

Lambert Review of Business-University Collaboration

BT welcomes the opportunity to contribute to this important review.

INTRODUCTION

The company values its relationships with universities and has developed an extensive programme of university relationships over many years. The majority of these are led from our research and Development Centre at Adastral Park near Ipswich, where our 300 strong research team is based alongside 3000 of our technologists and developers.

Our university relationships span a broad range; from being a major recruiter of graduates – peaking at over 300 per year during times of expansion, to running a major programme of long term strategic research. The academic strategic research programme accounts for 12% of the company's research expenditure; a total programme size of £18M spread over 5 years.

We summarise below the range and rationale for our various interactions and then address in turn the issues raised in the invitation document.

Strategic University Programme

This programme accounts for over 90% of our University expenditure. It comprises research contracts ranging from focussed activities employing single academics to larger programmes where we collaborate with multi-disciplinary teams. 20% of our programme is with non-UK Universities, primarily in the US. In all cases the academic research forms an integral part of our 'internal' research agenda and there is a researcher, or research team, in our own laboratories who is a 'customer' for the research. Our strategy is one of collaboration and payment against specific programmes or objectives, rather than loose 'sponsorship' of 'bright people'.

We have had some success with joining larger 'industry clubs' where funding is pooled and results shared. A particularly notable relationship of this type is our programme of 12 years standing with MIT and particularly the Media Laboratory. Our experience is that the best value has been obtained when our people are actively collaborating with the MIT teams and co-located for significant periods.

We see universities as bringing challenge, new ideas and a broader 'window on the world' to our internal teams. We value the neutral environment for inter-company collaboration that Universities can provide.

Short Term Fellowships

This scheme has been running for 20 years. Members of academic staff are encouraged to apply for a fellowship lasting typically 6 or 12 weeks. Most fellows join us during the long summer vacation period, or during a sabbatical year. They join one of our research teams at Adastral Park and are encouraged to become an active member of our community.

Student Placement Scheme

We provide 'vacation' placements for undergraduates each year during the long vacation. Each student is allocated to a R&D team and given specific personal project work. This scheme has provided some of our most successful graduate recruits over the years as well as further enhanced links back into University departments via their respective tutors.

Masters Programmes

BT has two innovative masters' programmes, both run under contract by University College London on behalf of London University. In both cases UCL bring in leading academics from across the UK to deliver some of the courses. Both are the major tools in our people development programmes.

The BTmasters provides a technically biased, MBA type course for a group of selected likely high-flyers across the company. It highly intensive involving residential periods at a BT college and visits to other companies in the UK and abroad, a business related project and the active involvement of the most senior people in the company as lecturers, tutors and mentors.

The Telecommunications MSc (previously known as the Martlesham MSc) involves around 150 professional engineers at any one time working on a modular, technical masters' degree. A typical degree will take around 3 years and involves part-time participation in modular courses, all of which are delivered at Adastral Park. Each module is 'owned' by BT senior technical leader in partnership with the University person who delivers the course.

Innovative University Research Centres @ Adastral Park

Over the last 2 years BTextact has been working with some of the UK's leading Universities on establishing relatively novel means of joint working. Initially University College London, then Essex University and the Cambridge MIT Initiative have been encouraged to establish postgraduate research and teaching centres on Adastral Park alongside BT's own research and development people. These centres are not part of BT, but owned and managed by the respective Universities, who are encouraged and

free to work with other companies. UCL@Adastral park has a technology focus, Essex one on Social Science and Human Factors and CMI on Entrepreneurship and Management.

We see these initiatives as a natural development of our long-standing relationships with the Universities represented and an effective means of 'blurring' the BT/academic boundary to the benefit of both parties. They provide the 'neutral' research environment referred to above and are an attractor to other companies considering locating within the vicinity. Financially they are an effective means of gaining 'multipliers' on BT's research investment as they attract research council and other public funding to carry out complementary work.

In all cases there has been full support from the local and regional authorities. In the case of UCL, the RDA has matched the BT research funding, enabling extra academic staff to be recruited able to gain Research Council grants.

Centre for Integrated Photonics

Two years ago Corning Inc acquired both the staff and facilities of BT's photonics research capability at Adastral Park. Corning invested approx \$20M turning it into one of the most advanced and best- equipped advanced photonics research centres in Europe.

