

15 April 2003

Mr Richard Lambert  
The Lambert Review of Business-University Collaboration  
1 Horse Guards Road  
London  
SW1A 2HQ

Dear Mr Lambert

**Institute of Physics response to  
the Lambert Review of business-university collaboration**

Thank you for the opportunity to contribute an input to your review of business-university collaboration. In response to the questions raised, please find attached a short report summarising our Institute views and including the views of some of our members in business, academia and other interested communities.

The Institute of Physics is a leading international professional body and learned society, with over 37,000 members, which promotes the advancement and dissemination of a knowledge of, and education in, the science of physics, pure and applied. Our membership and activities straddle the business and academic communities, therefore we are very interested in the findings of the review.

The review comes at a particularly appropriate time as we have recently launched our Institute report on 'The importance of physics in the UK economy', which looks at physics-based industry over the past decade. A copy of the report is enclosed.

In addition to providing evidence of the vital role that physics and physicists play in industry in the UK, the report also identifies four worrying trends requiring urgent corrective action if the UK economy is to continue to benefit from, and best manage the potential of, its physics base. The trends are not unique to physics, and it is clear that to achieve action of sufficient impact to tackle them effectively we will need to work in collaboration with others.

The four issues identified in our report link with your review topics and are therefore covered in response to your questions. In brief, they are:

- evidence of continued decreasing investment in R&D
- limited commercialisation of university research
- an increasing shortfall of trained physicists to meet industry needs
- false public perception that careers in physics and engineering are unattractive.

I hope that the views of the Institute will add value to your review. If there are further ways in which the Institute can assist, then please do not hesitate to contact me.

Yours sincerely

Dr Susan Fryer CPhys MInstP  
Business & Industry Manager

# Institute of **Physics**

## **Institute of Physics response to the Lambert Review of business-university collaboration**

The Institute welcomes the Lambert Review of how the long-term linkages between business and universities can be strengthened to the benefit of the UK economy. We consider the inquiry into how business can best exploit the technologies and skills that are being developed in the universities to be of key importance. In response to the questions raised in the consultation, we would therefore like to contribute the following points:

### **1. Best practice and excellence in business-university collaboration**

#### **a. Can you identify examples (UK or abroad)?**

One very successful example of which we are aware is that of the University Technology Centres (UTCs) run by Rolls-Royce. Rolls-Royce is one of over forty physics-based organisations in our 'Business Partners Network' and we understand that Rolls-Royce will have already provided information on their UTCs to you. Other members of our Network such as BAE SYSTEMS and BNFL also have formal structures to nurture relationships with universities. BNFL has four University Research Alliances (URAs), which are now recognised internationally as an excellent means of underpinning the science and skill base required in the nuclear industry. The URAs are at the Universities of Manchester, Leeds, Sheffield and UMIST. Sue Ion, BNFL's Director of Technology, would be able to give details.

A different type of example of best practice is that of the RDAs of Scotland and Wales. Scottish Enterprise and the WDA have led the way in enabling effective business-university collaboration relating to areas of physics and in providing an environment for such links to grow. David Crichton, Chief Executive of Scottish Enterprise for Edinburgh & Lothian, gave an excellent talk on such enabler initiatives at our recent Industry Day of the Institute's annual Physics Congress. Optoelectronics is a key physics-based area in which Scotland has been leading the way, and within it Heriot-Watt University is a particularly good example of how productive and successful partnerships with industry can be. Julian Jones, a professor of physics, is a key driver of these partnerships at Heriot-Watt.

A further success story from Scotland is the St Andrews ultra-fast photonics consortium, an industrial programme linking 6 universities and 8 companies, which has been supported by EPSRC for 5 years.

Scotland is a relatively small country and continues to punch well above its weight in commercialisation of physics-based research. Something which certainly works in Scotland's favour is that education and industry in the Scottish Executive are covered by a single department, unlike the government structure in England where responsibilities and activities are divided between several separate departments. The Scottish structure works well because of the better co-ordination possible in policy and delivery.

Ireland too seems to enjoy a significant number of successful business-university partnerships. The physics department at NUI Galway deserves particular mention for the number and range of the industry collaborations it has built up through its National Centre for Laser Applications (NCLA). Tom Glynn is the centre director there.

b. What more could be done to facilitate successful partnerships?

Discussions with our Business Partners suggest that physics-based businesses often find it very difficult to find out what research universities are doing that may be of relevance and potential value to their business. At the Institute of Physics we already provide a web-based resource, called 'Research Fields in Physics', which catalogues physics-based research at universities across the UK and Republic of Ireland. Please see [physics.iop.org/cgi-bin/RFIP](http://physics.iop.org/cgi-bin/RFIP). Of great value, this searchable guide also provides useful statistics, researcher names and contact details. Having sought feedback we are now considering the possibility of providing the information in a format that will be more accessible to industry.

One activity that would be expected to deliver increased numbers of successful partnerships is the fostering of a more entrepreneurial and business-aware culture across academia, and especially in university physics departments. This issue was highlighted in our physics-based industry report.

Many of the university physics departments and physics-based companies with which we have contact credit CASE studentships, TCS (Teaching Company Scheme) programmes and student placements as playing a major role in establishing, and subsequently strengthening, many of today's collaborations and linkages. TCS in particular has been seen as a very attractive scheme, affording academics the time, credit and respect for industrial interaction that might otherwise be denied them. However, the larger companies are concerned that TCS has been retreating to the SME arena, despite its great value to companies of all sizes already having been proven. Many companies have told us that they find student placements of less than 6 months to be of little value to either side and that year-long placements are the most effective. We believe that more value could be obtained from CASE studentships if students were able to spend a significant period of their time at the company sites.

