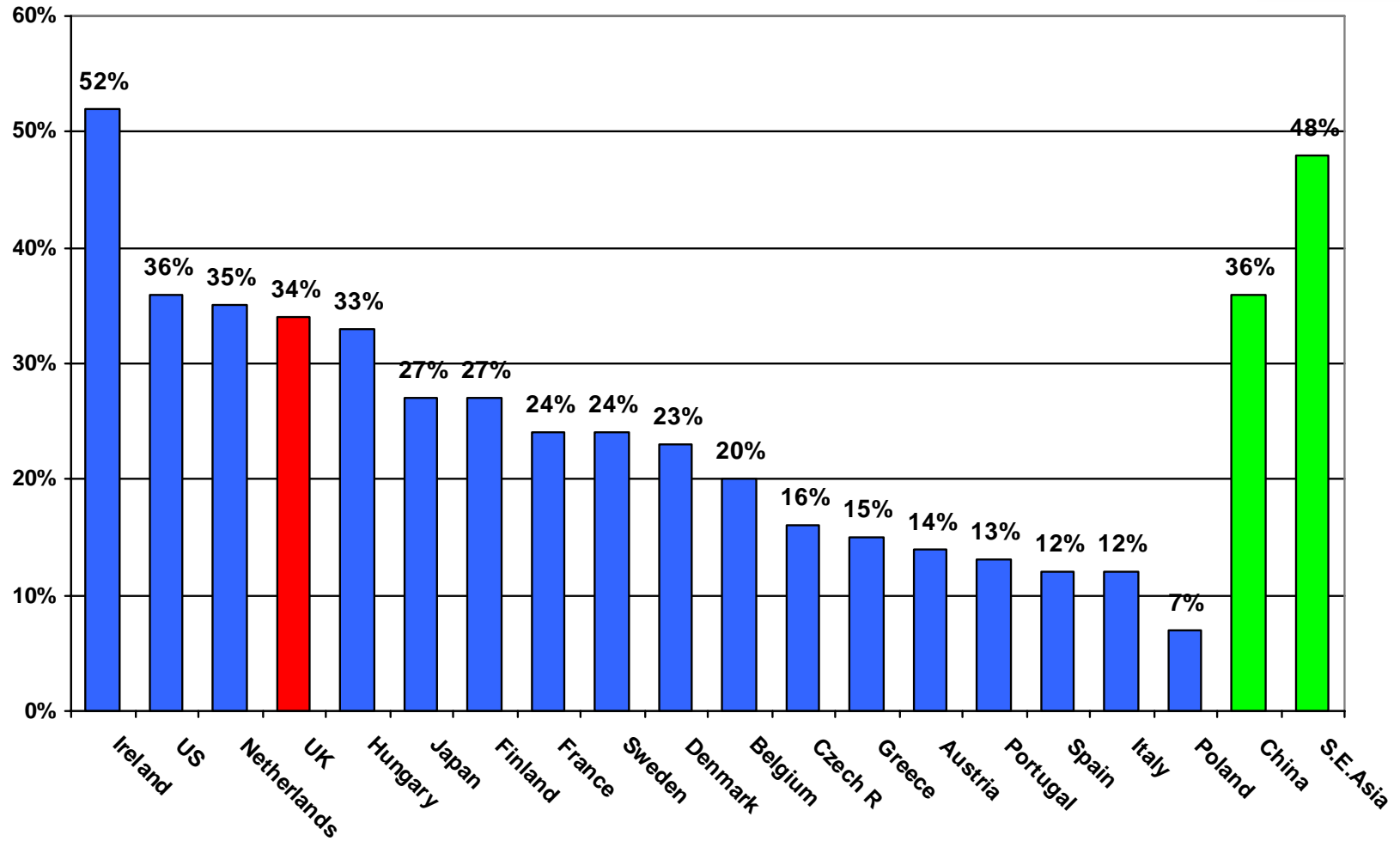


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High tech manufacturing exports as share of total manufacturing exports in 2005

