

LAMBERT REVIEW OF BUSINESS-UNIVERSITY COLLABORATION

CONSULTATION RESPONSE FROM THE UNIVERSITY OF OXFORD

1. Oxford University welcomes the opportunity to provide input to the Lambert Review. In the points below, we have touched upon the areas highlighted as 'of interest' to the review, but have concentrated in the main upon offering a mix of comments and a few pertinent examples of business-university collaboration, which we hope will be of help, rather than on providing lengthy lists of illustrations. These comments are based upon the University's long experience of working with business. Our commercial links take many forms, from the traditional (the transfer of graduates and new technologies into industry) to the innovative (the co-location of spin-out companies with interdisciplinary research activity in purpose-built facilities at its Begbroke Science Park).
2. Oxford's most enduring collaborations with business have involved research links. An increasing amount of its £150 million annual external research income now comes from a wide range of companies – both UK and international – which choose to spend their R&D funds at Oxford not only because of the world-class nature of the research base, but also because they have – or wish to have - links with academics whose work might provide answers to key commercial questions. Collaborations with major companies such as Ford, Sharp and Merck have led to long-lasting partnerships. Tangible products developed from research collaborations with Oxford include an 'intelligent' microwave oven incorporating Oxford's neural network technologies, light-emitting materials for a new generation of display products such as mobile phones and palm-top computers, and a supersonic powered device which can administer needle-free, pain-free injections, along with the powder-form drugs to accompany it.
3. In addition to one-off projects involving, for example, the funding of an industrial studentship or sponsorship of a ring-fenced research project over three years, Oxford University is keen to build long-term strategic partnerships with companies, where their research goals and direction are complementary to the work of a particular researcher or research group, department, division or much greater sum of academic parts.

Best practice and examples of excellence in business-university collaboration in the UK and abroad

4. One such partnership, which began in the early 1980s and involved the US corporation Monsanto, its pharmaceutical sister company G. D. Searle, and Professor Raymond Dwek of Oxford's Department of Biochemistry, has evolved over the last 20 years to produce physical property (Oxford's Glycobiology Institute), intellectual property (over a hundred patents) and 'corporate' property (the spin-out company, Oxford GlycoSciences, which has its headquarters only 10 miles from Oxford). Following a number of mergers taking place over the last few years, the relationship has moved on from Monsanto/Searle to Pharmacia, and is now undergoing its most recent manifestation as a result of Pharmacia's merger with Pfizer. New links are springing up as a result of these changes, and senior staff from Pharmacia/Pfizer will

shortly be visiting the University for discussions about taking forward the relationship.

5. A more recent strategic partnership with IBM UK has come about as a result of IBM's senior management's interest in research and teaching at Oxford and, more specifically, through Oxford's position as one of the leading e-Science centres in Europe. An example of this is the £4.2m eDiamond project, part of the Government's eScience initiative, which involves a three-way collaboration between IBM, the University's departments of Computing Science and Engineering Science, and the Oxford spin-out company Mirada Solutions. The project will build one of the world's most advanced data grids, and will provide a facility to standardise digital mammogram images (SMF), which will help radiologists to compare and evaluate mammography scans stored on eDiamond accurately, no matter where or when they were created. This will ultimately allow physicians to identify and diagnose breast cancer in earlier stages, and help researchers to develop new and more effective forms of treatment by studying a range of problems more effectively.

Academic publications

6. All of the University's contracts with industry, save for specifically-commissioned service-type arrangements, include rights to publish. It is natural to expect that the academic party will be the one wishing to publish the results of its research (indeed, as a publicly-funded institution it has the obligation to do so and to make the benefits of its activities available for the wider public benefit). More and more common, however, are joint publications naming both university and industrial scientists as co-authors. It is important for businesses across all sectors to gain credibility and visibility through such channels as high-level, co-authored publications in internationally-respected journals. This can be achieved, at the same time respecting the need for companies to protect commercially sensitive research results, through a standard contractual mechanism for imposing a short delay on publications and early patent filings involving the input of both parties.

Joint ventures between universities and business

7. Oxford is pioneering new approaches to working with business in relation to R&D contracts. Its experimental discussions with Pfizer's Strategic Alliances group are mentioned below. Also illustrative of the University's efforts to short-circuit the difficulties experienced on both sides in relation, for example, to studentship agreements and to bring about a better mutual understanding of each other's positions on key contractual issues, is the new Russell Group standard studentship agreement. In 2001/02, Oxford (through its Research Services) led negotiations on behalf of the Russell Group of universities with GlaxoSmithKline to try to achieve a mutually agreeable studentship contract for part-or fully-funded industrial research projects. Following 18 months of detailed discussions (involving, amongst others, senior personnel from GSK in the US), a final form was agreed. This achievement has received praise from the CBI and the Research Councils and is likely to become the ABPI standard for pharmaceutical industry-sponsored studentship projects. A non-pharma version of the agreement has now been produced and is currently being used by a number of universities and companies.

