Are We Realizing Our Potential? Joining Up Science and Technology Policy in the English Regions

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Science policy in England is determined within a governance system in which regional interests and perspectives are overlooked in favour of short term national excellence. Regional policies and the creation of the new Regional Development Agencies both are critically dependent on central government decisions over the spatial location of R&D spending. The scientific governance system lacks a mechanism to ensure that science policy works to improve regional competitiveness and scientific performance; thus, regional differences and strengths are overlooked by Whitehall departments in favour of the most vocal and well-networked representatives from a limited number of companies. Uneven scientific development with a lack of diversity in England is not a rational market decision but a continually reinforcing consequence of a chain of government policy decisions.

Scientific policy governance Regional innovation Devolution

Introduction

The recent Cabinet Office report (2000), *Reaching Out*, was one of the strongest statements yet from the UK government that there was a practical need to improve the delivery of particular policies through their regional-scale integration. On the surface, this is an admirable aim, and the recent creation of the Regional Co-ordination Unit in April 2000 might provide a mechanism for increasing regional input into national policy formulation. *Reaching Out* argues the locus for these changes will be the Government Offices for the Regions (GORs) which are responsible for the regional delivery of Department of Trade and Industry (DTI), Department of Environment, Transport and the Regions (DETR) and Department for Education and Employment (DfEE) policy areas, as well as having representatives present from the Departments of Health (DOH), Culture, Media and Sport (DCMS) and the Home Office (MAWSON & SPENCER, 1997). GORs are the natural focus for policy co-ordination as they are at the nexus of a constellation of local authorities and regional bodies through their control over the local use of central funds.

However, the reality of the situation is that even under the most radical reforms of the GORs being proposed, significant departmental powers with considerable potential for regional impacts will remain centrally directed. Although the reforms will lead to the better co-ordination of local delivery networks, there are a large number of national (English-scale) policy networks which will remain outwith this regional system. This has the effect of separating these local networks from the national policy debates, and serves to weaken the effectiveness of delivery. This policy review article presents evidence from one policy area – science and technology policy – to explain current shortcomings in the government's regional policy, and to offer some insights into the limitations of a regional governance system in which the central Whitehall departments refuse to delegate powers to the regions.

Regional policy strictly defined in England is formally the responsibility of the DETR and it has delegated a number of strategic functions to new bodies, the Regional Development Agencies (RDAs). These bodies, created in April 1999, are statutorily mandated to draw up strategies for the eight English regions outside London.[1] However, they have no control over a range of policy areas which affect regional economic performance, broadly speaking a mixture of economic and industrial policies. This short review takes one example – science policy – a responsibility of the DTI, and a responsibility which the DTI exercises with a solely national consideration.[2] Despite strategic responsibilities, RDAs are experiencing difficulties in writing effective regional innovation strategies principally because of the degree to which science and innovation policy lacks mechanisms for considering regional perspectives.

Science policy: defining the national interest?

The current system of scientific governance in the UK was established through the 1993 Cabinet Office White Paper, *Realising Our Potential* (CABINET OFFICE, 1993). The purpose of that White Paper was to 'give a clearer sense of the vital national contribution made by the ideas, inspiration and dedication of our science and engineering communities, and to devise organisational structures in which the individual can flourish and national priorities and objectives can be more clearly and openly set and pursued' (p. 7). Although the White Paper presaged a series of changes in structures, organizations and policies, the central rationale of the policy structure was to create a system of scientific governance which generated excellence in UK science to boost the competitiveness of UK businesses; 'the central thesis of this White Paper is we could and should improve our performance by making the science and engineering base more aware of and responsive to the needs of industry' (p. 16).

