EPSRC

A View on Research Sustainability

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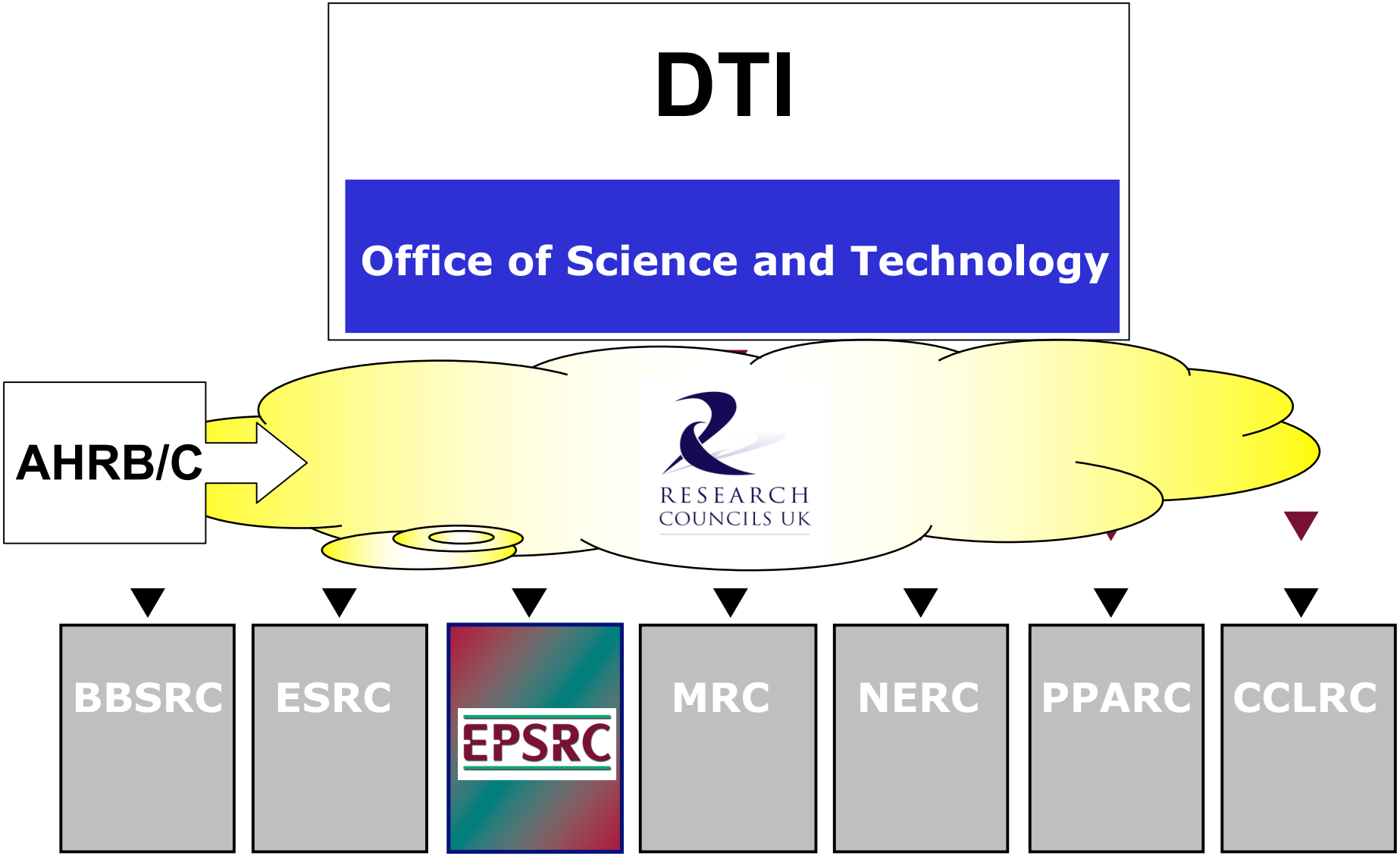
Chief Executive, EPSRC

Agenda

- Contextual background
- EPSRC in the science arena
- Aspects of SR2002 ‘Research Sustainability’
  - *perceptions, expectations and reality*
- Some broader issues on research sustainability in EPSRC space?

We are not alone!



GOVERNMENT

OST, DTI, MoD, DEFRA, DoH, HO, DoT, ODPM.

WORLD

USA, Germany, France. EU, other Europe, Japan, India, China, Others.

OTHER AGENCIES

BBSRC, CCLRC, ESRC, MRC, NERC, PPARC, AHRC

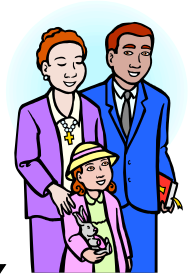
Funding Councils

Trusts

RDAs and devolved administrations.

Learned Societies and Professional bodies.

EPSRC with Universities



SOCIETY

Wealth, Health, Sustainability, Energy, Defence, Crime Prevention, Mobility, Leisure, Culture, Curiosity.

INDUSTRY

Retail, Electronics, Computing & Communications, Bulk products & Materials, Healthcare, Chemicals Pharmaceuticals & Biotechnology, Food & Drink, Financial services, Aerospace & Defence, Machinery & Equipment, Construction & Environment, Power, Transport.

Research Sustainability

- What needs to be sustained?
  - Research in universities and research council institutes
- What does that entail?
  - Set research on a trajectory towards sustainability, with full economic costs identified, acknowledged and covered
  - Achieve this whilst maintaining volume, quality and an appropriate balance for research endeavours
- A complex, multifaceted problem!
  - Nuances in ‘EPSRC space’ (e.g. nature of engagement with industry)