Early this year (2003), reluctantly and for reasons of financial duress, Corning closed the facility and terminated the employment of all staff.

In partnership with London University and The East-of-England Development agency, BTextact encouraged a rescue of the centre. EEDA are now the owners of the facility now renamed the Centre for Integrated Optics. Research Council and DTI funding has been earmarked and a team is in place to pull this funding down. The centre will carry out primarily academic research with University people in-situ. Partner Universities are London, Essex and Cambridge.

BT was the catalyst that caused this 'rescue' to happen and anticipates that it will work closely with the new centre on collaborative research and potential exploitation of technology

Brightstar

Brightstar is BT's corporate incubator, established approx 3 years ago on Adastral Park and widely recognised as being unique in its manner of working.

Brightstar's purpose was to extract added value from BT's long established R&D activities, it was also a catalyst for encouraging an innovation and 'small company' culture in BT's R&D unit.

From its inception Brightstar differed from other 'corporate incubators' as it worked in close partnership with several independent venture capital funds. BT's policy was to ensure that the management of 'launched' companies were free to plan their own destiny by retaining a minority share and a single seat on company boards. During its time as part of BTextact, Brightstar launched 5 companies involving BT people and intellectual property.

Brightstar has now become a joint venture between BTextact, Collier Capital and New Venture Partners (NVP) and migrated to become an independent corporate venture capital partnership - NVP Brightstar. NVP Brightstar, has the exclusive right to create new start-up businesses with BTextact using BT's intellectual property.

Questions for Consultation

We would like to identify best practice and examples of excellence in business-university collaboration in the UK and abroad. Some examples of the types of collaboration that we would be interested in hearing about include:

Industry's use of the information contained in academic publications, and academia's use of industry patents and prototypes or vice versa.

Our internal research teams are active users of academic publications in furthering their own work and have on-line access to many professional journals through our digital library. We are aware of the impact publications have on research assessment scores.

We have found that many academic research papers, although published on the Internet are difficult, if not impossible to find without knowledge of their location. We recommend that universities endeavour to index their material via standard search technology in a way that will allow the material to be located easily.

We have few, if any, examples of situations where we have taken Intellectual Property or patents from academia and used the results directly commercially. It is often the case however that University initiated research (eg from an EPSRC grant) will stimulate us to fund further work in the University group. We often make use of prototypes both hardware and software from University projects. On many occasions a prototype from a piece of work that was publicly funded – eg by EPSRC, has stimulated funding from ourselves to enable collaboration.

Joint ventures between universities and business, for example, personnel exchange or collaborative research and development projects.

It is our experience that an arms-length customer-supplier relationship with a University research team is generally unproductive. The best results are obtained via a collaborative environment, where our own people form an extended team with that in the University.

We make use of formal publicly funded collaborative research eg DTI-Link and CEC Framework Programmes. We do have to balance the additional administrative overhead of such schemes (both in bidding and participating) against the direct funding we receive, particularly with DTI schemes where there remains reluctance to fund large companies sufficiently. We feel that this is unfortunate given the situation where it is the large companies, such as ourselves, that have the internal research teams able to work closely with the university groups. Arguably it is also the larger companies that can rapidly have measurable impact on national wealth compared with small companies with more limited resources.

BT is one of two major industrial partners in the CMI initiative on improving innovation at the University/Industry interface. The CMI centre at Adastral Park is an example of our enthusiasm for investigating innovative methods.

We also have experience with industry/academic consortia in the United States(at MIT and to a more limited extent Stanford and Berkley)

Informal contacts, for example, meetings and conferences, use of science parks, business-university liaison, industry sponsored university posts or studentships, work experience for students, business contributions to curriculum development, academic secondments in industry and provision of continuing professional development training by universities for business.

We use most of these approaches – see above, and agree that ‘Networking’ both formal and informal is essential to effective collaboration. Effective collaboration relies on mutual respect and ‘delighting in the differences’ between academic and industrial worlds.

We do not in general sponsor posts in isolation, we prefer to fund work programmes. Nevertheless, we are happy to support Universities who prefer to deliver the work by appointing good people to nominal ‘BT chairs’.

