

Economic Development and Transport Committee

EDT(2) 12-05 (p1)

Date:	6 October 2005
Time:	2:00 pm to 5:00 pm
Venue:	National Assembly for Wales, Cardiff Bay
Title:	EDT Science Review : Welsh Assembly Government Position Paper

Purpose

The attached paper has been requested from the Welsh Assembly Government to inform the start of the EDTC science review.

Summary

The use of devolved power by the Welsh Assembly Government has given new impetus to scientific research and development in Wales.

The Assembly Government has led and encouraged greater collaboration between universities and companies across Wales. It has developed an all-Wales focus for scientific R&D. It has provided new funding streams both directly and through its agencies and partners. Furthermore, WAG has encouraged a stronger focus on bringing the benefits of scientific R&D to the people of Wales.

Introduction

- ‘Wales : a better country’, highlights the key issues of :
- achieving better health;
- raising the quality and quantity of jobs and skills, and

- creating stronger, more vibrant communities.
- On a long-term basis, a strong science base in Wales can contribute significantly to these goals as was explained in the Welsh Assembly Government's earlier 'science framework' position paper discussed in the EDC on 3rd April 2003 (EDC 06-03) (copied at Annex 3).
- This paper described how the Welsh Assembly Government science framework covers a very wide range of activities across the Assembly and listed a large number of relevant activities which were underway. Progress with some of these are described in the next section.
- The factual description of Wales' science base in academia and business, along with the key HEFCW and WDA support activities are given in the separate EDTC science review submissions from those bodies. Just to highlight two facts,
- in 2003/04, the total income of Welsh higher education institutions was £799m, an annual increase of £50m.
- business expenditure in Wales on R&D increased from £187million in 2002 to £264 million in 2003.

Developments since 2003

- There have been many exciting developments over the past few years both in respect of the growth of our science base and strengthening of Welsh Assembly Government support activities. The following are some of those of particular note.
- A task and finish group was formed to look at 'higher education and economic development, and reported in March 2004 through the 'Knowledge Economy Nexus' report. This report highlighted the strong role of universities in Wales, including :
 - the direct wealth contribution of universities, which are often significant long-standing businesses in their own right;
 - graduate output, as the prime expression of the knowledge communication role of universities, to which teaching makes its own dominant contribution; and
 - the knowledge transfer/commercialisation and cultural influences roles, both of which build on the global knowledge creation role of higher education sustained by scholarship and research;
 - The Nexus report listed seven sets of recommendations to strengthen our universities role

as a foundation for Wales' knowledge economy. The majority of these have either been implemented or are in the process of implementation, with many highlighted in the separate HEFCW and WDA submissions to the EDTC science review.

- Other developments which have followed from the Knowledge Economy Nexus report include the allocation of substantial WAG funding for:
 - the Swansea University Institute of Life Sciences;
 - micro/nano centre developments in Welsh industry and academia, and
 - support for advanced medical imaging developments.

Annex 1 lists some of the recent leading-edge developments in Welsh universities.

- Under the west Wales and Valleys objective 1 programme, significant funds have been allocated to the support of the development of innovation and R&D activities. In total, around £90m of funds have been committed under the priority 2 measure 3 – ‘innovation and R&D’ strand, across a wide range of technologies. Full details of the projects are available on the WEFO website but to give just two examples.
 - £5m was allocated to supporting innovation, product engineering and responsive manufacture in the Manufacturing Engineering Centre in Cardiff University's School of Engineering, which is a foundation operation within the Welsh Manufacturing Advisory Service.
 - Over £1m has been used to develop unique fish breeding and growth facilities at Swansea University which are being used to strengthen the aquaculture sector in Wales.
 - In addition, under priority 2 measure 4, ‘skills for innovation and technology’, some £20m of support has been committed.
- Also on the skills front in addition to the considerable success of GO Wales graduate-employment initiative, there has been significant progress in ensuring strong HEFCW and WDA input on high level skills in the pathfinder Sector Skills Councils.
- At the schools level, the standard of science teaching and learning have risen impressively in primary schools and science standards are also very high in Welsh 6th forms. There have been increased incentives for students following post-graduate mathematics and science initial teacher training courses in Wales and other measures to improve the supply and retention of maths and science teachers are under investigation, including closer links to the National Science Learning

Centre in York and the operation of a range of out-reach services from Techniquest, which receives annual grant-in-aid from the Welsh Assembly Government.

