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# Regions

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## BUILDING SCIENCE REGIONS AND CITIES



- Multi-level governance, higher education and research: international experiences
- The rise of regional science policy in the English regions
- Universities, economic development and the regional agenda

## GLOBAL EXCELLENCE, LOCAL FUNDING

### Guest Editor Beth Perry reflects on creative science policies in English regions

In 2001 a little piece of science history was made when England's first Regional Science Council was set up in the North West. Its first task was to develop a regional science strategy for world-class scientific achievement, attracting talent and investment, driving innovation and enterprise, and benefiting regional health, environment and society.

North western developments marked the beginning of a new era of English regional science policy: regional development agencies (RDAs) and local authorities are increasingly seeking to harness indigenous science and technological assets for economic and social gain. Most recently (2004–05), the focus has been on designating six Science Cities (Manchester, Newcastle, York, Bristol, Birmingham and Nottingham), to lead the campaign to make science, technology and innovation (STI) the UK's engine of economic growth.

Initiatives have largely been bottom-up: for English regions, 'devolution without resource' continues to characterise national science and research policy: regions are responsible for the development of their own science bases *if* they deem it a priority for economic development. The key science policy Ministries, namely the Office for Science and Innovation, Department for Trade and Industry, Department for Education and Skills and Department for Communities and Local Government are largely sceptical that regional science investment optimises scarce resources for economic development. It has been

made clear that national science funds will not and should not be regionalised. UK plc comes first, regardless of the distribution of resource and spatial implications.

Policy approaches are beginning to change, albeit slowly. Initial hostility to the notion of regional science policy has given way to an increased sensitivity to the need for joined-up thinking. The UK's 2004 Science and Investment Framework emphasised two things, firstly, the role of science and industry in achieving Government objectives on reducing regional disparities, and; secondly, the need for joint working between Research Councils and RDAs to explore how national funding systems can be better aligned to regional economic strategies. These two thrusts together committed the Government to tackling the tension between regional policy and the pursuit of excellence.

Yet concrete evidence of a policy shift is hard to find. While knowledge transfer to create wealth is increasingly influencing national priorities, there remains little explicit spatial (read regional) dimension to science policy. Government departments' views on science, space and place remain inconsistent.

Gaps in the evidence base exist, for instance, in relation to the potential case for moving scientific facilities between regions as a tool in development, the desirability of ensuring 'fit' between innovation funding and research strengths and the need to learn from

the experiences of Scotland and Wales about the potential benefits/detrimental effects of a regionalised HE policy.

What is needed is greater consideration of how funding regimes can be made more sensitive to supporting universities' engagement with their regions and localities in a variety of ways. Resources for university-business interaction have been increased, but are dwarfed by those available for research and teaching. There is clearly capacity to be harnessed across European regions, but policy 'cheerleaders' are hard to find. A notable exception, Science Minister Lord Sainsbury, sees regional investments supplementing national funds rather than a zero-sum game.

World-class research clearly needs to be supported. Yet regional science policy does not imply a dilution of this scientific excellence, rather selective investments in research and exploitation enabling the development of a more balanced distribution of clusters of scientific excellence. Failure to address such concerns means that the potential of regional science councils or Science Cities will be lost.

Without transformative effect, initiatives will ultimately appear to be little more than spin. We can no longer rely on an automatic assumption of trickle-down from prosperous to more disadvantaged areas. Governance, capacity, joined-up policy and a rethinking of science are important prerequisites to building science regions and cities.

*Further information is provided in the Regional Survey from page 6.*

## ETHICS FOR RESEARCH AND EVALUATION

### John Diamond argues for a clearer framework for regional researchers

One of the (probably) unintended consequences of Labour's enthusiasm for projects and initiatives has been the growth of the 'research, evaluation and consultancy' industry. And a secondary consequence has been that neighbourhood based initiatives are subject to numerous and separate evaluations.

In some cases local project managers and residents are required to respond simultaneously to the demands of local as well as national evaluators. Local regeneration initiatives – which are by their nature multi disciplinary – may face

four or five evaluation teams entering local neighbourhoods to complete their contracted tasks. And in some communities, the picture is more complex.

Thus whilst it might be a good time to be an academic working in research and evaluation, it may not be so good to be a resident or a regeneration professional who has to cope with the demands that we (as temporary visitors) make.

As practitioners we will all be aware of the necessity to have explicit statements on the ethical issues raised by undertaking our research fieldwork. Many of us

will have contributed to research codes of practice in our differing academic and professional associations. Most national evaluations contain statements on the use of data collected, the rights of individuals who participate and the centrality of confidentiality in the process.

The question is not: do we need guidance of the ethics of undertaking research and evaluation but rather how do we translate that into the specific contexts within which we find ourselves? In other words what responsibilities do we have when sitting down



## REGIONAL SURVEY: BUILDING SCIENCE REGIONS AND CITIES

This regional survey is guest edited by Beth Perry, SURF Centre, Salford

### INTRODUCTION

It is widely held that we now live in a hi-tech, hi-speed 'knowledge economy' in which science, technology and innovation (STI) are the key drivers of wealth creation and competitiveness. Many European countries have lost the battle for competitive advantage in land, labour and production costs and must now drive economic growth through innovation, skills, creativity and knowledge. This new world is both global and local. New paradigms of regional development emphasise innovation and the application of knowledge, embedded in economies of scale and surrounded by a critical mass of complementary expertise.

The global and local manifestations of the knowledge economy can be seen enshrined within contemporary European frameworks for action such as the Lisbon agenda (see *Regions*, No.262, p.7), the European Research Area initiative and the Bologna Declaration (European Commission 2001, 2003). Higher education institutions are critical to this agenda in terms of their multiple functions as knowledge producers, educators, civic agencies and potential agents for economic and social change.

Regions therefore need science. Yet there is evidence that science also needs regions. Regional agencies are increasingly providing vital co-funding as well as sources of support-in-kind. The exciting areas of research are in the grey zones between disciplines and sectors. New collaborations are needed between universities and key stakeholders to identify and solve complex interdisciplinary cross-institutional problems.

This is particularly the case with newer technologies, such as ICTs, biotechnology, nanotechnology or material science, which transcend disciplinary boundaries and depend on research-industry interactions at international, national and sub-national levels. Regional science is not just about chem-

istry and physics, but media, aviation, digital industries, environmental technologies and creative industries.

The enthusiasm with which sub-national actors have embraced science-based growth is remarkable, yet policy developments are proceeding at a faster rate than theoretical and empirical evidence. There are gaps in our understanding of 'what works' in distinct sub-regional circumstances, the critical success factors of regional and local initiatives in different contexts and the contribution of different knowledges, disciplines and institutions.

