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FULL REPORT OF RESEARCH ACTIVITIES AND RESULTS

Building Science Regions in the European Research Area:

Governance in the Territorial Agora

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1. Background

The last fifty years have witnessed the consolidation of neo-liberal economics, based on the principles of competition and the free market, accompanied by the rise of democracy (Turner 2003) and a questioning of appropriate levels of governance to deliver economic growth and political empowerment (Brenner 2004). Science has become increasingly open to the effects of these changes and is identified as a legitimate policy focus in the pursuit of strategic military, political and economic goals. This has given rise to debates over the ‘politicisation of science’ and the blurring of the boundaries between previously discrete areas of activity (Gieryn 1999. Guston 2000).

The relationship between science and the economy is now central to policy frameworks for growth and competitiveness at European, national and regional levels. The European Research Area (ERA) initiative aims to increase national expenditure on research and development (R&D) by 3% by 2010 and provides a key example of a strengthened European dimension to research, alongside a vision of strong regions (EC 2000, 2001).

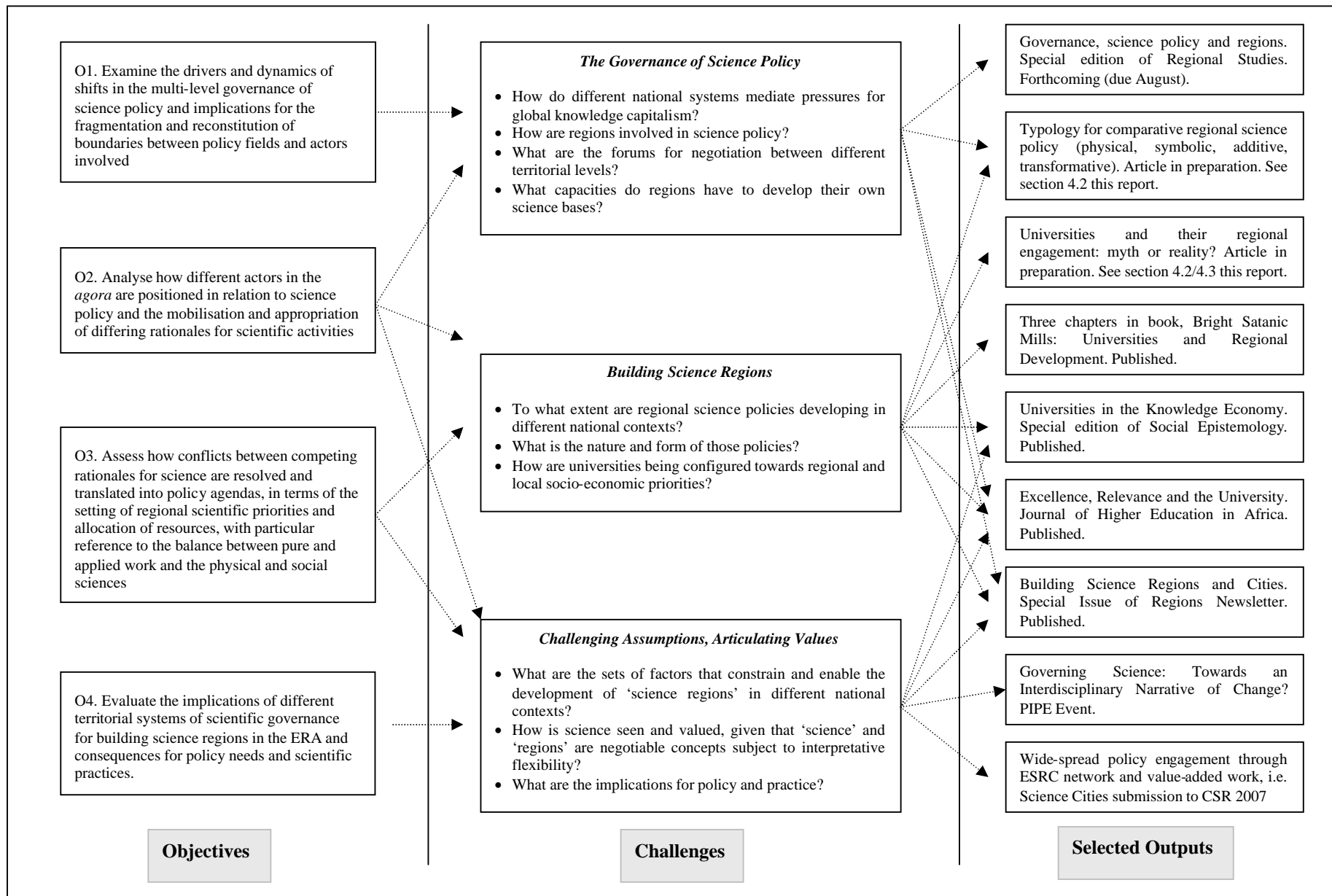
As a result of these trends both scientific excellence and socio-economic relevance are being sought. Science is seen to be moving closer to society in a process of ‘contextualisation’, creating social spaces – the ‘agora’ - where the justification, production and application of knowledge are contested by multiple stakeholders (Nowotny *et al* 2001). It is argued this has led to a greater focus on applied research, particular kinds of ‘useful’ knowledge and user involvement in the process of knowledge production (Gibbons *et al* 1994).

Since the 1980s, processes of top-down regionalisation and devolution across Europe have been accompanied by bottom-up mobilisation (Keating 1997. Le Galès 1998). What is new is the attention being directed towards the public sector research base in ‘supply-oriented’ approaches and the emerging relationships between universities and their regions (Laredo and Mustar 2001). Regional actors are seeking to ‘build science regions’ through not only *linking* science with industry but *harnessing* the power of science as a driver for wealth creation and economic growth.

There are three inter-related challenges that emerge from this context.

1. There is a gap in our understanding of the dynamics and drivers of shifts in the governance of science policy.
2. Better understanding of approaches to building science regions in different national contexts is needed.
3. There is a requirement to better articulate the assumptions on which interventions are currently based in order to lead to more effective public policy at different levels of scale.

Figure 1
OBJECTIVES, CHALLENGES AND OUTPUTS



2. Objectives

In this context, we develop a comparative analysis of approaches for building ‘science regions’ in order to understand the dynamic interaction between science, economy and governance. We build on a first-phase project which explored the regionalisation of science policy in England and seek to deepen and widen the insights from this work.¹ There are four main objectives, as defined in the original proposal (see Figure 1). We have operationalised these according to the conceptual challenges above.

