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The multi-level governance of science policy in England

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Abstract

This article outlines contemporary changes in the governance of science policy in England and assesses the recent emergence of regional science policies. The early 2000s have been marked by substantial sub-national mobilisation, representation and institutional creation through the regional science and industry councils. Complementary policy functions have developed at national and regional levels and cracks in national state control have appeared, especially in light of the strengthening relationship between science and economic development. A minimal system of multi-level governance has emerged, but one which enshrines and protects previous policy paradigms. The significance of recent sub-national developments is limited by governance structures, frameworks for action and dominant policy discourses which combine to constrain the development of strategies for regional and local science-based growth.

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Introduction

Parallel processes of globalisation and regionalisation in the context of the knowledge economy have led to an increasing emphasis on the importance of regions and localities in science-based economic growth. Regional development theories stress the importance of geographical proximity as a prerequisite for success in an increasingly competitive international political and economic environment. Considerable consensus has emerged around the concepts of 'clusters', 'networks' and 'local/regional innovation systems' within European, national and regional discourses (SIMMIE ET *AL,* 2002. PORTER, 2003. COOKE AND PICCALUGA, 2006). Yet there remains considerable diversity in response to this new paradigm of regional science with a combination of top-down and bottom-up developments in different national contexts.

Importantly, the context for the growth of regional science policies is shaped by patterns of intergovernmental interaction and existing governance structures between national and sub-national actors. In federal countries, such as Germany or Australia, the involvement of regional authorities in funding higher education and formulating science and innovation policies is well-established (CHARLES, 2006. KOSCHATZKY AND KROLL, THIS ISSUE). In France recent reform of the contractual relationship between the State and sub-national levels has strengthened the institutional arena for intergovernmental bargaining in research and higher education (SEE CRESPY ET *AL*, THIS ISSUE). The UK case is substantially different. UK science policy has traditionally been a highly centralised domain, with research resources distributed through a dual support system comprised of Research Council project funding and quality-related recurrent institutional support through the Research

Assessment Exercise (RAE). Devolution in Scotland and Wales since 1997 introduced a partially devolved system of higher education, science and research. Yet the situation for the English regions remains fluid and variable in the absence of elected regional government or any definitive response to the question of appropriate governance arrangements. National and regional responses to the demands of the regional science paradigm are intrinsically linked to this wider debate over governance and devolution. The challenge is for a greater consideration of how specific national/regional responses are addressing the demands of a multi-scalar knowledge economy within particular governance structures (PERRY AND MAY, THIS ISSUE).

In this light, this article analyses recent changes in the governance of science policy in England and assesses the significance of these shifts in constraining and enabling the development of regional science policies. The article describes the emergence of a 'minimalist' system of multi-level governance in science policy in England, in which national actors continue to dominate, despite uneven yet parallel policy processes and considerable sub-national mobilisation. It focuses especially on the relative significance of regional involvement in science policy. Are regions tokenistic participants or do they possess genuine influence or power over the formulation, content and distributive impacts of national science policy? In the context of hesitant and ambiguous Government attitudes towards the regional science paradigm, English regions – and more recently cities – have been largely left to their own devices to develop strategies for science-based growth. Mixed messages emanate from Government departments leading to variations in scale, scope and approach between regions. What this means is that there are real limits to the extent to which

the English regions currently possess the capabilities to become drivers of the UK's economy.

The article draws on empirical material collated through two projects funded by the Economic and Social Research Council (ESRC) Science in Society programme between 2002 and 2006.[1] The projects have examined the development of regional science policies in the North West of England and the implications for changing power relations, science policy processes and regional needs in science policy. The North West of England is a significant focus of study as the first region to challenge the spatiality of national science policy and to establish a regional science and industry council in 2001. The experiences in the North West have been compared in further research with the development of regional science policies in England (specifically the North East), France, Germany and Spain.

Content analysis of national and regional policy frameworks over time, as well as minutes, working papers and relevant reports have been analysed. The validity of official policy positions contained within such documents has been checked through over 80 semi-structured interviews, with national Government departments (including the Office for Science and Technology, Department for Trade and Industry, Department for Education and Skills, Office of the Deputy Prime Minister), funding bodies (Research Councils, Higher Education Funding Council), and with officials in the Regional Development Agency, Government Office, Regional Assembly, City Council and economic development agencies. A first round of interviews was carried out in 2003, with a second round in 2006. In addition, transcripts of evidence of senior ministers to parliamentary select committees in 1999 and 2003 have been examined. This has enabled a comparison between stated policy frameworks and policy discourses, enabling the relative significance of the former to be questioned and

interrogated. The empirical material has been analysed and tracked using the year 2000 as a break point in which the future contours of science policy were temporarily opened up and contested through the 'DIAMOND' debate (see below). Using this period as a watershed, regional and national developments in science policy are examined before and after in order to track the transition between governance paradigms.

Although the private sector is an important element of total science policy, the emphasis here is on the public sector and specifically on universities. This focus is justified for three reasons. Firstly, there is an increasing importance attached to universities as engines of development in the knowledge economy leading to greater pressures on universities to engage with regional and local actors (CASTELLS AND HALL, 1994. MAY AND PERRY, 2006A). Secondly, regional engagement with business was already a function of the Regional Development Agencies when they were established in 1999 and a relationship with universities or interest in basic, rather than applied research, was not initially conceived. Thirdly, as nationally-funded organisations that are nonetheless semi-autonomous, universities' behaviour is more subject to influence through policy levers relating to incentivisation and reward structures than private sector organisations. The HEI sector therefore provides a concentrated lens through which to examine shifts in governance.

The article is structured into three main sections. The first discusses the concept of multi-level governance and the gaps in our understanding relating to the nature of national/regional relations and sub-national mobilisation. It distinguishes between the concepts of participation, influence and power as a means to identify a minimalist and maximalist interpretation of multi-level governance. The second section examines the extent to which multi-level governance applies to science policy in England and

assesses the significance of the new regional architecture of governance arrangements in this policy field. Finally, the implications for both theories of multi-level governance and approaches to regional science-based economic growth are considered.

2. Multi-Level Governance: Participation, Influence and Power

'Multi-level governance' has entered into common parlance as a catch-all term to refer to any system that involves interaction between central state actors and other territorial levels. The widespread adoption of the term has led both to misunderstandings and misappropriations that dilute its potential usefulness as a heuristic and analytical tool (PETERS AND PIERRE, 2004), necessitating a return to basic principles. Multi-level governance can be located in a pluralist and neo-liberal tradition of countering realist 'black-box' views of the state (GRIECO, 1993. KEOHANE AND NYE, 2000). The concept emerged in the early 1990s, in response to resurgent optimism about the influence of sub-national players in the European Union (EU), as an alternative to views of European integration as an intergovernmental process dominated by member states national interests (MORAVCSIK, 1993, 1995. POLLACK, 1995). Yet multi-level governance rejects a simple opposition between state-centric and supra-national theories of integration, stressing the member state as the single most important actor whose sovereignty is not confronted directly (MARKS ET AL, 1996: 371) but is gently eroded by the actions of governmental and non-governmental supra-national and sub-national actors.