8. The new University spin-out company, Novarc Ltd, which is supported by the University, by the Ford Motor Company, and the investment bank Beeson Gregory, is illustrative of another type of successful joint venture. The company has licensed intellectual property from Ford Global Technologies Inc. (and arising from research in Oxford's Department of Materials co-funded by EPSRC and Ford), and will be taking forward methods of rapidly producing dies and tools for producing car parts which have been developed in custom-built facilities at the University's Begbroke Business and Science Park in partnership with the Ford Motor Company.
9. The Oxford experience indicates that the creation of spin-out companies provides a significant number of opportunities for researchers to act as consultants and non-executive directors to the new companies, and also to take up new employment opportunities where appropriate. (See also section 15 below on Oxford University Consulting.)

Informal contacts

10. There is a wide range of informal contact between the University and national and regional businesses. Many are facilitated by Isis Innovation, the University's technology transfer company. These include the Oxford Innovation Society (OIS), which has around 35 member companies. The OIS provides three meetings per year for representatives from these companies, and a number of additional seminars and research presentations also take place. Isis also manages the University's three HEIF funded Business Liaison Managers, whose core activities include contacting local businesses and forming links over research collaboration, consulting, licensing, student projects, and continuing professional development. In recent years the Vice-Chancellor has hosted a series of business dinners for local business leaders to promote interaction between SMEs and key researchers within the University. The University also enjoys a good relationship with SEEDA, and plays a key part in regional initiatives developed by the RDA. The Oxford Science Enterprise Centre (OxSEC), located within the Saïd Business School, has mounted a series of lectures given by the business community, and the SBS itself is interacting successfully with business through its New Business Development MBA module.
11. Other informal contact is facilitated by the presence of University spin-out companies on local business parks, including the University's own at Begbroke, and also at Milton Park and the Oxford Science Park.
12. Oxford's collegiate structure encourages interaction with the business community. Oxford colleges often host formal dinners or other events. St John's was recently the venue for a DTI/OST conference and dinner on one of the new Foresight priority areas, Cognitive Systems. A number of College fellowships and research posts are sponsored by industry and business, facilitating much informal interaction within colleges and departments of the University.
13. The University plays a key part in Oxford's annual international fair for entrepreneurs, Venturefest, this year scheduled to take place in June. The fair has a remarkable track record of bringing together inventors, researchers, entrepreneurs, professional advisors, and of course, industry and business, for two days of

networking and discussion on the establishment of technology-based business. The programme for this year's event is included with this response.

Formal contracts

14. The University's Research Services, a section of its Central Administration, deals with over 2000 research-related contracts per year, many of which involve industry in some role or other and cover the funding of research projects, collaborations, fellowships, studentships, industrial placements, or provide access (in either direction) to materials, software, services, etc. Those funding contracts sponsored by industry (or a mix of industrial-Government funding) will often include licensing terms within them. Contracting with universities in this way provides for companies one of the most important routes to access new intellectual property arising out of University research. The other, at Oxford, of course, is *via* Isis Innovation.
15. Isis has negotiated in excess of 150 technology licence and option deals and has supported the formation of 35 spin-out companies since 1997. In the last two years Oxford University Consulting (now part of Isis Innovation) has concluded over 50 consulting/services contracts between business and University researchers or departments. Isis currently manages 610 technology and consulting projects all of which involve interactions with business. (Further information on Isis and Oxford University Consulting can be found at <www.isis-innovation.com>.)