3. Methods

3.1 *The Case Studies*

The research has been conducted via five regional case studies: the North East and North West of England; Alsace (France); North Rhine Westphalia (Germany) and Catalonia (Spain). The case studies were carried out using extensive documentary analysis and semi-structured interviewing (see Appendices 2-4). Two types of documents were used: strategic frameworks and publicly-available consultation or opinion documents. First, three policy areas (science and innovation; higher education and regional / urban development) were scrutinised in order to build an understanding of explicit and implicit characterisations of the relationship between science and economic development through a content-analysis. Second, an examination of policy-shaping documents (such as consultation documents, Government inquiries), policy statements and policy responses (such as press statements, opinion documents) built an overview of the voices that have sought to shape policy over time. Where grey ‘policy-shaping’ documents were less readily available, secondary academic literature and verbal accounts via interviews have been used to illuminate processes of formulation and priority-setting over time. 167 semi-structured interviews have also been carried out over the course of the research across territorial scales and policy domains. The relationship between the documentary analysis and the interviews is not only to test and validate the relative significance of stated strategic positions, but to explore underpinning assumptions and value statements. In line with our ethical code, interviewees invoked their right to confidentiality in relation to discussions about strategic positioning and the flow and use of resources.

Additional value-added work and collaborative writing projects have provided the opportunity to test and validate our conclusions in a wider context (see Appendix 5). These include: Crete; the Sunshine/Fraser Coast (Australia); Japan; Finland; Canada; Scotland; Yorkshire and Humber and the six English Science Cities.

3.2 *Analytical Framework*

The research offers an institutional level analysis of the inter-relationship between governance, economic development and science as a realm of activity. Institutions are taken to comprise regulative, normative and cognitive structures and activities that “provide stability and meaning to social behaviour” (Scott 1995: 33).

Firstly, then, we see a focus on changing governance structures (‘regulative’) between territorial levels. We have used the framework of multi-level governance to characterise

¹ Award number L14425004, ‘Making Science History’: The Regionalisation of Science Policy? June 2002 – May 2003. Graded Outstanding.

the emerging sets of relationships between national and regional actors (see 4.1). We have also identified a distinction between a minimalist and maximalist interpretation of multi-level governance in order to better combine the regulative/normative dimensions (See Output 1). Second, we have focussed on understanding the dynamics of different approaches to 'building science regions' particularly in terms of the aspirations of policy-makers at different scales and mechanisms for implementation ('normative'). Here we develop a framework of understanding based on physical, symbolic, additive or transformative actions at the regional level (see 4.2). Finally, we focus on a critique of the assumptions underpinning policy and influencing the extent to which aspirations can be achieved in practice ('cognitive'). The emphasis here is on understanding the relationship between excellence/relevance ('science') and context ('regions') (see 4.3).

4. Results

4.1 The Multi-Level Governance of Science Policy

There are a series of drivers leading to the reshaping of national/regional roles and responsibilities that emerge from the top-down and bottom-up. These include: European integration and regionalisation; new forms of public intervention; budgetary constraints; the 'knowledge economy' and a recognition of the roles of universities in local and regional economies (Edler *et al* 2003. Harding *et al* 2007). Furthermore, it is often argued that the inherent nature of cutting-edge research, in areas such as the life sciences or nano-technology, requires new configurations of academic and industry actors to create economies of scale (Cooke 2004. Charles *et al* 2004). These global forces of knowledge capitalism have been mediated through different national systems with diverse political, economic and scientific systems, reflecting both European social traditions as well as the imperatives of neo-liberal Atlantic capitalism (Crouch and Streeck 2002).

In England, a minimal system of multi-level governance is emerging (Perry 2007a, see Output 1). There has been significant sub-national mobilisation in the area of science and innovation. However, national and regional policy processes remain parallel rather than inter-connected, with regions largely confined to exploitation and weak arenas for the systematic negotiation of joint priorities. A hesitant acceptance of the regional role in national science policy is evident, as long as regional engagement is seen to support nationally-set priorities. There are clear frameworks and incentives for universities to engage with their localities (May and Perry 2006a) yet few counter-concentration pressures can be seen, with a dominant focus on the Greater South East and differences in orientation and approach across the English regions. There has been no significant regionalisation of national science policy; nonetheless, a regional tier of science policy governance has emerged, driven from the bottom-up as a response to the logics of selection and concentration and tolerated from the top-down, as a means of gaining additional support for national policy.

In France, regional authorities are also emerging as important actors in science policy (Crespy *et al* 2007, see Output 1). Top-down pressures dominate, in response to budgetary constraints and the need for reform in the face of the European imperative. This has led to new modes in the steering and organisation of science and national efforts to co-ordinate and incentivise regional activity. Clear arenas for the negotiation of priorities exist. A more positive national approach to regions in science policy can be seen, compared with England, but the appetite for this across regions is variable. The objective of balanced growth is strongly held, but a recent shift from equality of outcome

to equality of opportunity can nonetheless be seen, resulting in the consolidation of existing strengths and centres of excellence. Outside the co-funding of higher education infrastructures, there has been little involvement of regions in university policy, nor explicit expectation that universities should consider their regional or local roles.

In Germany, science, research and higher education have traditionally been areas of joint responsibility between the federal government - the *Bund* - and the *Länder* states (Koschatzky and Kroll 2007). The public research system also includes a wide range of knowledge producers outside universities, such as the non-university research institutes. Major recent reform has strengthened the responsibilities of the *Länder* in relation to higher education, as a backlash against the perceived encroachment of the *Bund* on traditional regional competences. Funding science and research remains split. The *Bund* has been left with fewer legal responsibilities over universities, yet greater perceived 'freedom' for the strategic direction of science and research policy. Constitutional changes have meant new mechanisms for negotiation and co-ordination between *Bund* and *Länder* and among the *Länder*. Strong counter-concentration pressures exist in line with the constitutional commitment to balanced growth, particularly in relation to enabling the new *Länder* to compete on a more level playing field. Despite these pressures, capacities for action are uneven and certain regions in the West are forging ahead of those in the East that have historically been subject to different regulatory regimes.

The asymmetrical federal system in Spain means that strong differences exist with respect to regional capacities for action. The 'autonomous communities' have responsibilities for the governance and funding of universities, whilst competences for science and research vary. The Spanish constitution sets a general co-ordination function for the State to manage relationships between national and state governments, although there is evidence that this is of limited effectiveness (Muñoz 2001). The regions require no national approval for their science and research plans/activities. There is a national policy framework for research, but the national system is not the main frame of reference in the strongest regions, such as Catalonia. The regions are funded through the transfer of block funds, rather than by inter-governmental negotiation of priorities and in the lead regions there is an increasing percentage of these block funds spent on science and research. This contributes towards national targets for R&D expenditure and growth but lies outside the national strategy. Regional inequalities are built into the system through the historical differences in autonomy, with regions seeking to achieve growth in science and technology through complementary national and European funding sources.