An Observation

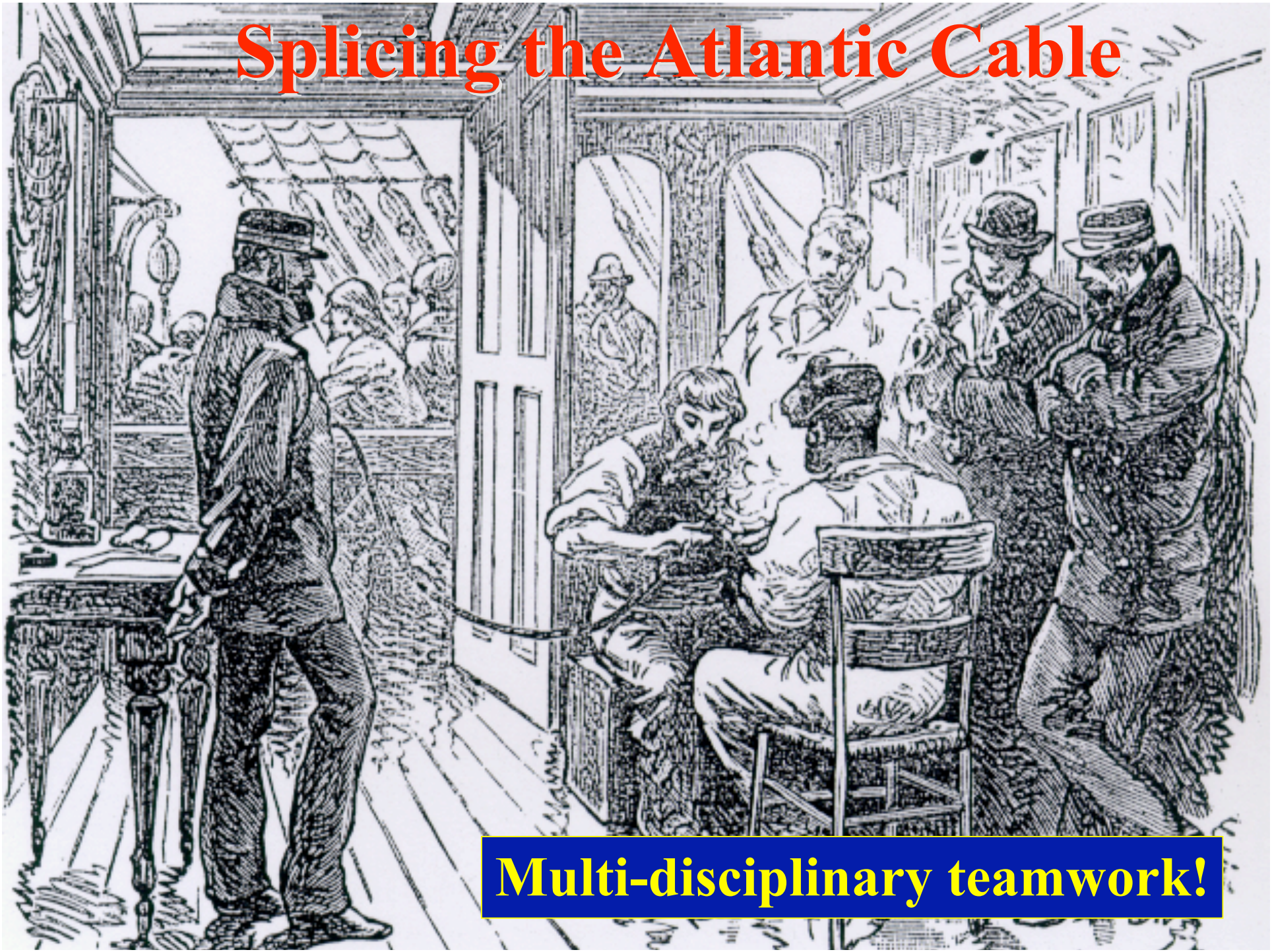
"Real world problems do not respect the boundaries of established academic disciplines – nor indeed the traditional boundaries of science and engineering."

The Science-Engineering Continuum

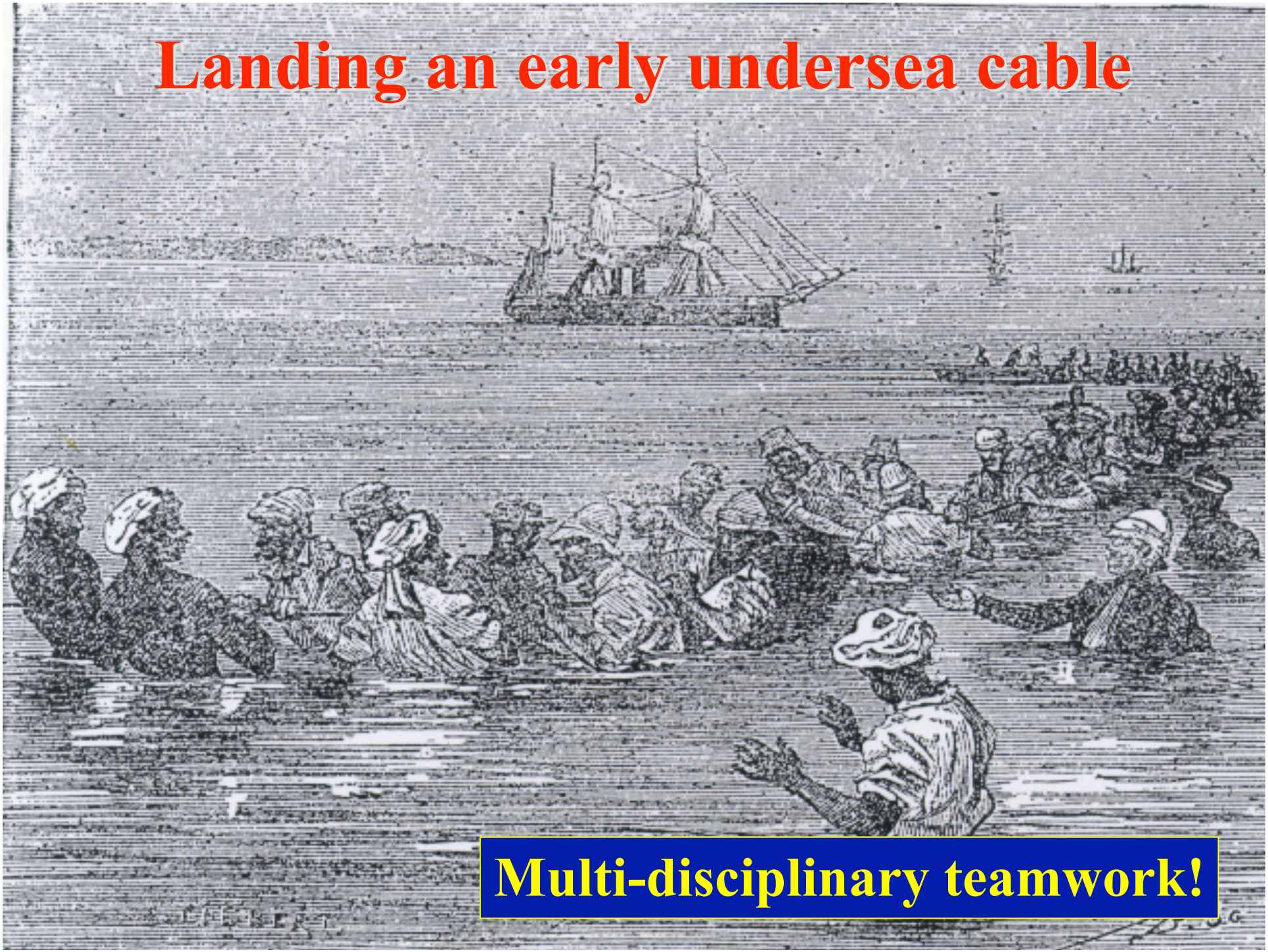
"These . . . problems resolve themselves into an infinite number of important and difficult questions, worthy of being the subjects of many experiments, and of special investigation which might occupy a lifetime, and enrich science by new discoveries.

But to make these facts practically available . . . all the above-mentioned problems must be studied and solved together;
for if we lose sight of any one of them, the results we obtain will probably be incapable of useful applications."

