

Commercialisation in Wales - A Report by the Independent Task and Finish Group



Report of the Independent Review of Publicly Funded Commercialisation Activities in Wales.

foreword

This Report contains the results of the independent Review into publicly funded commercialisation activities in Wales. It is important to remember that commercialisation is not new. Many of the world's most successful economies demonstrate the benefits of an investment in commercialisation activities. In Wales publicly funded commercialisation initiatives have been pursued for over a decade, most notably by the Welsh Development Agency, via initiatives such as the Spin Out and Technium programmes. What gives impetus to this Review is that it comes at a time when all advanced Western industrialised countries are facing enormous challenges to their competitive leadership. In the second half of the twentieth century European and North American economies faced the challenge of Japan and then the 'Asian Tigers'. Now there is common consent that two new Asian giants China and India, with a combined population of a little short of 3 billion people, represent an industrial challenge the like of which will not have been faced by the current generation of industrial leaders and policy makers.

Wales will not be immune to a shift in industrial power posed by these two emergent economies. During the second half of the 1990s the first signs of the erosion of Welsh manufacturing competitiveness became apparent as production capacity was progressively off-shored to Central Eastern European countries. But new sources of competition will not apply purely to the manufacturing sector. A recent article in Business Week (1) commented on concerns expressed by the US Chamber of Commerce at the comparatively low number of 70,000 graduate engineers joining the US workforce annually. In contrast India produces 350,000 and China 500,000. While there has been a debate about the accuracy of these numbers we believe they are sufficiently large that to ignore the challenges posed by both countries and their corporations to all aspects of economic activity and not just manufacturing production would be irresponsible. We believe there is an irresistible tide of change that is gathering pace. Wales, similar to many other economies, must learn to live with and adapt to these changes.

Faced with these circumstances it is increasingly apparent that 'Knowledge' is an important asset providing the basis for a robust economic development trajectory. We believe the value of what has been labelled the 'Knowledge Economy' will grow. One of the most important sources of Welsh knowledge is its higher education institutions. Therefore for the purposes of this Review it made sense to focus on this sector. The relationship between higher education and economic development, the third mission, has been the topic of considerable investigation. There has been the Lambert Report in 2003, the Assembly's own Nexus Task and Finish Group in 2004 and most recently the National Assembly Government's Science Policy consultation exercise. We did not consider it our job to go over this ground again. Instead with our shared experience of

building technology based businesses headquartered in Wales we believed it would be most productive to apply our attention to the processes by which intellectual property, inventions and innovations created within higher education, is developed to form wealth, employment and share holder value. We believe this is one of the most urgent tasks on the Welsh economic development agenda. Wales needs to act and adapt to change otherwise it will be acted upon. Our view is there is considerable potential within the Welsh higher education sector to provide the foundations for a vibrant and productive set of commercialisation outcomes.

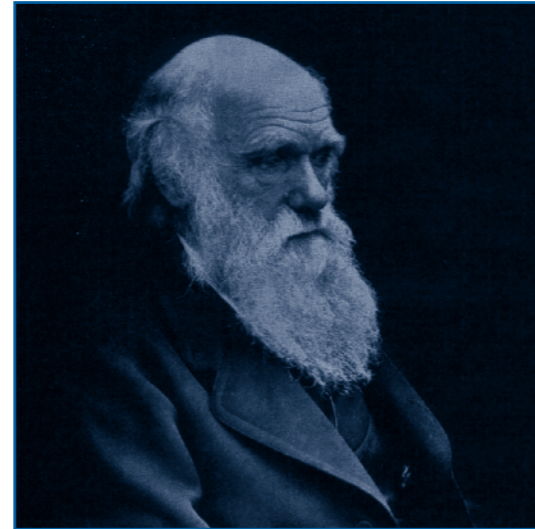
As the prospects of the agenda for action contained in this report grow to a stage where they are put into action we hope those responsible will continue to involve all members of the Review in the implementation of our findings.

The members of the Review are grateful for the financial support that has allowed the secretarial and research activities to take place. I would also like to take this opportunity to thank the people who gave their time to participate in interviews and provide insights that have proved important in forming our conclusions. In particular I would like to thank the officers of HEFCW for their help in seeking information on the financial returns from commercialisation activities.

Finally I must acknowledge the hard work, commitment, humour and time donated on a voluntary basis by my colleagues Mark Barry, Professor Ken Board and Ian Courtney. The words in this Report are ours collectively. We all believe it has been an invaluable exercise that can have a lasting beneficial impact.

Simon J. Gibson OBE, Chairman.





*“It is not the strongest of the species that survives,
nor the most intelligent that survives.
It is the one most adaptable to change.”*

Charles Darwin

The independent Review was commissioned by the National Assembly Government’s Minister for Enterprise, Innovation and Networks. The Terms of Reference require the Review;

- to assess the impact of existing publicly funded Welsh commercialisation activities;
- if appropriate, to recommend measures to improve their performance;
- to consider where appropriate recommendations for new measures to enhance the contribution of commercialisation activities to economic performance in Wales.

We have sought information concerning the objectives and scope of commercialisation of intellectual property created within Welsh higher education. Amongst other things we wished to understand the objectives for commercialisation activities, the costs and level of resources devoted to it, the expectations of achievement and the actual outcomes. To aid this process a series of interviews was conducted.

