

Lambert Review of Business-University Collaboration

Executive Summary

The University of Surrey is an internationally respected research-led University with a long history of collaboration with business and industry. It also has an excellent record of institutional enterprise. It has accepted the Government's new agenda on knowledge transfer and the place of universities in local and regional economic development. This has led to a paradigm shift in the way in which the University encourages and supports entrepreneurship, offers services to business and enters into collaborative industrial projects. As a result of its recent experience the University now wishes to propose new models to assist the vitally important process of business/university interaction in the UK.

Background

1. The University of Surrey is a research-led university, with an international reputation for excellence in research and teaching and a long tradition of close collaboration with business. This tradition stems from its forebear Battersea Polytechnic, which was founded in 1887 to promote 'the industrial skill, general knowledge, health and well-being of young men and women belonging to the poorer classes.' The sugar magnate, Henry Tate, provided £10,000 for the foundation, and his son Edwin chaired the Governing body until 1908. The College developed successfully in close collaboration with local businesses, finally becoming a College of Advanced Technology in 1957 and then moving to Guildford as the University of Surrey in 1967. Among its many distinguished alumni in business was for instance, Sir Alec Issigonis, the designer of the Mini.

2. The University has since established itself successfully in Guildford, without compromising its business orientation. It has maintained its business links most particularly through the 'professional training year' which most of its undergraduates undertake in the third and penultimate year of their course. This has led not only to

the University having consistently the best record among its peers for the employability of its graduates, but also to excellent individual contacts between academics and a very wide range of businesses, which in turn have fostered many consultancy opportunities for the University and its academic staff.

3. Institutionally, the University has an enviable record for enterprise. Of particular note are the nurturing and encouragement of Sir Martin Sweeting in his ambition to build and launch earth satellites, which led to the establishment of the now world renowned Surrey Satellite Technology Ltd, a University company in which it has a 95% interest. Alongside this the University made a major investment in the establishment of Surrey Research Park, also wholly owned, which is now home to *circa* 110 technology based companies. These developments have assisted the University greatly to expand its research portfolio which now accounts for *circa* 30% of its total income and to achieve outstanding results in the recent RAE. Over the most recent ten year period an average of *circa* 13% of the University's annual research grants and contracts income has come from business and industrial sources. These developments have also assisted the University to become one of the HEIs in the UK least dependent on government block grants, which currently account for less than 25% of its total income. They have also contributed substantially to the *circa* £0.5bn which the University estimates that the combined activities of the University and its Research Park contribute to the local economy each year. Among the University's more recent distinguished alumni in business is Andrew Rickman, founder of Bookham Technology.

Recent Developments

4. More recently the University has been very successful in its bids for Government funding to encourage so called 'third leg' activities and as a result has established a number of initiatives to increase knowledge transfer, provide support for business and stimulate individual enterprise and entrepreneurship among its staff and students. The awards and initiatives include:

1. Higher Education Innovation Fund (HEIF) projects:

- 1.1 **Surrey HEIF:** £640k over 3 years (from November 2001) to fund three Innovation Network Managers (INMs) and the Teaching Companies Scheme (TCS) Centre. The aim is to shift the University's research base from its current expertise-driven position and move towards a demand-led, responsive mode of delivery.
- 1.2 **SETsquared (collaborative HEIF):** The partnership is Southampton, Surrey, Bath & Bristol Universities. Southampton leads. The total grant is £5M over 3 years from November 2001. To date the funds have been allocated by giving each partner £875,000, with £1.5 being retained by Southampton for "centre activities". The aim is to establish pre-incubators (SETsquared Centres) at each of the four Universities, and to provide a range of mentoring and other services to assist knowledge based high growth start-up businesses.

2. University Challenge (UC) Fund - CASCADE

Surrey lead the CASCADE partnership with Sussex, Reading, Brunel & Royal Holloway Universities. The partners were successful in a bid for a Fund in the second UC competition. Each University provides the Fund with £200k and this is topped up by a further £3M from the DTI, creating a £4M Venture Capital Fund.

The Fund is managed by Generic Asset Management Ltd (GAML) of Cambridge.

CASCADE is intended to be an evergreen venture capital fund, investing in IP generated by the participating Universities. Two levels of investment are

possible, stimulus awards up to £50k, and growth awards in the range £50k - £500k. The intention is to use stimulus awards to test feasibility, build prototypes etc, and growth awards as second-round investments.

.3 Higher Education Reach-out to Business and the Community Fund (HEROBC)

The Surrey HEROBC award was for £1.2m over 3 years from 1999-2000 to 2002-3. The Surrey HEROBC project set up the Business Skills Unit. The aim was to build the University's capacity to deliver skills to SMEs.

The University has recently received an additional £185k of "transition funding", to allow activities initiated by HEROBC and key staff employment to continue through the "gap year" (2003/4) between the end of the HEROBC grant and the start of HEFCE's new third-mission funding stream in August 2004.

4. DTI Biotechnology Exploitation Platform - Biobeacon

In partnership with the University of Sussex, the University was awarded £250k over the period 2001-5, with matching inputs from their own resources, to ensure that biotechnology related Intellectual Property (IP) arising within their research programmes is uncovered and exploited. Following a mid-term review this has been augmented by the addition of a further £75k.

5. Great Ideas in Science and Technology Awards (GRIST)

SEEDA's Great Ideas in Science & Technology scheme (GRIST) is not an award - it is a loan fund of £1m to provide personal support to budding entrepreneurs during very early stage development. It has no specific value attached to individual awards. The Universities of Brighton, Kent and Surrey are piloting the award scheme for an initial 3 year period. The University will get £15k per annum for 2 years to manage it. GRIST will make available tranches of £10k per individual accepted, and is a valuable adjunct to the activities of the SETsquared Centre.

6. ESF Projects

As a result of successful bids the University has been, or will be in receipt of EU funding (£815,250) for eight projects (total value £1,784,776), that have augmented the funds described above and allowed UniS to carry out additional part funded knowledge transfer activities. Details are at Appendix 1.