The Story of the Telegraph
George Routledge & Sons
Circa 1880


Splicing the Atlantic Cable
Multi-disciplinary teamwork!

Landing an early undersea cable



Multi-disciplinary teamwork!

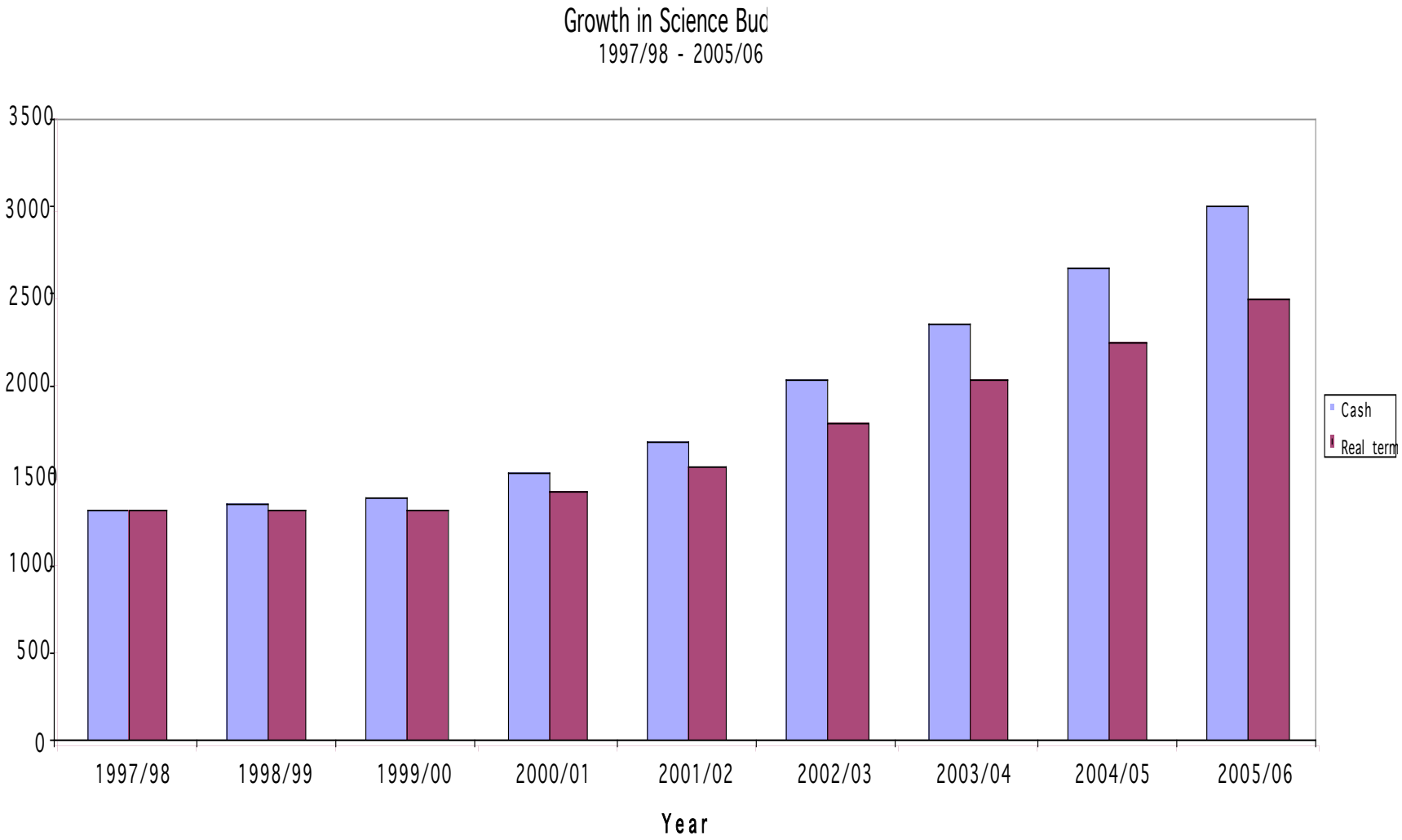
The Science- Engineering Continuum!

"Great discoveries and improvements invariably involve the co-operation of many minds"

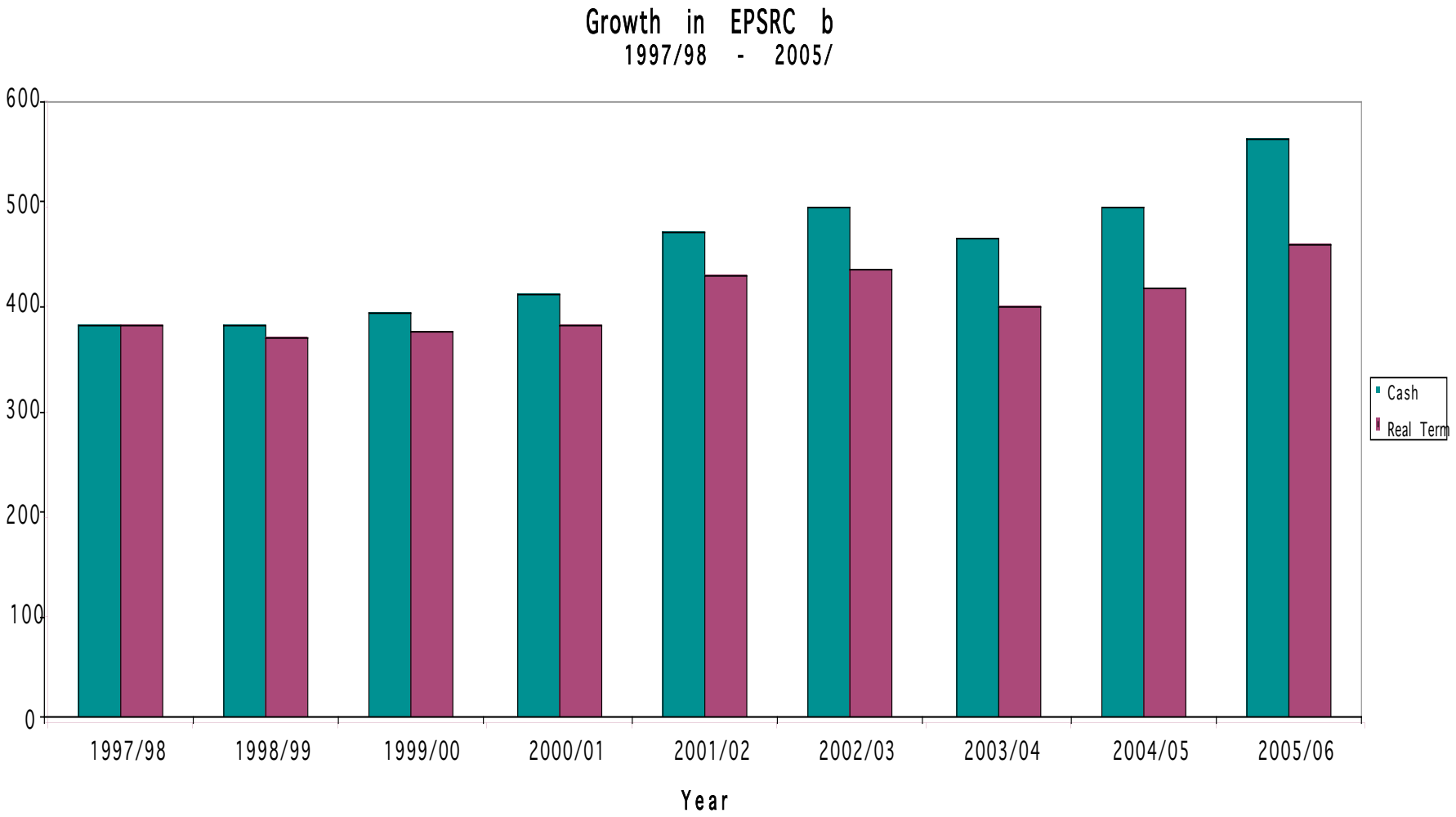
Alexander Graham Bell
(1847-1922)