A number of mechanisms have been identified to account for this piecemeal erosion of sovereignty in different policy arenas. MARKS and *al* (1996: 349) note that member states may deliberately shift decision-making to other levels as the political benefits outweigh the costs of losing political control, which consequently

places limits on the ability of states to control supra-national and sub-national institutions. Insights from historical and new institutionalist schools of thought are also relevant here in emphasising how gaps in central state control arise due to the partial autonomy of partisan institutions, unintended consequences and elaborate feedback loops, unequal access to information and shifts in national executive preferences (PIERSON, 1998. BULMER, 1998). Member states are losing their power to mediate domestic interest representation, particularly as both national and European institutions are disaggregated. Decision-making is seen to be characterised by intermeshing competencies, complementary policy functions and variable lines of authority. Each level of actors holds important resources such as information, political power, expertise and prestige and all are engaged in a bargaining relationship. The extent of shared competencies between territorial levels differs across policy stages (initiation, decision-making and implementation) and is seen to be most evident in the implementation of policy (MARKS and *al,* 1996). PETERSON and BOMBERG (1999) highlight how different theoretical lenses are applicable to understanding different parts of complex polities, with intergovernmentalism more relevant to 'history-making decisions' than, for instance, 'policy-setting' or 'policy-shaping' decisions.

Driven by the need to explain increasingly complex inter-relationships between state and non-state actors at multiple levels, attention has focused on applying multi-level governance to different sectors, policy processes and national contexts (JOHN, 1996. BACHE and FLINDERS, 2004a). On the one hand, it has been used to capture system-wide features applied to different national polities, as a hybrid model between centralist/federalist tendencies in the context of devolution across Europe. On the other, it has been applied as a tool to give insight into the

dynamics of policy-making in different sectors (HEINELT, 1996. PERRATON and WELLS, 2004), highlighting how different modes of governance and decision-making can co-exist, at different moments of time and across policy fields, within the same national polity. One attempt to capture these differences is HOOGHE and MARKS (2003) typology which distinguishes between two types of multi-level governance on the basis of jurisdictions, memberships, levels of jurisdictional organisation and design. This typology allows for far greater fluidity, diversity and complexity across policy domains within the same system of governance and therefore better accommodates the 'variable geometry' that characterises territorial relations in the EU (GOLDSMITH, 2003).

Increasingly, multi-level governance has been applied outside the context of the EU in relation to processes of state restructuring within nation-states (MARTIN and PEARCE, 1999. BACHE and FLINDERS, 2004b). In this case, the relevant focus of analysis becomes the interaction between national and sub-national tiers of authority and between governmental and non-governmental agencies. The issue at stake is the reallocation of decisional competences to sub-national actors but two key inter-related gaps remain in our understanding in relation to the nature of national/sub-national relations. Firstly, there is widespread consensus that national states have lost control to govern – horizontally and vertically - over different policy arenas in the context of external pressures such as globalisation and liberalisation (OHMAE, 1995. LE GALES and LEQUESNE, 1998). Yet the extent and significance of this shift is variable within different multi-level polities. Multi-level governance is often posited as a normative preference (BACHE and FLINDERS, 2004a), enabling and empowering sub-national actors in the formulation and implementation of policy; in reality it can be a positive- or negative-sum game as a result of top-down or

bottom-up changes. National governments may act as a brake or restraint on change, with systemic changes solidifying rather than diluting the preferences of national state executives. The issue is not the unintended emergence of multi-level governance, characterised by lock-in or path dependency, rather the attitudes and approaches of national governments in the face of emerging structural changes and sub-national demands. This is also reflected in the nature of state/regional relations in terms of mechanisms for the coordination of interests and integration between tiers of governance. A key distinction here is between scales of action as nested, but largely independent, or interconnected (MARKS, 1993. MARKS et *al,* 1996. JEFFREY, 2000).

Second, in accounts of multi-level governance, sub-national authorities have tended to be portrayed as inconsequential and passive until the interplay between central states and the EU provides an opportunity for mobilisation, or until central government passes decision-making powers down. This underplays the potential for bottom-up processes of mobilisation which lead to gaps in member state control (JEFFREY, 2000). Nevertheless, the relative significance of sub-national tiers of government in a multi-level polity is contested. We can distinguish here between the notions of participation, influence and power.

Sub-national actors have been mobilised and increasingly express distinctive preferences for science policy, emerging as new participants in the science policy domain. Bache has suggested that the term 'multi-level participation' is more appropriate than that of 'governance' given the minimal influence that sub-national actors exert over policy (BACHE, 1999: 42). Influence, then, refers to the indirect impact that this mobilisation and participation has in shaping the actions of others. The demands of sub-national actors may be amongst the determining factors of

national executive preferences, but influence cannot be controlled and may have effects contrary to those intended. Power, on the other hand, can be more generally understood as direct, intended and able to be wielded with particular outcomes in mind. Power has both constraining (power over) and enabling (power to) components in terms of the imposition of will, as well as the possibilities for action (RITZER, 1996). It is also highly relational and reciprocal and inherently related to the possession of different kinds of resources. Toffler argues that violence and wealth have given way to a new wave of shifting power characterised by the possession of forms of knowledge and expertise (TOFFLER, 1990). Importantly, the relationship between space, spatiality and power has been the subject of recent study with appeals to a more 'geographically curious dialogue of power' (ALLEN, 2003: 3) which emphasises the importance of relations of proximity and reach and the particularities, modalities and geographies of power. For the purposes of this analysis, power is used to refer to the ability of sub-national actors, through a variety of means, to affect changes in the outcomes of policy.

Given these issues, two different interpretations of multi-level governance can be identified, both nonetheless exhibiting common elements (see Table 1). In a minimalist reading, multi-level governance can be seen as a resistance to genuine devolution on the part of national executives, characterised by ad hoc reactions to bottom-up demands, parallel policy processes, uneven patterns of interaction and sub-national mobilisation and influence, rather than empowerment. A maximalist interpretation focuses on meaningful partnerships between national and sub-national tiers of governance, interconnectedness, strategic planning, top-down and bottom-up co-evolution (see SOTARAUTA and KAUTONEN, this issue) and negotiation and bargaining between actors with a tangible effect on outcomes. The distinction relates

to the way multi-level governance works in practice, rather than between two specific models. There remains a fundamental difference between a maximalist interpretation of multi-level governance and a federal state, in so far as the latter is characterised by a constitutionally-defined division of responsibilities, whilst the former is constantly open and negotiable. This does not prescribe certain areas of policy-making within a federal state being characterised by multi-level governance, where the formal constitution leaves room for interpretation or where competencies across fields (such as science and economic development) are overlapping (see SALAZAR and HOLBROOK, this issue).

