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WHEB is a partnership, established with the support of Welsh HEIs, Higher Education Wales, the Higher Education Funding Council for Wales, and the Welsh Assembly Government



Addysg Uwch Cymru Brwsel  
Ty Cymru, 11 Rond-Point Schuman, B1040 Brwsel, Gwlad Belg  
Ffôn: +32(0)2 2266697 Ffacs: +32(0)2 5028360  
e-bost: info@wheb.ac.uk Gwefan: www.wheb.ac.uk

Welsh Higher Education Brussels  
Wales House, 11 Rond-Point Schuman, B1040 Brussels, Belgium  
Tel: +32(0)2 2266697 Fax: +32(0)2 5028360  
e-mail: info@wheb.ac.uk Web: www.wheb.ac.uk



## Knowledge transfer involving Higher Education Institutions in Wales

Examples in a European context

May 2008



Amcan Addysg Uwch Cymru Brwsel yw hybu a chynrychioli Prifysgolion a Sefydliadau Addysg Uwch eraill yng Nghymru trwy gydweithio ar lwyfan Ewropeaidd.

Welsh Higher Education Brussels (WHEB) is a collaborative venture to promote and represent Welsh Universities and other Higher Education Institutions (HEIs) at the heart of Europe.

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# Knowledge transfer involving Higher Education Institutions in Wales – examples in a European context

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## **Introduction**

*Professor Phil Cooke, Director, Centre for Advanced Studies, Cardiff University and member of European Commission's expert group on 'European Research Area rationales'*

This document resonates clearly with current issues and concerns that are being pursued with vigour in DG Research and elsewhere in the Commission regarding the issue of improvement of commercialisation from universities and other public research. It seems that Europe always feels itself to be a little behind the USA in this regard. Nevertheless, data on commercialisation activities shows that some parts of Europe and the US are little different on output and outcome indicators. One main difference is the ten-to-twenty year lead in beginning 'academic entrepreneurship' enjoyed by the US.

Currently the European Research Area (ERA) is being reviewed, and the dimension of commercialisation of research knowledge flows is high on the policy agenda. It seems likely that consideration may be given to energising ERA by conceiving of substantive 'great issues' that are of importance to all Europeans and the rest of the world. Climate change comes immediately to mind as a social and scientific problem that may unite every discipline from diverse social scientific and natural science backgrounds to some degree in a quest for actions aimed at mitigating those effects that seem to be traceable to human action. Perhaps the societal consensus to move forward on this and other broad issues like healthcare, food security and energy is more integrated in the European tradition than elsewhere, where economic growth aspirations tend to prevail over social priorities.

These and other European success stories testify to the present and future importance of such developments in the exploitation of knowledge from scientific and social scientific research.

## Knowledge transfer in Wales

This paper seeks to highlight examples and expertise in Wales in respect of knowledge transfer<sup>1</sup> between Higher Education Institutions (HEIs) and, primarily, businesses. Knowledge transfer features in several of the current consultations and debates that the EU institutions have opened on the future of EU research, innovation and regional policy in the run up the EU budget review in 2009.

The Welsh Higher Education (HE) sector has a successful track record in knowledge transfer, as shown by the results of the annual *Higher Education – Business and Community Interaction (HE-BCI)* survey<sup>2</sup>. The sixth survey published in July 2007 found that although Wales has only about 5% of the UK population, HEIs in Wales are engaged in between 7% and 13.5% of key knowledge transfer activities in the UK.

In particular, Welsh HEIs are recognised within the UK for their strong relationships with both large and small companies, which lead to significant levels of collaborative R&D. In the 2005/06 academic year, Wales accounted for 11% of total UK income to universities from collaborative research involving both public funding and funding from business, outperforming six out of nine English regions. Welsh income generation has increased in this area by more than 70% since 2001/02.

This document gives examples of organisations – large & small companies as well as public and voluntary sector bodies – that have established partnerships with Welsh HEIs. Information from individual HEIs appears on the following pages<sup>3</sup>. This document is not a complete survey of knowledge transfer activity in Welsh HE, but gives enough examples to provide a flavour of our work in this area.

The paper concludes with an assessment of where knowledge transfer activities involving Welsh HEIs fit into the economic transformation of Wales.

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<sup>1</sup> The term 'knowledge transfer' is used as it was the topic of the European Commission's Communication of 04.04.07, although 'knowledge exchange' may be more appropriate to highlight the active role of both parties in the process.

<sup>2</sup> See press release at

[http://194.81.48.132/NewsSheets\\_Docs/18.07.06\\_Welsh\\_universities\\_strike\\_gold\\_-\\_English.doc](http://194.81.48.132/NewsSheets_Docs/18.07.06_Welsh_universities_strike_gold_-_English.doc)

<sup>3</sup> A list of Departments in Welsh HEIs awarded the top three grades (i.e. 5\*, 5, 4) in the 2001 UK Research Assessment Exercise appears in Annexe 2 of this paper. This list will be superseded by information to appear in the 2008 Research Assessment Exercise.

## Wales at a glance

Wales occupies much of the western edge of the island of Great Britain. It is one of the four nations that make up the United Kingdom. Devolution of power in certain fields in 1999 created the National Assembly for Wales and the Welsh Assembly Government.

The population of Wales numbers just over 2.9 million, the majority concentrated along the southern coastal belt and in the north east. Although integral to the UK, Wales has its own distinctive culture and language. English is spoken by everyone, while Welsh is also spoken by 20% of the population.

Wales is noted for the beauty of its landscape. More than a quarter of the country lies within a national park or an area of outstanding natural beauty. It has the UK's only coastal national park.

Wales has a long and distinguished history of industrial innovation and achievement. Important business sectors include:

- Aerospace and defence
- Automotive
- Agri-food
- Bioscience
- Construction
- Creative Industries
- Energy and sustainability
- Financial services
- Technology
- Tourism

99.3% of businesses in Wales have less than 50 employees<sup>4</sup>.

Since April 2007, Wales has had twelve institutions of higher education. Statistics collected in 2007 showed that the largest institution had 26,789 enrolments and the smallest 2,057<sup>5</sup>.

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<sup>4</sup> UK Government, Department for business enterprise and regulatory reform, *Small and Medium Enterprise Statistics for the UK and Regions 2005*

<sup>5</sup> Higher Education Funding Council for Wales, *Annual Report 2006-2007*

**Aberystwyth University – [www.aber.ac.uk](http://www.aber.ac.uk)**

### **Welsh Universities' Expertise Assists Sustainable Environmental Business Sector**

Three leading Welsh universities, Bangor, Swansea and Aberystwyth, officially launched an €11m service in July 2007, aimed at Welsh companies seeking to improve their profitability and environmental sustainability.

The Welsh Institute for Sustainable Environments (WISE Network) assists companies in the Objective 1 areas of West Wales and the Valleys to access specialist knowledge at the three universities, in order to further develop the environmental goods and services sector. Through this collaboration, the WISE Network aims to stimulate new joint ventures to develop novel technologies and products.

Through the WISE Network, the three universities are sharing knowledge, research capacity and technical expertise in a wide range of areas with the private sector. Areas include natural resource use and management and sustainable development, which can be applied to various situations (e.g. food quality analyses, ecological footprinting and composting).

Companies which have worked with the WISE Network include Reegen Ltd, an environmental consultancy based in Mid Wales, which first established a link when it identified the need for support and advice on project ideas and good links with a supportive research partner. When the company required specific advice on the availability of recycled building materials for a large sustainability project in North Wales, the WISE Network was able to assist.

