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Association of Independent
Research & Technology Organisations

The contribution of Faraday Partnerships to growth in innovation intensity in the UK economy

AIRTO Paper 2001/1

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EXECUTIVE SUMMARY

UK industry must engage better in science, engineering and technology (SET) application to secure a prosperous future for its citizens. This demands vision, focus and strategy, to achieve connectivity between players and resources. Faraday Partnerships can make a significant contribution to the objective of connectivity and innovation intensity growth.

AIRTO members are at the forefront of Faraday Partnership development. Faraday Partnerships set out to change relationships between the supply and demand sides for technological knowledge in the UK.

Today all AIRTO members share the mission to trade in the private sector in value-added knowledge application for the enhancement of profitability in a client organisation. This demands competence in research methodologies and links with global knowledge sources. However any intermediary which looks to Faraday Partnerships solely as a means of providing short term revenue benefits will be disappointed. Creating a successful Faraday Partnership is a strategic mission. It demands investment and entrepreneurial enterprise by any organisation dedicated to lead such a venture.

Faraday Partnerships can provide a solution critical to success of the interface between knowledge sources and companies. Often the problem to be solved in a company, demands inputs from several disciplines and a number of experts. A policy of one-to-one connectivity between local universities and local companies will not provide this independent brokering. 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 community. Finally there is the skill of problem diagnostics. To analyse a company's need is a significant skill. It is not available among the academic community because that is not the mission of that community.

The sometimes narrow and over-constrained agendas of schemes in Research Councils and government departments may confuse those who need to be engaged in Faraday Partnerships. There is a real danger that the Faraday Partnerships could be pulled apart by the vested interest of bodies in their own schemes and divergence from the focus needed to develop coherent understanding of the Faraday Partnership business model. There is a strong case for the rationalisation of public support schemes which, at present, confuse the marketplace.

The AIRTO community welcomes the level of commitment now given to Faraday Partnerships by several Research Councils and the DTI. This renewed commitment makes feasible the growth of an extended community of Faraday Partnerships in which AIRTO members will continue to participate and to provide leadership and management expertise.

AIRTO invites intermediaries not in membership to join the AIRTO community and to take up the challenge of exercising this leadership.

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Mr John Wood - Managing Director MIRA

AIRTO Policy Paper: The contribution of Faraday Partnerships to growth in innovation intensity in the UK economy.

1) The issue to be addressed: focus and connectivity in innovation intensity

The UK industry must engage better in science, engineering and technology (SET) application to secure a prosperous future for its citizens. This demands vision, focus and strategy, to achieve connectivity between players and resources. This paper sets out the contribution to solution of this challenge, provided by AIRTO members engaged in Faraday Partnerships together with some guidelines on best practice in running such Partnerships from experience to date.

Today the UK economy seems buoyant when measured by government finances, falling unemployment and a strong currency. Against these commendable characteristics must be set declining investment in R&D (when measured by the R&D scoreboard), mounting problems in funding higher education and other public services and little progress in enhancing competitiveness through innovation and investment, as reported in a recent Treasury study on productivity. Even in the so-called "new economy" areas, which exploit knowledge-driven, automated and networked production and services, there are grounds for concern. Also in areas of strength such as the creative industries, financial services and E-commerce, there is a tendency to ignore gaps in the underpinning infrastructure.

The potential of the UK economy is enormous. It operates in a relatively deregulated and low corporate-tax environment. There are adequate sources of financial investment. It benefits by having an internationally used language. There is a reservoir of people with strength in creativity, science, engineering and technology.

The issue is to develop a vision, articulate a strategy and achieve connectivity by joined-up government and joined-up everything, with focus on areas critical for development of value-added knowledge trading. This Policy Paper analyses impediments to progress. It points the way forward through partnership in value-added activity bringing together creativity, science and scientific research, engineering and technology application through improved methodology for knowledge transfer – namely industry-led Faraday Partnerships.

2) Creating wealth from knowledge

At the turn of the century the UK had one of the highest per capita incomes among developed economies. That is not the situation today. The industrial revolution created great wealth by positioning the UK as a leader in the global economy. For economic success today we need to reconsider the drivers of competitiveness.

Knowledge is of little value without application. Today critical drivers are topic focus, partnership, new business opportunities and investment in innovation. The UK cannot afford to invest randomly. That raises the challenge of choice. The usual alternatives quoted are government intervention or the free market. Successful economies achieve a balance between the two by directing funding support to innovative partnerships but leaving topic choice and value-added trading to the private sector.