As a result, policy is advancing on the basis of suppositions and investments are being made in attempts to emulate perceived (rather than substantiated) best practice. It is timely therefore to take stock and consider the scope for local and regional policy interventions which can support and seed the development of globally excellent research with real potential to drive knowledge-based economic development.



### Governance, policy, capacity

This special edition of *Regions* takes its inspiration from current research funded through the ESRC's Science in Society programme whose support is gratefully acknowledged. It draws on a wide range of contributions based on recent research by eminent academics, and insightful overviews of contemporary policy developments and reflections on key challenges by university managers. The articles are organised in three broad themes: governance, policy and capacity.

In a first section the diversity of international experiences and governance arrangements is highlighted. David Charles' article on multi-level governance arrangements in higher education is complemented by Jean-Alain Heraud, Knut Koschatzky and Fumi Kitagawa's more in-depth discussions of developments in continental Europe and South East Asia.

A second section then considers the rise of regional science policy in the English regions. My overview of key developments and challenges is contextualised by two contributions, one on 'Manchester: Knowledge Capital' from Cathy Garner, and secondly, the 'N8' Science Initiative from Trevor Page and David Secher. The role of science and technology in regenerating Teesside is then considered by Mike Hodson and Simon Marvin, providing an insight into regional science in action and the importance of supportive national frameworks.

The final section then turns to the implications of the regional agenda for universities. Tim May provides a cogent analysis of the 'missing middle' between the expectations held of universities in a sub-national knowledge economy and their capacities to deliver if effective policy-making and intended outcomes are to be achieved. Deian Hopkin highlights how the regional agenda is only one among many priorities currently facing universities in terms of their wider economic and societal roles.

The survey concludes with a report on recent activities of the ESRC-funded 'Embedded University' network, from myself and Elvira Uyarra. We highlight a series of remaining research questions that need to be addressed. In raising these issues of governance, policy and capacity, we hope that this *Regional Survey* can help foster a more productive dialogue about the necessary conditions at multiple scales for successful policies to build science regions and cities.

## GOVERNANCE I: MULTI-LEVEL UNIVERSITY SYSTEMS MODELS

David R. Charles, Newcastle University Business School

Debates about multi-level governance tend to be primarily framed around economic and social development policy areas, in which it is assumed that regions have as much interest in policy outcomes as national and indeed supra-national governances. More recently, however, the multi-level governance of science and innovation policy has been developing as a result of the connection between science and new economic development strategies. This challenges the perception frequently held in the UK and Europe, that university governance is a special case and is naturally dealt with at the national level, making regional governance of universities an undesirable outcome.

The UK model of university funding and governance is not particularly typical in global terms. In England, regulation and core funding of universities is undertaken by a single national body – the Higher Education Funding Council for England (HEFCE), with a devolved system for governance and funding of universities in Scotland and Wales.

Elsewhere, regulation and funding may be separated, and perhaps undertaken at different governmental scales, whilst in some countries it is regional or sub-national scales dominating higher education (HE) policy. In addition, there are distinctions between the autonomous position of universities in the UK and much more tightly state controlled models from across Europe. Within these different systems, the scope for a regional dimension to governance and policy varies considerably, and indeed the national culture of HE further complicates the situation.

One way to visualise the relative roles of national and regional governments in the governance of universities is to map the position of particular national systems of HE on two axes, one for

regulation and the other for funding, with the scale showing the dominance of national or regional government on each axis. If we compare England with other English speaking countries with similar HE cultures, such as the US, Canada and Australia, it is apparent that their federal systems of government have a significant effect on the regulation and funding of HE.

In Australia, which has a similar structure of higher education to the UK, the universities were initially approved and regulated by state governments, even before the formation of a national state, and state governments have retained regulatory powers. They approve the formation of universities, appoint representatives and approve university councils, and intervene in cases of quality infringement

Funding of student places and research has passed over time to the Commonwealth government, and there is a tendency for the national level to seek to influence and regulate through the funding formula, but state governments still protect their historic rights. Indeed, the Australian state governments are increasingly looking to increase their influence through major investments in the science base, co-funding new research institutes and even pump-priming new degree programmes, as well as supporting a general programme of outreach and regional engagement on a project basis.

Canada and the US also have strong state/province based systems of higher education with the state level both regulating and funding HE. Federal governments have increased their role over time through the provision of additional research funds, and in the case of Canada, through a shared responsibility for regulation, but both systems remain subject to decentralised political control.

The European tradition is normally considered to be nation-state driven, and in most European countries, universities are more strongly controlled by the national government through direct employment contracts for staff and national ownership of university assets. Yet here again there has been a greater move towards regional government involvement in the management of the HE system.

Germany, of course, through its federal system has always seen a shared responsibility for universities, with funding shared between state and federal governments (*cf.* Heraud & Koschatzky, this issue). However the regulatory relationships between the two levels are complex and varied, and even though there is considerable regional-level funding, there are countervailing pressures for national conformity and standardisation.

Other countries are also moving in this direction, notably Spain which has seen the transfer of responsibility for universities from the national government to the new autonomous regional governments, starting with Catalonia and the Basque Country (1985), finally reaching all regions by 1997. In Spain, regional governments regulate universities and provide funding for teaching, but research funds are still largely a national responsibility. The main proportion of the recurrent income of each university is derived from a core grant made by the regional government.

However, some regional governments have challenged this position – Catalonia launched a constitutional challenge and asked that their share of national R&D expenditure should be handed over to them for distribution, but were defeated in the courts. In the absence of a decision to decentralise this funding, some regions have decided to add funding from their own resources for research growth in the universities. As a result, the Catalan government spends as much on research in its universities as does the national government. Elsewhere Belgium and Austria also have regional systems.

Regional funding is not a general tendency, however, with the retention of a strong national focus to funding in Greece, Finland, Ireland and the Netherlands. In each of these cases, funding is direct from a national min-

**Fig 1 Role of governments in university governance**

Regulation	<b>Regional/state</b>	Australia ↓	Spain →	USA
	<b>Shared</b>		Germany ←	Canada
	<b>National</b>	UK (England)		
		<b>National</b>	<b>Shared</b>	<b>Regional/state</b>
			Funding	

istry or higher education authority via some variant of block grant or student weighted payment, although with some planning for growth in particular locations.

The UK as noted above is something of a hybrid, arising from its peculiar national governance. Thus whilst England has all the attributes of a 'nationally funded' university system, the establishment of a separate parliament for Scotland, and other forms of devolution in Wales and Northern Ireland has reinforced the independence of the separate funding systems in these territories.