Whilst the interviews revealed universal agreement about the importance of commercialisation there were mixed views about the success with which it was being conducted. Representatives of business and the funding community consistently made the point that higher education was not appropriately staffed for the task since it generally lacked access to management advice with experience of successful international business ventures. Absence of properly qualified experience has reoccurred as a key issue throughout the conduct of the Review.

We have noted the absence of a clear strategy statement summarising the expected outcomes for commercialisation activities. We believe the impact of commercialisation activities has been diluted because too many programmes have been designed to meet multiple objectives rather than focussing on the single core outcome of creating and realising commercial value. In assessing existing programmes we failed to establish the precise expenditure associated with them. We were more successful in identifying a total of 249 staff involved in commercialisation related activities. In attempting to assess the impact of commercialisation activities we were surprised information on commercial values derived from intellectual property created within higher education is not recorded and reported by individual institutions as part of the normal reporting process.





Moving forward we endorse the importance for the Welsh economy of the Assembly Government's commercialisation ambitions. This Report underlines our belief the relationship between the Welsh economy and its higher education institutions will be enduring and grow in importance. For the nation's citizens to benefit from this the relationship needs to be properly managed and resourced. But there are examples of systemic weakness within the existing approach and therefore there is a need for change. This should not be seen as criticism of the individuals responsible for designing and implementing current programmes. Wales, as is the case in many other parts of the industrialised world, has only relatively recently regarded commercialisation as an element of the economic development policy agenda. The recommendations we propose should be seen as part of the natural evolution of policy. However this does not diminish the urgency with which they should be implemented.

We believe the Review's recommendations respect the legitimate independent governance status of the higher education sector and at the same time offer a practical and effective route for Welsh wealth creation and realisation from commercialisation activities. They are founded on two principles. The first concerns the need to set realistic expectations of what is achievable and to guard against the belief that solutions can be captured from elsewhere and easily recreated in Wales. Properly crafted policies must recognise the setting and circumstances in which they apply. Secondly at the risk of sounding rhetorical economic adjustment and transformation is not a simple process and it can take several decades before the full benefits of government and other actions are realised.

The Review proposes the following recommendations;

1. The Assembly Government should **prepare a Commercialisation Strategy** that provides a clear framework for public policy design for all Welsh publicly funded agencies with an interest in the topic.
2. The Strategy needs to contain **a realistic set of expectations** of what is achievable and define relevant publicly funded actions.
3. In parallel with the preparation of the Commercialisation Strategy the Assembly Government should conduct an exercise to **refocus existing resources** to ensure effective implementation of the Strategy.
4. As part of its periodic monitoring of university third mission activities HEFCW should consider seeking **information on the value of intellectual property** created within Welsh higher education.

5. **Advisory panels** of internationally experienced business men and women should be set up to intensify the links between academics and business. The panels would help identify prospects for the creation of intellectual property by conducting scouting exercises. They would also advise on the route to commercialisation. Panels should be supported financially by the Assembly Government.

6. Depending on the higher education institution panels might be set up at individual faculties, departments or schools. We believe **advisory panels are appropriate for establishments with an identifiable potential to create intellectual property with commercial relevance.**

7. In parallel with investment in intellectual property **advisory panels should also be encouraged to invest in talented individuals or teams of individuals.**

8. The work of university **alumni programmes should be tied into the composition of advisory panels.** Former students who have achieved successful careers in business provide an immediate and obvious source of talent.

9. To balance the work of advisory panels the Assembly Government should commission the **preparation of an Innovation Toolkit.** The Toolkit would create a structured approach to commercialisation by establishing a number of tests and tasks to ensure a smooth and effective commercialisation process.

10. There should be a substantial campaign to offer **intensive and relevant educational courses on the rudiments of commercialisation** and business building aimed at students from relevant disciplines.





contents

1. Introduction.
 2. Key Findings from the Work Programme.
 3. Changes to the Existing Commercialisation System.
 4. References.
- APPENDIX.1 - Terms of Reference.
- APPENDIX.2 - List of Interviewees.

Introduction.

1. It is entirely appropriate to quote Charles Darwin at the front of this report. One direct consequence of his work was the generation of demand for scientific measuring devices amongst Cambridge University researchers. In 1881 Darwin's son Horace founded Cambridge Scientific Instruments to meet this demand. One of Cambridge Scientific Instruments earliest employees was William Pye who had also worked for Cambridge's Cavendish Laboratory. At the end of the century he founded the Pye Instrument Company which over a number of decades developed into the Pye Group. Through a series of research relationships with academic staff at the University Pye emerged as one of the pioneers of broadcasting and communications equipment, partially based on its capability to exploit work conducted by Cambridge University academics.

2. Although Pye no longer exists in any form its legacy survives in Cambridge with the Company being regarded as helping to lay the foundations for the strong instrumentation and semi-conductor clusters existing in the town. This recounting of the interplay between talented business individuals and the academic research community throws up a series of lessons not least the lasting local and national economic impact that is rendered when the relationship works effectively.

3. As advanced economies face intensifying competitive threats, governments are investing various forms of capital in an attempt to capture and exploit the knowledge base existing within the higher education sector, as part of a process frequently expressed in the words "shifting up the value chain." The process of turning science into growth based around technology transfer and intellectual property commercialisation is located at the very centre of public policies to build and maintain citizen's standards of living. We believe these are laudable and legitimate policy aims.

4. This independent Review was instigated by the Assembly Government's Minister of Enterprise, Innovation and Networks in autumn 2006. The Terms of Reference contained in Appendix.1 were proposed by the members of the Review and agreed by the Minister.