A recent House of Commons science and technology report examined how this system of governance affected the behaviour of Whitehall departments

(SCIENCE and TECHNOLOGY COMMITTEE (S&TC), 2000a). The inquiry found that there was little coherence of research activity between departments; the majority of extra-mural funding (i.e. research contracted out by government departments) was spent in pursuit of their short term needs, whilst longer term strategic spending was oriented towards raising the UK strategic technological base – science and technology were seen only in terms of supporting national competitiveness. This meant that their vital role in *creating regional economic capacity* through science and innovation was being systematically overlooked.[3]

A further weakness in the system is that the budgets for publicly-funded research in the UK have remained static in cash terms and declined as a proportion of the national product. From 1993–97 (the latest year for which figures are publicly available), national investment in R&D as a percentage of output has declined from 2·1% to 1·8%; government and research council R&D expenditure has also declined from 0·3% of GDP to 0·25% (1993–97). Much of government support for R&D is directed through two sets of agency, the Research Councils and the Higher Education Funding Councils which between them account for 48% of government expenditure on R&D (JONES, 1999). All these bodies have faced the situation of *managing budget decline*, rather than having discretion and flexibility with which to approach new challenges, and the Whitehall departments' budgets have borne a disproportionate brunt of the overall cuts.

Currently, the Office of Science and Technology (OST) has responsibility for science, engineering and technology, whilst there is no central body co-ordinating Whitehall departmental R&D expenditure. These structures created by the 1993 White Paper have been affected by major changes in the machinery of government. In 1993, the Minister for Science and science responsibility was in the Cabinet Office with Cabinet rank. In 1995, these responsibilities were altered; science policy was moved to the DTI and downgraded to a junior ministerial position. However, these changes in science and technology policy development sit relatively uncomfortably with fundamental changes in the policy environment after 1997. Since then, government management has claimed to be predicated on holistic and joined-up policy design, illustrated by the creation of the Performance and Innovation Unit within the Cabinet Office, and the Cabinet Office *Issues across Government* agenda.

From a regional economic development perspective, the current management of science and technology policy by government is extremely problematic. The government has accepted the need for regions to develop their own endogenous potential, and indeed in the light of the apparent needs of the knowledge economy, to develop innovative and creative industries (DTI, 1996, 1998a). As a DTI responsibility and with no administrative or consultative mechanisms connecting it to the regions, there is a clear problem with this system of scientific governance. Although the current government is concerned with integrating policy making across Whitehall departments, there is no means for regional economic development issues to be considered in scientific policy making. In part this derives from the pressure on the system from continually reducing science budgets, which naturally engenders a retreat from those areas and themes deemed the most marginal.

This problem is compounded by the fact that no government department has been responsible for regional economic development of individual regions since the abolition of the unsuccessful Department of Economic Affairs in 1969. The Regional Economic Planning Councils were disbanded in 1983; since 1997, responsibilities for the regions have been vested in the DETR whilst responsibility for economic development and competitiveness has remained with the DTI. Other elements are scattered across Whitehall, with education and training in the DfEE, industrial and technology policy with the DTI, physical planning with the DETR and social well-being with the DOH, respectively.

The linkages between science policy and regional economic development are clear. Elsewhere we have remarked on the close linkages between government science policy and the growth of electronics clusters in the Thames Valley and Cambridge (CHARLES and BENNEWORTH, 2000). Ignoring the spatiality of science policy ignores the potential for the public sector to stimulate regional economic development by contributions to their science, engineering and technological base.

Although very little of the DTI's policy making has a specific mechanism for incorporating consideration of regional development interests, it is clear that a top-down approach to science policy has significant negative impacts on those regions not currently host to successful science facilities and innovative firms. The implicit spatial consequence of these policies and indeed this policy framework is a continual concentration of science, technology and innovation activities in the South East of England, underpinned by significant government expenditure reinforcing this position. There has also been a hidden impact from the privatization of public research. Privatized corporations have tended to cut back on R&D expenditure, close R&D sites and move from joint product development with UK firms to the acquisition of often foreign technology with negative consequences for many UK regions. Similarly, the reduction in public support for industrial research associations has weakened regional research capacities.

