



Business-University collaboration



April 2003

Foreword by the Vice-Chancellor



Tamamy Baker



Collaboration with business is one of the cornerstones of the University's mission and fundamental to its continuing success. Its role in the economy of Bristol, the South West and the UK, its contribution to the country's international competitiveness, its research excellence, its financial stability and the opportunities available to its graduates all depend to a considerable extent on the strength of its relationship with the commercial world. Similarly, business has everything to gain from a constructive partnership with the higher education sector.

The University of Bristol enjoys excellent, mutually advantageous relationships with a wide range of companies, from locally-based SMEs to multinationals. We have learned the importance of building relationships based on trust, understanding of different organisational structures and culture, and on the sharing of common goals. The University has made significant progress, particularly in the last three years, in building better links with business. There is much more to do, of course, and we

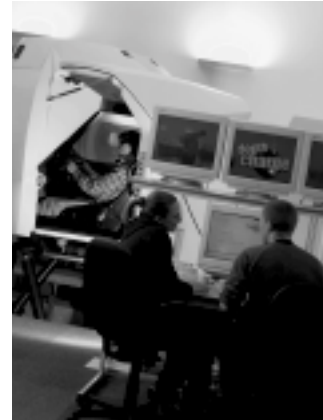
look forward to extending further our collaboration with business for the benefit of both parties and the wider community. We are ready to offer fresh ideas (and some appear in this paper). We are also keen to listen positively to new thinking from business and Government.

Government has an important role to play in this. Universities such as Bristol are under-resourced and struggle to maintain the international competitiveness of UK research, which is key to building a successful knowledge economy. Funding for the knowledge transfer process in research-led universities needs to be increased and sustained. Companies need to be encouraged to understand the funding regime of universities and to pay the appropriate price for the services provided. Less Government interference and red tape would enable universities to be more entrepreneurial and business-like and to become equal partners with the private sector in a healthy and thriving knowledge economy.

A handwritten signature in black ink, appearing to read "Eric Thomas".

Professor Eric Thomas

Context



Andy Stevens

The University of Bristol is intent on developing its role as an internationally competitive, research-intensive university providing world-class education and exceptional opportunities for the most talented students from all backgrounds and leading the way in knowledge transfer. Crucial to the fulfilment of this aim are research and enterprise strategies that recognise the challenges facing higher education and focus on the opportunities offered by Government policy and changing industry agendas.

The University has shown one of the UK's highest rates of improvement in research quality, as demonstrated by the Research Assessment Exercise (RAE):

- Bristol moved from having one 5* Unit of Assessment in the 1996 RAE to 15 in 2001;
- 78% of Bristol's departments have been judged as internationally excellent, achieving a 5 or 5* grade;
- 76% of all Bristol's academic staff work in departments ranked at these levels. Over 2,000 staff are active in research and there are 1,500 full- and part-time research students.

The University is a leading member of the Worldwide Universities Network (WUN), which is developing innovative research collaborations in priority fields and opening up new opportunities for knowledge transfer on an international scale.

It is partly for such reasons that demand for undergraduate places at Bristol continues to be among the strongest in the UK, and that employers' interest in Bristol graduates remains keen:

- there were some 39,000 applications for a little over 3,000 undergraduate places in 2002;
- over 96% of 2001-02 Bristol graduates are known to have entered full-time employment or moved on to further study.

The University has responded positively to the knowledge transfer or 'Reachout' agenda, recognising its fundamental importance to the success of the institution, its staff and students. Bristol has succeeded in winning competitive funding following Government policy and funding commitments to the knowledge economy. Thus:

- a recently published Science & Technology Policy Research Report, *University-Industry Research Collaborations in the UK*, ranked Bristol sixth in the UK for the number of university-industry co-publications during 1995-2000 – a rise from 18th place in previous years;
- the University's Research Enterprise and Development division handles over 800 new contracts a year with a full contract value of over £45 million – a growth of over 40% since its inception in 1999-2000. A large proportion of these are with industry;
- the University is managing a portfolio of over 100 patents.