Although a number of university systems have been through a process of increasing relevance to regional needs, this is not always associated with the regionalisation of funding or regulation. The extent to which funding is region-

alised depends, in part, on the existence of a regional tier of government with fiscal responsibilities.

Yet, even if universities are funded by regional bodies, this does not guarantee that the orientation of the university culture is to the region rather than the national level, or vice versa. This depends on the implementation of policy levers to shape the internal agendas of universities, either by directing resource allocation to specific kinds of activities, or by providing additional incentives or special funds for new regional activities.

The desire of regional/state governments to support their universities in establishing international levels of excellence, as well as underpinning regional strategies can be seen clearly in the additional resources provided by state governments in Australia (even to

the extent of synchrotron on a Monash University campus paid for by the Victoria state government) or the additional resources provided by Catalonia over and above the usual national government research funds.

None of this necessarily suggests that the UK should move to a regionally devolved HE system beyond the situation in Scotland, Wales and Northern Ireland. Appropriate forms of devolution depend on political accountability at the regional scale and, in the absence of regional government within England, no real devolution of HE regulation or funding seems possible. However, in many countries, there is a legitimate degree of negotiation between national and regional interests over the governance and management of HE, with benefits both for the regions and in some cases for the universities.

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## GOVERNANCE II: REGIONS, UNIVERSITIES AND EXCELLENCE IN EUROPE

### Jean-Alain Heraud and Knut Koschatzky

The European Research Area (ERA) initiative committed the European Union (EU) to spending 3% of GDP on research and development by 2010 to enable the EU to better compete with the knowledge economies of Japan and the USA. The corollary to a focus on international networks of excellence is recognition that there is a regional dimension to the ERA in which industry, university and local agencies collaborate in a reinforced partnership for economic development. This has drawn greater attention to the need for regional science policies in different national contexts.

### Germany: a strengthening national system

The scope for regional science policy in Germany can only be understood against the background of the federal system. While the federal government is responsible for general framework conditions, the implementation of education both at the school and the university level is under the legal and financial responsibility of each of the 16 German federal states (*Länder*). They have the highest decision-making powers and can set different scientific-technological focuses through university research. Each *Land* sets its own rules for university education and pursues its own

science policy, yet the degree of autonomy differs greatly between the *Länder*.

During the last years, the science expenditures of the federal states grew only slightly and even decreased in some federal states. Due to dwindling budgets at the *Länder* level, universities have been forced to look for additional funding and the openness for new forms of cooperation with industry has increased.

At least three important trends can be observed: the promotion of university spin-offs, the licensing of inventions and new forms of university-industry collaboration. These trends open up new opportunities for additional funding and access to research activities close to the needs of industry, but also place universities under new threats, particularly with regard to a possible loss of focus on basic research and a stronger dependence on the research demands of new clients.

Since the 1970s the building of new universities in so far underdeveloped regions had been used as an active instrument in regional policy. Yet the situation has recently changed. Mergers between universities, such as the Universities of Duisberg and Essen, and increased autonomy for universities will enable those universities with good starting conditions with respect to teaching, scientific excellence and budgets to progress further.

The expected strong increase in the number of students after 2010 and the recent reduction of jobs at universities will pose many universities severe problems, not only in teaching, but in research as well. It is not difficult to anticipate that in the long run only the attractive teaching and research universities will remain, while the others will have to reduce their disciplinary spectrum further.

An important activity in this respect is the 'Initiative for Excellence' which offers complementary funding for universities from the federal government. It is organised as competition among the universities along three lines: post-graduate schools for young scientists; clusters of excellence; and funding for ten selected elite universities.

A key consequence of the initiative is therefore that the cluster approach will cement pre-existing regional disparities in higher education for the sake of scientific excellence and international competitiveness. A second side effect is that the federal government safeguards its influence on the science policy of the *Länder* for another six years. This potentially means that the paradigm of a science policy with a clear regional policy focus, long associated with the German state is undermined.

### France: from Colbertism to complex governance networks

Starting from a centralist tradition, the governance system in France is experiencing greater decentralisation, in higher education and research (HER) as much as other public functions. Universities are still state-owned and centrally monitored to a large extent, but they have progressively been given greater autonomy in terms of administration and there is a tendency to complement national budgets with regional/local subsidies. Furthermore, linkages with private sector organisations are encouraged, through research co-operations, consultancy, technology transfer or exchanges of researchers.

The scientific scene is under transformation, leading to several multi-actor spaces where science is designed and monitored. With the new *Agence de l'Innovation Industrielle* (AII), the state is seeking to encourage large innova-

tion projects at the firm level, but in co-operation with public research organisations. Another novelty is the creation of a national research agency (ANR) – a National Science Foundation *à la française*. Researchers and research teams can now directly apply for resources without going through their institutions.

Regionalisation is one aspect of those changes in the national system of innovation. Several factors have boosted this evolution towards more decentralisation of HER: institutional changes; dwindling national budgets encouraging regional/local co-funding; the evolution of the science and technology arena and new modes of knowledge production/diffusion which challenge the traditional state-driven organisation (Colbertism). The evolution and reinforcement of the university system is especially at stake in the French system of innovation, which has been characterised by the importance of very large national research institu-

tions. Universities have traditionally been seen as national organisations, but fit better with new regional co-operation schemes than the French laboratories.

Governance mechanisms are becoming increasingly complex. A typical multi-level negotiation platform is the so-called *Contrats de Projets Etat-Région*, where national, regional and local authorities decide joint investments in public programmes, including the sectors of HER and technology transfer.

Recently, France's cluster policy (*Pôles de compétitivité*) introduced a real institutional innovation in France: a national competition for clusters, but one in which regions themselves define proposals for national funding, based on bottom-up initiatives and the self-organisation of local actors (HER institutions, firms, regional authorities). The resulting competition between territories sits very uneasily with the deeply engrained French principles of equity and balanced growth.

## GOVERNANCE III: CREATING INNOVATION HUBS IN SOUTH EAST ASIA

### Fumi Kitagawa, National Institute for Educational Policy Research in Japan

New types of innovative city-regions are emerging in South East Asia, such as Hong Kong and Singapore as part of the globalising knowledge economy. Governments have launched new strategies to create 'local innovation hubs' in pursuit of knowledge-intensive economic growth which are linked to regional, national and global innovation systems. Now the race is on to attract global talent and to compete for the mantle of South East Asia's innovation hub. This short article focuses on Hong Kong and Singapore as exemplars of creating new innovative city-regions in the South East Asian region.

Singapore, a city-state with 4.4m population, is striving to become a leading global player in high-tech industries such as semiconductors and genetic engineering. Singapore is also attempting to establish itself as a Southeast Asian media center, 'Mediapolis'. Singapore is mounting a major internationalisation drive by establishing jointly-owned technology parks in a number of countries, including China, India, Indonesia and Vietnam.