- In the business world, in addition to the excellent technology transfer record described in the HEFCW and WDA EDT science review submissions, there have been a number of exciting developments, many of which have received Welsh Assembly Government regional selective assistance or other support. Of especial note are the new technology-based expansions at EADS, General Dynamics, International Rectifier, Deepstream Technologies, Enfis and Sharp. Annex 2 gives further details.
- Similarly, impressive is the small company general spin-out record from Welsh Higher Education Institutions, just one of the latest being ‘Science Made Simple’, which is a new company devoted to breaking down the mysteries of science and increasing public understanding;
- The knowledge exploitation fund (KEF) has been transferred to the WDA and integrated with other relevant support mechanisms/programmes. The WDA submission highlights the excellent progress as a consequence of that transfer, including the funding of 46 new proof of concept projects. Simultaneously, the working relationships between HEFCW, WDA and the Welsh Assembly Government have been strengthened, and will be further enhanced through the ASPB merger process.
- The Wales Spatial Plan strongly features for most regions the importance of innovation and science to economic development . A range of relevant growth opportunities are now being identified through the Wales Spatial Plan implementation processes;
- The Economic Research Advisory panel deliberations has highlighted the critical importance for long term economic growth of innovation – broadly defined in both technology and business terms and in respect of its general diffusion and absorption.
- The Wales for Innovation Action Plan has proceeded apace, the most high-profile consequence being the network of WDA sponsored Technium centres which are now both helping to host and develop indigenous new high technology companies, and acting as a magnet for the activities for multi-national corporations. Also under the auspices for ‘Wales for Innovation’, initiatives such as the Wales Innovators Network, Welsh Design Advisory Service and Smart Cymru have performed well.
- In the health sector, a new intellectual property and innovation advisory service has been set up to advise our NHS bodies how they can best manage, share and capitalise on innovations that are developed within Wales. A third party contract to run this service has been awarded and there will be close partnership working with the WDA.
- At the broadest level, Dr David Slater has undertaken a study on the role of research and science

in Welsh Assembly Government's evidence-based policy making. In response to the recommendations in Dr Slater's report, 'Sound Science for Sound Government', the Welsh Assembly Government is currently putting in place arrangements for strengthening our professional science expertise.

Forward look

- As most people recognise, the importance of science and technology, especially its exploitation, to a successful Wales is so vital that we must not rest on our laurels. Clearly the EDTC science review process and the associated findings will be an important contribution to the Welsh Assembly Government thinking. However in the meantime, a number of important initiatives are already in train. These include :
- the development of a revised economic development strategy for Wales (A Winning Wales 2) and an updated Innovation Action Plan;
- the creation of the Knowledge Bank for Business which will help companies in Wales with major growth potential to identify significant collaborative opportunities, often with a strong science and technology dimension;
- the HEFCW third mission budget is being doubled and in-depth assessments continue of potentially landscape-changing inter-university collaboration opportunities under the auspices of the Reaching Higher collaboration fund;
- in the merger of the Wales Tourist Board, Welsh Development Agency and the Economic Development and Transport Department of the Welsh Assembly Government, a new Business Policy team with strong science and innovation policy responsibilities will be created and the science and technology activities of the WDA will be better integrated into a more effective business support framework;
- we are examining the potential for Welsh Assembly Government attention and resources to be more focussed on three particular areas of science, namely those associated with : health; low carbon energy systems and enabling sustained economic renewal.

ANNEX 1

Around £150m has been invested or announced in new and improved HE facilities and projects by the UK research councils, HEFCW, WAG, UK charities and industry.

