# RESEARCH INSTITUTES AND 'PRIOR OPTIONS'

POST note 74 February 1996



Research Councils have historically carried out some of their missions to support high quality scientific research by establishing institutes or units where specialised facilities and/or long-term expertise can be assembled. These are now undergoing the same examination processes as other departmental laboratories with a view to privatisation and/or rationalisation. Yet, as part of the nation's science and engineering base, their work is quite different.

***This note examines the prior options procedures currently being applied and their implications for the RCIs and the UK Science Base.***

## BACKGROUND

UK public expenditure on civil R&D comprises:

- The Office of Science and Technology's (OST) Science Budget-£1125M(93/4);£1312M(96/7).
- The Higher Education Funding Councils' (HEFCs) research funding-£942M(93/4);£961M(96/7).
- Civil departments' R&D-£1020M(93/4);£883(96/7).

The first two items together support the Science and Engineering Base (SEB) via Research Councils (RC) and universities, while civil departments R&D support their departmental objectives (regulatory support etc.) via work funded in Government Research Establishments (GRE), industry, independent research and technology organisations, as well as specific contracts in RCs and universities. Overall the Government's civil R&D funds are spent according to the locations in **Table 1** - approx. 13% were spent each in GREs and RCIs in 1993/4, half spent in universities and 10% in industry.

**Table 1** DESTINATION OF PUBLIC EXPENDITURE ON CIVIL R&D

| Year | Total (£M) | GREs | RCIs | HEIs | Industry | Other |
|---|---|---|---|---|---|---|
| 1987/8 | 3613 | 799 | | 1705 | 643 | 466 |
| 1988/9 | 3588 | 828 | | 1697 | 609 | 452 |
| 1989/90 | 3489 | 827 | | 1646 | 569 | 445 |
| 1990/1 | 3444 | 796 | | 1739 | 541 | 365 |
| 1991/2 | 3239 | 343 | 405 | 1736 | 428 | 327 |
| 1992/3 | 3326 | 446 | 422 | 1643 | 406 | 406 |
| 1993/4 | 3295 | 451 | 438 | 1644 | 330 | 428 |

*Source: 1994 and 1995 Forward Looks. N.B. All figures £1993/4 ; GRE and RCI spends not separable before 1991/2*

The departmental GREs have been under sustained review and change in recent years. The initial focus was on transforming them into 'Agencies' following the 1988 'Next Steps' initiative. Since 1991 however, GREs have been reviewed more from the point of view of need and ownership. As a result of these **departmental 'prior options'** reviews, some GREs have been closed (e.g. Warren Spring Laboratory) or are being privatised (e.g. Transport Research Laboratory). RC establishments are also reviewed periodically on a similar basis.

In 1994, a **Scrutiny Team** reviewed 53 Public Sector Research Establishments (PSREs), including some of the Research Council Institutes (RCIs). At the time (see POSTnote 53) there was some surprise and concern expressed at the exercise. Firstly, because it blended into the same process the GREs (primarily set up to provide a range of technical services to Government), and RCIs (set up to pursue basic research under the missions of the Councils). Secondly, that the selection of scientific areas appeared somewhat arbitrary. Thirdly, the PSREs reviewed embraced very different forms of ownership (e.g. departments, agencies, charities, companies limited by guarantee).

The Team concluded that for most PSREs the work was not seen as suitable for privatisation, the PSRE was not in shape for privatisation, or both. The Team found few examples of duplication but did comment on areas of "overlap" which suggested to the Team scope for rationalisation. Organisational models reviewed included a single 'Central Research Agency', groupings with common research areas, or reorganisation on a geographical basis. Another option proposed was to appoint two "Directors of Rationalisation". The Scrutiny Team's report was subject to Inquiries by the Science and Technology Committees of both Houses.

The Government response (September 1995), did not accept the Team's recommendations on rationalisation or reorganisation, but decided instead to institute another fundamental review of PSREs (including RCIs) under an expanded version of the prior options (PO) process already applied, with the aim of "*limiting public sector capacity to the minimum necessary to meet the Government's statutory responsibilities and other essential requirements*". This exercise potentially includes all the RCIs (from the Laboratory of Molecular Biology to the British Geological Survey), but the initial focus is on the units already reviewed by the Scrutiny Team (**Table 2**). This note thus focuses both on the specific institutes currently under scrutiny and the general principle of applying the PO process to RCIs.