The government is recruiting top talent from abroad. To attract foreign R&D, the government, through the National Science and Technology

Board, has focused its efforts on improving and expanding investment in higher education and research facilities as well as creating centres of excellence. The Massachusetts Institute of Technology (MIT) set up the Singapore-MIT Alliance in 1998 to promote global science and engineering education and research collaboration with universities in Singapore. The emphasis of the programme is on creativity and entrepreneurship.

Such a series of developments in Singapore heats up the competition for technology supremacy with Hong Kong, the biggest investor in mainland China. Hong Kong, the Special Administrative Region of the People's Republic of China, with 6.9 million inhabitants, has its own plan to be a new-economy hub. The city is both a centre of business with China and the top international service and finance center in Asia. Hong Kong aspires to become a centre of high-tech and entertainment electronics as well as Asia's leading TV and movie industry location.

It is a place where the dynamic economic region of the Pear River Delta (PRD) merges with the global economy. However, Hong Kong has been weak in its R&D capacity. Venture invest-

ments or funds with a technology focus have been lacking in Hong Kong. Since the Asian Financial Crisis in 1998, the Hong Kong government has launched major initiatives to improve innovation in the economy.

The city set up the Innovation and Technology Commission, which aims to enhance high technology and support R&D. Measures include the establishment of the 'Innovation and Technology Fund', the Applied Research Fund and a fund that invests in promising start-ups. It has been pointed out that a regional innovation system including Hong Kong and the wider PRD region with greater political and economic autonomy is emerging, and the policy direction has been suggested to strengthen the overall infrastructure to facilitate R&D activities in Hong Kong and the PRD region.

Technological innovation has only recently attracted serious attention in South East Asia. The main causes are the lack of an indigenous R&D tradition and the relative lack of interest among young people in an R&D career. Progress in the recent innovation systems in both Hong Kong and Singapore shows a new spatial order with the convergence of policies and institutional

inter-linkages at multiple spatial levels within the South East Asian region.

Singapore and Hong Kong have traditionally occupied a special status as cities of international trade and financial centres. Both city-regions are moving towards new innovation hub status in Asia with strong global links. Such developments are not confined to these two examples. Malaysia's efforts to build a Multimedia

Super-Corridor are unique, a new state attempt to nurture a digital district in Kuala Lumpur for developing advanced technology with strong global links.

The key question is whether or not the aspiration of these city-regions to become global innovation hubs has changed the nature of Asia's 'developmental states' characterised by the strong influence of the central government. In

order to become a truly global innovation hub in the South East Asian region, it may not be sufficient to provide generous research funding and infrastructure and to import technology and foreign talent. Investment in creative talent, as well as nurturing a creative cultural environment, must be key strategic elements of new science and innovation policies in the region.

## POLICY I: REGIONAL AND LOCAL SCIENCE POLICIES: TOWARDS BALANCED EXCELLENCE AND GROWTH?

**Beth Perry & Tim May, SURF Centre**

England's regions are taking small steps along an increasingly well-trodden path. Regional development is overflowing with conceptual tags and geological imagery: from knowledge corridors, clusters or capitals to silicon valleys, alleys, glens and fens. Out of the media glare occupied by well-known examples such as Boston 128 or Silicon Valley, numerous regions and localities have adopted strategies towards science-based economic development.

Initiatives such as 'Science Region Bonn' or 'Bielefeld 2000 plus' are seen as vital to sub-regional growth and competitiveness in North Rhine Westphalia, Germany. 22@bcn is an urban regeneration project in central Barcelona that aims explicitly to transform the former industrial district of Poblenau into a main platform for the regional knowledge-based economy.

The clamour to host new scientific facilities, such as the International Thermonuclear Experimental Reactor, demonstrates the priority attached to science, technology and innovation (STI) in regional strategies, with Catalonia in Spain fiercely contesting the French region of Provence-Alpes-Cotes-d'Azur for the privilege of fronting the cost.

Regions have a long history of engagement with innovation activities but the novelty in the current climate is intervention in traditional science policy areas, such as funding research or attracting and developing academic expertise. Regions fill an important gap in pump-priming, co-funding infrastructures and facilitating interactions. Regional science policy can be physical, symbolic, additive and transformative (see Box 1).

In practice, a range of interventions are being taken in a complex policy mix,

with the ultimate aim of transforming regional economic and social fortunes through STI. Tony Blair recently wrote in *Newsweek* (27<sup>th</sup> May 2006) that enterprise, education and skills are central to ambitions of boosting social mobility, tackling poverty and spreading prosperity and that markets alone will never create a knowledge economy.

The social dimension is key: but this is all too easily forgotten in the rush for sexy scientific status symbols or flashy new buildings where science takes place out of sight of the society that funds it. Transformation requires moving from regional or local *support for science* to see how *science can support* the development and growth of our places and spaces for the benefit of business and communities.

There are several important issues in making this transition. It is not simply a question of regionalising science policy. International comparisons show no automatic correlation between officially devolved regional responsibilities or budgets for science and the direction of STI investments which target regional needs. French regions, for instance, have greater legal autonomy than English regions, yet take fewer policy initiatives in STI areas than the non-elected, business-led, resource-poor RDAs.

In federal Germany, current debate relates to how a selective and focussed science policy which supports world-class excellence is possible in a regionally-differentiated and federal state, in the context of moves towards the European Research Area (ERA) and the associated emphasis on scientific competition and international networks.

Capacity and governance are therefore key for both regional agencies seeking to harness STI and also univer-

sities (*cf.* Tim May, this issue). In many countries, national research structures create bureaucratic barriers to university engagement and incentive structures influence academic behaviour. The role of universities in delivering objectives in relation to outreach and widening participation is important. But this needs to be balanced by an understanding of universities' legitimate functions as spaces of free thought and creativity, and not simply as tools of Government policy.

Yet a blinkered view of science predominates in which fears about the dilution of scientific excellence have been woven into defences of the *status quo*. Regional science policy has not been met with widespread enthusiasm across different national Government departments or European Commission directorates. Concerns remain about a perceived trade-off between international excellence and regional growth.

Beneath supranational frameworks, national and regional diversity persists. In France and Germany, governance structures, regional systems and university cultures interact to produce unique responses to the issues of regional science-based growth. Yet there are clearly common issues that inform higher education and regional reform. Most importantly, the dynamics of the ERA are leading to an increased focus on competition between territories in the search for international excellence. This has paradoxically led to efforts both to steer research as well as expand the autonomy of the university, with an increasing differentiation of roles and functions between institutions of higher education.