Despite differences in governance and research structures, the role of regions in science policy is growing (Laredo and Mustar 2001). These changes are driven variously from the top-down or the bottom-up, but rarely is science itself the driver. Instead, what we see is the mobilisation of a set of financial, political, cultural and economic considerations to create the context for regional involvement in science policy and only secondly, the legitimisation (or denial) of this involvement through appeals to the nature of scientific activity. In traditionally centralised countries, such as England or France, the black-box of the state in science policy has cracked; in federal systems, regions are further consolidating their influence in this policy domain (see Output 1). Each case represents a different variation of 'multi-level governance' (Bache and Flinders 2004) in science policy, characterised by a 'regional dimension' to national science policy, arenas for negotiation and sub-national mobilisation (see Table 1).

Table 1 What is the 'regional dimension' to science policy? (Perry and May, 2007, see Output 1)		
Passive	Regions as stages	Regions as implementors
	<p>Within nationally-defined policy frameworks, regions are seen as appropriate scales of action, as 'containers' of innovation or 'stages' on which policy is enacted. Policy may be defined or organised within regional units yet regional authorities or agencies are not seen as participants in that process.</p>	<p>Regional authorities and agencies have a role in the implementation of nationally-defined and funded policy initiatives. Regions provide not only stages for policy delivery but are agents for delivery according to centrally conceived priorities and targets.</p>
Active	Regions as partners	Regions as independent policy-makers
	<p>Here regional authorities and bodies have increasing agency in shaping national priorities for science and innovation in a more 'co-determined' model of policy formulation. Regions are participants in national policy processes and may, for instance, be involved in co-funding the national scientific infrastructure.</p>	<p>Regional authorities and bodies are increasingly devoting their own finance and resources to funding regionally significant scientific investments or projects. The emergence of 'regional science policies' may be characterised by independent agenda-setting, institutional creation and new governance arrangements, new mechanisms and policy tools or strategic intelligence and capacity building.</p>

England is the furthest away from this model, in terms of the dominance of national actors, with absent or weak arenas for the negotiation of policy. Furthermore, not all regions are equal as global forces tending to concentration disrupt efforts at resource distribution and balanced growth. Multi-level governance is more appropriate for *certain* regions, rather than *all* regions (Borras-Alomar *et al* 1994). Governance changes in favour of the regions have, therefore, paradoxically had little effect on policy outcomes in terms of the concentration of resource.

4.2 Building Science Regions

The North East and North West of England both have regional strategies for science and/or innovation, which are overseen by new governance structures in the form of science and industry councils (NWDA 2002). Whilst significant regional resource has been allocated, only in the North West is this targeted specifically at funding pre-competitive research within universities. Universities have a central role in both regions, particularly in the North East given the low levels of private sector R&D (Charles 2007). Regional economic futures are centrally linked to the priorities of innovation and science-based growth, although the relative emphasis differs between seeking wide-spread structural change (North East) or greater advantage within the national and international science context (North West). Nevertheless, the extent to which regional actors have the capacities or resources to achieve these is limited. Regional actors have been co-opted in support of nationally-set priorities; incentives and targets set centrally

determine the behaviour of key actors and a mirroring of national policy tensions, for instance, between concentration and the dispersion of resources can be seen (Charles and Benneworth 2001). Although there is widespread enthusiasm, attempts to build science regions have reached a plateau. In this context, the emphasis has shifted to 'Science Cities' or inter-regional alliances to meet aspirations for regional science-based growth (Perry and May 2006a).

In Alsace, the Regional Council makes several interventions in the science base, including funding basic and applied research in the form of theses, doctorates, projects and seminars. Recommendations for funding are made by a 'Committee of Experts' but there are no formal priorities for research, in the face of a strong opposition on the part of universities. The steering or direction of research towards regional priorities is seen as unfeasible and, in many cases, undesirable. This is clear from the (so far) insurmountable difficulties in constituting a regional science and industry council, despite a clear demand for this on the part of social and economic actors (CESA 2005). The mismatch that exists between the nature of the industrial fabric and the science base is to be overcome through efforts to orient industry towards science, rather than science towards industry (Heraud and Nanopoulos 1994). A strong commitment to balanced growth and equity can be seen with concentration in the Strasbourg conurbation countered through support for areas of emerging research in Mulhouse. Recent top-down national initiatives have legitimised the regional discussion of and involvement in science policy, culminating in a strong science and innovation focus in the 2007-2013 state-region joint planning exercise. In line with its European aspirations, the urban community of Strasbourg is also emerging as an important scale of action.

Science and innovation policy in North Rhine Westphalia (NRW) has had three distinct phases: infrastructural developments focused on the building of universities in the Ruhr (1960s); regionalised structural policy based on technology transfer and innovation to small and medium-sized enterprises (1980s) and future-oriented cluster policy (2000-), based on 'strengthening the strengths' as a reaction to the perceived failures of previously distributed policies (Iking 2006). Yet while the *Land* government has the constitutional right to develop a regional science policy, the scope and effectiveness of these activities is limited. A codified expression of regional scientific priorities does not exist and the presence of powerful regional government has replaced the perceived need for a regional science and industry council (Perry and May, 2007, p.17. See Output 1). Co-funding arrangements for science and research with the *Bund* mean that the identification of distinct national and regional policies is problematic. Regional competences for higher education policy have also increased, at the same time as universities have been given more autonomy. Freedom of research is constitutionally enshrined - as a legacy from the political appropriation of science in the 20th century - making the steering of university research towards socio-economic goals difficult. What this means is that the *Land* government has greater legal and administrative responsibilities, fewer direct mechanisms with which to steer the public research base and little uncommitted finance with which to determine and fund regional priorities for science. Overall, the rationale underpinning regional strategy in this area has developed from seeking structural change and considerations of 'need' to global positioning and an emphasis on concentration in existing centres of excellence.

The Catalan Government has full competencies over the governance and funding of universities and in science and research policy. Regional scientific priorities are articulated in the Research and Innovation Plan 2005-2008 which communicates a vision

of a coherent innovation system (CIRIT 2005). Throughout the 1990s a marked shift towards developing the academic research system has been seen (Sanz-Menendez and Cruz-Castro 2005), leading to an increasing percentage of regional funds for science and technology and the creation and funding of independent non-university research centres. Barcelona has dominated the Catalonian landscape with a key aim of creating strategic mass, yet counter-concentration pressures exist in terms of the creation of new universities in smaller towns and cities, the emergence of split site campuses and the location of industry-based research centres outside the capital. A primary goal underpinning these developments is to establish Catalonia as a player on the European political and economic landscape, as well as overcoming perceived structural problems and achieve international economic performance (Bukowski 2002).