INSERT TABLE 1

Neither view is of course static and further study of these dynamics in practice may reveal the differences to be no more than temporal, relating to successive stages of development. Nevertheless, this distinction between different multi-level governances provides a lens through which to view recent developments in the English governance of science policy.

Governance, Science and Regions in England

Contexts and catalysts in the 1990s: the myopia of science and regions

Historically the governance of science policy in England has been centralised on the basis that scientific quality can only be assured through national level frameworks and competitive funding. Research funding in England has been allocated through the dual support system. The first element comprises the eight Research Councils under the Director General for Research, managed through the Office for Science and Innovation (OSI), to which academics and consortia of academics across the UK bid for specific project-funding.[2] The second element is the (much maligned) Research Assessment Exercise (RAE) managed through the Higher Education

Funding Council for England (HEFCE), under the Department for Education and Skills (DfES), which allocates funds to institutions on the basis of the quality of research in key units of assessment (TALIB and STEELE, 2000).[3] With the election of a Labour government in 1997, quality-related funding was partially devolved in Scotland, Wales and Northern Ireland within a UK-wide system of competitive research council funding. Both elements of the dual support system, even within the devolved administrations, rely on peer-review processes to maintain levels of scientific excellence across disciplines.

Scientific funds have traditionally been distributed irrespective of spatial implications, with the result of offering high degrees of support to existing 'centres of excellence'. This concentration of resource has been a largely unintentional result of the system of research funding allocation. However, through the 1990s a shift to a more deliberate policy of concentration was seen, in the context of discourses around the global 'knowledge economy', economies of scale and the need for critical mass (SHARP, 1998. CHARLES and BENNEWORTH, 2001). Increasing attention was given to the relationship between science and wealth creation from the early 1990s onwards. The 1993 White Paper introduced the concept of technology foresight and placed an emphasis on the relationship between basic science and wealth creation (CABINET OFFICE, 1993). This importance of the 'science–economy' relationship was subsequently reinforced by the later moving in 1995 of the OST under the auspices of the Department for Trade and Industry (BRITISH COUNCIL, 1998). Such developments reflected dominant shifts in the notion of science policy as comprising not only research and teaching but also enterprise and innovation (RUIVO, 1994). Driven by the desire for success in a global knowledge economy, the boundaries between science, innovation and economic policy were becoming

increasingly blurred (GIBBONS, 2001. DE LA MOTHE, 2001), bringing a greater number of national Government departments and funding agencies into an already fragmented science policy domain.

It is through this focus on innovation and science exploitation that a gradual recognition of locational-specific assets began to emerge. For the first part of the 1990s, the role of regions in the innovation agenda was implicit and unarticulated. Although recognising the importance of the links between the science base and local business communities, through for instance the creation of Faraday Centres, Teaching Company Schemes or LINK, the 1993 White Paper did not explicitly address the regional dimension to science policy. However, university-industry links became increasingly 'regionalised' over the 1990s driven by the search for clusters and the perceived benefits of knowledge spillovers through the co-location of facilities and agglomeration of expertise (PORTER, 1990. MORGAN, 1997. POTTS, 2002). However, for the main part – and in the then absence of formal regional institutions – 'regions' themselves were seen as providing little more than boundaries or 'stages' within which innovation and exploitation might take place, through the interaction between particular sets of actors (PERRY and MAY, this issue, p10).

Indeed, the arguments around clustering also led to greater concentration of scientific resources: in the late 1990s it was already the case that over 40% of Government expenditure on R&D (GERD) was concentrated in London and the South East within the so-called 'Golden Triangle' of research expertise constituted by Oxford, Cambridge and London (ONS, 1999). It was not therefore that national science policy throughout the 1990s did not see regions, but that it only saw certain ones. A contradiction was apparent in claims for the non-spatiality of a UK science policy which nonetheless had very clear distributive consequences.

If the scientific establishment was myopic in relation to regions, regions were equally short-sighted in relation to the science or innovation agendas. The Labour government's commitment to a modernisation of the UK's governance arrangements with devolution in Scotland, Wales and Northern Ireland also included England. Yet a multiple-speed approach was designed to reflect differential demand for directly elected regional government across the country, characterised as an 'evolutionary approach to devolution based on demand', rather than any genuine positive desire for elected regional government (BENNEWORTH, 2001). As a first step, regional development agencies (RDAs) were formally established in England in April 1999 with five statutory objectives: to further economic development and regeneration; to promote business efficiency and competitiveness; to promote employment; to enhance the development and application of skills relevant to employment, and to contribute to sustainable development (DETR, 1999). This reflected a recognition that years of Government regional policy had failed to address the gap in productivity and prosperity between England's regions (DETR, 1997. CABINET OFFICE, 2000. HMT and DTI, 2001).

The RDAs were established as business-led organisations, comprising a wide mix of senior stakeholders within the region. Formally the RDAs were to report to the Department for Trade and Industry, yet their funding was subsequently changed to come through a 'single pot' based on contributions from multiple Government departments. The Single Pot will be £2.3 billion by 2007-08. RDAs have become delivery agents for a number of departmental objectives, yet over time have also developed the flexibility to develop individual regional responses. The legislation to establish RDAs also provided for the creation of regional chambers bringing together existing local authority representatives, along with other stakeholders, to provide a

scrutiny function for the RDA. In addition, the regional offices of central Government – the Government Offices of the Regions (GORs) - were charged with providing more formal accountability over the RDAs performance adding weight to an emerging regional architecture in England (SANDFORD, 2006).[4] London is an exception to this model, with its own directly-elected Mayor of London and London Assembly created through the 1999 Greater London Authority Act.

The first regional strategies addressed economic, social and environmental considerations. Although the importance of universities, public sector research establishments (PSRE) and private sector research had been recognised in policy statements throughout the 1990s, the RDA's early interventions primarily focused on core economic activities rather than on activities related to the development and exploitation of the science base. As they matured, however, such institutions became increasingly politicised and better able to articulate common regional interests, despite their continued status as non-elected Government organisations. The RDAs were joined by a whole host of other regional organisations, such as Higher Education Regional Associations (HERAs) and regional business associations comprising an enlarging tier of regional governance, with the political will and increasing legitimacy to campaign on behalf of 'regional needs'. By the end of the 1990s, expectations of Government regional policy were high, in terms of improving the economic performance of the English regions and potentially leading to greater political devolution (BENNEWORTH, 2001).

Concentration, regionalisation and regionalism were, however, uneasy bedfellows. A tension in the spatial implications of science policy and the stated Government commitment to reducing the gap in prosperity between the English regions emerged. Mixed messages were apparent in national frameworks in terms of

the emphasis on science as a building block in regional innovation systems and the concentration of resource in particular localities. This tension came to the fore in 2000 when the Government announced its decision to move a major scientific facility – the 'DIAMOND' synchrotron radiation source (SRS) – from the Daresbury Laboratory in the relatively deprived North West of England to the Rutherford Appleton Laboratory in the comparatively prosperous South East (PERRY, 2006).[5] The threatened loss of the synchrotron galvanised a regional consciousness around the importance of science and innovation as tools in development and a fierce battle ensued as regional actors campaigned for the retention of the facility in the North West. This was to no immediate avail with the Government announcing in March 2000 that the next generation DIAMOND SRS would nevertheless be built in the South East.

