Intervene or stand back – what should be the industrial strategy for the UK?

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The Foundation for Science and Technology Debate

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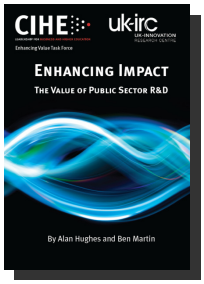
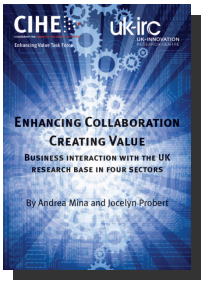
Hughes and Mina 2012 | **Hughes and Martin 2012** | **Mina and Probert 2012**





Downloadable from www.cihe.co.uk/category/taskforces/research-task-force/

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Intervention and Systems Thinking

- Sectoral Systems
  - Defined by markets focus
  - Sectoral value chains and existing firms
  - Intervention and selection with a sector focus
- Technological systems
  - Defined by knowledge and competence flows
  - Cross sectoral boundaries (e.g. general purpose technologies)
  - New firms and restructuring of existing firms
  - Intervene in technologies and science base
- Intervention at both levels needed

Industrial policy

- "Every form of state intervention that affects industry as a distinct part of the economy"

  Foreman-Peck and Giovanni (1999))Industrial Policy in Europe p. 3
- A policy " aimed at particular industries (and firms as their components) to achieve the outcomes that are perceived by the state to be efficient for the economy as a whole "

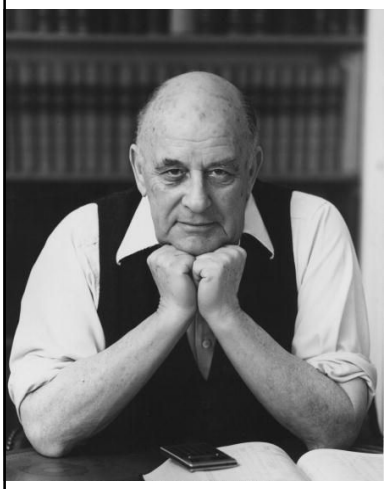
  Chang H-J (1994) The Political Economy of Industrial Policy p.66
- Horizontal and/or Selective
- It is 'selective intervention ' that causes the controversy ESP when it involves Science and Technology

Stand Back or Intervene?

STAND BACK?: The Haldane Principle(s)

- Haldane 'Principle(s)' 1918
  - Direction of basic scientific research should be chosen independently from government through peer review research councils
  - Public Sector Labs research for mission driven needs
- This is both Stand Back *and* Intervene
- Passions can run high

Intervene



"the country's needs are not so trivial as to be left to the mercies of a form of scientific roulette"

Rothschild Report. Para. 6, page 3.

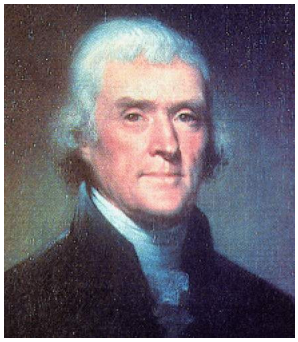
"However distinguished, intelligent and practical scientists may be, they cannot be so well qualified to decide what the needs of the nation are, and their priorities, as those responsible for ensuring that those needs are met."

Rothschild Report. Para. 8, page 4

The 'Death' of Blue Skies Research ??

This has become a sterile debate: Look for inspiration elsewhere

Louis Pasteur

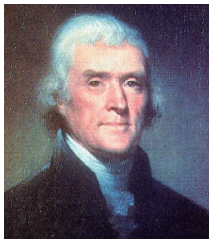


Adam Smith

Donald Stokes

Specialisation…..

'*Universities are… first and foremost designed to achieve a new understanding of natural phenomena and technologies: in this task they are naturally inventive. Conversely, in modern free market economies, it is firms that have the incentives and governance structures to make innovation their central goal, and are expected to be the almost exclusive sources of innovation*.'

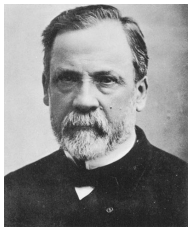


Foray and Lissoni, *Handbook of the Economics of Innovation*.

……and Connection

'…the issue is …about analysing how best to understand and manage connections…between differently funded and motivated research efforts in a system of knowledge production and innovation'

Hughes and Martin, *The Impact of Public Sector R&D.*



*Basic research **and** consideration of use*

Where do We Start From in the UK ….