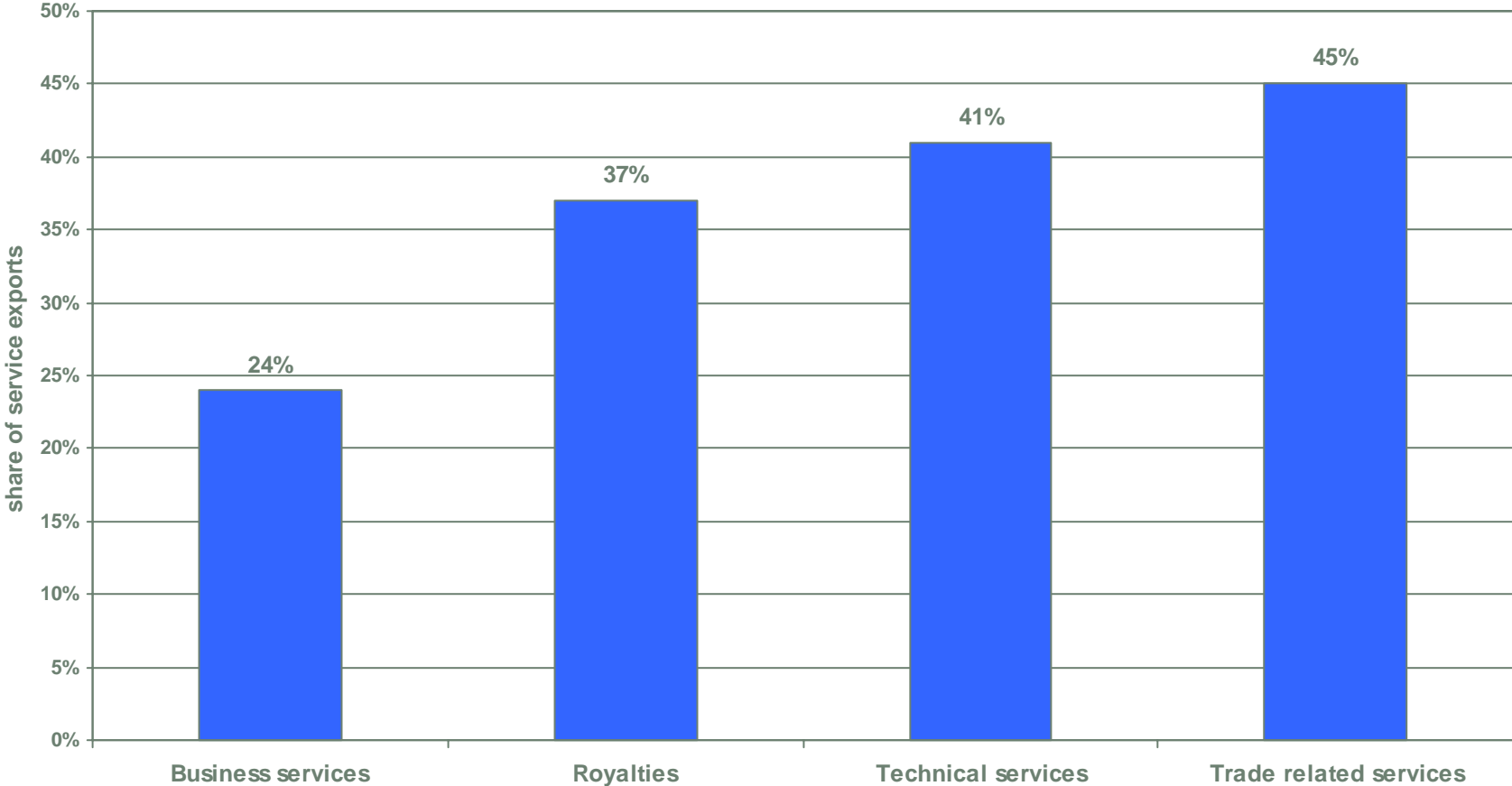
(Rae and Sollie OECD 2007)

