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THE ROLE OF INTERFACING UNITS BETWEEN UK UNIVERSITIES AND INDUSTRY 1/

by

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The Role of Interfacing Units between UK Universities and Industry

Introduction

The different components of University activity have received varying degrees of emphasis both in different institutions and at different times. Traditionally these components have been described as:

Scholarship - the acquisition of knowledge and understanding for its own sake

Study - as preparation for a particular profession or vocation

Research - or the advancement of knowledge

Development of mind - in its capacity for logical thought, curiosity and disciplined dissent.

In recent years there has arisen additionally the increasing expectation that University resources of scientific, technological and other specialised services should be of more immediate and obvious benefit to society in economic terms.

While in the past Universities have been regarded as a primary source, storage system and cultural carrier of expert knowledge in many fields, it is only recently (in the UK at least) that the further role of problem solving and active dissemination and diffusion of useful knowledge has been advocated.

Unfortunately, though Universities have been a fertile source of new ideas, these have often been, as it were, imprisoned by such self-constructed barriers as the arbitrary separation of academic disciplines which handicap study of many real-life problems and those norms and values which maintain the status, purity and independence of the basic researcher.

The watershed year for increased collaboration between Universities and Industry in the UK seems to have been 1965 when a conference on the subject was jointly organized by the Confederation of British Industry and the Committee of Vice Chancellors and Principals. One outcome was the setting up of a Joint Committee of academics and industrialists to encourage mutual understanding and foster further collaboration. It was a Working Party of this Committee which produced the Docksey Report (1) on the relationship between Universities and Industrial Research.

A number of other reports looking at the national utilisation of science, technology and manpower appeared in the later sixties and all underlined the need for closer collaboration between University and Industry (2), (3), (4), (5).

Types of University/Industry Collaboration

If Universities were to come down from their supposed ivory towers and increase their involvement with the realities of industrial and commercial life, what collaborative or interactive ventures could be envisaged?

The following table, taken from the Docksey Report, illustrates the considerable menu of activities culled from their survey.

Table 1

Types of University/Industry Collaboration
(from "Industry, Science and Universities" Report to the UIJC, July 1970)

1. **Personal assistance from industry with University activities**

Lectures by industrialists at universities.
Industrialists serving on University and faculty committees, etc.
Industrial advice on, and provision of problems for, research.
University staff and students visiting industry.
Industrial advice on curricula.
Use of industrial laboratories for higher degree work.
Secondment of industrial staff to work at Universities.
Technical advice or assistance.
Use of equipment or facilities in industry.
Instrument development.

2. **Use of University staff and facilities**

Industry using more consultants.
Industry sponsoring research at Universities.
Provisions of special advisory or consultancy services.
Refresher or retraining courses.
Secondment of university staff to work in industry.
Industry sponsoring sandwich students and also providing suitable training.
An increase in multidisciplinary projects.
Use of facilities or equipment at universities by industry.

3. **Joint Activities**

Joint research programmes with work at university and in industry.
Interchange of staff.
Joint supervision of students.
Local 'science-based' industry developing from university departments.
Joint meetings or colloquia.
Joint appointments.

4. **Positive role of 'third parties'**

Industrial Liaison Centres run by universities.
Science Research Council schemes for improving contacts:
(a) Co-operative awards in pure science (CAPS)
(b) Industrial studentships and fellowships.
(c) Awards for science, industry and school teaching (ASSIST).

4. (continued)

(d) "Instant" awards.
(e) Graduate schools.
(f) Support for collaborative research grants.

Research Associations translate research into technology for smaller firms and feedback to universities.

* Ministry of Technology Industrial Units.

University Grants Committee 'pump-priming' support for schemes of assistance to industry.

Professional institutions encourage joint activities and influence curricula by professional requirements.

* MinTech industrial liaison officers encourage university-industry links.

5. Financial (or similar) support from industry for university activities

Grants for research without a fixed timescale or agreed programme.
Grants for studentships, fellowships, etc.
Loans or gifts of equipment.
Endowment of a chair or university post.

* The Ministry of Technology is now designated Department of Industry.

Spurs to Collaboration

Universities not being noted for spontaneous change, some external intervention was necessary to promote (or provoke) developments. In 1967 the major source of University funding (University Grants Committee (UGC)) set aside £2 million to pump prime industry-oriented ventures proposed by Universities which would either be subsequently self-supporting financially or supported by the institutions' general funds.

Moving with the spirit of the times, the then newly established Ministry of Technology earmarked further significant funds to set up so-called "Industrial Units" within Universities and the Wolfson Foundation also devoted considerable revenue to the general cause.