There is another determinant in economic success. It is the techno-business culture, which pervades management. It will influence change through attitudes to risk and innovation. It will determine demand-side market pressure for knowledge transfer.

The United States, Germany, Japan and the UK have significant differences in techno-business culture. These differences limit translation of models for knowledge transfer from one culture to another. That is why the University Challenge Fund, following the American model, may be less than successful. The task is to achieve permanent change in management attitudes and an infrastructure with minimal public schemes intervention.

To enhance economic performance permanently and to stimulate a knowledge-driven economy, it is essential to address certain salient issues. Those issues are as follows.

- Management engagement in innovation and reduction of risk aversion.
- Connection between global sources of ideas and a community of industry decision-makers sensitised to the benefits of investment in innovation.
- Matching innovative ideas to business opportunity with fiscal incentives which ensure continuity of focus and action in companies.
- Networking value-adding knowledge trading by supporting – with public funds – pump-priming knowledge trading supply chains.

Analysis of trends in the UK using the above as criteria, reveal need for a new approach to knowledge transfer.

The first trend (over the last two decades) has been wide acceptance of an enterprise economy in place of state intervention and regulation. The economy has benefited from this change, but company commitment to investment in innovation is still weak.

Another trend has been government policy which introduces a plethora of "support" schemes. The pattern is not based on proven analysis. The beginning of this trend was the Rothschild report. It set out to define the customer/ contractor principle for government relations with service suppliers. The original purpose became distorted. It diverted demand-side pull for knowledge transfer away from the market to focus on pre-competitive projects which were often the antithesis of market need.

Other policies have added to lack of focus on value-added knowledge transfer in the UK. Some of these are rooted in equivocation concerning participation in EC Framework Programmes and, more recently, the seeming lack of rigorous success criteria for the Small Business Service (SBS) and the Regional Development Agencies (RDAs). All these emphasise the need for focus and rationalisation in government support schemes to minimise bureaucracy and maximise partnership with industry.

Study by AIRTO of knowledge transfer models elsewhere, such as the Fraunhofer Gesellschaft, together with initiatives by EPSRC and the DTI in developing the concept of Faraday Partnerships, provides a policy thrust which will transform the knowledge transfer infrastructure of the UK. What follows in this paper is evidence to support continued development for Faraday Partnerships.

3) Creating partnerships in knowledge broking

If UK industry manifested greater purchasing demand for knowledge transfer to increase innovation intensity, there would not be a gap between available knowledge and economic performance. Thus there is a problem of market failure. It is demand-side failure. This is caused by an industrial culture which still lacks enterprise and vision, combined with too many government schemes rather than fiscal incentives for companies to engage in innovation. The problem is compounded by low profitability in manufacturing and over-stretched management resources.

The DTI has introduced demand-side schemes but they have met with limited success. The current policy of allocating funds to universities to make them better connected with local industry, will make little contribution to solution of the bigger problem of management attitudes towards knowledge transfer. Present policy aimed at the science-base supply side is incorrectly focused. It seeks to imitate the US model but

ignores fundamental difference in US government policy and American management culture. The problem is not simply the supply side. In the USA the policy is not to change attitudes in academia nor is it to make universities value-added knowledge traders. Study of KTEC – Kansas Technology Enterprise Corporation et al will prove this point. The focus in the US is on the demand-side. It is directed to fund improved knowledge transfer competences, management attitudes towards risk and to make available financial incentives to the knowledge supply chain.

There is another issue critical to success of the interface between knowledge sources and companies. Often the problem to be solved in a company, demands inputs from several disciplines and a number of experts. A policy of one-to-one connectivity between local universities and local companies will not provide this independent brokering. 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 community. That is not the function of a university. Finally there is the skill of problem diagnostics. To analyse a company's need is a significant skill. It is not available among the academic community because that is not the mission of that community.

4) Background to the Faraday Partnerships

Drawing on published statements by the DTI, EPSRC and PPARC the following is clear. Faraday Partnerships are aimed at promoting improved interactions between the UK science, engineering and technology base and industry through the involvement of intermediate organisations. Qualifying intermediate organisations must be able to demonstrate an existing and strong connection with both industry (particularly SMEs) and with academia. Many of the best examples are to be found among the AIRTO membership.

