

Economic Development & Transport Committee

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Venue: National Assembly for Wales, Cardiff Bay

Title: Northwest Regional Development Agency

Subject: Briefing Note on the North West Science Council

Background

The Science base in the NW contributes 243,000 jobs and £25bn in sales to the regional economy. The combined NW Universities currently train 69,000 science students. Science is recognised as a high priority on the national Government agenda and is seen as a key economic driver within the Office of science and Technology. The role of RDAs in supporting science in their regions is relatively new and the NW has been the first region to put in place a regional Science Council and Science Strategy.

Origins of the NW Science Council

The Government decision to locate 'Project Diamond' in Oxfordshire rather than at Daresbury is well known. It was seen as a "disaster for the future of NW science" and resulted in a strong lobby of government by politicians, academics and business which produced the following:

- The Smith Review Committee. This recommended 9 collaborative projects, with a contribution of £26m from a specially created fund.
- The NW Science and Daresbury Development Group (NWSDG) was established and commissioned A D Little to prepare a background report on the NW Science Base.
- Following the report, NWSDG made recommendations to The Secretary of State which including
- establishing a NW Science Council, preparation of a Regional Science Strategy and rebuilding Daresbury as a science campus with an international reputation based on public / private partnership.

Prior to this time, the agenda for science research was nationally driven with no regional dimension at all. In contrast, the current NWDA RES includes a focus on the development of the science base in support of the regional economy with Objective 3 detailing 19 separate substantial actions.

Aims

The Council is made up of private sector business leaders (AstraZeneca, BNFL, BAE Systems, Unilever, Avecia, Rolls Royce ,CBI etc) senior university representatives(Vice Chancellors of Manchester,Liverpool and Lancaster Universities, Chairman of NWUA), public sector science leaders (Daresbury, NHS,GONW) and NWDA. Jeremy Scudamore of Avecia chairs it.

The aims of the Council are that:

- The region's science base should be built and maintained to the highest standards of international excellence.
- Excellence in science should be actively networked across the region and we should aim to have a university that has leading world ranking in science and technology in the region.
- To create and maintain a science base that provides active support for industry.
- To have a sustainable and dynamic science base with enough investment in infrastructure and facilities.
- To win a greater share of National, European and International research funding.

Council Achievements

- Publication of the first regional science strategy in October 2002. This is a living document to be continually revised and upgraded.
- Support for major cluster strengthening science projects including the National Biopharmaceutical Manufacturing facility, Core Technology facility, Genetics Knowledge Park, Infolab 21, Aerospace Innovation Centre, Centre for Environmental Education Research and Teaching.
- Development of a set of measures based on science excellence, people, finance, and exploitation against which progress will be monitored.
- Support for the Science Skills agenda including the National Centre of Excellence for Science Teaching.
- Marketing activities including a Westminster science strategy launch, the creation of website at northwestscience.co.uk and Council meetings with senior Government officials, MPs and Ministers.

Council Projects under Development

- Support for ongoing strategic science projects including 4GLS, the Microsystems packaging centre, NW Science Grid . Support for the development of the proposed Daresbury Science complex.
- Inclusion of other science based cluster strategies into the Science Strategy for example, textiles, ICT.

- Measurement of the baseline data set for science against which stretching targets will be set to raise our performance against UK and international comparators.
- Development of a 10-15 year strategic plan for regional Science Foresight. In this, the NW will be the first English region to have a recognisable science foresight activity.
- Support for the Skills agenda

Future Objectives

- NW Science Fund. Setting up and management of a NW Science Fund .This fund will be aimed at the development of science and technology projects in new fields subject to evidence of a clear fit with the Council Science Strategy and the Agency RES Objective 3 targets on Science. It will leverage significantly more national research council funding to the region and generate wealth from the commercialisation of high value science and technology. The Fund of £15M is almost all contracted now and includes investments in Stem Cell technology, Tissue Engineering ,Laser Engineering , Composite materials and Zoonosis(transfer of diseases between animals and humans)
- The further development of implementation of the Science strategy. The NW was the first region to set up a Science Council and to launch a science strategy and it is important not to lose this advantage. The Northwest leads on the Knowledge Economy section of the Northern Way and the NWSC will leading on agreeing the Science priorities in this .
- Provide continuing support and strategic guidance to regional partners undertaking or funding science and technology activity that achieves objectives defined in the NW Science Strategy and RES.
- Lobbying for NW Science , especially increased public sector R&D expenditure from a basis of arguing value for money and excellence.
- Strategy evolution.