University of Bristol Spin-Outs

Year of Formation	Company Name	Type of Business
2002	Cleanicepig Ltd	Development of innovative industrial pipe-cleaning methods
	Argelcom Ltd	Cryptographic products and services for electronic communications
	Adiuri Systems Ltd	Information access solutions
	Ascend Biotechnology Ltd	Human genome screening
	Bio-Results Ltd	Biomedical research services
	Iktrik Ltd	Special effects for the film and media industries
	MicroRheology Ltd	Rheology system for use in medical diagnosis, oil recovery and measurement of high molecular weight polymers
2001	D-Sense Ltd	Dental technologies
	Rotary Wing Innovations Ltd	Rotor technologies for light helicopters/autogyros
	Clarity Ltd	'Simple English' services for charities, financial institutions, etc.
	ArchLight Ltd	Heritage modelling and lighting software plug-ins for the games and architectural market
	Infinitesima Ltd	Atomic force microscopy
	ProVision Communication Technologies Ltd	Next generation wireless/video technologies
	Apitope Technology Ltd	Apitope/protein-based therapies
2000	ProXara Biotechnology Ltd	Cell-based drug discovery platform
1999	NeuroTargets Ltd	Biopharmaceuticals
	IHG Diagnostics Ltd	Diagnosis of genetically inherited diseases
	Hunter-Fleming Ltd (Aegis)	Pharmaceuticals
Pre-1999	Advanced Transport Systems Ltd.	Urban transport solutions
	Surface Active Ltd	Pharmaceuticals

Two of the spin-out companies formed during 2001-2002, MicroRheology Ltd and Infinitesima Ltd, won DTI SMART Awards.

Bristol best practice models

Some of the University's more significant developments over the past three years in working with business are summarised below.

- **Integrated research and enterprise development support services**

The University made a strategic decision to bring together all areas of academic support services that impact on commercial relations, from research funding through contract support to IP project management and enterprise development. The establishment of the Research and Enterprise Development (RED) division in September 2000 has been a great success, creating a major 'Gateway for Industry' into the University. Senior support staff with experience of industry are available to help academics understand the needs of industry, to provide a high level of service to business partners and to advise academics in discussions and negotiations over commercial contracts.

- **Funding and project management role**

RED has developed a proactive support service to help academics win research funding. It has also introduced a professional team to provide project management support to academics, particularly for large-scale, collaborative research programmes with significant industry participation. Members of this team are managed from RED but work to the academic leaders of the programmes. This approach has been used in initiatives such as:

- 3CR, the DTI-funded Innovation Centre that brings industry partners together with the University to work on ICT convergence;
- the Materials Centre South West, which brings Bristol and Exeter universities' materials science and analysis capabilities together in an industry-focused centre for the region.

- **Networking**

Bristol recognises the role that a university can play in catalysing industry networking at local and national level. To this end, the University serves as the hub of the Bristol Enterprise Network (BEN), which is designed to replicate the type of success demonstrated by the Cambridge Network. BEN is intended to stimulate a higher degree of interaction between companies and academics, supporting their networking rather than directing it. BEN is about to roll out a web system similar to that used in Cambridge to support this activity.

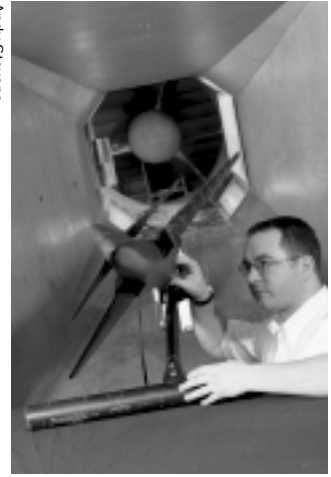
BEN links into the Southern England Technology Triangle (SETsquared), a project bringing together Bristol, Bath, Southampton and Surrey universities to support early-stage entrepreneurs with pre-incubation, networking, mentoring and learning. This will pick up on work done by CONNECT in San Diego.

At the academic department level, the Bristol Department of Electrical Engineering is particularly active in cultivating productive links with industry. The Image Communications Group is a core member of the Foresight Virtual Centre for Excellence in Digital Broadcasting and Multimedia Technology, together with five other universities and a number of leading communications companies. The Department also enjoys a long-standing relationship with Toshiba, and the Managing Director of Toshiba Europe, Professor Joe McGeehan, is the Dean of Engineering at Bristol.