Governance and the distribution of resource matter in shaping attempts to build science regions. There is little doubt that the capacity of regional actors in England to achieve their ambitious aspirations lags behind those available elsewhere. In Catalonia, full regional competencies over higher education and science and innovation policy afford greater potential to meet European and global aspirations in terms of the allocation of resource. In comparison, Strasbourg has similar 'European' aspirations to Barcelona, yet its capacities are limited by the nature of central-regional governance arrangements as well as an ambivalent attitude of the Regional Council. Similarly, the limits to attempts to steer universities in NRW can only be illuminated through reference to the historical development of the federal state in the 20th century. In England, there are important contextual differences in the framing of the 'regional science policy' paradigm in the North East and North West, as a result of differences in initial orientation and impetus. Context matters: a diversity of factors - political, institutional, historical, geographical and cultural - influence attempts to build science regions (May 2005. Charles 2006). Specific regional approaches are then enabled or constrained by interactions with other levels of governance and differences in regulatory regimes. Nonetheless, we can also see that there is no automatic correlation between officially devolved responsibilities and regional action. In the absence of democratically-elected regional assemblies in England, the Regional Development Agencies are doing as much, if not more, than their central European counterparts. Despite differences in context and governance structure, similarities in outcome can be seen, leading to a certain convergence in approaches and tensions at the regional level.

Common aspirations are being articulated for the transformation of regional economic and social futures through greater engagement with scientific research. However, regional interventions in science policy are best understood as *physical*, *symbolic* or *additive* (see Table 2) – with *transformation* assumed to occur automatically as a result. In none of these cases is science itself expected to change; rather science is conceived as an asset (physical), an emblem (symbolic), a magnet (additive). The power of attributed value leads to a symbolic politics, with positions in national and international league tables commonly quoted as evidence that regional interventions are 'working'. Securing a Nobel prize was seen as a high level aim for Catalonia, whilst a key emblematic investment in Alsace was represented as the funding of a new building for a Nobel prize winner in chemistry. The regional motivation for such investment was to increase the 'attractiveness of the territory' and potential synergies with the Alsace Bio-Valley cluster. However, an interview with the Nobel Prize winner in question revealed that this latter aspiration had little basis in fact.

Table 2 Interventions in the Regional Science Base	
<p><u>Physical</u></p> <p>Science is a physical agent to achieve other non-scientific goals, such as the redevelopment of deprived or industrial neighbourhoods. The focus tends to be on estate management, the reconfiguration of infrastructures and provision of ‘innovation’ spaces.</p> <p><i>Examples: Science Central (Newcastle); 22@bcn (Catalonia); science park developments</i></p>	<p><u>Symbolic</u></p> <p>Science also has symbolic value. Investments are made in high profile areas as a crucial part of building a positive image and reinventing regional identities. Initiatives are not designed to lead directly to improvements in economic performance, but to enhance reputation, image and scientific credibility</p> <p><i>Examples: National Zoonosis Centre (North West), Support for Nobel Prize Winner (Alsace)</i></p>
<p><u>Additive</u></p> <p>A third type of intervention focuses on gaining additional resources through capacity-building and enabling regional institutions to better compete in national and European competitions. These additional resources may be stitched together from a variety of sources for city-regional / regional benefit. Interventions may also be aimed at attracting knowledge workers or knowledge-intensive businesses as a basis for competing globally.</p> <p><i>Examples: University Mergers (Manchester/UMIST; Duisberg/Essen; Universities of Louis Pasteur/Robert Schuman/Marc Bloch)</i></p>	<p><u>Transformative</u></p> <p>Regional science policy can be transformative, with investments designed to direct the science base towards regionally important areas of research. This involves not only linking science with industry but determining scientific priorities and the reorientation of universities towards regional and local socio-economic needs.</p> <p><i>Examples: Bielefeld 2000; Greater Manchester Urban Knowledge Arena</i></p>

We have also seen a value attributed to particular kinds of scientific activity over others, particularly in relation to life sciences and bio-technology. Despite processes of choosing distinctive regional strengths, biotechnology appears as a ‘must-have’ in each of the case studies examined. Those areas of science that are deemed ‘less productive’, such as the social sciences or humanities, have generally been relegated to second-tier activities, with little understanding of their potential application. This is accompanied by an increasing tendency to focus on ‘world-class’ universities to the detriment of more regionally-oriented organisations, with the former accounting for the lion’s share of the funds, whilst the latter are acknowledged as being more relevant to economic and social growth. Prioritisation is particularly anathema in countries with a strong tradition of balanced growth, as seen in the process of choosing clusters for the Ruhr development plan or the antipathy of the German universities interviewed to the ‘profiling’ initiative. Nevertheless, despite such political difficulties, the dominant trend of regional interventions is towards selection, focus and concentration.

What is evident here is the gap between aspiration and practice. Building science regions is best understood in terms of regenerating places, representing existing activities and attracting additional resource. Regional support for science is more evident than science support for the region. Regional *science* policies only exist in an embryonic form; science is increasingly part of attempts to build coherent innovation systems, but ‘transformation’ relates to an *indirect* relationship with science, not *direct* attempts to

‘transform’ scientific activity itself. Relevance to regional economies is assumed to be automatic and indirect. A key example can be seen in the interviews conducted with regional agencies funding science and the academic recipients of those funds, particularly in the North West and Alsace. Regional money allocated to scientists was predominately used to fund pre-existing research agendas and further international reputations, with accidental rather than planned relevance to regional economies as a result.

4.3 *Excellence, Relevance and Context*

Traditional notions of scientific excellence have been challenged by an increasing emphasis on economic relevance and the need for applied research and new partnerships with industry. Yet the growth of regional interventions in the science base has introduced a further dimension, namely that of ‘context’. The rise of the regions reflects the demand that science needs not only to be relevant, but to be relevant to a particular place.

If we disentangle the excellence/relevance relationship and introduce different degrees of contextualisation (global/regional), five non-exclusive discourses can be identified (see Table 3). There are many hybridisations, with different rationales for scientific investment and distribution at multiple scales. There is no simple correlation between tiers of governance and particular positions. However, the disaggregation of national and regional interests according to different policy domains (science, economics, regional development) does reveal a certain clustering of positions that cut across scales of governance (see Perry and May 2006b). At the sub-national scale of action, excellence and relevance tend to be closer together, particularly within the English regions. The mission of the University of Newcastle, for instance, has been framed as ‘excellence with a purpose’, while the Manchester: Knowledge Capital aims at economic success, social inclusion and environmental sustainability (Garner 2006, see Output 2. Perry 2007b). The distinction between *relevant excellence* and *excellent relevance* is subtle, but important: it is not the criteria of excellence that is at stake, rather the extent of interpenetration into processes of knowledge production themselves and how the benefits from science will be realised. The final articulation of the relationship between science and regional economic development – *contextual relevance* - can only be found at the periphery of policy opinion. It is not a clearly expressed or implicitly held preference, rather it exists as a negative fear that the growth of a regional dimension to science policy will lead to ‘second-rate’ science.

It is this - largely unfounded - fear that has provoked a backlash from the scientific establishment. Disembedded excellence and competitive relevance have come to dictate the contours of the emerging neo-liberal knowledge economy. The dominant view is that space nor territory are valued in the search for global success and any understanding of the contexts within which excellence or relevance can be built is limited and partial. ‘Excellence’ is becoming a game in its own right, with an emphasis on position in international league tables, emblematic science investments and the pursuit of prestige. The result is competition (Sharp 1998) and an increasing concentration of research excellence in particular localities in which the philosophy of ‘survival of the fittest’ reigns supreme.