George Baxter

Subject: Northwest Science Strategy –Draft January 2006

1. Introduction

This paper provides background for discussion on further development of the Northwest's Science Strategy. This discussion is timely, given the context of the RES review, together with ongoing reviews of Business Support and Cluster policy and NWDA's commitment to move towards targeting NWDA investment in fewer actions with greater impacts. Further progress in this direction, and innovative implementation of the existing science strategy, is being encouraged by central Government. This paper summarises existing priorities and analyses of the NW's strengths and challenges and suggests an outline strategy.

2. Critical Issues

Science and Economic Growth – National Policy

Research conducted over a wide range of countries and timescales has consistently shown a positive link between levels of Research and Development (R&D) and economic growth, whether in the Public or Private sector. In response to this, many European countries including the UK have set R&D targets as a way of achieving higher R&D investment in the long term. UK data has not been updated since 2002, however, Table 1 illustrates the level of public and private sector investment in R&D as a percentage of GDP in 2002 for the Northwest, UK and selected competitor countries.

Table 1 2002 Figures Public and Private R&D Investment

% of GDP	Northwest England	UK	France	Germany	USA
Business	1.7	1.2	1.4	1.7	1.9
Public	0.4	0.6	0.8	0.8	0.8
Total	2.1	1.8	2.2	2.5	2.7

UK Government has recognised the significance of R&D investment in driving economic growth and has set targets for raising the ratio of R&D to GDP from its current level of around 1.9% to 2.5% by 2014. This policy is laid out in the UK's Science and Innovation investment framework 2004-14. This was published in July 2004 and sets the framework within which we need to develop the Northwest's approach.

Innovation activity divides into two components – Science, Technology, Engineering and Mathematics (STEM) related and non-STEM related. Current EU measures of Innovation Activity are weighted heavily towards STEM. The correlation between high levels of STEM activity and GDP per head figures is a statistical one, not absolute i.e. over a range of economies, there are those such as Sweden where high STEM levels do not lead to world-leading GDP/head figures. In these cases, social and political factors such as legislation, cultural views of entrepreneurship etc. have a significant impact.

The challenge for the Northwest is that, although overall R&D intensity is above UK average levels, the data gives a number of key messages:

- Public sector R&D is particularly low (this is due to relatively low levels of direct Government investment in Research Institutes etc – HEIs are also below the UK average, but not as much)
- Business R&D is concentrated into a few, high technology sectors – principally pharma and aerospace which disguises a long "tail" of R&D less intensive firms. The overall investment

figures in Table 1 above, whilst giving the impression that the North West does well compared to the rest of the UK, are misleading as investment is dominated by AstraZeneca.

The Northwest's economy has the critical mass, business R&D potential and international branding and infrastructure to exploit public investment.

Northwest Science Policy

The Northwest Science Strategy, originally published in 2002 set out the region's science priorities. The Science Council, supported by the Agency, provides advice on direction and priorities.

This paper proposes that the Northwest Science Strategy is based broadly on supporting those priority areas where the Northwest is strong and enjoys competitive advantage; increasing NW share of publicly funded research, increasing interaction between research in HEIs and business, the provision of physical incubation/innovation/science park space, fostering collaboration between institutions and increasing the supply of flexible financing.

Northwest Science Strengths

Annex 1 shows R&D expenditure by private business, HEIs and Government for each of the English regions and devolved administrations. Core strengths in each of these three areas are set out below.

i. Private Sector

Government R&D figures from the 2004 R&D scorecard show that 4 of the top 10 UK companies by R&D investment have significant R&D activities in the Northwest (Astra Zeneca (£2Bn), BAE (£900M), Unilever (£700m), Rolls-Royce (£300m)). Other major STEM contributors include:

- BNFL (nuclear)-£60M
- Avecia (biotech/materials)-£60M
- Pilkingtons (glass)-£30M
- UCB Films (plastic films)
- MEL Chemicals (zirconium)
- Baxi (heating systems)
- EA Technology (energy technologies)
- Renovo (biotech)-£8M
- Merck ("plastic" electronics)-£5M
- Marconi (telecommunications)-£250M

ii. Government

- Daresbury (accelerator science, electron-microscopy, supercomputing)-£60M

- Proudman Oceanographic Institute (oceanography)
- Patterson Cancer Research Institute
- CEH Lancaster

The majority of this investment is at Daresbury.

iii. Universities

In addition to traditional research departments, there are a number of Research Institutes, many multi-institutional

- UK Centre for Tissue Research-£5M
- Wellcome Clinical Centre-£3M
- Woolfson Medical Imaging Centre-£3M
- UK Biobank-£1M
- Organic Materials Innovation Centre (OMIC)-£1M
- Lancaster Environment Centre
- Christie Hospital
- Liverpool School of Tropical Medicine £20M opportunity
- Clatterbridge Centre for Oncology
- Salford Centre for Research and Innovation in the Built Environment (£5M EPSRC funding)

Core funding for traditional academic research comes from the Higher Education Funding Council for England (HEFCE). Quality Research (QR) funding is calculated using data from the Research Assessment Exercise (RAE) and the number of active staff.