Reegen Ltd expects to see an increase in turnover as a result of working with the WISE Network, in addition to the benefits of increased credibility, acceleration of business plans and the ability to offer a more comprehensive service to customers. The benefits of this relationship are mutual; both the WISE Network and Aberystwyth University benefit from Reegen Ltd's participation in other collaborations.

*The WISE Network is part funded (€6.2 million) by the European Union's Objective 1 Programme through the Welsh Assembly Government. The remaining funds are being invested by the three participating universities.*

### **See3D Visualisation**

See3D is a dedicated team of software engineers and graphic designers whose mission is to develop affordable visualisation solutions that add value for their academic and industrial customers. See3D provides visualisation services to academia, the public sector, and any business or organization requiring three-dimensional representations of how their product, plans or subject of research will look.

See3D Visualisation, part of Aberystwyth University, is located in a new €13.4m Visualisation Complex which offers state-of-the-art facilities and software, high powered computing equipment, and 3D visualisation theatres. The Centre was

partly funded by the European Union's Objective 1 programme through the Welsh Assembly Government.

### ***Supporting Public Consultation***

Dulas Ltd is a leading force in renewable energy both in the UK and overseas. The Dulas team has over 25 years of practical experience in the assessment, engineering and delivery of renewable energy solutions. See3D and Dulas Ltd recently engaged in an extensive program of consultation with the aim of benefiting both partners.

As a leading force in the renewable energy market, Dulas Ltd was keen to understand the potential of 3D visualisation to better empower the process of public consultation on windfarm proposals. The learning process also included a better understanding on the part of See3D of the norms and conventions of windfarm planning procedure.

The combined result of this two way knowledge transfer has been the provision of new techniques and standards to create a synthesis of the accumulated best practice from traditional simulations with cutting edge animated 3D visualisations to allow an unparalleled understanding of proposed windfarm developments.

### **Aberystwyth University Business Network**

To support interactions between business and academia and foster the conditions for successful knowledge transfer, Aberystwyth University has recently established the 'Aberystwyth University Business Network'. The inaugural event, held in November 2007 received positive feedback from both internal and external attendees. Based on the success of this initiative, a series of evening networking events are now under development.

Targeted at companies which have an existing link with the University together with regional business contacts, these events aim to generate a greater understanding amongst the business community of the range of expertise and services offered by the University. University representatives also benefit, by hearing the needs of business, identifying opportunities for engaging with third parties and developing and building on existing commercial relationships.

### **Knowledge Transfer Conference 2008**

Aberystwyth and Bangor Universities are currently developing plans to host a conference for Welsh Industrial Liaison Officer (WILO) representatives and associated colleagues from knowledge transfer offices across Wales. The conference will be held in Spring 2008 and will provide, amongst other benefits, opportunities for networking and exchanging of best practice across the sector.

For further information please contact:

Commercialisation and Consultancy Services, Aberystwyth University,  
Visualisation Centre, Penglais, Aberystwyth, Ceredigion SY23 3BF, UK

Tel: +44 1970 622385

Email: [ccservices@aber.ac.uk](mailto:ccservices@aber.ac.uk)

**Bangor University - [www.bangor.ac.uk](http://www.bangor.ac.uk)**

## **University pioneers innovative PhD programme with local businesses**

Bangor University has successfully harnessed Objective 1 European Social Fund (ESF) funding to develop a collaborative Doctoral programme for businesses based in West Wales and the Valleys.

Building on its award-winning collaborations with companies through the UK-wide Knowledge Transfer Partnerships (KTP) and its industrially focused taught Masters programmes funded by ESF, Bangor devised a programme that addressed businesses' needs for highly skilled employees and R&D capacity building.

### ***Project Objectives***

- Prepare individuals to contribute to research as professionals.
- Develop and recognise the transferable skills of researchers.
- Increase the research capacities of SMEs by linking with a PhD project.
- Encourage SMEs to undertake research and recruit researchers.
- Support the development of key technologies in an Objective 1 area.

### ***The Project***

In Phase 1 (2004 -2007) 50 industrially focussed PhDs were commissioned by companies across the Objective 1 region from Denbighshire to Pembrokeshire. Participating businesses included Micro, SME and Large Companies with projects covering a broad range of disciplines from Computer Science to Theology. Phase 2 (2005-2008) was widened to include an additional 80 PhDs and the region's other research-intensive universities as partners, Swansea and Aberystwyth.

### ***The Package***

- Companies received up to 50% support from the ESF for the cost of the PhD.
- A combination of cash and in-kind contributions from the Host Company and University met the remaining costs, resulting in a very attractive package for participating companies.
- Doctoral students received an annual bursary of €16 000 and an additional travel and equipment budget of up to €4 000 per annum.

### ***Key outcomes***

This initiative has been widely acclaimed in Wales and Europe as a successful approach to improving a region's R&D infrastructure and for following the European University Association's Responsible Partnering framework. ([www.responsible-partnering.org](http://www.responsible-partnering.org))

Independent evaluation has shown the substantial success of this innovative model and highlighted its potential to deliver on the Lisbon agenda. The

employability of participating doctoral students has risen measurably and the University's research profile has been strengthened.

### ***Ongoing Activities***

- Bangor and its partner universities are currently developing a bid for Convergence funding 2007-2013 to deliver a suite of collaborative PhDs and MRes (Masters of Research) projects. Knowledge Economy Skills Scholarships (KESS) builds up on the success of Phases 1 and 2 by enhancing the skills development and networking aspects of the collaboration.
- The University is seeking to deepen and strengthen its relationship with local businesses through a broad range of knowledge transfer and enterprise collaborations.

For further information please contact:

University Innovation Bangor, 9th Floor, Alun Roberts Building, Deiniol Road

Bangor University, Bangor, Gwynedd, LL57 2UW, UK

Tel: +44 1248 382501

e-mail: [innovation-enquiries@bangor.ac.uk](mailto:innovation-enquiries@bangor.ac.uk)

**Cardiff University** - <http://www.cardiff.ac.uk/racdv/index.html>

### **Cardiff University Innovation Network (CUIN)**

<http://www.innovation-network.org.uk>

CUIN is one of the most established and popular business networking events in Wales. The National Assembly for Wales has commented: "A highly regarded network between the university, Welsh companies and business intermediaries. This initiative is frequently held up as a prime example of best practice in this field of activity." Since its creation in 1996, with initial support from the Industrial South Wales EU Structural Funds programme, over 7 200 people in total have attended the 85-plus events we have run for local businesses and innovators. Around 10 events are held each year with 100-150 people from a variety of business backgrounds attending each event. The Innovation Network is recognised by many businesses and those in the public sector to be an important source of problem solving and knowledge-based resource provision. It is the "first port of call" for businesses that want assistance from the University. Representatives from a range of South Wales companies form the Industry Advisory Group, which helps the University to ensure the Innovation Network's activities address the needs of the industry.

### **Unilever and Cardiff School of Biosciences**

Research at Cardiff University to develop lung tissue cultures from human cells won an award for the benefits it promises to patients and the collaborative partners behind the project. The work, led by Dr Kelly BéruBé of the School of Biosciences, is a joint venture with Unilever, and co-funded by the Biotechnology and Biological Sciences Research Council (BBSRC). The project was awarded the 2007 Innovation Prize for excellence in collaboration between business and academia, awarded by the University's Innovation Network. This work has the potential to speed up the development of treatments and ways of preventing respiratory disorders. "This research is part of an ongoing programme of work aimed at developing novel ways of delivering consumer safety," said Dr Leona Greenwell, inhalation toxicologist at Unilever's Safety and Environmental Assurance Centre (SEAC).