The establishment of Faraday Partnerships is intended to strengthen the way technology is developed and exploited within the UK by stimulating coherence between researchers and new product developers. By bringing active players together around a common sector or technology theme, with common targets and agreed methods of working, the necessary elements for coherence will be put in place. Central to this is a style of management that works for the benefit of the Partnership as a whole, rather than a sectional self-interested group or organisation. It is an exercise in culture and attitude changing as well as a means to deliver specific knowledge transfer. Most important of all, it refreshes core competences among all parties and creates infrastructure based on a value-added trading business model.

For the intermediary the benefits are significant but must not be confused with the earlier relationship, based on government grant awards which contributed little to building a viable value-added knowledge trading business model.

Any knowledge transfer trading company must sustain its core skills. They must be competent in chosen areas of expertise and connected to global knowledge sources. Without such competence they are not able to translate fundamental research into practical application. Such competences are needed also to achieve technology transfer between sectors. When this competence in knowledge transformation is combined with capability in diagnostics for problem solving in industry, it is a powerful driver of increased innovation intensity.

At a time when science, engineering and technology are moving fast and traditional discipline boundaries are becoming blurred, the challenge of sustaining core skills in companies is of a high order. Faraday Partnerships offer a unique route to solution of this challenge.

If the Faraday Partnership is perceived by the intermediary and other partners as a short-term revenue generating activity it will meet with disaster. The Faraday Partnership is not designed primarily as a project programme. It represents a fundamental change in infrastructure which brings together the key players – industry, knowledge transfer trading companies and academia. It requires investment by all three plus the DTI and Research Councils. It must be seen as a long-term strategy which produces cultural change among all parties and leads to a private sector self-sustaining business model for value-added knowledge trading. Quick wins and shorter-term benefits are however necessary, as with any change programme, to maintain enthusiasm and to encourage further effort.

Faraday Partnerships are supported initially by directed public support funding. Their intention is to create a focus on a given area of core skill and to create on-going infrastructure. Looked at this way they offer great potential benefits to the universities concerned, to the knowledge transfer companies concerned and to the recipient industrial or commercial firms participating in the partnership. It could be argued to be a superior model to that operating in other European countries because it is embedded in the private sector, it is flexible, and able to respond to market changes.

5) The Faraday Principles

The “Faraday Principles” are designed to encourage closer contact and exchange between a knowledge base and business, and are expressed as follows.

- To promote active flows of people, industrial technology and innovative business concepts among the science, engineering and technology base and industry.
- To promote the partnership ethic in industrially relevant research organisations, business and innovative thinkers in the knowledge base.
- To promote core research that will underpin business opportunities.
- To promote business relevant post-graduuate training, leading to life-long learning.

The Research Council sponsors will provide up to £1 million over four years to each Faraday Partnership on a pump-priming basis. Subject to meeting quality considerations these research and training activities will be funded from an earmarked provision. This funding must be spent in the participating HEIs.

DTI will provide additional grant funding of up to £1.2 million over three years to each Faraday Partnership but with the possibility of a further two years support if recommended after an interim evaluation. DTI funding may be used, inter-alia, as a contribution towards the cost of supporting the following.

- Core infrastructure management and the employment of “technology translators”.
- The setting up of “industry clubs”.
- The wider dissemination of the knowledge generated by the partnership, especially through activities that link into the national, regional and local business support structure. The management and supervision of “Faraday Associates” (PhD students engaged on industrially-led research who are also receiving enhanced training as part of their work).

The DTI will also support centrally managed activities designed to network partnerships and to provide a national profile for the growing network of Faraday Partnerships including annual meetings of Faraday Associates.

Most importantly, Faraday Partnerships are expected to become self-supporting in due course through attracting a combination of support from business coupled with funding won in open competition from existing UK Government, Research Council and EU schemes including, for example, TCS, SMART, LINK, Framework Programmes etc.

The Faraday Partnership should be assembled around one or more suitable “Hub“ partners (eg an intermediary, university, government agency or private sector laboratory) with a group of participating research organisations, intermediaries and business users. The participants must share a common sector or technology interest and common vision

with agreed strategic and business plans for the Faraday Partnership likely to result in significant economic impact.

6) The business model and mission for an AIRTO member-driven Faraday Partnership

AIRTO members are at the forefront of Faraday Partnership development. Some partnerships have been more successful than others. This suggests need to deduce from experience the business model and mission which will deliver long term commercial success.

