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Supporting Industrial Innovation in the UK

A view of Government Grant Assistance Schemes
(Past, Present and Future)
by airto

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Making innovation happen

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Supporting Industrial Innovation Activity in the UK

A View of Government Grant Assistance Schemes (Past, Present and Future)

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Executive Summary

In 2009, AIRTO was asked by Adam Afriyie, MP, Shadow Minister for Science, for examples of innovation schemes that were highly rated in helping to support industry, particularly SMEs. This paper has been developed by AIRTO in response to this request. It details the major schemes that are in place and provides an overview of historic and possible future schemes that would be welcomed by industry.

The main criticisms by companies of existing schemes are their complexity and relative inaccessibility. Despite simplification of the support schemes available, there is still the impression in many companies that the schemes are very hard to understand and use, with a lot of luck needed. These and other criticisms led to a number of recommendations:

1: Introduce and maintain widely applicable schemes with clear simple rules, efficient administration and longevity.

2: Maintain the delivery of existing schemes, such as Manufacturing Advisory Service and Grant for Research and Development that are currently delivered by RDAs.

3: Schemes that have demonstrated strong value for innovators and full take-up of resources should be expanded, not curtailed.

4: Use and develop the existing industry support infrastructure to manage and deliver support schemes on behalf of industrial companies and particularly SMEs.

5: Develop schemes that can provide benefits more widely in industry, for example through the use of research and innovation clubs or associations to manage them on behalf of the participating industrial companies.

6: Maintain and develop support for investment readiness programmes that help innovative companies commercialise technology.

These recommendations can be developed in more detail with input from AIRTO and others.

Introduction

This short paper has been developed by the members of AIRTO in response to requests for inputs from politicians and others with a keen interest in the Innovation Landscape in the UK. It starts from

a premise that there is a role for government in supporting industrial innovation, largely on the basis that a more innovative industry will compete more effectively, provide better employment opportunities and ultimately pay more taxes from larger profits.

The paper is divided into a number of sections. We begin with a summary of the "problems" that government could seek to counter in the Innovation Landscape; then provide a short review of current industrial support schemes and the areas they impact (we have not quantitatively assessed the scale or success of their impact, merely their intention); and then make suggestions in Recommendation 5 for new measures to fill identified gaps between existing schemes, using knowledge of past schemes and schemes elsewhere.

The Industrial Innovation Landscape

The UK has some of the most innovative and successful companies in the world, especially in manufacturing. Major companies in the UK include Rolls Royce, GKN, all the major car manufacturers, major electronics companies and many others, as well as being renowned for having some of the best designers and service companies (including financial, engineering services, retail and distribution). In many sectors, including biotechnology and health care for example, there are world-class UK companies that make a significant contribution to trade, employment and the communities they are embedded in. However, in many sectors there is an excess of companies that drag down the average performance and reduce the UK's ranking in many indices. For many UK companies investment in innovation and research are below the European average. At the same time, even our world-class companies face intense competition and when investment decisions are being made, non UK locations can outcompete the UK in terms of innovation and industrial support, access to markets and quality of workforce.

Problems that government can seek to solve include:

- Underinvestment by UK companies in R&D (due to lack of finance, lack of capability, lack of understanding of benefits, leakage of benefits, or other reasons).
- Poor linkages between industrial companies and the Science Base.
- Graduates and Post Graduates that are not "industry ready".
- Low level of knowledge in companies of innovation processes and their management.

For many companies the lack of "spare" finance and management capacity to develop and innovate is acute, especially amongst small and medium sized enterprises (SMEs), and even when SMEs are fortunate enough to have sufficient finance, they often face difficulty in sourcing talent that can help them innovate and grow.

Current Industrial Support Schemes

There are currently four main sources of public sector assistance to industry in the innovation space:

1. The Technology Strategy Board offering support for technology development and Science Base interaction.
2. Regional and Devolved Development Agencies/local councils providing general support and advice to SMEs and some technology development support.

3. Issue specific Agencies such as Carbon Trust, Energy Technology Institute and WRAP providing support for particular topics.
4. Centres, programmes and networks funded by the above agencies to deliver support in specific sectors or technologies, but delivered by others (in the public or private sectors), such as Knowledge Transfer Networks, Centres of Excellence in Nanotechnology, etc.

Some government departments such as MOD and DOH also support programmes of technology development in industry that suit their particular purposes, and the European Union supports programmes of technology development and innovation/cluster support and development, through various funding mechanisms.

It is worth noting here that the Department for Business Innovation and Skills has undertaken a business support simplification exercise that has started to reduce the number of individual branded schemes available to industry, whilst maintaining examples of the main types of support under its Business Solutions brand. This brand is meant to be progressively adopted by most public funding bodies in England. Different arrangements exist in Wales, Scotland and Northern Ireland.