While many universities were conscious of having resources which could be utilised by industry and that the benefits might be mutual, it had to be realised that universities and industrial organizations have different goals, attitudes and methods of working. The classical solution for collaboration in such cases is by means of interfacing or linkage units and research has suggested that collaboration works best when the latter have characteristics intermediate between those of the potential partners.

Interfacing Units

Some of the funds referred to above were used to establish industry-oriented post-experience courses and extensions to an interdisciplinary PhD programme, but most was devoted to the establishment of interfacing

or linkage units. As would be expected from the autonomous nature of universities, the units have been of various types. A (non-comprehensive) list is tabulated in Table 2 with some attempt at a simple classification.

The Liaison Offices and Bureaux classified in Group 1 have a broadly catalytic role, attempting to extend and deepen relationships with industry over a broad interface and attempting most of the forms of collaboration itemised by Docksey. Firms are visited, invited on university visits and open days; information is disseminated via the press, technical and trade journals, radio and television; short courses are organized; undergraduates made more aware of industrial realities, vacation jobs, projects and graduate employment stimulated.

Naturally there is some expectation that as a result of these closer links, specific consultancy and contract research opportunities will flow but revenue generation is not an explicit prime objective. Rather the Liaison Director acts as a change agent or honest broker and endeavours to modify favourably both academic and industrial attitudes towards interaction.

A further set of linking functions has been identified (Group 2, Table 2) where universities have set up some centralised unit for generating, negotiating and administering consultancy and contract research. A sub-variant is a unit restricted to a particular department or faculty.

As Universities have looked increasingly to industry for the generation of revenue, stricter accounting and contractual procedures have been urged on them by the UGC. Where formerly academic Departments had considerable autonomy in the negotiation of outside work, central administrators have been trying to ensure that where contract research and development or consultancy used university facilities, realistic charges are made which not only cover all identifiable direct costs but also make some contribution to general overheads. Furthermore it has become evident that, in the past, contractual arrangements have not always afforded adequate protection either to the client or the university.

In some universities this administration of contracts and patents has been combined with the promotion and the negotiating function which can spearhead the university effort in this area as well as coordinate a variety of specialist input across the disciplines where this is needed.

An interesting development under this head has been the appearance of several university companies which, besides offering the considerable advantages of limited liability, is said to permit a business-like manner of operation which industry appreciates. These companies generally have a very small staff and covenant their profits to the university. One such company reports a turnover of £215,000 per annum in its last trading year but the proportion of this revenue which might have reached the university anyway is not known.

The nature of most universities makes the mandatory use of these interfacing units impossible and at the outset it is believed that the services had to be sold as intensively within as outside the institutions.

When the distinctive skills or facilities within a university department become regularly used by industry, the demands of consultancy, contract research, test work, etc., can exceed the resources of the academic staff if they are to fulfil their central roles of teaching and academic research. What should happen then is a nice point of philosophy which will be referred to later. One development has been the establishment of industrial units (Group 3, Table 2) with pump-priming funds from sources already listed as well as from venture capital houses.

The units are able to engage specialist staff on limited contracts outside the University tenured system and allow installation of specialised equipment and facilities.

These operations are required to become self-supporting from revenue after three or four years, a task which has not been uniformly easy in an uncertain economic climate.

Table 2

Types of Interface Unit

Group 1 - Broad Catalytic Linking Role

Bradford	Industrial Liaison Office (ILO)
Brunel	Bureau of Industrial Liaison
Dublin	ILO
Galway	ILO
Oxford	University and Industry Committee
Queens, Belfast	ILO
Surrey	ILO
Liverpool	Industrial Studies Committee
UMIST (University of Manchester Institute of Science and Technology)	ILO

Group 2(a) - Centralised Consultancy and Contract Research Negotiators

Aston	Aston Technical, Management + Planning Services Ltd.
Bath	South Western Industrial Research Ltd.
Edinburgh	Centre for Industrial Consultancy and Liaison
Heriot Watt	UNILINK
Loughborough	Loughborough Consultants Ltd.
Leeds	Leeds University Industrial Services Ltd.
Manchester	Research Consultancy Office
Stirling	Industrial Projects

Group 2(b) - Consultancy and Contract Research Negotiators (specific department or institute)

Cambridge	Wolfson Industrial Unit (engineering)
Southampton	Wolfson Industrial Units (attached to several departments)
Sheffield	Joint academic/industrial liaison posts established in several departments