This absence works directly against the promotion of national competitiveness, a perverse result given the desire to engender national scientific excellence. This outcome arises as UK competitiveness directly derives

from the innovation potential of its regions. A top-down scientific governance system weakens UK economic performance if it cannot direct scientific policy to create capacity for growth and development throughout its constituent regions. The DTI innovation policy focuses on support for R&D without regard for its location; there is significant evidence that its spatial concentration inhibits the development of complementary excellence outwith the traditional centres of expertise (CENTRE FOR URBAN AND REGIONAL DEVELOPMENT STUDIES (CURDS), 2000). Thus, despite a rhetoric of commitment to national scientific excellence, the aggregate effect of the scientific governance system weakens overall national performance by concentrating resources in the South East, and increasing the specificity of the UK science base, reducing its responsiveness to new technological opportunities in alternative areas.

Foresight: dissemination or negotiation?

The weaknesses of this system of scientific governance are illustrated by the Foresight process which the government began in the wake of the 1993 White Paper and to which the 1998 Competitiveness White Paper commits the future direction of policy (DTI, 1998a, p. 62). The Foresight process is intended to shape UK scientific priorities, but has no mechanism for examining whether different regions should choose to pursue divergent priorities, or indeed even whether different regions would choose to order their priorities differently.

The Foresight process was operated through a set of national sectoral panels incorporating interests from business, academia and government. Inevitably, those panels were largely constituted by representatives of larger firms and the major research-based universities. A number of regional meetings were held around the country, but principally to discuss technical questions rather than interface between national and regional priorities. Finally, a regional dissemination programme was launched after the publication of the national reports. It was clear that firms, especially SMEs, in the regions, found a national priority-setting programme irrelevant; there was thus a need to enrol regional organizations in the Foresight process rather than merely in dissemination.[4]

Each of the new English RDAs has the responsibility to write innovation strategies for their regions building on the work undertaken in the drafting of their regional economic strategies (DETR, 1999). The weakness of the DTI approach to these new regional arrangements was that although they were repeatedly informed of the importance of developing clusters, their mandate did not extend much beyond mapping activities and facilitating business clubs. All the RDAs faced the difficulty of trying to write a strategy for a knowledge-based economy knowing that the most critical decisions affecting them are taken without consideration for their regional needs. Even their moves to develop their own cluster strategies have since been outpaced by the DTI's determination to *nationally* determine which clusters are important and to which the RDAs should given further consideration (DTI, 2000a).

If RDAs are now to develop effective regional innovation strategies, these should parallel the national Foresight activities and actively shape the outcomes to give an overall framework with greater relevance for the regions and provide a place for developing more effective partnerships and integration between business and the science base in all UK regions. The only mechanism through which Foresight can currently influence them is to redirect them back towards national priorities in terms of sectors and actions. Significant concerns must be raised because, unless national Foresight can incorporate those regional priorities and decisions, the DTI's science policy will directly undermine attempts elsewhere in Whitehall to create endogenous R&D potential in all English regions.

The synchrotron facility: conflicting departmental interests

The case of the location of the new Diamond synchrotron facility again illustrates the weakness of the current institutional arrangement for the simultaneous delivery of science and regional development policies. The background to the case was that the UK government decided to fund the development of a new synchrotron, a device for generating sub-microscopic images with extensive applications for both physical and life sciences. An existing facility was located at Daresbury, in Cheshire, in the North West of England, one of the three sites of the Central Laboratories of the Research Councils (CLRC), the others being the Rutherford Appleton Laboratory in Didcot, Oxfordshire, and the Chilbolton Observatory in Hampshire. However, given that this new facility was expected to cost some £175 million in capital costs (£500 million over its lifespan) and the capital budget for CLRC was £10·5 million, it was clear that additional sources of funding needed to be found (DTI, 1999; JONES, 1999). Rejecting the possibility of a public–private partnership, a consortium was assembled to fund the work, principally comprising the Wellcome Trust (with a strong interest in its biomedical applications) and the French government alongside the OST (which administers the science budget).