Table 3 Excellence, Relevance and Context

Disembodied excellence can be seen as traditionally non-spatial and amenable to global logics in which processes of knowledge production are divorced from the context in which they are produced. Distributive issues are secondary to quality as judged by peer-review.

The corollary to this is *competitive relevance*. A de-contextualised interpretation of relevance places emphasis upon application to specific economic or social issues and strategic priorities as a precondition for global success. The focus on biotechnology, nano-technology and genomics is symptomatic: research may be 'applied' but does not have a direct advantage to any particular community or group.

A *relevant excellence* discourse highlights the indirect benefits of science and technology to particular places and spaces. This does not relate to changes in processes of knowledge production, rather it seeks to exploit, extract and attract knowledge products and institutions for territorial benefit. This most closely approximates the relationship between science and regions in practice in the case studies examined.

The partner to this discourse can be characterised as *excellent relevance*. Here we see a concern with what is produced in scientific establishments in terms of the generation of co-produced research priorities and agendas through a linking of content with context. This most closely approximates the aspirations for regional science policy put forward here.

A final discourse then appears as *contextual relevance* where scientific investments are seen to be driven by narrow political or economic regional objectives, giving rise to a fear on the part of the scientific establishment of an inward-looking parochialism and 'second-rate' science due to political interference.

Sub-national actors are not immune from these global forces; a concern with distribution, equality or social cohesiveness is undermined by the pursuit of scientific prizes as symbols of regional identity and growth. For the Catalan Minister for Research, 'good science' means publishing in top journals, attracting research talent and winning funding. Where regional priorities or preferences are 'dared' to be expressed (not in Alsace), a regional view of science is restricted to 'relevant excellence' - through regional innovation policies of which science is a part.

The role of universities is critical. Mixed messages are apparent for universities in demands for world-class research as much as economic relevance (May 2006). This relates both to the relative levels of funding attached to different activities, as much as the types of policy mechanisms that are used. An example here is the German *Exzellenz* initiative - with high levels of direct funding from *Bund* and *Länder* allocated through a national competition - and regional cluster-led programmes which are network-based and have little funding attached. Institutions tend to compete, rather than collaborate, except where collaboration is itself a stepping stone to global visibility. Examples include the 'N8' research alliance in Northern England (Page and Secher 2006, see Output 2); the ABC region in NRW (**A**achen-**B**onn-**C**ologne) or the mergers of universities - between Manchester and UMIST (Manchester), Duisberg and Essen (NRW) and the three universities in Strasbourg to form the 'European University of Strasbourg' (Alsace). As a result some universities may be 'in', but not 'of' their localities (May and Perry 2006a). Universities that wish to enhance their own competitiveness in international research rankings are forming alliances with regional actors to obtain additional resources through cluster-type strategies (Charles 2006). A few universities are beginning to bring global

and local, excellence and relevance, together in their strategic positioning, as evidenced in the extensive interviews with senior university managers in the English case studies. Yet generally, the demand for universities to be international and regional is managed through a division of labour: diversification in role accompanies stratification in university systems with the 'third mission' becoming the last choice for those universities outside the upper echelons of the global hierarchy.

The interviews also revealed a high degree of public support for the autonomy of the researcher and the university in general, contrary to accounts of demise and delegitimation. The extent and nature of this autonomy is debated between university managers and policy-makers, for instance, in relation to the significance of new contract planning processes in NRW and is particularly negotiable in the English context. However, a paradox emerges: on the one hand, the deficits of an 'inflexible', 'bureaucratic', 'elitist' university system, as expressed through interviews, are widely noted, with a desire for greater steering of universities towards particular agendas; on the other hand, this has been accompanied by shifts to greater autonomy for universities, with incentivisation through funding streams remaining the only tool to influence behaviour. Even in more neo-liberal systems, regional demands on universities are largely restricted to being physical agents, attractors and economic actors, with little consideration of their civic role. We do not want to undermine the need for universities to remain 'spaces of reflection' as much as 'places of expectation' (Fuller 2004. May and Perry 2006b). But our findings indicate a certain power of institutions, according to position in regional, national and global hierarchies, to protect 'science' in the face of an encroaching relevance.

What is missing is any public space – or 'agora' – where different articulations of the relationship between excellence, relevance and context can be contested, debated or openly negotiated. Differences in orientation and aspiration do exist. However, the emerging consensus view on the relationship between science, economy and scale is not the result of a conflict of values; the debate is yet to be had. We see value attributed to science and assumed by universities, without any accompanying debate on the values of or for science (Perry 2006a). Our research found that questioning this narrow understanding of excellence is almost taboo in certain national contexts, particularly Germany and France, where the institutional authority and autonomy of the university as a guardian of excellence remains predominant. As Harding notes (2005) this raises real issues over the relationship between science, expertise and democracy.

A normative emphasis, against the backdrop of global changes, further explains both differences and similarities in issues associated with building science regions. Regions are more involved in science policy and are devoting significant proportions of their own resources towards the funding of the science base in the expectation that this will lead to economic development. Yet this is accompanied by an uncritical worship of science as economic saviour and a disconnection between efforts to direct and steer research within wider cluster policies and the orientation of the science base towards international competition. Innovation policy is seen as spatial while science policy is not, with the result that universities are simply not as amenable to 'harnessing' in the ways that regional interventions had originally presumed (Gibbons 2001: 35). In this, there is a gap between policy aspirations and the realities of implementation; a missing middle between expectations and the capacity to deliver (SURF *et al* 2006).

The implication of this institutional analysis is that a reshaping of governance needs to be accompanied by a rethinking of science, if the aims of national and regional policy-makers for science-based economic growth are to be met (Perry and May, 2007, see Output 1. Perry 2006b, see Output 2). It is not simply the case that regionalising science funding or governance will lead to regionally-tailored policies; nor is it true that regional science policies are inherently second-rate, inward-looking or parochial. What is required is greater joined up thinking between tiers of governance and across policy sectors, particularly science, innovation and higher education and regional development. Most importantly, greater consideration is needed of *how* the attributed value to science will be realised. This needs to be accompanied by an open, free and non-determined public debate about the values for, value of and role of science in society. Such findings point to a more sensitive reading of contemporary shifts in science, governance and economy in relation to multi-scalar interactions, the contextualisation of science in society and the extent of new modes of knowledge production.

5. Activities and Outputs

Activities and outputs reflect the ethos of this research in relation to its interdisciplinary focus and combination of theoretical rigour and policy relevance. Given the scope of these activities, we have represented highlights in Figure 2.

