

TECHNOLOGY AND INNOVATION CENTRES



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AIRTO has long argued for a UK equivalent of the technological support infrastructure represented by the Fraunhofer Institutes in Germany. This would address a long standing problem with the UK's underperformance in converting world class research into economic growth. The problem stems from a perception at policy level that investing in universities and encouraging closer working with business and industry will of itself bring about significant economic growth. This falls quite a long way short of what's needed in relation to a) boosting research based innovation by facilitating industry to industry working and b) making available a full spectrum of specialised skills and support at every stage of the journey from research through innovation to successful commercialisation.

This article reflects the oral evidence from the author to the House of Commons Science and Technology Select Committee into Technology and Innovation Centres in December 2010.

Adding dedicated research and enterprise resources to universities achieves a measure of success, but struggles to address several important aspects of the challenge, particularly where collaboration and partnership between multiple parties is concerned. More extensive support is required, particularly to help match demand side pull from business and industry with scientific and technological expertise; to co-ordinate access for industry to multiple sources of scientific and technological development; and to proactively stimulate collaborative enterprise, foster technology development and support business incubation.

Until very recently, this had not been recognised; but in late 2009 Lord Mandelson was introduced to the Fraunhofer system. Taking the message seriously, he instigated the Hauser Review. This has moved us a long way forward, helped considerably by the increasing emphasis on high-growth companies to drive job creation

and wider economic development and by the need for these companies to leverage new technology.

This isn't the first attempt to enhance the industrial uptake of new technology in the UK. New centres were brought into being after both world wars and, together with Public Sector Research Establishments and privately formed research organisations, these comprise a considerable network of technologically highly skilled resources across the UK.

SO WHAT IS THE PROBLEM?

Governments have repeatedly tried to make these centres financially self-sufficient. This inevitably changed their business models, away from generic research serving the national interest and working with SMEs, towards services and less risky work for larger enterprises worldwide, thereby moving them away from the purpose for which they were established.

A previous attempt to emulate Fraunhofer style institutes gave rise to the Faraday Partnerships that came into being in the 1990s. I ran one of the first of these. Why didn't they last?

The Faraday Partnerships started up very unevenly. First of all, a number of Post-graduate Training Partnerships were established between individual RTOs and research intensive universities. This was modelled on one element of the Fraunhofer system. Those of us involved felt that they were very successful. Later in the decade the Faraday Partnerships proper were launched as the EPSRC provided an initial tranche of ring-fenced research money for university partners. The Department of Trade and Industry could not find the budget at the time to provide what would be the core funding for the partnership infrastructures; that eventually came somewhat later.

When the ring-fenced research money was exhausted, the Faraday Partnerships were

directed to apply through normal research grant application processes to be peer-reviewed competitively, along with the main body of university researchers. As industry began to call for the initial ground-breaking work to be pursued further, the rankings from the peer review system declined, in many instances because, although fundamental to the technological foundations of industry's development programmes, it was no longer the glamorous or break-through research traditionally used to benchmark academic research proposals.

There was (deliberately) no specific or well-defined governance model; some Partnerships were run by universities and some by intermediate organisations. Most resulted from open calls for proposals, rather than developing from a strategic perspective on the UK's innovation landscape. There was little support for brand development in the way now being proposed. Eventually, as policies and responsibilities within government changed, the Partnerships evolved into the Knowledge Transfer Networks which, although extremely useful, do a very different job. It was a valiant effort, but too piecemeal, not helped by difficulties in co-ordinating public funding for them.

The proposals for Technology Innovation Centres have taken on board many of the lessons from that era. Most importantly, the core funding must be maintained in a consistent fashion to anchor each Centre in a strategic role serving the national interest with an activity plan that is not deflected by disproportionate pressures from short term financial imperatives; such pressures will otherwise override other longer term

activities to the detriment of the Centre's mission.

Any new Centres must fill gaps in what is currently available from the networks of existing organisations (RTOs, PSREs, universities), otherwise there will duplication of the expertise and support that is already available to industry. The TICs must utilise this existing expertise and capability, both up-stream to additional sources of innovation and research and downstream to new business and industrial constituencies in a hub and spoke model, to deliver new outcomes that cannot currently be achieved. The Technology Strategy Board must avoid duplication and ensure that the new outcomes are delivered. The funding should not be used just to continue what's already being done.

The TSB will need to map the capabilities that already exist and to identify, against the UK strategic needs, what of the current capabilities can form the starting point for TICs and what is missing. AIRTO's members already do quite a lot of what is needed. But they don't currently have the core funding to operate in the manner envisaged for the TICs. They mostly have to behave very commercially, prioritising large company clients for research and providing mainly routine services for smaller companies.

There is merit in preparing a business plan for each TIC, much along the lines of investing in a business. This means identifying market needs; routes to market; strengths and weaknesses of existing players; resources that can be brought to bear; competitive edge; how much it will cost and return on investment, all with supporting evidence. Clearly, TICs, given their remit, are broader enterprises than typical companies, but the process of

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defining the above parameters in a business-like way is entirely applicable. Such a plan should underpin each TIC.

Industry wants TICs to be able to take apart their problems, source the science and technology from the best available and put it all back together as a solution. To facilitate this there may well be students, professors and academics on secondment from a number of different universities. There is a compelling argument therefore for TICs to be independent of a particular university or universities, so that they can go to as many world leading scientists as necessary. Centres should look to strong international networking as well as strong connections in the UK. This approach also permits greater choice of geographical location. Perhaps the most sensible place to locate a TIC hub is within a concentration of the industry that it will serve.