### **Smile-On Ltd and Cardiff School of Medicine**

Experts at Cardiff University are leading a major multi-partner project to reduce the inappropriate prescribing of antibiotics, and help halt the rise of resistant bacteria. A multi-disciplinary team, headed by the Department of General Practice in the School of Medicine, is working with healthcare learning specialists Smile-On Ltd to encourage doctors to consider when and why they prescribe antibiotics. Their joint development of an interactive online learning resource earned them the 2007 Innovation Award for Early-Stage Collaboration from the University's Innovation Network. The programme, known as STAR – "Stemming the Tide of Antibiotic Resistance" – is funded by the Medical Research Council and also involves experts from the Department of Epidemiology and Statistics, and the School of Social Sciences at Cardiff University, NHS Wales, and Glamorgan University. Working with Smile-On Ltd, a London-based company, the

Cardiff team has developed a website, accessible by password, on which medical practitioners evaluate the importance of the issue and then access video case studies, on which they make decisions about prescribing. The programme has been rolled out to selected doctors' surgeries across Wales, while the technology is now also being used to develop a new programme for staff running HIV-AIDS treatment services for children in Africa.

### **Physical Acoustics Ltd and Cardiff School of Engineering: Knowledge Transfer Partnership (KTP)**

Acoustic emissions tests (AE) are capable of detecting micro-cracks in a bridge. They can provide information about active damage sources, including those that are inaccessible to conventional inspection. The project, in which a civil engineering graduate from the School of Engineering was recruited as an Associate based with the company, was aimed at refining and developing AE testing. As a result of the project, Physical Acoustics Ltd was able to establish a presence in the civil engineering market, thereby improving its competitive position. Sales of the new system were expected to significantly increase turnover and there was the possibility of establishing a subsidiary to market generic non-destructive techniques. Physical Acoustics Ltd is now the market leader in the application of AE testing technology to civil engineering structures. The company has been appointed as sub-consultant for bridge inspection to the UK's Highways Agency and to a firm of consulting engineers. The Associate was then employed by Physical Acoustics Ltd as their Civil Engineering Applications Manager. This project won a UK National KTP award.

### **Geoenvironmental Research Park (GRP)**

<http://www.grc.cf.ac.uk/grp/index.php>

With the introduction of the new legal framework for contaminated land in Wales, many stakeholders are likely to be faced with large clean up costs for their polluted sites. This could affect the profitability of many existing companies and deter others from investing in sites, which may be contaminated. Many of these sites are in the West Wales and the Valleys Objective 1 area. This project, with support from the Objective 1 ERDF programme in Wales has successfully achieved its aim of creating a Geoenvironmental Research Park (GRP) in the Wales Objective 1 area. The GRP is developing more economically viable, new and innovative techniques to treat potentially polluted sites that benefit the region by supporting existing companies and encouraging inward investment. The GRP emphasis is on new remediation technologies coupled with new and innovative methods of dealing with alternative materials. Existing companies, who are partners in this project, have been able to take advantage of these technologies and have expanded their own technology base as a result. The project aims to develop a long term R&D capacity in the region.

For further information please contact:

Research and Commercial Division, Cardiff University, 7th Floor, 30-36 Newport Road, Cardiff, CF24 0DE, UK

Tel: +44 (0)29 2087 5834

Email: [racd\\_help@cf.ac.uk](mailto:racd_help@cf.ac.uk)

### **Digital Media Consortium**

The North East Wales Institute of Higher Education has been leading the all-Wales Digital Media Consortium – an initiative funded by the Welsh Assembly Government Knowledge Exploitation Fund (KEF), developed to support the growing creative media business sector. The initiative involves several of the HEIs in Wales together with Skillset (the UK Sector Skills Council for the audiovisual industries).

In the first year of the project, learning and training materials covering design fundamentals, management, and intellectual property were developed, piloted and evaluated with 30 companies across Wales. More recently, that work has been taken forward through a series of workshops, involving keynote speakers from the sector and providing a good combination of industrial and academic content, attended by more than 200 practitioners from a wide range of companies in the sector throughout Wales. The interaction between business and academia stimulated through the workshops has provided the catalyst for the development of more formal programmes of study designed to meet specific continuing professional development requirements within the sector.

Following the completion of the KEF funded work, the HEIs concerned are now well placed to maintain and extend their interaction with businesses in the creative industries sector and offer and provide training and other knowledge transfer solutions tailored to meet specific needs.

### **Calon FM**

A radio broadcasting facility was first established at the North East Wales Institute of Higher Education (NEWI) in 2003-04, providing students with opportunities to learn about and practise radio production and broadcasting operations. Restricted Service Broadcast Licences have been secured and used on two occasions since then. That experience enabled NEWI to secure support from community based and commercial organisations, and the BBC, to prepare a successful bid for a Community Radio Licence serving a population of 250 000 in North East Wales and Cheshire. The opportunities offered through a community radio station, in terms of programming and broadcasting hours, and in terms of volunteer places, go far beyond the scope of a student-based “internal” operation. Work is now under way to form an independent company limited by guarantee to operate the radio station Calon FM. The company’s members will be drawn from community groups, the commercial sector and from NEWI.

Knowledge transfer underpins the company’s existence and operations – as a mutually beneficial process. The teaching and research work of NEWI staff provides the essential know-how for the radio station in terms of journalism, production and broadcasting, as well as student staff members. Calon FM’s operations will attract and involve practitioners in those fields and in other walks of life, enriching the experience of student and volunteer staff. Together, NEWI

and Calon FM will be able to develop new routes for learning and training in radio production and broadcasting.

### **Knowledge Transfer Partnership (KTP) with Stoneflex URP**

Stoneflex URP is a small production company which manufactures URP plastic/stone aggregate external wall cladding designed for use in the system building construction market. The company's owners believed that there was insufficient focus on marketing and so the business could not thrive. The primary objectives of the KTP project were to help the company become more market oriented and in doing so embed a culture of innovation. Fundamental to a successful KTP is the transfer and embedding of knowledge from the "knowledge base" partner to the company.

As a subject specialism, marketing draws its knowledge from several business disciplines including economics, accountancy, organisational behaviour and quantitative methods for example, but also the social sciences. All these disciplines were required in order to assist the company in developing a Marketing Information System (MKIS) which has proved invaluable in both identifying and understanding its major customer and market needs, but also which were or could be profitable. Analytical techniques such as segmental analysis, price elasticity of demand, portfolio analysis and break-even analysis were introduced and employed in the project, and the knowledge embedded into the MKIS for reporting on the company's future marketing performance. The Associate employed by NEWI and Stoneflex to lead the project gained a wealth of commercial experience through that work, and subsequently joined the company as a member of its senior management team.

For further information please contact:

Enterprise Team

North East Wales Institute of Higher Education

Postal Point 15

Plas Coch, Mold Road, Wrexham LL11 2AW, UK

Tel: +44 1978 293444

Email: [services@newi.ac.uk](mailto:services@newi.ac.uk)

## Swansea Metropolitan University – [www.smu.ac.uk](http://www.smu.ac.uk)

The Creative Industries Research and Innovation Centre (CIRIC) at Swansea Metropolitan University provides a unique and innovative support package to creative businesses, researchers and entrepreneurs who are active within the Objective 1 area of Wales. Based in the Dynevor Centre for Art, Design and Media, CIRIC houses the latest technologies in the fields of Applied Arts, Textiles and Video including digital printing, laser cutting, cameras and editing suites. CIRIC's aim is to promote and develop the economic activity of creative practitioners in the Objective 1 area.

There is no fee to join CIRIC, although practitioners must complete an application pack and base their practice or activity within the Objective 1 area of Wales. If a research project is approved, members will then have the opportunity to work with CIRIC staff to create individually tailored action plans specifically aimed at utilising the facilities to develop their research that will, once complete, assist their business.