7. SEEDA Surrey Enterprise Hub

As a member of the Surrey Economic Partnership, which brings together all the stakeholders in the Surrey Economy, including the major suppliers of business services, the University together with Royal Holloway University of London (RHUL), was a primary partner in establishing a SEEDA Enterprise Hub for the County. The award of £750k established new incubation facilities at Leatherhead Food International and at RHUL, networked with the University's Technology Centre on the Research Park and provides a networking focus for small knowledge based companies around the Hub Director located on the Surrey Research Park.

Organisation

5. Over the past seven years, the University has steadily and consciously embraced the new knowledge transfer agenda. In 1999 it expanded its original small Business Liaison Office to include legally qualified staff dealing with contracts and intellectual property, as well as providing support for a reformulated University Research Committee chaired by a Pro Vice Chancellor whose portfolio now includes Enterprise as well as Research. The subsequent injection of the funding outlined above has now allowed the University to develop its strategies to interact with business and industry through the establishment of a significant professional organisation - UniSdirect, employing *circa* 40 staff - to address all aspects of the knowledge transfer agenda. The result has been a significant increase in activity in these areas over the past 5 years.

Business University Collaboration

Skills

6. Because of its background the University of Surrey has always placed considerable emphasis on equipping its undergraduates for work, primarily through the Professional Training Year, which the large majority (>90%) undertake. It has also always grounded its science and technology courses firmly in the real world of industry and commerce. At the postgraduate level it has over a long period provided a wide variety of well regarded and well attended diploma and masters courses as well as other non credit bearing short courses aimed specifically at continued professional development in the industries where the University has particular expertise. Recently it has put particular emphasis on the transferable soft skills, much valued by employers in its undergraduate courses. As a result of the HEIF SETsquared funding there is now an increasing emphasis on entrepreneurial training

and competitive awards are now available for entrepreneurial activities among new graduates, both at Guildford and at University of Surrey Roehampton (The Federal University of Surrey Entrepreneurs Project [FUSE]).

7. Since the HEROBC funding and the establishment of the Business Development Unit within UniSdirect, the University has also been able to concentrate on services to local businesses, which are predominantly SMEs. As a result regular contacts have been established with *circa* 1800 companies. Of these some 400 regularly attend seminars and courses on a wide variety of business topics of value to their companies. Some 20 such meetings have been held in the last year, mainly in the breakfast seminar format. Whilst this has been a valuable development in building contacts in its own right, it raises at least three problems:

1. There has been little read across into collaboration in research and consultancy with these small companies. The lack of will or ability through some suitable clustering mechanism, for SMEs to enter into research collaboration is a serious impediment to the Government's business- university collaboration agenda.
2. The activity has not yet been fully integrated with that of the Small Business Service, or the Surrey Enterprise Hub. This may lead to confusion among the SMEs and has led to some irritation among the other suppliers, so there is a need to clarify and agree remits. Efforts are underway to do this through the common membership of the Surrey Economic Partnership, but there is probably also a need to clarify roles at the national level.
3. Since much of this initiative has been carried out with ESF money, it has not established a culture of paying for training among the SMEs. This will be a requirement when EU expansion cuts back ESF money. Moreover since it mainly uses external contributors to deliver the training, it has not established a culture of 'just in time' demand led training activity in the academic community of the University. Ways will need to be found to foster both these culture changes if government's agenda is to succeed.

Research and Knowledge Transfer

8. Since the late 1970s there has been a steady and significant rise in the quantity, variety and quality of the University's research base, culminating in the recent

excellent RAE performance. A large proportion of the funding for this (10-20% depending on the year in question) has come for research in collaboration with industry. More recently, the University has made significant moves towards multi-disciplinary research and the formation of research centres, which are particularly pertinent to the problems of industry. These include the Centre for Environmental Strategy (CES), the Digital World Research Centre (DWRC), the Food, Consumer Behaviour and Health Research Centre (FCBHRC), the Healthcare Worker Research Centre (HWRC), the Sleep Research Centre and the Centre for Research on Nationalism, Ethnicity and Multiculturalism (CROMEM). There is also a highly successful network between Nokia, Ericsson, and Thales and the University's Centre for Communications Systems Research (CCSR) and the Rolls Royce University Technical Centre in the School of Engineering.

9. Over the years, industrial collaboration has quite often sprung from, or led to exchange of staff and/or the establishment of chairs in the University funded by industry (Appendix 2). Whilst these earlier collaborations were valuable to both sides, they were frequently not clearly and soundly based, with the result that:

1. Overhead costs were grossly under-valued and even direct costs not always fully recovered by the University.
2. Intellectual property was not properly handled by the University.
3. Long term relationships of value to both sides were seldom established.
4. Project management was often poor and a source of discontent for the industrial partner.

10. The recent moves by the University to strengthen its legal capability and the additional funding provided by Government leading to the establishment of UniSdirect (see paragraph 5), have led to significant changes in the approach to industrial collaboration and knowledge transfer. These include:

- A more professional approach to costing and contract negotiation with potential industrial partners, including a correlation between the funding level and the value of any intellectual property which may arise from the work.
- A much greater awareness of the value of the University's intellectual property arising from non-industrial funding and a clear strategy to exploit it. This includes

regular training for the academic community, regular auditing of current research, the establishment of a business plan for all IP considered valuable enough to protect and professional assistance to carry it through.

- The establishment of an infrastructure to assist in the knowledge transfer process e.g. Professional advice on processes including spinning out companies, access to pre-incubation and incubation facilities and University Venture Funds for early stage start-ups.