Faraday Partnerships set out to change relationships between the supply and demand sides for technological knowledge in the UK. This aim coincides with the AIRTO member business model. Some AIRTO members have their origins in collaborative research aimed at translating craft into technology. Other AIRTO members have evolved from new business enterprises, corporate research centres or from privatisation of public establishments.

Today all AIRTO members share the mission to trade in the private sector in value-added knowledge application for the enhancement of profitability in a client organisation. This demands competence in research methodologies and links with global knowledge sources. It requires constant replenishment of core skills. It is in meeting this need, that Faraday Partnerships offer a radical extension of value-added trading by an intermediary. However any intermediary business which looks to Faraday Partnerships solely as a means of providing short-term revenue benefits will be disappointed. Creating a successful Faraday Partnership is a strategic mission. It demands investment and entrepreneurial enterprise by any organisation dedicated to lead such a venture.

The Faraday Partnership is a co-ordinated collaborative programme in product and process innovation. It involves industry and universities and encompasses:

- definition of requirements for science, engineering and technology to underpin innovation projects;
- commissioning of science, engineering and technological research to support these requirements;
- exploitation of advances capitalising on research and technology adapted from other areas;
- help and support for SMEs seeking to innovate;

- training for post graduates, other students and those participating in the partnership whether from academia or industry.

Direction and management leadership must be provided by an intermediary of some kind, a role for which many AIRTO members are ideally placed, with high level support from the participating organisations. Work in the partnership must be carried out by smaller groups or consortia formed from the total participating community.

A Faraday Partnership must have a clear vision statement. The partnership vision should embrace the following objectives.

- To achieve first choice status as the natural "port of call" for specialist expertise and collaboration in the chosen subject area.
- To extend the partnership reach to embrace progressively increasing numbers of industry partners.
- To influence the agenda for innovation in the chosen focus area.
- To nurture development, commercial implementation and exploitation of knowledge from all sources relevant to the topic area.
- To provide training and education of post-graduate and post-doctoral personnel in academia to enhance their value to industry and provide re-training for industry-based personnel to update skills and competences.

7) Business guidelines for a successful AIRTO member led Faraday Partnership

7.1 The AIRTO member leadership of a Faraday Partnership must not be based solely on anticipation of short-term revenue generation. The policy must be primarily that of a medium to long term investment. This strategy will have several target objectives, among which are the following.

- Developing a business model and competencies for the future that address growth areas and which embrace collaboration with academic resources for research work.
- Upgrading continuously the core skills of the AIRTO member organisation by defining, managing and participating in networked research.
- Developing the marketplace for a variety of value-added knowledge trading services provided by the AIRTO member by leading the Partnership vision and through networking with key industry players.

7.2 The role of the intermediary/AIRTO member is pivotal to the success of a Faraday Partnership. The reason is that it demands leadership and management of the following.

- The network of industrial partners together with the best universities for particular work, whoever and wherever the best expertise exists.
- To ensure the work carried out is additional to that which would have been undertaken by the partners in the absence of the partnership. For example, ensuring the work is more than usually challenging, is industrially led and multidisciplinary – possibly involving several universities.
- The availability of "neutral" help to assist in resolving tensions in complex consortium-based project teams.
- Ownership of the exploitation process through the "development-gap" in early stage funding to deliver the product and/or process innovation enterprise goals of Faraday Partnerships.
- The application of public infrastructure funding with no unfair advantage to any single organisation.
- The informed, authoritative and balanced overview of the interests of all participants (large companies, SMEs, academics, investors, government etc.) that is necessary to underpin the partnership.

7.3 The strategy for the Faraday Partnership must be owned at high level in the AIRTO company, with ongoing personal involvement by senior management.

7.4 The Faraday Partnership must be understood by all staff in the lead company as a key strategic development in value-added knowledge transfer business and a core activity for the business direction of the AIRTO member for the future.

7.5 The Faraday Partnership must be backed by leading companies in the sectors served; it must encompass a majority of significant players in both industry and academia.

