



Association of Independent
Research & Technology Organisations

**Increasing UK innovation
intensity and the solution
to the problem of knowledge
transfer to business enterprise**

AIRTO Paper 2000/3

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August 2000

Executive Summary

This paper recommends the DTI reconsider its present support policies and redirects funding to its primary constituents in industry. This should be done by establishing an innovation-auditing scheme. AIRTO would work with the DTI to develop such a demand side programme which could change the intensity of knowledge transfer from the academic community globally to British business.

AIRTO members and universities complement each other in their business mission. Universities receive public funding to create knowledge. AIRTO members are funded by trading in a competitive marketplace and have the skills and business purpose to apply knowledge by value-added trading. The problem for both parties is that industry demand for knowledge purchasing and innovation is weak in the UK.

Partnership between AIRTO members and universities would be a powerful force for change in the economy. Such partnership, based on AIRTO brokering, would be more effective than most one-to-one relationships based on a single university link with companies such as promoted by the present government programmes. The reason is obvious. Each university has particular knowledge, whereas the company client has diverse needs.

AIRTO proposes investigation with the DTI for a new innovation broking service based on partnership between knowledge transfer companies and the academic community.

This discussion paper is presented as a formal request for response from the DTI.

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Members of the AIRTO Working Party on Increasing UK innovation intensity and the solution to the problem of knowledge transfer to business enterprise

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Increasing UK innovation intensity and the solution to the problem of knowledge transfer to business enterprise

1) The Problem

The UK economy is not generating the wealth potentially available from its knowledge base. The result, for all government administrations, is inadequate financial resources to meet the aspirations of society for better health care, better education and a lifestyle comparable to other competitive nations.

This evidence of economic under-performance has been well documented. Two recent publications which re-state the problem are that from the Social Market Foundation "Universities and innovation: meeting the challenge" and the DTI publication "Our competitive future: UK competitiveness indicators 1999". Analysis of the problem reveals a number of underpinning causes. Among the causes may be found the following.

- An educational structure weak in science, engineering and technology (SET) emphasis combined with a lack of role models, which extol the virtues of enterprise and wealth creation from SET exploitation.
- A post-1945 industry environment in which industrial relations and fiscal policy were antagonistic to innovation and enterprise.
- Little continuity in government programmes focused on the central problem of change in attitudes and practices in industry management.

In the last decade, progress has been made in industrial relations and fiscal policy. However there remains a management culture, which is risk-averse and in some sectors lacks the competences required in the new technologies, which will be drivers of the emerging knowledge economy. This suggests need for a government-led mission to cure these short-term and long-term infrastructural impediments to increased innovation intensity.

Recent government policies have been characterised by a fragmented programme of incentive schemes for industry combined with those which attempt to use universities to change industry culture. The hypothesis on which these policies are based is the assumption that universities, if incentivised, will drive new knowledge into on-going wealth creating processes in industry. This thinking is flawed. This false hypothesis assumes there are two drivers of innovation.

The first assumed driver is that small proportion of university activity which is enterprise orientated and successful in converting knowledge into a wealth creating process or business enterprise. Analysis of this phenomenon will show it is an activity of only a few universities. Its impact on the economy, or on the development

of major supply chains capable of global competitiveness, is minimal. Those Vice-Chancellors who champion this work do so to raise funds to stay in the top rank of global educational institutions. They incur significant financial risk in adopting such policy. They do not undertake this risk primarily to serve “local” industry and certainly not to serve SMEs. Discussion on these activities with university staff will reveal conflict which produces negative tension within the academic system. The activities which involve “trading” are often seen as in conflict with the purpose of the university to pursue fundamental curiosity-driven research to upgrade continuously the teaching content of the university. These views are not stated to argue against encouragement for a university to “trade” when there is a benefit to the university and freedom from conflict with the institution’s primary mission. However the scale of this driver will not be such as to change the UK economy to one which is knowledge driven. That is not criticism of those universities which take up the challenge. Instead it is simply recognition of reality in understanding the size of the problem.

