

AIRTO contribution to the debate leading to a possible White Paper on Science and Innovation Policy. Presented to the Minister for Science: December 1999

Background

AIRTO has been privileged to be able to preview and comment on the DTI review paper on Science and Innovation Policy. The paper contains valuable analysis and moves in a direction to which AIRTO is sympathetic.

AIRTO agrees strongly with the key concern over the low priority given by industry to innovation and the evident low innovation intensity across the majority of industry sectors in the UK.

The DTI paper identifies five challenges for government in its quest to increase innovation activity. AIRTO acknowledges and supports the importance of these five areas in the government's thinking but suggests that a more comprehensive approach to stimulating innovation in industry, commerce and the public sector is needed in order to make a more fundamental impact on the problem.

Overall, the analysis and recommendations presented in the paper place too much emphasis on the university science base, instead of focusing clearly on the measures required to solve the problem in industry. The focus must be on the causes of market failure and the role of government in contributing to a solution, in partnership with both public and private sector organisations. It is fundamentally unsound thinking to suppose that stimulating the science-base in universities and its exploitation by these same universities will of itself address the real deficit in innovation in the UK.

We agree with the DTI analysis that there is a need for more innovation intensity in UK industry and better exploitation of the strong UK science base to form innovative companies.

We agree with the DTI analysis that there is a gap in the venture capital industry provisions for early stage technology start-up businesses.

It is expected that in the future the most able technically qualified people will be less motivated by working as employees of large organisations and will be more motivated by working in small growing organisations in which they can have a meaningful share ownership stake. The flow of talented people away from large and/or public sector organisations is likely to increase. Thus the gap in the venture capital market will become more important as a limiting factor for national growth than in the past. This is

where an increase in innovation intensity could have large scale consequences in the long term.

Large industrial organisations have both inertia and resources but need to be fed by small innovative companies both as suppliers and as trade buyers of small businesses. Thus a focus on small companies without resources but able to grow quickly is likely to be most effective if the right approach can be found. SME's are an essential part of every dynamic supply chain as are the larger supply chain leaders.

The market failure of the venture capital industry in the investment range £50k - £1.5M is seen as partly due to the approach and resources available to it and partly due to banker's desires to maximise return and reduce risk. At early stage, before there is an established revenue earning business, conventional diligence is expensive and market and technology knowledge is more crucial to success of the enterprise. Risk can be reduced with improved knowledge. Rate of return can be increased with appropriate support. This is where new thinking is needed.

However, this gap cannot ever be addressed by Universities or other HEIs. There is an intrinsic conflict of interest between the university mission to produce well qualified people and published academic research using public money and the high growth company mission which is to exploit often unpublished or confidential technological developments for private commercial gain.

Without a broader perspective that is less apparently concentrated on the university role in the science base, and more obviously cognisant of the barriers to innovation in industry, the DTI policy review will have less impact than would otherwise be the case. In this document AIRTO therefore advocates a broadening of the policy review.

Summary of AIRTO recommendations for a new Science and Innovation Policy

- Shift policy to balance incentives for knowledge creation and dissemination with those for demand driven uptake by increasing the latter. This can be helped by stimulating value-added knowledge trading in the private sector.
- Complement the concept of the science base as a provider of knowledge for innovation with a focus on motivating the demand side. Broaden the policy to include all organisations that contribute to the science base, recognising that universities are not the only or even the primary generators of innovation and are unlikely to be so if they are to fulfil their other roles properly.

- Introduce a fiscal policy whereby benefit is derived by all those committed to innovation. Ensure a “level playing field” for all concerned, including equal tax treatment and equal access to resources, funding and support schemes.
- Make a central pillar of innovation policy the creation of a vigorous private sector encouraging innovators to form new high growth technology companies
- Support initiatives which contribute to risk reduction in innovation and thus stimulate a higher level of innovation intensity in the UK.
- Support several competitive early stage investment funds aimed at filling the current venture capital market gap and provide special incentives or support opportunities for this sector
- Ensure Foresight is used to identify key issues which set the agenda for academic research. Ensure connectivity between government departments and between policy directions and the private sector to produce critical mass initiatives capable of generating real change in innovation intensity.
- Enhance Faraday Partnerships as a means of stimulating the growth of new supply chains.
- Change the Research Assessment Exercise (RAE) to emphasise accountability in HEIs for transfer of academic research output to teaching, thus raising the quality of people-output from universities. Emphasis should be on inculcating attitudes in graduates that support industry needs.
- Pursue a long-term policy (five years) of support for a networked infrastructure of ICT based knowledge management and knowledge dissemination (the national knowledge pool). This should be aimed at a long-term self-sustaining and profitable knowledge-trading activity in the private sector. Policy must recognise the conditions needed for this to flourish.