The net result has been significant recent rises in the number of technology disclosures (15 in 2000/1, 32 in 2001/2), patent applications (14 in 2000/1, 19 in 2001/2), licensing deals (5 in 2000/1, 22 in 2001/2), spin out company formations (none in 2000/1, 3 in 2001/2), seed fund investments (none in 2000/1, 2 in 2001/2) and university income from knowledge transfer activity (*circa* £30k in 2000/1, *circa* £105k in 2001/2). The University is also on course to meet its target of 45 invention disclosures, 25 patent applications, 4 spin - out companies, 6 investments by the seed fund and income of £120k in the current year.

11. Moreover the nature of the deals reveals a paradigm shift in the University's approach. Prior to *circa* 2000, companies established by the University or its staff remained too closely associated and dependent on the Institution, with for instance Boards without external business membership and too large a holding by the University in those companies not wholly engaged in University business. With a few exceptions, notably Surrey Satellite Technology Ltd, these companies were generally financially unsuccessful. The new process, in which the pre-incorporation and establishment stages are supported, a professional management installed and a minority stake taken, leads to an arms length relationship, which is more likely to succeed. The success of this approach has still to be fully elucidated and it is arguable that circumstances have forced the University to take too small a share in its spin-outs to be likely to get a reasonable return overall, for its input. However, the approach is leading to a real culture change in the academic community which increasingly sees the potential advantages of exploiting its IP.

12. It is expected that the new approaches will lead to the formation of a substantial number of companies, many on the Surrey Research Park, who are more likely to look to the University to collaborate on research than many of the SMEs currently in

the Region. This may help to persuade other SMEs to look in the same direction. This virtuous circle may be one way of achieving the Government's agenda on knowledge transfer for SMEs. At present, despite our efforts to be demand led through our new Innovation Network Managers and our increased emphasis on the Teaching Companies Scheme and other routes in order to allow SMEs to fund collaborative research, it is not generally happening. This in turn is counter-productive to the efforts of UniSdirect to alter the academic culture to facilitate such collaborations. The University believes that the processes must cease to separate SMEs from big business as if they were beginners at turning ideas into wealth. SMEs often represent the flexibility and catalyst for radical change between academe and big business. All the myriad interactions that are needed to convert ideas into profits are SMEs in all but name.

13. Research collaborations with larger companies are however increasing, for a number of reasons. Most particularly, the reputation of the quality of the University's research has risen substantially over the past few years and its strategy to encourage multi-disciplinary research, which is often the key to innovation in the modern world, has attracted industrial interest. The University has also introduced the Surrey Scholars Scheme, which encourages organisations to fund the appointment of young world class researchers in areas of relevance to their interests and this also helps to forge partnership e.g. Unilever have had two such scholars. A list is appended (Appendix 3).

14. The University has had 100 industrial collaborative contracts between £50k and £1m over the past ten years (Appendix 4). In most instances the status of the resulting IP has been adequately defined in advance, but despite this, the University has never received any income from IP in a sponsored research contract. More recently the University has been able to take a more informed view of the likely value of the IP in sponsored contracts and has been factoring this into contract negotiations. Many contracts have been one off and have not established a lasting relationship which the University believes brings the greatest mutually beneficial. A number of companies in the pharmaceutical industry have placed repeat contracts, but not within some over-arching framework. The most successful area in this respect has been telecommunications, where Nokia have placed a long lasting

contract with the Centre for Communications Systems Research and nominated the University as a Key HEI in the UK for recruiting, course development and continuing personal development activities. Also in this area the University is a partner in the Virtual Centre of Excellence in Mobile and Personal Telecommunications. This partnership between 25 leading companies and 7 leading universities in the field, takes the form of a 'not for profit' company in which each partner has a share. It provides uniquely effective long term research. Its innovative structure accesses the highest quality academic skills and staff, whilst ensuring that research is industrially relevant, yields valuable intellectual property and provides high financial gearing through the use of EPSRC grants and industrial funding. More recently the University has been awarded a Rolls Royce University Technology Centre which is another example of longer term close association.

15. Overall the University's industrial research contracts have generally been successful, but it has learnt that the most successful have a number of key characteristics:

- There must be mutual agreement and clarity over objectives and outcomes at the start
- Partners must be able to work with each other
- Key decision makers must be involved in the early stages
- Partners must recognise that contacts will move with increasing frequency
- Partners must be able to recognise each others requirements and pressures
- There must be excellent project coordination

The University has also learnt that in none of these partnerships, no matter how successful, are its costs covered and this is an increasingly major factor in its strategic thinking.

International Aspects

16. The University has established a substantial international reputation for both its teaching and its research. It has (and always has had) a very high proportion of overseas students, both in residence undertaking a wide variety of courses and notably through the distance learning activity of the School of Management. This

gives the University a large cadre of alumni in overseas business. The University has also fostered numerous overseas research collaborations, that have been important in creating its international research reputation. The University believes that this international activity is vital to its mission to assist economic development in its locality and its region. Recently it has adopted a strategy of creating formal partnerships with carefully selected universities of a similar size and having an associated research park in countries and/or regions sharing common interests, in order to integrate the regional and international agendas to take knowledge to commercialisation, across all scales of industry. The first such partnership with the University of Kuopio in Finland is flourishing and others are now under active consideration. Innovation and enterprise activities will be central to these partnerships.

The Future of Business University Interaction

17. The University of Surrey has by most measures been very successful in interacting with business over many years and it has shifted up a gear over the last 5-10 years. It believes that its success has been achieved by being demand led. The Lambert Enquiry has been asked to view University Business interactions from the demand led i.e. the business perspective. However this begs the question whether the majority of the demand side have yet fully understood the market place they are now entering? It is one where only constant innovation will keep their share of the market. But in the face of constant requirement to innovate they are incapable of fulfilling in house all their research needs in the current fast moving technological world. In the face of this challenge, do they understand the contribution which world class Universities can make, given the right framework?