In RAE terms, 12 STEM related units received 5 star ratings in RAE 2001:

Manchester: Studies allied to medicine

- Computer Science
- Metallurgy and Materials
- Pharmacy

Liverpool: Physiology

- Engineering

LJMU: Sports science

MMU: Sports science

Lancaster: Physics

Statistics

Salford: Built environment

IRIS Library and Information management

It is worth noting that there is not necessarily a direct correlation between 5 star excellence and Regional economic performance – it is possible that Regional economic impact is greater from 4 or 5 rated Departments. This will be an issue for the Northwest economy in future if the RAE exercise continues to concentrate QR funding in a small number of research excellent departments, leading to the closure of 4 or 5 rated groups.

In summary, across the private sector, Government and HEI, the Northwest is internationally strong in the following sectors:

- Pharma/Medical/Health related research
- Chemicals/Materials (high end)
- Aerospace/Materials (high end)
- Nuclear

There is significant growth potential in

- Biotechnology (2nd strongest Cluster in U.K.)
- Energy (transmission, alternative energies)
- Aerospace
- Nuclear
- ICT (including Microsystems Packaging)

3. Principles for Regional Support

The analysis above would suggest that future Regional support activity be consistent with three broad principles:

- Investing in specific schemes only where there is market failure (ie. no funding from alternative sources) and only in alignment with the national Science and Innovation Framework and regional strengths;
- Focus more on major, transformational projects (acknowledging relatively high risk) that demonstrate an opportunity to the market;
- Use and develop business support and skills delivery structures, together with venture capital and knowledge transfer schemes to provide the right environment for sustainable exploitation and commercialisation of scientific strengths

In particular, therefore, Science investment should meet most or all the following criteria:

- Build on Regional strengths
- Proven market demand for product/service
- Demand can be aggregated (ie. there is a common need from a number of SMEs)
- Internationally competitive
- Support from business sector/cluster (financial and moral)
- Not near to near market research that is for business to fund
- Sustainable beyond RDA funding
- Exploitable in the Northwest
- Fits with RES/Northern Way priorities
- Encourages industry to work with sources of knowledge, e.g. HEIs

Areas for ongoing Regional support

1. Using the criteria and principles above suggests that the following projects would be suitable for ongoing support:
2. Daresbury International Science and Technology Park(Creating an international Science and technology park at Daresbury)
3. Joule Centre(Energy research)
4. Project Unity (Creating a new University in Manchester with internationally excellent science)
5. Dalton Institute (Nuclear Fission Research)
6. Microsystems Packaging Centre (Nanotechnology devices)
7. Aerospace Innovation Centre

8. Liverpool School of Tropical Medicine (Developing new drugs to treat resistant diseases)
9. Core Technology Facility Manchester (Biotechnology business start up support)
10. National Biomanufacturing Centre (Manufacture of trial quantities of new biotech drugs)
11. Lancaster Environmental Knowledge Building (Knowledge transfer in the environment sector)
12. Liverpool Science Park
13. National Nuclear Laboratory and Skills Academy
14. Defence Diversification Agency (DDA) knowledge transfer
15. Science Enterprise Centres (Entrepreneurship development in STEM graduates)
16. A north-west specific HEIF programme targeting demand from industry for collaboration with HEIs, rather than supply (Promoting academic/industrial collaboration)
17. Infolab 21 (ICT business development at Lancaster)

Delivery - Exploiting strengths

The region has a number of existing initiatives and policies either directly targeted at supporting and maximising the economic gain from the strengths outlined above, or with significant impact on them. Looking ahead, we need to consider how these investments can continue to be most effectively targeted. We suggest that the most effective approach will be to identify large scale transformational projects that demonstrate business opportunities and encourage a market that mainstream business support services are then geared up to support. This approach may require reviewing the direction of a number of current activities. These are set out below.

Science Park development

Where what is being developed is a classic Science Park without major, embedded science research facilities then the default position should be that these should be developed with private sector investment as has happened in Manchester, at Runcorn Heath and elsewhere across the U.K..

Incubation

- NWDA Incubation policy, developed in 2002, was to fund a series of small (a few thousand square meters) Regional Incubators based around particular technologies. Evidence has shown

that these have been most successful where they have been linked to a source of ideas and businesses (e.g. an HEI) and/or have an outstanding management team. Any future support of science-based incubators should demand that they:

- Have sufficient scale to be sustainable without public support (>2000m²)
- Be linked to an HEI/college/industry if possible
- Link to the Regional technology strengths
- Be located in an environment attractive to new business start-ups

Business Support

The Science investment model proposed is one where NWDA would make key interventions where there was strong indication of likely market engagement. This requires appropriate and effective business support and skills delivery structures.