In parallel with the assembly of the financial package, a decision had to be taken on its location, for which there were two possibilities, either using an existing CLRC site or holding an open competition, permitting the emergence of a greenfield contender. Initially, it appeared as if this new facility would be located at the site of the current synchrotron in Daresbury, and indeed a number of statements to this effect were made by the

Secretary of State for Trade and Industry, Stephen Byers, early in 1999. This decision would have dovetailed rather neatly with the Regional Economic Strategy for the North West. It identified that the three largest industrial sectors in the region were all sectors forecast to experience significant decline in the next decade – aerospace, chemicals and nuclear power. The strategy for the region was predicated upon economic revival through promoting closer linkages between firms and the science base. Although the North West has eight universities investing some £125 million annually in R&D, there are only 800 people engaged in government R&D in the region, and the majority of these are employed at Daresbury, making it a critical element of the North West's regional innovation system (NORTH WEST UNIVERSITIES ASSOCIATION, 2000).

However, the attitude of the DTI towards the location of the Diamond facility shifted during the course of 1999;[5] there was a perception within the Office of Science and Technology that a swift location decision needed to be taken to keep the project alive which was its paramount concern without regard to its location. Indeed, this tallies with the departmental mission articulated through its Public Service Agreement with the Treasury, which argues that there are two targets for science expenditure: improving the UK's international ranking for science excellence; and increasing the number of university spin-out companies (DTI, 2000a). The idea of an open competition was replaced with a much less comprehensive but much speedier consultants' comparison of the two sites.[6] The comments from the Minister for Science concerning the Synchrotron events explicates the DTI's approach to science policy:

> The key criterion used in selecting the site for the synchrotron is what is best for the long-term health of UK science. It is clear that both Daresbury and the Rutherford Appleton Laboratory offered viable sites for the location of the new synchrotron. There were, however, four key areas which pointed to RAL as the preferred location: ... [(iv)] its proximity to the biosciences expertise at Oxford University, the MRC units, including the Mouse Genome Centre on the adjacent Harwell site and the National NMR centre (S&TC, 2000b, p. 2).[7]

The damaging effect of the siting decision on the regional economy of the North West was acknowledged by the DTI in a press release shortly after the RAL decision was taken, announcing £25 million of government support to 'enhance the science infrastructure in the North West as a consequence of the synchrotron siting decision' (DTI, 2000b, p. 1). However, its corrosive impact on the scientific capacity of the North West appears not to have been considered in the process. The strategy of the North West Development Agency (NWDA) notes that Daresbury is the only government research institution of any size in the region, and that the NWDA's success in encouraging competitiveness will depend on the degree to which it is able to persuade the government and higher education institutions as much as businesses to improve their contribution to what it terms a regional learning economy (NWDA, 1999). These funds are additional to the operating costs of the site for the next five years, until the Diamond source is fully operational, and are intended to assist the diversification and commercialization (realistically, survival) of the site.

Considering this case on the merits of the published criteria, it *is* fair to accept the decision as in the best interests of the UK as a whole. However, it is clear that these criteria have been set in accordance with a DTI philosophy which unashamedly favours the concentration of the science base in the South East. It is disingenuous to argue that market logic underpins these decisions. HEIM, 1988 has unearthed significant evidence from documents released under the 30-year rule that, in the immediate post-war period, the location of government research establishments was based as much upon the irrational prejudices of particular senior civil servants than a logical calculus of the scientific potential of particular localities (HEIM, 1988). It only makes sense to view the events as a culmination of several decades of purposive government investment in science and technology which has served to widen economic, technological and social disparities between core and peripheral areas of the UK.

