

UK Science and Technology Policy: An International Perspective

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Structure of Talk

Overview of UK Research System

Science and Technology Policy under

- Major Administration
- Blair Administration
- Brown Administration

University Research Assessment Exercises

UK Technology Foresight Programme

Conclusions

Overview of UK Research System

Relatively decentralised

- ~5 Dept's with major R&D spending
- 7 Research Councils
- Separate HE Funding Councils for England, Scotland etc.

Dual-support system for funding university research

Some co-ordination and oversight through e.g.

- OST/OSI/Govt Office for Sc + Government Chief Scientist
- Technology Foresight Programme

Major Administration

1993 White Paper on S&T, *Realising Our Potential*

- Research Councils – reorganised, new missions, more users involved
- New ‘social contract’ – researchers have responsibility to help users
- Technology Foresight Programme – to link S&T more closely to national needs

1995 – OST moved from Cabinet Office to DTI to link research more closely to wealth creation BUT

- concerns re basic research and autonomy
- co-ordination across Ministries harder

Blair Administration

- Little change in policy but increase in funding for research
- Review of Foresight → Foresight Programme to continue
- Continued refocusing of resources
- Joint Infrastructure Fund (JIF) – Welcome Trust, OST + HEFCE - competition
- HE ‘Reach Out to Business and the Community’ (HEROBC) – new 3rd stream of funds to encourage knowledge transfer

2000 White Paper

Built on 1993 White Paper – linking science base to users, Foresight, accountability

More emphasis on contributions of science base to quality of life, not just economic benefits

Need to build up public confidence/trust (e.g. re GM food)

Initiatives

- SRIF for new equipt & labs in universities
 - ~£400-500M pa
- £250M for priority areas
 - e.g. genomics, e-science, nanotech
- £140M HE Innovation Fund (HEIF)
 - 3rd stream of funding
- RDAs - £50M for clusters etc.

Investing in Innovation, 2002

(NB HMT report)

Strategy for putting sc base on a sustainable basis

- Partnership with other stakeholders
- Investing more in pay and training of QSEs
- Expanding the science base – promoting research in promising new areas
- Encouraging collaboration between universities and business through increased investment in knowledge transfer

Science & Innovation Investment Framework 2004-2014

(Also HMT)

Presents next steps in 5 key policy areas

- Maximising impact of science on the economy through increasing innovation
- Increasing RC's effectiveness
- Supporting excellence in university research
- Supporting world-class health research
- Increasing the supply of STEM skills

Science Budget Allocation 2005-06 to 2007-08

Science Budget to rise from £2.73B to £3.45B

(~double that in 1997)

10-Year Investment Framework

Initiatives

- DHSS & MRC to create single health research fund of >£1B pa [Plan since dropped]
- After 2008, replace RAE by metrics
- OST Centre of Excellence in Horizon Scanning
- Extended R&D tax credit to medium-size companies
- Subsequent annual reports + indicators
 - e.g. of excellence of UK science, responsiveness, business engagement, supply of QSEs, public engagement etc.

2005 Initiatives

- RC grants – shift to ‘full economic costs’, with RCs paying 80%
- Arts & Humanities RC – replaced previous AHRB
- Research Base Funders’ Forum for govt & non-govt research funders to coordinate strategies
- Research Establishment Sustainability UK
 - to address problems in RC institutes & other PSREs of low cost recovery, complex lines of strategic responsibility, and inadequate investment
 - to help introduce ‘full economic costing’

Brown Administration (2007-)

(NB Earlier HMT initiatives & reports)

New Dept for Innovation, Universities & Skills (DIUS)

- Brings together
 - former DTI, including responsibilities for science and innovation
 - FE, HE and skills (previously part of DfES)
- “The new Department will deliver the Government’s long-term vision to make Britain one of the best places in the world for science, research and innovation. It will ensure that the UK has the skilled workforce it needs to compete in the global economy.”

Research Assessment Exercise

1984 – UGC – need for more selective approach to resource allocation

1986 – 1st Research Assessment Exercise (RAE)

- 37 units of assessment + peer review by panels
- 4 grades (below average, average, above average, internationally outstanding)
- 5 best publications per unit (→ bias in favour of big dept's)

1989, 1992 & 1996 – 2nd, 3rd & 4th RAEs - evolution of approach

(1994 – first Teaching Quality Assessment, TQA – 6 dimensions + 4-point scale. No extra money but lot of work!)

RAE (cont.)

2001 - 5th RAE

- ~70 units of assessment + peer review by panels
- 7 grades (1, 2, 3b, 3a, 4, 5, 5*) based on national/international excellence
- 4 publications per 'active' researcher
- no bibliometric data (cf. 1992)
- census date (→ transfer market)
- wider differentials

RAE now influences 95% of HEFC research money

cf. TQA – no direct financial consequences

→ More emphasis on research cf. teaching

RAE (cont.)