There are three key policy implications that need to be addressed if the promise of regional and local science policies is to be delivered. First, there is no optimum

**Box 1: Exemplar policy rationales for regional and local science policy****Physical**

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. Science Central in Newcastle is to be based on the site of an old brewery and the former Terry's Chocolate Works in York will be redeveloped to include an integrated creative and digital business centre.

**Symbolic**

Science also has symbolic value. Investments are made in high profile areas, such as genomics or stem cell research, as a crucial part of building a positive image and reinventing regional identities. Initiatives, such as the National Centre for Zoonosis Research in Liverpool or the support given to the Nobel Prize winner for Chemistry in Strasbourg by Region Alsace, are not designed to lead directly to improvements in economic performance, but to enhance reputation, image and scientific credibility.

**Additive**

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. This can take the form of support for reinforced institutions, such as the merger between the Universities of Manchester-UMIST or the Universities of Essen-Duisberg. Incentives are being offered to mobile academic stars around whom clusters of excellence can be built and who can lever additional resource from industry. In Germany, regional funding is important in enabling consortia to form that can subsequently bid for European funding.

**Transformative**

Regional science policy can be transformative, with investments designed to directly improve the relationships between the science base, industry and government and to address a number of regional and local socio-economic needs. Examples range from creating spin-offs or working with existing companies to improve their innovative capacity, to more socially-oriented interventions aimed at helping disadvantaged communities, improving the evidence-base for regional policy or enhancing science education and communication. The regionally-funded Research Institute for Regional and Urban Development, Building and Construction of North Rhine-Westphalia or the Innovation Partnerships of Manchester Knowledge Capital can be seen as attempts to achieve these goals.

distribution of resources and responsibilities for science policy that fits all countries, regions or cities. Science-based initiatives succeed if they can meet policy-makers' needs at a range of levels and across a variety of sectors, necessitating networks, partnerships and alliances. There is no magic bullet or structural solution. Cross-national and cross-regional comparisons are essential in understanding the dynamics of success in different contexts, but the focus must be on transferable lessons not transferable solutions.

Second, joined-up policy thinking is needed at both European and national levels on higher education, science and innovation, health, skills and regions and cities. Better sectoral co-ordination is key to enabling issues relating to governance, incentives and regulatory frameworks to be addressed. The need for university reform to create responsive and adaptable institutions is paralleled by the need for appropriate governance structures with a strategic capacity in a post-Elected Regional Assembly era.

Finally, regional science policy needs a rethinking of science to legitimise a 'balanced excellence' model of growth, both in terms of research funding and the location of research facilities. Public policy must review and enhance the evidence-base for regional intervention in STI to examine how the expected benefits from science can be achieved. This also requires addressing important questions relating to the breadth and depth of regional science policy and the role of different institutions.

**POLICY II: BUILDING MANCHESTER'S SCIENCE CITY****Cathy Garner, Chief Executive of Manchester: Knowledge Capital**

Manchester, UK was a world city in the 19<sup>th</sup> century at the heart of industry, manufacturing, engineering and cultural and political thought. Manchester's ambition for the future draws on this past. The spirit that has delivered a remarkable turnaround in fortune over the past two decades also governs its future. Manchester has set its sights on becoming a world-class Science City, a leading centre in the global knowledge economy of the 21st century.

The city's vision for its Science City programme is based on the prin-

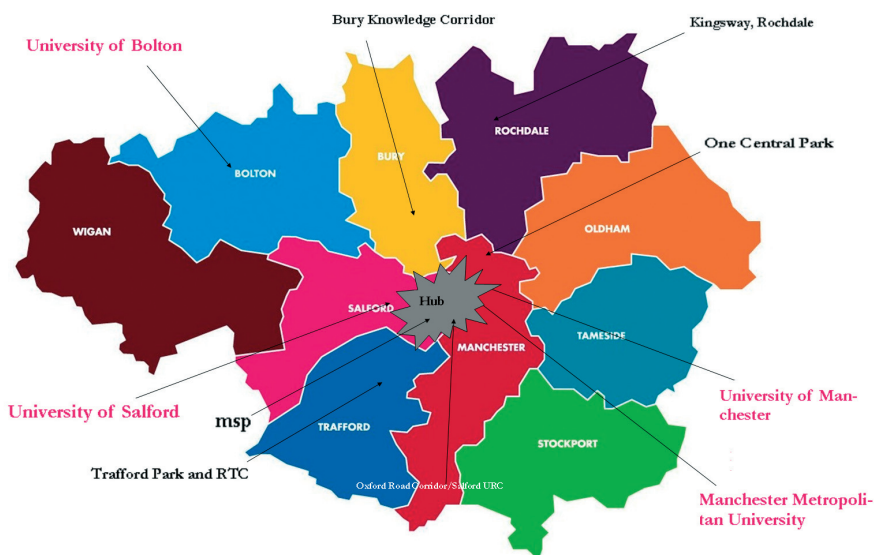
ciples of: economic success through innovation; social inclusion for all the people of Manchester; and, environmental sustainability as an underlying principle. The vision is being driven by the Manchester: Knowledge Capital partnership which is a grouping of city leaders from academe, local government and business, who fund the initiative as well as support from the Regional Development Agency. The Manchester: Knowledge Capital partnership seeks to ensure that Manchester will be globally recognised for its ongoing achievements

in knowledge, innovation, culture and enterprise.

Manchester: Knowledge Capital is first and foremost a knowledge-based economic development partnership and a champion for new ways of working and living – a transformation agent and a catalyst. The realisation of the partnership's ambition will not be delivered by increasing science and research excellence alone.

This is why the Manchester Science City programme is not only about investment in more science, but it is also about ensuring that excellence





### Manchester: Knowledge Capital – Science City Hubs and Spokes

pervades business and industry, stimulates appropriate skills development and educational attainment, and encourages a community that accepts and embraces research and innovation as a meaningful part of their life and work.

We have learned from others around

the world the lessons of a two-speed knowledge economy and the consequences of its polarisation and increased inequality. The development of the knowledge economy in Manchester is not only about increasing the number of start-up companies from the science

base, not only about increased external private sector investment and the development of new science facilities.

These will all be important. Success for Manchester: Knowledge Capital and its Science City programme will be measured as much for its contribution to addressing the health, education, employment and skills challenges facing the city. Alongside initiatives to attract increased venture funds and highly regarded scientists to the city, the partnership includes organisations from the social and voluntary sector which connect individuals and families from many communities who might not naturally have good connections into growth opportunities.