Government R&D: potential for regional redistribution

The examples of Foresight and Daresbury both indicate the central weakness of the current framework: *the absence of a transparent mechanism for resolving conflicting priorities between different policy-making groups.* Science policy is dominated by the DTI; their policy networks are central in setting the agenda around which policy consultation occurs. The DTI argued to the Science and Technology Select Committee that there were four main stakeholders in the Synchrotron decision: the priorities between different policy-making groups. Science and the French government. However, because the decision process followed rules the DTI had set, the ultimate consideration for the government was the national scientific system. As Stephen Byers stated in questioning to the Commons Science and Technology Select Committee, 'as the Cabinet Minister responsible for science I could not put myself into a position where we would lose this world-class science facility for the United Kingdom scientific community' (S&TC, 2000c, para. 124). Both CLRC and the Wellcome Trust had to represent themselves in accordance without spatial consideration, although the Wellcome Trust argued that, as a charity supporting scientific research, they were unable to take regional policy into account.[9]

The essence of that problem more generally with the UK scientific governance system is that, although a wide range of stakeholders are regularly consulted in

the scientific governance process, the terms of their evidence are shaped by the attitude that the DTI has, which is that the purpose of 'science' is to contribute to competitiveness at the UK scale. Thus, the current system of scientific governance could not incorporate and consider regional development arguments and interest representations; this is symptomatic of an overly hierarchical and rigid policy framework. With the Foresight programme, activities which were ostensibly for the national good had in fact a very limited regional applicability, although those companies which regularly engage with the DTI around policy, secondments and regulation did unsurprisingly benefit from the exercise. Conversely, those firms with limited capacity or reason to engage with the DTI in London found the activities far less relevant to their needs.

It is a worthwhile exercise to gauge the extent to which the funding regime continues to exacerbate these regional scientific potential disparities. Lord Sainsbury[10] acknowledged that, in the UK, there was a problem with persuading companies to invest in R&D and argued that government R&D expenditure was critical in determining the patterning of the UK scientific base. Table 1 demonstrates the degree to which government R&D expenditure remains disproportionally concentrated in those regions immediately adjacent to London. The table shows the 'jobs gap', that is to say the difference between actual employment in government R&D, and if the expenditure were distributed in accordance with the contribution of each region to national competitiveness (GDP, the standard DTI competitiveness proxy) (DTI, 1998b).

The table demonstrates the imputed potential regional employment effect of a more geographically-balanced distribution of government R&D employment. For a region such as the North West, an extra 1,600 jobs would make a considerable difference to the regional innovation system, representing a doubling of current levels of government R&D expenditure and a trebling of current employment. The increase in the number of knowledge workers would make the greatest contribution to the stimulation of knowledge-based activities, and in some regions a reorganization would significantly augment the science base. It is not suggested nor is it feasible that a direct redistribution of employment would actually take place. The purpose of the table is to make rather starkly the case that the DTI's current approach to locating science where there is the greatest existing expertise is significantly flawed by a failure to consider the implication of past funding decisions. Moreover, these funding patterns are working directly against other government departments seeking to improve overall regional economic performance in these regions.

Table 1. Government expenditure on R&D (GOVERD) index, 1997, by GOR[1]

	GOVERD (1997, £m)	*GOVERD* index (UK GDP 100)	*GOVERD* gap (£m)	*GOVERD* employment gap (jobs)
UK	2,018	100	n/a	n/a
England	2,811	105	89	1,140
North West (GOR) and Merseyside	88	41	127	1,630
London	205	67	100	1,290
Yorkshire and Humberside	55	36	99	1,270
East Midlands	69	51	67	860
North East	17	23	56	720
Wales	33	40	49	630
Northern Ireland	12	26	34	440
Scotland	163	97	4	50
West Midlands	185	109	16	200
Eastern	250	134	64	820
South West	257	158	94	1,210
South East (GOR)	685	213	364	4,670

Notes: 1. UK *GOVERD* in GDP 100.
This table takes the published figures for *GOVERD* and estimates what the expenditure would be if *GOVERD* was distributed in accordance with regional contribution to national GDP (the DTI's leading measure of regional competitiveness potential). The cost per job in *GOVERD* establishments in 1997 was £77,915 per person. The quotient of the funding gap and the cost per job allows an indicator for *GOVERD* gap to be calculated, that is how many public sector science jobs would be created if government expenditure on R&D was distributed in accordance with the contribution of those regions to national wealth.