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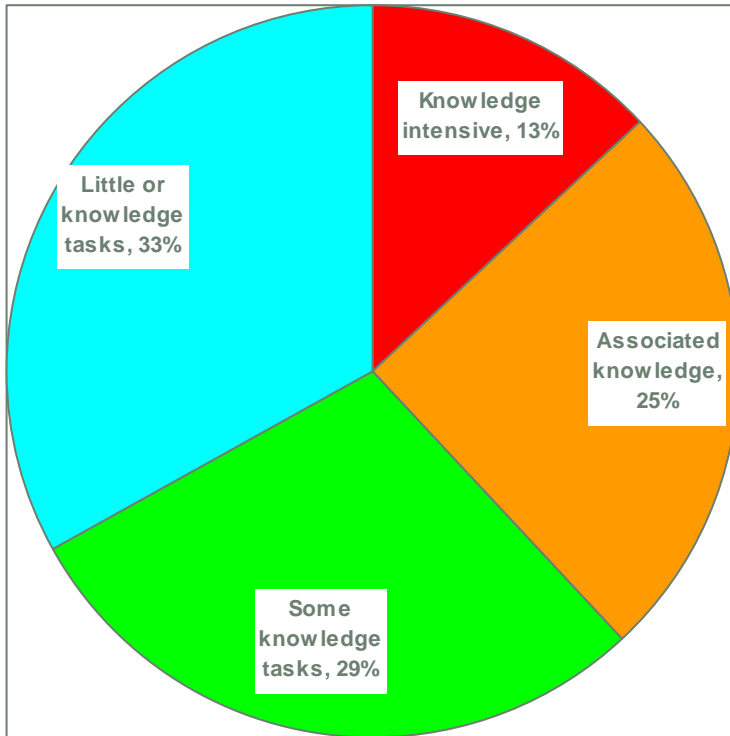
Manufacturing major producer of knowledge based services

Share of service sector exports produced by manufacturing companies 1997-2003 (A Portrait of Trade in Services, Report for the DTI 2006)

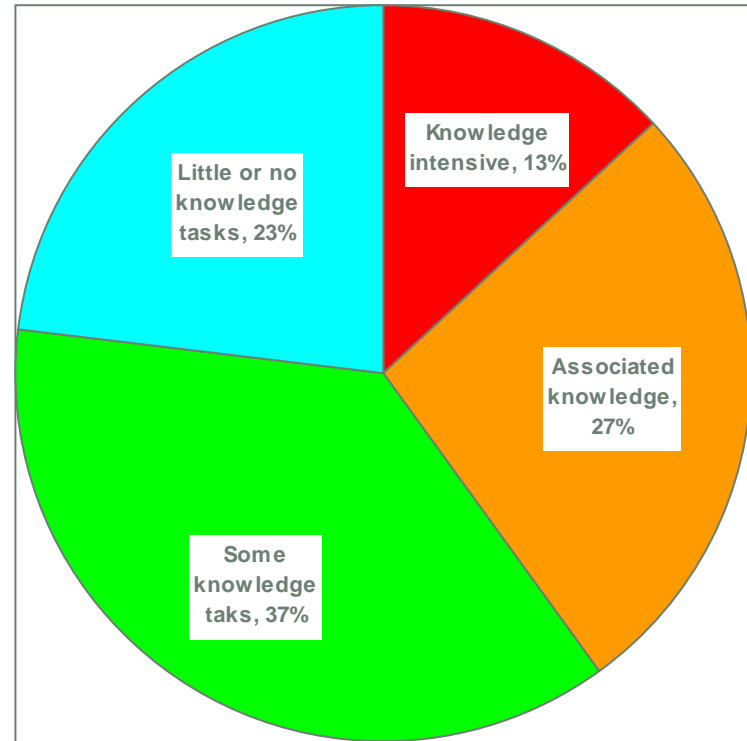


Manufacturing requires as many knowledge intensive jobs as services (TWF Knowledge Worker Survey, provisional results)

Tech based manufacturing



Knowledge based services



A short history of general purpose technologies (GPTs)...