Cardiff, with critical mass assisted the merger of the College of Medicine, leads in terms of funding received but Swansea, Bangor and Aberystwyth universities have all had significant investments. Of especial note are :

- The Institute of Life Sciences at Swansea University is co locating a number of Swansea's life science research teams and will back them up with massive computing capacity from IBM's deep computing visualisation centre. When linked to the UK GRID computing network it will be able to participate in multi disciplinary research projects on a strong international basis.
- Swansea, also with international industrial partners, is setting up an Institute of Advanced Telecommunications.
- At Cardiff :
 - the Wales e-Science (WeS) was opened in 2004 and is one of the seven GRID computing nodes in the UK. WeS is providing the advanced ICT and GRID based distributed computing power that is now essential for the carrying out of modern science.
 - The Brain and tissue Repair Imaging Centre (CUBRIC) has been set up with £8m DTI funding to enable research in neuro science and advanced brain scanning techniques.
 - Proteomics, cytomics, particle physics, the re-equipment of the physical organic chemistry laboratory and the upgrading of the nano/micro technology research laboratory have each received between £1m and £3m and the Innovative Manufacturing Centre some £3.2m.
- Bangor through its School of Informatics has spun out the UK Laser Machining Centre. The UKLMC has jointly with Cardiff won two of the six awards made by the DTI in its recent Nano Micro Technology facilities call. They will receive £ 4.3m from the DTI and £2.5m from WAG which will reinforce Welsh research strengths in nano microfluidics and will help Wales to become the leading region in the UK for the manufacture and design of polymer based nano fluidic devices particularly for health diagnostics.

Additionally the Nano/micro team at Cardiff University's Manufacturing Engineering Centre are co-ordinating two European Commission FP6 Networks of Excellence projects on trans European micro technology.

- The planned purchase of a PET scanner (and the cyclotron to make the short lived isotopes it needs) is set to become the nucleus of further diagnostic research and a cluster of related imaging-research based companies.

ANNEX 2 : MAJOR TECHNOLOGY BASED EXPANSIONS IN COMPANIES IN WALES

EADS

- EADS (formerly known as Cogent) recently received a £2 million RSA offer towards a project to establish an R&D facility at Cleppa Park. This investment will enable the company to diversify into new market areas and enable the transfer of key R&D responsibilities to in respect of encryption and secure networks from group facilities in France. The RSA project is expected to create 180 jobs, mostly skilled and high paid. Cogent supplies military, public safety and civil secure communications.

GENERAL DYNAMICS

- General Dynamics UK Ltd, based at Oakdale, is one of the leading European suppliers of integrated avionics and mission systems and the second largest supplier of UK avionics equipment for the Eurofighter aircraft.
- In 2001 the company were successful in bidding for the £1.7 billion BOWMAN contract to design, for the British Army, a secure command, control and communications system.
- As a result, General Dynamics (GD) has set up a Communications Research Centre (CRC) to develop intellectual property. This should keep GD at the forefront of Defence C41 technology within the UK and Europe and enable them to compete for further defence contracts to come on stream after BOWMAN. This has been supported via a £5.2 million offer of RSA funding.

DEEPSTREAM TECHNOLOGIES

- The company was set up to design, produce and market the next generation of intelligent sensors for a number of key markets in electrical related industries. The project evolved from a £2.4 million development programme undertaken by Delta Electrical Ltd for whom the founders of Deepstream previously worked.
- Deepstream received an RSA offer of £1.2 million towards the establishment of their new facility at Bangor. The company is expected to create 61 new jobs.

ENFIS

- Based in Swansea, this company is a spin-out from Swansea University. Established in 2001, the company provides a vehicle for the commercial exploitation of high brightness light emitting diode (LED) technology developed by leading academics at the university. Enfis also has a contract to produce a range of devices for the medical/dermatology sectors. The company has been offered £150,000 RSA to expand in addition to venture capital funding and Finance Wales support.

INTERNATIONAL RECTIFIER

- IR Newport (IRN) is a key microelectronics manufacturing centre of International Rectifier Ltd, a global power management semiconductor factory. IR provides enabling technologies for products that work smarter, cooler and raise the world's productivity per watt.
- IRN was established in March 2002 when they acquired the ESM facility at Newport. RSA of £14.1 million was offered to the company at that time towards the expansion costs. IRN now focuses all its high voltage integrated circuit R&D in Wales. Subsequently, second phase circuit fabrication facilities have been opened at the site.

