

Technium Concept

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ABSTRACT

Traditionally the economy of Wales has been based on the coal and steel industries. Recently, Wales has elected its own National Assembly and together with the Welsh Development Agency (WDA) and through a Regional Technology Plan, has prioritised the creation and development of a knowledge based economy. The culture of Wales has always placed emphasis on education and for a small nation, has a University sector with an excellent reputation for advanced research. The WDA and the University of Wales Swansea came together to establish Technium, which is an unique concept designed to bridge the gap between advanced University research and commercial exploitation. Technium was co-funded by the WDA and the European Regional Development Fund. The project is seen as the first phase of creating a network of sector specific Techniums across the country, all linked via state of the art telecomm-infrastructure to University centres of research excellence. This paper will describe two case studies, both in the Optics / Photonics field, of research centres being established in Technium by blue chip international companies. Those companies having located in Technium specifically because of the links to high quality university research. One company is Agilent Technologies Inc. (USA) a global leader in Optoelectronic components. The second company, ICN Pharmaceuticals Inc, design and develop optical devices to be used in conjunction with pharmaceuticals for the treatment of a range of diseases. Working closely with the WDA and the University of Wales Swansea, these and other companies will pursue product development, sponsor postgraduate research and generate intellectual capital that will benefit the company, students and the region alike.

Key Words: Technium, Optoelectronic, Knowledge Driven, Technology Transfer

1. INTRODUCTION

Wales is a country within the United Kingdom whose population is a little less than 3 million. Its geographical location means that it is on the very western edge of the European Community and only Ireland is more distant from the centre of Europe. In the 19th Century, Wales had a thriving economy based on metal and coal industries. During the 20th century, the expertise and skills of the nation in these sectors facilitated the development of the world's primary centres for the steel and tinplate industry. The second half of the 20th century saw a decline of Wales' traditional economic activity, as other regions of the world became increasingly competitive, particularly on price. The last quarter of the century saw a great success in attracting inward investment, particularly high added value manufacturing jobs in the electronics, automotive and related industries. However, as the new millennium started and the political map of the world changed, it became clear that salary structures, particularly in the former eastern block states, made it increasingly difficult for Wales to continue to secure inward investing manufacturing operations.

Wales is blessed with a well-established university system, which is recognised for the excellence of its research, particularly in the science and engineering disciplines. If market economics make it difficult for a small nation in Wales' situation to secure and retain manufacturing operations then basing a future economic strategy on research and development in the knowledge economy, becomes a viable alternative. Where it may be relatively easy to uproot and move a manufacturing activity from one geographical location to another, it is far harder to relocate an R&D operation. Research and development has as its primary asset the skills, knowledge and know-how of its people. Valuable intellectual assets are based upon and developed by the individuals employed by the company and these are much more difficult to replicate at a new location.

Developing an R&D team requires significant investment and can take a long time. Once developed that R&D team contains invaluable know-how regarding the company's current products and is the primary source of product improvements. It is for these reasons that the Welsh Development Agency and the University of Wales Swansea decided to pilot the Technium project.

Technium was established with four key aims, namely:

- i. The construction of a high quality environment appropriate to facilitate and support the growth of knowledge driven businesses.
- ii. To accelerate the rate of increase of creation of new SMEs in the knowledge economy.
- iii. To support the growth of already existing knowledge driven SMEs.
- iv. To create a “one-stop-shop” to encourage the relocation of inward investing R&D operations.



The project was co-funded by the WDA and the European Community's Regional Development Fund. Funding approval was granted in December 1999, building commenced in the Spring of 2000. Technium was completed, commissioned and fully occupied by early Summer of 2001. Even though it is early days, the initial period has been viewed as a success has encouraged the WDA and the National Assembly for Wales to make Technium a key part of Wales' National Economic Development Strategy. In the short term, a network of Techniums will be established in the South West region of Wales, all based upon collaboration between the private, public and higher education sectors, facilitated by the Welsh Development Agency.