The Life Sciences Interface . . .

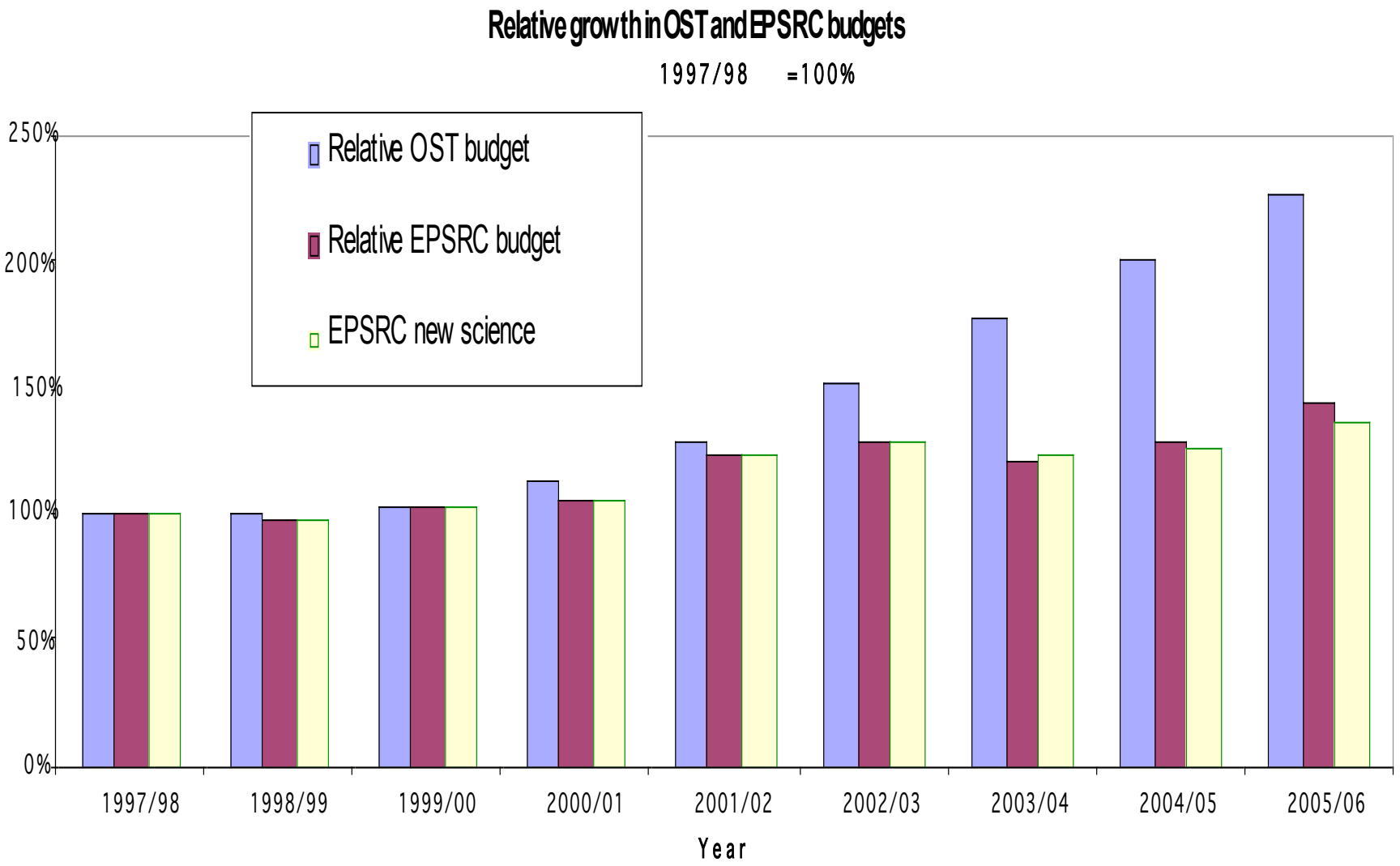
Anatomy of the Science Vote



EPSRC Budget Growth



Growth in OST & EPSRC Budgets



Why?

- JIF, SRIF were not about more science *per se* but about better infrastructure for science, correcting the historical anomaly of under-investment in research space and facilities
- In SR2002 this is followed through with SRIF2 RCI and ‘Roberts’ money

More money for science
≠
money for more science

More money for science
≠
money for more science

- Applies to all ‘Research Sustainability’ moneys
- Headline figures can mislead – give rise to unrealistic expectations
- Research sustainability moneys are not about increased research activity (and for the avoidance of doubt will not lead to improved ‘success rates’)

  . . . but equally should not lead to reductions!

SR2002 Research Sustainability

SRIF:

- Much needed and greatly welcomed
- But need to recognise:
  - NOT money for extra research projects
  - Infrastructure includes equipment not just buildings
  - Infrastructure investment (buildings and equipment) brings with it on-going operating costs that need to be considered
- *Is this recognised and reflected in university SRIF investment actions?*

SR2002 Research Sustainability

- ‘Roberts money’, such as:
  - PhD stipends,
  - Post Doc Salaries,
  - Differential stipends and salaries in ‘shortage’ areas
- Much needed and greatly valued
- Is not money for ‘extra’ research
- Funding is incomplete, e.g.
  - RCs not provided with allocations for RA1B salary up-lifts (impact on Engineering and IT)
  - Need follow through in SR2004 re stipend up-lifts

SR2002 Research Sustainability

But in particular . . . .

. . . moving towards ‘Full Economic Costs’

- The current 46% regime means these are not covered by RCs + HEFCE QR, supplementation comes from ‘elsewhere’
- FECs must be identified and covered

  (for Universities and RCIs)
- RCs to pay a % of FECs – universities to provide rest from QR, etc . . .
- Does that do it?