ANNEX 3

ECONOMIC DEVELOPMENT COMMITTEE EDC 06-03(p4)

Date:	3 April 2003
Time:	9:00am – 11.55am
Venue:	Committee Room 1, National Assembly for Wales, Cardiff Bay
Title :	Our Science Framework for Wales

OUR SCIENCE FRAMEWORK FOR WALES

Introduction

Plan for Wales (2001) highlights the Welsh Assembly Government's mission to build on Wales' potential as a small, creative nation 'to deliver a modern economy which brings prosperity to all in a new sustainable future for both rural and urban areas'. Success will depend on the acquisition, communication and application of knowledge and thus good science is a key driver.

An enhanced science capability is vital to our future economic prosperity. It is instrumental in creating new high skilled jobs, as well as providing the impetus behind major technological breakthroughs in the

medical sciences, and in discovering cures for life threatening diseases. However it must also be remembered that science is an international activity and therefore, from any individual nation's standpoint, access to the global science base is all-important.

Against these principles the Welsh Assembly Government has an overarching R&D/Science framework whose key purpose includes both:

- creating a culture in which the importance of research is actively recognised within the Assembly, ASPBs and other partners in Wales and effectively used for policy development and implementation, and
- strengthening our research base.

The Welsh Assembly Government has ensured that its various detailed plans for health, education, the economy, culture, community development and the environment, all embrace the importance of the acquisition, communication, and application of knowledge by, for example,

- raising awareness in schools of the importance of science and promote take-up of science subjects post 16;
- ensuring our universities are well placed to participate in international research
- supporting the effective use of academic research by businesses to develop more innovative products and services
- ensuring that Wales achieves the maximum benefit from the European Structural Fund programmes for the 2000-06 period, and
- encouraging and supporting innovation generally through our 'Wales for Innovation' action plan.

Further details for each policy area are given in Annex A.

The Way Ahead

The Assembly Government is determined to build upon our existing strengths in key manufacturing sectors, such as aerospace, automotive, biotechnology, electronics and optronics, by providing the dedicated resources to enable them to develop their full potential as major contributors to the Welsh economy. The Assembly Government's continuing support of the various sector specific technology fora has already reaped considerable benefits for such as the medical devices sector in Wales.

Through 'Wales for Innovation', the Welsh Assembly Government will invest up to £260 million in encouraging innovation. Key elements of the plan include the roll-out across Wales of the WDA sponsored Technium concept, providing quality incubators, with close links to university expertise, and establishing a single innovation grant scheme worth some £25 million over the years 2003-05. Technium is a unique and integrated support infrastructure, which acts as a highly visible vehicle for exciting new businesses and first class company-academic links.

Higher education will continue to be well supported, as evidenced in Professor Phil Gummett's letter of 6 February (circulated to EDC as pg537a.doc) and through programmes such as the Knowledge Exploitation Fund, exploitation of the considerable Welsh institutions' knowledge base will be further encouraged.

Generally, much more effort will be expended to produce policies, which are firmly based on our expanding knowledge of what works in Wales

Comparison with Scottish and Northern Ireland strategies

Scotland published its science strategy 2 years ago and Northern Ireland is currently consulting on such a strategy. 'A Plan for Wales' and its sub-strategies, are based on similar principles to achieve similar goals.

Conclusion

The Welsh Assembly Government believes it is better to embed our science related objectives within the individual high level health, economy, education, etc., strategies, where we can guarantee that they will receive appropriate attention. As yet, from the Wales perspective, insufficient added value has been identified from creating a separate science policy to justify risking disconnection of science, and more important the generic application, communication and exploitation of knowledge, from our main policies and especially our sustainable development duty.