2. RELEVANT RESEARCH IN THE UNIVERSITY SECTOR

The strategy for Technium is based upon the excellence of local university research. Time and time again, potential inward investing companies have stressed the need to access high quality university research and the recruitment and retention of high quality staff as their highest priorities. A parallel initiative entitled *The Centres of Excellence for Technology and Industrial Collaboration* (CETIC) links directly into the Technium network. The CETICs are helping companies to benefit from the best of industrially relevant expertise and facilities within universities within Wales. A rigorous selection exercise has resulted in the accreditation of twenty CETICs recognised for their research, world-class facilities and exceptional track record of success industrial collaboration. Each Centre has a dedicated manager and is able to provide focussed and productive support to local, national and international companies, including organisations that are seeking to invest in Wales.

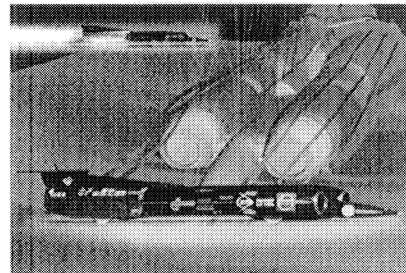
Technium as a project was based initially on the following CETICs at University of Wales Swansea. .

2.1 Power Electronics Design Centre

The Power Electronics Design Centre has a strong research background in power semiconductor device design and application. It combines thermal modelling expertise with detailed device design and characterisation.

2.2 Centre for Computation and Simulation

The Centre is based upon the research activities of the Department of Civil Engineering at the University of Wales Swansea, which has an outstanding international reputation for the development of computational techniques for the simulation of engineering problems. The Centre contributed to the design of the THRUST Supersonic Car, which broke the world land-speed record.

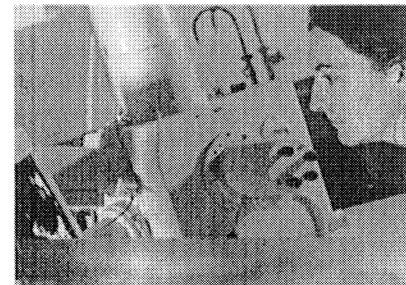


2.3 Centre for Communications and Software Technologies

The Centre for Communications and Software Technologies is a joint venture between the Departments of Computer Science and Electrical and Electronic Engineering at the University of Wales Swansea. It is based on the research of a multidisciplinary group of communication engineers and computer scientists, with expertise in communications, software technologies and multimedia systems.

2.4 Centre for Materials Engineering

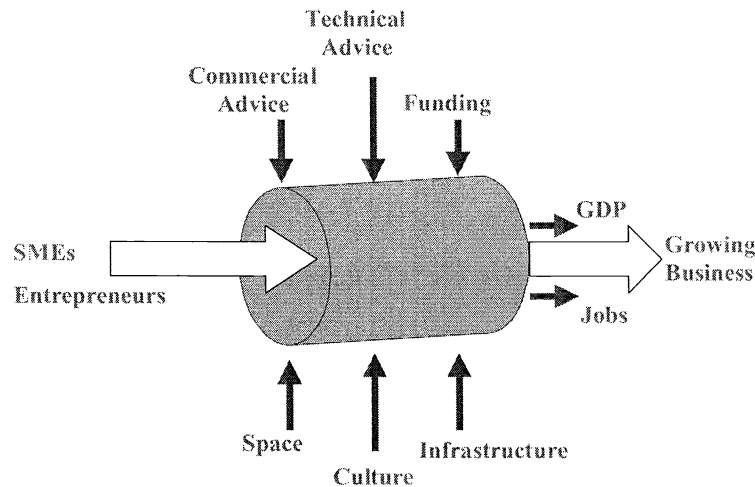
The Centre integrates the expertise of the Materials Engineering Department with the computer modelling capabilities of key staff in the Mechanical and Civil Engineering Departments. The expertise covers High Performance Materials, Polymers and Composites, Steel Technology and process modelling. The Centre transfers its expertise and knowledge to industry through research, postgraduate training, industrial courses, software development and cutting edge consultancy.



2.5 Centre for Complex Fluids Processing

Complex fluids are extremely diverse and range from biotechnological materials and food products to mineral slurries and polymer melts. Underlying their diversity are certain properties that must be understood if processing is to be effective and efficient. These properties are the focus of the Centre for Complex Fluids Processing.