The strength of the regional political lobby and the need to bolster the North West science base post-DIAMOND led to a second announcement, however, that set in train two key processes. First, £25m was top-sliced from the national science budget to be spent on peer-reviewed projects in the region to help the North West develop future scientific assets. The North West Science Review later allocated the money to nine collaborative projects in the region. Second, the North West Science and Daresbury Development Group was established to look into the future of the Daresbury Laboratory post-DIAMOND and the regional science base more widely.[6] The Group required collaborative working and negotiation between national scientific organisations and between regional institutions, local politicians, trade unionists, industry and academic representatives. Their recommendations included the establishment of a Regional Science Council, charged with the creation of a science strategy to link the science base to the economic and social development priorities of the region (ARTHUR D LITTLE, 2001).

The DIAMOND debate was catalytic in opening up gaps in national state control over science policy and sowing the seeds for a minimal multi-level system of science policy governance. The link between science and economic development meant that the siting decision had no clear national ownership. The positions of the ministries for science (Office for Science and Technology) and economics (Department for Trade and Industry) were particularly ambiguous, with their respective and seemingly contradictory public sector agreement targets (PSA) on scientific excellence and reducing regional disparities. Ministers' views were inconsistent, leading to false hopes, opaque decision-making processes, disaggregated interests and fragmented policy. Multiple lines of authority could therefore be exploited by political lobbying. The process also set up a precedent for the nature of national/regional relations in this policy area, characterised by unilateral processes of negotiation with regions on an ad hoc basis and a variable geometry approach. Nevertheless the legitimacy that the DIAMOND debate gave to the involvement of RDAs in science policy eventually led to the creation of new institutions for science and innovation in all of the English regions.

Bottom-up developments: institutional creation and sub-national mobilisation

Following the DIAMOND decision and as a direct result of the North West Science and Daresbury Development Group, the North West Science Council (NWSC) was established in September 2001, the first for the English regions. Chaired by the Chief Executive of a multi-national pharmaceuticals company with headquarters in the North West, the NWSC was charged with the task of advising the North West Development Agency (NWDA) on science-related matters, promoting the North West region and helping to develop a productive relationship between the science base and industry. The Science Council was charged with meeting quarterly,

initially relying on the assistance of the newly appointed NWDA Science Manager and voluntary core group to make progress in the interim. The primary role of the NWSC has been the development of a Science Strategy for the region, launched in October 2002 in London which aspired to build and maintain the highest standards of international excellence in universities, companies and research organisations. The Science Vision in the North West was expressed as making the region 'an area of world-class scientific achievements, creating a magnet for talent and science investment, a powerful driver for innovation and enterprise and an effective force for delivering benefits to health, the environment and society' (NWDA, 2002). In particular, the Strategy was intended to deliver benefits for the seven objectives in the regional economic strategy on business, health, education and culture and to feed into the region's innovation strategy. To do this, the Strategy set out a framework for the development of science in five initial priority cluster areas, chosen from the sixteen clusters in the regional economic strategy: environmental technologies, chemicals, biotechnology, aerospace and nuclear energy.

The strategy was designed to have the most direct impression over the medium term based on both 'push' and 'pull' factors, in order to enable new science drivers to steer new and existing company growth and to shape the science and technology base to better meet the needs of regional businesses. On its initial creation, no specific funding was allocated for the NWSC from the NWDA budget but the last three years have seen the allocation of £200,000 per annum as running costs, as well as the establishment of the North West Science Fund, to the tune of £15m over three years, to leverage funding to the region and generate wealth from the commercialisation of high value science and technology. Within and outside the scope of the Science Strategy and Council a wide range of initiatives can be seen within the North West

region. This includes £35m for the merger between the Universities of Manchester and UMIST in 2004; £10m for the National Institute for Accelerator Science and Technology; £30m for a microsystems packaging centre and an combined investment with European Regional Development Funds (ERDF) of over £30m in venture capital for early-stage high-tech enterprises (HOUSE OF LORDS, 2004). Investments have cut across the scope of funding pre-competitive science, applied research and exploitation and the importance of the science base as a pivotal component in economic development was emphasised in a more recent review of the regional economic strategy (NWDA, 2006).

Developments in the North West quickly led to an increased interest in science and technology as drivers for regional growth across England. The North East was the first to follow suit with its *Strategy for Success* with the RDA investing £200m over 5 years in the Science and Industry Council (2002) and a series of Centres of Excellence in life sciences, nanotechnologies, new and renewable energy, digital media and process innovation. In 2006 all of the English regions now have specifically dedicated posts or small teams responsible for science and innovation and have formally constituted Councils for science, industry and innovation (see Table 2); those RDAs that had not already initiated institutional creation were encouraged to do so by the 2004 Science and Innovation Framework (HMT et *al*, 2004). This mirrors developments that followed devolution in Scotland in terms of the creation of the Scottish Science Advisory Council in 2001 and the Intermediate Technology Institutes designed to strengthen innovation and R&D capacity.

TABLE 2 TO BE INSERTED

Across the English regions, there are divergences in scale, scope, policy rationale and approach. Regions see science as an agent for physical redevelopment;

as symbols for the reinvention of sub-national identities; as catalysts for the attraction of further resource and as heralding transformations in economic and social development (PERRY and MAY, 2006). Distinctive policy mixes have emerged, from the Centres for Industrial Collaboration in Yorkshire and Humber to the Innovation Action Plan of the South East's Science, Engineering and Technology Council, yet all share a common interest in developing the science base and encouraging linkages between science and industry. The most recently aggregated figures (see Table 3) show that collectively the RDAs invested £250 million in science, engineering and technology-related activities in 2002-03, representing approximately 15% of their budgets and will reach £350m in 2005-2006 (HOUSE OF LORDS, 2003. HOUSE OF COMMONS, 2006a).

TABLE 3 TO BE INSERTED

To this regional architecture we can add other scales of action. The last five years have seen an increasing importance attached to the concept of the 'city-region' and the need for metropolitan-wide governance arrangements (SURF and CUPS, 2006). Cities have increasingly been recognised as motors of sub-national and national economies (ODPM et *al,* 2003. PARKINSON, 2006) with a particular emphasis on knowledge and innovation as levers for economic growth. The emergence of regional science institutions in the North West was mirrored within its capital city, Manchester, in the creation of the 'Knowledge Capital' initiative between the local council, knowledge institutions and economic agencies (MAY and PERRY, 2006b). More recently, the Chancellor of the Exchequer designated six 'Science Cities' in 2004 - Bristol, Birmingham, Nottingham, Newcastle, York and Manchester – intended to be at the vanguard of the campaign to make science, technology and innovation the engine of economic growth in the UK. City-regionalism has further

been accompanied by supra-regionalism in the form of the 'Northern Way'. In 2004 the Office for the Deputy Prime Minister launched its strategy for addressing the gaps in prosperity between the north and south of England with a pan-Northern regions development strategy (ODPM, 2004). A key element of this is the Northern Science Alliance – or 'N8' – a research collaboration between the eight most research-intensive Universities in the North of England aiming to deliver on the Government's Science and Innovation Framework by translating critical mass into societal and economic benefits (PAGE and SECHER, 2006).

