

# Technology Strategy Board Triennial Review

Department for Business, Innovation and Skills



This is a submission from the Royal Academy of Engineering to the BIS Triennial Review of the Technology Strategy Board (TSB). It is based on the views of a number of Academy Fellows, who were presented with a series of questions (numbered 1-8 in the text below), based on the request to the Academy from BIS. This review is welcomed by the Academy, as we feel it is important that the TSB is optimally delivering its remit to support innovation.

## **1. How well does the TSB perform in its role of supporting innovation in industry?**

The TSB has established good relationships with industry. It consults with industry to establish industrial priorities, it has industrial representatives on its board, and all proposals to it must be led by industry. This means that it reflects and is reactive to national priorities, and appears to be successful in identifying innovation and wealth creation opportunities important for UK businesses. It seems to be able to engage both big business and SMEs – activities such as innovation vouchers, SMART and SBRI all tend to be favourably received by SMEs. The projects have a relatively quick turnaround and enable innovation within companies to be taken forward quickly. The TSB could be even more responsive to industrial needs by being taking up innovation ideas generated within business, as well as encouraging the exploitation of new science by business.

While the TSB does a remarkable job with the limited resources available to it, its support is of necessity restricted to a few industry sectors and the limitation on resources compromise its ability to maintain breadth and continuity of support. The result is that the TSB tends to deal with issues cyclically rather than providing the continuous focus required. The recent call on 'Developing the Civil Nuclear Power Supply Chain' illustrates the problem. The call is targeted at SMEs who do not have the funds, resources or detailed sector knowledge to address all of the key issues, and the overall funding is tiny compared to the cost of just one new nuclear station. It is unclear how this work will be taken further once this call is completed.

This problem threatens the TSB's ability to maximise returns on earlier stages of its investment and it also means that the UK's investment in more basic research is not fully exploited. It is therefore not obvious to what extent the support the TSB provides at early stages can lead to innovative products and services reaching the market place.

## **2. Does the TSB have the right relationship to the science base?**

The science base provides fundamental research and the TSB focuses on the exploitation of that research. As such, the TSB attempts to fill the gap between innovative research (funded by the Research Councils and directly by companies, carried out at university research labs) and the production environment. This seems to represent the right relationship, although it is not an easy position to occupy, and it is inevitable that there will be tensions in the relationship between the TSB and the science base.

There appear to be good links between the TSB and the Research Councils, especially EPSRC and MRC. However, it might be useful to implement a more formal mechanism whereby Research Council projects that have proved successful in terms of exploitable outputs could be reviewed by TSB in terms of possible support for routes to market. This would be a way to enable the TSB to capture some of the innovative outputs of government funded research, and ensure that they make their way to exploitation.

TSB initiatives such as the Knowledge Transfer Partnerships (KTPs) which fund a recently qualified PhD student to work in a company, often in an SME, are a useful way to create a link between research and industrial exploitation. The role of the KTP advisor is an important one in the development and success of KTP applications. A wider integration of advisors into the TSB and alignment of the KTP funding with other TSB routes (such as Collaborative R&D and the Catapult Centres) may prove beneficial in aligning the TSB's collaborative activities between industry and universities.

The utilisation of the Knowledge Transfer Networks (KTNs) should be a key mechanism for engaging the science base and many are becoming more involved in facilitating the relationship between universities and businesses through their networks, through Special Interest Groups and via \_Connect.

The TSB tends to focus on supporting innovation flowing from the science base, but it would do well to look also at supporting business led innovation ideas, and looking at how to develop technologies to meet customer needs. In addition, there should be more support for entrepreneurs and business to further develop existing technologies, as well as support for exploiting new science.

### **3. Is TSB able to give advice to Government on issues relating to innovation strategy, and should it be expected to do so? Can and should the TSB contribute to broader government objectives?**

The TSB clearly has experience of working with industry and in supporting innovation, and knows the innovation needs of the country. It should offer that experience to Government, particularly in support of the growth agenda. In its role of providing a link between industry, the science base, and Government, the TSB is also in a position to support Government policy for specific technologies. However, as a Government agency, rather than as part of a Government department as it was within the DTI, the TSB is likely to have less opportunity for direct influence on policy making.

The TSB could contribute to broader government objectives as part of the goal to achieve joined-up Government. In addition, as a link between the stakeholders in innovation and applied research, the TSB should provide the information to Government upon which broader objectives are developed – for example, the TSB should be in a position to advise on the Green Deal, having sponsored the Retrofit for the Future project. Furthermore, the TSB could advise on the STEM aspects of Higher Education, perhaps at the postgraduate level. In this way HEFCE and the TSB could work together on the technology skills shortages agenda, to assure future economic growth.

However, this should not happen at the expense of TSB's primary objective of providing support to industry and promoting innovation in areas that will significantly benefit Britain's economy. It may be valuable for the TSB to work more closely with other organisations which advise Government, including the Royal Academy of Engineering, to inform wider Government objectives without diverting resource from its primary tasks.

### **4. In terms of the remit of the TSB, do you believe that there are things it should stop or start doing, or that it should do differently?**

Overall, it is felt that the remit of the TSB is appropriate, and that it functions well given current funding limits. However, there are a number of suggestions that can be made about the TSB's remit.