- 9000 BC – 1400AD – Creation of seven GPTs (domestication of animals and plants, wheel, smelting of ore, writing, use of bronze, then iron and steel and creation of water wheel)
- 1400 – 1750 – Creation of two GPTs (three masted sailing ship and printing)
- 1750 - 1900 – Creation of five GPTs (steam engine, factory system, railway, iron steamship, communications)
- 1900 – 2000 – Creation of nine GPTs (internal combustion engine, electricity, motor vehicle, airplane, mass production, computer, lean production, internet , biotechnology)

“If I have seen further than other men it is because I have stood on the shoulders of giants”

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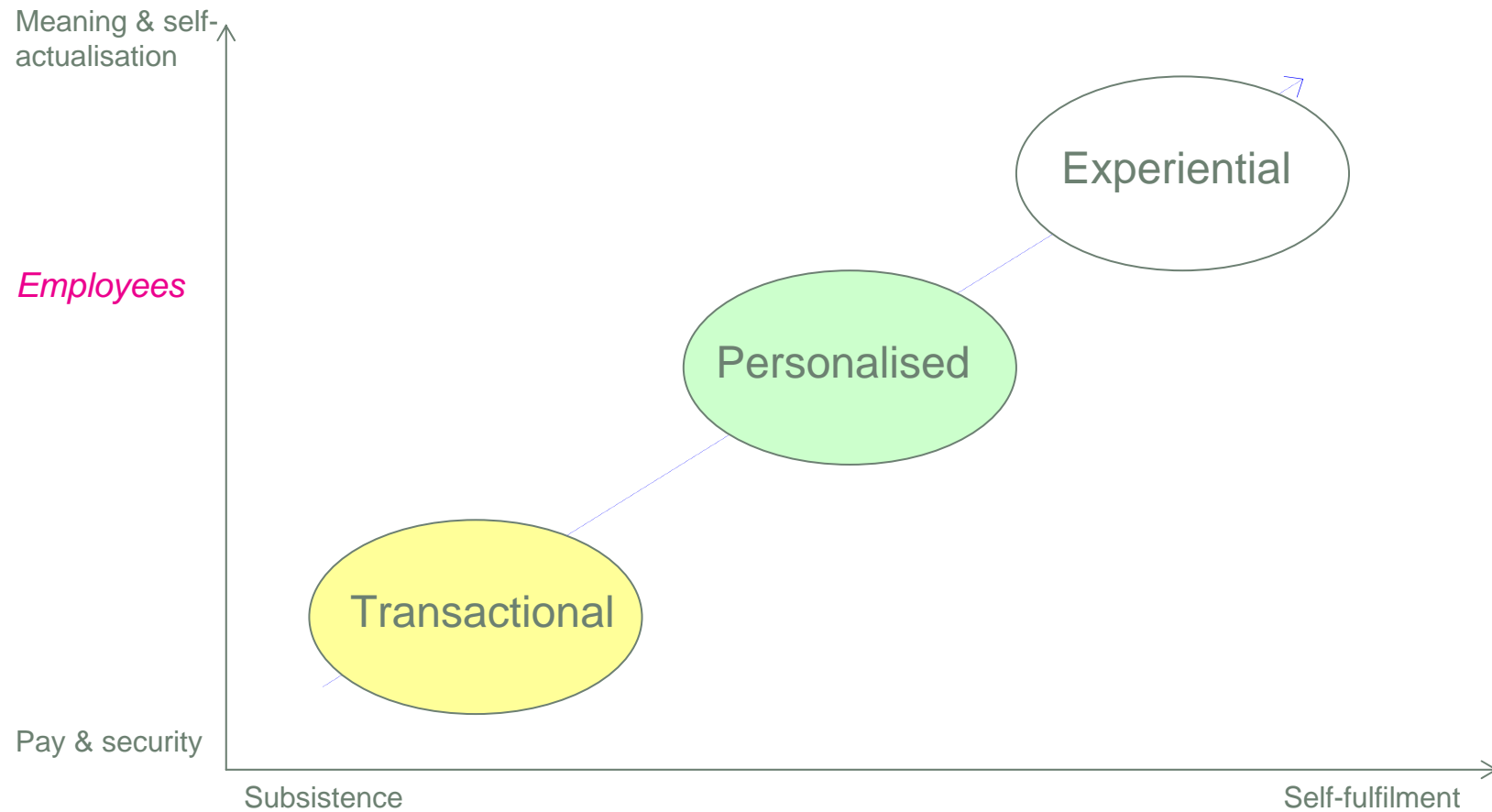
- Innovation depends on cumulative stock of scientific and technological knowledge – and inventions tend to happen simultaneously
- Elisha Gray and Alexander Graham Bell
- Alfred Wallace and Charles Darwin
- Linus Pauling and Crick/Watson
- Galileo and sunspots
- Konrad Zuse and John van Neumann
- 46 per cent of 2000 research scientists say their work has been anticipated once or twice
- High, mid and ground level innovation

