



Text of a talk given by Richard Lambert to members of the Institute of Welsh Affairs at the Cardiff Thistle Hotel on March 19th 2004

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The UK has a world-class science base. By any measure it comes out close to or in some cases actually at the top of the world league tables. Take the number of first class research papers or scientific citations produced in the UK as an example. You can create an index, which, measured in per head terms, puts the UK at 100 in both categories. By this yardstick, France clocks in at just 78 and 49 and Germany at 69 and 64. The US rating is roughly the same as that of the UK for both research papers and citations.

Yet, despite this strong comparative advantage, Britain has a poor record of turning research excellence to our commercial advantage. Stories of the brilliant inventions that have been developed in the UK and brought to market elsewhere are well known. One of the best-known and most tragic stories is that of Godfrey Hounsfield, of EMI, who invented the X-ray body scanner, for which he won a Nobel Prize. But the discovery led to the collapse of EMI's medical division because it lost so much money in trying to manufacture and market the scanners. This was the most important innovation in X-ray technology since the invention of the X-ray itself, and all the commercial benefits went to the companies abroad that picked up the pieces.

These failures have had a direct impact on the performance of the UK economy. They have left it with a business sector which – across many different sectors, in services as well as manufacturing – has a poor record of innovation, of bringing new ideas and products to market, of thinking of new ways of doing things.

In a review of UK competitiveness published a year ago, Harvard's Professor Michael Porter wrote that "current levels of UK innovation are insufficient to drive UK productivity growth and close the UK productivity gap versus key international competitors." This is a problem for the UK as a whole, and it's a particular challenge for Wales.

This is well recognised in *Wales – a Better Country*, the strategic agenda of the Welsh Assembly Government. The repeated theme is that: "Wales cannot and should not try to

compete on cheaper labour costs. Raising levels of educational attainment, skills and innovation is critical if Wales is to compete on adding value.”

But this is a big challenge, as the Assembly has recognised. Wales has a good higher and further education system, and it enjoys an unemployment rate that has been lower than that of England. But at the same time it is well behind in such key measures as GDP per head, or the numbers of new companies being created. What this means is that Wales is going to have to find ways of creating more higher-value jobs if it is to succeed in its aspirations. And that in turn must require more innovation, more creativity, and more research intensity in Welsh business.

Why is it that British business so often seems to fail in its efforts to capitalise on the opportunities created by the country's high-class university research base? And are there obvious barriers between universities and business that could be knocked down by wise policy making?

Across the UK as a whole the problem has in some senses been getting worse for much of the past 25 years. The OECD recently published tables of growth in business R & D among its member countries in the period between 1995 and 2001. The UK squeaked in ahead of Australia and the Slovak Republic, but was behind all the other countries in the league table for the growth of business investment. As a result: the research intensity of British companies slipped markedly in the 90s, falling well behind such countries as the US, Scandinavia, France, Germany or Japan.

Our growth rates have been poor right across the board, including in the services sector. This represents less than 20 per cent of business R&D in the UK, compared with more than 30 per cent in countries like Norway, Spain and the US. A handful of large companies – probably less than 20 – account for the great bulk of investment in R&D by British owned companies. These are heavily concentrated in two broad sectors – pharmaceutical and health, and aerospace and defence.

All these big companies are now global in character, and all have fewer cultural and intellectual ties with the UK than they did a decade ago. In the past, their decisions about where to invest in science were heavily influenced by their UK roots. In future, there will be an increasing number of calls on them to consider research investment in other parts of the world.

There are many contributory factors including:

- Management training – what the OECD has politely described as “the issue of the educational profile of top managers in UK-owned firms, who have rarely been trained as scientists in contrast with US executives ...or with their French counterparts.
- A tendency among British companies to expand by acquisition rather than by organic growth. Companies in the US and Germany spend much more money on research and capital investment than they do on acquisitions: the reverse is often true in the UK.

- Macroeconomic instability for much of the post war period. You can't make long term plans if the annual rate of inflation is swinging between 5 and 15 per cent, as it did through much of the 70s and 80s.
- A lack of intermediate skills.
- A less competitive business environment than exists in the US, coupled with planning and building regulations, which tend to be inefficiently and arbitrarily enforced.

My report on business-university collaboration has been built round a few guiding principles. The first is that universities have a crucial and growing part to play in building a more innovative and research driven economy.

For sound commercial reasons, businesses around the world are changing their approach to R & D – cutting back their corporate laboratories and building collaborative research programmes with other partners – most particularly, with universities. Companies can no longer do it all themselves. In a world where the big scientific breakthroughs - are coming through the combination of different disciplines – engineering and biosciences, for example - businesses are reaching out to find partners with the expertise they need to develop new products.