## WHAT ARE PRIOR OPTIONS REVIEWS?

As described in **Box 1**, PO reviews involve tests of whether a public service function is required, whether there is scope for privatisation, contracting out, merging bodies or transferring work between them. This

**Box 1 PRIOR OPTIONS STAGES**

The Prior Options process goes through a number stages:

**1 Is the function needed at all**? - e.g. is the original need for the function still applicable? Who are its customers? Do they pay for it? What would happen if the function ceased? Is it in an area seen as important in the technology Foresight Programme?

**2 Must the public sector be responsible**? Government policy is that only those core functions that are both necessary and best carried out in the public sector should remain there.

**3 Must the public sector provide the function itself**? Where the public sector retains responsibility for the function, the possibility of contracting out is then examined.

**4 What is the scope for rationalisation**? Where the function remains for the time being in the public sector, the possibility of rationalising the function must then be considered. Rationalisation may be undertaken either in conjunction with other alternative suppliers of the same function or by reorganisation, e.g. by sharing resources, overheads, and administrative functions etc., with other bodies. Where rationalisation leads to significant changes, the organisation is expected to return to the start of the procedure and consider privatisation again.

5 **How will the function be managed**? Finally, where a function remains within the public sector, after rationalisation, it is then decided what its status should be (e.g. next steps agency, or a non-departmental public body), its organisational structure, its relationship with customers, its medium and long-term future and organisational efficiency plans.

review includes a rigorous examination of the options for privatisation, assessment of the work in relation to the technology foresight findings, and relationships with other establishments in related fields, with an eye to potential rationalisations. The 22 RCIs in the first series of reviews are listed in **Table 2**- they range from £2-£98M in turnover, with a combined budget of £300M.

These reviews are on short timescales. The first tranche (19 centres inc 5 RCIs) in four areas of research activity (e.g. fisheries, physical sciences) is scheduled to be reported to Ministers by the end of March 1996, the second (3 research areas, 14 centres inc 11 RCIs) by July 1996, and the rest (2 research areas, 10 centres inc 6 RCIs) complete by the end of 1996. The reviews follow the procedure outlined in **Figure 1**.

## WHAT DO THE RCIs DO?

RCIs are one of the options available to RCs to deploy the funds voted by Parliament for science to best effect. They can be grouped into the following categories[1]:

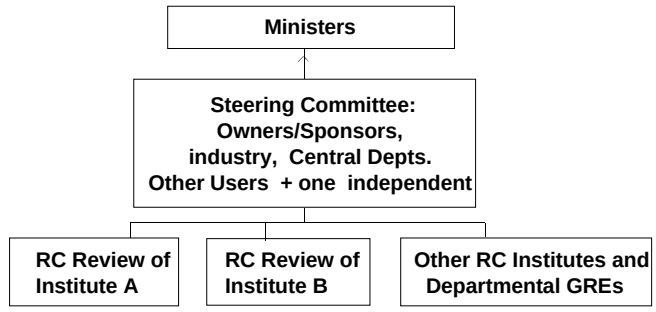
- RCIs set up to build a critical mass in areas of national importance; they bring together scientists from different disciplines with the required infrastructure to pursue longer term basic research strategies. Such units may be integrated within universities and are subjected to regular peer review. They are typified by MRC and some BBSRC institutes.
- Large facilities (e.g. high-power lasers, neutron sources) which would be unaffordable for separate research departments and thus require an institutional setting to provide a central service to other researchers. These would be typified by the Central Laboratory of the Research Councils (CCLRC).
- Establishments which have developed over the last 100 years to meet the UK's need for a strategic capability of long-term, large-scale agricultural, food, marine and environmental research, survey and monitoring. Some formerly existed independently of RCs; some (e.g. BBSRC institutes) are independent charities or companies limited by guarantee.

RCIs generally receive some level of long-term (e.g. rolling 5 year) funding subject to peer review, compete for grants with university-based researchers, Interdisciplinary Research Centres etc., and can contract research from external sources. The Research Councils see their institutes as offering the mechanism for maintaining and developing a strategic national research capability where specialised facilities, interdisciplinarity and continuity are essential, as illustrated in some of the examples in **Box 2**.