18. The consensus of informed industrial opinion suggests that in the light of these pressures there will be an increasing emphasis on leveraging industrial R&D spending in both Europe and the US. This will happen by making far better use of the knowledge assets inside and outside the business and by significantly increasing the flow and pace of valuable innovations. In particular there will be greater strategic focus on R&D alliances, joint ventures and technology licensing and probably an increasing number of large enterprises taking up corporate venturing. There will be

more spin-offs based on developed technology and a greater willingness to run R&D as a revenue generating technical service for third parties. There is also likely to be more grants and contracts for university R&D although there will be commensurate expectations that universities enter as partners and take on some of the key business attributes of the sponsoring companies. If this is to happen the University believes that new models will be needed in which a dynamic has to be established between academe, big business and SMEs.

19. The concept of the Ideopolis/Technopolis, the community of enterprise working and living together is a concept seen only in Asia and to some extent in the US. It is one which this University is exploring as it plans the further development of its campus next to its Research Park. It was also hoped that this could have been incorporated into its recently established Advanced Technology Institute, but in the event industrial funding was not forthcoming.

20. A linked network of dynamic hubs as demonstrated by the Surrey/Kuopio interaction where a universities and their research parks combine to cover the knowledge generation to wealth creation chain is another model. The extension of this network across Europe and wider may create a new and fast moving innovative engine of competitive growth that matches anything in other parts of the world. It is a model that is attractive because whilst it burrows deep into the regional economy, it is by definition global.

21. Both these models are however external to industrial R&D and are complementary to and often palliative to under-performing company technology functions. Companies that drive up their internal performance in response to the new market place should see a dramatic increase in the flux of valuable innovation and a great deal done internally at lower cost. These changes when they come call for very different models, where collaboration will be essential and traditional functional boundaries cease to exist. Businesses that prosper will be those that put their emphasis on knowledge and trust. It is in this area that novel methods and models for universities and business to work together are most urgently required.

22. One such model was put forward recently by the Vice Chancellor of this University in a short address to the All Party Parliamentary University Group on 15 October 2002. A speaking note is at Appendix 5. The contribution was predicated on a belief that businesses should enter into long term relationships with universities that meet their research needs, taking the researchers fully into their confidence and sharing their strategy and goals and most importantly paying the full costs for the work. In return the University should provide a safe, secure and properly project-managed service, using well paid full time dedicated researchers. Both sides would understand and agree in advance the IP issues including a reasonable return for the University on its value. Many of these principles are strongly supported in the recent 'Strategic Review of Higher Education.....Influencing Policy' by the influential Council for Industry and Higher Education (December 2002).

23. The contribution starts by pointing up the paradox that whilst world class universities can provide very low cost high quality research to business, they cannot come close to recovering their overhead costs in most cases, when they do so. Meanwhile, UK business with much higher R&D overheads and an enormous spend on R&D (£8.6bn per annum / 50% of the national R&D spend in the UK) with all the problems of keeping 'at the cutting edge' only spends 3.6% (£314m) of that with English universities. It goes on to propose a new model based loosely on the Virtual Centre of Excellence in Mobile and Personal Telecommunications described in paragraph 14. This concept of a genuine long term partnership between one or more universities and one or more businesses using full time well paid researchers in dedicated facilities, jointly and properly managed doing agreed fully funded strategic research with pre-determined status of any IP arising, has mutual advantages for both parties. A beneficial national spin-off of this model is likely to be a substantial increase in the attractiveness of research as a career and a reversal of the trend of fewer young people opting to study science and technology.

24. Whether ways can be found to bring such models into existence in the near future is probably for Government to broker and to set the precedent, but for business and universities to individually and/or collectively to agree. The alternative is probably to drift slowly and piecemeal into such arrangements with loss of competitive edge in the process.

25. Apart from the specific problems we have highlighted in paragraph 7 and the key points for current best practice in paragraph 15, the strategic conclusions which the University wishes to bring to the attention of the Review are:

- The business/industrial environment is changing very rapidly
- The University must maintain an international reputation if it is to be effective as an economic driver nationally and locally
- The University cannot continue to subsidise its research
- There is not a 'one size fits all' solution to university/business interaction, but strategic partnerships could be a very important element. However any template which is developed has to be adaptable and flexible
- Any Government involvement should be enabling and of a light touch
- As a country, UK must nurture its science base and back and support the current and future winners/change agents if its businesses are to remain competitive

Appendix 1

ESF Projects

	Total Value of Project	EU Contribution	EU Received to Date
Diagnostic Tool for Skills Requirements	£394,559	£151,503	£146,796
Computers into Small Businesses 1	£125,266	£53,106	£43,859
Enterprise Associates	£110,457	£49,311	£40,389
Women in Business	£108,752	£57,405	£11,151
Computers into small Businesses 2	£129,153	£57,776	£11,407
Business Training Knowledge Transfer	£216,178	£95,956	£20,316
Developing Entrepreneurs	£279,518	£125,783	£0
Recognition of Prior Learning	£420,963	£224,410	£53,414

Appendix 2

Current Industrially-funded Chairs University of Surrey

<i>Sponsor and Title</i>	<i>School</i>	<i>Current holder</i>
Charles Forte Chair of Hotel Management	Management (Mgt Studies)	Prof Paul Phillips (f/t 5 yrs initially)
International Flight Catering Association Chair in Production and Operations Management	Management (Mgt Studies)	Prof Peter Jones (f/t)
IBM Chair of Business Transformation	Management (SEMS)	Prof Merlin Stone (0.2 FTE 3 yrs temp)
Steel Construction Institute Research Chair in Construction Systems	Engineering	Prof Mark Lawson (0.8 FTE 5yrs fixed term)
GNC Trust Chair in Nursing Education	EIHMS	Prof Pam Smith (previously Prof Rosemary Pope) (f/t)
Professorial Research Fellowship funded by Astra-Zeneca	SBLS (Chemistry)	Dr W Lockley (0.225 FTE - 2 yrs)
Research Chair in Nanoscale Materials Processing (funded jointly by Philips/Applied Implant Technology/Royal Academy of Engineering)	SEPS (SCRIBA)	Prof Nicholas Cowern (f/t - 5 yrs)

In the recent past there has been a Racal Chair of Information Technology in SEPS which Professor George Pavlou held. Our strong links with Philips led to the appointment of Professor Paul Krause in SEPS who until recently held part-time posts in both UniS and Philips, as did Professor John Shannon. Professor John Hay of Chemistry has also held a DERA/QuinteQ post.