Research Excellence and its Application

The Distribution of Research Income and Commercialisation Activity across UK Universities in 2010-11

	QR 2010 %	Research Councils 2010 %	Charities 2010 %	Central Government 2010 %	Industry 2010 %	Overseas 2010 %
Top 10%	53	64	76	58	62	65

Source: Authors' calculations based on HESA Financial Statistics

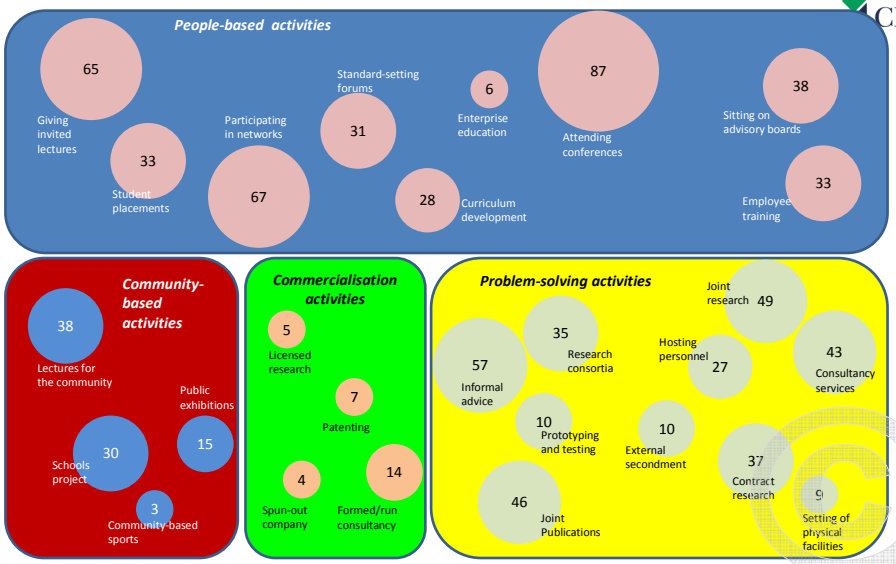
The Share In Third Steam Activity of the Top 10% UK Universities ranked by Total Research Income in 2010/11

UK Universities Ranked by Total Research Income	Research Contract Income %	Cumulative patent portfolio %	IP revenues %	External investment for Spin outs and Start ups %	Collaborative Research Income %	Consultancy Contract Income %	Continuing Professional Development Income %
Percentage share of top 10%	59	58	53	59	44	36	23

Source: Authors calculation based on HEBCIS data

But Narrow Commercialisation is not the whole story …

Pathways to Impact: People based, Problem solving Community based and Commercialisation activities



Source: Cambridge Centre for Business Research Survey of Knowledge Exchange Activity by UK Academics (Hughes, A., Kitson, M., Abreu, M., Grinevich, V., Bullock, A. and Milner, I.) UK Data Archive Study Number 6462.

Bringing it all together: A Salutary Lesson

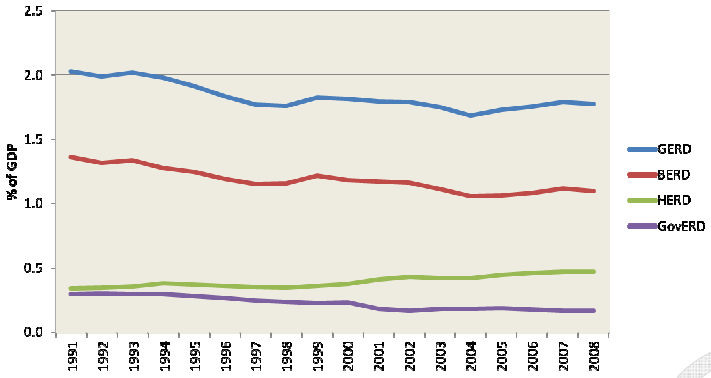
- Investment Framework for Science and Innovation 2004-2014
- Raise total R&D to 2.5% of GDP by 2014
- Required increase in both science base R&D *and* Business R&D
- Introduction of Full Economic Costs to HEI and PSRE

10 Year Framework R&D Target

R&D Investment as percentage of GDP		
	2004	2014
Science Base	0.35	0.5
Other Government R&D	0.31	0.3
Private Sector	1.24	1.7
UK TOTAL	**1.90**	**2.5**

Science and Innovation Investment Framework 2004/14, HM Treasury, DTI, DfES July 2004