5. The Review covers the area of higher education commercialisation activities. For the purposes of the Review commercialisation involves publicly funded activities by which intellectual property created within the higher education sector can form the foundations for the creation of value. This is regarded as a key part of the third mission process by which academic research contributes to economic growth. Third mission activity has been the subject of much recent attention and comment amongst public policy makers for a variety of reasons. One of the most pressing is an appreciation of the impact of universities on their local economies, something that has been heightened by the growth in value





Report of the Independent Review of Publicly Funded Commercialisation Activities in Wales.

and importance of knowledge intensive industries. Equally higher education is concerned to supplement its income flows and appears to regard the commercial exploitation of IP created within its institutions as an important source of new funds.

6. The Review complements a priority identified by HEFCW's Third Mission Committee which reported it is considering ways in which to encourage and enable higher education to commercialise their intellectual property (2). This is just one aspect of the much broader third mission of higher education which involves the relationship between the sector and local communities, including the business community. Universities have long standing relationships with the local business community not least because their traditional teaching and research functions have helped to meet the requirements for skills and ideas demanded by employers.

7. This Review has not addressed Further Education's role in commercialisation activities. This should not be taken as a sign we regard the sector lacking importance. We set ourselves a tight timetable for reporting our findings and our belief is that higher education should therefore be the target of our work as it represents the primary focus for commercialisation activity and that in principle our findings are likely to be equally applicable to Further Education.

Key Findings from the Work Programme.

8. The Terms of Reference require the Review;

- to assess the impact of existing publicly funded Welsh commercialisation activities;
- if appropriate to recommend measures to improve their performance;
- to consider where appropriate recommendations for new measures to enhance the contribution of commercialisation activities to economic performance in Wales.

9. To better understand the context of the Review we sought information concerning the objectives and scope of commercialisation taking place in Wales. We were particularly interested in establishing the objectives under-pinning commercialisation activities, the associated costs and resources, the expectations of achievement and associated performance targets, the methods and means for measuring impacts and the actual outcomes.

10. A series of interviews with representatives of higher education in Wales, public policy makers, business organisations and individuals involved in funding and building intellectual property related businesses was conducted as part of the Review. The list of interviewees is contained in Appendix.2.

11. Nobody interviewed informed us they doubted the importance of commercialisation but there were mixed views about the success with which it was being conducted not just in Wales but across the United Kingdom. Representatives of business and the funding community consistently made the point that higher education was not appropriately staffed for the task since it generally lacked access to management advice with experience of successful international business ventures.

12. This point was generally acknowledged by members of the higher education community, although the view was by not held by all representatives of the sector that were interviewed. Business representatives also remarked that this lack of experience became apparent during negotiations over valuations. Typically the higher education institute would place a higher value on a company or piece of intellectual property than the investor. While disagreement on values is perhaps predictable as part of the negotiating process we empathise with the views of the investment community. Very early stage valuations are notoriously difficult to assess for two reasons. Firstly it is highly unusual for revenue to have been secured at this point and earnings related multiples are one of the traditional methods for assessing the value of a company. Secondly immense uncertainty surrounds a company's future prospects, notwithstanding the strength of the core technology or business proposition. Early stage funders gain confidence about the future prospects for their investment from the experience of a company's management team. In many instances this is absent from start ups based around higher education created intellectual property. Failure to reach common ground between funders and owners of intellectual property regarding valuations can act as a deterrent to successful commercialisation. In particular it can result in a protracted period of time before agreement is reached and jeopardise the continuing interest of investors.

13. An important issue was raised concerning the basis for commercialisation and knowledge transfer more generally. It is one with which we have sympathy. We believe the conventional policy approach to commercialisation in the United Kingdom is largely based on the concept of identifying and if necessary protecting a piece of intellectual property and pushing it out into the marketplace. Our view is the general application of this linear model of innovation is flawed and has foundered because it is based on a partial appreciation of the true nature of the relationship between science, innovation, economic development and growth.

14. We are very conscious that public policy makers from all parts of the developed world understandably draw inspiration from patterns of economic development and innovation in North America, especially those in California's 'Silicon Valley'. The role of Stanford University is frequently judged to have been instrumental in spawning a collection of some of the





Report of the Independent Review of Publicly Funded Commercialisation Activities in Wales.

most innovative and successful companies on the planet. For instance Sun Microsystems, Cisco Systems and Yahoo are all companies that have an association with the institution. Although Stanford has a number of enviable relationships with the companies and particularly their founders that have bestowed considerable wealth on it none of them can be considered to be traditional university spin-outs. As a private university Stanford does not have a comparable position to Welsh universities. We make this point to emphasise that from a public policy perspective it is essential to be aware of the unique conditions that apply in 'Silicon Valley', especially the intensity of relationships between technologists and venture financiers.

15. Similar observations can be drawn from Massachusetts Institute of Technology (MIT). According to MIT it has become a leader in developing collaborative relationships with industry. It claims that its industrial relationships and research activities have resulted in the creation of jobs, companies and even new technologies. By introducing real world technology and management issues into the research laboratory MIT claims it is an important component of the USA's innovation system. The published relationships forged between Amgen (bio-tech), Merck (pharma), NTT (telecoms), Microsoft (computing software) and Hewlett Packard (computing hardware and software) for science research, Ford (auto) for design and Merrill Lynch (investment banking) for financial engineering reads as strong and impressive evidence of the benefits of the third mission and technology transfer programmes.