Main barriers to strengthening partnerships and relationships

Management and organisational issues

16. Oxford University has streamlined its management, planning and decision-making processes for the 21st century, and has put in place key units or individuals who are easily accessible and who can respond directly to the needs of business. Since October 2000, the University's departments and faculties have been organised into a divisional structure, enabling clear leadership and strategic development for interaction with industry, particularly in the three science divisions, but also within Social Sciences and the Humanities. (Two charts showing [i] the main decision-making bodies within the University and [ii] the way in which these interact with the colleges and their representative body are enclosed for information.)
17. Divisionalisation has made collaboration within the University significantly easier. One key area in which the science divisions have collaborated recently is that of nanotechnology. (A new national Interdisciplinary Research Centre in Bio-Nanotechnology led by Oxford involves, for example, collaboration across the departments of Physics, Biochemistry and Physiology, i.e. from all three Science divisions.) Divisionalisation has also enabled speedier decision-making through the University's Planning and Resources Committee and the Council of the University itself. Allied with a new resource allocation mechanism, the University's new system of governance has been an unqualified success in facilitating decisions on capital and recurrent resources, new initiatives, and new research opportunities (for example, Oxford's formal partnership with Princeton University, which includes a number of large-scale, multi-disciplinary research collaborations and the exchange of best practice on technology transfer).

18. In terms of outreach activity, the University has a number of units with specific roles in fostering links with the business community and with industry, including Isis Innovation and Research Services. As a result of this experience we would say that it is most appropriate for universities to employ those people who have the necessary experience, background and remit to interact with business. In general it is unrealistic to expect any but the largest companies to develop their own university liaison functions. Having said that, it is important for businesses themselves to realise that interaction with the best of the university sector is a way of developing their commercial growth, and that interaction with academia is a worthwhile area in which to invest their own human and financial resources.
19. A large number of initiatives and funding schemes have been aimed in recent years at promoting interaction between the science base and the industrial sector, principally through DTI/OST. Although these have provided welcome funding, they have contributed to a sense of initiative overload in the science base, with penny-packets of ring-fenced money for small-scale schemes. It is important that universities should be left to decide what organisational mechanisms best suit their own style of technology-transfer operations. Resources might best be concentrated at the interface between universities and business – ie the technology transfer operation. The relationship between a University and a company is often complex and multi-layered, requiring skilled professional staff with expertise in key areas who are able to negotiate the interaction of two fundamentally different cultures.

Technology transfer

20. In Oxford's experience, the successful transfer of technology through a University-operated medium such as a specialist unit or subsidiary company requires several key components, all of which must be prompted by the academic institution.
21. First, it is critical to have a robust intellectual property policy with wide-spread 'buy-in' from the academic community. At Oxford this has been achieved over the years by close and careful consultation across the University with staff and students, and through the gradual introduction of changes which have contributed to the current policy. The ownership of IP rights (other than in books or scholarly articles) arising from research or commissioned activities carried out by Oxford's staff and students is claimed by the University. In exchange for this claim of rights, the University is responsible for ensuring that appropriate and well-resourced mechanisms are in place to maximise the potential of the IP rights, for individuals and the institution alike.
22. For the IP policy to work on a practical level, the university must be willing to invest significantly in its technology transfer mechanism and support services (at Oxford, these are Isis Innovation and Research Services) so that intellectual property can be assessed from a commercial and legal perspective and then efficiently marketed and transferred into business.
23. It is critical that the IP policy be supported by appropriate incentives which are sufficiently attractive to students and academic members of staff. Not only must they have confidence that their home institution's technology transfer company will provide them with an excellent service, but they should also be able to expect to reap

a fair share of the benefits of commercialisation. At Oxford this is achieved through well-practised royalty and equity sharing procedures.

24. Finally, it is essential that technology transfer be supported by the top echelons of the University's management, and that this support is visible to the rest of the academic community. Oxford currently has a committee appointed by Council to oversee good management and policy setting relating to technology transfer. The committee is populated by specialists and senior academics, and it plays an important part in communicating the message about the importance of technology transfer to the academic community.

Intellectual property

25. The main barriers to productive negotiations between universities and businesses around intellectual property rights issues in R&D contracts result from a lack of understanding and appreciation, on both sides, of the priorities and culture of the other party. For example, universities do not communicate well the need imposed on them by Government to ensure that the benefits of their research are made publicly available; nor do many make sufficient effort to understand fully the overall business profile (and 'drivers') of the companies with which they contract before entering into negotiations. Companies in the UK, on the other hand, have historically perceived universities as a relatively inexpensive source of R&D, whose research activities should be controlled in order to enable the industrial partner to secure the most advantageous commercial position. Both parties arrive at the negotiating table intending to protect their own turf, and this over-protective approach can lead to delays and sometimes stalemate.
26. Companies' complaints that universities are over-protective of their positions and expect far too much in return for their input to a piece of R&D are commonplace. This is the result perhaps of a lack of understanding, as mentioned above, but also of universities having been exploited by industry for too long. There is a noticeable difference between the attitudes of US companies, which treat universities more as equal partners and are willing to negotiate amicable solutions to the issues which tend to divide academia and business (over the thorny issue of publication rights, for example), and UK companies – particularly in the manufacturing sector – many of which have failed to develop their approaches to industry-academia relations and still farm out the same contractual terms as they were using 15 years ago, with the same expectations that they can pay under the odds for the research yet acquire ownership of all the results with no pay-back to the academic partner in the event that the work brings commercial benefit.
27. Oxford has been working hard to overcome these attitudes, and has been collaborating closely of late with some of its larger corporate research clients (such as Pfizer) to gain a better mutual understanding of the issues on both sides, and to develop contractual terms which address these fairly.