These scales of action are inter-connected rather than simply nested. Science Cities are embedded in regional frameworks for action as are pan-regional developments. Scale is not a given and boundaries are not fixed. Birmingham Science City is part of the West Midland's wider strategy of developing 'high technology corridors' (AWM, 2005). Bristol Science City envisages as many potential linkages with the London economy within an 'M4 corridor' as it does with the wider South West. Multi-level governance arrangements can be seen as much *within* the sub-national context as the wider national state. An important element of this is increasing collaboration between partners, such as the Science Cities Policy Development Group, in order to better communicate sub-national interests and priorities back to central government, particularly in the context of influencing the upcoming spending review (2007). The recently appointed science and innovation mangers of the RDAs meet regularly and have a designated lead-RDA on science matters to represent common interests and liaise with national agencies.

There is little doubt that an unintended consequence of the tensions in Government science and regional policy, highlighted through the DIAMOND debate, has given rise to extensive sub-national mobilisation in a previously discrete national

policy arena. As in other countries where existing regional governance structures are deemed insufficient to deal with new policy demands, such as Japan, (PERRY and MAY, this issue. KITAGAWA, this issue), institutional creation has been widespread. Variously named science, innovation, industry and engineering councils have been established by the partially autonomous RDAs, which have exploited their limited capacities and freedoms to develop competencies for science and technology, reorienting significant resource towards the science base. An aggregation of sub-national interests has taken place to influence national government departments through variable lines of authority. Indeed, an increasing sophistication in the arguments put forward by sub-national agencies can be seen, emphasising the role that regional S&T can play in delivering national objectives rather than simply curing endogenous ills (*cf* N8 above). National control over science policy, already fragmented across departments, is therefore further challenged by the emergence of a regional tier of science policy governance. RDAs and city councils have power over the distribution of their own resources and therefore limited power to act. Yet if empowerment is reciprocal and relational, the real test relates to the impacts of sub-national mobilisation on the formulation, content and distributive outcomes of national policy.

National reactions: devolution of responsibility without resource

The immediate aftermath of the 'DIAMOND' decision appeared to signal a sea-change in thinking on science and the regions. The North West Science Review was the first time that a proportion of the national science budget had been allocated to any one region and heralded the possibility that a proportion of the science budget might be used for regional science funds to pump-prime excellence, suggested again in the Cross-Cutting Review of Science and Research following negotiation with the

NWDA (HMT et *al*, 2002: 83). Since then, a more conciliatory tone towards the idea of regional need as a 'second level criteria' can be seen, through comparing transcripts from evidence to select committees in 2000 and 2003 (HOUSE OF COMMONS, 2000, 2003. HOUSE OF LORDS, 2003) and in the language of some senior OST officials, who spoke in interviews of 'excellence as a semi-colon, not a full stop' and 'looking for the win-win'. In the last five years, positive relationships between national and regional actors have, on the face of it, continued. Bottom-up initiatives have been met with top-down approval and the establishment of Regional Science Councils have been encouraged as a means of providing strategic advice to RDAs (DTI et *al,* 2002). The Science and Innovation Framework 2004-2014 emphasised the role of science and industry in achieving Government objectives on reducing regional disparities and highlighted the need for joint working between Research Councils and RDAs to explore how national funding systems could be better aligned to regional economic strategies. It further committed the Government to tackling the tension between regional policy and the pursuit of excellence (HMT et *al*, 2004).

The regional dimension to science exploitation and innovation has also been made more explicit and is reflected in numerous policy statements (DTI and DfEE, 2001. DTI et *al*, 2002: 11). This is evident in the strengthening of the Higher Education Innovation Fund (HEIF) managed jointly by HEFCE and the OSI with an allocation of £238m over the years 2006-2008. HEIF is to be distributed in association with RDAs through the Regional Advisory Groups to represent a small permanent third stream of funding alongside funding for research and teaching. Similarly, the Lambert Review of 'Business-University Collaboration' (2003) strengthened the RDA role in knowledge transfer between science and industry. The Government's

response to the 'Science and the RDAs' select committee envisaged a key role for Regional Science and Industry Councils in the development of the new national Technology Strategy and Board which aims to identify and address gaps in the provision of applied and industrial research in relation to different science, engineering and technology dependent clusters and sectors (HOUSE OF LORDS, 2004). Interestingly, the constitution of the Technology Strategy Board as an arms-length body outside the DTI reduces ministerial involvement in the setting of priorities for science and innovation and increases the potential routes through which sub-national influence over policy can be exerted. In the last spending review (2004) the RDAs were given new responsibilities for managing R&D grants, enterprise in disadvantaged areas and encouraging collaborative research between business and universities, as well as strengthened roles in the regional skills partnerships and relationships with the Learning and Skills Councils.

The RDAs are increasingly being recognised as co-funders of scientific infrastructure. In so far as RDAs have increased flexibility of spend through the movement to the 'single pot regime', they have as much potential influence over the location of scientific infrastructural investments as any other co-funder, on the basis that 'value for money' is an increasingly important criteria in national scientific decision-making processes. Evidence of national/regional science funding coalitions are increasingly common, as mentioned above in relation to HEIF, in proposals for the Daresbury Campus, the North West Science Park and the recent merger between the University of Manchester and UMIST. The Quinquennial Reviews of the Research Councils (OST, 2001a,b) emphasised not only the primary national role of scientific facilities, but also their responsibilities to local and regional economies. The same can be said for higher education institutions (HEIs). In the early 2000s, HEFCE

was instrumental in encouraging the development of regional higher education associations and provided a small amount of annual grant funding for this purpose. HEFCE's most recent Strategic Plan (2006) stressed the role of HEIs in contributing to regional issues as well as the role of RDAs in addressing the priorities of higher education. This latter element is important: across Government a subtle re-structuring of the 'science and regions' debate has taken place, in terms of an emerging focus on how RDAs and partners can contribute to, rather than purely benefit from, national priorities and policies.

Underpinning these developments are a series of increasingly institutionalised linkages between territorial scales of governance. A willingness to work with and to consider RDAs as partners in science consultations can be seen and is embedded in new relationships such as regular meetings between Research Councils-UK and the RDAs.[7] HEFCE now have regional consultants in all regions and held regional consultation events in 2004 with the RDAs, HERAs, Government Offices and other partners to produce regional priorities documents. The RDAs are represented on the Funders Forum, set up to allow governmental and non-governmental funders of public research to consider the collective impact of their strategies.