16. However the income generated from technology transfer is not as high as might be generally anticipated. Analysis (3) of MIT data indicates that even though the University's technology transfer office opened in 1940 in 2002 it only generated \$22 million of net licensing income representing a mere 2.4% of research income which totalled \$899 million. The same research calculated that after making a prudent allowance for expenses both MIT and the vast majority of US universities lose money on technology transfer operations.

17. With this observation in mind we considered it important that we should collect performance data and other information for Assembly Government funded and administered programmes whose objectives are connected to commercialisation. The review received data for eleven programmes in total. However this is not a comprehensive response as we have not had access to data for the Technium programme, which is we understand is regarded as one of most important programmes with a role in commercialisation.

18. Our view is the impact of the majority of the programmes reviewed has been diluted because they have been designed to meet multiple objectives rather than focussing on a single core outcome. The objectives appear admirable insofar as they are intended to improve the competitiveness of Welsh firms and the economy by increasing the level of innovative activity. But the existence of a range of objectives for many individual

programmes has complicated our ability to judge their effectiveness. We do not doubt that many of them have had beneficial consequences but it is uncertain whether they will bring about a fundamental shift in attitudes and approaches and long term consequences for the creation and realisation of commercial value.

19. Based upon data originally made available to the Review the combined expenditure on commercialisation related programmes, in some parts funded by European Union Structural Funding, administered by the Assembly was in 2005/06 a little over £6 million. Further analysis of un-audited data carried out by officials and made available to the Review suggests that Grant in Aid expenditure in 2006/07 by the Knowledge Exploitation Fund, which is the main vehicle by which the Assembly supports commercialisation in both further and higher education, was £9.7 million. The proportion of this spending allocated to commercialisation is unclear as the relevant Assembly Department records and reports data on a programme rather than an activity basis. It is not clear whether these figures include staff employment costs.

20. It is possible therefore the figures above may underestimate costs substantially. As already mentioned they do not include either capital or current expenditure associated with the high profile Technium Programme. A large proportion of the total costs associated with the Technium Programme appear to be related to capital expenditure. In total we believe the total cost of the Technium programme since its inception in 1999 is over £85 million.

21. The objectives providing the foundations for the Technium Programme included; "Technium encourages businesses in Wales to become more competitive by developing and adopting leading-edge technologies, product and process innovation" and "Technium nurtures potentially successful businesses capable of strong growth and improves the climate for enterprise in Wales." We believe these to be laudable and appropriate. But the evidence suggests progress in meeting them has been mixed. One of the main reasons for this is the absence of a continuous pipeline of strong technology based tenant companies. In the circumstances we believe it would be appropriate to re-focus commercialisation activity towards achieving the original Technium objectives.

22. In our view the success Technium has achieved to date flows from its existence and marketing as a network of well designed and provisioned premises. The Programme appears to have been developed in the belief the availability of premises is a major determinant in building successful companies. Whilst we accept the importance of premises we believe one of the key priorities for any programme of commercialisation is not accommodation but the quality of advice and support given to companies which in this case appears more apparent than real. Put simply if companies are successful then solutions to meet their accommodation requirements will follow.





Report of the Independent Review of Publicly Funded Commercialisation Activities in Wales.

23. The Review also sought data for the number of public employees involved in commercialisation programmes. We were originally provided with the following answer - “a recent review sought to identify job roles and numbers of knowledge transfer professionals, a database of 249 individuals (from KEF’s Knowledge Transfer Professionals database) was used for questionnaire research. This was not seen as inclusive e.g. professionals in the NHS Trusts who have a particular role in R&D matters were not included (it is believed that this category would account for around 50 or so)” (4). Subsequently officials conducted further analysis of the data. This analysis indicated the figure comprised 60 staff employed in further education, 139 in higher education including members of industrial liaison offices and staff at CETICS, 33 Assembly Government staff and 17 from industry and other organisations. We are not familiar with the duties and responsibilities of individual employees nor does our remit extend to the activities of NHS employees. We are aware though individuals are involved in a range of activities, not just commercialisation. Whilst we are not prepared to say these numbers are excessive the figure appears large. From our own deliberations and interviews we believe there is not a sufficient level of experience of commercialisation and developing businesses with a high growth potential amongst the group.

24. We have not been able to assess individual programmes in substantial detail. We did though review the Spin-Out Programme which is funded and administered by Finance Wales in greater detail than most programmes. It might appear unfair to single out this programme for analysis but our reason is that it appears with its distinct relationship with higher education to be an initiative that is closely related to the terms of Reference for the Review. Spin-Out provides loan facilities to relatively new companies whose founders or core technology are associated with a Welsh higher education institute. We have been informed that 36 companies involved in the programme had intellectual property transferred to them by the host higher education institute. The data suggests it has contributed to the formation of over 150 new companies by providing debt facilities totalling £2.4 million. Of these 150 companies a very significant majority are still trading. It is not clear how significant the availability of loan facilities and mentoring facilities have been instrumental to the foundation of the companies or their survival.

25. Within the boundaries of its objectives, to assist new businesses in spinning out, the Programme does appear to have supported a large number of companies, the majority of which have demonstrated the ability to survive. Evidence is not available to indicate whether Spin-Out companies gather sufficient momentum to grow beyond the lifestyle stage. Indeed the fact that one of the Key Performance Indicators chosen to monitor the programme’s outputs is job creation suggests limited objectives that have an indirect relationship to value creation and realisation. We do not intend this observation to be seen as critical of the Programme rather it reflects a wider issue, namely the existence of a

large number of programmes with similar objectives which on the face of it emphasise job rather than value creation.