NOTE:

These proposals are discussed in what follows in this document but the AIRTO Board would welcome opportunity to elaborate on them in discussion with the DTI.

Observations on the DTI review paper on Science and Innovation Policy

The key issue is the low priority given by industry to innovation and the evident low innovation intensity in the UK. (Section 3.1) of the DTI draft paper. The short-term high return on capital sought by shareholders and investors (paragraph 2.28) is a major factor in this problem.

It is a fact that many UK companies focus on acquisition and disposal to energise themselves, rather than concentrating on other forms of innovation strategy. This is a cultural and fiscal problem. It is by examining the impact of these two factors – industry culture and the fiscal environment – that progress towards solutions are likely to be identified.

Dealing with risk in industry

Large organisations, including government, are seeking increasingly to divest themselves of risk preferring to pass risk to their suppliers. Smaller supplier companies find it progressively more difficult to absorb higher levels of risk. This in itself reduces profit margins and deters innovation in SMEs particularly those in high technology supply chains trading in the global market. With a few exceptions, SMEs engaged in supply chains have always found great difficulty in funding R&D. This includes finding the means to upgrade their innovative competences. The DTI policy change, which ended incentives to collective multi-client research and knowledge transfer, has weakened innovation intensity in UK SMEs. Recent independent auditing of this DTI policy change provides evidence to prove this point. There is a need therefore to re-examine policy with a view to providing greater demand side incentives for SMEs, particularly in supply chains which can engage in collective R&D and knowledge transfer.

There are other factors to be taken into account. As a result of their policy of passing on risk, large organisations are reducing their commitment to research. This is particularly true of indigenous UK organisations, which means they are progressively losing their position as supply chain leaders. Present government policies which place pressure on universities to generate trading income encourages large companies to outsource their research to universities on contract, at least in part as a cost reduction exercise. This reduces the level of active industry involvement in research and downgrades high quality curiosity driven research in the universities. Present policies are actually weakening both the incentive for companies to retain their own capacity for research and for universities to pursue curiosity driven, but relevant, fundamental research.

These aspects of industrial strategy are not dealt with in detail in the DTI review paper. It is AIRTO's view that it is this aspect of business strategy rather than lack of resources

available to industry - that creates the more important barriers to innovation. It will be essential to examine more fully the drivers conditioning the behaviour of firms in the marketplace. From this examination may be deduced incentives to counteract the failure of the market to stimulate sufficient product and process innovation. AIRTO is engaged already in such investigative work in collaboration with ESRC. Partnership with DTI to advance this work more quickly would be welcome and could benefit all concerned.

Clearly, the problem hinges around the risk/reward ratio associated with innovation. At present there is failure in the total system which inhibits R&D investment both in large enterprises and in SMEs unless the rewards on offer are extremely large.

To increase innovation intensity it will be necessary to take steps to reduce risk and reach a situation where more modest returns are sufficient to justify investment. A number of factors serve to reduce risk. Some are identified in the review paper. These include the availability of large buyers for innovation-based products and services. The review paper points out (paragraph 2.48) there is a strong government customer presence associated with defence and health. This correlates well with the innovation intensive aerospace, defence and pharmaceuticals industries (paragraph 2.37). In these industries the UK has both strong government presence and supply chain leaders who influence innovation intensity significantly. The result is UK dominance and successful economic performance in these areas. Sir Alec Broers has drawn attention to this issue. He has highlighted the fact that much UK innovation in other sectors fails to lead to the development of supply chain leaders. It is clear that working with a supplier and a world leading customer company helps to nurture innovation (paragraph 2.36). The problem is that there are few large indigenous UK supply chain leaders in many important sectors. Measures to encourage the presence and development of such companies in the UK should have a high priority albeit the process will require long-term measures and continuity of policy.

Innovation policy needs to take account of what more can be done to reduce risk and make investment more attractive. Technology risk can be reduced by partnership with people having a track record of understanding of science, engineering and technology. Measures to facilitate access to, and interaction with, experienced knowledge application practitioners will provide a significant impetus to innovation intensity.

Public support targeted at the demand side, towards SMEs in particular, to provide incentives for collective R&D and techno-business consultancy at affordable rates would contribute to solving the challenge of increasing innovation intensity by

- reducing development risk

- contributing to the establishment of a market for knowledge transfer
- establishing a range of competitive SME suppliers with enthusiasm for innovation in supply chains engaged in global trading.

The Universities

The cultural issue referred to earlier will be a long-term problem. It is where the science base should make its greatest contribution to enhancing innovation intensity.

Universities represent a massive investment of tax payers funds. They must focus on producing people with new attitudes and new skills. Value for money from universities will not be achieved by giving them incentives to become trading enterprises (Out-reach and University Challenge etc.). The value of direct exploitation and knowledge trading by universities is minuscule compared to their investment cost and to their potential contribution in terms of producing high quality and appropriately motivated graduates.