However, despite these forums, the RDAs remain only as one among many sets of stakeholders in national science policy processes, limited to lobbying, consultation processes and submission of evidence. Continued points of interaction between national and regional actors in the shaping and implementation of policy are evident, yet these are best seen as attempts by national agencies to reassert control over the unanticipated bottom-up growth of regional science policies across the English regions. National and regional science policy processes remain parallel rather than fully integrated, a point highlighted in the recommendations of Government

inquiries (HOUSE OF LORDS, 2003. HOUSE OF COMMONS, 2006). Despite efforts at integration and strategic overview, policy is characterised by a lowest common denominator approach, particularly given the diversity of approaches, policy positions and regional contexts across England.

Issues of strategic importance to a particular region tend to be negotiated unilaterally rather than through more representative forums. Interactions are ad hoc and reactive, rather than co-ordinated, giving rise to a series of differentiated multi-level governances (JOHN, 1996), rather than a single model. Regional influence is therefore also unequal: the North West and North East of England, initially seen to be leading the way in this field, exerted pressure over policy in the early 2000s. More recently, attention has been drawn to the influence of the South East over national policy vis-à-vis the other regions through their lead role for RDAs on science matters and participation in the Funders Forum.

Overall, despite subtle shifts in rhetoric, recent developments can be seen as little more than a continuation of previous trends. Although the aftermath of the DIAMOND decision legitimised the science base as an ultimate recipient of regional funds, the message from national agencies has been clear in terms of a *national* science policy, supplemented by *regional* investment in science exploitation. RDAs are free to invest their own finance in the science base '[but they should] tension this decision about putting money against other uses of that money to support economic growth and innovation' (Lord Sainsbury in HOUSE OF LORDS, 2003). The distribution of funding is indicative in this respect. The North West Science Review paradoxically led to a stronger reassertion of national scientific decision-making criteria. The decision to top-slice the national research budget was met with anger

from the scientific establishment and other English regions, leading to claims that 'the peer review system was broken'.

There has subsequently been a strong rejection of any intention to involve the RDAs further in the allocation of national scientific resources, the setting of priorities or management of the research system. National representatives from the Research Councils, OST and Treasury have made it clear in interviews and publicly that the proposals in the Cross-Cutting Review of Science (2002) for regional science funds will not be met through the national science budget. Science budgets have not been devolved nor regionalised. As Table 4 demonstrates, the direction of funding is towards continued selectivity and concentration (DfES, 2003. ONS, 2006). In 2003, London and the South East still accounted for 51.3% of Government R&D and 46.6% of Higher Education R&D, with the East of England also gaining in terms of increased R&D spend across sectors.

TABLE 4 TO BE INSERTED

The dominant national approach can be characterised as devolution of responsibility for regional science-based development without resource, liberty without endorsement. Counter-concentration pressures do exist. This is particularly evident within HEFCE, in terms of the creation of new universities (in Cumbria, Suffolk and Cornwall for instance), the designation of university status to higher education colleges, the allocation of additional student numbers on a limited regional basis or pilot programmes such as Train to Gain (a new national skills programme introduced across England in 2006). Indeed, such initiatives have been criticised by some as 'using the regional agenda to introduce a planning role through the back door' (BRICKWOOD and BROWN, 2005, p.10).

However, the dominant view held by national science departments and funding agencies is of the irrelevance of sub-national actors in the formulation, content or distributive outcomes of science policy. The Government's responses to recent inquiries such as 'Science and the RDAs' (2003) or 'Research Councils and Knowledge Transfer' (2006) are indicative in this respect; they emphasise that RDAs are not doing enough in knowledge transfer, but fail to consider the importance of a national context that constrains or enables regional action. RDAs are seen as responsible for addressing deficits in approach on their own and a certain complacency can be seen in the attitudes of national actors towards the more challenging recommendations for participative policy processes or joined-up thinking (HOUSE OF COMMONS, 2006b).

Current debate relates not to the spatial implications of national science funding on regions, but to the implications of regional funding on science and exploitation. Attention has been drawn to the fact that RDA funding is allocated on the basis of regional criteria and the need to reduce the growth gap, rather than the location of innovation potential, with the implication that 'those RDAs with the greatest concentration of HEIs have the least funds available to them' (BRICKWOOD and BROWN, 2005, p.6). Such statements, reiterated privately by national officials in interviews, fuel suspicion that the regional science agenda has been captured by the South East and the 'Golden Triangle'. Interviewees in the Northern regions have questioned the ability of the South East of England to represent wider regional issues, given the coincidence of interest between national departments and the South East of England Development Agency (SEEDA) in the allocation of existing funding. This would explain in part the low perceived need of the London and South East Development Agencies to invest their own resources in the science and technology

base (see Table 3 above). This is in line with European experiences, for instance, in France, where the Ile-de-France (Paris) region devotes less of its own resources to the science base, given their status as a key beneficiary of national investments (CRESPY et al, this issue, p.23).

Overall the emphasis is on how RDAs and local partners can assist in the achievement of nationally-set objectives for science and innovation and the regional disparities agenda has been all but forgotten. To this extent the national scientific establishment has greatest influence over sub-national priorities, rather than vice versa. In this, the demands of the RDAs in relation to science and innovation have been sidelined; the multi-level governance system of science policy in England enshrines and protects previous policy paradigms, without giving any real power or resource to sub-national actors.

This situation is perhaps not unsurprising in the wider context of the changing governance in England. In 2002 the Government published its plans for taking forward the manifesto commitments for the English regions. 'Your Region, Your Choice' (DTLR, 2002) paved the way for the English regions to establish directly elected regional assemblies (ERAs), subject to referenda, and for increasing regionalisation through the strengthening of existing regional institutions. Yet the high level of support shown for regional government in Greater London in the 2000 referendum (72% majority) has not been echoed elsewhere. The North East of England had demonstrated the highest level of desire for an ERA, yet a referenda in 2004 revealed a large majority of 78% against. As a result, further referenda in the Yorkshire and Humber and North West England were abandoned along with hopes for democratically elected and accountable regional government in England, at least

for the time being. What this means is that the governance of England within a devolved UK is still an active issue.

Across different policy areas, regions tend to be seen as sites of implementation or experimentation, rather than shapers of national policy (HODSON and MARVIN, 2006). Although the emphasis here has been on the higher education sector, the area of health is also interesting, in terms, for instance, of the tension between the locations of persistent health inequalities and the existing distribution of resource. A key issue is knowledge transfer between higher education and health sectors (COOKSEY, 2006. DH, 2006) in order to ensure that the public investments in university-based health R&D are exploited for the benefit of the health service (MAY, PERRY and SIMPSON, 2006). Here we also see a certain regionalisation of activities in terms of the National Health Service (NHS) Innovation Hubs at local level and the recommendations for Health and Higher Education Partnerships (HESP) to look into areas of research, teaching and learning. Again, however, sub-national developments are not well-integrated into national strategic frameworks, resources do not match up to aspirations or capacities and patterns of sub-national mobilisation differ greatly across England.