The second assumed driver in the hypothesis concerning the role of universities stems from the inability of government to fund properly the high calibre universities, which are leaders in the global educational community. Government appears to urge the whole university community to engage in knowledge trading to compensate for lack of selective public funding for leading institutions. This is combined with the contradictory refusal to allow universities to trade in their major market, which is charging tuition fees.

The strategic approach to this issue of university funding is discussed in the recent Social Market Foundation booklet on universities and innovation. It questions whether it is feasible for the UK to continue to fund all universities from the public purse. It discusses an alternative policy, which would encourage development of private universities, free to organise their funding outside state control. This issue is not new. It was presented some years ago by Kealey. It should be a separate topic of policy discussion between government and CVCP.

In developing a strategy to increase innovation intensity, the question of university funding must be disengaged from the issue of knowledge input to innovation in industry through value-added knowledge trading. This document presents a solution to enhanced innovation intensity based on a sustainable knowledge-trading market.

2) Creating partnerships for knowledge broking

It is a self-evident truth that if UK industry manifested greater purchasing demand for knowledge transfer to increase innovation intensity, there would not be an issue of the link between knowledge transfer and economic performance. Thus there is a problem of market failure. It is a demand-side failure caused by lack of enterprise vision in management and low profitability.

The term “knowledge transfer” has no meaning without context. Where a company experiences a problem and seeks solution, it defines - in general terms - the knowledge requested. However, the analysis of the problem is often incorrect. On other occasions companies pursue product or process improvement without awareness of new knowledge and better solutions, often available from disciplines or by sectors with which they have no contact. Thus knowledge brokering becomes critical to finding solutions to such problems.

Knowledge from most sources, but especially academic sources, is not available in ready-to-use packages. To solve industrial problems and to develop innovative products, it is necessary to garner elements of knowledge from many sources and to value-add to such elements by processing it into solution for a particular problem. Thus independent and multi-discipline knowledge broking is necessary.

Academic research, quite properly, does not expend its limited resource on packaging knowledge for problem solving. That is not the objective of academic research. Academic research needs “curiosity space” to generate fundamental new understanding. By contrast a company demands research results in a task-focused form. Most companies do not have the resources, time or competences to gather units of knowledge from different sources to package the material into a solution for their problem. Thus there will remain often a mismatch between academic researchers and industry managers seeking solutions for their business with limited knowledge-conversion resources.

Cursory examination of knowledge transfer companies from a range of different origins – Andersen Consulting, Scientific Generics, Fraunhofer Institutes, AIRTO members – will demonstrate the need for a third party function which operates between knowledge sources and their application to value-added business. For such knowledge transfer to operate continuously, it must itself be a value-adding business process, otherwise it will demand permanent public funding similar to the legitimate demands of HEIs on the public purse. Thus it is in the government’s interest to stimulate and support a private sector knowledge trading market.

Where there is market failure in knowledge demand – which there is in the UK economy –intervention is required to change market behaviour and stimulate

knowledge demand which develops into an ongoing profitable business activity. This suggests there are two modes of knowledge transfer needed to enhance UK competitiveness. They are as follows.

- Increase the creation rate of new business enterprises by supporting early stage development of new ideas – an example of which is E-SYNERGY Limited.
- Innovation auditing of companies by competent independent knowledge brokers to stimulate demand side market growth in knowledge transfer – undertaken by technology consultancies - an example which are AIRTO members.

Both the above activities operate already in the UK. The problem is that the scale of such activity is too low to make the required impact on the economy and the widespread market failure. What is needed is significant, but short term (five years), public funding support to break the cycle of inertia and to create infrastructure which will support an on-going self-supporting business in knowledge trading.

3) Two means of knowledge transfer stimulation in the UK economy

3.1 Early stage funding

There is no shortage of innovative ideas in the UK. The problem is filtering proposals and the infrastructure needed for early stage funding prior to support from venture capital or other investor communities. Innovative proposals come from many sources. The university community and AIRTO companies are two sources.