Science base policy should be reviewed radically. Science base policy should be focused on the quality of university training output – the graduates. That quality should be subjected to new measures. The measures should relate to graduate competences, their relevance to the needs of industry, and developing positive attitudes towards the challenges of enterprise and innovation in industry and commerce. When they reach industry these graduates can then apply their intellectual skills to the problems of industry. It is not the function of universities to develop trading activities that seek directly to solve the problems of industry and they are not equipped for this. Exposure to radical thought processes and fundamental research in areas relevant to, but not applied to, industry needs should be at the forefront in universities.

The expenditure on research in universities should be re-appraised. It must be made more accountable against specific criteria, including Foresight priorities, but more particularly based on graduate development. Even more important is the upgrading of teaching to produce a better graduate output. Much of the lower quality academic research is not relevant to the needs of industry and does not contribute fundamental new knowledge. It contributes little to the enhancement of teaching quality and the quality of graduate output.

An important aspect of innovation is the flow of talented people. AIRTO supports the views on this subject of Dr Alan Rudge CBE FRS and Dr Bruce Smith CBE. Both have advocated curiosity driven research in universities but on relevant topics. They have advocated more policy initiatives in the transfer of people as a contribution to the solving innovation problems. Mobility of people between organisations, as an aid to knowledge transfer, is essential. The Teaching Company Scheme (TCS) makes a contribution but it addresses only one facet of the problem. Present schemes which seek to involve

industry incur considerable cost and risk for the donor organisation. This acts as a deterrent. This is a policy area in which detailed review is required.

Measures to stimulate innovation

A tendency which runs through the present DTI review paper is the inclination to introduce “promotional schemes” to solve the innovation problem. Awards can motivate companies to change behaviour, but the benefits diminish over time. Evidence based assessment of the marketplace demonstrates an alternative way to stimulate change. The model is that of the sector leader or sector maverick.

There is no more powerful influence on other players than the successful exemplar. A successful exemplar based on innovation forces all players to reconsider their position and practices. This implies radical change for DTI policy as the agent of public leverage. It suggests abandonment of “promotional” change management and its replacement via competitive bids with support to progressive private sector enterprises willing to adopt innovative business activity. Support to such enterprises linked to Faraday Partnerships and to a knowledge transfer trading sector would produce step-change in the UK marketplace. Faraday Partnerships remain an excellent concept. The original Faraday concept was one of partnership between the academic community and industry, with industry setting the agenda. Aspirations for these Partnerships will be fulfilled only if incentives are provided for industry to set the pace and direction.

The argument that this means backing winners can be overcome by an independent competitive challenge award system. AIRTO would be willing to elaborate this concept if invited so to do by the Minister.

In summary, innovation is not an abstract concept of linear knowledge transfer focused around the university science base. It is a practical activity which must be embedded in all organisations. It must be underpinned by a positive culture towards change and risk. Innovation policy must take an holistic view of the subject.

Focusing on early stage investments: public - private partnerships and the need for comprehensive management support

An essential driver to improve innovation intensity is to maximise UK creativity and turn it into a profitable business enterprise. The ideas may come from a wide spectrum of inputs. There are many employees with excellent innovative ideas who have no route to implementation. Research and technology organisations produce many novel ideas but have not developed partnership with the venture capital industry. Individuals in the science base have novel ideas but are disinclined to collaborate with their own organisation or with venture capitalists.

The DTI has made commitment to recognition of this problem through its commissioning of Westport Private Equity to manage the DTI UK High Technology Fund. This approach is to be welcomed but it must not be the exclusive involvement of the DTI in early stage support. There are two reasons why this commitment must be extended. In the first place Westport Private Equity will benefit by having competition. Second the AIRTO community can provide a comprehensive network of support to early stage development which is wider in coverage and greater in depth than any venture capital managing agent is able to provide. The willingness of the DTI to be an investor in a number of such funds is an excellent initiative. It should be developed. Through what follows in this document the AIRTO members concerned with the new consortium initiative – E-SYNERGY Ltd – invite the DTI to be a subscribing partner.

The growth of small technology companies in the UK can be increased only by active involvement of investors and participation at board level in the formulation of strategy that will manage the development culture. An initiative has been made by the AIRTO consortium to develop a new style venture capital fund especially for the purpose of enhancing the growth rates of small science, engineering and technology based businesses. Such businesses often need investments in the range £50k - £1.5m. In addition to financial support a tailored package is needed to assist market and technology development for each company. Constantly developing and streamlining these support systems and processes, which will include ideas filtration, will need to be undertaken so that they become increasingly cost effective. The more effective they are the more proposals can be screened. The more proposals screened, the greater the probability of increasing the success rate of new enterprise generation. The better the support network, the more synergies will be found between company ideas. The present schemes on offer via universities or the venture capital industry and Business Angel networks do not satisfy the required conditions. The track record demonstrates market failure in this area.