### **Case Studies in Applied Arts**

#### ***AIR Architecture***

Robin Campbell is an architect and urban designer who has considerable experience in the field of distinctiveness, orientation, spatial maximization and response to site. His principal concerns lie in the revitalisation of brown field sites, spaces and buildings by means of innovative architecture and public art. The deployment of renewable systems and the ability to control internal climates in an environmentally sustainable manner are guiding concerns. These issues have been utilised at the Swansea Environmental Resource Centre and a series of low energy projects in a search for a more environmentally responsive series of buildings utilising wind, solar, ground source, thermal storage and heat pumps.

AIR is currently working on commissions for several low-energy houses, conversion of training and office facilities for Dynamix Ltd., a Gower barn conversion, chapel conversions in Snowdonia and also the Lammas Community Hub.

#### ***Heulwen Lewis***

Heulwen Lewis produces beautiful unique floral designs. She has a passionate commitment to modern design, textiles and wallpapers. Nature is her main influence and includes florals, such as delicate botanical roses into her contemporary designs, and also draws inspiration from daily life, vintage fabrics, baroque decoration and the beauty of the unexpected.

Heulwen has undertaken research with the resources available to CIRIC applicants, such as the textiles digital printing machine, CAD systems, and also the laser cutters.

She has sold designs to Hallmark cards, greeting cards at art galleries, exhibited designs at Indigo, Paris, and at New Designers. She is currently liaising with several textile agents and large companies who wish to commission her art work.

## Case Studies in Visual Media

### *Justin Kerrigan*

I Know You Know – Feature Film

Award-winning writer/director Justin Kerrigan (Human Traffic) is making his long awaited new feature film, I Know You Know, which was filmed on location in Bridgend in October and November 2007. CIRIC in partnership with Bridgend County Borough Council encouraged the film company to setup in Bridgend above other locations outside of Objective 1. CIRIC also supported the generation of new crew positions on the film and used other Objective 1 based businesses to assist filling the new vacancies.

The results of this are increased economic benefits for Bridgend as well as job creation within an Objective 1 county.

### *Dave Gregory*

Poor Me – Music video prototype

For David Gregory's fledgling company, the technical support of CIRIC gave him the opportunity to research High Definition compositing techniques for the music video of the song, "Poor Me", by Eugene Francis Jr. Gregory, from Haverfordwest, worked around the clock to complete the many sophisticated special effects shots that give the video its unique style.

"Poor Me" was screened in rotation on the MTV2 and VH1 TV channels in mid-July 2007 and the business has since increased its exposure within the industry.

For more information about CIRIC or its members please contact:

CIRIC

Dynevor Centre for Art, Design and Media

De La Beche Street

Swansea

SA1 3EU

UK

E-mail: [ciric@sihe.ac.uk](mailto:ciric@sihe.ac.uk) [www.sihe.ac.uk/ciric](http://www.sihe.ac.uk/ciric)

Tel: +44 1792 481241

Swansea University – [www.swansea.ac.uk](http://www.swansea.ac.uk)

### **Rolls-Royce University Technology Partnership in Materials (RR UTP)**

Materials research supporting all sectors of the Rolls-Royce business (aero-engine/energy/marine) is focussed via the University Technology Partnership (UTP). This network encompasses materials capability at the Universities of Swansea, Birmingham and Cambridge – individually designated University Technology Centres (UTCs). Collaboration amongst these partners supports many aspects of materials development, characterisation, component design, manufacture and repair.

At the heart of the Swansea UTC is a rolling five year research contract. This funding provides top-up bursaries to well-qualified Masters, PhD and EngD students to supplement research grant or company funded studentships. This regular income source allows for periodic discussions between the industrial and academic partners to set research strategy in support of developing technologies. The ever-increasing confidence in the UTP network often allows the company to outsource sensitive research relevant to the immediate introduction of next-generation products.

The core UTP academics then successfully bid for “geared” funding from the major UK and international funding bodies. In addition, independent RR project teams also utilise the network of expertise and fund larger scale packages of research. Considerable success has been achieved in this respect over the past decade, with funding currently supporting a Swansea UTC team comprising 5 academics, 7 post doctoral research officers, 6 PhD, 5 EngD, 3 MRes students and 2 support staff. The ongoing value of this research income to the University is approximately €5m at any point in time.

In particular, the UTP is recognised as an effective tool for graduate recruitment into the company. Such alumni often act as valuable contacts for future research funding and collaboration. Recruitment of high quality students begins from the earliest stages of undergraduate study. Leading First Year students are invited for summer vacation placements based at RR Derby and consideration for employment at the completion of undergraduate studies. Senior University academics have also been invited by the company to provide technical training modules towards their internal Graduate Training Scheme.

### **Engineering Doctorate Centre in Steel Technology**

The Engineering Doctorate in Steel Technology has been at the heart of the successful partnership between the UK Steel Industry and the School of Engineering at Swansea since 1992. The scheme has consistently delivered high quality research, trained manpower, infrastructure support and technology transfer for the industry sector.

The scheme was established as a partnership between three Universities in Wales (Swansea, Cardiff and NEWI) and the Welsh steel industry interests owned by British Steel. The scheme was hugely successful and was a major component

of the award of a Queen's Anniversary prize to the University in 1998. The Centre maintains excellent performance statistics:

- 75 % graduate recruitment into the steel industry
- Of the remainder one third are working on related projects through university research
- Over 79% retention of EngD graduates in industry over a 10 year period
- Average EngD salary rates are 25% higher than graduate entry equivalents

Several research groups in the partner universities have grown to world leading status specifically as a result of the EngD activities.

### **European Social Fund project: "Automatic Classification of Defects in a Corrosion Environment"**

School of engineering, Swansea University, Wales, UK

Student: Alicia Romero Ramirez, Academic supervisor: Dr. J.S.D Mason

Company name: Silverwing UK Ltd

Industry supervisor: Neil Pearson, Manager Director: Simon Packer

A primary reason for failure in large-scale petro-chemical storage tanks is corrosion. Silverwing UK Ltd is an SME specializing in non-destructive examination (NDE) equipment concentrated on above-ground storage tank market. They provide a range of inspection services for storage tanks, primarily for the oil, gas and petrochemical industries.

The goal of this research work is to extend the information provided. Achieving this goal will give the company a significant market lead. The work to date has led to published results highlighting classification accuracies of over 90%; realising this performance in the field is the goal of current work.

### **Performance Engineering Training Consortium**

The Performance Engineering Training Consortium operates from Swansea University and provides training and education for companies and individuals involved in the sector. The focus is on motorsport and aerospace companies, but includes those in other areas of transport or manufacturing where the need for high performance gives a competitive advantage. A number of seminars for SMEs have been organised across Wales. There have been seminars on engine management, diagnostic testing, data logging and Product Lifecycle Management. The team has also promoted its activities at many automotive and aerospace events.

For further information please contact:

Research & Innovation Office, Swansea University, Singleton Park, Swansea, SA2 8PP, UK

Tel: +44 1792 295412

E-mail: [c.d.jones@swansea.ac.uk](mailto:c.d.jones@swansea.ac.uk)

### **Smart Approach to Rapid Product Development and Intellectual Property Management Drives Innovation**

Dr Richard Bibb, Dr Huw Millward, Chris Bolger, Jon Irlam

Unlike large corporations, the adoption of rapid design and development principles in small companies is often hindered by the fundamental absence of systematic product development and intellectual property management procedures.

Mangar International Ltd is a leading designer and manufacturer of lightweight rehabilitation products. The company, based in Mid Wales, was set up in the early 1980s and employs around 60 staff. The majority of Mangar's products are powered using low-pressure air and it is the use of this adaptable technology that has given the company its competitive advantage.