Group 3 - Industrial Consultancy or Contract Research Units

Edinburgh	Conversational Software Ltd.
Imperial College	Infrared Engineering Ltd.,
	Optical Systems Ltd.
	Colin Buchanan + Associates
Lancaster	ISLO
	Lumina Lancaster Ltd.
	Libra Ltd.
	Luncord Ltd.
Queens, Belfast	Electro-Photonics Ltd.
Reading	Coating + Filter Design Ltd.
	Research Unit for Instrument Physics
City	Instrument Systems Centre
Liverpool	Wolfson Vacuum Unit
Queen Mary Coll.	Industrial Research Ltd.
Newcastle	Engineering Design Unit
	Marine Industries Centre
Nottingham	Wolfson Institute of Interfacial Technology
	Wolfson Industrial Automation Group
Swansea	Industrial Tribology Centre
Strathclyde	Centre for Industrial Innovation
Bangor	Industrial Development (Bangor)
Aston	Small Business Centre
Royal Coll. of Art	Industrial Design (Engineering) Research Unit
Cardiff	Laboratory for the Biology of Industry
Edinburgh	Micro-Electronics Unit
Liverpool	Vacuum Unit
Surrey	Bio-analytical Centre
Leeds	Industrial Tribology Unit
Salford	Centre for Industrial Design and Manufacturing
Cranfield	Unit for Precision Engineering

Group 4 - Miscellaneous

Lancaster	Enterprise Lancaster (joint appointment with City Council to attract new research-based industry)
Brunel	Institute of Industrial Training

The Operation of Interface Units in Practice

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The growth of the interfacing activity was eventually thought to create a new hybrid - the University Director of Industrial Liaison and in 1969 a semi-formal professional association, the UDILs, was formed to act as a forum for the exchange of information and sharing of problems. Despite a great disparity in manner of operation, as already indicated, enough common ground has been established to enable useful joint work to be carried out.

Among the dangers postulated by the 'catalytic liaisers' about the more overtly financial orientation of the 'managing directors' is the possibility of accepting routine work to boost turnover or the removal of work from the academic departments to the specialised units where tighter control of work to time and to budget may be exercised. In either case, the effect on academic teaching and research is lost. The managing directors, in turn, probably regard Group 1 practitioners as woolly-minded do-gooders as it is not easy to quantify the general benefits of improved communications between industry and the universities.

Pearson has attempted a study of contract research activity between these two sectors.

Twenty-two industrial organisations were studied in respect of R + D activity purchased from outside sources. Although most of these used university facilities to some extent, the value of work placed there as a percentage of total R + D expenditure was small (less than 1% in most cases).

Among the observations made by the industrialists were the following:

1. Universities used for more basic work (most respondents)
2. There must be at least one man in house as well informed as those doing the work.
3. Outside sponsored work takes up valuable management time in supervision.
4. Contract research can be a balancing item in research budgets.
5. Valuable in fringe areas or for testing new ideas.
6. Opinion was divided on whether sponsoring a doctorate student or retaining the consultancy services of a faculty member is more effective.

The same investigation also studied university interface groups, of which 14 responded. Most had been operating from the late 60s/early 70s. Income varied from £10,000 to £1 million per annum. Few yet able to develop future plans because of uncertainty of their position in the university. Academics working through the interface units tended to be small in number and product oriented and technologically inclined.

A wide range of difficulties was described:

1. Initial (and continuing) lack of interest by a large proportion of academic staff.
2. Opposition due to the feeling that contract research cuts across traditional academic freedom.
3. Frequent failure of industrial respondents to maintain liaison.
4. Many academics still ignorant about realistic contract procedures and reluctant to seek or take advice.
5. Concern about professional negligence liability.
6. Difficult to assemble multidisciplinary teams to tackle major problems.
7. Lack of working capital.
8. Reluctance of some clients to pay realistic overheads.
9. Lack of internal leadership to create a favourable climate for industrial interaction.
10. Scarcity of research students and assistants.

These comments raise the question - is the academic institution the right place in which to conduct research work sponsored by industry? Are universities in it just for the money? How difficult is it to combine such work with the more usual academic pursuits of teaching and research sponsored by Research Council (Government funded) grants which do not imply the same type of organizational structure, time scales, planning, monitoring and cash flow analysis? Should, in fact, work for industry be maximised or optimised?

If progress is to be made from the present relatively small base, some careful thought is needed on how the effort is to be managed and related to other activities within the institution.

University Interface Units and Developing Countries

With only a few exceptions, the interface units described in the paper have, up to now, had little interaction with developing countries. The extensive involvement of British Universities with the developing world in the field of advancement of higher education in these countries either tends to occur through individual contacts or through the agency of such bodies as:

IUC (Inter-University Council for Education Overseas);
TeeTOC (The Council for Technical Education and for overseas countries);
CEDO (The Centre for Educational Development Overseas), and the British Council.

