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Royal Society Response to the Lambert Review of Business-University Collaboration and the DTI Innovation Report

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This document is the Royal Society's response to both the Lambert Review of Business-University collaboration, and the DTI innovation report; Competing in the global economy: the innovation challenge. This submission has been prepared by Professor David Wallace FRS, treasurer and vice-president of the Royal Society in consultation with Professor Sir David E.N. Davies FRS, Professor Peter Goodfellow FRS and Professor Anthony Ledwith FRS. Professor David Wallace FRS endorsed the report on behalf of the Royal Society Council.

The Society welcomes the publication of the Lambert review (Lambert 2003), with its analysis of both business-university collaboration and university management and governance. We believe that this is an important input to the debate on these issues, but in some areas further work is required at a detailed level, as comments that are relevant, for example, to biosciences do not always address the problems in engineering. Further issues are raised in the parallel DTI innovation (Hughes) Report (DTI 2003), and this response also incorporates comments on the latter publication.

The establishing of strong links with business and the public services is beneficial to all parties and is essential if the UK economy is to grow and our public services are to develop. Such links are also beneficial to the university sector in that they can allow new insights into the direction of research, and can provide additional funding. However, while such additional funding at both institutional and personal level can provide incentives, it is essential to recognise that this will always be a relatively small component of overall university funding, and that it is the overall public good in terms of benefits to the economy and public services that should be the main aim of innovation policy.

Members of academic staff have always been involved with activities in the wider economy and in advancing the public good. There have been claims that some current funding methodologies and performance targets have acted as constraints to such activities. To redress this situation requires both positive encouragement by universities as employers, and attention by funding bodies that need to explore the possible unintended results of their policies. Successful involvement with business or other users of the output from higher education should be seen as no less of a positive factor in career progression as good teaching or fundamental research.

Business Scene and the Demand for Research from Business

The Lambert review notes the traditional concerns over Britain's poor record in transferring research to the market place, and many other recent reports have noted the declining investment by business in R&D and other innovative activity. The UK's total expenditure on R&D (GERD) has fallen significantly over the past two decades from *ca.* 2.4 % in 1981 to *ca.* 1.87 % in 2004 (OECD). This is largely attributed to falls in business R&D expenditure. The Society would, however, observe that it is important to explore beneath the general statistics. Some UK industries compare well with the best in the world, while others lag well behind and are the reasons for the UK's poor overall performance. Moreover, although some European countries are

performing significantly better than the UK, these are largely smaller countries and Europe as a whole lags significantly behind both the US and Japan. While the UK should be developing its own policy in this area, it is important that this takes account of the wider European context.

Other issues in the relative overall decline of UK business, European R&D and other innovative activities quoted by Lambert are:

a. Companies apparent interest in growth by acquisition rather than organic growth;
b. The run-down of corporate laboratories associated with multinational companies;

To these could be added the run-down of the corporate laboratories associated with large previously nationalised industries. However, as stated earlier the situation differs widely across industry sectors, and it is important to understand the reasons why some sectors are less innovative than others.

Whatever the reason for the tendencies of British companies to grow by acquisition, where this is through the merging of two large companies, there is a danger that, at least in the short term, this can lead to a decrease in innovation, if R&D facilities are rationalised as part of the streamlining of the two activities or are moved out of the UK or even Europe. However, in at least some recent pharmaceutical mergers, the savings arising from rationalisation of R&D activities were reinvested in new R&D. Shareholders in this industry expect a certain level of research expenditure to be maintained. Furthermore, growth by acquisition of high-tech spinout or start-up companies is generally helpful to the innovative process in that it brings much needed resources to the development of potential new goods and services, and by providing an exit route for spin out companies that can free up resources in the academic sector for developing new ideas.

The lack of business expenditure on R&D outside the pharmaceutical/biotechnology/ aerospace sectors may well be a contributory factor to the imbalance noted in the review between spin-out companies and licensing in the UK and the US, as universities may have to try and process ideas further in Europe than would be the situation in the US. It is most important to encourage greater market pull from the science base by business as recommended by the DTI report (DTI 2003).

As the publications note, universities are important sources of innovation, through the education and training of the highly skilled workforce, the generation of new ideas and sources of technological advice more generally. There is, however, a need for more firms to take advantage of the resources that are available.