26. To get a clearer view of the actual value of Welsh commercialisation we tried to obtain information about financial returns to higher education. We were aided in this task by HEFCW which circulated a request for information to all institutions. Unfortunately the vast majority of the returns were incomplete and therefore the exercise failed to provide a clear picture of the situation. We sensed there was confusion amongst some university staff regarding the information the Review was seeking. Some returns failed to distinguish between consultancy and project related income (such as revenue from EU structural funds), capital values and revenue. We believe this state of affairs provides evidence of the need to improve access to business skills within the higher education sector if commercialisation activities are to flourish. It also surprised the Review this information is not recorded and reported as part of the normal financial reporting process as we would have expected it to be key information for monitoring wider third mission activities. We believe action is required to remedy the absence of data on commercialisation returns.

Changes to the Existing Commercialisation System.

27. At this stage we believe it important to state clearly that we do not doubt the importance for the Welsh economy of the Assembly Government’s commercialisation ambitions. But there are examples of systemic weakness within the existing approach. We have therefore concluded changes should be introduced. One of the most pressing is for a clear strategy that recognises the value to the economy that can be delivered by successful commercialisation. We do not doubt recognition of this already exists but we are not convinced that all the bodies with responsibility for contributing to its delivery share the same degree of commitment to its execution. Action on this front demands strong statements setting out realistic expectations of achievement with short, medium and long term goals which establish whose primary responsibility it is to ensure they are realised. We have been informed the HEFCW Third Mission Committee has expanded its remit beyond economic development to encompass social development. We do not believe we are qualified to comment on the appropriateness of this but we would be concerned were this to occur at the expense of the Committee’s commitment to the importance of the relationship between higher education and business.

28. We wish to register a number of comments regarding the way in which aspects of the commercialisation agenda have evolved and been administered. At the commencement of this Review we sought to identify a statement setting out the guiding principles and expectations for commercialisation activities in Wales. We were informed the Assembly Government addresses commercialisation by providing support through a range of programmes. But an articulation of goals and objectives in a single document or statement





Report of the Independent Review of Publicly Funded Commercialisation Activities in Wales.

does not appear to exist. We believe this should be addressed urgently as in its absence it is difficult to judge what progress is being made in the effective delivery of public policies.

29. In composing this statement there are two simple yet important principles which it should be based on. The first concerns the need to set realistic expectations of what is achievable and to guard against the belief that solutions can be captured from elsewhere and easily recreated in Wales. Properly crafted policies must recognise the setting and circumstances in which they apply. Secondly at the risk of sounding rhetorical economic adjustment and transformation is not a simple process and it can take several decades before the full benefits of government and other actions are realised. We feel expectations of impact should reflect this. Equally for the proper management of public interventions we would expect a series of demanding but achievable milestones are incorporated as part of the performance monitoring framework.

30. We believe policy initiatives with multiple objectives contain structural weaknesses because of the inherent complexity that is added to the management process when public servants have to juggle with competing priorities. Establishing a single commonly shared objective for commercialisation will not be straightforward. We are only too aware of examples of a strong mutual suspicion of intentions amongst the groups involved which can lead to a gap between the promise of commercialisation and the actual outcome. Commercialisation policy objectives would benefit from greater clarity. We urge policy makers to avoid falling into the trap of designing programmes which contain multiple objectives. For instance we are conscious of programmes intended to have beneficial regeneration, business start up and commercialisation outcomes. We believe publicly funded commercialisation activities should be judged and evaluated by the extent to which they result in the creation of value by Welsh companies.

31. There are a number of beneficial aspects to an approach that focuses aggressively on the creation of commercial value. One clear potential gain for universities and their employees would be the possibility for them to share in the wealth benefits. Equally broader benefits might flow via an improvement in the innovation system, a boost to job creation, especially the employment prospects for post-graduates and graduates and a general improvement and broadening of the experience of management and executive talent. Our view is these should be regarded as potential consequences of commercialisation activities and not the primary policy objectives. To confuse objectives runs the risk of compromising the attainment of all of them.

32. Whilst we accept the comment made by business representatives that generally higher education is not entrepreneurially staffed, we appreciate this is something to be expected given its heritage. Direct involvement in the creation and more pertinently the realisation

of value, unlike the high profile North American institutions we have mentioned, does not have a long tradition amongst the United Kingdom's universities. Academic staff and their employers are motivated by many different factors but an ambition to build companies and wealth are not always prominent amongst them. A tradition of public service and desire to extend the boundaries of human knowledge are compelling enough factors for many researchers. Together these motivations have contributed strongly to the performance of higher education in undertaking its traditional teaching and research missions.

33. Sensitive management of the interplay between the traditional first and second missions and the relatively recent third mission is critical if commercialisation activity is to achieve its true potential. In particular the incentives for commercialisation must be weighed up, especially when placed alongside the responsibilities and commitments required of higher education to secure research funding. It appears an almost total reliance is placed on the consequences of the Research Assessment Exercise, an undertaking that appears to bear very little direct relationship to the capacity or ambition of an institution to participate in commercialisation.

34. We have already observed that failure of commercialisation activity frequently appears to be assumed to be the result of an academic culture that acts to inhibit the smooth transition of knowledge from the laboratory to spin-out or licence. Indeed it was probably the prevalent view amongst the members of the Review team prior to commencing the exercise. But solutions aimed at removing perceived blockages by fixing a culture considered not conducive to value creation are not the sole answer.