A significant percentage of undergraduate places in UK universities is taken up by students from developing countries and their representation in doctorate research programmes is even more marked.

Research for developing countries is sponsored by various UK agencies and some universities have special departments or institutes devoted to development problems.

From an informal survey conducted among fellow UDIL members, it would seem that university involvement with the problems of developing countries frequently arises by chance and the formal co-ordination of departmental interests overseas rarely happens. One university collects and summarises its overseas interaction through a special committee of Senate; another has appointed an "Overseas Officer" to record, co-ordinate and stimulate this work.

Perhaps UNIDO could consider ways in which universities might be encouraged to appoint or designate interfacing units devoted to problems of developing countries and it is hoped that this paper might serve as a modest input for such a discussion.

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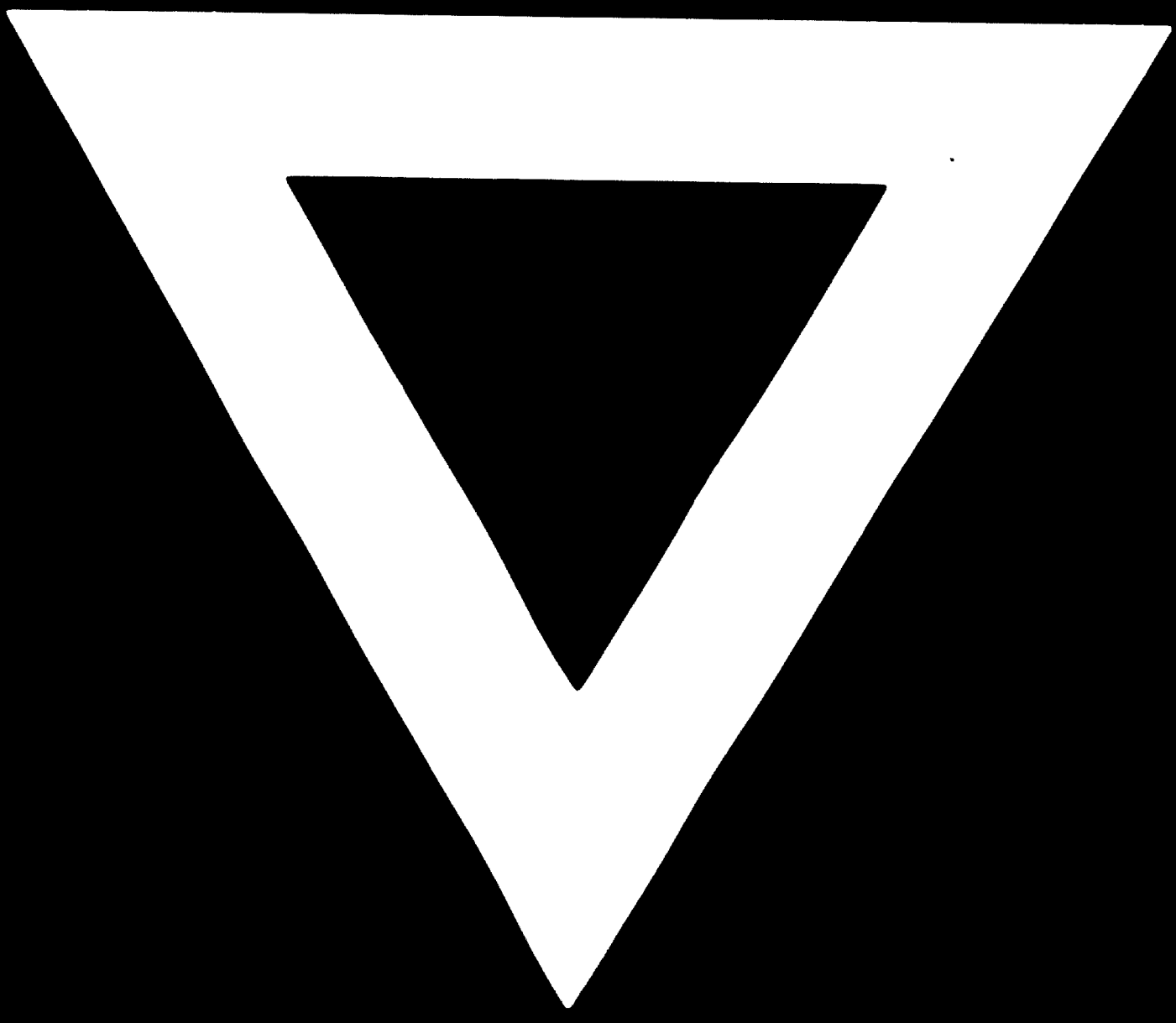

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