SR2002 Research Sustainability

- FEC approach may apply to:
  - Grants
  - Fellowships
  - . . . . but not to studentships
- EPSRC has ‘Project’ studentships associated with grants!
  - Applying FECs here but not to ‘normal’ (DTA) studentships could distort and might mean paying twice under current HEFCE funding arrangements
  - To simply leave out might shift balance since RAs would be very expensive c.f. project studentships
- For some Fellowships RCs currently fund on the basis of cover/replacement – does this still make sense?
- RCs and OST working on such issues

SR2002 Research Sustainability

Salaries of Academic Investigators

- Component of FECs
- Need to be addressed
- Should RC funding contribute or might this better be part of the draw down from ‘QR etc’?

- *Why is this an issue?*

. . . . an example might help . . .

SR2002 Research Sustainability

Mathematics – an e.g. of 'people dominated' research

- Grants are small in value and small in number – because most research is carried out by Academic staff + PhD students
- FECs including academic salaries could result in need/pressure for mathematicians to apply to RCs – with expectation of RCs providing a % of FECs
- But EPSRC does not hold this money – it's already with universities as QR
- Special steps (such as different %) might enable this to be addressed – at least to some degree – but careful modelling needs to inform action here

For maths might read 'theoretical physics, theoretical Computer Science, most of AHRB, some ESRC etc

Bear with us . . .
. . .we're working on it!

- Universities need to be able to say what are their FECs re research activities
  - Some already track and can report FECs; it appears some don't and can't
  - for those that don't/can't there will be increased internal costs (the 'b' word is an appropriately pejorative term here!)
  - but any organisation needs to know the costs of its operations to be effectively managed
  - so I don't see this as a cost of ensuring 'research sustainability' so much as 'institutional sustainability'
- Interim arrangement of an increase in the % contribution to 'other related costs' buys time to come to terms with these complex issues – but is NOT sustainable!
- FECs must be addressed!

There are other facets to sustainability . . . .

Do we have adequate/appropriate

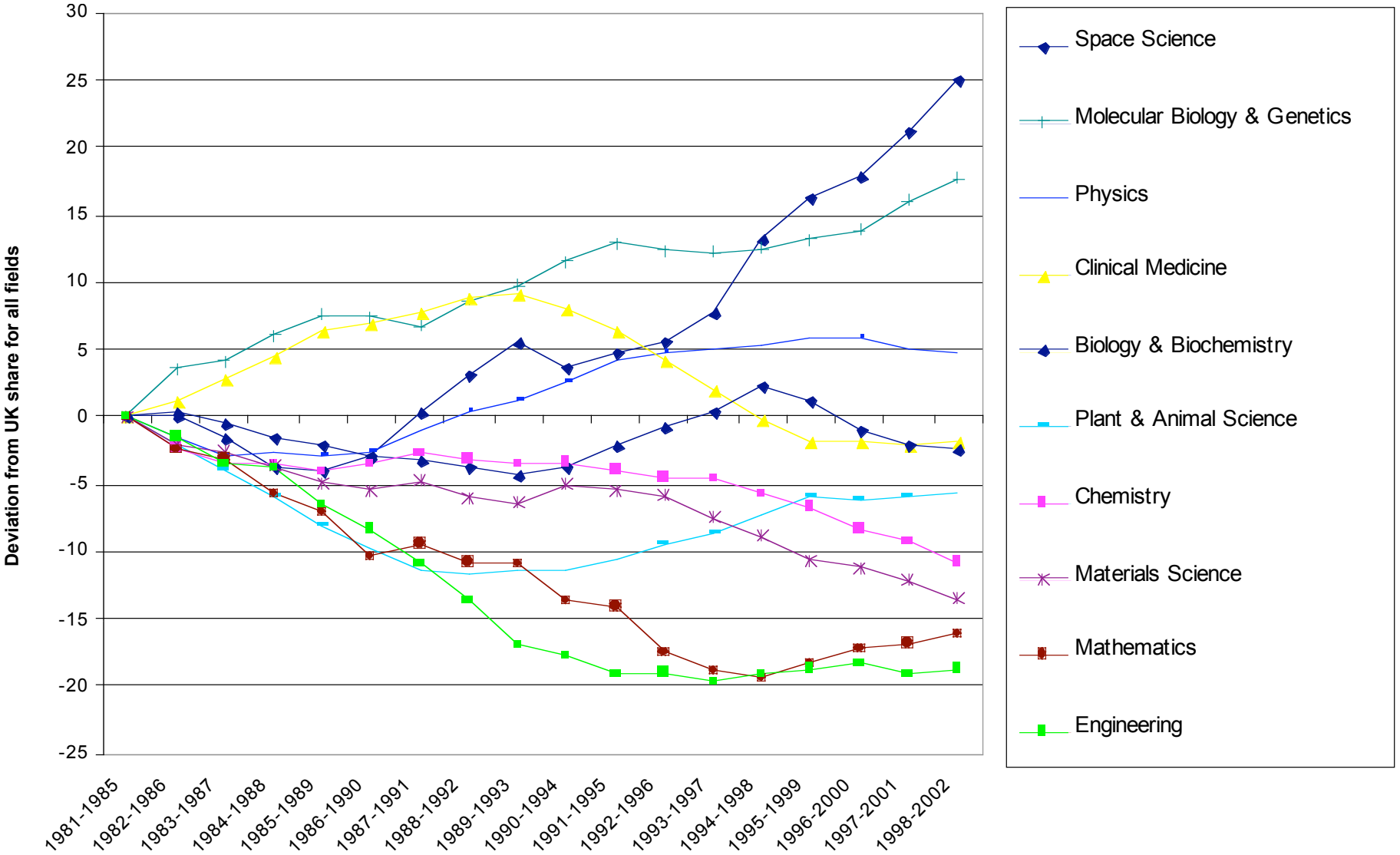
- Capacity
- Level of activity

in different areas of science and engineering?