Appendix 3

Surrey Scholars

Former Scholars

The Unilever Surrey Scholar

Appointee: Dr Ben Newling (appointed January 1997)
Department: Department of Physics, School of Physical Sciences
Research Area: Solids Magnetic Resonance Imaging and developing techniques for long-term industrial applications
Research Leader: Professor Peter McDonald
Update: Recruited by Unilever two years into the scholarship.

The Fina Surrey Scholar

Appointee: Dr Jim Janimak (appointed July 1997)
Department: Polymer Research Centre, Department of Chemistry, School of Physical Sciences
Research Area: Research into advanced polyethylenes, seeking to understand their crystalline behaviour and morphology-property relationships using advanced microscopy and microprobe methods. Focusing on devising ways to tailor commodity polymers, and polyolefins in particular, to enhance their performance and broaden their applications potential.
Research Leader: Dr Gary Stevens
Update: Left UniS after completion of the scholarship.

The (BGplc) Lattice Foundation Surrey Scholar

Appointee: Dr Walter Wehrmeyer (appointed January 1998)
Department: Centre for Environmental Strategy, School of Engineering in the Environment
Research Area: Management of Contaminated Land – advancing research into corporate risk management strategies which can integrate ‘hard’ technical and economic data with ‘soft’ social and political inputs.
Research Leader: Professor Roland Clift
Update: Appointed as a Senior Lecturer in CES.

The June Layson Surrey Scholar

Appointee: Dr Marion Kant (appointed January 1998)
Department: Department of Dance Studies, School of Performing Arts
Research Area: Research addressing the history and central artistic character of dance.
Research Leader: Professor Janet Lansdale
Update: Appointed as a Lecturer in the Dept. of Dance Studies.

The Guildford Borough Council Surrey Scholar

Appointee: Dr Birgitta Gatersleben (appointed September 1998)
Department: Joint post, within the Department of Psychology, School of Human Sciences, working alongside the School of Biological Sciences
Research Area: To address comprehensively the issues of transport, pollution, health and their commercial implications. Constructing and evaluating future environmental scenarios for public discussion.
Research Leader: Professor David Uzzell
Update: Appointed as a Lecturer in the Dept. of Psychology.

The Philips Surrey Scholar

Appointee: Dr Ed Gerstner (appointed April 1999)
Department: Surrey Centre for Research in Ion Beam Applications, School of EE, IT and Maths
Research Area: Working on amorphous semiconductor materials and cost effective processes for devices used in large area electronics
Research Leader: Professor Brian Sealy

The National Grid Surrey Scholar

Appointee: Dr Guy Warman (appointed September 1998)
Department: Professor Josephine Arendt's research group in Endocrinology, School of Biological Sciences
Research Area: The effect of Electromagnetic Fields (EMF) on neural systems, in particular cultured rhythmic tissue from the retina and other parts of the nervous system.
Research Leader: Professor Josephine Arendt

Scholars in post

The Second Unilever Surrey Scholar

Appointee: Dr Elisabetta Ciampi (appointed October 1999 – was to finish 30 September 2002 but extended by one year)
Department: Department of Physics, School of Electronic and Physical Sciences
Research Area: Magnetic Resonance Imaging and developing techniques for long-term industrial applications
Research Leader: Professor Peter McDonald

The Vodafone Surrey Scholar

Appointee: Dr Amparo Lasen (appointed September 2001 – finishes September 2004)
Department: Digital World Research Centre, School of Human Sciences
Research Area: The sociology of communications
Research Leader: (was) Professor Richard Harper

Scholars to be appointed

The Corus Surrey Scholar

Department: Department of Civil Engineering, School of Engineering
Research Area: Research in the design of thermally efficient steel framed buildings. Investigating mechanisms for promoting the free cooling of buildings, initially focusing on water or air cooling of floors and soffits. The structural design of new flooring systems, incorporating cooling elements, for steel intensive buildings, is also envisaged. (This research area is subject to confirmation)
Research Leader: Professor John Harding and Dr Gerald Parke

The Second Guildford Borough Council Surrey Scholar

Department: Department of Psychology, School of Human Sciences
Research Area: Influencing waste attitudes and behaviours
Research Leader: Professor David Uzzell

Appendix 5

SPEAKING NOTE

VICE-CHANCELLOR'S SPEECH TO THE ALL PARTY PARLIMENTARY UNIVERSITY GROUP

15 October 2002 at 6.30 pm



Chairman may I first of all thank you for this opportunity to speak to your Group on the subject of “Industry Funding of HE Research”. I do so from a background of chairing UUK’s Business and Industry Strategy Group and as the Vice-Chancellor of one of the UK’s leading research-led universities – Surrey. Before that I spent 30 years on the staff of Imperial College as an active researcher, heading a 5* Department of Engineering for 10 years. For the whole of my time at Imperial I was sponsored by industry. I shall speak from the point of view of a **supplier** of research rather than from that of the customer, although as the only Vice-Chancellor on the EPSRC’s User Panel, I have a fair idea of how industry views research.

My presentation will consist of two parts. Firstly, I will examine how business has funded university research in the recent past before going on to suggest how the university-business relationship ought to develop in the future. **I will not touch directly** upon the Government’s wider agenda for promoting entrepreneurship in the Universities and involving them much more deeply in economic development,

although you will see that there are clear links where university research leads on to innovation and subsequent commercial exploitation. I will also refer mainly to **big** business, which has provided by far

the largest part of industrial funding into UK Universities in the past. I will try at the end of the presentation to suggest ways in which Small and Medium sized Enterprises (SMEs), which form **the largest part** of the UK industrial base, might also find ways of benefiting from university research.