Bristol is also actively engaged in networking at the international level, particularly through partnerships such as the Worldwide

Bristol best practice models

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Universities Network (WUN), an alliance of 13 universities in the UK, the US and China formed in 2001, with the aim of promoting a global research culture through collaborative academic activity. Successes so far include 25 international research symposia, 100 US-UK student exchange awards and corporate sponsorship for a range of international academic activities. Bristol's Vice-Chancellor, Professor Eric Thomas, is Chair of WUN.

- **Best practice learning and collaboration**

The University actively networks in order to collaborate and learn. It has links with fellow research and knowledge transfer professionals at the University of Illinois and MIT in the USA, as well as through the Worldwide Universities Network. It networks through university knowledge transfer groups such as the North American Association of University Technology Managers (AUTM), the University Companies Association (UNICO), the UK Science Enterprise Centre network (UKSEC), Russell Group Enterprise Managers and the Higher Education Regional Development Agency-South West (HERDA-SW). It also collaborates at a project level with other universities. Examples include SETSquared, the £9 million Sulis Investment Seedcorn Fund, the Wessex Enterprise Centre and Western Arc – the DTI-funded Biotechnology Exploitation Platform linking four regional universities and NHS trusts. It is clear that the university sector has learned that there is much to be gained by sharing best practice and collaborating.

Bristol also actively participates in industry sector-based initiatives such as Bioapproaches SW and the West of England Aerospace Forum.

- **Relationships**

Bristol maintains excellent working relationships with key stakeholders in the region. Its links with Business Link West are strong, with many of the key advisers working in the University at least once or twice a month with students and early-stage businesses, particularly spin-outs and start-ups. This has not led to a significant level of formal business–university collaboration as the Business Links tend not to have sufficient reach among the knowledge-intensive companies that are best suited to such collaborations.

Connections with the South West Regional Development Agency (SWRDA) are strong. The Vice-Chancellor is on the Board, and RED supports the organisation on a wide range of initiatives.

In recent months, Bristol City Council has responded favourably to the University's willingness to play a significant role as a sub-regional partner.

Links with other private sector bodies are also good, including the CBI, the Chamber of Commerce and Initiative, sector-based groups and professional advisers (accountants, lawyers, etc.). It is essential that the University has an open and responsive approach to such groups as they form a major conduit for mutual understanding with business.

- **Marketing to business and supporting information systems**

Lack of understanding of what institutions do and who to contact is often perceived as a

Bristol best practice models



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major barrier to collaboration. To respond to this, Bristol has created a number of specialist posts:

- a Professor of Public Engagement with Science and Technology;
- a Research Publicity Officer to support academics in promoting their research and produce an accessible magazine giving a wide audience of businesspeople and the general public an insight into Bristol research;
- an enterprise marketing specialist targeting businesses with relevant information, working with departments and research groups to improve their marketing, and surveying attitudes to the University among customers and potential customers.

Supporting these initiatives is a range of information systems including a new, web-based Directory of Experts to help journalists identify and communicate with academics working in particular fields.

Other systems under development include a University-wide customer relationship management system to allow tracking and targeting of industrial and other contacts. The web-based Research Directory and Publications Directory are also being refined to make them more customer-focused and to allow different types of customer, including businesses, to access information more easily.

- **Enterprise Leaders, HE stars and Research Directors**

The University has appointed Enterprise Leaders – full-time academics with part of

their time bought out for enterprise and business-related issues. They are change agents, talking with colleagues on enterprise issues, informally auditing activity in their departments, offering initial advice and ensuring that in-depth follow-up support is made available. They also promote collaboration by networking, targeted marketing, visits and events, chairing departmental industry committees and sitting on the council of the regional sector group.

- A second group has also been identified – the ‘HE Stars’ – who are eminent scientists whose backgrounds and research status make them an immediate draw to industry partners. Stars are helped to spread their message as widely as possible. The SWRDA has made considerable use of them on overseas visits to promote the region’s knowledge base and encourage potential inward investors. This model is being taken forward through the new Faculty Research Director approach. These individuals with international research reputations will represent the faculty externally, generating income and championing the development of new initiatives.