UK R&D Expenditure as a Percentage of GDP



Source: Hughes and Mina 2012

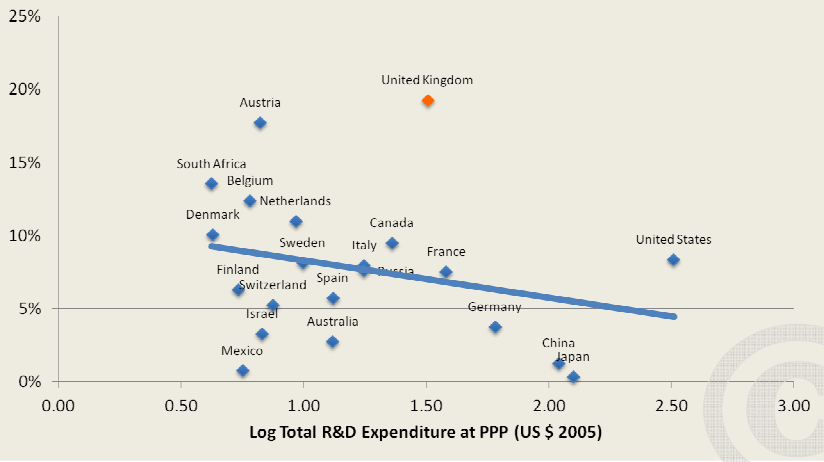
% GDP	2008	2010
GERD	1.79	1.76
BERD	1.11	1.07
HERD	0.47	0.48
GovERD	0.16	0.17

BERD, GovERD and HERD

BERD 2010-11

- Total £16bn
- 10 largest R&D *performers* 34% of total
- Independent small firms < 4% of total
- 22% is *funded* from overseas
    - An extreme case

R&D Share funded from abroad versus Total R&D Expenditures (2005)



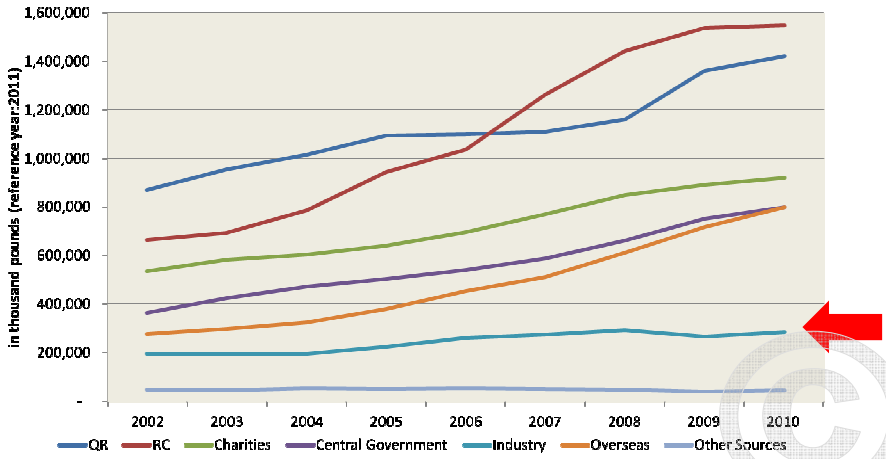
Source: Derived from Hall (2011) Table 2 p.183
based on data drawn from UNESCO Institute of Statistics (2010) Science and Technology Statistics.

Public Sector R&D Expenditure in the UK in 2010-11

- GovERD
  - c. 140 PSREs in 2010-11
  - £1.3bn Government Departments/Research Institutes (mainly Health and Defence)
  - £1.1bn Research Council HQ and Institutes
  - 88% Publicly Funded (c.£2.1bn)
- HERD
  - 163 HEI in 2010-11
  - £7.1bn
  - 68% Publicly Funded (£4.8bn)
- Public/Private Sector Connections??

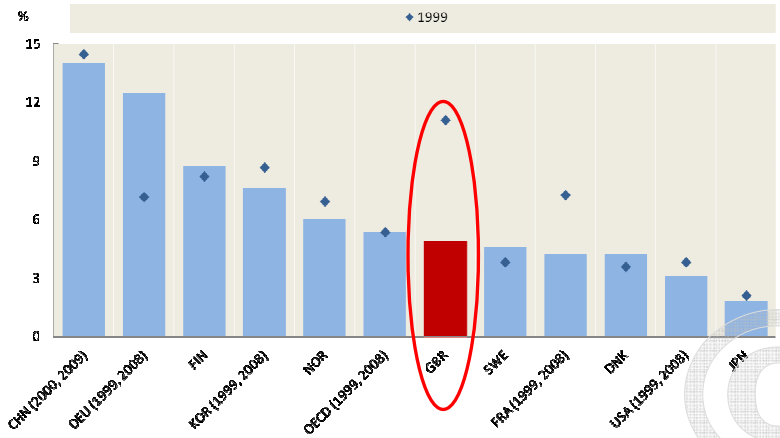
Source: Derived from Hughes and Martin 2012 Exhibit 1