Let me start with some of the headline statistics.

All Party Parliamentary University Group						
Research Income by HEI Type 1994/95 and 1999/2000 (£m)						
	Post 1992 Universities		Pre 1992 Universities without Medical Schools		Pre 1992 Universities with Medical Schools	
	94/95	99/00	94/95	99/00	94/95	99/00
Research	138 (4.6%)	190 (5.8%)	690 (23.1%)	763 (23.3%)	1599 (37.2%)	1868 (39.1%)
Total Income 100%	2984	3277	2987	3276	4299	4772

Figures expressed on a 1998/99 basis
UUK Report 'The Internal Economy of UK HEIs 1994-2000'

Industry Funding of HE Research

This table compares the percentage of total income that is attributable to research funding from **all** sources for **UK** universities in 1994/5 and 1999/2000, quoted on a 1998/99 basis using the Treasury's published deflators. These figures probably slightly underestimate the extent of industrial funding i.e. we can include part of the funding returned as 'Other Services'. In 2000 £98m of this funding was provided from business sources, much of which borders on research, and which under certain conditions qualifies for inclusion in the RAE.

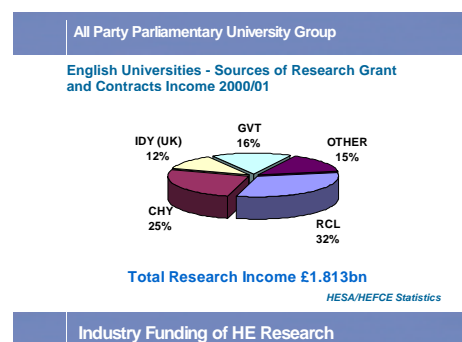
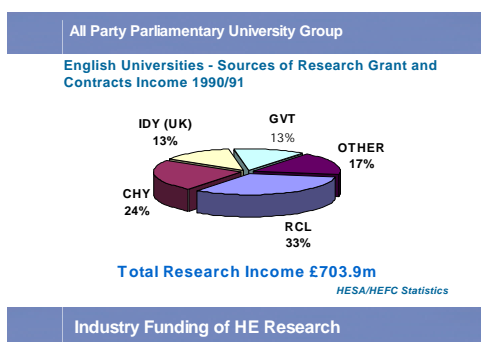
By far the greatest part of research funding goes to the 'pre-1992' universities, with those with a medical school particularly well placed to obtain funding from charities, which is a mixed blessing, as I shall explain. There has also been a modest percentage increase in research funding in all three categories of universities over this period.

In my own university the percentage of our income derived from research is well above the national average at 26% and post 2001 RAE is now in excess of 30%.

All Party Parliamentary University Group		
Research Income in UniS in 1994/95 and 1999/2000 (£m)		
	1994/95	1999/2000
Research	21 (26.4%)	28.5 (26%)
Total Income 100%	79.9	109.8

Figures expressed in cash terms

How does this research income break down? My figures **this time** refer to the period 1990/91 to 2000/01 in **English** universities for research grants and contracts.

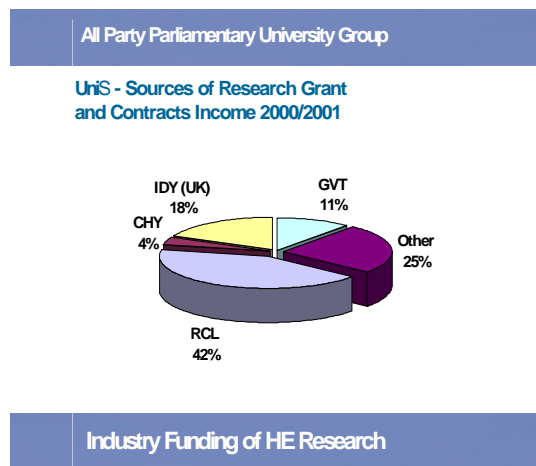


The overall picture shows a remarkable consistency when expressed in percentage terms, between 1990 and 2000.

UK Industrial funding for research contributed 13% of the total of £703m in 1990/91 and 12% of the total research grants and contracts funding of £1.813bn in 2000/01

although in real terms (uncorrected for inflation) the funding has risen from £93m to £215m. Not included in these statistics is the figure for Government (HEFCE) funding through the dual support mechanism. This funding, which amounted to £880m in 2000/01, has increasingly been tied to RAE ratings, but the statistics available for 1990/91 did not allow it to be clearly identified and estimated.

Surrey is well above the national average of 12% for university industrial research grant and contract funding. In 2000/01, **the figure for Surrey was £3.58m (18% of our total research grant and contract funding)** or £4.5m if I include the relevant earnings from the Other Services class.



This industrial funding reflects the substantial increase in research ratings over the period - Surrey is now earning in excess of £30m per annum for its research. The UK industrial funding of research at Cambridge is 8% and at Imperial College is 15%.

But the headline figures on total funding are not the whole story. As university accounting systems have become more sophisticated, the extent of our **losses** on the funding of Research Contracts and Grants has become more apparent.

UniS Support Cost Recovery Rates for 2000/01

Research Councils	46%
European Union	20%
Government	61%
Industry	49%

Industry Funding of HE Research

A few of our sponsors and customers have clear guidelines on the proportion of support costs that they are prepared to pay for their contracts over and above the direct salary costs of the researchers. The Research Councils pay support costs of 46% and expect the rest of the support costs to be covered by HEFCE dual support funding. I believe that this is a valid argument. However this funding **does not and probably should not** cover the support costs of other research customers. The EU pays 20% of support costs on top of direct costs, the charities generally will not pay support costs and other customers have no set rules. **So because many of our funders will not pay the full economic cost for research, universities are losing significant amounts of money to ensure that we remain involved in cutting edge research.**

In the case of Surrey, which is one of those recovering the highest proportion of its support costs our overall support cost recovery rate for research contracts in 2000/01 was 49%. This breaks down to 20% from the EU, 46% from the Research Councils, 61% from Government, Local Authorities and the NHS and 49% from industry (This latter figure varies and was 71% the year before).