Funding is being sought to support a range of innovative programmes to bridge this divide, including digital connection and links to music, art and creative industries to ensure that Manchester offers all its citizens the opportunity to use all their talents. This is an ambitious agenda but one where Manchester's pioneering spirit and determined leadership will not contemplate failure.

## POLICY III: THE NORTHERN SCIENCE INITIATIVE (THE 'N8')

### Trevor Page, Newcastle University and David Secher, N8 Consortium

The 'N8' is a research collaboration between the eight most research-intensive universities in the North of England, York, Sheffield, Newcastle, Manchester, Liverpool, Leeds, Lancaster and Durham. The N8 Consortium was created in response to the launch of The Northern Way initiative by ODPM in 2004.

The N8 provides unique opportunities to drive forward the Government's *Ten Year Strategy for Science and Innovation* by translating the depth and critical mass of their combined research excellence into societal and economic benefits. The N8 grouping has the research quality, income and critical mass to match university groupings in the South East of England, Europe and USA. Whilst geographically spread across the north of England, the universities are no further apart globally than the campuses of the University of California.

Besides their research acumen, the eight universities can also draw on a wealth of further experience in technology transfer, commercialisation and regional development, building on existing European, regional and sub-regional networks, including those



Lord Sainsbury, speaking at the second national Science Cities Summit in Manchester in May 2006

surrounding the emergent Science Cities of Newcastle, Manchester and York.

The N8's first step has been to identify areas of research excellence and capacity which are predominantly held in the North of England and which may be translated into significant benefits for UK plc over the next decade. Initial

priorities are Ageing and Health, Water, Molecular Engineering, Energy and Regenerative Medicine.

The five thematic strands will be led by Working Groups drawn from across the eight Universities and with members variously representing research excellence, industrial linkages and research

translation and commercialisation. There will be strong business representation on these Working Groups. To govern the overall collaboration, a Joint Venture company is being established, led by a Chief Executive (Professor David Secher) and with a Board containing representatives of all the member universities.

Initial funding for N8 will come from the Northern Way Growth Fund. This will be used to set up virtual research centres or networks, in the chosen thematic areas. These networks will then seek research and development funding from Research Councils, Government,

EU and industry.

To achieve success, it will be critical to ensure that the research networks fit well with member institutions but also with the priorities and policies of the Northern RDAs, Central Government and the EU which are all seeking to promote regional development by exploiting regional knowledge resources. This will involve finding innovative ways for business and academics to share large facilities, expertise in commercialisation, and access to early-stage venture capital.

Success will also depend on engaging industry to address long-term (10-20

years) business and technological needs. A further aim of N8 is to involve the public, particularly young people, in understanding the social, ethical and political implications, relevance and excitement of the work, something which is equally true of Science Cities.

We will measure progress and recognise success when the research excellence of the Northern universities – individually and collectively – achieves the international recognition it deserves and when the voice of those universities is respected and trusted on important social and economic issues.

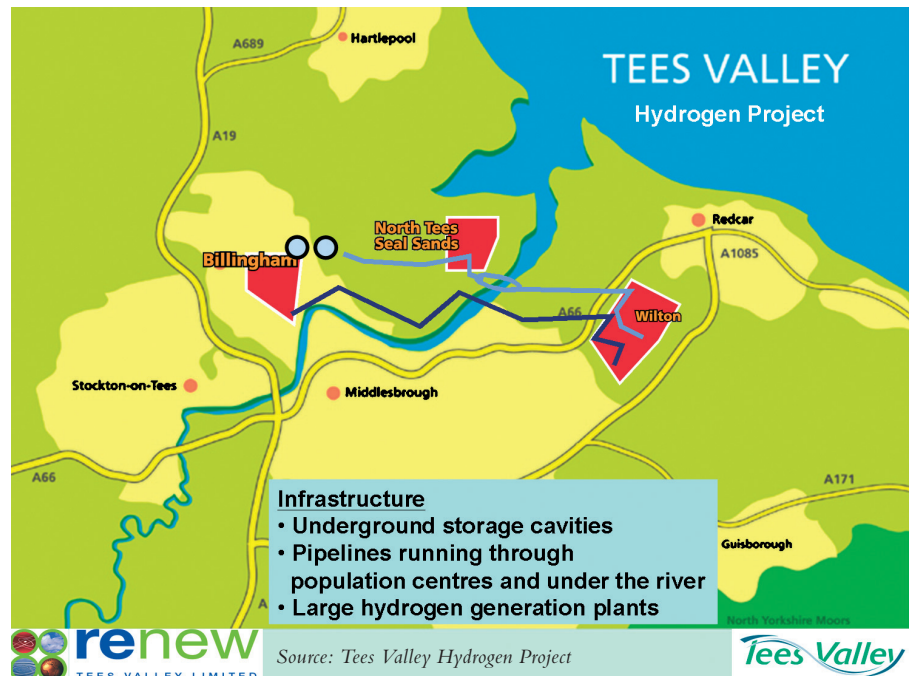
## POLICY IV: REGIONAL SCIENCE IN ACTION IN TEESSIDE

**Mike Hodson & Simon Marvin – SURF Centre, Salford University**

Old industrial cities and regions are increasingly attributing a key role to science and technology as a means of ‘regeneration’ and transformation. Teesside in the North East of England has, in response to decline in the chemicals industry, sought to develop an alternative hydrogen energy economy. This would be built on an existing production, distribution and storage infrastructure where hydrogen could be safely stored in 40 large salt caverns with an overall capacity of 600 tonnes, and distributed around 30km of pipeline between three large hydrogen generation plants straddling the River Tees.

Yet the hydrogen economy is a highly contested idea, with advocates as varied as George W. Bush and Greenpeace. It may be broadly understood as the widespread use of hydrogen as a fuel for transport, heat and electricity generation. At a national and international level, the development of a hydrogen economy is often understood as providing a response to the difficulties associated with a widespread reliance on fossil fuels, in addition to providing opportunities for economic development. At a regional and local level, in the UK, it is this latter issue that has often shaped interest in hydrogen.

This contemporary attempt to represent Teesside through developing a hydrogen economy had a coherent narrative that built on the region’s 20<sup>th</sup> Century history. The infrastructure, skills, knowledge and social processes which developed as a legacy to the petrochemicals, steel and coal industries have been seen as vital assets and resources in creating new jobs and economic pros-



### Making Teesside’s Hydrogen Economy Visible

perity within contemporary agendas.

In Teesside it was hoped that the hydrogen economy would offer a basis for restructuring traditional activities, skills and infrastructures with a number of currently perceived growth areas. The development of a transformative ‘vision’ of a Teesside hydrogen economy, although led by a local authority, Redcar and Cleveland Borough Council, involved the ‘stitching together’ of various agendas regionally (science and innovation), sub-regionally (economic competitiveness) and locally (job creation).