Twenty-first century prospects ? Grand Challenges for Engineering



- Nanotechnologies
- Energy from fusion
- Carbon sequestration
- Manage the nitrogen cycle
- Water
- Health informatics
- Durable customised infrastructure
- Customised medicine
- The brain
- Cyberspace security
- Enhance virtual reality
- Personalised learning

From transactions to experience



Consumers

The rise of the experiential – authors of our own lives



- Air travel
- Customised cars – Formula One forerunner for all of us
- The adventure holiday
- The shopping mall
- The live gig
- Virtual reality
- The SIPP
- Etc etc

Components of a National Innovation System



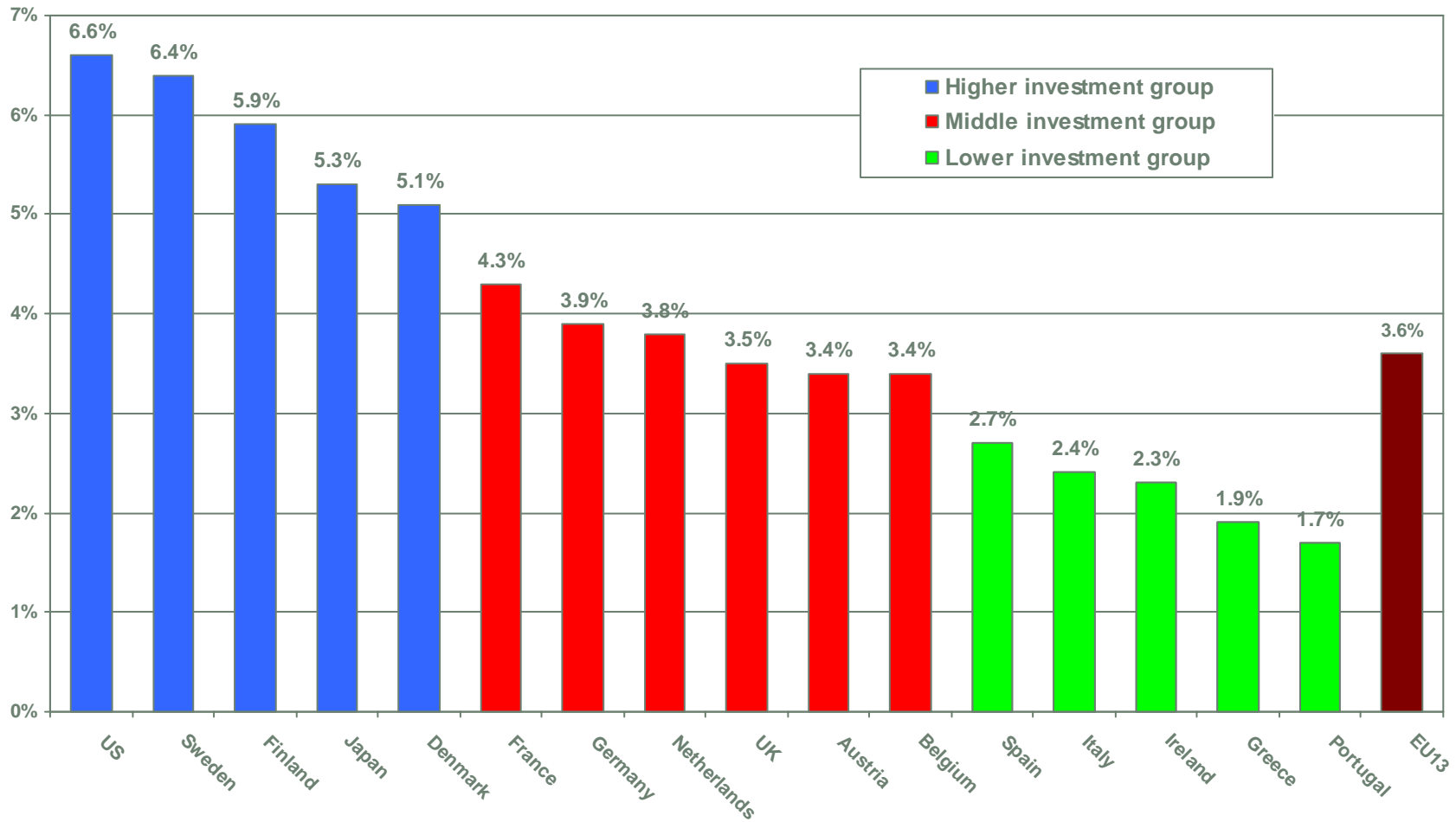
- Average life expectancy of S and P 500 company 45 yrs in 1955 – 11 years today
- Knowledge Creation and Diffusion
- Selection and Dissemination of Research
- Entrepreneurial Experimentation
- Market Formation
- Financial mobilisation
- Human Capital Development