The recommendation in the Lambert review (Lambert 2003) on the establishment of a high level forum to enhance the effectiveness of technical innovation overlaps with the proposals in the DTI innovation report (DTI 2003) for a Technology Strategy Board. Such a board or forum needs to have a close relationship to the newly re-organised Council for Science and Technology (CST), which advises on the totality of Government expenditure on R&D. Just as the CST must include business interests, the strategy board needs to involve the university sector at a high level.

The Lambert Review identifies the problems faced by small/medium enterprises (SMEs) in establishing links with universities. The Society agrees that additional Government support in this area would be helpful, possibly through regional development agencies (RDAs). This is unlikely in itself to require major additional funding.

The Society agrees that the Knowledge Transfer Partnerships, Faraday Partnerships and the LINK scheme all continue to provide a helpful route for knowledge transfer from universities, but that they could all be better marketed and, in some cases, particularly with LINK, the application process could be streamlined further.

As the Lambert review indicates, it is too early to determine the overall effect of the R&D tax credits introduced in 2000, but leading financial advisors Grant Thornton have recently reported (Grant Thornton 2003) that the scheme is failing as the rules are too complex and there is ambiguity around the definition of a technology business. Better marketing for these credits, although clearly helpful may not be sufficient and a reassessment of the eligibility and clarification of the rules could be appropriate – for example the ineligibility of start-up companies where the SME is set up as a sole trader or partnership. The tax credits also exclude bought-in software costs. The draft report coordinated by the Engineering and Technology Board (Williams 2004) makes similar suggestions regarding better marketing and clarification of R&D tax credits in its draft report. The Inland Revenue's recent publication (IR 2003) of further guidelines clarifying the definition of research and development and qualifying costs is therefore welcome, although it is too early to ascertain its effects.

Knowledge Transfer

As the Lambert review points out, knowledge transfer to businesses from the universities as dynamic repositories of existing knowledge and skills and the generators of new ideas can take place through a number of different routes, almost all of which involve the transfer of people, and the remainder at least involve the interaction between business and university staff.

At the highest level, academia and local industry are often linked through business-university fora, or networks organised by the universities, local chambers of commerce or regional organisations. As the Lambert review points out, there should be strong representation of business on university governing bodies and for there to be appropriate academics on company boards. Appropriate training and professional development for senior university managers is a difficult issue, and a not insignificant cost. While training of new board members should, of course, fall to the firm, there is a need to consider arrangements for training potential new members from academia. Some form of competitive bursary scheme may be appropriate.

The Society agrees that there are significant benefits from business researchers and others lecturing at universities on a part time basis. We note, for example, the successful Royal Academy of Engineering Visiting Professors in Design scheme, and we would be concerned if the attempts by the Education Departments to improve the training of full time members of academic staff were to cause undue barriers to recruitment from outside the higher education sector.

The Society agrees with the Lambert review's proposals for enhancing the level of consultancy and contract research and collaborative research, including the need for universities to draw up clear codes of conduct for their staff to avoid conflicts of interest, and the drafting of model research contracts. The public have a legitimate concern in potential conflicts of interest regarding academics on Government or other regulatory bodies.

The Society supports the establishment of so called "third stream" funding as a permanent substantial input to university funding, alongside that for teaching and research, and the proposals for simplifying the funding arrangements. We welcome the recently announced expansion of HEIF funds to £187m over 2004/5 and 2005/6.

The Society agrees that the balance between spin-outs and other forms of technology transfer needs to be examined further, bearing in mind both the points made earlier about European business in general not providing such a strong technology pull as those in the US, and the danger of spinning out unsustainable companies. It is essential to have a satisfactory business plan, including consideration of exit strategies and/or the likely availability of longer term funding.

Intellectual property and technology transfer

The Society has recently published a report on the current situation over intellectual property rights resulting from university research (RS 2003a). We note the recommendations in the Lambert review for an IP protocol, but it is not clear that this is any different from the present situation. Arrangements need to be flexible as no one arrangement is appropriate in all situations. The Society agrees that any arrangements should not restrict future research, or interfere unduly with the publication process.

The Society is concerned that the Lambert review does not cover the full range of situations where a business can interact with a university, and how this may affect intellectual property. Businesses may contract specialist types of research, where the university does not demonstrate an inventive step and as such is not entitled to IP rights; however, the university usually plays a more prominent role in a relevant project and will be entitled to intellectual property rights.