Good university researchers have a lot to offer in this new environment. They work alongside other disciplines on the faculty; they know where the best stuff is going on in their field around the world, and they are constantly being refreshed by the arrival of clever new colleagues - whether they are students, postgraduates or teachers. University researchers have an especially critical role to play here in Wales, where there just aren't enough big companies with head offices and research and development activities. This problem has been identified in *Wales: a Better Country*: head offices are where you find the higher paid jobs, and the critical support services, such as R & D.

On the other hand, Welsh universities *do* have research departments of international standing, and *do* have the potential to build on their competitive strengths in areas such as aerospace, automotives, telecommunications, tourism, the creative industries, and renewable energy. Clusters of dynamic new businesses, often built around a university campus, can start to compensate for the lack of the big industrial juggernauts.

The best form of knowledge transfer comes when a talented researcher moves out of the university and into business, and vice versa. The most exciting collaborations arise as a result of like-minded people getting together – sometimes by chance – to address a problem. Encouraging academics and business people to spend more time together should be a high priority.

So networks, formal and informal, should be strongly encouraged. In Wales, these have involved Government schemes like the Knowledge Exploitation Fund, designed to create a whole new culture of entrepreneurship throughout the universities and college system; the centres of excellence for technology and industrial collaboration, and of course the Technium initiative. Proximity matters, too, when it comes to business collaboration, especially for small and medium sized enterprises. Informal networks cannot easily be sustained over long

distances, and even large companies may find it more efficient to work with research departments in their own locality.

It is very important, therefore, that research departments with distinctive areas of expertise should continue to flourish right across the country. The UK will not be well served if all its research funding and expertise is concentrated in a handful of world-class universities in the South East corner of England. And universities everywhere have to find new sources of research finance: they can't rely on public funding to finance everything they want to do.

This appears to be especially true here in Wales. In relation to the size of its population, the level of research funding achieved by Welsh universities is low compared with higher education institutions elsewhere in Britain.

Another guiding principle is to do with trust – trust between business and universities, and between universities and Government and the funding councils. Universities too often believe that business is trying to rip them off by paying too little for their intellectual property. Business thinks that academics wildly overvalue their IP, and don't take account of the ultimate cost of bringing a product to market. We need to find ways of simplifying and clarifying negotiations about intellectual property.

Continuity matters, too - whether it is in government support for infrastructure in general or for particular projects, whether it is in business commitment to innovation and research, or whether in the university's determination to support areas of research excellence.

This was a point made in a paper published by the Institute of Welsh Affairs a couple of years back. In this report Dr. Gareth Jones argued that the schemes then available for encouraging and funding business creation in Welsh higher education did not have the same guarantee of continuity of funding as existed for research and teaching, were too fragmented and overlapped with one another, were underfunded and could lead to risk averse decisions. The same criticisms could be made of the different systems across the rest of the UK, and that shaped some of the conclusions in my own review of business university collaboration.

The final general principle is especially relevant in Wales. In the analysis that I've already mentioned, Professor Porter argued that the competitiveness of the UK had been held back by the centralised system of government spending; that investment in Britain is less well adapted than in other countries to regional and local opportunities and needs; and that private sector leaders are less willing to engage in local efforts if important decisions affecting the quality of their business environment are made in London.

Wales, Scotland and Northern Ireland recognised this problem a long time ago by establishing their own development agencies - a process which has obviously been taken a deal further by the process of devolution. England has started to catch up, with the establishment six years ago of a web of regional development agencies spread across the country. But what's very obvious already is that the English regional development agencies that are working best are those where there is a genuine regional identity, as in the North East or the North West. In some of the bigger conglomerations in the South of the country, the

RDA's are having a much tougher job of getting the support they need from the local economy.

The Welsh Development Agency, with its established networks and knowledge base, its strong sense of national identity, must be a critical competitive advantage for Wales in this respect.

One of the case studies in my report concerned a small company based in West Wales called Concert and Celtic Harps. The owner wanted to expand the business, and commissioned a market research study from Cardiff University. This helped to identify a gap in the market, and with the help of Know-How Wales, the company identified the manufacturing engineering centre again at Cardiff University as the most appropriate source of expertise. The result was a manufacturing system to mass-produce a newly designed harp - a marriage between traditional and new technologies - and the creation of new and sustainable jobs in rural Wales. This is not the kind of idea that could ever have been dreamt up by central Government in the middle of London.