ANNEX A: SUMMARIES FOR INDIVIDUAL POLICY AREAS

Education and skills

The 'Reaching Higher' strategy aims to strengthen the research base in the Welsh HE sector by selective funding to build world-class capacity in key areas, and in particular to encourage collaborative bids and collaborative effort. The latter is one strand of the reconfiguration activity, which is being given priority in the early years of the strategy. Research partnerships and collaboration are also likely to be encouraged by the revised research assessment methodology, which is being drawn up by Sir Gareth Roberts, at the invitation of the HE Funding Councils. The Cardiff Gene Park is a notable example of what can be achieved through collaboration and partnership funding.

We have targets for increasing the proportion of Research Council resources that come to Wales and a range of activity led by DfTE to achieve this (with support from R&D Group and individual researchers in their policy areas).

Income from the Research Councils has grown steadily from just 2.8% of the UK total of grants awarded in 1996/97 to 3.3% in 2000/01. Research grant applications from Wales have a good percentage success rate, exceeding the UK average in some areas, eg those funded by the ESRC. However, the number of applications per active researcher and the scale of projects coming forward are not as great as in England and Scotland but it is worth noting that, during the five years to 2000/01, total external research income secured by Welsh HE institutions from sources other than the Research Councils grew by 54% to £55.8 million.

Looking back to 1992, in the Research Assessment Exercise (RAE) at that time, only 4% of submissions from Wales reached the top '5' grade. In RAE 1996, that proportion had risen to 13% compared to nearly 20% for the UK sector as a whole. The results of the 2001 RAE showed a further improvement and demonstrated that the quality of research in Welsh institutions now stands comparison with the rest of the UK. The proportion of top 5/5* ratings rose to 33% compared with 38% for the UK. Weighted for size of research team, the overall average score for Wales was 95% of the UK average.

However, although physics did well, research performance in Wales was significantly below UK levels in a few subjects which are important to the economy or quality of life - including biological sciences, chemistry and hospital-based clinical subjects. In response, HEFCW has established a Research Capacity Development Fund which will provide some £8.5 million over three years to build research capacity in areas including nanotechnology and biosciences.

More generally, the policies described in The Learning Country and Reaching Higher are all designed to ensure that in Wales we produce competent knowledge managers underpinned by lifelong learning. Specific aims include :

- In schools raising the awareness of the importance of science and technology and boosting the take-up of science subjects post 16;
- Making the best use of ICT tools;
- Better integration of schools and further and higher education institutions into their communities, and
- Effective training provision in Wales.

We have also established a Liaison Group on Research in Education and Training, which is currently reviewing research priorities.

Economic Development

In the 21st century it is no longer possible for a Western European country to be successful purely as a commodity producer of low cost goods and services. With the growing economic strength of nations like China and the impending enlargement of the European Union, Wales has to move up the value chain to foster research and development as an activity and the production of technology-rich goods and services. This is fully reflected in the policies encompassed by 'A Winning Wales' and the focus on innovation in

‘Wales for Innovation’. The latter encompasses investing in our high-technology infrastructure and has strong links to the Higher and Further Education agenda. Through ‘Wales for Innovation’, the Welsh Assembly Government will invest up to £260 million. This action plan spells out which public sector organisations in Wales will be doing what, and by when, initially to improve Wales’ economic performance relative to other parts of the UK.

Other relevant commitments include:

- Investing £115m in creating a first rate broadband infrastructure in Wales and ensuring its full use of e-commerce
- Developing a clean energy/energy conservation strategy for Wales which takes into account the development of new technologies
- Continuing to back phase 1 of the Wales Gene Park (one of only six prestigious UK Genetic Knowledge Parks). This involves boosting research capacity and exploring commercial opportunities from human genetics-related research. It also aims to educate and inform health professionals and the general public alike about the potential and ethical considerations surrounding developments in the field. Bold plans for the second commercialisation phase are ongoing, to provide an environment for companies, large and small, to undertake and commission research and production of high-value biotechnological products.
- Through the activities highlighted in the business and environment action plan, actively pursuing sustainable development objectives
- Encouraging enterprise and exporting
- Establishing an Economic Research Advisory Panel (ERAP) and an associated programme of research, monitoring and evaluation. One of ERAP’s goals is to advise on how best to increase the capacity of Wales-based institutions to contribute to its economic research agenda
- Developing new fisheries, aquaculture, horticultural and biomass strategies
- Implementing ‘Farming Connect’ as a technology transfer mechanism for the farming sector, both through creating a network of demonstration centres and by creating stronger links with universities and IGER.