Innovative business development, by university staff, is often frustrated by its environment. Not all universities have an effective mechanism to take forward business proposals. There are conflicts within the structure and lack of connectivity to the marketplace and to independent financial resources. Constraints also exist in AIRTO companies. The principal constraint in the AIRTO community is lack of investment funding caused by low revenue surpluses, sometimes as a result of the “not-for-profit” heritage.

E-SYNERGY Limited has been established by AIRTO members to overcome the above problems. E-SYNERGY will be unique in developing a software-based Internet-managed filtering system combined with incubation connectivity throughout the AIRTO membership. E-SYNERGY Limited will also have access to Member States and EU support programmes as well as project management infrastructure better than other incubators. It will encourage networking with top rank universities, which have venture capital companies within their infrastructure eg Isis Innovation Limited.

3.2 Demand-side stimulation to innovation

Government policy of allocating funds to universities to make them better connected with local industry, will make only a small contribution to solution of the bigger problem of knowledge transfer. Those universities which have an effective industry interface will develop value-added business wherever it is located and do this through their own business competences. Others without such competences will not be changed by the modest schemes on offer.

Present government policy aimed at the science-base supply side is incorrectly focused. The problem is not the supply side. The problem rests with the demand side. It is related to competences, attitudes towards risk and the availability of resources in companies. The solution requires focus on private sector companies (especially technology based SMEs) and their needs.

There is another issue critical to the interface between knowledge sources and companies. Often the problem, which requires to be solved in a company, demands inputs from several disciplines and a number individual experts. Thus a policy for one-to-one connectivity between local universities and local companies will not provide this independent brokering. On the other hand it is in the business of AIRTO members to play the role of independent broker. As the world shrinks, in terms of communications via the Internet and other technologies, the role of the independent broker must cover a market for sources greater than any single Member State academic community. Finally, there is the skill of problem diagnostics. To analyse a company's needs is a significant skill. It is not available among the academic community because that is not the mission of that community.

AIRTO members know there is much knowledge available which would enhance the performance of companies. It could be brought to bear on the improvement of supply chains, and in particular the SMEs, which need competencies upgrading. The solution is demand-side incentivisation. The first step is a methodology for innovation auditing. Such innovation auditing has already been exemplified by some AIRTO members. It consists of entering the management structure of a company to define impediments to profitable growth which may be solved by the introduction of new ideas, new products, new processes or new markets. There is an obvious link between this process and the outputs of Faraday Partnerships but the link needs financial support and conversion into a trading process. Innovation auditing carries significant business risks. It is a missionary activity. It depends on changing attitudes and culture in a business to turn the audit into value-added profitable knowledge-trading business. Thus for the provider of such a service it is a high risk marketing strategy. There are less risky opportunities for AIRTO members to pursue, thus it may not be their top priority. It is not the role

of AIRTO members to compensate for UK market failure. That is a task for the DTI. However AIRTO is prepared to be a business partner with government in finding a solution.

The AIRTO community could contribute significantly to knowledge transfer from the academic community through a system of company innovation auditing. For that to happen, pump-priming funding to the demand-side (recipient companies) will be required.

This paper recommends the DTI reconsider its present support policies and redirects funding to its primary constituents in industry. This should be done by establishing an innovation-auditing scheme. AIRTO would work with the DTI to develop such a demand side programme which could change the intensity of knowledge transfer from the academic community globally to British business.

4) AIRTO Brokering Partnership with Universities

AIRTO members and universities complement each other in their business mission. Universities have public funding to create knowledge. AIRTO members are funded by trading in a competitive marketplace and have the skills and business purpose to apply knowledge by value-added trading. The problem for both parties is that industry demand for knowledge purchasing and innovation is weak in the UK. Partnership between AIRTO members and universities would be a powerful force for change in the economy. Such partnership, based on AIRTO brokering, would be more effective than most one-to-one relationships based on a single university link with companies such as promoted by the present government programmes. The reason is obvious. Each university has particular knowledge, whereas the company client has diverse needs.