35. Successful commercialisation involves the interaction of a wide range of skills and experience incorporating academic researchers and managers, active and supportive investors and experienced professional service practitioners such as lawyers, accountants and marketing staff. We believe there is a deficit of experience in the Welsh professional services sector. Whilst we recognise there are a number of experienced individual practitioners in Wales we believe generally there is an absence of in-depth familiarity with the needs of young companies especially those based on new technologies. From our own experience this results in too much reliance on inadequately qualified consultants delivering poor advice. In this respect it is instructive there are no Welsh based advisors regulated by the London Stock Exchange to act as Nominated Advisors to companies seeking a stock offering on publicly traded exchanges.

36. All the evidence indicates commercialisation is most effective when the objectives of all parties involved in it are in alignment. Equally it is essential to recognise the existence of a complex institutional framework and set of cultural conditions in which commercialisation functions.





Report of the Independent Review of Publicly Funded Commercialisation Activities in Wales.

37. Practical commercialisation measures must respect these conditions in two ways. The first is that a standard template is inappropriate because different sectors and importantly different institutions require different approaches. Secondly any actions must demonstrate clearly and unquestionably they build and strengthen relationships between qualified entrepreneurs and academics. Experienced entrepreneurs working with academics undoubtedly form the best solution in understanding the dynamic nature of markets and in judging how to adapt intellectual property to create successful commercial enterprises.

38. The main reason for suggesting an intensification of the relationship between business and academic research is straightforward. No matter the quality and strength of the invention or innovation commercial success can never be guaranteed. Market timing, the availability of funding and the strength of the management and board teams are critical factors in influencing whether a company develops or flops. The chances of success will nearly always be enhanced by drawing on the skills and experience of seasoned executives capable of counselling fledgling company owners. These realities are clearly recognised by publicly funded programmes since access to business mentoring is a central feature of many of them. We believe two associated issues need to be addressed.

39. The first concerns the point at which academic researchers and their work initially comes into contact with seasoned business advice. Generally this takes place after a business proposition has been identified. We believe there are benefits to be gained from encouraging contact to take place much sooner. By allowing contact to take place at an early stage researchers can take advantage of market based advice on the potential of a research idea and in particular its commercial applications. Our own experience tells us that many ideas which were originally developed with a specific application in mind actually end up being applied in entirely different areas. For instance one member of the Review is the founder of a company whose technology was initially developed for application in the medical sector but adapted it and has now established itself as a market leader in industrial and architectural lighting. Not only does this anecdote illustrate a weakness in the linear model of innovation it also serves to remind us of the value of testing ideas for market acceptance.

40. We are aware the Knowledge Exploitation Fund's Patent and Proof of Concept Fund has been established to address this important issue of pre-competitive market testing. The issue we have is not with the aim of the Fund which we believe helpful and sensible but with its execution. We are not assured the consultancy organisations responsible for delivering many aspects of the Fund have acquired the experience that qualifies them to deliver the best advice.

41. We do not believe recommending a general model for universal application across Welsh higher education would be helpful because circumstances vary not just between institutions but also between individual faculties, departments or schools within institutions. Welsh higher education institutes have a range of traditions with some, especially the new universities, showing a shorter history of research activity than others. Additionally smaller institutions face issues of scale that do not exist amongst the larger Welsh establishments. It has been suggested to us that institutions might care to consider the prospects for merging some of their Industrial Liaison activities. Ultimately these are decisions for individual establishments to make. However we are aware of the recently launched arrangements involving Aberystwyth and Bangor which are predicated on the basis of the benefits to be obtained from institutional and departmental research and third mission collaboration. From our understanding these arrangements provide a good example of an innovative approach to securing advantages of scale and may offer a model worthy of consideration and development for application elsewhere.

42. Individual institutions possess governance arrangements which have been established to protect higher education's independent status. We wish to emphasise we have no wish to suggest anything that might compromise these arrangements. Realistically we are also aware we have no chance of achieving such an outcome even if we wished it. We are though under an obligation to make suggestions we believe would enhance the impact of commercialisation activity.

43. From a practical perspective we believe institutions might assess whether they are satisfied their own frameworks for commercialisation are suitable. In particular they may care to assess them to establish the scope and depth of involvement of well qualified business men and women. An approach we commend is the establishment of an advisory panel that coincides with an acknowledged level of research excellence. Depending on the institution this might be at the level of the individual faculty, department or school.

44. Establishments with an international research reputation denoted by their five star rating are obviously a case in point but we do not believe a top rating should be the only qualification. As we have noted the relationship between the Research Assessment Exercise and commercialisation potential is not a direct one. Also it must be recognised that many Welsh higher education departments with five star ratings are not in research disciplines with a clear capacity to generate intellectual property with value potential. Therefore we believe advisory panels are relevant to establishments with an identifiable possibility of creating intellectual property with commercial relevance.

45. The orthodox approach to commercialisation is to invest time and energy in exploiting ideas and inventions whose foundations have largely been formulated. This





Report of the Independent Review of Publicly Funded Commercialisation Activities in Wales.

is largely an academic researcher centric model and is a proven method for conducting commercialisation. We believe in parallel with this approach advisory panels should be encouraged to invest in talented individuals or teams of individuals, some of whom may not necessarily be academic employees but might equally be technical support staff. This is intended to imitate the classic approach of venture capitalists for whom the mantra “the three most important things to invest in are people, people and people” illustrates the importance they attach to surrounding potential ideas with people who display strong creative energies and skills in executing business strategies.