**Table 2**
**RESEARCH INSTITUTES IN CURRENT PRIOR OPTIONS REVIEWS**

| | *INSTITUTE* | *BUDGET (£M)* | *ACTIVITIES* |
|---|---|---|---|
| *(a)* | ***Biotechnology and Biological Sciences RC (BBSRC)*** | | |
| | Babraham Institute | 13 | animal science and biotechnology |
| | Inst. Grassland and Environmental Research | 12 | grassland crops and animals: sustainability and efficiency |
| | Inst. for Animal Health | 18 | animal diseases |
| | Inst. of Arable Crops Research | 21 | arable crops efficiency and quality |
| | Inst. of Food Research | 14 | food and allied products |
| | John Innes Centre | 13 | plants and microorganisms |
| | Roslin Institute | 8 | animal production and breeding |
| | Silsoe Research Institute | 7 | engineering for bio-industries |
| *(b)* | ***CCLRC*** | | |
| | Central Lab. of the Research Councils | 98 | large-scale central facilities |
| *(c)* | ***Natural Environment RC (NERC)*** | | |
| | **Centre for Coastal and Marine Sciences** | | |
| | Dunstaffnage Marine Laboratory | 3 | marine sciences in Scotland |
| | Plymouth Marine Laboratory | 10 | marine sciences |
| | Proudman Oceanographic Laboratory | 6 | ocean processes and modelling |
| | **British Geological Survey** | 33 | geosciences, surveys and mapping |
| | **Centre for Ecology and Hydrology** | | |
| | Inst. Freshwater Ecology | 4 | freshwaters and estuaries research |
| | Inst. Hydrology | 8 | Water cycle, hydrology etc. |
| | Inst. Terrestrial Ecology | 14 | terrestrial ecosystems, human impacts |
| | Inst. Virology & Environmental Microbiology | 4 | viruses and microbes in the natural environment |
| *(d)* | ***Medical Research RC (MRC)*** | | |
| | Dunn Nutrition Unit | 4 | human nutrition and health |
| | Radiobiology Unit | 4 | effects of radiation on cells and tissue |
| | Reproductive Biology Unit | 2 | human reproduction |
| | Toxicology Unit | 4 | toxixity mechanisms, human health |
| | Virology Unit | 2 | structure / function of human viruses |

**Figure 1 PRIOR OPTIONS PROCESS (EACH SCIENTIFIC AREA)**




1. The Scottish Office (SO) is responsible for a number of REs, primarily in the agricultural field, which also have many of the characteristics of the RCIs. These are also part of the current PO review.

**Box 2 SOME INSTITUTE-BASED RESEARCH**

The **Institute of Animal Health (IAH)** combines expertise in animal physiology, immunology and disease pathogenesis with major high containment facilities for exotic diseases at Pirbright, Surrey and for endemic diseases at Compton, Berkshire. Typical long-term capabilities include modelling the spread of exotic diseases and estimating the likely threat to British agriculture under changing climatic conditions and world trade regimes.

The **Institute of Grassland and Environmental Research (IGER)** integrates the plant and animal science needed for the efficient healthy production of meat and milk from grassland. Strategic breeding of grasses and clover (jointly with industry) builds on basic plant genetics research. Developing devices to measure soil mineral Nitrogen in fields has led to a significant reduction in the N fertilizer needed for herbage production.

At the **John Innes Centre (JIC)** a large multidisciplinary team is working on the genomes of the world's major food crops. They were the first to develop genetic (RFLP) maps of wheat, rye and millet and have shown how similarities have been maintained during evolution between them and maize and rice. The latter has a relatively small genome, is easier to handle, and this discovery opens up to possible genetic improvement by approaching any cereal gene via its equivalent in rice.

The **Institute of Arable Crops Research (IACR)** deploys skills in chemistry, insect physiology and plant science to develop integrated approaches to controlling pests, diseases and weeds in field crops that are less reliant on agrochemicals. This requires an understanding of complex biological interactions, for example between pest and beneficial insect populations. One product, a biological agent to control slugs, is available commercially.