Following the 1998 Comprehensive Spending Review, the OST commissioned a review of costing in universities and the resulting Joint Costing and Pricing Steering

Group recommended a costing procedure for all university activities which I understand has been accepted by OST. The final report from this Group is not yet available, however I have reason to believe that, accepting that there are variations depending on the type of project involved, **it will suggest that** an overall ballpark figure of 150% for support cost recovery is necessary merely to break even on the average research contract. That figure is one that my experience from Imperial College and Surrey would suggest is correct. We cannot continue down path indefinitely.

So, which industrial sectors are customers for university research, for what purpose and how do they identify the university to fund? Inevitably there is not too much in the way of hard facts on these questions, but there is a good deal of 'accepted wisdom'.

The DTI's R&D Scoreboard for 2001 shows that the 597 UK companies included in the survey invested just under £15bn on R&D although Government statistics show that only *circa* £8.6bn is spent by industry in the UK.

All Party Parliamentary University Group

DTI 2001 R&D Scoreboard

- 597 UK Companies invested just under £15 bn in R&D
- Pharmaceuticals (38%) and Aerospace (10%) dominate the UK R&D spend, both investing in R&D above international levels
- UK has 10% of its R&D spend in food processing and oil gas compared to 2% internationally
- UK has 10% of its R&D spend in electronics, chemicals and engineering compared to 17% internationally

Industry Funding of HE Research

My earlier figures suggest that at most some £314m (*circa* 2.1% of the total spend or 3.6% of the UK spend) has been spent in English universities.

The industrial sectors with the largest proportion of UK spend are pharmaceuticals (38%) and aerospace (10%), both investing in R&D above international levels. Health also spends above international levels when measured as R&D intensity (R&D as a percentage of sales). So it is not difficult to see why universities with medical schools tend to have the highest proportion of their total funding from research. Food processing and oil and gas account for 10% of UK R&D spending compared with 2% internationally, whilst electronics, chemicals and engineering account for just 10% by comparison to the 17% spent in these sectors internationally. These figures are useful to universities because they show which industrial

All Party Parliamentary University Group		
R&D Performed in the UK in each Sector according to source of finance, 2000		
Sector Providing Funds	Total (£m)	Total as %
Government	2533	14%
Research Councils	1259	7%
HE Funding Councils	1276	7%
Higher Education	157	1%
Business Enterprise	8639	50%
Private non-profit	815	5%
Abroad	2854	16%
Total	17 532	

UK GDP for 2000 *circa* £900bn

National Statistics

Industry Funding of HE Research	
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sectors to target, however they are also disturbing, since they demonstrate why our national R&D spend is only 1.9% of GDP (GDP in 2000 *circa* £900bn) when the **desirable** level is around 3% and why many of our industrial sectors lag their international competitors.

Industry, which invests **50%** of the national R&D spend, does so to obtain commercial advantage and return on investment. The R&D Scoreboard demonstrates that this objective is realised because R&D intensity correlates with company performance measures. Forty years ago most big companies saw themselves rather like universities, able to carry out all necessary R&D. Subsequently industrial Research

Departments have increasingly aligned their work directly to the requirements of the business by seeking commissions from the operating and customer divisions, leading to the outsourcing of some of the underpinning research. Universities, from which industry seeks basic or strategic applied research, are major contractors and most large companies now have a clear cut strategy for placing such contracts. Rolls Royce, for instance have a long standing policy of creating centres of excellence in appropriate universities and, subject to reviews, they provide secure long term funding in exchange for access to results. Others companies fund Chairs in areas of interest. But in too many companies such strategies are noticeable by their absence. A review carried out for my university in 1996 highlighted that a number of companies then only took account of RAE ratings as a guide to the facilities and support available in a university department.

All Party Parliamentary University Group			
Industrial Funding of UniS R&D by RAE Grading 1996/2001			
Subject Area	RAE rating	Income (£m)	% of total industrial income
Subjects Allied to Medicine	5*	3.475	31
Electronics	5*	2.65	24
Sociology	5*	0.296	3
Physics	5	1.004	9
Psychology	5	0.368	3
Chemical Engineering	5	0.241	2
Mechanical Engineering	4	0.608	5
Civil Engineering	4	0.271	2
Business and Management	4	0.277	2
Chemistry	3	1.391	12
Others		0.78	7

Industry Funding of HE Research

Direct or indirect assessment of the researchers was more important, coupled with confidence that results would be delivered. Often companies used senior academics as consultants in order to try to ensure that this process was successful. Many companies professed to support a surprisingly relaxed approach to pricing, seeing value for money as most important. In practice this is not the experience of universities undertaking this work judged against support cost recovery rates. All

companies wanted to retain full rights to any intellectual property arising from such work, although most were prepared to concede the university the right to use the IP in subsequent work and some were prepared to reward the individual researcher if the IP were exploited. I suspect that this approach leads to most of the industrial funding going to the highest rated departments in the RAE.

Figures from my own university certainly support this view. Two of my 5* rated areas in the recent RAE accounted for 55% of our industrially funded research over the period 1996/2001, five 5 rated departments accounted for a further 17% and five 4 rated departments for 14%. Only Chemistry (3A) with 12% of the funding seems to buck the trend. On the whole, selectivity is working effectively.