Investment in some knowledge assets (R&D, higher education, software) in 2003-2004

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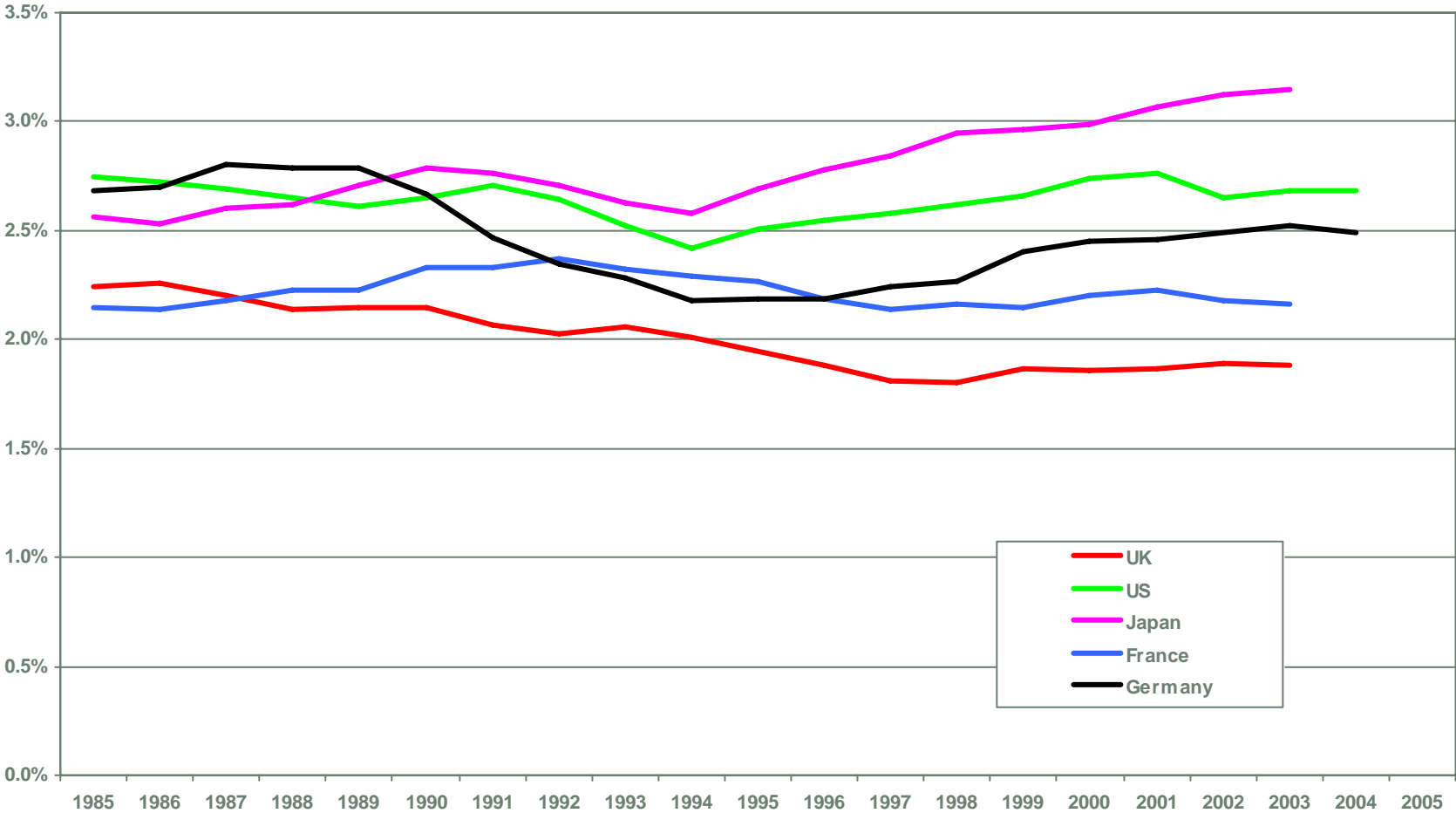