Regional Issues

The Society agrees that RDAs have a crucial role in developing innovation within their region and that it is essential for them to be suitably staffed and have access to expert advice to enable them to undertake this. As the Lambert review recommends, this activity should be underpinned by appropriate long-term objectives that takes into account the appropriate timescales. More generally, RDAs should not be fettered by central double guessing of their detailed decisions.

The Society also agrees that local university research capacity can be important, especially for SMEs, and this is a major constraint on the net benefits of increased selectivity. There is a need to provide relevant support for the development of appropriate consortia of university expertise to create the necessary critical mass outside of the South East of England to support technology-based clusters. Nevertheless, there is a balance to be struck. Not all support can or need be at a regional level and there are dangers that RDAs may all wish to develop expensive regional centres when one or two national centres may be more appropriate.

Funding University Research

The Society welcomes the recognition by the review that, while there is no scope for second-class research or other related professional activity, excellent research does not necessarily equate to internationally recognised research. In addition to requiring usually some minimum scale of operation, internationally recognised research is breaking new ground as far as new or developing techniques and the application of these to new areas of knowledge. However, there is much important highest quality underpinning research that needs to be done, for example, in applying existing techniques to localised problems, or to novel areas related to those already studied. It is for that reason that the Society has warned of the dangers of over-selectivity in the distribution of research funding (RS 2003b), especially with a system where the general (funding council) research funding pays for the salaries of academic staff whilst they are undertaking research. This problem is illustrated by some cases where the withdrawal of very modest funding has led to real problems at universities with promising departments rated 3a in the last Research

Assessment Exercise (RAE), and some respected departments rated 4 in the last RAE are being closed or are under threat.

While re-affirming the clear need for two separate funding streams, the Society has also called for a reconsideration of the methodology used in the longer term to determine the Funding Council side of the dual support system (RS2003c). It has also commented in detail on the Roberts Review of the RAE (RS2003d) and of the OST review of university sustainability (RS2003e). Whilst the recent amended proposals for the next RAE (HEFCE 2004) go some way to addressing our concerns, the Society has pressed for further studies (RS 2003e) and possible evaluation of other arrangements for determining research quality in parallel with RAE 2008.

The Lambert review states the need for extra funding for departments that do not receive significant dual source funding but still carry out industrially relevant research. The review suggests a new stream of business relevant funding of up to £200 million pa. The Society is not convinced that a separate stream of business-relevant research is necessarily required if the arrangements for determining the funding councils' stream are properly assessed. However, if the present arrangements and level of selectivity continue there may be no short-term alternative to the creation of a separate stream. In any event this should be for fundamental underpinning research, rather than "near-market" research. The latter should be funded by business or one of the existing public funding schemes. While it is true that some RDAs are not yet in a position to administer such a fund for underpinning research, it is essential for the health of their region that all RDAs rapidly build up expertise relevant to industry based in their in their territory. Indeed, quite independently of any potential funding role, an understanding of the role of fundamental research should be a high priority in the development of all RDAs. The Society notes that some RDAs have Science and Industry Councils, and that such high level bodies could provide advice on the development of appropriate expertise in this area.

Management, governance and leadership

Universities at the start of the twenty first century are completely different from the universities in the 1960s, when the members of the Robbins Committee were drafting their report. Universities are now part of a mass higher education system, research is a much more resource intensive activity, and universities have a much greater impact on the economy, including their many interactions with business. It is therefore important for universities to have management and governance arrangements appropriate to the new situation, which allow more rapid decision-making within clear guidelines. At the same time these arrangements must ensure, for example, that academic freedom and academic standards are safeguarded, and the research process is not stifled through inappropriate management. Hence, while it is important to take seriously developments in corporate governance, largely in the private sector, such as the Cadbury (Cadbury 1992) and Higgs (Higgs 2003) reviews, these must be tailored to the particular circumstances of universities.

It is important for each university to try to achieve its own optimum balance between strong management and collegiality. The Society believes that the latter is a distinguishing feature of universities and is forgotten at our peril. Equally, however, this is not an excuse for weak management.

As indicated in the Lambert review, universities require: strong central management for appropriate functions; devolution of as many functions as possible to operating units at a faculty, departmental or other operating unit; and appropriate consultation and checks and balancing mechanisms usually formalised within the governance arrangements. The key is to identify the balance between these, and also between the various governance players. The arrangements

need to be clear and transparent.