A two-year Knowledge Transfer Partnership (KTP) collaboration between Mangar International and UWIC's National Centre of Product Design & Development Research (PDR), has successfully delivered on two counts. The collaboration, which involved two KTP Associates, produced an innovative rapid product development process and also provided a systematic framework approach to intellectual property management. These new procedures have driven the development of novel, award-winning products.

### **Fresh Design Ideas and Methodologies Revolutionise Product Development at Structural Engineering Company**

Professor Alan Lewis, Darragh Murphy, Chris Byrne, Mike Tomlin

Francis & Lewis International Ltd (FLI) is a market leader in the design and manufacture of steel towers for the telecommunications industry. As the telecommunications market approaches saturation point and with the competitive impact of globalisation on the industry, FLI decided that it was necessary to diversify its product portfolio and explore new markets.

A Knowledge Transfer Partnership (KTP) programme was considered by the company in early 2004, as an ideal way to make this transition. A two-year collaboration with UWIC's National Centre for Product Design & Development Research (PDR) presented the company with the opportunity to secure its future by harnessing innate strengths in innovative ways, in order to create a competitive advantage.

Mike Tomlin, an industrial design graduate, joined the programme as KTP Associate, bringing a wealth of experience in novel design tools, such as photo-realistic 3D modelling. The successful collaboration with PDR not only empowered FLI to innovate and design aesthetically functional products, but also transformed the company's strategic thinking and direction towards niche markets.

## **It's All in the Design! Novel Interface System Transforms Digital Design and Prototyping**

Steve Gill, Gareth Loudon, Bethan Gordon, Paul Wilgeroth, Gareth Barham, Alex Woolley

The Programme for Advanced Interactive Product Research (PAIPR), spearheaded by Steve Gill, Director of Research at the Cardiff School of Art & Design, aims to develop methodologies that enable designers to emulate complex computer-embedded products accurately without having in-depth knowledge of electronics and programming skills. The rationale is to create better appliances for the end-user whilst helping companies to reduce the commercial risk involved in market acceptance.

Findings from extensive studies carried out by the research team have resulted in the development of a novel solution known as the Information Ergonomics System (IE System). This pioneering "toolkit" has been proven to offer a far more realistic picture of how the end product will behave. Additionally, it offers greater accuracy of results and reduces prototyping lead time by several weeks.

The PAIPR programme attracted financial assistance from the Knowledge Exploitation Fund, supported by the Welsh Assembly Government and the European Union Objective 1 Programme. Market research has tested "proof of concept" of the IE System and explored its potential commercialisation and route to market. The resulting independent reports concluded that the system has a very high potential value and a patent application is currently being sought.

One of PAIPR's core principles is that research in the design field should produce results that can be applied in industry. A key indicator of its success has been the adoption of the IE System by Sony Ericsson's design team for prototyping the "Smart Phone" interface; as part of its strategic market development.

Commenting on the added value derived from this unique system, Gary Denman, Manager, Usability, at Sony Ericsson says: *"The PAIPR tools and methodology enables us to simply and quickly undertake user evaluation of the complex interactive experience of manipulating screen user interface with hardware keys. This in turn enables us to identify usability issues early in the process when redesign is easier to implement."*

For further information please contact:

Research & Enterprise team, UWIC, Llandaff Campus, Western Avenue, Cardiff  
CF5 2YB, UK

Tel: +44 29 2041 6614

Email: [res@uwic.ac.uk](mailto:res@uwic.ac.uk)

Trinity College, Carmarthen – [www.trinity-cm.ac.uk](http://www.trinity-cm.ac.uk)

### **TenderWise - Public Sector Procurement, A Toolkit for Small and Medium Size Enterprise Sector**

The PSP Toolkit is an innovative solution to the problems facing small and medium sized businesses (SMEs) in engaging with the public sector's procurement rules and practices. Funded through the INTERREG programme, the project is led by University College Dublin (UCD) in partnership with Trinity College, Carmarthen and is aimed at SMEs in the Irish and Welsh Interreg regions. The toolkit takes the form of a multi media interactive CD ROM and website ([www.tenderwise.com](http://www.tenderwise.com)) which supports SME's seeking familiarity and greater awareness of the regulatory requirements of the public sector's procurement policies in order to tender for contracts and the provision of services.

### **Geiriau Bach – training for early years practitioners**

Geiriau Bach is a Welsh Assembly Government-funded project to extend the use of the Welsh language in early years settings and through the Foundation Phase. Students follow a 2 year part-time course, leading to a Certificate of Higher Education in Welsh and Bilingual Practice in the Early Years. To date, the Geiriau Bach project has been successfully established in Torfaen, Powys, Carmarthen, Pembrokeshire, Rhondda Cynon Taf, Bangor, Rhyl and Llanelli.

### **Knowledge Exploitation Fund project: Creative Solutions**

The focus of the Creative Solutions project has been on creating a unique and innovative inter-disciplinary Creative Arts programme, generating opportunities for creative interaction and networking between disciplines through shared modules and shared space, and the delivery of bespoke business skills sessions. This ensures that graduates and postgraduates are multi skilled and have increased employability, as well as the ability to generate sustainable creative businesses through self employment. The project worked in collaboration with a range of partners, including relevant Sector Skills Councils - Skillset Cymru and Creative and Cultural Skills in its design and development.

### **Knowledge Exchange Project: The role of Corporate Social Responsibility (CSR) in SMEs in tackling climate change**

This Welsh Assembly Government-funded project will investigate the current provision of information, training and other support for SMEs in key areas encompassing CSR, including sustainable employment practices, environmental management, community support, procurement practices and ethical business practices; identify examples of best practice in CSR in SMEs and the business benefits associated with these; examine current knowledge transfer methodologies between agencies / organisations and SMEs; test the use of social learning tools as a medium for engaging SMEs in sustainable business practice.

### **Y Llwyfan**

Y Llwyfan is the recently completed €3.4m cultural enterprise centre based at Trinity College. It provides a permanent base for Theatr Genedlaethol Cymru, and a range of organisations in the creative and cultural sector, along with hot-desking and meeting facilities. An application has been made to the EU-funded

Rural Development Plan (RDP) for project funding to support the growth of creative and cultural industries in rural Carmarthenshire, and provide demand-led training and development opportunities for the sector.

### **Trysordy**

Launched in 2007, Trysordy ([www.trylordy.org.uk](http://www.trylordy.org.uk)) is a Scrap Store which received support from Trinity College under the Wales Spin Out programme in 2006. It provides a low-cost, one stop shop for clean, safe waste materials from industry which can be used for play, creativity, education and community events. The project is supported by over 30 regional organisations and provides vocational training for the Probation Service.

### **Knowledge Transfer Partnerships – graduate placements**

Introduced in Trinity College in 2004/05, the Knowledge Transfer Partnership (KTP) scheme enables graduates to have the opportunity of being placed with local employers for an extended period. Academic staff gain excellent insights and up-to-date experience from local businesses, whilst employers benefit from the professional expertise of College staff and new potential employees. The KTP scheme is complementary to the GO Wales scheme of student placements.

### **eLearning Benchmarking Initiative**

In partnership with the Higher Education Academy (HEA) and Joint Information Systems Committee (JISC), Trinity College has recently been involved in an eLearning benchmarking initiative. This allowed the college to compare itself with other HEI institutions, identifying comparative strengths and weaknesses, identifying and adopting good practices with a view to improving the quality and delivery of eLearning.

### **Directory of Research and Scholarly Activity**

Trinity College has recently developed a comprehensive Directory of Research and Scholarly Activity. Detailed information has been collated on a wide range of fields including individual staff members' areas of expertise, publications, conference activity and funded project work. It is anticipated that this resource will significantly enhance knowledge exchange and transfer activity.