- **Training and bursaries**

Bristol has developed a range of non-accredited training programmes in enterprise-related skills for staff and postgraduate researchers. These include:

- programmes focused on the role of the director in a company, delivered in the main to academics looking to exploit their research through spin-out companies;
- IP workshops helping academics understand the issues behind exploitation;
- customer care workshops focused on research groups and units with industrial links.

Bristol best practice models

Delivered by a new customer care specialist, these are designed to help improve the process of customer interaction and the understanding of industrial customers' expectations. One outcome is the simplification of the process through which vets refer animals to the Bristol Veterinary School's hospitals, which before could have required 11 different interactions.

For staff wishing to explore these issues in more depth, the University offers bursaries allowing them to take selected modules from its MSc in Professional Management.

- **'Proof of Concept' funding**

The successful exploitation of research often requires further work to be done after research funding has ceased. This may involve learning about markets, competition or complementary technologies, or additional work on the technology, for example the development of a demonstrator or commercially robust prototype. Bristol makes discretionary grant funding available to academics wishing to undertake this type of work as a stepping-stone to exploitation. Between 10 and 15 awards of up to £15,000 are generally made each year. They have been effective in taking projects on that would otherwise have stalled and there is a clear need to extend this model.

- **Enquiry referrals and completion - Knowledge Exploitation South West**

Through the South West's regional association of HE institutions, HERDA-SW, Bristol is participating in the £3.7m Knowledge Exploitation South West project, funded by the SWRDA. This project takes initiatives such as Bristol's Enterprise Leaders, Proof of Concept

funds and enterprise education and training, and allows other higher education institutions in the region to benefit from them. It is also addressing the problem of SMEs who find it difficult to identify appropriate expertise within universities. Each institution is therefore appointing a Business Account Manager working within their 'Business Gateway', whose remit is to ensure that the best regional HE supplier for the company receives and manages enquiries that cannot be serviced by the university receiving the 'first contact'.

- **Incubation, Bioincubator and Science Park**

Companies need appropriate accommodation and support, whether they are created within the University or involved in a partnership with it. Bristol has developed an incubation flow model which begins with pre-incubation (a simple, low-cost incubator with high support levels), leads on through conventional and specialist incubators with associated support, to final location on a world-class science park. With the support of the SWRDA and others, Bristol has the first two stages in place within the University precinct. It is now working to finalise plans for a specialist bioincubator in Bristol and continues to work with the SWRDA and other universities in the region on the formation of a Bristol Science Park. Each of these elements is essential in promoting the development of knowledge-based businesses with strong links to the University, in offering locations for inward investors to the region and in enhancing the perception that Bristol is a serious player in industry-academic collaboration.

Barriers to relationships

Knowledge transfer professionals in the HE sector are working hard to minimise obvious barriers such as lack of understanding, to improve access to appropriate information and to facilitate opportunities for networking and the essential 'serendipity' effect. It is important that the value of such efforts is communicated to industry. A company that tried to build a relationship in years past and failed, perhaps because the University did not have the necessary systems in place, may have a perception that it is hard to work with universities. The message must be that universities are learning, are becoming more skilled and wish to work with industry as effective knowledge partners.

At the same time, there is a need for a more 'intelligent' demand side, for business to become more educated as to the role and importance of the university sector in innovation. UK research, including the DTI's R&D Scoreboard and the CBI's Innovation Survey, repeatedly indicates that British business is less innovative and invests less in R&D than its competitors in other leading economies.

The UK university sector can play a role in changing this position, but it cannot do it alone.

To establish an effective knowledge exchange relationship (an infinitely preferable position to the 'throw the knowledge over the fence to the exploiter' approach), there need to be two parties operating on 'transmit and receive'. It is not clear that UK-based industry in general and in particular the SME sector is willing and able to play such a role. There is much work to be done to mobilise 'intelligent demand'.

There are many exceptions to this generalisation. In particular, larger companies with active strategic research and development plans work hard to develop the relationships required for effective collaboration and knowledge creation. There is also a group of advanced SMEs who have identified the economic and competitive benefits of such collaboration and are investing resources to achieve them. This investment might range from providing student placements to participating in large-scale collaborative research.



Attracting the best graduates

One of the major reasons businesses want to get close to industry-focused University departments is to attract and recruit the best graduates. This is appropriate and to be expected, and is a further benefit of collaboration.