Demand pull and technology push need to work together to deliver the TICs' mission. Some Faraday Partnerships successfully brought industries together to articulate their needs. That was the pull. Academics were brought together, in the same meeting, to describe where their research was going. That was the push. Partnership staff then facilitated consortia to take forward work of common interest. Without push, opportunities for innovation will be missed; without pull, technology may be developed

for which there is no customer. SMEs were brought in by ensuring that large enterprises (their potential customers) were present. The facilitation skills to join push and pull are key. It is important for TICs to be open to all sources of invention and innovation; although universities contribute a lot, many more innovations come from industry itself. This too needs TIC support, across the many players in the supply chains, calling on university science where needed.

A TIC's precise mode of operation and the push/pull balance will depend on the maturity of the relevant technology and supply chains. Inserting innovation into existing supply chains requires a particular approach with much emphasis on licensing. If the market isn't fully matured and supply chains haven't evolved, a different mode of operation is necessary, with more emphasis on start-up companies. The latter needs technology push, but also a lot of entrepreneurialism. The key is finding entrepreneurs whom investors can back to build businesses into spaces where supply chains don't yet exist.

Intellectual property needs careful handling. Formalised invention disclosure procedures are increasingly being used in universities and elsewhere, helping to determine when and what to patent (and what not to patent) and there is exchange of best practice between AIRTO's members and universities and



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between the universities themselves. However, the Research Assessment Exercise (now Framework) complicates the position for university partners. Academic researchers strive to produce publications because that is the primary measure of university performance. Delaying publication does not go down well, but it is generally possible to produce a respectable publication while not disclosing information that may prejudice the potential to patent. The more partners involved, the more complicated the handling of these matters becomes. TICs can reach out across the cultural bridges, between universities and small businesses in particular. This is a good reason for positioning and equipping the TICs to serve as brokers in such matters.

There are a number of other important roles for TICs. One is helping to incubate and attract investment to SMEs aiming for rapid growth. Another is helping companies access European funding, through Framework Programmes for instance. The UK does well here on the academic front, but industry does proportionately less well. The TICs can help correct the balance by increasing the return to industry. Applying for Framework projects is difficult and bureaucratically painful in many respects and industry is frequently deterred. SMEs find it particularly hard to bear the risk

that they will invest considerable effort in applying and then be unsuccessful in obtaining funding. TICs can do a lot of the work, reducing risk for participants and championing the effort to increase the UK's industrial return.

A clear, shared vision for what the TIC is trying to achieve is crucial, and this must remain consistent for a good period of time and not 'creep' because new people with different visions become involved. It will need a strong drive from the TSB to set up the appropriate terms of reference and success criteria. TICs may come under pressure to address a variety of national, regional, technological, socio-economic and even global goals. It is very important to keep in mind that it is economic growth, wherever that takes place in the UK, that justifies the investment. Individual regions come into play when looking at where new enterprises associated with the TIC hubs and spokes become established. Schemes to support early-stage companies outside the South East are well funded to help attract such enterprises and promote growth in these regions.

The TIC brand will need managing. If performance among the TICs is variable, industry may start to regard some of them as failing. At the highest level, the TSB needs to look after the brand and make sure that the TICs' image and their performance reinforces the brand.

Governance could be based on a number of alternative models. AIRTO members embody several of them. However, particularly when trying to bring something new, like the TICs, into existence, it's important to keep clear of vested interest and to avoid suspicion between potentially competing stakeholders. The model that generally works best in these circumstances is the Company Limited by Guarantee (CLG). A CLG is not driven to satisfy a particular group of shareholders. It re-invests surpluses rather than distributing them. Its assets cannot be acquired, except by another CLG; and it positions the organisation in the 'centre ground', albeit without the ability to raise funds in the way that a shareholder-owned company would. This is probably the structure most appropriate for the TICs.

The main measure of success has to be impact on economic development. The third/third/third funding mix and the amount of private sector funding leveraged is a performance target that TICs have to go for very hard. This won't be achieved overnight if they are starting from scratch, and this is a reason for utilising existing organisations as the starting point for TICs, wherever possible and appropriate. The private funding provides the benchmark that says that the TIC is fulfilling a real need. Most AIRTO members started out being publicly funded but have moved progressively to a position where they are privately funded for the majority of their work. As noted earlier, this is at the expense of providing some of the service characteristics that can only be sustained with consistent public funding, ie engaging heavily in research and dedicating significant time to SMEs. The margins from other

work do not provide the necessary headroom to reinvest a really substantial proportion of revenues (ie the 50% that would be required for a purely private sector TIC) on such activities.

TICs, over time, will probably also move towards majority private funding as they grow, but through continuing core funding will be able to maintain the resources to keep up the public service element of their work, at least until the market failure is no longer so pressing. If core funding is removed prematurely, TICs will move towards more commercial models, abandoning the behaviour that supports the national interest and SMEs, and an enduring engagement with research. If this happens, all we will have done is set up another SME.

TICs should also be measured against the additional funding they recover from European programmes; against numbers of patents and successful spin-outs; and development of skills and career paths – TICs are potentially routes for a valuable apprenticeship from which to move on, either to set up a business or to take up a role in an industrial supply chain.

The TIC concept has enormous potential and longevity, but each individual Centre needs to perform at the highest level. The consequences of non-performance should be a change of management, merger with another TIC or even dissolution.

It is critical that this new initiative is well managed and maintained over time, because it will take several years for the true economic benefit to emerge.

But this is a great start.