7.6 Faraday Partnerships must not act as "closed shops"; they are intended to be networks; albeit business relationships need to be defined to support financially sound business activity

7.7 The Faraday Partnership leader must allocate adequate resources and provide top management commitment to ensure that the Partnership is coherent and constantly developing to become a self-sustaining value-added network of R&D activity

The vision of a Faraday Partnership may be hard to grasp because it is ambitious, high level and multi-faceted. The vision demands champions who share the high level aspiration for new business models in value-added knowledge transfer which will increase the innovation intensity of the UK economy. Such champions are hard to find.
It is a major task to explain to new sponsors (industry, Research Councils, government departments) what Faraday Partnerships seek to achieve. Nevertheless, when decision-makers and others analyse what is wrong with current industry-to-academia interfaces and then explore the Faraday Partnership concept, they usually recognise the concept as embodying the essential elements of the remedy that they have been seeking. The devil is in the detail. Making a new and ambitious concept work, against the backdrop of many and fragmented government initiatives and a traditionally risk-averse culture is a challenge.

The sometimes narrow and over-constrained agendas of schemes in Research Councils and government departments may confuse those who need to be engaged in Faraday Partnerships. There is a real danger that the Faraday Partnerships could be pulled apart by the vested interests of these bodies in their own schemes and divergence from the focus needed to develop coherent understanding of the Faraday Partnership business model. There is a strong case for the rationalisation of public support schemes which, at present, confuse the marketplace.

The socio-business marketing skills required by an intermediary/AIRTO member to align disparate interests and to sell ownership of a Faraday Partnership are critical. While this motivation and competence is to be found in many AIRTO members, they may not be available in other organisations which are disinterested in making contribution to development of UK infrastructure. Amongst the other partners there will be different reasons which motivate them to participate in a Faraday Partnership. For example, large companies may be looking for ideas and innovative enterprise lacking in their own structure; SMEs may be looking for financial support or new customers or new markets; investors may be looking for potential deal flow; academia may be looking for financial support to research; government sponsors may be looking to stimulate innovation and increase financial return on public spending. The task of the Faraday Partnership leader is to synergise these aspirations.

Companies do not join Faraday Partnerships as an act of charity. They expect business benefit. This means Faraday Partnerships must embrace different activities, from high quality research to technology application, by engaging companies which seek technology, products, markets and financial support from both public and private sources. The Faraday Partnership leader must be able to work in all these areas and achieve connectivity throughout the partnership network. The incentive for this will

continue only if public support schemes are rationalised and long-term backing is given by government to the Faraday Partnership concept.

The “hub” structure referred to previously describes a Faraday Partnership in which one or more intermediary organisation takes responsibility for leadership. On occasions the co-operation of, say, two intermediaries in the “hub” structure can provide advantage. It extends networking. It may be the means to share the workload involved in developing closer relationships in a fragmented sector. The “hub” structure requires good working relationships and close ties at senior level based on trust and a shared vision. In terms of performance, a “hub” structure with more than one intermediary may have the advantage of introducing a degree of competitiveness between the managing intermediaries and preventing the Faraday Partnership drifting towards the business interests of a single Partnership leader or abdication of industry leadership.

Experience proves that having intermediaries “holding the ring” and leading the Faraday Partnership is beneficial. The intermediaries must, however, be practitioners in an area of technology as well as brokers and networkers able to command respect from all partners. Intermediaries must not treat the leadership of a Faraday Partnership as simply running another scheme for government. They must be committed to the vision of a task which is strategic and one which will transform their own business and the sectors concerned.

Technology translation is a central function in a Faraday Partnership. It is the activity of spanning communities of interest and linking individual participants in a way that goes far beyond older concepts of business support programmes or outreach activities of universities. It requires skills and experience often found only in established intermediaries or in individuals with years of experience at the academic/industry interface. The value of this role to the economy, in changing radically the value-added knowledge trading supply chain, is of a high order. The DTI is right to investigate the feasibility of creating professional training in this skill.

8) Faraday Partnerships will provide a route to new enterprise.

Innovation intensity will be fuelled in large measure, by entrepreneurs converting ideas into value-added business. Individuals with ideas may often reside in universities, albeit the academic community is certainly not the only source of ideas. The track record demonstrates that many winning ideas come from a “university drop-out” or frustrated employee. Another erroneous assumption, is the idea that universities can be converted into knowledge trading enterprises. While any university should be encouraged to support commercial enterprise, evidence shows this will be only a minor source of

revenue in an academic organisation. The successful pattern in the USA demonstrates that academic sources must be partnered with an organisation which can turn ideas into a properly articulated business proposal. Thereafter they must be supported by several stages of funding which will operate outside of the academic community.