But what of the future? This is a time of great change for both industry and universities. The nature of R&D partnerships between the two is likely to change and I would like to propose a possible future model. Many companies are now realising that in today's world it is knowledge and skills, not assets, which are the key to success. Continuous innovation is necessary to stay at the top of the market. Companies must increasingly depend on their ability to combine resources and knowledge from different sources at all stages of product development leading to what I will call the '**dispersed** company'. Moreover the complex nature of the problems, combined with the rapid pace of technological progress now make it

impossible for companies to cover all their territory alone. **Genuine strategic partnerships with other organisations that possess the necessary cutting edge knowledge, is increasingly attractive.** Universities such as Surrey, with a proven track record of high quality multi-disciplinary, problem-orientated R&D, technology transfer and exploitation, are the obvious partners. **Moreover our government is now investing strongly in our research infrastructure, which should encourage industry to set up such partnerships and themselves invest at full economic cost.** Such public/private partnerships in R&D might even help to alleviate the concerns of an increasingly sceptical public about the problems and ethical issues it perceives in the use of technology.

Universities are also changing rapidly and in ways that are a challenge to this highly desirable model of a partnership. Our financial state is more parlous than it was, so we can no longer afford to subsidise our research. We are far more aware of the commercial value of our intellectual property and far better equipped to exploit it. If we are to enter long term partnerships, industry must work on the basis of prices and contracts which give them value for money but which allow us to achieve at least full cost recovery. After all, we must not forget that it costs industry in excess of double our suggested 150% support costs to do R&D in-house. Problems of intellectual property must also be solved to the benefit of both sides. Of course on our side we must accept clear goals, establish secure facilities and put in place effective project management. **These are the potential barriers to any new model for industry funding of HE research.**

Universities **currently fail to recover our support costs** on work commissioned by Government Departments. It would therefore be both helpful and justifiable if Government Departments were to set an example and accept the new full cost

methodology as a basis for future pricing. It would be difficult to persuade industry to pay full support costs for university commissioned research if the Government did not itself practice what it preaches.

I apologise for having put so much emphasis on finance, however there is a benefit to industry, to the universities and to the UK economy arising from the development of the model I am advocating, that far outstrips narrow financial considerations. In common with many other OECD countries we are witnessing a marked decline in the number of young people opting to study science and technology as clearly laid out in the Roberts Report. The effects of this decline is obvious on the supply of good science and engineering graduates for industry, leading to intense competition to employ them. This in turn is leading to a rapid fall in the number of UK graduates opting for postgraduate research training. In my own university, increasingly the postgraduates are from overseas, and they of course usually take their expertise elsewhere when they finish, exacerbating an already unsatisfactory situation in which post-doctoral researchers both in the universities and in industry are faced with poor pay and career prospects. The net result is a real threat to the future of the UK science base to which industry and the country is increasingly turning for the innovations needed to compete in the modern world. The Roberts Report contains a number of proposals to **reverse** this trend and I am delighted to say that in the recent Comprehensive Spending Review the Government gave a very generous settlement to boost science skills and research, a large part of which will be spent on implementing the Report's recommendations. This is extremely good news, although we are still waiting to see the detail of how and when the funds will be available, making financial planning difficult.

The area in which the Roberts Report struggled most to find positive recommendations was 'research as a career'. The evolutions now occurring within industry will if anything exacerbate that problem and the development of strategic university/industry partnerships could offer a real solution.

I envisage a model in which individual universities or more likely partnerships of universities establish multi-disciplinary research centres to meet the basic and strategic needs of an industrial sector. Such centres would have a core of full time well paid researchers, supported by postgraduates and post doctoral researchers and with other academic staff available as the need arose. There are models, such as the Faraday Centres, which demonstrate some of the desired criteria. At Surrey, **the Mobile Virtual Centre of Excellence in Telecommunications provides another excellent example.** The further development of such models would be a real 'win win situation', but it requires a step change in which the rewards to the researcher are commensurate to their value and appear attractive to aspiring younger scientists. **I suggest that we should actively pursue this model and seek to raise the 2.1% (£314m) of the industrial R&D spend currently given to the English universities to at least 7% (£1bn) over the next 5 years.**

Finally let me turn briefly to the SME sector, which currently does not benefit greatly from the research base. Both the EU and the UK Government recognise the problems this causes and have attempted to find solutions. In the UK, Government funds have been made available to universities, including my own, to encourage partnership with the Regional Development Agencies to promote skills and technology transfer to SMEs. However, the problem of networking remains.... In the EU, the Sixth Framework Programme, is more problem orientated than its

predecessors and contains 'integrated programmes' which make strong provision for involving SMEs in projects. The difficulty for researchers is to make contact with potential SME partners in several EU countries. The model I am suggesting could also help in this area, as the strategic partnership must take account of the development of the 'dispersed company' and bring the supply chain into the loop. Since many of these companies are SMEs, this would begin to demonstrate how they can **also** benefit.

Chairman, I hope I have cast some light on this subject and given my audience some ideas to take away and use in the political arena. The essential message I wish to leave with you is:

- 1. UK industry is changing. Knowledge (not assets) and innovation are becoming the key to success and leading to the 'dispersed company'.**
- 2. Strategic partnership is essential to the future prosperity of the 'dispersed company'.**
- 3. Research-led universities can provide such strategic cooperative partnerships if the terms and conditions are carefully negotiated.**
- 4. Government is investing in renewing research infrastructure in the universities and supporting technology transfer. Industry should now respond appropriately.**
- 5. In the current mode, UK industry spends £8.5b per annum on research in the UK, but at best £314m (3.6%) of that is spent in English universities;**
- 6. Industrial funding of university research falls significantly short of the real costs to universities, and does not correctly reflect its value.**
- 7. Industry's own overheads for R & D are twice those of the universities;**

- 8. New strategic partnerships between industry and universities are needed, based on the real value of university research. Such a strategy will produce considerable benefit to the UK economy, industry and the future of the science base by increasing profitability and rekindling interests in research as a career.**
- 9. We actively pursue this model and seek to raise the 2.1% (£314m) of the industrial R&D spend currently given to the English universities to at least 7% (£1bn) over the next 5 years.**

I should add that the universities see these issues as challenges not problems and will seek to develop innovative responses that benefit the UK.