6. Impacts

The research has generated a high level of policy interest in the UK and abroad. The primary impact has been to catalyse greater dialogue between national and regional actors across sectors and thus contribute to more effective public policies at different levels of scale. Evidence includes (see Appendices 5-6):

- Good levels of attendance at project-initiated events, especially seminars within the *Embedded University Network*;
- Participation of policy-makers in the co-production of the *Regions* newsletter (distributed to 72 policy-makers).
- Report written for Science Cities Consortium, drawing on conclusions of this work, as the basis for submission to the Comprehensive Spending Review, 2007.
- Policy advice through value-added work, including the OECD, HEFCE, Yorkshire and Humber Universities, Science Cities and national Governments abroad (Australia, Korea)
- Contributions to national select committee enquiries, including 'Is there a future for regional government' (2006), 'Research Councils and Knowledge Transfer' (2006).
- ESRC-funded Impact Grant to develop a tailored 'knowledge exchange' strategy of the implications of this work for business. April 2007.
- Project-specific website, generating average 1,046 hits / month 2006-2007.

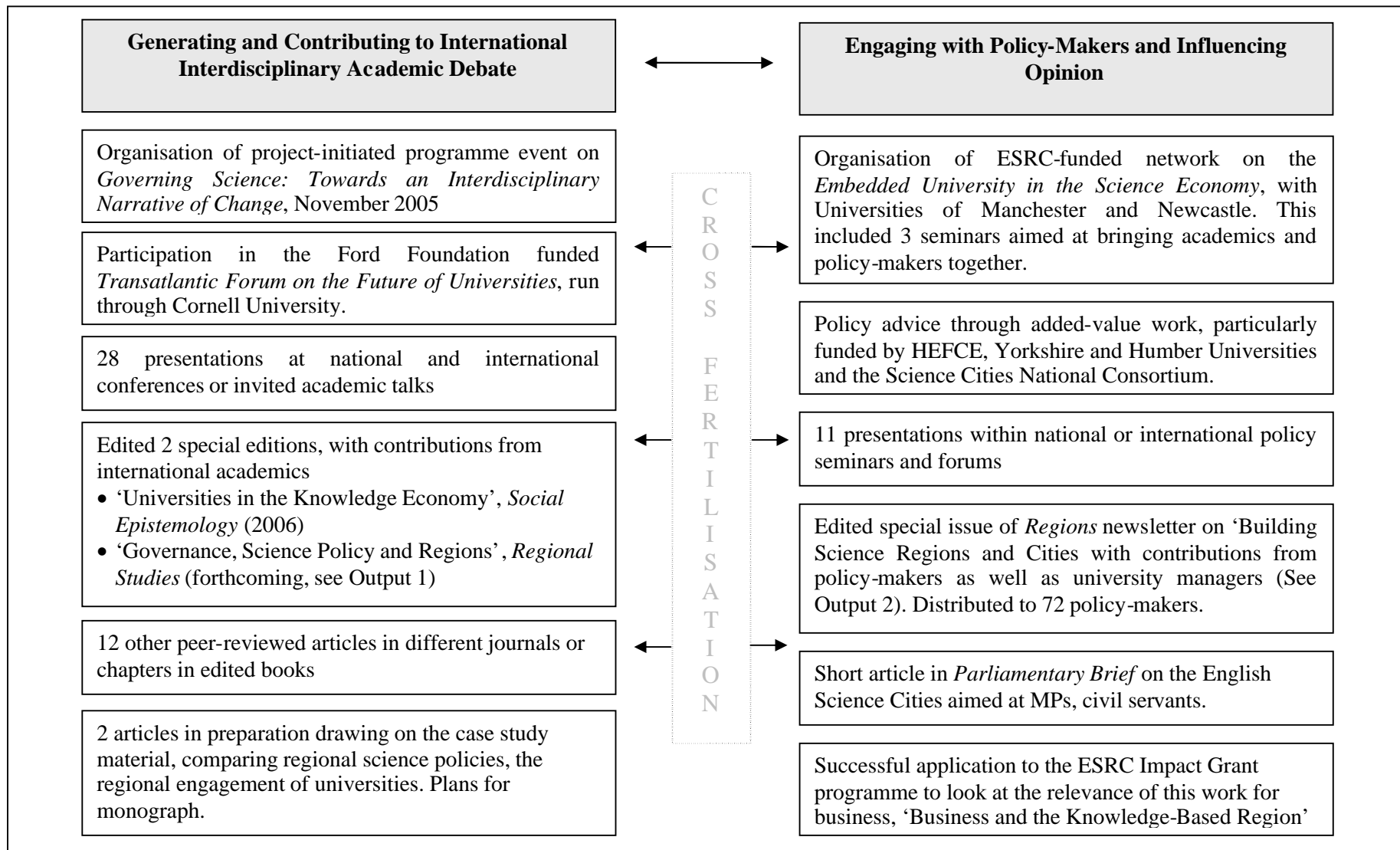
7. Future Research Priorities

There are two ongoing avenues for further research. Firstly, we intend to embed our ESRC-funded Impact Grant within a wider research agenda relating to the role of business in regional and national science policy. Second, there is an emerging focus on the sub-regional scale, and particularly city-regions, in science, technology and innovation and this trend towards 'knowledge-based urban development' needs greater

articulation and conceptualisation. We have an ongoing research programme funded through the Science Cities Policy Development for this purpose. An application has also been submitted to participate in NESTA's CRUCIBLE scheme for early career researchers in the relationship between science and society.

Words, 5495

**Figure 2
ACTIVITIES AND OUTPUTS**



Details are available on <http://www.surf.salford.ac.uk/BuildingScienceRegions/home.htm>

APPENDICES

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Appendix 2: Documentary Analysis

Table A1 Example from UK: Strategic Frameworks and Sectoral Differences		
	How does science see regions and cities?	How do regions and cities see science?
Indicative search terms	urban, local, city/ies, region/s, regional	science, research, innovation, higher education, universities
Indicative policy frameworks	<p>‘Science and Innovation Investment Framework 2004 – 2014’ (2004), HMT/DTI/DfES</p> <p>‘The Future of Higher Education’ (2003), DfES.</p> <p>‘Prosperity for All in the Global Economy’ (2006), Leitch Review of Skills.</p>	<p>‘Sustainable Communities, People, Places and Prosperity’ (2005), ODPM</p> <p>‘Your region, your choice’ (2002), DTLR</p> <p>‘Meeting the regional economic challenge’ (2006), HMT, DTI, ODPM</p>

Table A2 Example from France: Shaping, Formulating and Responding to Policy		
Policy-shaping	Policy Frameworks	Policy Response
<p>Economic and Social Council of Alsace (2005) ‘L’innovation et le transfert de technologies en Alsace’.</p> <p>Ancori (2004) Report on ‘Colloque Régional sur la Recherche en Alsace.’</p>	<p>‘Contrat de Projets Etat-Region 2007-2013’.</p> <p>Regional Council of Alsace (2006) ‘Une stratégie collective pour une Alsace plus compétitive’. Regional Economic Development Plan.</p>	<p>Economic and Social Council of Alsace (2006) ‘Avis: Le Contrat de Projets Etat-Region 2007-2013.’</p> <p>Economic and Social Council of Alsace (2006) ‘Avis: Le Schéma régional de développement économique’.</p>

We have used our international facilitators to assist with language difficulties where they have occurred and have been fortunate that many documents, such as the Catalan Research and Innovation Plan, also exist in English.