It is clear from feedback during a review of Regional Innovation Strategy in 2005 that many SMEs still feel that their Innovation support needs are not being met by the usual public support routes (e.g. Business Links) and they therefore lack the capacity to exploit new technologies. This will be addressed through the current review of Business Support.

Venture Capital

The V.C. funds developed by NWDA have been very effective at supporting technology based businesses – for example, around 50% of all investments made have been in the Biotech area. There is no lack of ideas or ingenuity among small start-ups in the Northwest – the issue identified by the VC community is the lack of ability by those with ideas to make a business case.

Skills/Enterprise

RES data shows that the Northwest overall suffers from a lack of entrepreneurship. In the STEM area, though some enterprise training is now universal amongst all graduates, a comparison with world-leading Universities such as MIT, illustrates the relative weakness in in-depth enterprise training numbers in the U.K. The Science Enterprise Centres have gone some way to address this at Liverpool, Manchester, Salford and Lancaster Universities, however there is scope for considerable expansion in this area and this should be examined.

More than 50% of all undergraduates in the Northwest's Research Intensive HEIs now come from public schools which have 8% of pupils- policies need developing to address this.

Clusters

NWDA is currently reviewing its cluster policy. Adopting an approach based on a smaller number of large interventions in the STEM area would indicate a move towards a twin-track approach to relevant

Clusters where some warranted additional investment beyond basic networking and collaboration support and others did not.

Energy Council (NVEC)

Section 2 of this report identified Nuclear and alternative energy sources as key existing strengths of the Region or potential growth areas, therefore the role of the NVEC is important to ensure that these areas are properly addressed.

Northern Way

NWDA leads the Northern Way C2 workstream, Knowledge Base and Innovation. Current activities focus on three areas:

- Research and Innovation Centres (up to 3 in the North)
- Knowledge Transfer Partnerships (KTP) – expand the scheme
- Centres of Professional Excellence (CPE) – identify and develop

Further details can be found in the Northern Way Business Plan published in 2005. In addition, the RDAs are reviewing their Innovation and Science strategies together to look for areas of overlap/learning.

In parallel with this, the 8 Research intensive Universities of the North – Lancaster, Manchester, Liverpool, York, Sheffield, Leeds, Durham and Newcastle are working together as the "N8" to build on the North's Research strengths. They have identified these as follows

- Ageing and Health
- Energy
- Sustainable Water Use
- Molecular Engineering
- Regenerative Medicine

These have similarities to the Northwest's strengths already discussed. The Three Northern RDAs are working closely with the N8 to develop these plans and have been involved in the recruitment of its first Director. Analysis done by the N8 shows that in most Research areas, they collectively outperform the "Golden Triangle" Universities of Oxford, Cambridge and London. There is therefore an opportunity to establish the North as a major international Research hub, if an appropriate mechanism for the N8 collaboration can be developed.

4 Strategic Regional Sites

There are four strategic regional Science and Technology sites:

1/ Daresbury

2/ Merseyside , including the Science Park and Speke Biotech Cluster

3/ Manchester Science City

4/ West Cumbria, including Westlakes Science Park and the Sellafield facilities

Each of these locations has the critical mass to become a major national centre of Science and Technology activity and each is developing its own strategy to achieve this .

Daresbury in particular has the capability to become a major international Science and Technology Park , able to attract everything from large multi-country science projects through to corporate R&D and SME start ups.

George Baxter

Annex 1

Expenditure on research and development, 2000

Expenditure within (£ million)			
	Businesses	Government	Higher Education Institutes
United Kingdom	11,510	2,134	3,633
North East	164	2	122
Northwest	1,451	57	287
Yorkshire & the Humber	304	48	284
East Midlands	933	56	204
West Midlands	576	194	192

East	2,758	259	324
London	810	258	895
South East	2,964	635	515
South West	867	307	160
England	10,827	1,816	2,984
Wales	144	65	139
Scotland	400	238	440
Northern Ireland	139	15	70

Source: Office for National Statistics

Annex 2

Research in the Northwest attracting high levels of Quality Research Funding

In 2004/05, 8 units of research in the Northwest attracted more than 25% of available UK QR funding

- Nursing (29%)
- Metallurgy and materials (27%)
- Built Environment (31%)
- Social Work (27%)
- Accountancy and Finance (28%)
- Linguistics (28%)
- Library and Information Management (28%)
- Sports related (27%)

Most of these are relatively lowly funded areas. If the barrier is lowered to >15% of QR, these units are added:

- Preclinical studies
- Physiology
- Vet Science
- Earth Sciences
- Computer Sciences
- Chemical Engineering
- Sociology
- Business
- European Studies

Note the absence of core STEM areas such as Physics, Chemistry and Mathematics.