The largest current schemes that support innovation and technology development in industry in England are (funder in brackets):

- Collaborative Research and Development (CR&D) (TSB and others)
- Knowledge Transfer Networks (TSB)
- Knowledge Transfer Partnerships (TSB)
- Manufacturing Advisory Service (RDAs)
- Grant for Research and Development (RDAs)
- Designing Demand (RDAs/Design Council)
- Small Business Research Initiative (TSB and others)

For a brief description of all the schemes mentioned, see annexes 1 and 2. Each scheme is designed to plug a failure in the market, by addressing one or more of the weaknesses outlined above. Based on published information concerning scope and objectives, these schemes can be categorised according to the number of beneficiaries and the scale of the benefits as shown at figure 1, whilst Figure 2 provides a summary of the development stage covered by each scheme (using the well recognised technology readiness level criteria as described at annex 3).

Figure 1: Comparison of Impact of Schemes on Companies

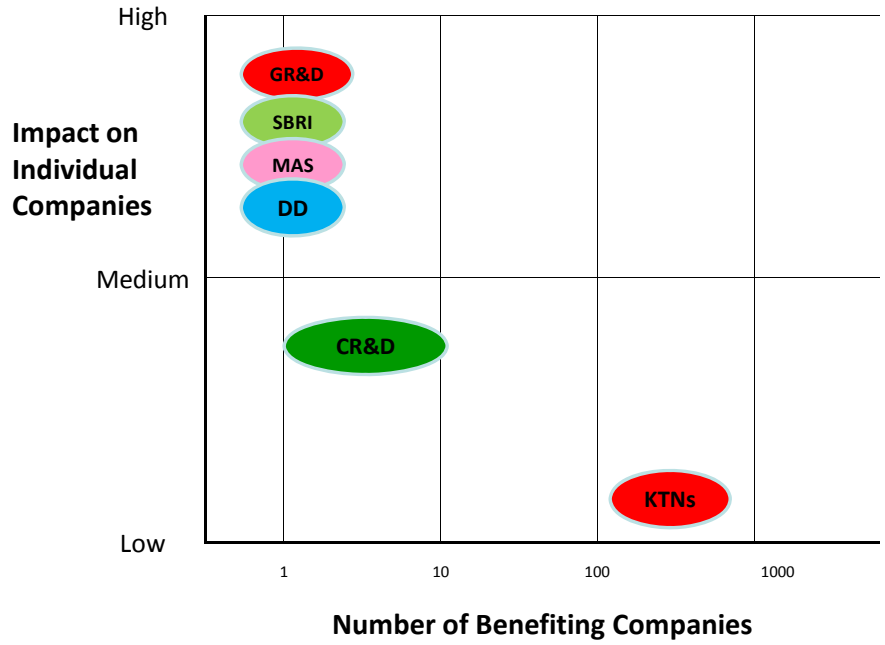
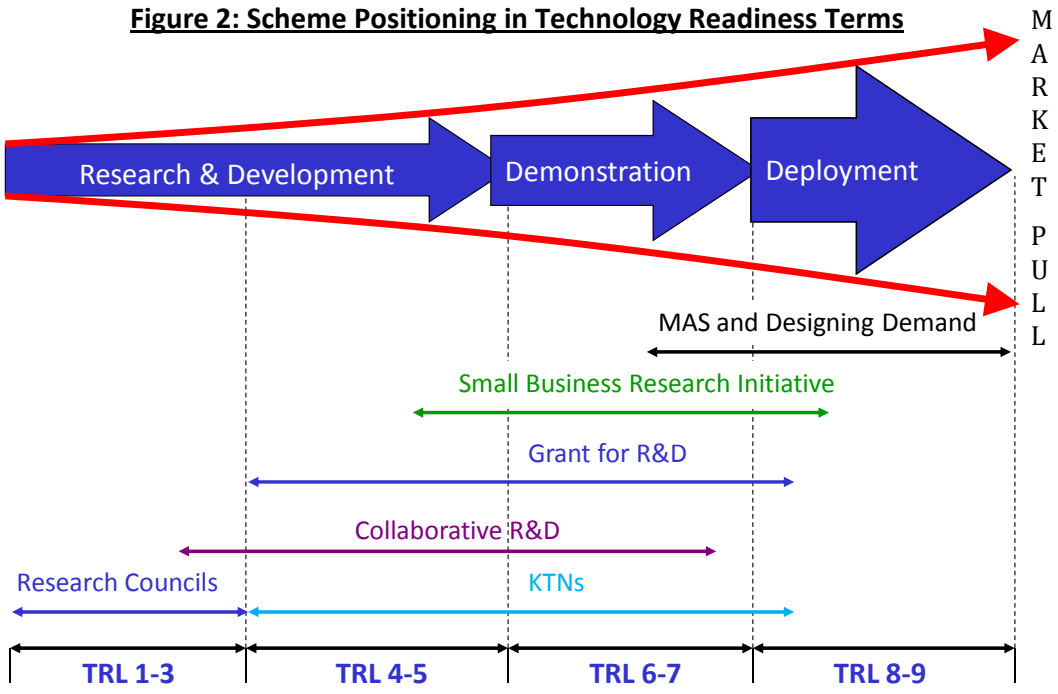