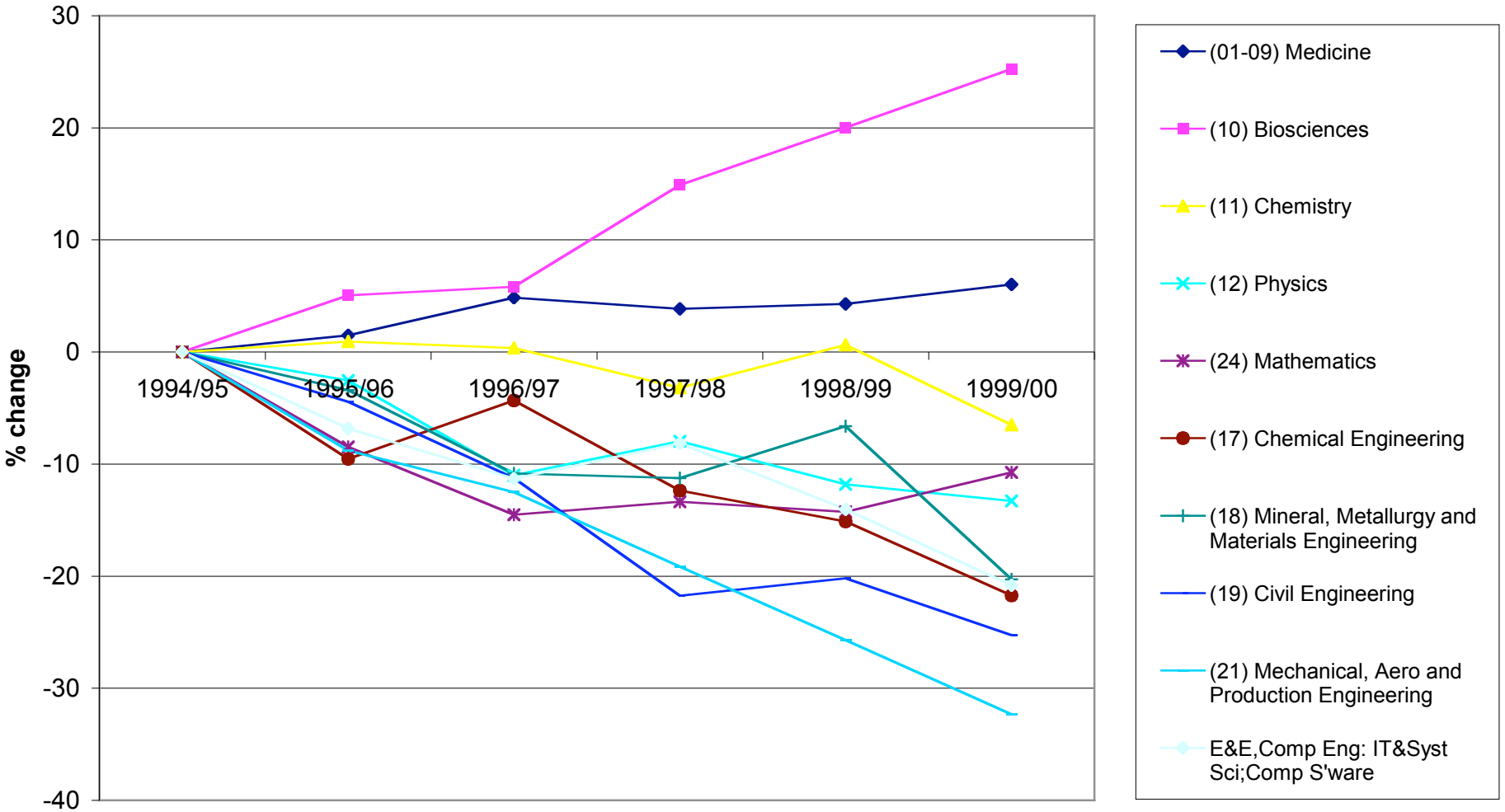
Is this something we realistically can control or significantly influence?

Changes in UK share all papers by field

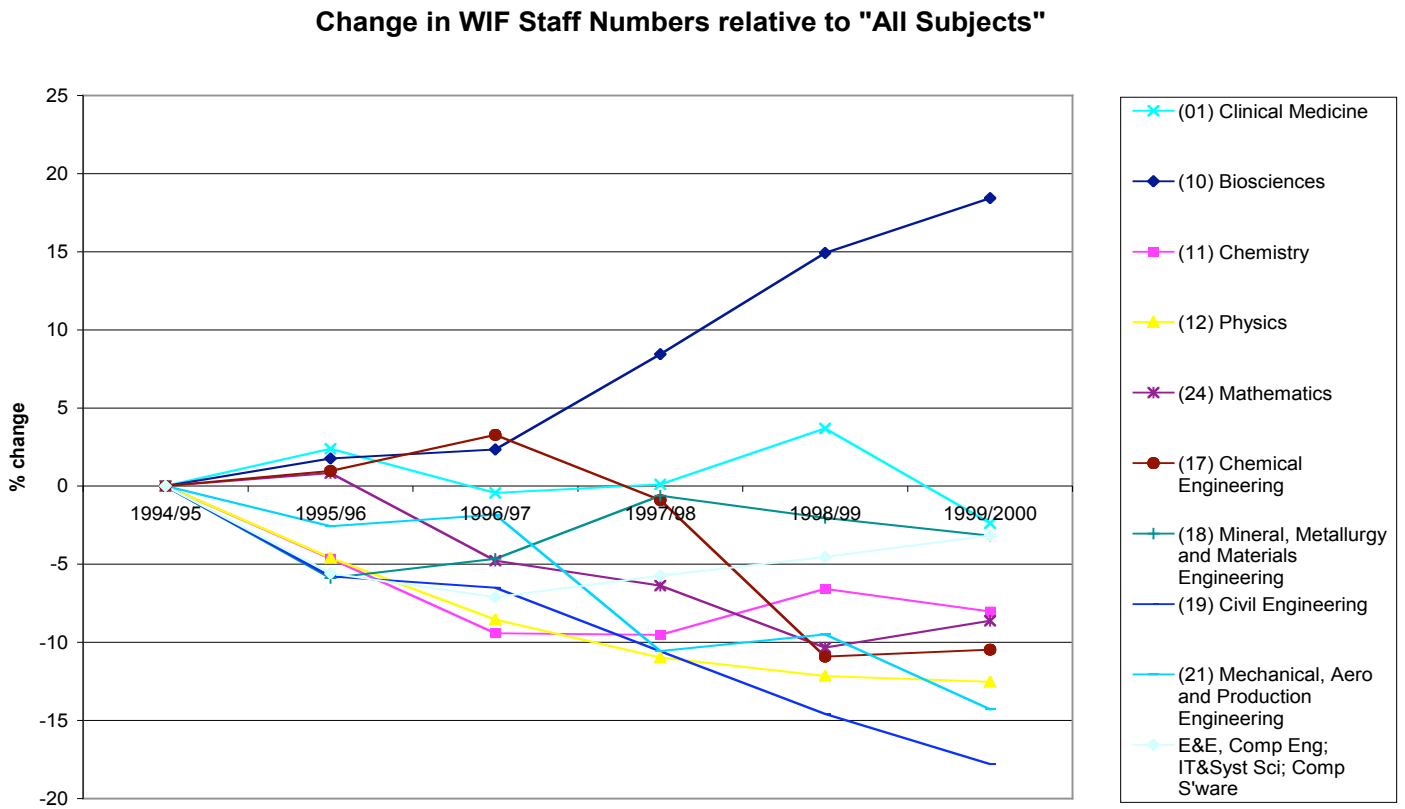
relative to share for all fields for rolling 5 year windows