The Society agrees that the vice chancellor is key to the satisfactory operation of the university. In many ways the vice chancellor has a more difficult job than the CEO of a public company in that the objectives of a university are significantly more multidimensional than the "bottom line" (profit/share price) for a public company. The post holder must provide strong leadership and retain the full confidence of both the Governing Body and of the academic community. The Society supports the proposal to enhance the training available to existing and aspiring vice-chancellors.

Furthermore, while the Society agrees that good management from the centre needs to be supported by appropriately qualified and trained supporting staff in finance, human resources and estate management, it is concerned about the huge increase in administration costs of universities. Some of this of course is the result of over-management from the public funding bodies, and it is to be hoped that the VandeLinde review will offer some relief in this area. Currently the RAE has also increased the administrative burden well beyond that required to provide the basic input to the Funding Councils. This is largely because of the significant financial penalties for missing a particular rating. It remains to be seen whether the revised arrangements for 2008 will lead to a reduction in administration.

The governance arrangements define the roles and responsibilities of the vice chancellor and other bodies involving both internal and external stakeholders. The overall direction of the university is in the hands of its governing body, and for the older English universities these functions were usually split between council and a larger court (in Scotland the nomenclature and arrangements are different). The Society agrees with most recent commentators that the powers of the governing body should be vested entirely in the council, which should be relatively small. Courts can still serve a useful purpose in bringing in a wide range of external stakeholders to whom the council should report regularly. As Lambert observes, however, courts were not introduced for the post 1992 universities, many of which have found other mechanisms of involving stakeholders, including representatives of local business.

There are some areas within university activities, where it is important for there to be consensus within the academic community, and these matters are usually devolved to senates or academic boards, chaired by the vice chancellor. These are not mentioned in the Lambert review or the DTI report, but the Royal Society believes that such bodies are essential to developing future teaching and research strategies. We recognise that some senates are more effective than others and universities should review their structure on a regular basis.

The key is to balance the powers so that where appropriate quick decisions can be made where these are genuinely essential, while ensuring that consensus can be reached in appropriate areas. Consensus usually involves longer timescales, but provided business is planned satisfactorily the system can accommodate a collegial approach.

Outside regulation and monitoring

As indicated above, the Society believes that there is significant scope for reducing the outside regulatory and monitoring burden on universities, but apart from the RAE, on which it has already suggested a further investigation (RS 2002), we note the progress to date and await further outcomes from the VandeLinde Report.

Oxford and Cambridge

The Society supports the recommendation that the new vice-chancellors of both Cambridge and Oxford be allowed to develop their management and governance in a way that is appropriate to these universities, and that no attempt should be made to impose a solution from outside.

Skills and people.

The output of graduates, post-graduates and postdoctoral researchers is arguably the most important task of universities as far as the development of the economy and our public services are concerned. The Society would question the rather general statements made in both the Lambert review (Lambert 2003) and the DTI report (DTI 2003) concerning the current supply of science, engineering and technology graduates. We are particularly concerned about both the numbers and quality of students applying to read the physical sciences, mathematics and engineering (Roberts 2002), especially in light of the shortfall in graduates who go on to teach mathematics and physics in schools. It is essential to ensure that sufficient of the best young people are attracted into science and engineering courses. This may require financial inducements, but also future employers or their representative bodies must make it clear by their actions how much they value graduates in particular disciplines.

We have also long warned of the growing shortfall at the intermediate skills level – technician and skilled crafts (RS 1998, RS 2003b, RS 2002). We recognise that intermediate level training, whilst of immediate benefit, does not always provide career-long skills, and retraining may well be required to achieve promotion or new directions. A well-designed life-long learning culture, particularly for technicians and skilled craft people might make these careers more attractive to young people. This may require better planning and advertising of sub-honours degrees programmes including foundation degrees and HND/HNCs, which currently account for one third of all students in higher education (CIHE 2003).

All past attempts at person-power planning have been failures, and the Society would be concerned if the funding councils were to be asked to distort the course provision to meet a particular view of the requirement for specific disciplines. Many courses, even fairly vocational ones, such as engineering, have proved good groundings for many future career choices. It is generally recognised that the best approach is to allow informed student choice, and hence it is crucial that potential students should be provided with as much relevant information as possible.

We have some concern over the proposals for 6-month employment statistics, as these are likely to give a distorted view on the future career of students from particular universities or university departments.