Appendix 3: Extracts from Ethical Code of Practice

The British Sociological Association’s Statement of Ethical Practice informs this research. This recognises that there are no apriori rules for the resolution of ethical dilemmas in research. However, there is still a need to make choices on the basis of principles and values and the often-conflicting interests of those involved. Given the large interview element of this research, particular attention has been given to the ethics of ‘*relations with and responsibilities towards research participants*’:

“ Sociologists ... should strive to protect the rights of those they study, their interests, sensitivities and privacy, while recognising the difficulty of balancing potentially conflicting interests.”

“As far as possible sociological research should be based on the **freely given informed consent** of those studied. This implies a responsibility on the sociologist to explain as fully as possible, and in terms meaningful to participants, what the research is about, who is undertaking and financing it, why it is being undertaken, and how it is to be promoted. [...] Research participants should be made aware of their right to refuse participation whenever and for whatever reason they wish.”

“ The anonymity and privacy of those who participate in the research process should be respected. Personal information concerning research participants should be kept confidential. Where possible, threats to the confidentiality and anonymity of research data should be anticipated by researchers. The identities and research records of those participating in research should be kept confidential whether or not an explicit pledge of confidentiality has been given.”

Appendix 4: Interview Sampling Framework

1. Sampling Framework

Table A3 Interview Sampling Framework			
	Scientific	Political	Economic
European	DG Research	European Parliament / Committee of the Regions	DG Competition / DG Regional Policy
National	Ministries for Research and Higher Education, National Research Funding Bodies; Advisory Groups.	Cabinet Ministers, Members of Parliament, and in relevant advisory and committee systems.	Ministries for Competition/ Trade/ Industry / Regional / Local Government
Regional	Regional science councils and ministries, universities, scientists.	Regional and local elected officials.	Economic development agencies, industry, chambers of commerce, trade unions.

Interviewees were identified:

- with the assistance of our international facilitators on the ground;

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- through a ‘snowball’ effect of onward referral and
- as representatives of key organisations with an involvement or interest in regions and / or science policy.

2. Visits and Access

Visits made included:

- Two trips to each case study region: an initial meeting to set up the research and meet key regional gatekeepers and a second longer trip to carry out extensive interviewing;
- One visit to Brussels to interview representatives within the Directorate-General of Regions, Research and Enterprise and Innovation;
- Visits to meet with national policy-makers within ministries for science and regional development.

The use of international facilitators, particularly Jean-Alain Heraud (ULP, Strasbourg) and Knut Koschatzky (Frauenhofer Institute, Karlsruhe) in the European case studies has worked well and has guaranteed a high level of appropriate policy access.

3. Participants and Organisations

All of the interviews were taped and selected interviews were transcribed. In line with ethical guidelines, we undertook not to make these transcripts publicly available in exchange for levels of frankness. We successfully applied for a waiver from the data archive in this respect. As a result, we note here only the institutional breadth of the case study (Table A4). 167 interviews were carried out across 123 organisations.

Table A4 Institutional Breadth of the Case Studies	
UK	Office for Science and Innovation – Knowledge Transfer; Office for Science and Innovation – Science and Engineering Base; Department for Communities and Local Government - Regional Policy; Department for Communities and Local Government – Urban Policy; Department for Education and Skills; Department for Trade and Industry –Regional Policy; Department for Trade and Industry – Economic Policy; Higher Education Funding Council for England; House of Commons Science and Technology Committee; Economic and Social Research Council; 4GLS; Chemicals North West; NW Texnet; Kitshoff Gleaves Consultancy; Daresbury Laboratory; Envirolink; Government Office North West; North West Development Agency; Manchester Knowledge Capital; Manchester Science City; North West Regional Assembly; North West Universities Association; Universities of Manchester, Manchester Metropolitan, Salford, Liverpool, Liverpool John Moores, Central Lancashire, Lancaster; One North East; Government Office North East; Universities for the North East; Newcastle City Council; Newcastle Science City; Centre of Excellence in Life Sciences; Econnect Ltd; NaREC; Northumberland County Council; Durham University; Northumbria University; Sunderland University; Teesside University; Gazelle Wind Turbines; PB Power Ltd; SMD Hydrovision Ltd; the Engineering Business Ltd.
France	Ministry for Research and Industry – Innovation Policy; Ministry for Research and Industry – Higher Education and the Regions; Interministerial Committee for Territorial Development and Competitiveness; National Agency for Research; Ministry for Education – Research and Evaluation; British Council in Paris; British Embassy in Paris; University Louis Pasteur; University Robert Schuman; University Marc Bloch; University Haut-Alsace; Alsace Biovalley; Alsace Technologie; Department General for Bas Rhin; Regional Council Alsace; Economic and Social Council Alsace; Prefecture of Alsace; CNRS; Regional Committee of Experts; Institute for Physics and Chemistry; IRCAD (Cancer Research); Centre for Private Law.
Germany	Ministry for Education and Research – Strategy; Ministry for Education and Research – Higher Education/Excellenz; Ministry for Education and Research; Max Planck Institutes (national); German Universities Conference; Competence Network Advisory Council; Ministry for Science, Innovation and Research, NRW – Higher Education; Ministry for Science, Innovation and Research, NRW – Cluster Policy; Center for Innovation and Technology; Institute for Spatial Planning; Regional Union of the Ruhr; Bonn City Council; Science City Bonn; Technical University of Aachen; University of Bonn; University of Duisberg-Essen; University of Bielefeld; University of Applied Science in Bonn; Bielefeld 2000; Centre for Higher Education.

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Spain	Ministry for Research (DURSI); Generalitat de Catalunya; Generalitat de Catalunya –CIDEM; 22@ Barcelona; Barcelona Biomedical Research Park; Business Angels Network; Centre Tecnologic de Telecomunicacions de Catalunya; Consorci de Transferencia de Coneixement (CTC); Institut Joan Lluís Vives; La Salle Innovation Park; Parc Científic de Barcelona; Programa Cerca; Programa Innova Politécnica de Catalunya; Transferencia de Tecnologia la Salle; Technical University of Catalonia; Autonomous University of Barcelona; University of Barcelona; Office for the European Knowledge Area.
European	DG Enterprise and Innovation, DG Regions, DG Research, European Science Foundation

Appendix 5 Non-ESRC funded comparative work

1. A review of territorial development policies in Crete for the OECD (2005) with a specific focus on the role of research and innovation
2. Involvement in the OECD (2005) programme on supporting the contribution of higher education institutions to regional development and specifically an evaluation of the Sunshine/Fraser Coast (Australia)
3. Report on the implications of an emerging regional policy for higher education in England?, for Universities UK (2005-6)
4. The impact of HEIs in Yorkshire and the Humber, for Yorkshire Universities (2006)
5. Analysis of the regional dimensions of investment in research in a Scottish case study, for the ERAWATCH network and Institute for Prospective and Technological Studies, Seville (2006-2007)
6. Realising the potential of Science Cities, for the Science Cities Policy Development Group
7. Science Cities Contribution to the Comprehensive Spending Review, drawing on this ESRC work (2007)
8. The production of the *Regional Studies* special issue, with academic contributors in Canada, Finland, Japan, as well as France, Germany and the UK.