Source: *Economic Trends*, 1999; *Regional Trends*, 1998; authors' own calculations.

Concluding remarks

The continuing disparities in scientific funding, which are an important element of interregional disparity in the UK, are a direct consequence of the system of scientific governance. Although *Realising Our Potential* represented a new era in the relationship between central government and SET users, it did not overcome the problem of co-ordinating science policy between departments. Under *Reaching Out*, the GORs would be the natural home for some manner of regional science and technology executive, which could report directly to the Cabinet Office. Regardless of the actual administrative changes, recent science policy suggests that, to make it add value to policy and contribute to regional development, there is a need to create loud regional voices in the national scientific governance system.

Part of this system arises from bodies which take funding decisions having their latitude for action constrained by a need for accountability to Parliament through a Whitehall department. However, in practice this has meant that the only views that they consider are those that their sponsor department deems appropriate, which as the case of Foresight and Daresbury demon-

strates, excludes important stakeholders in other policy communities.[11] The Higher Education Funding Council for England deals with this by having funding formulae which ensure that universities are awarded science, engineering and technology funds on the mixed basis of excellence, capitation and minimum standards, which means in practice that each region has sufficient universities to create a vibrant science base. There is consequently much less interregional inequality in higher education R&D than in either the business or the government sectors, and different regions can develop their own particular research expertises.

There has been much rhetoric on the need for government funding to work with the private sector because of the impossibility of national governments funding internationally competitive research facilities. What is, however, true is that it is impossible for science to flourish and explore manifold emergent opportunities under conditions of low and falling science budgets. The European Parliament recently called for R&D in the European Union to be raised to 3% of GDP; however, if UK R&D was raised to an average of our four main competitors, to 2·52%, then spending would have to increase by £5–6 billion (and in the short run, government would have to accept considerable responsibility for this). This would allow the flexibility to both support existing excellence and create new capacities for the benefit of the UK as a whole. There is a need for some serious consideration of the impact of government scientific funding on regional development, given recent policy commitments to knowledge-based economies, acknowledged weaknesses in leaving R&D to UK businesses and the glaring inequalities currently inherent in the government funding regime.

Notes

1. Drawing up a regional strategy for London is the responsibility of the London Development Agency, which is itself responsible to the Greater London Authority, which formally came into existence on 4 July 2000.
2. From the DTI point of view, there are two sets of policy which have an explicitly regional dimension; the first is industrial assistance and the processes associated with the designation of areas eligible for assistance. The second is relations with the trade and industry functions of the devolved administrations in Scotland, Wales and Northern Ireland.
3. Until the curtailment of the cost-plus procurement system in the MoD in the 1990s, MoD contracts had two purposes – to obtain supplies and to obtain a supplier. Government spending on civil R&D has the same effects, but without this necessarily being appreciated by research funders.
4. One of the authors was involved in the North East 'dissemination' project which had the objective of critically appraising the regional relevance of the national framework and stimulating the formation of some regional panels in the North East, as well as developing relevant institutions (CURDS/EDC, 2000).
5. Indeed, by December 1999, it had become a non-negotiable for OST in their discussions with the Wellcome Trust to put together the package of funding (S&TC, 1999c, para. 20).
6. The Science and Technology Committee later criticized this consultancy exercise for a lack of added value. The Committee argued that the consultants had not added to the simple facts which CLRC could have disclosed to the Office of Science and Technology themselves. Thus, all the consultants provided was either an *ex post* rationalization of a *fait accompli* or a public relations document.
7. The other three were: (1) the potential for operational, technical and scientific synergy between the new synchrotron and the other facilities on the site, especially the ISIS neutron source; (2) the potential to produce a world-class international research centre drawing together a range of scientific and engineering disciplines; and (3) the sharing of many technical functions, for example: accelerator design, magnets, pulsed power, etc. and support functions such as security, safety, administration, etc.
8. The Council of the Central Laboratories of the Research Councils (CCLRC) is effectively the board which sets policies for the Laboratories as well as scrutinizing the activities of the CLRC's various sites.
9. When CCLRC are stakeholders in a (DETR) planning inquiry they may choose to represent the interests of their two sites separately, but from the DTI point of view, CCLRC, a national agency, was considered as a body with a single opinion (articulated through its director, John Cadogan and later John Taylor).
10. *The Westminster Hour*, first broadcast 4 June 2000, 10 p.m. Radio 4 (92–95 MHz).
11. In the Daresbury decision, the unions at Daresbury assembled a report which they presented to the OST to try to present a regional dimension to the decision. However, the unions were dismissed as scientists who 'get terribly, terribly focused into their own particular areas', whilst the Wellcome Trust regarded that 'we are the policy-makers' (S&TC, 1999c, para. 24).