2. TECHNIUM CONCEPT



Technium is an incubator with a difference. It has, of course, the public and private sector commercial support facilities offering commercial, financial and marketing advice and guidance. However, it has direct links to the university's research centres. That link is realised not only via an IT infrastructure offering high quality bandwidth capability but also a constant ebb and flow of personnel. This offers direct access to world-class research and facilities that often even the largest of companies could not afford.

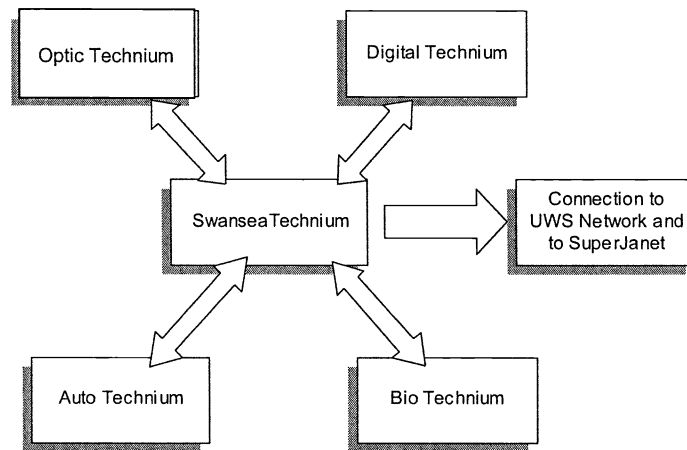
Tenants in Technium are vetted on the bare minimum of criteria. Firstly that they are in the knowledge economy and secondly, that their business plan demonstrates the wish and intent to grow aggressively. Based on that vetting, they are offered a short term tenancy (18 months to 2 years) after which they will be offered premises of similar quality adjacent to Technium. Knowledge driven businesses go through continuous evolution process. It is recognised that even when they leave Technium, the companies will still require access to public and private sector support and access to university R&D facilities is something they will require at all phases of their development.

Such has been the perceived success of this initial phase of Technium that the WDA and the National Assembly for Wales have decided to support the expansion of the concept into a network of Techniums. The first Technium will be the hub of that network and will house and manage the business support mechanisms and the IT infrastructure which will connect the whole network to the University of Wales Swansea and from there out to the world. Care will be taken to avoid replication and duplication of the central support resources. The hub Technium will be non-sectorally specific, whereas each of satellite Techniums will be predominantly active in a specific defined commercial sector.

The sectors will be defined by market forces and private sector involvement will be an essential pre-requisite. The economic activity of the region has already led to plans for developing Techniums in the automotive, digital, biotechnology, media and energy sectors. Each will have a different sub-set of partners with direct interests in the commercial sector represented by that Technium. Wherever possible competition will be avoided and companies directed towards the Technium that represents their specific sector. The integrity of the Technium brand will be protected and each Technium will have as a minimum, the following key features.

- Direct links to world class university research
- The support of and links to a high band-width IT infrastructure
- High quality premises
- Business support on site
- Primarily active in the knowledge economy

Each of the Techniums will be interconnected through a central hub where the primary business and IT support resource will be located.



3.1 The Digital Technium

Location: University of Wales Swansea

Total Project Cost: £7 million

Funding / Partnership: University of Wales Swansea, WDA, Agenda, CISCO and Agilent Technologies. It is the subject of an Objective One bid.

Academic links: Electrical and Electronic Engineering, Computer Science and Civil Engineering.



Accommodation: 3500 sqm on three floors. One floor will be dedicated to incubator units and house 13 incubator offices. The remaining space will be associated with specialist research laboratories, development laboratories and training laboratories. It will be geared to develop young, start-up companies.

Specialist Facilities: Virtual reality studio; High frequency communications research facilities; multimedia research facilities, computer graphics research facilities. The Centre for Computation and Simulation and the Centre of Communications and Software Technologies – accredited Centres of Excellence at the University of Wales Swansea – will be housed in Digital Technium.

Sectors: Digital Technium will cater for the digital technology sectors including communications, multimedia, animation, telecommunications, environmental sensing, e:Learning and IT.

Anticipated start of work: April 2002

3.2 Auto Technium

Location: Llanelli Gate, Llanelli, with satellite operation the Pembrey International Racing Circuit where the British Automobile Racing Club (BARC) is extending its racing track for testing and international racing.