In the UK there is now recognition of the importance of early stage funding to convert ideas into business enterprise. This function requires well-informed support in matters of science, engineering and technology as well as comprehensive incubation facilities. Such a trusted resource linked to Faraday Partnerships to capture emerging ideas which require transformation into profitable business is a powerful combination. Few of the present venture capital or other investment vehicles possess the required characteristics.

AIRTO has nurtured a unique new player in the funding scene in the form of E-SYNERGY Limited, a new type of investment firm for early stage technology support.

E-SYNERGY has been formed by a group of CEOs and former CEOs, of AIRTO member organisations, all with practical experience in growing technology businesses. They have attracted investment from leading venture capitalists forming a unique blend of experience, networks and resources.

E-SYNERGY provides a new approach which offers understanding of the process of developing new technology, combined with a reliable and cost effective evaluation process and management experience to realise the potential of the embryonic idea. The challenge is to capture ideas by effective evaluation which will lead to realisation by nurturing those ideas to the point of a convincing business proposition. E-SYNERGY has formed investment partnerships with key organisations with world class expertise in different markets including AIRTO members and university spin-out organisations. E-SYNERGY is engaged in dialogue with university based exploitation companies to strengthen this network.

E-SYNERGY has arrangements with two leading Faraday Partnerships. Involvement of an investment partner with the Faraday Partnership at an early stage brings a much-needed new perspective to the process of increasing innovation intensity. The E-SYNERGY approach will provide help to technology innovators to develop improved awareness of the market potential for their proposals.

Part of the mission of E-SYNERGY is to be the trusted partner and the financial and incubation supporter to innovative thinkers found within Faraday Partnerships. This

connectivity will complement the total activity of a Faraday Partnership and provide another route to the value-added trading of knowledge.

9) The AIRTO community supports quality deliverables lead by an industry orientated intermediary

The AIRTO community endorses Faraday Partnerships as a new mode of knowledge transfer in a knowledge-economy and commits support to accountability against deliverables and rigorous quality management. The AIRTO community subscribes to open statement of success criteria for Faraday Partnerships and rigorous independent evaluation of their achievement. Some criteria to be used in measuring success for individual Faraday Partnerships should include:

- output targets – for new products and processes; people trained (at various levels); research completed; levels and types of industrial problems solved; industrial and venture capital funds raised for further product development, etc.
- the management arrangements for the partnership, including industry leadership, industry participation, industry recognition of the partnership through promotion and publicity;
- effective arrangements to market outputs to business and to define work areas for academia;
- leadership in the business arrangements for Faraday Partnership outputs including management of IPR;
- management of Faraday Partnership direction to ensure added value/cost benefit over existing activities/organisations and demonstration of commercial advantage to industry recipients;
- responsibility for developing long-term business plans to achieve independent viability in the private sector of the Faraday Partnership.

The AIRTO community, in addition to commitment to the above success criteria, makes commitment to the management of specific deliverables from Faraday Partnerships in which AIRTO members participate. The expected deliverables from each Faraday Partnership will reflect clear objectives established by the partnership and will often depend on the leadership provided by the intermediary. The AIRTO community suggests that Faraday Partnership deliverables should cover the following.

- A defined level of brokerage – of ideas, people and resources – to increase the effectiveness of research and its application. Particularly important will be the management of exchanges of personnel between industry and academia and

between firms in supply chains. This implies an enhanced strategic management role for intermediary personnel. It emphasises the difference in the Faraday Partnership, with its focus on strategic change, from the previous era of project management.

- Defined levels of technology audit and exploitation activities needed to bring about significant change in the UK economy and which may be subject to measurement.
- An appropriate interface between SMEs and academia, otherwise SMEs will have little opportunity for participation in collective research to enhance their competences.
- Targets for the number of post-graduate research students (Faraday Associates) recruited each year and trained in technologies essential to UK business. This will contribute uniquely to change in the competence profile of UK industry, which in turn will lead to increased demand for the services of AIRTO members. This then becomes a strategic marketing investment for the AIRTO member.