Change in Research Income



Changes in Staff Numbers



Electrical Power Engineering

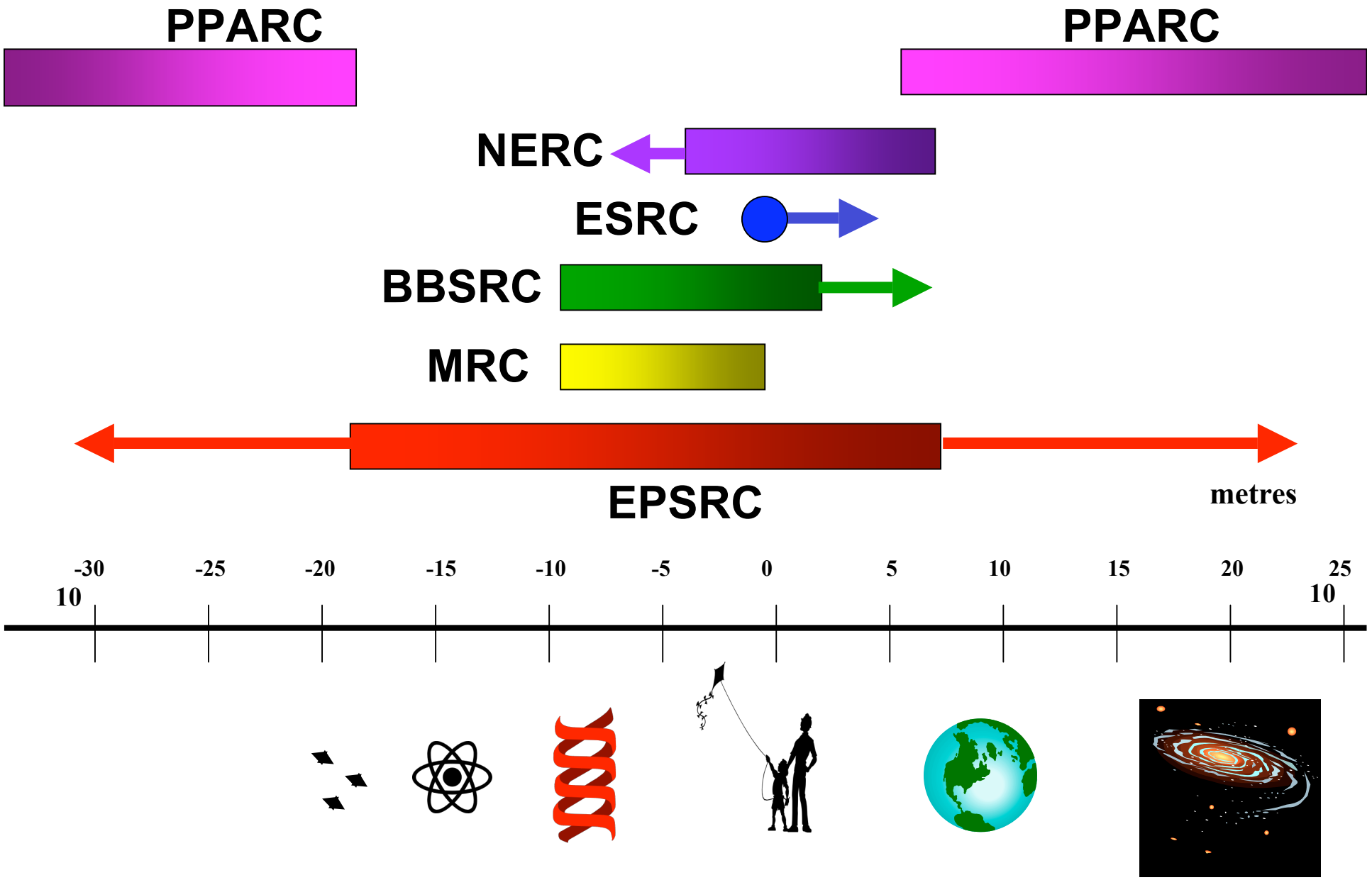
2001 Employment & Skills study

- Age imbalance
  - 38% between 45 and 59
  - 4% under 24
- 77% of electricity employers have and are expecting problems
  - Technician/Craft
  - Electrical Engineering
- 75% report problems in attracting good graduates
- 50% have difficulties recruiting apprentices
  - Local regional difficulties
- Less difficulty in recruiting for ICT and commercial/business skills

Power Academy

- IEE
  - Co-ordinating role
- Universities
  - 3-4 across the country
  - Strathclyde, UMIST, Southampton, Bath
- Networking Companies
  - 4 or more including EME
  - 30 students per year by 2009

Research Council Domains



Enthusing young people:

EPSRC Senior Media Fellowships

EPSRC and Industry

Participation by Number:

- In 1993 13% of EPSRC research grants had some degree of industrial participation
- By 2001 industrial participation in ~40% of projects

Participation by Value

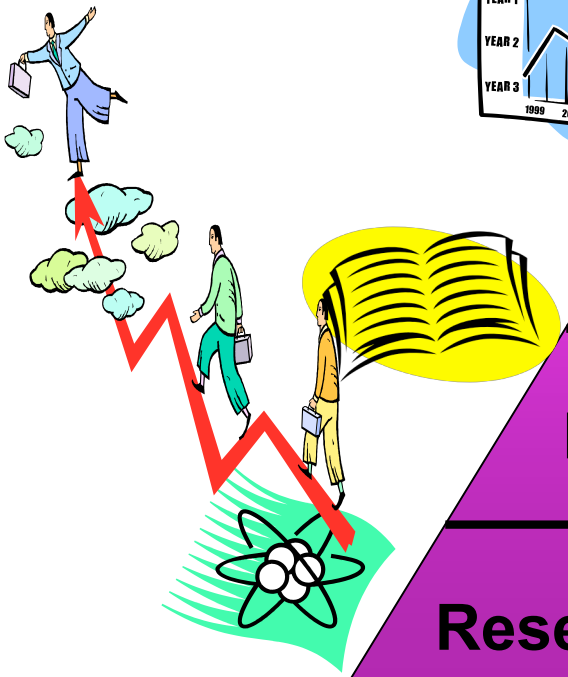
- EPSRC investment ~ £500m p.a; ~£300m per year on grants for research projects in universities
- Additional ~ £120m from collaboration with third parties (Industry +)

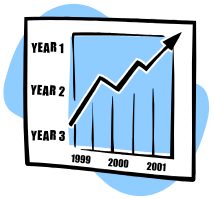
Strategic Partnerships - examples

- **BAE SYSTEMS: £30m programme over 5 years**
  - To co-fund University research, BAE SYSTEMS gives EPSRC £20m over 5 years to invest on their behalf, matched by £10m of EPSRC money: First £6m (multi-university) project launched in 2003
- **Carbon Trust: £20m over 3-4 years**
  - EPSRC & Carbon Trust each contributing £7m, to be committed over a 3-4 year period; industry participation to take this to £20m
  - Promote step change technologies for a low carbon future: low carbon technology, energy efficient buildings, renewable energy technology, green process technology
- **Co-funded Chairs: e.g. Rolls Royce**
  - Professor Simone Hochgreb appointed to Rolls-Royce funded Chair of Experimental Combustion, part of University Gas Turbine Partnership
  - EPSRC contributing initial £0.5M of research funding to the chair