We do not fund ‘bricks and mortar’ at Universities as a matter of policy; insisting on a direct working relationship between University and BT people in everything we do.

We note that in the United States it is common for top academics to also have high level careers in industry. People appear to straddle the boundary more easily and often pass to and throe as their career develops. Whilst not unknown, it is more exceptional in the UK, and usually occurs as a result of a 'career change' decision on the part of the individual, rather than being part of a natural career progression.

Formal contracts, for example, the use of licensing, research contracts, consulting projects, establishment of spinout companies, product testing, or business support.

We do not in general use Universities for business support or product testing. The other mechanisms are part of our normal activities.

We have a single experience of a joint spinout where the university had some complementary Intellectual property to our own. A joint IP for equity arrangement was made with the founding partners.

We would also be interested to learn how the relationship came about. Were your local Regional Development Agency or Sector Skills Council involved? What more could be done to facilitate successful partnerships?

In our single case the founders approached us; their University partners had also undertaken BT funded research and were thus aware of our complementary know-how and IP. We are actively encouraging Universities to explore further joint exploitation activities using the NVP- Brightstar incubator.

We maintain close contact with the RDA who have actively supported activities on Adastral Park – see notes on UCL and CIP. Several of our people serve on RDAs or other more local development agencies.

We have little involvement with the Sector Support Councils at the R&D level. Contacts are maintained however centrally within the BT group.

2) If you do not have, or would like to strengthen such relationships, what are the main barriers to doing so? These might include:

Management and organisational issues. How can businesses and universities best organise themselves in order to benefit from each other's resources? Do the present mechanisms for priority setting, decision-making and funding in the university sector help or hinder business-university collaboration? What changes might encourage collaboration?

In our experience the best and most productive universities recognise that their 'research business' works on different principles than industry. Their 'business' depends on raising funding to further their own research agenda, grow their research teams and reputation and contribute to knowledge. To achieve this they need to keep their industrial partners supportive. To be supportive and continue to fund, industry needs to be able to access the results easily, use them freely and continue to enjoy excellent knowledge transfer. Thus creating a virtuous circle. Sometimes government measures, third-leg initiatives etc, tend to hinder, rather than accentuate this circle.

The metrics used in successive Research assessment exercises take very limited account of industrial collaboration; publication quality and international reputation among peers dominating. We hope that the Roberts review of The RAE will correct this.

Public funding schemes for academic research appear to find it difficult to react to the innovative and unusual. We mention above the UCL@Adastra park initiative and the 'rescue' of the ex-Corning research centre. On both occasions approaches were made to several individuals, schemes and departments in EPSRC and the DTI for funding support. All agreed that they were initiatives worth funding but were unable or unwilling to take on a cause that was not within their usual mechanisms. On both occasions it took the personal intervention of the Minister for Science and some pro-active support of the RDA to make progress

There are difficulties working at the boundary between disciplines, within universities and the funding agencies. The RAE and the research councils struggle to deal with multi-disciplinary work. Effective mechanisms are needed to encourage multidisciplinary working. It is our experience that this will drive both creativity and innovation.

Government continues to appear focused on SME's and fails to recognise that it is the large companies with critical mass that can have significant effect on GDP in the short term. Many DTI funding mechanisms for academic-industrial, or inter-company, collaboration discriminate against large companies by limiting support to a low percentage of costs, whereas SMEs enjoy 50%.

Technology transfer. What are the barriers? How can it be made more effective?

We recommend that the metrics are aligned to funding decisions ensure that knowledge transfer is a key ingredient, replacing the current enthusiasm for direct exploitation by licensing patents and university incubators.

Maintain and enhance however the quest for scientific and research excellence.

Intellectual property. Are the present arrangements understood and appropriate?

IP is only of real value to the economy once the invention is exploited by industry. This should be the priority.

There is a fundamental question of who should own the IP generated within universities from public funding. The current convention, and one that has been encouraged for at least the last 20 years, is that it belongs to the university to exploit freely to generate a direct revenue stream. There are however very few examples of universities actually achieving significant revenues through such an approach. University revenues continue to be dominated by teaching, capital grant and research council funds, followed by industrial contracts and sponsorship, with revenues from IP being a very low percentage.