Appendix 6 Evidence of Impact

Table A5 Organisations Involved in the ESRC-funded network	
Ascent Media Ltd	N8 Universities
Association of University-Industry Links	National Institute for Education Research in Japan
BBC	Newcastle City Council
Bristol Business School	North West Development Agency
Contact Partnership of Greater Manchester Universities	North West Regional Assembly
Department for Communities and Local Government	North West Textiles Network
Department for Education and Skills	North West Universities Association
Department for Trade and Industry	Office for Science and Innovation
Department of Health	One North East
Economic and Social Research Council	Prospects Career Service
Envirolink North West	Queens University Belfast
Eversheds	Scottish Executive
Evidence Ltd	Sheffield Hallam University
Experian	Sustainability North West
Fujitsu	Tameside Metropolitan Borough Council
Government Office North West	Universities 4 North East
Greater Manchester Police	University of Central Lancashire
Greater Manchester Strategic Research Alliance	University of Durham
Higher Education Funding Council for England	University of Glasgow
Higher Education Funding Council for Wales	University of Limerick
Higher Education South East	University of Liverpool
HM Treasury	University of Manchester
House of Commons Science and Technology	University of Newcastle

REFERENCE No.

Committee Lancaster University Liverpool John Moores University Manchester Business School Manchester Enterprises Manchester Inward Development Agency Services Manchester Knowledge Capital Manchester Metropolitan University Moonfish Ltd	University of Northumbria University of Oxford University of Salford University of Strathclyde University of York Ward Hadaway York University Yorkshire Universities
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Table A6	
Distribution List for Regions Newsletter	
Pam Alexander	Chief Executive, South East England Development Agency
Bertil Andersson	Chief Executive, European Science Foundation
Gordon Andrews	Head of Economic Development, Neath Port Talbot County Council
Steven Barwick	Director of Strategy, North West Regional Assembly
Dennis Bate	Managing Director, Bovis Lend Lease Ltd
Peter Betts	Director of Regional Policy, Department of Communities and Local Government
Helen Bidwell	Project Manager, Vision Twenty One
Andy Bishop	Executive Director, Science Policy Unit Scottish Executive
Peter Brandon	Director of Strategic Programmes, University of Salford
David Briggs	Acting Director, Contact Partnership
John Brooks	Vice Chancellor, Manchester Metropolitan University
Peter Brunt	Energy Strategy and International Unit, Department of Trade and Industry
Keith Burnley	Executive Director, North West Universities Association
Adam Chase	Director, E4Tech Consultancy
Steve Connor	Director, Creative Concern
Peter Connor	Head of UK Regions North, British Telecom
Nick Cox	Advantage West Midlands
Ian Diamond	Chief Executive, Economic and Social Research Council
Malcolm Eames	Brunel Business School
David Eastwood	Chief Executive, Higher Education Funding Council for England
Paul Ekins	Policy Studies Institute
Peter Ellis	Assistant Director of Regeneration Services, Redcar and Cleveland Borough Council
Mike Emmerich	Chief Executive, Manchester Enterprises Ltd
Philip Esler	Head of Research Councils Knowledge Transfer, Arts and Humanities Research Council
Uwe Fritsche	Institute for Applied Ecology
Rebecca Garrod	Department for Trade and Industry
Charlotte Buckley	European, International Strategy, Department for Trade and Industry
Paul Hildreth	Policy Advisor, Department for Communities and Local Government
David Gani	Scottish Funding Council
Ian Gibson MP	House of Commons Science and Technology Committee
John Goddard	Chair of Science Cities
Phil Gummett	Chief Executive, Higher Education Funding Council for Wales
Gareth Hall	Welsh Development Agency
Martin Harris	Chair, Manchester Knowledge Capital
Martin Havenhand	Chief Executive, Yorkshire Forward
John Hawkins	Head of Policy Unit, Association of Greater Manchester Authorities
John Healey	MP, HM Treasury
Chris Henshall	Chair of Science City York
David Higham	Director of Economic and Regional Issues, Government Office North West
Lorelei Hunt	South West of England Regional Development Agency
Sue Kirkby	East Midlands Development Agency
Mark Kleinmann	DCLG Head of Urban Policy
Roger Lewis	NW Regional Consultant, HEFCE
David McAuley	Director of Higher Education, Department of Education and Learning
Graham Meadows	European Commission, DG Regional Policy
Roger Milburn	Ove Arup
Ian Mitchard	Welsh Development Agency
Ruth Mourik	Energy Research Centre of the Netherlands
John Mumford	Vice President, BP Oil UK

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Chris Murray	Director, Core Cities
Michael Noble	Yorkshire Universities
Clare O'Neill	Manchester Knowledge Capital
Mary Parkinson	Sustainability North West
Mark Pearson	Innovation Manager, ONE
Helen Pickering	Universities 4NE
Chris Pywell	Head of Strategy for Success, ONE
Bill Rammell	Department for Education and Skills
Randal Richards	Chief Executive, Engineering and Physical Sciences Research Council
David Ridley	Knowledge Transfer, ESRC
Tom Russell	Deputy Chief Executive, New East Manchester
David Sanderson	Science Policy Manager, North West Development Agency
Katrine Sands	HM Treasury
Jim Skea	Research Director, UK Energy Research Centre
Adrian Smith	Freeman Centre, University of Sussex
Paul Steeples	DTI Regional Policy
Sandy Taylor	Strategic Regional Advisor, Birmingham City Council
Greg Vaughan	Senior Policy Advisor, Department of Trade and Industry
Mark Watts	Senior Advisor to the Mayor of London
Sarah Webb	OSI Knowledge Transfer
Peter White	Director of Policy and Intelligence, North West Development Agency
Malcolm Wicks	Minister for Science and Innovation, OSI
Ceri Williams	Science Exploitation Manager, Yorkshire Forward
Phil Willis	House of Commons S&T Committee
Alan Wilson	Master, Corpus Christi College

Website Statistics

We have created a project-specific website (in 2004) to disseminate the outputs and results from the research. This is available at <http://www.surf.salford.ac.uk/BuildingScienceRegions/home.htm>. On average over the period 2006-2007, 1046 hits were generated each month.