Graduate and postgraduate transfer into business

How can business attract the best graduates and postgraduates?

28. The University already engages in a number of schemes designed to promote the attractiveness of business careers to its undergraduate and graduate students. There is a significant level of input into undergraduate course design and content, and students at all levels could be further attracted to business by the provision of studentships and by funding for short-term placements with industry, particularly through the long vacation. At graduate level, for research students, joint supervision can enhance academic programmes, influence the agenda, and also communicate the excitement of a career in industry. The seminars and workshops within graduate skills programmes can also provide an industrial perspective during the course of a student's training. In addition, the Saïd Business School and OxSEC play key roles in promoting to students the possibilities and opportunities of working in and with business.
29. OxSEC has already had a direct impact on the number of companies formed from our research, and its programmes - providing free knowledge transfer training, mentoring, and networking for researchers - have generated significant interest within the University in making entrepreneurship training a core part of our science and engineering degrees. As an example, last academic year over 170 research students turned up weekly for an evening voluntary course on "The basics of building a business".
30. The University, through its Department of Continuing Education, provides Continuing Professional Development (CPD) to business through part-time postgraduate provision. The graduates who undertake such courses are generally very highly motivated, resourceful, and committed, and are able to translate the lessons learned in a university context back to their place of work. This is highly effective means by which research-led institutions, such as Oxford, can play a role in sustaining skill development, and that this model of CPD provision ought to be encouraged in research-intensive universities by means of funding and project support and bursaries for industry-based students.

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

31. Oxford's Department of Continuing Education is prolific in this area. Most of its academic programming for continuing professional development has involved carefully-established advisory panels consisting wholly of industry representatives who have an interest in the development of professionals in their own subject areas (analogous to industry representation on such panels for other departments within the University). In this way an industry perspective is ensured in the development and generation of the academic programme. In the case of award-bearing courses, the same basic approach is used, although the academic planning and development of the course remains the responsibility of University staff. The industrial members of the advisory panels are able to provide clear insight into the developmental needs of senior scientific and technological staff in fast moving areas of industrial activity. Industrial partners are not always aware of the value of their input into the sphere of curriculum planning, and academic colleagues are not always aware of the value of business intelligence in designing courses, particularly in the design of taught masters programmes.

32. The Oxford University Careers Service was invited to contribute to the University's consultation response. Because of the specialised nature of its input, this is attached as an annex to the University's main response.

Financial considerations that help or hinder the relationship between business and universities

33. In general the University adheres to the viewpoint, expressed above, that the funding for the promotion of industrial and business liaison and technology transfer should be as simple as possible and that its best use should be determined, as far as it is possible, at the local level rather than being too closely prescribed by funding bodies. Technology transfer practitioners within institutions are best placed to interact with both regional and national industries to develop ways of exploiting university research and technology. One very simple way of enabling local development would be to predicate a certain level of technology transfer funding on the volume of research grant funding derived from the Research Councils (perhaps by a small earmarked increase in the level of the indirect cost addition), and allowing institutions to determine the best mechanisms for their local environment. For example, in 2001-02, Oxford's Research Council grant income was £46.5m. Just 1% of this figure would make a major contribution to our efforts to ensure that resulting research outcomes are properly identified and exploited in the most effective way.
34. Successful partnerships can be built on both a national and international basis. The Higher Education Innovation Fund (HEIF) has played a significant part in the development of such partnerships, and has enabled universities to develop new forms of interaction between academia and local and regional businesses. It is important that these benefits should be sustained by continuing and expanding the HEIF initiative, and focusing it more closely on academic institutions that have had the greatest success in fostering links with the business community and creating new businesses.
35. We would encourage the provision of greater investment in university science parks that are closely linked to the basic and applied research which is undertaken in leading university research laboratories. Although HEIF has been excellent in providing funding for initiatives, there are limited financial opportunities for developing the infrastructure and building facilities in university science parks (such as the University's Begbroke Science Park).