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Description of AIRTO

AIRTO is a network of the United Kingdom's independent research and technology organisations and promotes their role in strengthening industrial performance through consultancy, design, information management, knowledge transfer, research and development, skills provision, technology transfer and training.

AIRTO members are quality- and value-adding companies with a track record of success in knowledge transfer. They are driven by the desire for customer satisfaction and profitable success in a competitive market place.

AIRTO provides a point of contact between UK independent research and technology companies and government agencies, industry bodies and the European Community. It co-ordinates the views of its members and, by representing these to industry and government it provides policy leadership in the knowledge trading sector.

With some fifty member companies having between them a total turnover approaching £1 billion, AIRTO embraces a major portion of the growing industrial R&D effort of the UK. Members' activities span a wide range of disciplines from life sciences to engineering. Their work includes consultancy, managed fundamental research, contract research, developing and designing innovative products or processes, instrumentation, testing and certification, programmes of best practice, and techno-economic consultancy. Most run comprehensive information services, conferences and seminars as part of the process for knowledge acquisition and dissemination. Many organise joint ventures including venture capital investment programmes. The majority trade in the global market place.

Recent AIRTO Policy Papers are listed below.

- 2000/2 AIRTO response to the DTI proposal for a network of regional centres for manufacturing excellence and productivity
- 2000/1 Summary of AIRTO recommendations for a Science and Innovation Policy
- 99/1 Encouraging people to collaborate to compete: Proposal for implementation of a Competitiveness White Paper vision – AIRTO VIRTUAL
- 98/1 The PTP Scheme Achievements, lessons and recommendation for its continuation
- 97/2 The role of the RTOs in cross sectoral technology transfer: building on the success of The Carrier Technology Programme
- 97/1 AIRTO contributions to Foresight, training and education and knowledge-transfer as presented to Mr John Battle, MP, Minister for Industry and Energy on 12 June 1997
- 96/3 Case for the continuation of the first five PTPs

List of Members

Advanced Manufacturing Technology Research Institute	AMTRI
Aircraft Research Association Ltd	ARA
The British Glass Manufacturers' Confederation	British Glass
BHR Group Ltd	BHR
BLC Leather Technology Centre	BLC
British Maritime Technology Ltd	BMT
Building Research Establishment	BRE
Brewing Research International	BRI
The Building Services Research & Information Association	BSRIA
British Textile Technology Group	BTTG
Camden & Chorleywood Food Research Association	CCFRA
British Ceramic Research Ltd	CERAM
Construction Industry Research & Information Association	CIRIA
The Central Laboratory of the Research Councils	CLRC
CRL – The Innovation Centre	CRL
Cambridge Refrigeration Technology	CRT
EA Technology Ltd	EA
ERA Technology Ltd	ERA
FIRA International Ltd	FIRA
HR Wallingford Group Ltd	HR
Inspectorate plc	Inspectorate
Leatherhead Food Research Association	LFRA
LGC	LGC
Materials Engineering Research Laboratory Ltd	MERL
The Motor Industry Research Association	MIRA
Mineral Industry Research Organisation	MIRO
The Motor Insurance Repair Research Centre	MIRRC
The National Computing Centre Ltd	NCC
National Physical Laboratory	NPL
Pera Group	PERA
Pira International	PIRA
The Post Office Research Group	The Post Office
The Paint Research Association	PRA
RAPRA Technology Ltd	RAPRA
SATRA Technology Centre	SATRA
The Steel Construction Institute	SCI
Sira Ltd	SIRA
Smith Institute	Smith Institute
The Sports Turf Research Institute	STRI
TNO BIBRA International Ltd	TNO BIBRA
TRADA Technology Ltd	TRADA
Transport Research Laboratory	TRL
TRW Technical Centre	TRW
TWI Limited	TWI

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