46. We emphasise that advisory panels would function exactly as that and should be constituted in a way that they do not compromise existing governance arrangements. Their purpose would be to intensify the relationship between academic research and business by ensuring skills and experience are available at the earliest stages of the commercialisation process. Part of this responsibility would be fulfilled by conducting a technology scouting exercise involving members of the group advising on potential commercial applications of academic research.

47. We have not been tempted to draft a detailed specification for members of a panel however we think there might be a series of preferred qualifications. We are impartial about the professional background and specialisation of the individuals involved. But members should be capable of demonstrating senior management exposure, ideally at an international scale and a high level contribution to a successful start-up preferably with first hand experience of negotiations with private sector funding institutions whether this is in the context of public markets, private equity participation or more traditional banking facilities. The reason for setting these criteria is to ensure quality thresholds for advisory group members.

48. Our view regarding the approach to recruiting advisory panel members is that it should be an ambitious one and therefore not confined to Wales. Institutions will need to build on their existing relationships and if necessary form new ones and should be prepared to acquire the necessary experience from national and international sources. In the absence of changes to the operation and delivery of current commercialisation policy the operations of advisory panels may not be expenditure neutral. Members will incur personal expenses which we would expect to be reimbursed. Inevitably the possibility may arise of remuneration for advisory group members. One possible route would be to encourage group members to participate in a commercial enterprise either as an investor or an officer of a company. In this event arrangements should be in place to ensure potential conflicts of interest are properly managed.

49. We anticipate the operation of the advisory panels will need to be supported. There are a number of mechanisms available for delivering the appropriate support facilities. For instance the Assembly Government already helps to fund the cost of employees at Centres of Excellence (CETICS). It may be possible that these individuals could take on additional duties if a Centre was chosen as the favoured focus for advisory panel activities, however our proposals mean CETIC based establishments will only be one possible approach. Therefore we acknowledge new positions will probably need to be created and funded. Our view is a position as de facto secretary to advisory panels should be funded at least for an initial three years by the Assembly Government with the proviso that the role is ring fenced and the holder of the post acts purely in a capacity in support of the work of the panels. Arrangements must be properly defined and documented.

50. Alongside the work of the advisory panels we believe there is considerable merit in tying the work of university alumni programmes into advisory panels. Former students who have achieved successful careers in business provide an immediate and obvious source of talent to join advisory panels.

51. To balance the work of advisory panels we suggest the Assembly Government should commission the preparation of an Innovation Toolkit. The purpose of the Toolkit would be to create a structured approach to commercialisation by establishing a number of tests and tasks that must be applied to ensure a smooth and effective process. The Toolkit would be a body of knowledge available to anybody involved in commercialisation activities in Wales. The Toolkit would be based around a series of questions, procedures and protocols. Individual sections of the Toolkit would address issues such as;

- The identification of intellectual property – is it clear who the owners are; has the intellectual property been patented; is it worthwhile patenting the intellectual property;
- The establishment of a management team and board of directors – what should be the role of the academic researcher whose intellectual property forms the basis of the company; how might the academic’s employer approach the issue of appointing a nominee to the Board; what remuneration structures could be adopted for management team members.

52. To complement these measures the Review believes there should be a substantial campaign to offer intensive and relevant educational courses on the rudiments of commercialisation and business building aimed at students from relevant disciplines. For the sake of transparency it is essential this report notes that one member of the Review, Professor Ken Board, informed colleagues he has developed and delivered a student oriented module and is ambitious to pursue a commercial interest. The views of the remaining members of the Review have not been swayed by this disclosure. Whilst





Report of the Independent Review of Publicly Funded Commercialisation Activities in Wales.

we are supportive of the concept it is entirely inappropriate to the work of the Review to comment on or endorse Professor Board's approach.

53. A brief survey undertaken by Swansea University several years ago revealed that over twenty Swansea alumni had formed companies across the world over several decades that today have a combined valuation in excess of us\$ two billion dollars. Although the University had no direct involvement in the progress of the companies the lesson we drew was an appreciation of the budding wealth foundations that higher education institutes' possess in their students. We consider there are two possible routes worthy of further consideration to capture this potential. Firstly a module or modules on entrepreneurship should be introduced compulsorily and on a wide scale into the undergraduate curriculum in a wide range of relevant subjects. Secondly one day workshops on entrepreneurship should be held in higher education establishments with the involvement of experienced and successful entrepreneurs as role models to provide support and direction for fledgling companies.

54. In conclusion we would like to underline our belief the relationship between the Welsh economy and its higher education institutions will be enduring and grow in importance. For the nation's citizens to benefit from this the relationship needs to be properly managed and resourced. The fact we believe there is a need for changes to be made to the current arrangements should not be seen as criticism of the individuals responsible for designing and implementing them. Wales, as is the case in many other parts of the industrialised world, has only relatively recently regarded commercialisation as a formal element of economic development policy. Therefore the recommendations we propose should be viewed as part of the natural evolution of policy measures. However this does not diminish the urgency with which we believe the weaknesses in the system should be addressed. We believe the Review's recommendations respect the legitimate independent governance status of the higher education sector and at the same time offer a practical and effective route for Welsh wealth creation and realisation based around the need for flexibility and the capacity to adapt to change.