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

36. The present arrangements under the 2001 FSMA for the certification of business angel investors is limiting the distribution of spin-out investment opportunities. The need to protect investors against inappropriate selling of inappropriate investments is of course important. However the requirement for business angels to provide annual certificates is currently a restriction on raising new finance for spin-out companies.

R&D Tax credits

37. The concept of R&D tax credits has stimulated much interest, but it is unclear how successful the current scheme is perceived to be from the business point of view. Feedback suggests that the processes involved in obtaining this form of tax relief are

bureaucratic and difficult to navigate, and absorb a great deal of valuable business capacity, particularly for SMEs which are tightly stretched at management level. Furthermore, an academia-industry R&D scheme predicated upon the rigid requirement that all of the rights in arising IP should vest in the sponsoring company might not provide the most flexible or profitable means of managing the commercial outcomes. The approach could be extended to provide additional incentives and tax credits for business to interact with a university by the establishment of a 'University Tax Credit'. This could be available to companies who contract with a university to develop their business through research and development collaborations and contracts, consulting and continual professional development.

Other funding schemes

38. The University Challenge Seed Fund has had a substantial impact on Oxford's technology transfer activities. The £4m Oxford UCSF has to date invested £3.7m in 66 projects. The UCSF now has shares (held in the University's name) in 20 of the University's recent spin-out companies. Four of the investments made have been in projects which have since been licensed out to existing companies.
39. The UCSF concept should be continued with substantial additional funding so that technology commercialisation projects continue to receive 'development gap' funding. The three years of operation of the Oxford UCSF show that it is investing £1.25m per annum. The scope of the Funds could also be extended to provide leverage for attracting follow-on funding for spin-out companies in a way which contributes to their growth without subsidising it.

ANNEX

Oxford University Careers Service contribution to responses to Lambert Review's 'Questions for Consultation'

1. Best practice and examples of excellence in business-university collaboration in the UK and abroad.

The Careers Service has developed and maintains extensive links with employers across a wide range of employment sectors. The purposes of these links are:

- (a) from the employers' point of view, the establishment of their profile among potential recruits; the opportunity to inform students of the range of opportunities they offer and the qualities and skills they are looking for; and the opportunity to encourage students to apply and to assess their potential; and
- (b) from the Careers Service's point of view (and in the words of its Statement of Purpose, Aim, Goals and Values) 'to provide a quality service to as wide a range as possible of employers and others and to encourage and enable them to provide information about the opportunities they offer, to recruit from Oxford and to contribute to the work of the Service'. This goal serves the Service's principal goal which is 'to educate, encourage and empower current and recent undergraduates and postgraduates, and contract research staff, to appreciate and explore the range of opportunities available on graduation and the abilities and skills needed for them; to clarify their values and interests and to relate them to possible career choices; to recognise and further develop their skills; and to formulate and realise their early career plans'.

These links are reported on each year in the annual report of the Careers Service. Indeed they feature as one of the four principal sections of the report on the work of the Service. Copies of the reports going back to the early years of the century are available, and the report for 2000-01 and 2001-02 is attached. Particular attention is drawn to pages 12 and 13 and to Appendices 4 and 5.

These links are illustrated by the following examples:

The Careers Service's term programmes: each year some 100 or so employers come to Oxford to give presentations to students. The programme of events, of which these presentations are part, is coordinated and publicised by the Careers Service through its term card (which is sent to all penultimate and final year undergraduates and to registered postgraduates) and its website (www.careers.ox.ac.uk). It is one of the most extensive programmes of any University Careers Service.

Careers Fairs: in addition to a general careers fair which is run by the Oxford Guild Society (and supported by the Careers Service), the Service lays on the following Fairs: the Law Fair, the Management Consultancy Fair, the Finance and Actuarial Fair, the Postgraduate Study Fair and the Work Experience Fair. Smaller events are also run for Media and

Communications. The major Fairs provide an important source of income for the Careers Service.

Skills training events: in addition to the careers information and skills training events which are run by Careers Service staff, the Service encourages employers to come to Oxford to run sessions of these kinds.

Employers' vacancies: the Service receives, processes and publishes, in its weekly vacancy bulletin, *The Bridge*, information about employers' vacancies. Each year some 2,000 vacancy notices are published in *The Bridge* and getting on for 1,000 work experience opportunities appear in the Work Experience Section of the Careers Service. All of these vacancies appear on the Service's website. The service is free to employers.