We argue that government and many universities do misunderstand the value of IP residing in and managed by a university department. It is worthless if the resources are not behind it to exploit it and protect it. Few, if any Universities would contemplate litigation to defend a patent infringement in the United States for example.

We have walked away from some University research contracts in the UK because the demands on intellectual property were both unreasonable and unrealistic. Unless industry sees no barriers to exploitation, the current economic climate encourages the view that life is too short to continue to negotiate.

Our Positioning

- We would not normally expect to undertake work of a confidential, or highly competitive nature in a University laboratory as we feel the environment is necessarily open and not conducive to 'chinese walls'.
- We value the Intellectual Property created by our contracted academic research colleagues, although would not scope a University project expecting patents to be the prime deliverable.
- Unless a University provides an active patent management, protection and exploitation service we usually negotiate our research contracts such that BT retains patent ownership, with an automatic 'grant-back' to the University for furthering their research agenda and attracting additional funds.

Some US Universities such as MIT have a long-standing and professional IP management capability, with pooled access to industrial partners, in such cases we are prepared to allow patent ownership to reside in the academic institution.

We always allow Universities to publish the results from our contract research, but require that they formally seek our approval first to allow us to confirm that there is no commercially damaging content. It is rare for us to request changes prior to publication.

3) A third set of questions relates to how business can attract the best graduates and postgraduates with the skills that they require, especially in technology. Questions include:

Is the quality of graduate recruits satisfactory? Are there any obvious gaps in terms of skills and disciplines?

There is an issue of 'quality of degrees' – is a degree from Wolverhampton University equal to a degree from Warwick? We would like to see independent accreditation of Engineering and Science degrees by relevant professional institutions eg IEE, Engineering Council etc.

There is evidence of grade drift, particularly it seems in some of the premier league institutions. The percentage at 2.1 and above has steadily increased year-on-year.

Graduates need to be rounded and able to acquire depth and new knowledge. An understanding of the fundamentals in the case of Science and Engineering degrees remains essential. Fashionable titles eg 'Internet Engineering' may attract students but leave employers sceptical. A balance in degree syllabi between breadth and depth will help individuals.

How do businesses, individually or collectively, communicate their needs for specific scientific or technical skills and for the development of relevant courses in universities?

Industrial Advisory Boards at University departments – we support many of these. Industry based visiting professors etc – again we have several on our staff. Our fellowship scheme also provides a direct awareness of our needs to members of university staff.

How could more attractive career paths for science and technology graduates and postgraduates be developed?

There appears to be an assumption that effective career paths do not already exist. There are examples within our own and many other companies of science and engineering graduates rising to the very top of their company or profession. We have schemes such as our MSc programmes that encourage such developments.

It is for industry to offer career progression, companies that do so are likely to attract the best people.

What plans does business have to attract the best talent in the future and are the universities made aware of them? If not, what more could be done to facilitate such a dialogue?

We find our summer placement scheme highly effective, linked to our high reputation as a good employer with members of academic staff. Career's fairs are of limited use. One also needs to offer a competitive employment package.

4) The review team will also want to understand whether financial considerations currently help or hinder the relationships between business and universities. Questions include:

Are there ways in which the present financing arrangements could be made more effective?

Support large companies on the same terms as SMEs – this will encourage more industry/ university collaboration.

There remains a place for curiosity-led research, wholly government funded. This should be protected and managed by the research councils. It should however be regularly tested for quality, radicalism and avoidance of incrementalism.

Faraday centres and Link type schemes are effective, but the seemingly plethora of new initiatives is confusing to industry . Simplification and flexibility is needed.

Currently there are a large number of checks, balances and reviews, involved with gaining government funding for research, but seemingly less effort in reviewing impact and feeding it into future decisions. Consider rebalancing.

Review the government advice and funding streams to Universities regarding intellectual property. The recent white paper is asking universities to excel in research, teaching, knowledge transfer and increasing participation, not direct revenue generation from IP. Encourage academia, via funding, to help industry exploit results, not to set up exploitation departments of their own to get increased revenue *from* industry, as many are doing.

Has the introduction of R&D tax credits influenced business demand for research and skills, and if so, how? Are there other means to the same end?

Tax credits are a positive approach to government support for industrial R&D expenditure. The unprecedented downturn in the ITC sector has masked any resultant increased demand for R&D skills.