Figure 2: Scheme Positioning in Technology Readiness Terms



Other Industrial Support Schemes

Major schemes used successfully in the past in England and used elsewhere (in the UK, Europe and the USA) include:

- Support for Innovation (1980's, DTI)
- LINK (1990's, all government departments and research councils)
- Advanced Technology Programme (1990's to current, USA)
- Carrier (1990's DTI)

These and other schemes are described and commented on in annexes 1 and 2.

Recommendations for Improving Innovation Schemes

The main criticisms by companies of all schemes are their complexity and relative inaccessibility. There needs to be clear understandable rules, rapid responses to applications and efficient administration. Despite simplification of the support schemes available, there is still the impression in many companies that the schemes are very hard to understand and apply to, with a lot of luck needed to win support. This is not helped by the rapidly changing scheme landscape. The benefits of schemes often need to be communicated by peers, which requires long lived schemes. It can be very frustrating to hear that the support needed is no longer available – because the scheme has just closed or the technology/sector priorities have changed. This is particularly a problem with schemes that have just one call for proposals on a particular technology. Issue driven calls for proposals bring their own problems in understanding the applicability of a company's chosen approach.

> **Recommendation 1**: Introduce and maintain widely applicable schemes with clear simple rules, efficient administration and longevity. Do not launch multiple short-lived calls for issue or technology driven research proposals that are one-offs, with long rules of engagement and complex application forms.
>
> **Recommendation 2**: Maintain the delivery of existing schemes, such as Manufacturing Advisory Service and Grant for Research and Development, that are currently delivered by RDAs, even if the role of RDAs is reduced or removed.
>
> **Recommendation 3**: Despite strong pressure on government finances, AIRTO urges that schemes which have demonstrated strong value for innovators and full take-up of resources be expanded, not curtailed. A good example is the Measurement for Innovators programme.

Many companies that can benefit from increasing their level of innovation are limited in management resource available for project management and in their ability to apply to government sponsored schemes. They can benefit from being drawn into schemes where the bulk of the administrative burden is taken up by others, such as industry associations and research and technology organisations, as well as government owned/backed research establishments. Schemes that use these kind of intermediaries effectively will deliver more technology transfer and wider benefits than narrow projects involving only research intensive companies.

Recommendation 4: Use and develop the existing industry support infrastructure to manage and deliver support schemes on behalf of industrial companies and particularly SMEs.

Recommendation 5: Develop schemes in targeted priority areas that can provide benefits more widely in industry, for example through the use of research and innovation clubs or associations to set up collaborative programmes/projects and manage them on behalf of the participating industrial companies. The Technology and Innovation Centres proposed in the Hauser Review may go some way towards achieving this if given the appropriate remit.

Supporting the later stages of innovation as companies seek to commercialise the results of research and bring products and services to market is as important as supporting applied research. Rightly, the private sector is the key player in providing finance for commercialisation. However, ensuring adequate access to finance and the availability of such finance to technology based innovations is essential for high growth companies and a necessary role for government.

Recommendation 6: Maintain and develop support for investment readiness programmes that help innovative companies commercialise technology.

Disclaimer

This paper has been put together using the combined inputs of the members of AIRTO and some additional desk based research. It is not a definitive guide to innovation schemes in England or elsewhere, though it does attempt to summarise the salient schemes and issues, as seen from an RTO perspective. AIRTO would welcome opportunities to augment and develop this paper through dialogue that helps to develop the debate about innovation support, of which this paper forms merely one part.

Annex 1: Overview of Industrial Innovation Support Schemes

Single Company Support Schemes

Knowledge Transfer Partnerships

The KTP programme (formerly the Teaching Company Scheme) is managed by the TSB, with multiple funding bodies across government. It is a very long running programme with an open application process and strong support to applicants. It part funds the placement of a graduate in a company with university supervision to conduct a research project (usually over three years but may be shorter). The graduate may be registered for a higher degree.