University based schemes will be, on average, peripheral to the core question of stimulating company growth. The idea that universities can deliver high growth companies is flawed in concept and unworkable in practice. There may be some cases where university based expertise is helpful, particularly if it is of a direct technical nature. A positive approach to encouraging universities to help small businesses is beneficial but this will never change the culture in UK businesses. Indeed, as previously stated in this paper, the habit of looking to universities for free or subsidised technical advice can undermine the value of focused technical consultancy and project management operating in the private sector.

If universities are distracted from their primary mission of teaching and academic research, this is detrimental to the national infrastructure which cries out for well educated and highly trained people who are appropriately motivated to meet the needs of industry. There is already evidence that the flow of properly trained and qualified post-graduates is dwindling. If the universities focus on people as their product, there needs to be a different system entirely which can focus on companies as their product for development. This is provided by the venture capital industry – which is more highly developed in the UK than elsewhere in Europe – but nevertheless its approach is still lacking when dealing with complex technology and early stage investments.

There is a gap in the market for investments in the range of £50k - £1.5m. The venture capital industry finds it difficult to make this area of investment cost effective. Business Angels fill some of this need but act as individuals without organised support. This lack of organisation and comprehensive support facilities lessens the effectiveness of Business Angels for many start-up proposals. The Business Angel networks (some of which are sponsored by the DTI) are of value but they are not allowed under the Finance Act Legislation to provide comprehensive investment advice and support. The most they can do at present is facilitate meetings between investors and companies looking for investments. They cannot help either the decision process or support growth of the company. Under the present legislation it is considered this can be done only by an organisation with IMRO registration. Business Angels may thus often make unsafe investments using their own money because they are without organised technology, market diligence or a wider experience of trading patterns.

The new proposal from a consortium of AIRTO members

Drawing on the experience and supply chain networks of AIRTO members, E-SYNERGY Ltd has been formed. It plans to focus on investing in, and supporting, the growth of small innovative companies where technology is an important part of their

business objective. It is planned to put together a fund of around £50 million for investment in small technology based businesses in Britain.

E-SYNERGY Ltd will include not just the fashionable Internet activities but any area of industry where growth can be achieved with new technology. It will not be restricted to a single geographic location but will build synergistic relationships on a national basis. It will develop professional processes a) to improve the efficiency of effective investment decisions and b) to enhance the growth rate of small technology based companies and encourage a culture of effective R&D. The aim is to use the network of independent research and technology organisations to complement the provisions of the venture capital industry and of Business Angel networks.

The management company will include established venture capital partners who will then be able to take on later stage investment once the ventures are established. An investment and support methodology is being developed specially for large numbers of early stage technology proposals. Discussions have taken place with representatives from the venture capital industry as well as the banking community. E-SYNERGY Ltd has been welcomed with enthusiasm. E-SYNERGY will have unique characteristics not available from any similar initiative. Some of these characteristics are as follows.

- A management board composed of CEOs with an established track record of managing technology for profit.
- Unique links with the investment community which bridges the technology - to - investment gap.
- The resources to draft - in additional management skills whenever required from the AIRTO community.
- Unique experience and skills in linking public funds to early stage development in a continuum to other investment funds and subsequent onward financial growth.
- A unique reputation as a trusted partner community willing to provide partnership support and longer term investment.
- Through the AIRTO network, a wide range of marketing contacts and marketing intelligence.
- Through the AIRTO network, a wide range of incubator facilities combined with project and financial management skills.
- Connectivity to additional research and development skills in the AIRTO community or the university network.

E-SYNERGY is a unique initiative by the private sector. It seeks no special privileges or arrangements with the DTI. However, as the DTI has acknowledged the need for high technology funds, the Department is now invited to invest in the E-SYNERGY fund to

assist in its initial development, following the precedent reported for Westport. It is also invited to pilot an appropriate grant scheme tied to investment in SME growth that would be fairly and openly available to all. AIRTO and E-SYNERGY would be willing to help develop such a scheme. Other valuable assistance would comprise a Ministerial letter commending the E-SYNERGY initiative and arrangements to refer early stage proposals from spin-offs and SMEs to E-SYNERGY for consideration and evaluation.

Dr Brian Blunden OBE, President

Professor Richard Brook, Chairman

Dr Andrew Stevenson, Member of Council and Chairman of E-SYNERGY Ltd

on behalf of the AIRTO Board

20 December 1999

cc: Mr Robert Foster - DTI
The AIRTO Board