Policy is done *to* regions, rather than *with* or *for* them (MARVIN and MAY, 2003). Where a mismatch between national and regional interests occurs, responsibility for addressing resulting policy tensions tends to be passed down to sub-national actors. In relation to the RDAs, there is a tension between the expectations and functions attributed to them and their capacities and resource to deliver. This is particularly the case in the context of a redefined science policy, in which exploitation and innovation are increasingly emphasised. For some, the 'Science City' agenda offers new hope, in light of the capacity gap within RDAs and in response to the new

wave of 'city-regionalism' that has emerged to fill the 'missing middle' between local governments and regional governance structures (HARDING, 2000).

Yet despite originating from the Treasury, responsibility for delivering on this agenda has been devolved without accompanying resource. Science Cities falls short of the new forms of state intervention that characterise this policy domain in countries such as France or Germany, for instance, the *poles de compétivité* or the *Kompetenz networks* (CRESPY et al, this issue. KOSCHATZKY AND KROLL, this issue). Far from seeking to involve and distribute scientific capacity, Science Cities was initiated from the top-down without prior consultation; there was no national competition rather the arbitrary designation of Science City status; no guidance for policy development was issued and no funding has thus far been attached. Furthermore, national reactions to Science Cities are mixed and confused, spin is masking any real substance.

For the designated Science Cities, the glass is half full. The Science Cities are seeking to seize the opportunities afforded by designation to better influence national policy and develop context-sensitive policies. Nevertheless, it is clear that there is a gap between the aspirations of national policy-makers to become world-class in this area, and the levels of investment, resource and support that are currently on offer. The reality is that the same issues will face city governments as RDAs, in terms of a concentration of resource and a reluctant tolerance of sub-national actors in science policy, so long as their actions support national priorities, without additional cost.

Reshaping Science Policy from Below or Within?

A system of multi-level governance in science policy has emerged in England. Centralised control over decision-making, formulation and particularly

implementation has been undermined by sub-national actors who have mobilised their own resources to exploit cracks in policy processes. The disaggregation of national interests, especially in light of the strengthened relationship between science and economic development, has enabled limited influence to be exerted through substantial sub-national mobilisation, representation and institutional creation. Complementary policy functions have emerged, with variable lines of authority. Yet such changes represent the *potential* for reshaping science policy from below, rather than the *reality* of what occurs in practice. The challenge to national science policy initially mounted in the North West has not led to a reorientation of capacities or devolution to the English regions. The explicit model emerging is one in which the dual support system is fundamentally unaltered by the growth of the regional role in science exploitation. Mobilisation and influence have increased without genuine empowerment; indeed sub-national actors have been largely co-opted into support of a nationally-driven paradigm for science and wealth creation. In theory, RDAs have limited power to define their own agendas and distribute resource, but this is minimised by an absence of power over the contours of national policy, resulting in a 'mimicking' at regional level of national priorities. No real arenas exist for the co-production or negotiation of policy with tiers of governance largely parallel rather than strategically joined-up. National reactions to the involvement of RDAs in science policy have been hesitant and reluctant; patterns of interaction are varied across the English regions and responses are ad hoc. The RDAs have thus far failed to significantly reshape science policy from below. In such a minimal system of multi-level governance, the capacity of the English regions to truly develop science regions or cities is limited.

Multi-level governance has been used both as a heuristic and explanatory tool, describing intergovernmental relations at the same time as offering an understanding of the processes driving change. It rejects a simple dualism between global and local scales for action as a corrective to state-centric views of development, emphasising the need for a multi-scalar understanding of governance, alive to the complex relations between nested, overlapping and interdependent spatial scales. Yet changing territorial relations and sub-national mobilisation may be incorporated within a new system without any significant benefit to regional actors or change on policy outcomes. A normative approach fails to consider how multi-level governance can act as a restraint on devolution or regionalisation through a convincing charade of inclusion and participation, thus limiting real change. Sub-national mobilisation does not necessarily lead to empowerment. The minimalist and maximalist understandings of multi-level governance, put forward in this article, allow for greater sensitivity to the preferences and attitudes of central state actors, the nature of intergovernmental relations and significance of the sub-national tier.

The article also points to the need for attention to be given to the importance of governance structures in relation to the conditions for successful regional science-based growth (COOKE and PICCALUGA, 2006). In this respect, the findings are equally interesting for a federal country. The existence of a formal division of powers, through a constitution, may mitigate the tensions between national and regional actors in certain policy areas where responsibilities are very clearly defined or restricted to one territorial level. However, science and innovation policy is not one such area. Here, national and regional actors both tend to retain some role, particularly given the strengthened relationship between science and economic development. In the US, Canada, Germany and Australia, for instance, science and innovation policy,

economic development and higher education funding and regulation are governed jointly, leading to complex sets of inter-governmental negotiation and bargaining, overlapping competencies and the potential exploitation of ambiguities for either federal or state advantage. Multi-level governance can characterise an area of policy-making within a federal state, particularly given the tensions between concentration and distribution of resources, between competition and equality. Indeed, given that the principles of equality between states may also be constitutionally enshrined, such as in Germany, tensions are perhaps even more likely to emerge. National and regional frameworks for action and intergovernmental relations constrain and enable efforts to build science regions and cities, as do entrenched policy discourses, values and views on science, economic development, space and scale (PERRY, 2006). There can be no one-size fits-all solution; context matters (MAY, 2005).

For the English regions such an analysis may seem bleak. However the terrain is inherently shifting. The permeability and porosity of boundaries leaves the possibility of change open, particularly as territorial relations can be easily reshaped without the need for complex and bureaucratic processes of constitutional reform, as in Germany for instance. Power in the English system is not fixed, held or embodied, but constantly negotiable and relative; indeed, this is inherent in the very notion of multi-level governance (ALLEN, 2003). Efforts to aggregate interests and join-up thinking pan-regionally can only increase the persuasive influence of the English regions and cities. As they are taken more seriously as having not only wealth to offer, but also knowledge and expertise (TOFFLER, 1990), the possibility for reshaping science policy from within policy processes increases and thus the potential for a more maximalist system to emerge. This points to the need for an ongoing

analysis of the shifting power relations in science policy governance in England over time.