. The report concluded that:

- Business, universities and the various funding agencies should look for simpler methods of transferring intellectual property - new ideas and technologies - from universities to business. At present it can be just too expensive and time consuming, with loads of lawyers at every turn.
- The government and the various funding councils should place funding to support technology transfer between business and universities on to a permanent basis.
- The government should create a significant new stream of business - relevant research funding, which would be available to support university research departments that can demonstrate strong backing from business. It's important that research departments which are doing world-class research work should be strongly supported by public finance. But this should not be at the expense of those departments which are doing work that may not be world class but which is still of vital importance to the regional or national economy.
- The regional and national development agencies should have a vital role to play in building bridges and creating networks and in allocating the proposed extra funding.
- Universities should develop and adopt a concise code of governance, which would represent best practice across the sector. In return, the government should adopt a much lighter touch when it comes to regulating those universities that can demonstrate that they are well run. At present, there is too much micro management across the system - my impression is that this problem is worse in England than it is in Wales.
- The government should increase public funding of the science base in the UK - a process which, to be fair, it has already started.
- Business should get its act together. There has been a real culture change across many universities in the past decade, certainly in Wales. Gone are the days of the ivory tower: universities now recognise that they have a vital role to play in the economy, and they are trying much harder than they ever did in the past to reach out to the business community. But the demand from business has not, at least until recently, been rising to meet the growing supply of innovative new ideas on offer from the university sector.

How do things look three months after my report was published? Well, there have been some important initiatives. First, and much the most significant, the Chancellor of the Exchequer, Gordon Brown, confirmed in his budget the promise he made in January 2004 that the level of public investment in the science base will grow faster than the trend rate of growth in growth domestic product over the coming years. In other words, science is going to get a bigger slice of the cake.

The Chancellor also made clear that he hoped to see matching commitments from business and charity funders of R & D and that the strength of the response from such groups would be a crucial factor in determining the scale of public funding. In the same announcement the government proposed that it would put the funding for knowledge transfer between universities and business on to a permanent footing, and would work with business and universities to develop standard contracts for passing intellectual property into the marketplace.

The English RDAs are likely to get a bigger role in strengthening business-university links, and consideration is being given to developing a lighter touch approach to regulation of the university sector.

The full Government response to my report will come in summer 2004, with the completion of the spending review. Among other things, that is when we will learn whether there is going to be more public funding for universities that can show that their work is of real value to local or national businesses. Meanwhile, the Committee of University Chairmen is working to develop a code of governance along the lines proposed, and a new organisation - the Leadership Foundation - has been established to provide training for vice chancellors and future leaders of the university sector. Individual universities are responding enthusiastically to ideas for building new kinds of partnerships with the business community.

And what about the business sector itself? Well, some of them are talking the talk - you can't walk past Downing Street these days without seeing the boss of a high tech company walking out of Number 11 - with a slightly dazed looking expression on his face.

There are more serious reasons to be optimistic about the scope for building demand for university-based research from British business. There has been a change of culture in many UK universities in recent years, and the science base remains strong. As for the R&D tax credit, the changes announced in the budget should make it more accessible to more businesses: it is certainly worth checking it out. On paper, at least, the UK now has one of the most generous R&D tax structures in the OECD area.

A growing proportion of business managers has been through higher education. The proportion of the whole labour force educated to degree level in the UK is just 17 per cent, compared to 28 per cent in the US. But among 18 to 30 years olds, the picture looks very different.

Another point to note is that the main problem in terms of the lack of research intensity and innovation in the UK lies in established, mature industries. The picture looks brighter when it

comes to industries of the future, such as biotechnology, ICT and the creative industries. These often have roots in the university system, and it is here that the UK in general and Wales in particular look most innovative and competitive.

There is also an increasing volume of evidence that businesses that invest in their knowledge base produce significantly better returns over time for their shareholders than those that seek to grow by acquisition. In a globally competitive world, companies that innovate successfully do better than companies that do not - whether they are making semiconductor chips or Welsh harps.

I am particularly excited by important university initiatives in two UK cities. The University of Manchester is in the throes of a merger with UMIST which, backed by substantial funding from the regional development agency, is intended to create a world class research university in the North West of England. And, here in Cardiff, the University is on the point of merging with the University of Wales College of Medicine. I am not a believer in size for its own sake. But I firmly believe that if this merger achieves its goals, it will bring great opportunity to the city and the nation, both in intellectual and economic terms.

- It will end the anomaly whereby Cardiff is the only research-intensive university without a medical school.
- It will create an institution with critical mass on an international scale - around 30,000 students and £250m or more of annual revenue.
- It will support the multi-disciplined approach to research that is vital for scientific breakthroughs today - such as engineers and medics working together in the new tissue engineering centre.
- It will bring substantial new investment - including funding from the Office of Science and Technology - along with several thousand new jobs to the city.
- As a joint body, the new university will be able to bid for research projects that the two institutions could not have tackled individually.
- It will be able to offer a wider range of products, research and consultancy services to the private and public sectors - and through a single shop window.

So it is hard to overstate the potential importance of this marriage.

My final argument for optimism is that the economic background is significantly more stable than it has been in recent decades. I am enthusiastic about the way that business and universities are working together across the UK, and about the scope for substantial further collaboration in the future. And I think that the opportunities are particularly important here in Wales, where excellent university research departments can compensate for the lack of business investment in R & D and the merger here in Cardiff can bring very real benefits.

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