Bristol has put in place a number of Enterprise and Entrepreneurship courses for undergraduates and is moving towards the embedding of these optional units in degree curricula. Over 300 students a year participate in one of these courses. There is anecdotal evidence from the students that such modules on their CVs have helped in getting jobs with leading employers and have changed their views on employment in (entrepreneurial) small- and medium-sized companies. There is a counter argument emerging in the science sector, in particular from the pharmaceuticals industry, that the use of limited undergraduate time on learning core skills means that fewer technical skills can be taught. Universities will have to respond sensitively to industry demands for the 'perfectly' skilled graduate, recognising that the needs of the SME may be very different from those of GlaxoSmithKline.

There are many more SMEs that would benefit from the employment of graduates and the use of undergraduate-level skills than currently consider recruiting them. Effective and cost-neutral student placements and projects, both within degree curricula and through schemes such as the Shell Technology Enterprise Programme (STEP), have demonstrated real economic benefits to companies and have introduced undergraduates to the reality of life in an SME. Such programmes, along with other ways of exposing companies to undergraduates, can only increase the transfer of knowledge into such companies.



Financial considerations

The nature of research funding in the UK has led to difficulties over the true cost of research within a university. The UK policy of providing core research funding through HEFCE with this then topped up by the Funding Council, with overheads set at 46 per cent, has led companies to assume that indirect costs are very simply set at this level. There is a need to move towards an agreed system for costing research in the UK. The 2003 White Paper *The Future of Higher Education* argues that universities should move to demonstrating funding sustainability in research. Industry must also recognise that it has a responsibility to pay a sustainable market rate for services provided. Currently the system is unsustainable, with little or no return available to invest in maintaining or developing new research infrastructure, leading to declining facilities and capabilities (themselves therefore less valuable to industry) and to the need for occasional Government initiatives in research infrastructure such as JIF and SRIF. No successful business would continue to operate in this environment.

A secondary problem is the common perception among SMEs and innovators approaching universities that because they are taxpayers, work can be completed free of charge. The nature of the relationship needs to be clarified, and further support given to this group – for example, simplification and enhancement of the R&D tax credit and the softening of the requirement for an SME to

have a person spending 75 per cent of their time on R&D. It would also be of value if the tax credit went to 100 per cent for a fixed period for SMEs investing in university research collaboration. A 100 per cent relief model for two years was used to promote investment in IT among SMEs and was very effective. There is no anecdotal evidence at Bristol that the existing R&D tax credit has made the difference for any company between working and not working with the University, although it has been valuable for spin-out companies contracting with the University.

Alternative ideas include the promotion of the benefits of spending SMART Award funding with a university and the development of a 'Proof of Concept' Fund as already implemented in Scotland. Opening such funding in part to SMEs would promote collaboration at a stage that is much more appropriate to near-market-focused businesses.

There are also concerns about some companies' aggressive approach to ownership of intellectual property rights. It is common in the UK for companies funding research to insist on full ownership or assignment of any IP developed, notwithstanding the levels of contribution made. In collaborative programmes such as LINK, it is often the case that the research programme is well advanced (or even finished) before any agreement on IP ownership and management is close. The lack of sustainable levels of funding,



together with extended disputes on ownership, put significant pressures on the academic and collaborating industry representative and on the commercial/contract teams in both company and university. In the case of charities, many of which make no contribution to indirect overheads, there is an increasing trend to aggressive claims on IP ownership.

It is recognised that rights to IP assets are essential before further investment can be committed to exploit the IP, and that the post-research investment might easily be 100 times that of the research. However, a simple framework is required to minimise the misunderstanding at this stage.

The US pricing and IP model is more appropriate and successful. Federal audits are made of institutions giving a standard, transparent, audited, indirect overhead figure. All parties commissioning research, including Government departments, funding bodies and industry, then use this rate by law. Where organisations such as charities are unable or unwilling to contribute at these levels, their contributions are simply managed as endowments or donations. Linked to this transparent funding model is the tendency for IP ownership to be retained by the university with exclusive licences being awarded. In the case of world-class institutions such as MIT, even exclusive licensing is unusual, with the majority of IP licences being non-exclusive.



Western Air Photography

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