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Table 1

TABLE 1 Interpretations of Multi-Level Governance	
Minimalist MLG	Maximalist MLG
Resistance to change	Embracing change
Controlling sub-national developments	Facilitating sub-national developments
Parallel policy processes	Joined-up policy processes
Ad hoc reactions	Strategic frameworks
Uneven patterns of interaction	Widespread regional engagement
Sub-national mobilisation	Sub-national empowerment
Bottom-up lobbying	Negotiation and bargaining
National influence dominates	A mutual reshaping of agendas

Table 2

TABLE 2
Overview of Establishment and Membership of Regional Science and Industry Councils

Region	Title	Date	Membership
North West	North West Science and Industry Council (North West Science)	2001	19 (6 private sector; 6 HE; 1 research council, 3 RDA, 1 GOR; 2 non-affiliated)
North East	Science and Industry Council	2001	13 (8 private sector; 3higher education; 1 research council, 1 RDA)
South East	South East Science, Engineering and Technology Advisory Council (SESETAC)	2003	23 (7 private sector; 5 PSRE/HE; 6 RDA, 1 GOR, 2 Learning and Skills Council; 1 central government; 1 non-affiliated)
West Midlands	Innovation and Technology Council (ITC)	2004	16 (9 private sector; 2 HE; 1 Learning and Skills Council; 1 health sector; 1 central government; 1 research council; 1 RDA)
South West	South West Science and Industry Council (SWSIC)	2004	13 (8 private sector; 3 HE; 1 research council; 1 RDA)
East Midlands	Innovation East Midlands (InnEM)	2004	12 (6 private sector; 3 HE; 3 RDA)
East of England	East of England Science and Industry Council (SIC)	2005	13 (7 private sector; 5 HE; 1 research council)
London	CATALYST (formerly London Innovation Steering Group (2001) and London Science and Industry Council (2003))	2005	13 (5 private sector, 5 HE, 1 RDA, 1 GLA, 1 research council)
Yorkshire and Humber	Yorkshire Science (formerly Futures Forum 2003)	2005	12 (6 private sector, 3 HE/PSRE, 1 RC, 1 RDA, 1 GOR)

SOURCE: Website review of available sources November 2006. Update of status of each Science Council is available at http://www.innovation.gov.uk/innovationreport/index.asp?lvl1=4&lvl2=3&lvl3=0&lvl4=0.

Table 3

TABLE 3 RDA BUDGETS [8]				
RDA region	2002-2003 Allocated Budget		SET-related Expenditure	
	£m	£ per capita	£m (estimated)	Budget %age
North East	208	80	60	29
Yorkshire and Humber	206	41	50	24
West Midlands	209	39	37	18
North West	283	40	39	14
East of England	82	15	10	12
South West	100	21	10	10
South East	109	14	10	9
East Midlands	107	25	9	8
London	286	39	15	5
Totals	1590	32	240	15
SOURCE: House of Lords (2003) Evidence to Select Committee on Science and the RDAs, p.18.				

Table 4

TABLE 4
Regional Breakdown of R&D Expenditure by Sector 1999-2003 [9]

	% regional share of Business R&D in England		% regional share of Government R&D in England		% regional share of Higher Education R&D in England	
	1999	2003	1999	2003	1999	2003
North East	1.5	2.2	0.1	0.1	4.1	4.4
North West	13.9	12.2	3.1	3.2	9.5	10.1
Yorkshire and the Humber	2.9	3.0	2.6	8.0	9.9	9.6
East Midlands	7.9	7.3	3.1	1.3	6.6	6.2
West Midlands	6.8	4.6	10.7	2.3	6.6	6.3
East of England	24.1	27.0	13.9	20.0	9.3	11.4
London	6.9	6.0	13.0	16.6	30.6	29.6
South East	27.5	27.1	36.4	34.7	18.0	17.0
South West	8.4	10.6	16.9	13.7	5.4	5.3
ENGLAND £m	10607	12786	1779	1679	2723	3606

SOURCE: Table compiled from data in Office for National Statistics Economic Trends, November 2006, p.21.

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[2] The Office for Science and Innovation is the new name for the Office for Science and Technology, renamed in 2006. It manages the seven disciplinary Research Councils in the areas of arts and humanities, biotechnology and biological sciences, engineering and physical sciences, economic and

social sciences, medical research, natural environment and particle physics and astronomy. The eighth research council is the Council for the Central Laboratory of the Research Councils which will merge with the Particle Physics and Astronomy Research Council in April 2007 to form the Large Facilities Research Council. The OSI is not a Government department; it falls under the Department for Trade and Industry.

[3] The first RAE was in 1986, introducing an explicit and formalised assessment process of the quality of research. Further exercises were held in 1989, 1992, 1996 and 2001. The next RAE is in 2008 and will differ from previous rounds as a result of a recent review (led by Sir Gareth Roberts) but nonetheless retains expert review from discipline based panels as the mechanism for assessing research quality. Discussions are still underway on the potential movement to a more metrics-based system. The RAE is managed by the Higher Education Funding Council in England, the Scottish Funding Council, the Higher Education Funding Council for Wales and the Department for Employment and Learning in Northern Ireland.

[4] The Government Offices are the primary means through which a wide range of Government policies are delivered in the English regions. They represent 10 national Government departments in the regions and also offer those departments views from the 'bottom-up' on policy development and implementation. The nine Government Offices are coordinated centrally by the Regional Coordination Unit.

[5] The Daresbury Laboratory in Cheshire, North West England, is one of two scientific facilities run by the Council for the Central Laboratory of the Research Councils (CLRC). In 1980 the world's first Synchrotron Radiation Source (SRS) was opened at Daresbury and over the course of the next twenty years, most of the UK's expertise in the production and exploitation of synchrotron radiation became concentrated in the North West region. The second facility under the control of the CLRC is the Rutherford Appleton Laboratory (RAL) in Oxfordshire in the South East. In 1999 the UK Government announced its decision to replace the SRS with a 3rd generation light source, the DIAMOND synchrotron, that would be the biggest single investment in UK science infrastructure for 15 years. The DIAMOND concept had been developing over a number of years at Daresbury and the preliminary feasibility study was based on the new SRS being located at Daresbury alongside the existing facility. But since the original funding decision in 1993, policy contexts, funding coalitions and even the science itself had shifted. As a result, rather than automatically locate the new facility at the Daresbury

Laboratory or hold up the process further through an open competition, a choice emerged between the two laboratories under CLRC control in Oxfordshire and the North West.

[6] The North West Science Review was announced by the Minister for Science and chaired by Dr Bruce Smith, the then Chair of the Economic and Social Research Council. Its remit was to spend the £25m top-sliced money on research projects in the region that were subsequently allocated to the relevant research council's portfolio. The North West Science and Daresbury Development Group was established by the Secretary for Trade and Industry to look into the future of the science base more widely. No funding was allocated for this latter partnership.

[7] Research Councils UK is the strategic partnership of the eight research councils.

[8] The data is based on RDAs' own submissions in 2002-2003. The report notes that these figures underestimate the true picture by focussing on identified projects rather than the wider range of RDAs' activities in which SET is, in one form or another, an integral part (House of Lords 2003: 18).

[9] The table shows percentage changes in R&D by sector in the English regions between 1999 and 2003: an absolute increase in expenditure may still show as a small or negative change in percentage share. Whilst there are acknowledged issues with data on regional shares of R&D (see for example House of Lords 2003), ONS statistics provide the best currently available indicators of regional performance.