Manufacturing Advisory Service

MAS provides subsidised consultancy services to SMEs, often on topics relating to process improvement and cost reduction, rather than on innovative products. Companies need to be in the manufacturing supply chain, but not necessarily manufacturers.

Grant for Research and Development

GR&D provides SMEs with part-funding for their own R&D, targeted at one-off new innovative products and services. Organisations such as Carbon Trust sometimes offer similar small grants for businesses developing low carbon technologies.

Designing Demand

Provides subsidised consultancy services to SMEs in design and redesign of products and services.

Small Business Research Initiative

SBRI provides a contract to deliver research services to government in specific topics of interest to the sponsoring department. (TSB manages the programme but funding comes from other government departments). Re-launched in 2009, the experience of completed projects is very limited, but the intention is for the government to procure the products that result from the research that has been successfully completed.

Multi Company Support Schemes

Collaborative Research and Development (CR&D)

Collaborative R&D programmes usually involve industry and Higher Education institutes (HEIs) and sometimes other organisations such as RTOs, NHS research centres and hospitals, international research centres, etc. The Technology Strategy Board runs a major programme of CR&D, with several calls each year on a wide variety of topics – some technology led and some challenge or problem based. Topics are usually called once and it is not always necessary to collaborate with HEIs.

Other examples of CR&D include the **Inventions for Innovation** programme run by Department of Health/National Institute for Health Research. This is a multi-annual programme where the same topic (medical technology) is open to multiple calls each year. Carbon Trust runs occasional calls for CR&D on specific topics, as do other organisations. Most **EU R&D** (see below) is collaborative, as was **LINK**.

Knowledge Transfer Networks

KTNs are topic specific membership based networks with administration funded by TSB. They typically provide newsletters and events for members with specific technology interests (eg Smart Materials, or Photonics). KTNs do not undertake their own research, but are often part of research based organisations or sector specific trade associations.

Major Schemes in Use Elsewhere

EU R&D Funding

The EU funds CR&D through its Framework Programmes (each a collection of major topic areas agreed as priorities by member states). Each Framework Programme lasts for several years (usually 5) and there are multiple calls for proposals. Applying for EU funding is usually highly competitive and complex.

Eureka

Eureka is a European initiative with EU backing but funded by member states directly, each according to its own priorities. It part-funds collaborative industry development projects. The UK government does not fund Eureka projects, unless they are part of another funding scheme.

Technology Innovation Program/Advanced Technology Program

The ATP (renamed TIP in 2008) is the long running USA federal government support programme, providing part funding for company R&D in collaborative and single company projects. Calls are issued on specific topics chosen by TIP in consultation with industry.

Fraunhofers

Fraunhofer Institutes are German Research and Technology Organisations that receive major government core support to provide industrial R&D services for the width of German industry. *See also the Hauser Review for further details of this and other innovation support infrastructures in other countries.*

Manufacturing Extension Partnerships

MEPs are government funded centres in the USA, in which subjects relevant to industry and or government needs are tackled by collaborative projects. MEPs provide manufacturing customers with a wide array of fundamental services in business and process improvements, helping them to stay strong and ready to compete in the global market. They focus on advanced technology adoption.

Annex 2: AIRTO View of Various Support Schemes

In 2009 AIRTO was asked by Adam Afriyie, MP, Shadow Minister for Science, for examples of innovation schemes that were highly rated in helping us to support industry, particularly SMEs. AIRTO has surveyed its members and compiled the following "practitioner's guide".

Collaborative R&D Programmes

In which subjects defined by business/industry to be relevant to their needs are tackled by collaborative projects involving industry and HEIs. An example was ***LINK*** which was highly rated by those working in (e.g.) the medical, engineering, and food sectors. Successes in these can be evidenced. It could be argued that the TSB Collaborative R&D projects are based on LINK, and that therefore this type of support funding continues. Other such programmes have existed, for example within certain of the **Faraday Partnerships**. For those Faradays which were led by industry and RTOs, they provided a way of exerting industrial needs "pull" on the UK's excellent science base, and the decision to curtail this aspect of their operations is much regretted in some quarters.

Single Company Support Schemes

In which end-user companies receive support funding from Government departments (or RDAs) to address aspects of innovation – process and product improvement, product concept testing and proving, etc. The support funding is used to contract with suppliers who provide and implement the appropriate skill/knowledge set – these not being available "in-house". Highly rated schemes were: - ***Manufacturing Advisory Service (MAS)*** currently operated through RDAs, and ***Measurement for Innovators*** (one of the wider National Measurement System programmes). This latter scheme was vastly over-subscribed and with a considerable body of evidence as to benefits reaped. It has now been curtailed. **Faraday Partnerships** also provided direct support of this kind for those in participating SME communities, but this aspect has also been curtailed.