AIRTO members acting in leadership of a Faraday Partnership must link this role to the business plans of their own organisations. They must have in-hand work on a range of new product/process concepts developed by consortia of organisations at the academic/industry interface, which are willing to continue working together regardless of public sector support. This is the central deliverable for the AIRTO member in engagement in Faraday Partnerships. It is the use of pump-priming funding (from the Research Councils and the DTI) to create the marketing of a new business model for value-added knowledge trading. It provides the opportunity for market research and business development investment in a new business model which ensures:

- technological and market focus for research and exploitation taking account of new regional innovation and economic strategies;
- opportunity to set the agenda for HEI research and teaching programmes which will provide outputs for value-added business opportunity, including the participating AIRTO member;
- the means to manage linkage between the various elements of public sector support programmes leading to joined-up everything and a more responsive marketplace.

10) Conclusions

The AIRTO community and UK-based value-added knowledge transfer companies operate in a fashion radically different from their equivalents in other EU Member States. AIRTO members operate in the private sector and follow private sector business models.

Unlike other EU Member State models, AIRTO members are not dependent on public funds. However the emergence of a knowledge-driven economy demands a new approach to the relationship between industry, knowledge transfer companies and academic sources of knowledge – including the global community of academic resources.

The AIRTO community recognises that the development of a knowledge-driven economy demands a different approach to partnerships between industry, knowledge transfer companies and academia.

The AIRTO community notes with satisfaction that much of the Faraday Partnership concept has its origins in EPSRC when under the Chairmanship of Sir Alan Rudge FRS FREng – who was familiar with the roles played by intermediary organisations – and in DTI's best practice and business innovation departments. The AIRTO community welcomes the level of commitment now given to Faraday Partnerships by several Research Councils and the DTI. This renewed commitment makes feasible the growth of an extended community of Faraday Partnerships in which AIRTO members will continue to participate and provide leadership and management expertise.

AIRTO recognises that Faraday Partnerships are strategic. They must not be confused with previous government support to project based programmes for multi-client research. The initial objective of the Faraday Partnership must be to utilise pump-priming funding to produce self-sustaining value-added business models for knowledge transfer and wealth creation from the science base, wherever it may reside. AIRTO invites intermediaries not in membership to join the AIRTO community and to take up the challenge of exercising this leadership.

The AIRTO community – explicitly through its Board of Directors – endorses the rigorous assessment of Faraday Partnerships in terms of their quality, their leadership of change and their measurable outputs, which must be aligned with criteria that relate to enhancement of the UK economy. The AIRTO Board welcomes such independent and rigorous assessment and supports those Faraday Partnerships which demonstrate best practice and achieve the desired measures of success and leadership of change.

APPENDIX I

CURRENT FARADAY PARTNERSHIPS

The Faraday Partnership in Automotive and Aerospace Materials:
Oxford University, Cranfield University, Oxford Brookes University, Business Link: Heart of England; The Oxford Trust and MIRA (the Motor Industries Research Association).

The Food Processing Faraday: The PERA Group, Leatherhead Food Research Association and Birmingham University.

The Imaging Faraday Partnership (formally 3-D MATIC): Imaging Technology and Applications
National Engineering Laboratory, Sira Group and University of Glasgow.

IMPACT: Innovative Materials Development and Product Formulation by the Application of Colloid Technology: Campden and Chorleywood Food Research Association, The Bristol Colloid Centre and The Institute of Applied Catalysis.

INTErSECT: Intelligent Sensors for Control Technologies: Sira Group and the National Physical Laboratory

Faraday Plastics: The Catalyst for Innovation in the Supply Chain:
RAPRA Technology Limited and the Warwick Manufacturing Group (WMG).

PRIME: The East Midlands Faraday Partnership, Products Comprising Interdependent Mechanical and Electrical Parts:
PERA Group, The University of Loughborough and University of Nottingham.

The Smith Institute for Industrial Mathematics and System Engineering: The Smith Institute.

The Technitex Faraday Partnership (Technical Textiles)
Heriot-Watt University, British Textile Technology Group (BTTG), UMIST and the University of Leeds.

The White Rose Partnership for Enhanced Packaging Technology:
University of Leeds, Pira International, Cambridge Consultants, University of Sheffield and the University of York.

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.

2000/4	AIRTO response to OST consultation on research in Europe after Framework 5.
2000/3	Increasing UK innovation intensity and the solution to the problem of knowledge transfer to business enterprise
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, education & 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
96/2	Trading with SMEs: Improving their competitiveness
96/1	The role of the European Commission in funding research and technological development

List of Members

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Brewing Research International	BRI
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The Building Services Research & Information Association	BSRIA
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