**MRC Institutes and Units** (of which there are 42) are set up to create a special research culture - demanding a fully interdisciplinary approach or investment on a scale not easily achievable through standard grant funding. Expertise in MRC units includes molecular biology (e.g. the **Laboratory of Molecular Biology** in Cambridge studies biological phenomena at the molecular level and its work has attracted Nobel Prizes); basic science/clinical interfaces (e.g. the **Biochemical and Clinical Magnetic Resonance Unit** at Oxford on the biochemical basis of human disease and the **Institute of Hearing Research** in Nottingham on hearing disorders). Other units such as the **Dunn Nutrition Unit** in Cambridge and the **Toxicology Unit** in Leicester, undertake research in their respective fields and are a source of independent advice for industry and government.

NERC's **British Geological Survey** is the national centre for earth science information and expertise and the oldest national geological survey. It undertakes basic, strategic and applied R&D surveying and monitoring in the fields of mineral, energy and groundwater resources, land use and geological hazards.

The **Centre for Coastal and Marine Sciences** includes three laboratories (Table 1) with multidisciplinary expertise in the marine sciences, oceanography and ocean biology and ecology. Such work has shown that pollutants are affecting the population of some marine species at very low levels.

The **Centre for Ecology and Hydrology** brings together four laboratories covering all aspects of the terrestrial and freshwater environment. For instance, chemists, geologists and ecologists developed the critical load approach for acid rain regulation.

The **Central Laboratory for the Research Councils** comprises the Daresbury and the Rutherford Appleton Laboratories; these operate large-scale facilities for RC-sponsored researchers (mostly from universities). CLRC serves some 12,000 users with facilities such as ISIS (the world's most powerful pulsed neutron source), and the Synchroton Radiation Source and Vulcan Laser. The laboratory is also a key centre through which the UK participates in international science through CERN and ESA.

# ISSUES

## *Prior Options and Long-term basic Research*

The PO process seeks market solutions by identifying 'need', 'customers', etc.; for instance, with the GREs' work, it has been possible to develop clear customer-contractor relationships, which could then be assessed for alternative (private) provision. With the RCIs however, there are concerns whether **simple market concepts** are adequate to deliver the long-term objective of building up and maintaining the human resources needed to sustain the national knowledge base. Science and technology resources take time to build up and cannot be turned 'on' and 'off' with the ease of some services the Government buys from the private sector; neither can curiosity-driven basic research (a key to scientific advance) be defined in terms of 'deliverables' (e.g. a testing service, or physical goods) which can be specified in a contract. Moreover, RCs do not see themselves as simple purchasers or 'customers' for research but more as agents through which research is carried out to the nation's benefit.

Another focus of PO is to seek rationalisation to reduce areas of 'overlap'. Here there is a potential conflict with the **diversity** desirable in a strong SEB. More than one source of expertise is essential for the peer review process, and competition between peer groups is a key driving force in scientific progress. Forced 'rationalisations' could reduce the freedom of research sponsors to select the most appropriate means of pursuing research and remove the competitive pressures which sustain and improve quality. Moreover, World class scientific research encouraged by the Research Councils depends on the ability of excellent scientists to recognise the coming importance of emerging fields, and is less amenable to central planning than technical service support and some applied research.

Another concern over the PO process is that it pays insufficient attention to **existing mechanisms** for change. RCIs are not funded because they are there - all compete for RC funds and have diverse sources of income (**Figure 2**). They are not 'permanent' or unchanging - MRC units are reviewed on a 5-year cycle and may be closed if standards are no longer competitive or if the original need no longer applies. Other RCs have implemented major rationalisations. Thus 11 AFRC institutes have closed since 1984 and institute staff reduced from 6300 to 3700 with restructuring costs of £127M. NERC has closed or withdrawn from 19 sites over the last 10 years and reduced permanent staff from 2565 to 2044 with restructuring costs of £15M. Three NERC establishments are being transferred to universities - e.g. its Institute of Oceanographic Sciences and Research Vessel Services to Southampton University (at a cost of £41M). The Central Laboratory of the Research Coun-

cils was established after a PO review in 1995 and provides services to the other five RCs, with no direct funding of its own. Many thus see current systems adapting effectively to change, with recent moves to open RC awards to applicants from all RCIs, GREs and UK non-profit research organisations, further strengthening competitive pressures for rationalisation.