Consultancy service to employers: employers are able to consult the relevant Careers Adviser (at Oxford, Careers Advisers specialise not in academic departments but in occupational sectors) about their recruitment needs and the best ways of achieving them. Again this service is free to employers and many of them make use of it.

Visits to employers: each year Careers Advisers visit employers to learn about their recruitment plans and to discuss their recruitment strategies.

Employer Liaison Unit: the Service has established within it an employer liaison unit, the purpose of which is to make it as easy as possible for employers to find their way around recruitment at Oxford.

Recruiters' Group: this Group consists of the 80 or so top employers at Oxford. They make financial contributions to the Careers Service; receive a termly newsletter from the Director, which keeps them up to date with the graduate recruitment scene in Oxford; receive copies of the Service's annual report, its *Guide* for students and the University's Annual Report. The Careers Service's annual report also contains a full analysis on the annual first destinations survey

Employer Conferences: each year the Careers Service organises four one-day conferences for employers: one for new recruiters, which is open to all employers; and three for Recruiters' Group members (one for the legal profession), at which issues of common interest are debated, ideas are exchanged and opportunities are provided for employers to talk with students.

Cvs.ac.uk: this is a web service which the University, in partnership with 20 or so other research Universities, has established, which enables these Universities and other employers to search a database of highly qualified contract research staff and postgraduates.

2. Strengthening these relationships

A weakness in these relationships is that certain occupational sectors are under-represented. The City occupations are heavily represented, but industry and small and medium size businesses are not. Various steps have been taken to remedy this (eg local advertising of the help the Careers Service can provide), but none has been particularly successful. The Careers Service will continue to try to broaden the base of organisations actively and systematically seeking to recruit from Oxford, but it is for consideration (a) whether the SME sector is

adequately organised to take advantage of the opportunities available, and (b) how the prevailing attitudes and expectations of students and their parents towards employment in the sector can be modified to its advantage.

3. How business can attract the best graduates and postgraduates with the skills they require, especially in technology.

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

The experience of the Careers Service is that a wide range of employers, to judge from their recruitment strategies, their presence in Oxford, and the numbers of graduates they recruit from Oxford, are convinced that the quality of Oxford graduates is highly satisfactory. The Careers Service considered that this is attributable to a number of factors: the high intellectual calibre, drive and ambition of those selected to study at Oxford; the rigorousness of the courses they follow; the intensity of the teaching they receive; the pressure on them to perform to their potential (each week, not just in their examinations); and the wide range of opportunities which a collegiate university can provide for the development of the softer skills which employers value so highly. Oxford students do appear to be highly attractive to employers. Indeed, recruiters frequently comment on how relatively well-prepared Oxford student graduates are for their recruitment and selection processes. This is despite the relative absence of vocational degrees and of careers/skills modules in the curriculum. The inclusion of such modules is bound to be at the expense of the more demanding academic content of courses. This is not to argue that such modules have no place in degree courses, but to question the assumption that they deliver the sort of graduates that employers actually seek out.

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

It is clear that there are opportunities to influence the content of courses. In a number of subjects, advisory boards on which employers are represented, have been set up. Where relevant, courses are accredited by professional bodies on which employers are also represented. A question which could repay further research is how far employers have sought to use the influence they have and how far their attempts have been successful. Generic complaints from employers about skills shortages would be taken more seriously if specific examples could be quoted – and also if employers' actual recruitment practices reflected their complaints.

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

The perception of the Careers Service is that quite a few science and technology students are put off careers *in their fields of study* because of poor financial rewards, perceived low status, and the perceived difficulty of developing the sort of skills required for advancement. These are some of the reasons why many of them are attracted to the more lucrative and glamorous City occupations.

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

The Careers Service considers that its extensive contacts with employers do enable it to keep abreast of their plans, and to communicate these to students and, through its annual reports, to academic departments. The constitution of the Careers Service (which includes provision for

employer representatives) was recently amended to include representatives of the Academic Divisions, thereby increasing contact between the Service and the academic community. One area in which employers could do more to attract students is the provision of work experience opportunities, for which there is a growing appetite among students.

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

The general economic climate affects the degree of effort and expenditure which employers are willing to commit to the recruitment of the graduates they need. The best protect this expenditure, recognising the importance of graduate recruitment, but for others this expenditure is not necessarily in the priority category. Employers who stay in for the long haul (and not necessarily the largest employers) are generally the most successful at recruiting. It is for consideration whether more could be done, particularly for SMEs, in the way of financial incentives for the provision of work experience.