The Funding of UK University Research: Dual Support and Other Sources 2002-3 to 2010-11 (in 2011 Prices)



Source: Author's own calculation

Business-funded R&D in the Higher Education and Government Sectors, 1999 and 2009 (as % of R&D performed in these sectors (combined))



Source: OECD

Where do we go from here…

- There is no choice between standing back or intervention…. Governments intervene and allocate resources all the time
- We need
  - informed strategic intervention
  - a long term commitment to public sector and *private* sector research and investment in the UK
  - The design of sector and technology specific interventions and "connecting" institutions
  - Science push AND demand pull
  - Attract "footloose" R&D and make added value from research 'sticky'

BUT isn't intervention doomed to fail?

- Government is a Blind Giant
- Impossibility of Picking winners
- Policy capture by vested interests

Industrial Policy Design

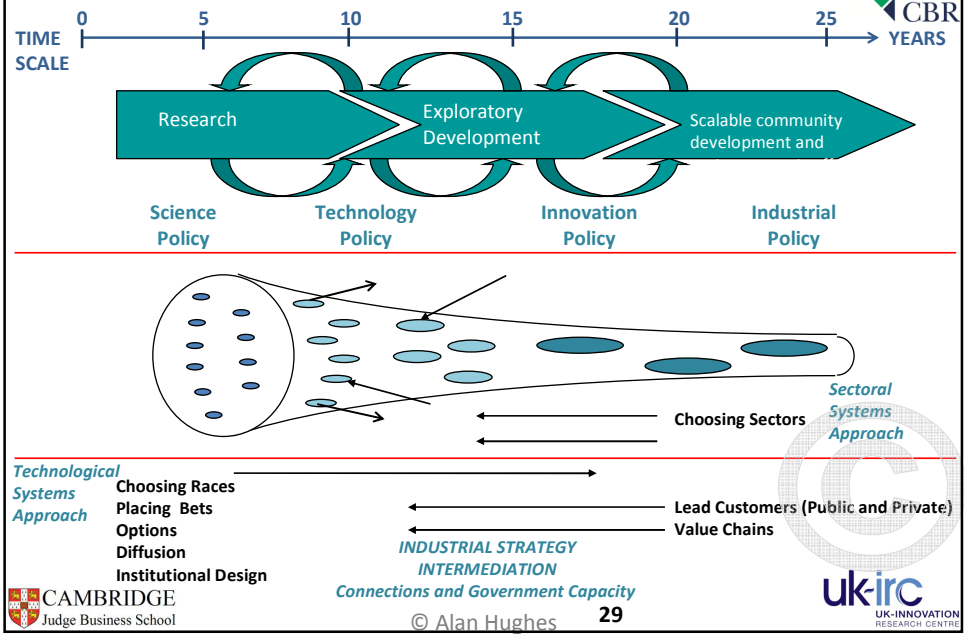
- "Embeddedness" and the blind giant,
  - *"the government has only a vague idea at the outset about whether a set of activities is deserving of support or not, what instruments to use, and what kind of private sector behaviour to condition these instruments on. The information that needs to flow from the private sector to the government in order to make the appropriate decisions on these are multidimensional and cannot be communicated transparently through firms' actions alone. A thicker bandwidth is needed."*

  (Rodrik, 2006, p26).
  - wide range of institutional developments may serve this purpose (informal and formal development forums, advisory councils and Research and Technology Organisations)
- Building Government Internal Absorptive Capacity

Picking Winners and Vested Interests

- Choosing Races and Placing Bets
  - Pick sectors and technologies *not* firms
  - Granularity…one size doesn't fit all
- Sticks with carrots: incentives, and disincentives
  - weeding out investments that become "honourable dead-ends"
  - A real options approach
- Full public accountability

From Science Policy to Industrial Strategy



Internationalization and the appropriation of value

The Apple iPod = 299$ of Chinese exports to US

http://blogs.computerworld.com/node/5724

Distribution of the value added

- 299 US$
  - 75$ **profit** to US (Apple)
  - 73$ **whls/retail** US (Apple)
  - 75$ to Japan (Toshiba)
  - 60$ 400 parts from Asia
  - 15$ 16 parts from the US
  - 2$ assembly by China
- iTunes Music Store (2003)
  - 70% digital market share
  - Big 5 recording companies

Source: Andrew Wykoff, OECD www.oecd.org/dataoecd/4/46/45154092.ppt