Health and Social Care

The objectives in our ‘Improving Health in Wales’ plan concerning improvements in primary care/social care/mental health/public health/sexual health/clinical networks, health promotion, etc, all depend on amplifying our knowledge capacity in the health sector.

The R&D strategy for health and social care is looking to shift its emphasis towards better understanding the determinants of health and disease (genetic and environmental) and to identify ways to stimulate much greater health awareness

Our plans include :

- the translation of findings from biomedical and social sciences research into new ways of treatment, diagnosis and service delivery;
- better understanding of the determinants of health, illness and health care-seeking behaviour by better application of biomedical and social science, particularly molecular biology and genetics. More exploration of the influence of social circumstances and lifestyle, and the rural and built environment on the individual's health and health-seeking behaviour;
- new methodological approaches to the acquisition of new knowledge in complex settings and in the evaluation of complex interventions;
- telemedicine pilots and generally looking to improve service delivery through innovation;
- continuation of support for NHS Trust research activity;
- consultation on a new health and social care research and development strategy and continuation of support for Trust research activity;
- better linkage of routinely collected data from health and social care, so that large scale prospective, quantitative studies can be undertaken across all Wales;
- improving the empowerment of patients, carers and the cared-for by better understanding of their needs and views, and the influence of their circumstances on quality of life;
- better understanding of the interface between health and social care at individual, organisation and national levels, and exploration of methods to achieve greater integration;
- further strengthening our health promotion research;
- creation of a new national website for health promotion;
- improving understanding of environmental effects on health, and
- the introduction of a research governance network.

Culture

Our cultural agenda from the knowledge perspective includes the ambitions to :

- strengthen the Arts Council for Wales;
- establish Cymru'n Creu as a vital force in the development of the cultural industries in Wales;
- increase participation/use of museums, libraries and art centres, and
- maximise the use of ICT to increase access.

Environment Planning and Transport

The environmental protection research and monitoring programme aims to complement that of DEFRA, which in most instances covers England and Wales for environmental and agriculture-related research. This programme aims to fulfil the information requirements for Wales where these are not met elsewhere, for example commissioning research into the effects of climate change in upland areas which are of relatively higher significance for Wales.

A Wales planning research programme supports the delivery of an evidence-based land use policy via strategic planning policy and associated technical advice notes. This is exemplified by :

- the development and implementation of waste management and climate change programmes for Wales;
- work on a whole range of revised planning technical advice notes (TANs) which are supported by a Planning Research Programme.

Innovative public transport and intelligent transport systems (including using the latest information systems technologies), alongside vehicle efficiency improvements and exploiting new materials development to implement environmentally friendly transport solutions are all of key relevance to achieving our sustainable development goals.

Local Government Housing and Communities

Better local and community governance depends very much on a targeted focus on more evidence-based policies. Plans in these areas include :

- creating a simpler, more focussed ‘best value’ regime;
- better use of new technology to support customer focused services;
- through its Communities First programme, focusing its policies and programmes on Wales’ most deprived areas to bring them up to the standard of more better off communities;
- a housing research programme;
- adapting homes for disabled people to help them live independently;
- improving home energy standards;
- construction industry best practice programmes including the rethinking construction initiative;
- social housing innovation programmes;
- innovative housing allocation schemes, and
- ‘secure by design’ home crime prevention programmes.

Conduct of Assembly Government Business

A separate Research and Development Group has been formed to encourage all to focus more effectively on evidence-based policies and there is a strong knowledge application thrust in each of the following :

- the Welsh Assembly Government’s R&D framework;
- Cymru Ar-lein our ICT strategic framework for Wales, a European exemplar eGovernment strategy
- the Better Government programme to support improvements in day to day leadership and management, and
- in strengthened economic advice/statistical functions and associated Welsh databases.