But there has been little tangible material manifestation of the hydrogen economy – a situation common with a number of other cities and regions in the UK. Why is

this so? For a number of reasons; primarily though, whilst those involved regionally in developing the Teesside hydrogen economy generated a partially shared understanding through the stitching together of agendas, this was less apparent in the relationships between the region and national government.

National officials were primarily focused on how Teesside could act as a site for national hydrogen economy demonstrations rather than hydrogen’s local and regional transformative potential. The regional vision of Teesside as local and regionally developed with a post-industrial future for regeneration was clearly at odds with the national vision as an old industrial centre. The result was a tension between transformative potential and the obduracy of existing political perceptions and relationships.

The view that technology can be harnessed in attempts to regenerate and transform old industrial regions raises three important issues. First, it provides an example of the disconnection between regional views of regional transformation and national views of regions. This has important consequences given the relative constraints on coalitions of regional actors acting in isolation.

Second, the mismatch between the vision of a re-imagined Teesside and its communication, mediation and reception is an important one to acknowledge as this process of representing and communicating regions is crucial to leveraging resources (particularly economic capital), whether these resources come from national government, the EU or private corporations.

Finally, the critical issue is how can such

relations be unblocked – how could a transformational strategy be developed that involves regional and national actors as well as critical commercial interests? The salient issue is that national officials need to be engaged by local and regional actors and become meaningfully involved at the earliest stages of developing a transformative vision, rather than solely as recipients of such a vision subsequent to its production.

## ORGANISATION I: UNIVERSITIES' 'MISSING MIDDLE' AND SOCIO-ECONOMIC ENGAGEMENT: POLICY, ORGANISATION AND CAPACITY

Tim May, SURF Centre

In a modern 'knowledge economy', universities have varied roles to fulfil: to educate and train students; to produce excellent research according to peer-reviewed criteria; to innovate in order to enhance productivity through collaborative relations with external partners; to produce relevant research according to the needs of client organisations; to make socio-economic contributions to their localities and businesses in general and to enhance civic value in the public realm.

Inherent in these diverse roles are sets of expectations, which embody different values. Their overall balance, in the U.K. context, is mediated via Government policy with incentivisation through alternative funding streams.

In each case, differing Government assumptions about connections between research, teaching and third mission activities dictate 'appropriate' measures of success for the university. Ideas of knowledge transfer, for example, tend to rest upon outputs that are measurable according to patents and/or the setting up of new companies.

Matters of organisational accountability are set according to targets: performance is judged by the ability to attract resources; economic impact is mediated through the production of spin-out companies, patents and the attraction of inward investment, whilst research and teaching scores are taken as demonstrable indicators of excellence.

Acknowledging the diversity of values that underpin Government assumptions and targets for the university raises core questions about the appropriateness of national policy instruments. Mixed messages are apparent in the drives for international excellence and collaborations for regional benefit.

It is assumed that research excellence

will lead, in some way, to relevance in a given locality, as if there were some automatic connection between the place in which a university is located and its benefits to that area. Institutions tend to compete, rather than collaborate. As a result some universities may be 'in', but not 'of' their localities (May and Perry 2006).



A tension is evident in the coherence, consistency and robustness of Government policy in terms of the degree to which stakeholders outside of Whitehall are involved in policy conception, rather than execution. According to Better Policy Making (Cabinet Office 2001: 14), modern policy-making should incorporate forward looking, outward looking, innovative, flexible, evidence-based, inclusive and joined up methods of working.

However, Government departments exhibit different assumptions and policies in relation to suitable scales for activities: from the local, to city-regional, national and international. When different signals come from Government departments, policy frameworks will remain ambiguous.

Concerted action does not simply require coherent policy frameworks, but also effective organisation. Internal

coordination within the university needs to be appropriate to meet external expectations. The traditional centralised and bureaucratic mode of organisation of the university is challenged by the need to respond flexibly to increasingly unpredictable environmental changes, to engage with the varying needs of a locality and in the pursuit of third stream funding.

New organisational forms are required that enable interpretations of environmental changes to be rapidly implemented into organisational responses. It is around teaching that we would expect higher degrees (no pun intended!) of bureaucracy within the university and a concern with the maintenance of numbers in order to allow for planning.

Research funding offers a variable level of predictability, in terms of the relative security offered by quality-related funding compared with engagement with external clients. A balance between centralised bureaucracy and flexible forms for the university demands not only imaginative management and appropriate design, but also the right mix of skills, values and knowledge among personnel across organisational units.

Despite these issues, relatively little is known about the contexts, which enable and constrain the relations that exist between policy expectations and the actual capacity of universities to deliver to different groups. Instead, we move from initiative to initiative without sufficient learning from experience, leaving expectations being either too impractical or unmet. Content-less policy initiatives are left to be populated by varying interests, without sufficient time for consultation or a general understanding of the conditions for success.

A 'missing middle' exists (SURF 2006) between the aspirations for universities in relation to socio-economic development, the nature of policy frameworks, the governance of spatial relations and organisational forms and capacities. A series of questions populate the missing middle.

At national level, these include: how do different government departments view scales of action and what are the implications for policies that affect higher education? Is a shared ethos developed in partnership with identified stakeholders who have a clear set of aims that are coherent, agreed upon and externally communicated in a consistent manner? How will it be understood and communicated when and how initiatives are having a positive impact?

At the level of the university and

sub-national stakeholders, the missing middle can be populated by asking the following questions: what are the relations between cultures of production and reception of knowledge which do not assume simplistic hypodermic models of knowledge transfer?

What types of institutional arrangements are required which preserve the distinctiveness of the university as a site of knowledge production, but also enable engagement with different stakeholders for mutual benefit? What are the changing skills, knowledge and priorities of personnel in different units and what effects do these have on organisational effectiveness and stakeholder expectations? What consequences do different forms of organisational design have for the university as a whole and what lessons may be learnt for the future?

These questions have not been subject to systematic and comparative research and yet directly influence the effectiveness of initiatives that involve universities in collaboration with various partners. Without this understanding in place, the distinctiveness of the university as a site of knowledge production, transmission and reception is diminished and so too is its contribution to socio-economic development at local, regional, national and international scales. Issues around the mixed messages of policy and organisational capability constitute an urgent need for a proper assessment of the relations between expectations and the capacity to deliver. We hear a great deal about 'what is to be done', but much less 'by whom, with whom, with what capacity and according to what desired effects'?