Companies

Knowledge Transfer





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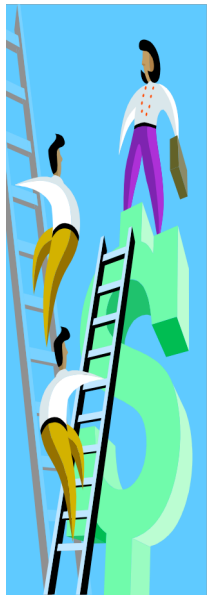
Innovation

Knowledge and Skills

Research & Research Training

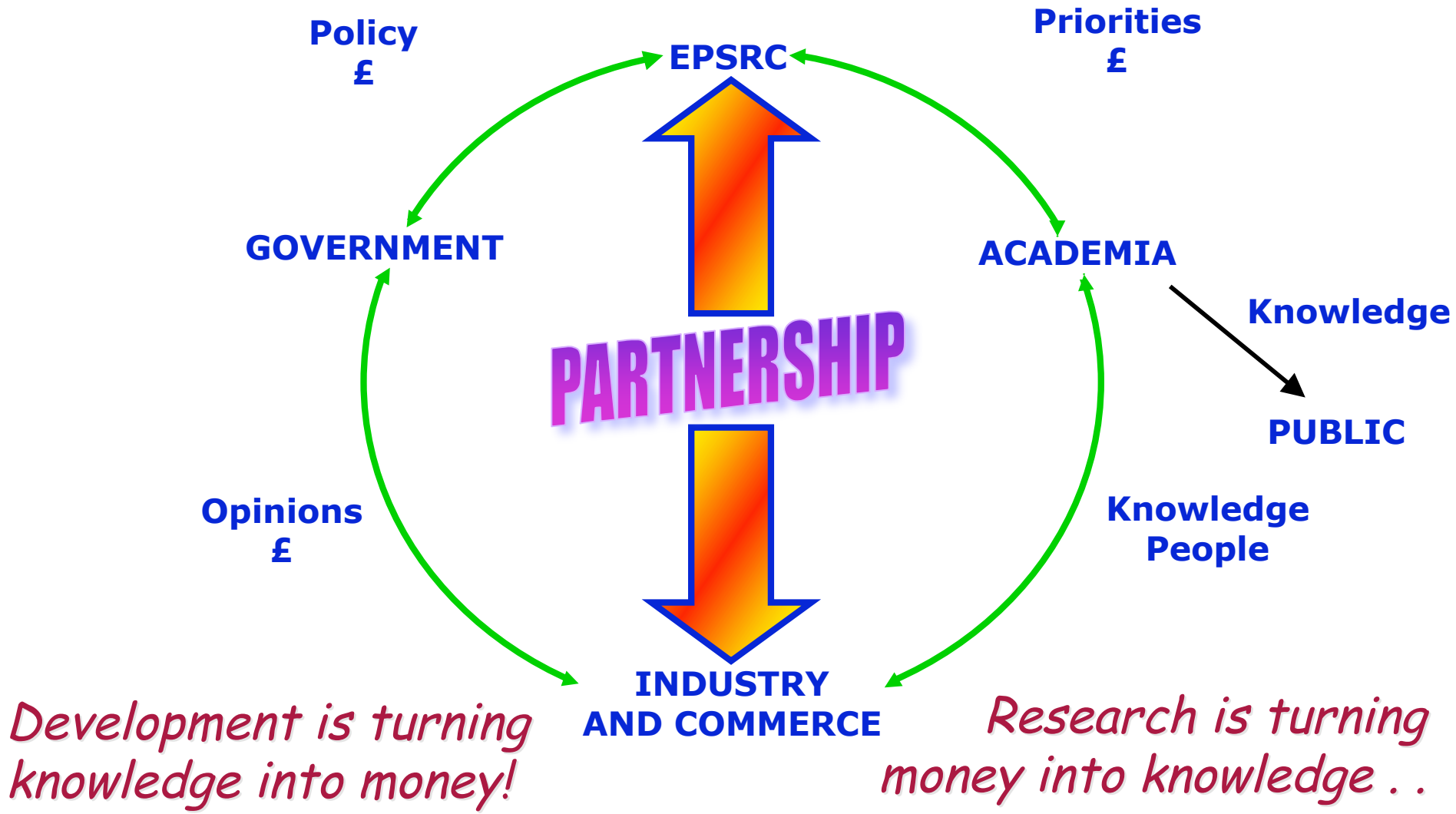


Physics Mathematics ICT Engineering IEP

Chemistry LSI Materials Manufacturing

Universities

National Research Cycle



Generation and Flow of Knowledge and Skills

- **EPSRC Mission: *Wealth Creation* and *Quality of Life***
  - Wealth creation is driven by innovation
  - Innovation is driven by knowledge and skills
  - Knowledge and skills are driven by research
- **EPSRC at bottom of *'Food Chain of Wealth Creation'***
  - Do not know where innovation may flourish
  - Can only influence this at the margins
  - But – need to ensure that through research we promote a broad base of knowledge and skills to feed the Innovation Process

Children's Story:
The Princess and the Frog

- **Beautiful Princess meets a lonely frog**
- **Looks after it - but the frog still seems sad**
- **Wanting to make the frog happy she kisses it**
  - **But unknown to the Princess the frog was a Prince, turned into a frog by the magic spell of a cruel witch**
- **The Princesses' kindness (and kiss!) breaks the spell**
- **The frog turns into a handsome Prince**
- **They fall in love, marry and live happily ever after!**

Why am I telling you this?

Knowledge Transfer

- Successful innovating companies are the "princes" of wealth creation
- But to find a 'prince' you have to kiss a lot of frogs!

- EPSRC is in the business of "kissing frogs" to ensure that the nation has the knowledge and skills needed to produce a future generation of "Princes of Wealth Creation"

It's not about 'picking winners'

"If you can look into the seeds of time, and tell me which will germinate and which will not, speak then to me."

Shakespeare

- We do not know where innovation may flourish
- We need to ensure that through research we promote a broad base of knowledge and skills to feed the Innovation Process

Kissing Frogs!

- Do we succeed?
- Does EPSRC research in universities lead to the formation of new ‘Spin Out’ companies?
- In last 10 years > 500 university ‘start-up’ companies known to come from EPSRC funded research
- Recent survey by Royal Society of Chemistry identifies ~85% of spin-outs coming from EPSRC support
- Survey by IoM^3 has a broadly similar figure

Why do I mention these ‘other aspects’?

- I acknowledge that these later issues I’ve discussed are not what SR2002 ‘research sustainability is about
- But how we implement FECs could have unintended impact – so need to have them in mind
- In any case, I see ‘SR2004 research sustainability’ and FECs as necessary but not sufficient
- In terms of positioning UK re a Knowledge Driven Economy a good start has been made with the substantial increases in the science vote . . .

But we ain’t there yet!

Let no-one be in any doubt . . .

Even in the difficult climate of the next (SR2004) spending review we continue to press the case for further investment in research!

. . . and I am pressing the case for engineering and the physical sciences

Thank you

for your attention