Total project cost: £14 million

Funding/Partnership: WDA, Carmarthenshire County Council, BARC, the University of Wales Swansea and Swansea Institute of Higher Education. It is subject to an Objective One bid.

Academic links: University of Wales Swansea, Swansea Institute of Higher Education supported by the Welsh Automotive Forum.

Accommodation: The 7.4 hectare site will create a secure automotive park. The main building will provide 2,200 sqm of accommodation, housing 15 incubator units, a conference room, meeting rooms and training area. The operation at Pembrey will include a 300 sqm satellite office.

Specialist facilities: Three separate buildings will house state-of-the-art sophisticated, specialist machinery to develop and refine new products and processes. BARC Motorsports Library.

Sectors: Businesses specialising in performance engineering, embracing design, development, testing and motorsports events to a world class standard.

Anticipated start date: March 2002

3.3 Bio Technium

Location: The National Botanic Garden of Wales, Llanarthne

Total project cost: £4.7 million to include Bio Technium and research laboratories for the National Botanic Garden.

Funding / Partnership: The National Botanic Garden of Wales, WDA, ERDF, Millennium Commission, private funding.

Academic Links: University of Wales. Other links being developed nationally and internationally with the botanical gardens worldwide.

Accommodation: 1600 sqm to provide highly flexible furnished and serviced laboratory and office space, meeting rooms and support areas. Units will range in size from 90 sq ft to 1900 sq ft accommodating 12 companies employing up to 48 people. Future expansion of these businesses could be accommodated on site.

Specialist facilities: Sponsorship for science equipment offered from Leica, FEI Philips, Applied Biosystems, Sanyo Gallenkamp, Beckman Coulter.

Sectors: Bioscience/environmental technologies with a particular emphasis on plant based technologies.

Start of work: Under construction – completion anticipated May 2002.



3.4 Media Technium

Information on this project is being kept under wraps while the final details are being put in place. It is being led by the private sector and will be housed in Gelli Aur Mansion near Llandeilo, Wales. It will provide accommodation for companies, individuals, start-ups and entrepreneurs within the media sector including standard and new media ranging from publishing to web design, video and interactive TV. It is expected to house around 30 businesses and employ some 180 people in highly skilled, knowledge based work. Media Technium will have links to the expertise of the higher and further education sectors.

3.5 Optic Technium

Location: St Asaph Business Park, St Asaph, Wales

Total project cost: £7 million

Funding/Partnership: WDA, Welsh Opto-Electronics Forum, University of Wales, ELWa, private sector. It is the subject of an Objective One bid.

Academic Links: University of Wales Bangor, NEWI, University of Wales Aberystwyth.

Accommodation: 4000 sqm of quality accommodation, housing up to 20 incubator units, a technology centre, a business support centre with conference facilities.

Specialist facilities: State-of-the-art equipment in the Technology Centre to support industry.

Sectors: Companies specialising in optonics.

Anticipated start of work: April 2002

3.6 Technium 2

Location: Swansea Docks - opposite Technium I - and will be the second flagship development for the Port Tawe Innovation Village.

Total project cost: £4 million.

Funding / partnership: WDA, University of Wales Swansea, City and County of Swansea, ELWa, Swansea Institute of Higher Education, Morgan Cole, PricewaterhouseCoopers, Urquart-Dykes and Lord. It is the subject of an Objective One bid.

Academic links: The University of Wales Swansea and Swansea Institute of Higher Education.

Accommodation: Technium 2 will provide4 accommodation for businesses currently operating in Technium that have expanded, taken on more staff and need more space. The building, on three floors, will measure 3639 sqm, providing 13 units with in-build flexibility to meet the requirements of the occupants. Units will range in size from 93 sqm to 590 sqm. It will have a basement car park.

Specialist facilities: It will be linked to Technium, allowing companies access to all the business and technical support needed and bandwidth infrastructure.

Sectors: It is not sector specific but for companies operating in fast growth sectors including semiconductors and IT orientated businesses.

Anticipated start of work: March 2002.