For further information please contact:

Development Unit, Trinity College, Carmarthen, SA31 3EP, UK

Tel: +44 1267 676767

E-mail: [developmentunit@trinity-cm.ac.uk](mailto:developmentunit@trinity-cm.ac.uk)

## University of Glamorgan – [www.glam.ac.uk](http://www.glam.ac.uk)

For the University of Glamorgan, Knowledge Transfer means the development and application of market-orientated research and development activity with external organisations for the benefit of the region. To achieve this, the University assists hundreds of private and public organisations each year through consultancy, training and collaborative research activities.

Our services are delivered through a number of Faculty-based Knowledge Transfer Centres. Importantly the Centres are supported by a central Knowledge Transfer Office which facilitates communication across the University to provide needs-based solutions using quality driven processes and, where necessary, involving more than one Faculty.

Glamorgan Knowledge Transfer involves 3 cross cutting areas of activity

- Knowledge Transfer Centres & Networks
- Commercialisation, Enterprise & Innovation
- Collaborative Research

Specific market sectors that are of interest are

- Health & Sports Technology
- Creative Industries
- Transport Solutions
- Sustainable Energy
- Sustainable Construction
- Biological Waste Treatment

The University has a thriving enterprise culture and starts 3 staff spinout companies each year plus 30-40 graduate start-ups. Business support and mentoring services are provided through an incubation centre called GTI located near to the campus. A system for managing and exploiting intellectual property is in place and a number of IPR licences are completed each year.

Probably the best example of Knowledge Transfer at Glamorgan is CEPE, a Knowledge Transfer Centre within the Faculty of Advanced Technology which was established in 1995. Its aim is to stimulate the use of microelectronics technologies and facilitate their transfer to industry, especially small companies. All staff at CEPE have a strong industrial and commercial orientation, which enables them to provide the services that are required by industry.

CEPE is currently an accredited **Centre of Excellence for Technology and Industrial Collaboration**. This accreditation and award by the Welsh Assembly Government recognises the commitment of CEPE's staff to the transfer of microelectronics technologies to companies in all sectors of industry. Recently CEPE was awarded the status of the **National AIDC (Automatic Identification and Data Capture) Centre for Wales** to promote the innovation potential of these technologies in new products and processes.

The Centre is equipped with modern computer workstations, test equipment, electronic development hardware and software tools, all dedicated to industrial

projects. This includes modern electronic Computer Aided Design tools as well as a **Rapid PCB (Printed Circuit Boards) Prototyping facility** capable of producing high quality multi-layer PCBs for its projects and customers.

CEPE had previously successfully operated in the following industry support and knowledge transfer programmes:

### 1. DTI Electronics Design

This 5-year programme, following on from a previous DTI (Department for Trade & Industry) Microelectronics in Business programme, was created by the DTI to help British companies take advantage of the opportunities and competitive edge offered by the continuing advances in microelectronics design. The driving force behind the initiative was the widespread need for information, advice and training related to design practices which could shorten time to market, reduce costs and facilitate products which perform better.

### 2. EU Electronics Best Practice Programmes

CEPE has been actively engaged in EU funded electronics programmes over a number of years, most notably the €60m First User Action (FUSE) technology transfer programme in microelectronics. This was aimed at simulating the wider use of microelectronics technologies by European enterprises to improve their competitiveness and enhance their growth. CEPE and their associated First User companies were conspicuously successful in this programme.

Other successful programmes run by CEPE include:

- Knowledge Transfer Projects (KTP) Programmes (25).
- Engineering and Physical Sciences Research Council Industrial CASE Projects (5)
- EU FP 4/5 Esprit Fuse Project
- EU IST Jenet, SIDCOM and INES

The Centre also works with research units across the faculty to facilitate collaborative research with businesses including the following;

- The Integrated Communications Research Group.
- Medical Electronics and Signal Processing Research Unit
- The Information Security Research Group

For further information please contact:

University of Glamorgan Commercial Services (UGCS), University of Glamorgan,  
Pontypridd, CF37 1DL, UK

Tel: +44 1443 482482

Email: [ugcsenq@glam.ac.uk](mailto:ugcsenq@glam.ac.uk)

**University of Wales, Lampeter – [www.lamp.ac.uk](http://www.lamp.ac.uk)**

### **Knowledge Transfer Partnership**

University of Wales, Lampeter supports an innovative product-market development for indigenous Welsh food producers. Implementing marketing management for new Welsh food brands, improved supply chain management and servicing of target markets.

### **E-content for Technology Supported Language Applications**

The University is developing an integrated on-line dictionary and grammar with 300 000 lexical items. The development is in partnership with translation and audio-visual companies that will enhance standards in public broadcasting using screen translation.

### **E-learning**

Development of specialist delivery tools to support learners with audio-visual impairment to gain equitable access to learning resources and support. The institution is working in partnership with the HE Academy and the Joint Information Systems Committee on the approach to strengths and weaknesses of new delivery methods.

### **Screen Translation**

The University is a resource and training centre for the development and updating of professional subtitlers working in the audio-visual industry in Wales, the UK and Europe. The institution maintains the good standard style guide for the industry.

### **Work Based Learning**

The institution is undertaking development work on the accreditation of workbased learning in SMEs, with a particular emphasis on management and innovation.

### **Entrepreneurship and Spinout ventures**

The University started Graduate Enterprise twenty years ago and was rolled out across Wales in 2000. The institution is involved in supporting enterprise start-ups in the knowledge economy – with a particular emphasis on technology. Recent spinout-companies successes have arisen in developing New Media and also with Public Relations.

### **Sustainable University**

The University is leading a community based initiative concerned with low-energy futures. This is intended to challenge existing practices and engage with sustainable development principles, which includes social as well as environmental issues.

For further information please contact:

Centre for Enterprise, European & Extension Services, University of Wales, Lampeter, College Street, Lampeter, Ceredigion, SA48 7ED, UK

Tel: +44 1570 424746

E-mail: [i.roffe@lamp.ac.uk](mailto:i.roffe@lamp.ac.uk)

**University of Wales, Newport - <http://www3.newport.ac.uk>**

The Equinex project ([www.equinex.newport.ac.uk](http://www.equinex.newport.ac.uk)) was an ESF Equal project led by the University of Wales, Newport involving partners from the region of south east Wales, including Newport City Council, Careers Wales Gwent, The National Autistic Society, Jobcentre Plus and many other partners. The project aimed to develop and pilot innovative ways to support people from disadvantaged groups into education, training and employment.

The National Autistic Society worked with the University to develop a social skills support system to address the social skills difficulties faced by people with Asperger's syndrome, which prevent them succeeding in the workplace, education or training. This innovative social skills curriculum "Socialeyes" was developed using pilot groups throughout the UK and in Ireland and is the only one of its kind in the UK.

Newport Social Services, a project partner, has successfully worked with people with sensory, physical and learning disabilities traditionally referred for care assessment. The project employed transitions officers working holistically with individuals to move people nearer to the job market. The School of Education at the University worked closely with project partner organisations and beneficiaries to develop and produce awareness raising packages for employers and frontline workers. As a result of this work some beneficiaries were offered work opportunities.

The transnational work programme with partners in Estonia, Ireland and Italy carried out research comparing teleworking practices in three EU member states. A pilot vocational training programme is now being developed.

### **Ty Poeth**

Ty Poeth is the Welsh name of a project being led by the University of Wales, Newport which translated into English means 'Hothouse'. The aim of the project is to develop an innovation framework for collaborative creative R&D between academia and industry, based on experimental intensive knowledge-exchange workshops.