1. "Filling the Engineering Gap" written by Vivek Wadhwa, Business Week, 10 January 2006.
2. Written Evidence submitted by the Higher Education Funding Council for Wales to the Economic Development and Transport Committee's Review of Science Policy in Wales, 30 September 2005 (Page.9, paragraph 12).
3. "From Science to Growth". The Hughes Hall, Cambridge University, 2006 City Lecture given by Stephen Allott, City Fellow, Hughes Hall, 6 March 2006.
4. Appendix 1 'Initial analysis of KEF scoping survey for Knowledge Transfer Professionals' in 'CPD for Training and Skills Needs for Knowledge Transfer Professionals in Wales'.

references





Terms of Reference

Background.

The belief that Wales' future economic prosperity is closely linked to its ability to participate successfully in what has been labelled the "Knowledge Economy" has been well documented. The role and performance of Welsh higher education institutions, both in their teaching and research capacities, is regarded as pivotal in influencing the ability of Welsh companies to compete effectively in the Knowledge Economy. It is no co-incidence that some of the most vibrant regional and local economies are also home to some of the world's leading universities, providing evidence of the strong relationship between economic growth and higher education. At the United Kingdom level this relationship has been the subject of an extensive review conducted by Richard Lambert (Lambert Review of Business-University Collaboration, Treasury 2003). In Wales the Report of the Welsh Assembly Government's Higher Education and Economic Development Task and Finish Group (March 2004) explored similar issues as part of its exercise.

http://new.wales.gov.uk/docrepos/40382/4038231141/4038211256/Nexus_Report_-_Role_of_HE_i1.pdf?lang=en

The Task and Finish Group identified evidence (page 9, paragraph 2.4) from the third annual UK Higher Education Business Interaction Survey to suggest an increasing contribution from Welsh higher education to economic performance. Whilst the statistics quoted must be welcomed as an indication of an increased level of interaction between higher education and business they do not alone provide compelling evidence of any lasting beneficial impact. Nonetheless it can probably be concluded that this increased level of activity reflects the introduction by the Welsh Assembly Government and its agents of a variety of programmes intended to sharpen the contribution of higher education to economic performance. Included amongst these programmes are the Knowledge Exploitation Fund, the Technium Programme, Centres of Excellence for Technology and Industrial Collaboration and the Finance Wales administered Wales Spinout Programme.

Review Priorities.

The purpose of this Review is not to repeat the exercise conducted by the Task and Finish Group. As part of its report the Task and Finish group acknowledged the importance of "ensuring commercialisation from higher education institutions is maximised." This underlined the significance attached by economic policy makers to what has been called higher education's 'third mission'. The Review will build on the work of the Task and Finish Group in this area by focussing on the impact to date and future potential of publicly funded commercialisation activities. For the purposes of the Review commercialisation involves the activities by which new inventions and innovations created within higher education are marketised to form value. The Review will;

- Assess the impact and performance of all areas of publicly funded commercialisation activities taking place in Wales. This will incorporate an assessment of all programmes intended to support the commercialisation process, their cost and other aspects of resource allocation and the realisable value created by individual projects with which they have been involved;
- Consider and where appropriate make recommendations regarding the sustainability of existing commercialisation programmes and any measures felt necessary to improve their performance;
- Consider and where appropriate make recommendations regarding the introduction of new measures which it is felt necessary to enhance the overall contribution of commercialisation activities to Welsh economic performance over the short, medium and long terms.

Outputs and Timetable.

The Review will produce its findings in the form of a report. It is anticipated the first draft of the Report will be available by the end of the year. The Review will have the ability to request the preparation of background information on topics of relevance to its enquiry.

Members of the Review.

The Review will be conducted by;

- Simon Gibson, Chief Executive, Wesley Clover Corporation.
- Professor Ken Board, Chairman UWS Ventures, Founder Enfis Ltd.
- Mark Barry, Chief Executive Officer, Q-Chip.
- Ian Courtney, Chief Executive Officer, TM Communications and Media Ltd.

Supported by:

James Price, Director of Strategy, Department of Enterprise, Innovation and Networks, Welsh Assembly Government.





appendix 2

List of Interviewees

Sharon Linnard and Eleanor Marks, Department of Enterprise, Innovation and Networks, Welsh Assembly Government.

David Halton and Les Hobson, University of Glamorgan.

Phil Gummett, Roger Carter and Len Arthur, Higher Education Funding Council for Wales.

John Howells and Judith Cole, Department of Education and Lifelong learning and Skills, Welsh Assembly Government

Russell Goodway and Clare Saralis, Cardiff Chamber of Commerce.

Brenig Preest, Wales Fund Managers.

Peter Wright, Nick Moon and Steve Smith, Finance Wales.

Jon Kestenbaum, National Endowment for Science, Technology and the Arts.

Geraint Jones and Nick Bourne, Cardiff University.

Virginia Chambers, Department of Enterprise, Innovation and Networks, Welsh Assembly Government.

Richard Davies, Vice Chancellor, Swansea University.

Andrew Stevenson and Richard Brook, e-Synergy.

Amanda Wilkinson, Higher Education Wales.

Richard Lambert, Director General, Confederation of British Industry.

Will Williams, University of Glamorgan Business School, formerly of investment bank N.M.Rothchild in Cardiff.

David Rosser, CBI Wales.

Karen Turnbull, University of Wales College Newport.

Stephen Allott, Chairman Trinamo and former CEO Micromuse Software.

Victoria Provis, Odgers, Ray and Berndtson.

Robert John, Chairman, Wales in London.

David Baynes, Chief Executive Officer, Biofusion