## ORGANISATIONS II: UNIVERSITIES AND ECONOMIC DEVELOPMENT

### Deian Hopkin, Vice Chancellor, London South Bank University

Since the introduction of Enterprise in Higher Education (DfES 1999), universities have been encouraged to engage in activities, which fulfil the objectives of regional and national economic policy. Graduate employability is now a key criterion in the league tables, while income from the Higher Education Innovation Fund is a surrogate measure of success. Universities engage, with varying degrees of profitability, with their RDAs and the evolution of knowledge transfer has accelerated. Universities UK has regularly produced reports on the economic impact of universities, whilst regional associations, such as London Higher, have emphasised their contribution to the local economy (Strathclyde/Universities UK 2006, London Higher 2005). Economic relevance has joined teaching and research as the third leg of university activity.

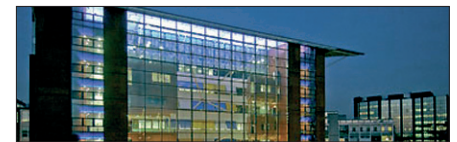
We are, however, on the cusp of three more dramatic changes, which will impact with varying severity across the sector as a whole. First, the new system of student finance that shifts the burden of cost from the taxpayer to the individual student is likely to change the perception of education. No one knows how the prospect of an average £20,000 debt will influence the choice of institution, subject or career by the client-student. Estate agents have

a carefully calibrated system of estimating market demand for property. If studying for a degree becomes the second largest investment in an individual's life, who is offering the same nuanced calculation?

Secondly, the internal economics of universities are changing. Universities have long recognised that the pocket of the taxpayer is not limitless. Every institution has been making its own calculation to deal with the inevitable reduction in state funding. For some, alumni or charitable contributions will provide new sources of income; for others intellectual property and spin-out companies offer alluring prospects.

An increase in contract income from the Health Service or teacher training may also be a lifeline. The lucky few can enjoy all of these. The problem is that once one moves outside the comfort zone of HEFCE or the Department for Education and Skills, the politics of engagement changes. Internal institutional politics have to adjust accordingly (see preceding article).

Most importantly, however, there is growing awareness that the educational system has not produced historically the range of skills which the UK needs to compete. We are, paradoxically, the fourth most successful economy but the 22<sup>nd</sup> least successful in terms of educational achievement (OECD 2004).



### Tackling under-achievement in the UK capital

Lurking in the complex undergrowth of British society is an educational virus which is undermining our economic potential; under-achievement is becoming a fashionable and dangerous aspiration.

The UK has never needed universities more than today. The mass emigration of software engineering and technical call-centres is partly caused by the reluctance of young people to consider science, technology or computing as worthy of attention. We are exporting our future. Supporting vocational and professional education is one means by which we may restore our position, but this in turn requires a re-assessment of the ways universities engage with employers and employability. The implications for the curriculum, assessment and methods of educational delivery are far-reaching, but for those who do embrace change, the prize may be considerable.

## CONCLUSIONS: THE EMBEDDED UNIVERSITY IN THE ‘SCIENCE’ ECONOMY: CONTEXTS, CAPACITIES AND EXPECTATIONS

Beth Perry and Elvira Uyarra

Regional and local science-based economic developments in the North of England have been the focus of a series of network events recently organised by the SURF Centre at the University of Salford, PREST at the University of Manchester and IPP/CURDS at the University of Newcastle.

The network, led by the SURF Centre, was established as part of the ESRC’s ‘Impact of HEIs on Regional Economies’ programme which funded five networks to examine the current state of knowledge in this area and to identify key gaps for further research.

The work of the network has been divided into two stages. In the first phase, a gap analysis of the current research was carried out through two workshops bringing together academics, senior HE managers and policy-makers and a supplementary literature review.

In a second phase, three seminars have been hosted focusing on a) the theory, measurement and practice of the role of universities in economic development, b) universities, science cities and the city-region agenda and c) cross-sectoral university engagement and strategic socio-economic development.

A number of key issues have emerged through the network events. Recent initiatives to promote ‘science cities’ require careful consideration. Concern was expressed whether the UK has the commitment and focus to ensure that science city projects are competitive internationally in terms of the necessary levels of national support and finance to ensure real transformative effect.

At the same time, science cities should not be restricted to a narrow focus and a re-branding of previous initiatives on science parks and incubators, but rather adopt a broader interpretation to include wider economic, social and cultural impacts of a university in the region and beyond.

This is, however, constrained by the limited evidence base available in relation to assessing these wider socio-economic impacts of universities. Besides quantifiable economic impacts on income and employment based on multiplier analyses, there is a lack of theoretically rigorous, empirically tested and measurable methodologies linking university activities with economic and social, cultural, environmental and health benefits.

There is also a lack of understanding of

the different scales (local, regional, cross-regional) at which these impacts occur. The territorial dimension of universities is not straightforward. Different geographies are linked to the different roles, activities and impacts of universities and possible contradictions, conflicts and tensions are likely to emerge due to HEIs pursuing different agendas at different spatial scales. The geographical pathways of HEI interactions are also influenced by external institutional and economic factors, such as funding structures and priorities, the industrial base and economic conditions of the region for instance.

Finally, city-regions are emerging as key geographical units for implementing science-based strategies, adding a crucial urban dimension (SURF and CUPS 2006). In this context, it is important to explore the links and interactions between HEIs strategies and the dynamics and strengths of the host city-region.

The issue of city-regional governance is central to the question of focusing investment to achieve critical mass at the local level, as is the need to consider sectoral perspectives, institutional differences and context-specific policy rationales.

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This special edition of *Regions*, 'Building Science Cities and Regions', takes its inspiration from current research funded through the ESRC's Science in Society programme whose support is gratefully acknowledged. It draws on a wide range of contributions based on recent research by eminent academics, insightful overviews of contemporary policy developments and reflections on key challenges by university managers.

The articles are organised in three broad themes: governance, policy and capacity. In a first section the diversity of international experiences and governance arrangements is highlighted. A second section then considers the rise of regional science policy in the English regions, with an overview of key developments and challenges, and case studies of 'Manchester: Knowledge Capital', the 'N8' Science Initiative, and the role of science and technology in regenerating Teesside.

The final section then turns to the implications of the regional agenda for universities. A particular focus is the 'missing middle', between the expectations held of universities in a sub-national knowledge economy and their capacities to deliver if effective policy-making and intended outcomes are to be achieved. Other pieces highlight how the regional agenda is only one among many priorities currently facing universities in terms of their wider economic and societal roles.

Finally, a report of the recent activities of an ESRC-funded network on the 'Embedded University' highlights a series of remaining research questions that need to be addressed. In raising these issues of governance, policy and capacity, we hope that this Regional Survey can help foster a more productive dialogue about the necessary conditions at multiple scales for successful policies to build science regions and cities.



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