The project will refine the successful formula used with large companies to meet the R&D needs of small technology-centred businesses in Wales. The Ty Poeth team is outstandingly good at thinking as trained and experienced designers. 'Design thinking' is not usually part of the training for engineers and technologists. Yet experience shows that giving creative engineers and technicians intensive exposure to 'design thinking' results in new product ideas, creating products that will satisfy consumer needs and create new markets, as well as giving a new way of approaching the process of design-based R&D.

### **Strategic Insight Programme (SIP)**

The Strategic Insight Programme (SIP) is a collaborative project between three HEIs based in south east Wales: the University of Wales, Newport, the University

of Glamorgan, and the University of Wales Institute Cardiff. The Programme seeks to facilitate strategic placements from HEIs into partner organisations (private, voluntary and public sector) and to receive reciprocal input from the partner organisations. Fundamental to this approach is the transfer of knowledge and cultural understanding on a mutually beneficial basis.

A number of different types of secondment can be envisaged. For example, a short term secondment (of one to two weeks) to shadow a colleague in a partner organisation would lead to a better understanding of the culture of the host organisation. Alternatively, a placement onto the board of a SME or voluntary sector organisation for a year (this is probably no more than a half day per month commitment) would be a good strategic placement. This three year, pilot project has been awarded HEFCW funding through its collaborative Third Mission fund.

### **Knowledge Exploitation Fund eLean project**

The eLean Project aims to develop a web based training programme to transfer the knowledge and competences required to develop and implement sustainable business improvement strategies and techniques, based on Lean Thinking and Six Sigma. It is targeted at small and medium (SME) sized manufacturing companies in Wales.

### **Knowledge Exploitation Fund Waste Treatment Technologies project**

In response to the challenges facing the industry and the need to develop increased skills within this sector for Wales, a new 'MSc' level module (NVQ level 5) in 'Waste Treatment Technology' is being developed in partnership by several leading Welsh universities, including University of Wales, Newport. The module will equip those involved in the field of waste management or considering a career in this area with the knowledge and skills necessary to make informed decisions and provide cost effective innovative solutions for the management and treatment of waste, whilst decreasing the environmental impact of waste production.

For further information please contact:

Karen Turnbull , Deputy Director of Research and Enterprise, University of Wales, Newport, Allt-yr-yn Campus, PO Box 180, Newport, NP20 5XR, UK

Tel: +44 1633 432400

Email: [karen.turnbull@newport.ac.uk](mailto:karen.turnbull@newport.ac.uk)

## Conclusion: Future challenges

The EU recognises the importance of improving knowledge transfer between research institutions and industry as part of the Lisbon Strategy for Growth and Jobs. At the UK level, the Sainsbury Review of Science & Innovation recently stated that:

*Clusters of high-technology companies can stimulate regional economic growth, and a recent report by Library House showed the extent to which high-technology clusters have been forming in the UK around our world-class research universities. This supports the theory that universities are one of the driving forces behind the formation of clusters. They promote innovation and entrepreneurship, not only by spinning out companies, but also by creating an appropriate microenvironment to attract innovation-based companies and foreign R&D facilities.<sup>6</sup>*

Wales is well-placed to form dynamic clusters around HEIs, because the size and institutions of the country favour a strategic approach to knowledge transfer. Moreover, the EU Convergence programme - available in many parts of Wales until 2013 - can support this, especially by creating excellent research facilities and a 'critical mass' of high-value activity.

In this transformation of the Welsh economy, the experience of successful knowledge exchange initiatives such as those highlighted in this document should be built upon, capitalising on the excellence found across the Welsh Higher Education sector. In addition, clusters require an outward-looking perspective and strong international connections in order to prosper. Welsh HEIs can play a crucial role in developing overseas partnerships that lead to new business, for example with multinational corporations.

As shown by their investment in the Welsh Higher Education Brussels office, the Welsh HEIs are keen to explore further collaboration with partners in Europe and beyond. This work can be supported by EU programmes such as FP7, Erasmus, and Interreg, as well as those for culture, media, public health etc.

For further information, please contact:

Welsh Higher Education Brussels  
Wales House  
11 Rond-Point Schuman  
B1040 Brussels  
Belgium  
Tel: +32 2 2266697  
Email: [info@wheb.ac.uk](mailto:info@wheb.ac.uk)  
Web: [www.wheb.ac.uk](http://www.wheb.ac.uk)

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<sup>6</sup> *Sainsbury Review of Science and Innovation*, October 2007, p.143

## **Annexe 1: Selected initiatives in Wales in support of knowledge transfer between academia and industry**

### ***Centres of Excellence***

The **Centres of Excellence (CETIC) Programme**<sup>7</sup> has helped HEIs to fund the recruitment of commercial and technical staff dedicated to working with industry, and SMEs in particular.

CETIC is a network of 18 accredited, industry-focused research groups linked to Welsh universities. The programme supports technology transfer services to industry to ensure that local, national and international companies benefit from the most industrially relevant expertise and facilities from universities in Wales.

Centres of Excellence is an accreditation scheme managed by the Welsh Assembly Government and part financed by the EU Objective 1 Programme.

### ***Intellectual Property***

Each HEI in Wales has at least one member a staff working as an **Industrial Liaison Officer (ILO)**. The ILOs meet on a regular basis to share practice and learn from each other. Recently they have worked together in proposing projects for funding under the research and innovation priority of the West Wales and The Valleys Convergence Programme 2007-13.

The Welsh Industrial Liaison Officers are working with the Welsh Assembly Government to agree the format for an inventory of the **IP currently held in Welsh HEIs** with a view to advising on its commercialisation. It will enable access by potential investors but maintain the necessary confidentiality of the information. Following a review of the material with the HEIs, the final document is scheduled to be completed by April 2008.

Welsh HEIs draw on the expertise of the **UK Intellectual Property Office**<sup>8</sup> (UK IPO), which is located in South Wales. The UK IPO contributes regularly to capacity-building events organised by the UK-wide **National Council for Graduate Entrepreneurship**<sup>9</sup> (NCGE). Several registered users of the education community of the NCGE work for Welsh HEIs. Furthermore, the UK IPO has provided speakers on IP issues related to entrepreneurship at several meetings organised by academic departments at Welsh HEIs (sometimes also attended by local businesses). UK IPO has also held information days in Wales attended by HE staff.

### ***Graduate and student mobility between academia and industry***

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<sup>7</sup>

<http://new.wales.gov.uk/topics/businessandconomy/help/innovation/academia/cetic/?lang=en>

<sup>8</sup> <http://www.ipo.gov.uk/>

<sup>9</sup> <http://www.ncge.com>

The **Knowledge Transfer Partnerships (KTPs)** scheme places Graduates - known as Associates - to spend up to two years or more in a company undertaking a project of significant strategic value. The scheme has been in existence since 1975 and is sponsored by a number of bodies across the UK. The Welsh Assembly Government funds Welsh projects. The UK Government also supports Welsh projects on a part funding basis. Wales currently has a target of 110 programmes to be achieved by 2008. The current budget is €1.42m.

Reviews have reported that KTP has made HEIs more aware of the needs of businesses and nearly 80% reported an increase in the extent of their linking/networking with industry. 80% of Associates take up jobs with their host firms as a result of their participation in KTP. Wales has taken forward review recommendations on KTP, by increasing the levels of funding and targets and continuing to explore diverse ways of supporting KTPs outside the field of technology transfer, e.g. tourism.<sup>10</sup>

The Higher Education Funding Council for Wales (HEFCW) manages the **Graduate Opportunities Wales (GO Wales)** programme, which helps students and graduates from Welsh universities to find work - or work experience - in Wales, and encourages Welsh businesses to look to home-grown talent to meet their high level skills needs. The programme is delivered across all Welsh HEIs and offers services to undergraduates, graduates and businesses throughout Wales. GO Wales has developed links with over 2 000 local SMEs, and includes financial support for SMEs to train and develop the graduates that they place. GO Wales Phase 1's evaluation showed that around 60% of graduates found that their placement led to permanent employment with their host or another organisation. GO Wales is currently partially supported by the Objective 1 European Social Fund programme.