Assessment of RAE

- Improved quality of research, esp'y in lower ranked HEIs
- Clearer (and more effective?) university res strategies

But

- Much game-playing + emphasis on presentation (but even more in TQA where costs > benefits?)
- Increasing resource concentration
 - Top 5 universities get 1/3rd of funds
- Contradiction between
 - RC policy emphasising users and interdisciplinary/applied research
 - RAE with its disciplinary (and basic/mainstream) focus

Replacement of RAE by metrics

2006 Pre-Budget Statement

RAE successor will use a set of indicators based on

- research income (income from whom? weighted how?)
- postgraduate numbers
- “a quality indicator”

For science & engineering, quality indicator will be bibliometric

1st assessments under new system in 2009

Will begin to inform funding in the 2010-2011

But metrics likely to generate other (larger?) problems

Technology Foresight

New generic technologies

- likely to have revolutionary impact on economy and society
- dependent on advances in basic research

Growing strategic importance of science and technology

An explicit longer-term policy for S&T essential

Foresight is

the *process* involved in *systematically* attempting to look into the *longer-term* future of science, technology, *the economy, environment and society* with the aim of identifying the areas of *strategic* research and the *emerging generic* technologies likely to yield the greatest economic *and social* benefits

Foresight is **NOT** the same as forecasting - a ***process*** not a technique

*Not predicting but shaping or **creating** the future*

UK FORESIGHT PROGRAMME

1983 – SPRU report - learn from Japan & try foresight on an experimental basis - little impact - 10 years too early!

1992 – SPRU review → options for UK

1993 – White Paper on S&T launched foresight programme

- Aims
 - increase UK competitiveness
 - create industry/science base/government partnerships
 - identify exploitable technologies
 - focus attention on mkt opportunities + better use of science base
- Organisation
 - Office of Science and Technology (and other depts) + consultants
 - Steering Group (industry, universities, government)
 - 15 sector panels (members $\geq 50\%$ 'users')

TFP - Three Phases

1. Pre-Foresight

- 'Focus on Foresight' seminars, 'co-nomination' to identify experts, selection of 15 sectors and panels

2. Main Foresight Stage

- Initial analysis – panel discussions, scene-setting, UK strengths & weaknesses, consult expert pools, preliminary reports
- Wider consultation – regional workshops etc., Delphi survey (7000 experts)
- Panel reports – trends, driving forces, challenges, barriers → identified S&T priorities + recommendations for implementing
- Steering Group synthesis – identified **generic** S&T and infrastructural priorities

3. Post-Foresight (i.e. implementation)

- influence government R&D priorities + wider policy (e.g. regulation)
- influence company R&D strategies + improve industry/science base partnerships

TFP CONCLUSIONS

27 generic science and technology priorities

e.g. communicating with machines, bio-informatics, chemical & biological synthesis, security & privacy technology, product & manufacturing life-cycle analysis, risk assessment & management

Classified into 6 categories

1. Harnessing future communications & computing
2. From genes to new organisms, processes & products
3. New materials, synthesis & processing
4. Getting it right: precision & control in management
5. A cleaner world
6. Social trends & impact of new technology

TFP CONCLUSIONS (cont.)

Identified main bottlenecks

- getting potential of technology understood by managers, workforce, consumers
- complementing new technology with right skills
- freeing up markets & ensuring market transactions conducted on orderly basis

18 generic infrastructure priorities

e.g. communication skills, incentives for multidisciplinary research, information superhighway, special incentives for SMEs, supportive regulations

Classified into 5 categories

1. Education and training infrastructure
2. Research infrastructure
3. Communications infrastructure
4. Financial infrastructure
5. Policy and regulatory infrastructure

UK (continued)

Impact

- Process benefits (the '5 Cs') substantial – addressed areas of UK weakness
- Foresight Challenge Fund – >£90M of government + matching private funds
- Re-orientation of spending by Research Councils + Ministries (partly)
- Impact on companies – engaged key decision makers, influenced sectors without a track record of working with the science base, provided case studies + industrial champions

1997 Labour Govt review → continue & strengthen Foresight

Second Foresight Programme

- learn from 1st programme and improve
- getting foresight into boardrooms, City, SMEs etc. – change in title
- more emphasis on societal aspects (e.g. ageing population, crime)
- Delphi dropped but introduced digital 'knowledge pool'
- launched in 1999 but never fully completed (no synthesis)

Foresight Phase 3

2001 D King review – Foresight needs to

- refocus on S&T
- be more flexible to take account of emerging devlpts
- focus resources more where would best add value

2002 New rolling prog of projects on specific topics

- Starting point for a project area
 - a key issue where science holds the promise of solutions
 - an area of cutting edge science where potential applications and technologies yet to be considered and articulated

E.g.

- Flooding and Coastal Defence
- Cognitive Systems
- Cyber Trust
- Crime Prevention

Conclusions

1. **Revised ‘social contract’** in UK – researchers receiving public funds have a duty to identify users/beneficiaries and help address their needs
2. Financial and political pressures → emphasis on **accountability** and value for money and ∴ on evaluating performance and results
3. UK in forefront of development of **performance assessment** in research
 - Development and experimentation with bibliometric and other indicators
 - Research Assessment Exercise for HEFC research funds
 - Increased ‘efficiency’ but also perverse consequences

Conclusions (cont.)

4. ***Technology Foresight*** process central in
 - identifying priorities
 - building partnerships – i.e. ‘wiring up the National System of Innovation’
5. Increasing involvement of ***users*** in
 - policy making
 - funding decisions e.g. in Research Councils
 - research collaboration
 - performance assessment
6. ***Fundamental contradiction*** in UK science policy re user engagement (encouraging multi-disciplinary research) and RAE (organised on disciplinary basis)