### *Implementing the Prior Options Process*

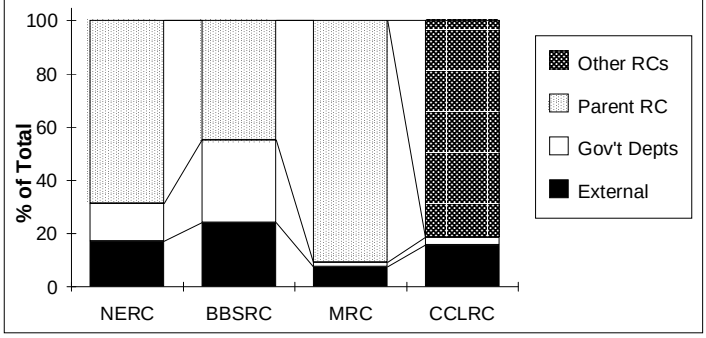
Since the PO process is proceeding there are also issues associated with its implementation. Some see a danger that the rapidity and limited transparency of the process could lead to a cursory approach. The Royal Society (RS) is organising a meeting to allow the scientific community to discuss issues raised by the process, and principles to guide the Steering Committees (Fig. 1).

On **ownership**, many of the RCIs (and the SO's REs) are already independently consituted as charities and / or companies limited by guarantee. They are nevertheless, under current Treasury definitions, classed as publicly owned, whereas Universities are defined as the 'private' sector. Since both rely primarily on public funds from budgets voted by Parliament for research, the Commons Science & Technology Committee noted that it would be a "fiction" to see transfer to a university as removal from the public sector. The reasons for differentiating may be due to the fact that some RCI Board Directors are appointed by the parent RC or Government department, and are answerable to Ministers, and because pensions and redundancy payments for full-time RCI employees come from central funds.

If the 'rules of the game' encourage a shift from RC to university ownership (as with the NERC / Southampton Oceanography Centre), what are the potential costs and benefits of such changes? On the **financial costs** side, transferring the pension rights of staff would involve transfer charges on the RC (BBSRC estimate typically £10-15M per institute), as well as creating a shortfall (up to £25M p.a.) on the current pension scheme - these would require central support if budgets for scientific research were to be maintained.

On the **scientific 'costs'** side, the former RCI's focus on research would, under its new setting, have to mesh with the university's broader interests of under- and post-graduate education and training, other areas of research, commercial activities, conferences etc. The close match between the RC's and its institutes' priorities could diverge; there could be penalties if previous 'one-stop shop' capabilities (whether in medical research or environmental research and monitoring) became fragmented. Moreover, privatisation could lead to increased dependence on short term contracts, undermining the stability conducive to original research - particularly when it involves the assembly of a critical mass of interdisciplinary expertise. Potential scientific

**Figure 2 SOURCES OF INCOME FOR RCIs (1994/5)**




**'benefits'** could include greater flexibility and adaptability, and synergy with postgraduate training and industrial contacts of the university.

The balance of advantage and disadvantage will vary greatly between individual units, and the RS and others emphasise that the PO reviews should not seek blanket solutions and should be conducted on a case-by case basis. Considerations of scientific quality, ability to maintain the UK's competitiveness in international science, an ability to maintain an adequate skills base to meet current and future needs, and synergy with the follow-up with technology foresight should be the key considerations rather than a simple wish to move resources from one type of public institution to another.

Notwithstanding the above, supporters of the PO process point to experience with some of the GRE privatisations as holding out the prospect of efficiency gains without sacrificing continued scientific impartiality and, with the cooperation of the scientific community, adequate attention being given to long-term needs. Thus with the National Physical Laboratory, the RS and Royal Academy of Engineering have constituted a committee to advise the President of the Board of Trade on the long-term capability and standing of the NPL; with the Laboratory of the Government Chemist, the Royal Society of Chemistry is part of the consortium selected as the preferred bidder to take over the LGC.

All in all, there is no disagreement over the need for continued improvement through normal management mechanisms. Where dispute arises is over the appropriateness of the additional overlay of the current PO exercise. Here the RS and others argue that there is no case for submitting those PSREs reviewed in 1994 and 1995 to the prior options process again. Moreover care must be taken if 'pulling up the plant too often to examine its roots' is not to affect the ability of the RCs to maintain the long-term vitality of the SEB, by diverting management time and Science Budget funds to the inevitable legal and administrative tasks involved. The Government on the other hand wishes to reduce to a minimum work carried out in the public sector and sees the additional PO process as a critical part of that policy.