As far as industry input to universities on the content of courses, this can be at various levels and it would not be appropriate to specify that this should normally to be through Sector Skills Councils. This is just one of a number of sources of advice to universities in this area.

Additional Comments on Issues raised in the DTI (Hughes) Innovation Report

Role of the Research Councils

It is essential for there to be different arrangements for operating the Research Councils and the Government business support schemes financed by DTI and the devolved administrations, and in some cases healthy tension between them. Nevertheless, it is important for there to be continued consultation and where appropriate coordination between the two sectors.

The Society notes the suggestions for the Research Councils set out in paragraphs 3.14 - 3.16 of the report. It is essential that the Research Councils' programmes be designed to ensure that the underpinning fundamental research base is maintained and developed for the longer term, and there are dangers of distorting the overall balance in an attempt to pick short-term winners. Nevertheless, the Society agrees that:

a. there needs to be an overall strategy for the Research Councils support of technology transfer activities;
b. where Research Councils are supporting joint projects with business, eg within the LINK scheme, there needs to be both a sound business and science case;
c. any performance indicators are appropriate, and not just chosen because they can be measured. Performance measures must be designed to encourage the required behaviour and not distort this. Furthermore timescales for targets must also be appropriate. We shall be monitoring the development of measures for collaboration (3.16).

DTI Schemes

There has long been concern about the large number of different DTI schemes on offer (186). This is largely because of the difficulty in ensuring that firms understand what help is potentially available to meet their particular problems, and ensuring that DTI funds can be appropriately prioritised between them. The brigading of the schemes into five product lines (3.32):

a. Collaborative R&D;
b. Knowledge transfer networks;
c. Grant for R&D;
d. Grant for investigating an innovative idea;
e. Knowledge transfer partnerships.

is a long over-due development, and should aid sensible rationalisation and development within each of these sectors.

Other Issues

Design is an essential component of innovation. There is a need for UK business to take it seriously, and for its role to be clearly understood by universities. However, expertise on the intimate link between marketing and design falls largely in the business sector. Visiting professors, such as those promoted by the Royal Academy of Engineering are a helpful model, and have the additional advantage of bridging the gap between industry and academia.

The Society endorses the increased involvement of the technology intermediaries, who employ over 20000 scientists and have a turnover in excess of £2 billion. Technology intermediaries have a played a major role in establishing Faraday partnerships and increasing the emphasis on technology transfer.

We welcome the proposals for developing the objectives of those Government Laboratories associated with the national measurement system (NMS, consisting of the National Physics laboratory, the former Lab of the Government Chemist, the former National Engineering Laboratory and the National Weights and Measures laboratory) to include a greater focus on innovation. The output from these laboratories is too often taken for granted, and there has been too little incentive for individual firms to work with them.

The Society endorses the recommendations for the encouragement of female entrepreneurs, and has well-established policies for encouraging women to stay in scientific careers. We welcome the proposal that DTI would work with existing network of women's enterprise agencies to provide advice, mentoring, etc. Similar issues are highlighted by the draft ETB coordinated report (Williams 2004), which is also proposing tax incentives for career breaks and fast track initiatives. The Royal Society is well placed, through its University Research Fellowship and Dorothy Hodgkin Fellowship schemes to encourage young female researchers in entrepreneurial activities, where appropriate.

European policy in the area of innovation is of increasing importance, and the establishment of a unit to track policy developments and promulgate them to the sectors involved is an important development, although this should work closely with those who are already active in this area.

Chapter 5 proposes a role for Government in seeking to increase innovation in UK business through:

a. procurement - acting as an intelligent customer in stimulating R&D and innovation within business;
b. making more use of R&D undertaken in support of Government department's policy and procurement roles;
c. appropriate policies associated with the Government's role as a regulator.

Each of these can potentially lead to major boosts to innovation, but equally bring significant challenges. While these challenges are not insuperable, they will require skilled handling if they are not to be counter-productive. Helpful best practice may well be available from those businesses that have developed their supply chain, balancing the need to retain competition and ensuring appropriate links with suppliers to ensure continuous development.

The Society particularly supports the concept of outcome-based regulation, as this not only stimulates innovation, but may very well result in a more satisfactory approach to the issue being regulated. However, it cautions that this places significantly greater burdens on the relevant Government department to understand fully the systems being regulated, and this requires both adequate in-house expertise and high quality advisory bodies.

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