Sector Oriented Programmes

In which relevant Government departments funded business/industry sectors. The sectors themselves put together collaborations of sector bodies, companies, RTOs, and HEIs to define and address sector wide issues. A highly rated scheme in the construction sector was ***Partners in Innovation (PiI)***, but this has been curtailed and nothing similar has taken its place. The RTO oriented sector-to-sector programme called ***Carrier Technology*** was an innovative "first" in trying to cross connect sectors. It only ran for a limited number of years, and would be worth re-exploring in some guise or other. More recently, Innovation and Growth Teams (IGTs) have explored sectoral needs for this kind of support in partnerships with Government.

"Procurement" Driven Programmes

In which Government Departments and Agencies buy in "solutions" to operational or policy needs they have, and for which external ideas or innovations are required. From our responses, the ***Food Standards Agency (FSA) Research Calls*** were well rated. AIRTO also welcomes the start up of the ***Small Business Research Initiative (SBRI)***, which seems to be the first substantial attempt to use the procurement mechanism as a stimulus for innovation. Other mechanisms are still needed however.

Knowledge Driven Programmes

In which the focus is on knowledge exchange and enterprise – i.e. networking of ideas rather than application of services/goods. This is a relatively new idea of which the **KTNs** are an example of a

mechanism designed to deliver knowledge exchange. Several RTOs are currently engaged in them. These have had **Faraday Partnerships** rolled over/into them (see above), with very mixed views as to whether this is a step forward or not. The ***Knowledge Transfer Programme*** in which "Associates" from HEIs are placed into sponsoring companies with some funding support for donor and recipient falls into this category, although they have been around in various guises for a long time. RTOs can act as donors but not many do as the reward/cost equation is not felt to add up.

Venture Capital Funding Programmes

In which Government money is put up as a match to private capital investment in order to fund start up, or early stage, small innovative companies. ***Gateway to Investment (g2i),*** which is backed by the LDA, was highly rated in our survey as an Investment Readiness Programme, but there have been, and are, others – ***Early Growth Funds, Enterprise Capital Funds, etc.*** are all important to help get new enterprise off the ground.

Comments were also received concerning the "negative" aspects of funding schemes as follows:-

- Funding through LINK type schemes, as with the current TSB schemes, is not competitive with that available through the European Framework Programmes. Therefore, attention is focussed on the Framework Programme as it is economically more attractive although more complex to access.
- The funding rules underlying the current TSB funding mechanism can discourage industry from working with universities which is unfortunate.
- Programmes can be bureaucratic and slow, a problem compounded by frequent changes of departments and staff dealing with them.
- Programmes, having been introduced, are all too readily changed, if not curtailed in favour of the next "flavour" of the month. A recent and ongoing example is the journey from Postgraduate Training Partnerships, to Faraday Partnerships, to KTNs (Mark 1), to KTNs (Mark 2).

Finally, there is the ongoing subject of funding rates (complexity, lack of clarity, differing (and changing) rules, etc), as well as the levels of funding, particularly when non-appropriate business models are applied to them. This is not peculiar to the UK, but is a barrier to participation, and hence to raising innovation activity. In dialogue with the TSB, AIRTO is trying to bring about a better order for this through a more appropriate recognition of the differing roles that RTOs play (project inception and management, dissemination, sub contract, partner, etc) and how each role needs to be treated to make innovation an economic activity (in a market sense) in which people are encouraged to participate.

As has been pointed out, the UK can have the best schemes in the world, but if they are poorly implemented, they come to naught.

Annex3: Technology Readiness Levels

TRLs are a technology management tool that provides an indication of the technical maturity of a project by identifying risk associated with technology and system integration. They are a graduated scale that uses specific criteria to define the maturity of technology. TRLs were developed by NASA in the 1980s.

TRL	Definition[1]
9	Actual technology system qualified through successful mission operations.
8	Actual technology system completed and qualified through test and demonstration.
7	Technology prototype demonstration in an operational environment.
6	Technology system / sub-system model or prototype demonstration in a relevant environment.
5	Technology component and/or basic technology subsystem validation in relevant environment.
4	Technology component and/or basic technology subsystem validation in laboratory environment.
3	Analytical and experimental critical function and/or characteristic proof-of-concept.
2	Technology concept and/or application formulated.
1	Basic principles observed and reported.

[1] As used by MOD: see www.aof.mod.uk/aofcontent/tactical/techman/content/trl_applying.htm

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