4. CASE STUDIES – THE IMPACT OF TECHNIUM

4.1 ICN Photonics

ICN Photonics is a subsidiary of ICN Pharmaceuticals Inc, an American Stock Exchange listed company. One of ICN Pharmaceuticals speciality is dermatology. A medical discipline in which devices can play a key role in both therapy and diagnostics. A particular commercial opportunity open to ICN due to its activity in pharmaceuticals and devices is the development of combination therapy where light and drug work together to combat disease. Indeed, the whole purpose of ICN's original investment in Wales was to develop this area of its activities. ICN Photonics manufactures medical devices in Wales and those devices are marketed by the parent company to the world market.

4.1.1 The Commercial Scenario

Device product life times, in contrast to pharmaceuticals, are relatively short and a continual pipeline of new products and product extensions must be established. In order to achieve this effectively, a close collaboration must be established between device developers and the clinical environment. ICN took a decision to locate an R&D centre at Technium in order to establish a close link with a University containing an Engineering and Medical School.



4.1.2 The Nature of the Technium Involvement

ICN has established an embryonic R&D Centre at Technium with the aim of developing a range of research collaborations with academic departments. The goal of those collaborations being to accelerate near market research activities in a manner that is of benefit to both commercial and academic partner.

4.1.3 The Economic Benefit to the Region

ICN's tenancy at Technium has only been established relatively recently. However, the parent company is pleased with the research deliverables resulting in an increase of 140% in the R&D budget, all of which is expended directly in the local economy.

4.2 Agilent Technologies UK Limited

Agilent Technologies UK Limited is on the leading edge of nearly every major trend in communications and life sciences, from optical and wireless communications to diverse discovery research. Leading companies including communication equipment manufacturers, internet service providers and bio pharmaceutical companies depend on Agilent's test and measurement products. Agilent also develops and manufactures semiconductor devices and chemical analysis tools to help drive today's communication and life sciences revolutions.

4.2.1 The Commercial Scenario

Agilent is headquartered in the UK at Ipswich. In 1999, the company was looking to establish a new R&D team to develop next generation production and test equipment to support their range of optoelectronic devices currently being produced in several worldwide facilities. Sites considered in the UK were Ipswich, Sheffield, Glasgow, Edinburgh and Swansea. The options were to either expand at the existing facility at Ipswich or establish a new operation near a centre of recognised academic research. The key factors in nominating the location being the availability of relevant quality graduates, academic research expertise, suitable infrastructure and support from the public sector.

4.2.2 The Nature of the Technium Involvement

Soon after receiving an initial approach from Agilent, a meeting took place to identify their detailed requirements. As a result a full proposal was generated within a timescale defined by the Agilent project management team. The proposal covered many areas of activity but in particular, addressed all the concerns and issues raised by Agilent. There followed a recruitment campaign designed to assess the quantity and quality of graduate engineers available for employment. Academic links were established with identified centres of relevant research. In addition, an infrastructure package tailored to Agilent's needs was produced which included building space issues, broadband telecomm connections and a public sector grant assistance package. All dialogue between Agilent and Technium was undertaken via a single point of contact and delivered within Agilent's defined timescales.

4.2.3 The Economic Benefit to the Region

Clearly, the immediate impact of an investment by Agilent is the creation of high quality jobs within the region. Creation of these jobs brought a significant "multiplier" effect resulting in the creation of additional jobs directly in the region. The arrival of a leading edge facility has had the further effect of "upskilling" the local industry in order for it to become a customer and supplier to Agilent.

5. CONCLUSION

Technium is a new and innovative project, which attempts to assist in the stimulation of the growth of the knowledge economy of a small European region, Wales. That region's general economy has suffered from the demise of its traditional steel and coal industries. Wales, however, has a long and excellent tradition of university education, which has led to the existence of world-class research activity in its universities. The Technium concept, driven by public and private sectors in partnership, attempts to derive direct economic benefit from this unique asset. To date, the project has delivered real and tangible benefits, stimulating the growth of indigenous knowledge driven SMEs and attracting inward investing R&D centres. That initial success has encouraged The National Assembly for Wales and the WDA to expand the concept across the whole nation. This paper simply outlines the concept and describes a vision. Time will tell whether or not it will have the major economic impact hoped for. However, initial signs are positive.

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