## **2. Barriers to business-university collaboration**

If you do not have, or would like to strengthen, such relationships with HE, what are the main barriers?

a. **Organisation.** How can businesses and universities best organise themselves to benefit from each other's resources?

Universities should make more effort to enlist the support of external SMEs already operating in a sector appropriate to, or having synergy with, potential spin-outs. Marketplace insight and knowledge, which is often learnt the hard way, is invaluable.

b. **Management.** Do present mechanisms for priority setting, decision making and funding in the university sector help or hinder business-university collaboration? What changes might encourage collaboration?

We think that it is important that universities should not be expected to function as industry-style operations. Universities need to be able to support risk and encourage innovative approaches, rather than to operate tight-management of risk.

A mismatch in management timescales often hinders business-university relationships. Physics-based companies typically need to work to medium-to-long-term strategic plans, but the funding of research at universities is usually

on a much shorter timeframe, typically one to three years, which adversely affects the effectiveness and continuity of linkages.

c. **Technology transfer.** What are the barriers & how can it be made more effective?

We have identified that a major barrier is poor communication between academia and industry, certainly in areas relating to physics. There seems to be no shortage of good ideas in physics departments, but there is little effective communication of the potential opportunities to industry. We believe that the Institute of Physics has a role in helping in the introduction of technology transfer co-ordinators to cover academic research in physics-related areas and in building trust between university physics departments and companies who would be well-placed to exploit the good ideas.

Another barrier is that there is currently limited availability of investment for the scale-up stage of ventures. This funding for demonstration of production is especially important for the survival of smaller companies, but it has not been a priority for most funding bodies (such as the EPSRC) in the past. By comparison, 'proof of concept' funding has been relatively easy to secure. Encouragingly, Scottish Enterprise is aware of the difficulties and is allocating resource accordingly.

The two-way movement of people from universities to business, and vice-versa, is critical to the process of technology transfer. This is a highly effective mechanism of linkage between physics departments and business.

d. **Intellectual Property.** Are present IP arrangements understood and appropriate?

IP is a difficult issue. Universities now require formal IPR agreements to be signed even before preliminary discussions can be held. The inevitable lack of trust on both sides inhibits the potential of the collaborations. The situation does not appear to come from the academic departments themselves, but from the university business development offices that impose the regulations. Of course, it is important that academics be protected against exploitation, but today's requirements can create obstacles to progress.

### 3. Skills

How can businesses attract the best grads & postgrads with the skills they require, especially in technology?

a. **Quality of graduates.** Is it satisfactory? Are there any obvious gaps in terms of skills and disciplines?

Sir Gareth Roberts' report 'SET for success: the supply of people with science, technology, engineering & mathematics skills' (2002) covers this point well and gives the physics perspective. There is overwhelming evidence of a shortfall of trained physicists to meet the demands of industry.

Business awareness is regularly flagged as something lacked by many of today's graduates. An important concern raised by a number of physics-based companies is not so much the quality of new graduate recruits, but that the knowledge and skills base of older employees, over ten years post-graduation, can easily fall out-of-date. More emphasis and investment must be put towards the regular updating of skills and technical knowledge. University-business linkage has a key role to play here.

b. **Career paths.** How could more attractive career paths be developed for science, engineering & technology grads & postgrads?

We believe that the issue is not that physics graduates and postgraduates lack attractive career paths, but that there is little awareness of the options. Careers advice at schools level should be improved to increase awareness of the breadth of exciting and well-rewarded careers open to those with SET qualifications. Many students in the UK do not perceive science and engineering-based industry to be an attractive or well-paid profession and this influences their choice of study.

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

Salary is obviously a key means of attracting the best talent. If industry is to compete with City firms for the best physics graduates then it will need to be prepared to improve its salary offerings.

The Institute of Physics has previously arranged fora for representatives from universities and physics-based businesses to debate the issues around attracting high-quality graduates. These have proved extremely valuable experiences for all involved and we intend to continue them.

#### **4. Financial Considerations**

Do financial considerations influence business-university collaboration?

a. How can present financing arrangements be made more effective?

Financial considerations are certainly important, but they must not become the all-dominating influence. We are aware that financial agreements are often set on an ad-hoc or individual basis and many of those involved can feel resentful as a consequence if they feel that they have been poorly rewarded compared to others. Consistent rules are needed for how UK and Republic of Ireland university staff are paid for work done in collaboration with industry, such as any additional hours spent on consultancy. This will ensure more transparency and fairness in the system. It could also mean that good academic staff, who would otherwise be lost to the university in pursuit of added remuneration for their inputs, would be more likely to remain in academic positions.

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

The feedback that we have received suggests that the new R&D tax credits are found to be overly complicated and that much of the money they release is taken away again in other ways, for example as a consequence of HM Treasury's redefinition of what constitutes 'R&D'.

For further material please refer to our report on 'The importance of physics in the UK economy' (as enclosed, and also available in electronic form from our industry website at [industry.iop.org](http://industry.iop.org)). We would also encourage you to consult 'The links between university physics & industry' (1997), a report prepared for our Institute by the Science Policy Research Unit (SPRU).