OECD composite indicator, share of GDP: EU13 excludes Greece. US, Japan, Germany are 2004, rest are 2003. OECD STI Scoreboard 2007.



R&D as a share of GDP across the OECD 1985-2005

Source: OECD



Knowledge Creation and Development



- Aggressive public investment in R and D, Russell Group Universities and be tough on strategic priorities
- Establish “ University Consultancy” – JV with major PLCs professionally to identify and network ideas for commercial exploitation
- Innovation prizes of up to £10 million
- US style tax incentives for universities who commercialise research
- Assign Design Council lead role co-ordinating British design and applications

Selection and Dissemination of Research



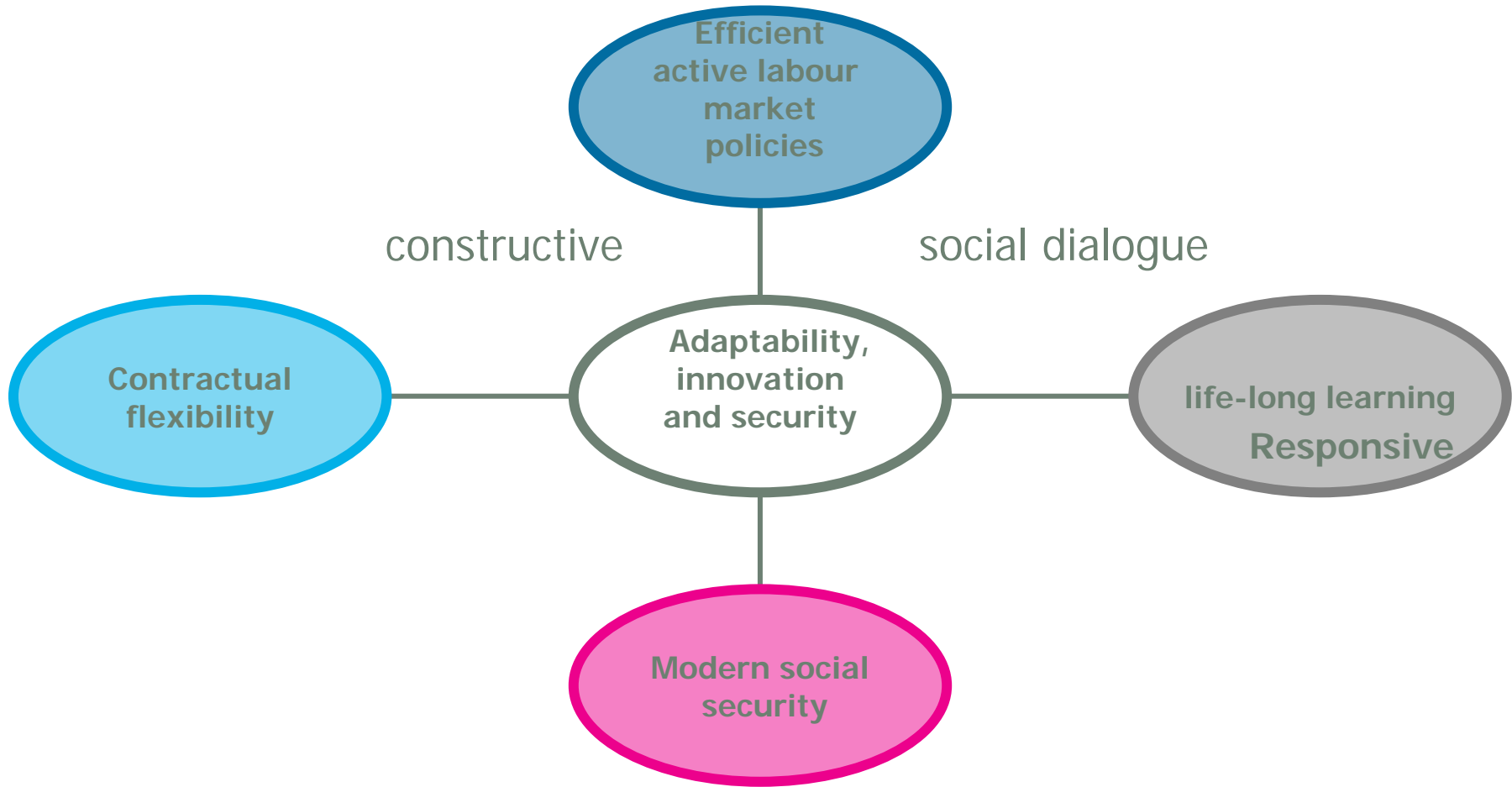
- Fund Technology Strategy Board and Foresight to publish rolling ten and twenty year visions of future Britain and wider industrial societies
- Launch British network of Fraunhofer Institutes – to horizon scan, screen, and assess technologies identifying companies who might be able to exploit them, especially SMEs.
- Replace RDAs with City based Innovation Panels to manage City based Innovation Funds to support clusters and specific knowledge generation to support. Each City to have “ Total Innovation” strategy.
- Renewal fees for patent and copyright to be much higher