References

Council of the Central Laboratory of the Research Councils (CCLRC) (1999) *The New Synchrotron – A New Light for a Better Future*. CCLRC, Didcot.

Cabinet Office (1993) *Realising Our Potential: A Strategy for Science, Engineering and Technology*. HMSO, London.

Cabinet Office (2000) *Reaching Out*. Stationary Office, London.

Charles D. R. and Benneworth P. S. (2000) Clustering and economic complexity – regional clusters of the ICT sector in the UK, paper present to 'Do Clusters Matter in Innovation Policy?', OECD Cluster Group Workshop, Utrecht, May.

Centre for Urban and Regional Development Studies (CURDS) (2000) Memorandum of evidence,

in Science and Technology Select Committee Inquiry, *Are We Reaching Our Potential?* Stationary Office, London.

CURDS/ENGINEERING DESIGN CENTRE (1996) North East Technology Foresight networking programme, Stage 1 Scoping Study report, CURDS/EDC, University of Newcastle.

DEPARTMENT FOR THE ENVIRONMENT, TRANSPORT AND THE REGIONS (DETR) (1999) *RDAs' Regional Strategies: Building Partnerships for Prosperity*. DETR, London.

DEPARTMENT OF TRADE AND INDUSTRY (DTI) (1996) *Competitiveness: Creating the Enterprise Centre of Europe*. HMSO, London.

DTI (1998a) *Our Competitive Future: Building the Knowledge-driven Economy*. HMSO, London.

DTI (1998b) *Results of the Consultation on Regional Competitiveness Indicators*. Government Statistical Service, London.

DTI (1999) *Trade and Industry: The Government's Expenditure Plans 1998/99 to 2000/01*. Stationary Office, London.

DTI (2000a) *DTI Strategic Framework 2000–2001*. DTI, London.

DTI (2000b) North West Science Review team start work, DTI Press Release 294/2000, 27 April.

HEIM C. E. (1988) Government research establishments, state capacity and distribution of industrial policy in Britain, *Reg. Studies* **22**, 375–86.

JONES P. (1999) Research and experimental development (R&D) statistics 1997, *Econ. Trends* **8**, 35–59.

MAWSON J. and SPENCER K. (1997) The government offices for the English regions: towards regional governance?, *Policy & Politics* **25**, 71–84.

NORTH WEST DEVELOPMENT AGENCY (NWDA) (1999) *England's North West: A Strategy Towards 2020*. NWDA, Manchester.

NORTH WEST UNIVERSITIES ASSOCIATION (NWUA) (2000) *Building on Success*. NWUA, Warrington.

SCIENCE AND TECHNOLOGY COMMITTEE (S&TC) (2000a) Government expenditure on research and development: the forward look, Fifth report 1999–2000, Stationary Office, London.

S&TC (2000b) Letter to the Chairman of the Committee from Lord Sainsbury of Turville, Parliamentary Under-Secretary of State for Science, Memorandum of evidence, 14 April, Stationary Office, London.

S&TC (2000c) Minutes of evidence for Wednesday 19 January, on the Proposed New Synchrotron Facility, Stationary Office, London.