### ***Funding streams***

HEFCW's **Third Mission Fund**<sup>11</sup> supports HEIs in activities that bring economic and community benefits. Allocations are based on a common level of foundation funding to all HEIs plus formula-based supplementary funding that takes account of past performance. A further €700 000 a year has been reserved to support collaborative third mission activities and institutions are able to bid for a share of this additional money.

Several knowledge transfer initiatives in Wales are financed by **the Knowledge Exploitation Fund (KEF)**. This is financed by EU Structural Funds and the Welsh Assembly Government and has the following elements:

- Through Collaborative Industrial Research Projects (CIRP), KEF is providing funding for industry-academic collaborative R&D projects in order to increase

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<sup>10</sup> National Assembly for Wales, Enterprise, Innovation and Networks Committee, *Review of Science Policy in Wales*, 2007, p.74

<sup>11</sup> Summary taken from *Higher education-business and community interaction survey 2004-05 and 2005-06*, Higher Education Funding Council for England, 2007, p9. Available at [http://www.hefce.ac.uk/pubs/hefce/2007/07\\_17/07\\_17.doc](http://www.hefce.ac.uk/pubs/hefce/2007/07_17/07_17.doc)

the R&D capacity of Wales and to stimulate the development of more high-technology, R&D driven businesses.

- Technology Transfer Centres (TTCs) provide an opportunity for businesses to access leading edge technology and specialist advice and test services located within the resources of Higher and Further Education Institutions.
- Technology Transfer Networks (TTNs) are designed to facilitate joint working between research and technology transfer centres to provide an integrated and Wales-wide enhanced R&D capability for the benefit of the Welsh economy.
- The Patent and Proof of Concept Fund (PPoC) proves the technological application of ideas born out of academic research. It is a step beyond 'blue sky research', bridging the gap between pure research and the precompetitive development stage of the R&D process.
- KEF has established an all Wales e-training network resource for HEIs to deliver high level science, engineering and technology skills to the Welsh SME base (€2.7m). It has helped establish 8 industrial training consortia (€3.4m) for developing and piloting high level skills
- All HEIs in Wales have developed a strategy for entrepreneurship, bringing together local and national activity designed to create a culture of entrepreneurship across the sector, develop the skills of staff and students, and support graduates who wish to go on and set up their own business. The 2006 survey of the KEF Entrepreneurship Scholarships indicates a contribution to the Welsh economy of €28.7m and 761 jobs created.

## Annexe 2: Research excellence in Wales

*Departments in Welsh HEIs awarded the top three grades (i.e. 5\*, 5, 4) in the 2001 UK Research Assessment Exercise*

### **Aberystwyth University**

Politics & International Studies	5*
Celtic Studies	5*
Drama, Dance & Performing Arts	5
Physics	4
Applied Mathematics	4
Computer Science	4
Geography	4
Law	4
English Language & Literature	4
German & Related Studies	4
History	4

### **Bangor University**

Psychology	5*
Celtic Studies	5*
Agriculture	5
Accountancy	5
Music	5
Physical Education & Sports Science	5
Biological Sciences	4
Environmental Sciences	4
Electrical & Electronic Engineering	4
English Language & Literature	4
French	4
History	4
Theology, Divinity & Relig Studies	4

### **Cardiff University**

Other Studies Allied to Medicine	5*
Psychology	5*
Civil Engineering	5*
Town & Country Planning	5*
English Language & Literature	5*
Theology, Divinity & Relig Studies	5*
Education	5*
Pharmacy	5
Physics	5
Earth Sciences	5
Pure Mathematics	5
Computer Science	5
Electrical & Electronic Engineering	5

Built Environment	5
Law	5
Sociology	5
Business & Management Studies	5
European Studies	5
Celtic Studies	5
Archaeology	5
History	5
Communication & Media Studies	5
Music	5
Biological Sciences	5
Clinical Laboratory Sciences	5
Chemistry	4
Mech, Aero & Manufacturing Engineering	4
Biological Sciences	4
Hospital Based Clinical Subjects	4

### **Swansea University**

Civil Engineering	5*
Physics	5
Pure Mathematics	5
Computer Science	5
Social Work	5
Celtic Studies	5
German & Related Studies	5
Spanish	5
Psychology	4
Chemistry	4
Electrical & Electronic Engineering	4
Mech, Aero & Manufacturing Engineering	4
Geography	4
Economics & Econometrics	4
English Language & Literature	4
French	4
Italian	4
Classics & Ancient History	4
History	4

### **University of Wales Institute Cardiff**

Art & Design	4
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### **University of Wales Lampeter**

English Language & Literature	5
Theology, Divinity & Relig Studies	5
Archaeology	4
History	4

## **University of Wales Newport**

Art & Design 5

## **University of Glamorgan**

Computer Science 4

English Language & Literature 4

### ***Centres of Excellence***

The following have been accredited under the Centres of Excellence accreditation scheme managed by the Welsh Assembly Government and part financed by the European Union.

Aberystwyth Bio Centre - Aberystwyth University

[www.aber.ac.uk/abc/](http://www.aber.ac.uk/abc/)

Centre for Advanced & Renewable Materials -  
Bangor University & North East Wales Institute

[www.carmtechnology.com](http://www.carmtechnology.com)

Centre for Advance Software & Intelligent Systems -  
Aberystwyth and Cardiff Universities

[www.aber.ac.uk/casis](http://www.aber.ac.uk/casis)

Centre for Communications & Software Technologies –  
Swansea University

<http://cast.swan.ac.uk/>

Centre for Complex Fluids Processing – Swansea University

[www.swansea.ac.uk/chemeng/centre](http://www.swansea.ac.uk/chemeng/centre)

Centre for Electronic Product Engineering – University of Glamorgan

<http://www.glam.ac.uk/soe/CEPE/>

Centre for Research in the Built Environment – Cardiff University

[www.cribe.uk.com/about/about.html](http://www.cribe.uk.com/about/about.html)

Manufacturing Engineering Centre – Cardiff University

<http://www.mec.cf.ac.uk/>

Civil & Computational Engineering Centre – Swansea University

[www.swan.ac.uk/civeng](http://www.swan.ac.uk/civeng)

Materials Centre of Excellence – Swansea University

[www.swan.ac.uk/mateng](http://www.swan.ac.uk/mateng)

National Centre for Product Design & Development Research –  
University of Wales Institute Cardiff

<http://www.uwicresearch.co.uk/knowledge-transfer/>

Wolfson Centre for Magnetic Technology – Cardiff University

[www.cf.ac.uk/engin/research/wolfson](http://www.cf.ac.uk/engin/research/wolfson)

ICON – IBM Joint Proposal (School of Informatics) –  
Bangor University

<http://www.iconphotonics.co.uk/>

Centre for Enterprise and Quality Management –  
University of Wales, Newport

<http://www.ceqm.co.uk/>

Centre for Applied Marine Sciences – Bangor University

<http://www.cams.bangor.ac.uk/>

Centre for Engineering, Research and Environmental Applications –  
University of Glamorgan

<http://fat.glam.ac.uk/cerea/>

Wound Healing Research Unit –  
Cardiff University

<http://www.whru.co.uk/>

Centre for Research in Energy, Waste & Environment –  
Cardiff University

<http://www.engin.cf.ac.uk/research/group.asp?GroupNo=39>