Entrepreneurial Experimentation



- Competition policy to be much tougher on merging for scale and consolidation advantages so achieving static gains – instead emphasising dynamic gains from plural firms competing hard.
- Tax policy to favour small firm start ups and exits
- New 3i to finance start-ups
- Support large firm entrepreneurship via procurement, financing and R and D support
- Promote even more contractual flexibility in return for better unemployment benefit, employment insurance, lifelong learning, proactive career development and active labour market policies. “Flexi-curiry.”

Flexicurity components



Market formation



- Understand market creation – from infancy to maturity
- Regulate to create markets
- Standard setting for “credence” goods
- Benchmark against best eg “Top Runner”
- Smart public procurement looking to co-innovate
- Procurement to target key sectors eg defence, pharma, life sciences, ICT and Telecoms

Financial mobilisation – reducing casino bias of modern finance



- Innovation Bank to provide medium term finance for knowledge based companies. Super 3i?
- Infrastructure Bank to plug up to £500 billion financing gap over next decade
- Refocus City on “productive entrepreneurship” – ban guaranteed bonuses, establish clawback mechanisms etc
- Break up too-big-to-fail super banks
- Shrink shadow banking system
- Bank of England to discount Innovation and Infrastructure Bank paper
- Corporate governance reform to encourage committed share ownership, including full disclosure
- FSA to regulate rather than promote financial services

Human Capital Development



- Introduce German style “ Berufschule” and build up apprentice system
- Specialist FE Colleges to have residential capacity
- Education system to develop cognitive skills rather than learning for exams
- More interdisciplinary degrees
- Individualised training and Innovation Accounts to support lifelong learning

The politics...

- New Labour still best positioned in terms of philosophy
- Will it be blamed for a very severe crisis?
- Globalisation at risk
- Big devaluations always herald paradigm shifts
- Conservatives developing liberal conservatism and dropping market fundamentalism
- Everything to play for