The TSB should concentrate on strategy of development, and not attempt to duplicate the capabilities of other organisations or duplicate work funded elsewhere; such as by HEFCE or the Research Councils. For example, introduction of the new Catapult Centres is laudable where there is a 'gap in the market', but not when they might introduce unfair competition with existing research providers. The TSB would benefit from working more closely with these organisations. TSB and HEFCE need more effective dialogue to encourage better HEFCE capital funding coordination. As suggested above, the TSB could work more closely with Research Councils to ensure more continued support for development of new technologies and to maximise the gain from early stage funding by the Research Councils.

The TSB should seek to leverage the resource, expertise and capacity of the Research and Technology Organisations (RTOs). It needs to maintain its links with all the relevant stakeholders, including the intermediate research and technology sector to remain successful, and should identify new opportunities for fostering increased dialogue to help inform future strategy.

The TSB should not be handling smaller value programmes or projects, which are better given to the KTNs or smaller development agencies to fund. TSB should focus on managing (appropriately) major strategic initiatives such as Catapult Centres or major research themes. The Catapult Centres will need long-term funding if they are to become firmly established and effective.

The TSB should help fill the void left by the RDAs, to deliver local support for innovation, to support SMEs and to act as the Government agent identifying industrial needs across the sectors. To do this, it needs to develop its infrastructures in key sectors and fully exploit its knowledge networks to keep informed of other sectors. It should also establish a dialogue with both Infrastructure UK and the key spending departments to ensure that innovation and investment are kept in step.

Greater engagement in Europe and beyond in identifying EU and international funds to potentially co-fund innovation within the UK, would be valuable to ensure that the UK can benefit optimally from EU and other international funding.

The TSB could do more to exploit the huge potential business opportunity in public procurement. It relies on the SBRI programme which is minuscule compared to total public procurement spend. The SBRI is not very visible and needs stronger support from Government, increasing it along the lines of the model adopted in the US. Marketing of the SBRI scheme and the TSB identity generally needs to be reinvigorated.

In terms of the mechanisms for funding research and innovation, there is a need to continually assess schemes, dropping those that are no longer effective and introducing new ones to address 'market failures'. This does not mean a continual churn in schemes, but rather a continuing process of assessment and confirmation that the schemes help to deliver the TSB's overall objectives. It is important that the TSB be dynamic, always assessing new ways to engage and promote innovation while still supporting the effective existing mechanisms. Any changes in TSB activities should always flow from a rational assessment of its target technologies, and it is important that limits are set on sectors or themes to be supported in order to prevent funds being spread too thinly.

Over the past year, TSB has been the recipient of additional government funding to take ownership of existing schemes or run new initiatives. This reflects the Government's confidence in the TSB as the UK's main innovation agency. If the TSB is to continue to function effectively, the human resources of the TSB need to be increased accordingly to support these activities to avoid a limited resource being overstretched.

### **5. Does the TSB offer adequate accountability and value for money?**

The perception among many is of a lean organisation with minimal internal bureaucracy. The TSB process seems to be both efficient and effective in distributing public funding to worthwhile projects. The oversubscription of calls suggests that it could do even more with a significantly larger budget. International comparisons with the US indicate that the level of investment in similar innovation activities is much higher and Government procurement (SBRI) programmes are more widespread. Even after correcting for scaling factors the UK, investment in innovation is still relatively modest.

However, it is difficult to assess conclusively whether the TSB offers good value for money without more information. The only financial measure available is a report commissioned by the TSB relating to benefits of 400 of its collaborative R&D programmes and purports to show an average return of £6.71 in additional GVA per £ spent. However, this analysis was for projects started after 2004 (when TSB was first created) and finished in 2009 and therefore almost totally reflects the TSB performance before it was created as an agency and separated from business policy.

To provide an up to date assessment of how successful TSB grants are, it would be valuable to know the impact in terms of both increased employment and financial returns created in relation to the total amount of funding it allocates. It should also take into account, as far as possible, the cost to industry and universities of preparing bids. Publication of operational costs as a percentage of public funding provided would also help to assess financial value. However, value for money needs to be assessed in this context not just in pure financial value but in the quality and depth of the connections the TSB facilitates which will ultimately result in creating valuable companies for the UK.

There is a need for improved public information on projects, participants, and outcomes. An easily accessible, searchable database would be helpful. Otherwise, value for money judgements are difficult to make without a full picture of the activities supported.

The leanness of the TSB can sometimes result in problems with response time and actions, including providing feedback to disappointed applicants, which is not routinely done. The overall quality of communications with TSB during an application process and internally between activities in TSB is problematic and much could be done to improve the customer experience during the application process. Investment in human resources may be required.

### **6. Does the TSB have sufficient technical expertise, and is it (and does it need to be) sufficiently politically impartial and independent from Ministerial influence?**

The TSB has strong technical expertise in its staff, board, contractors and in its network of project monitors and proposal assessors. However, it covers a large range

of sectors, and it is therefore a challenge for it to maintain technical expertise right across this range.

While the TSB could undoubtedly benefit from more technical expertise this would be difficult to achieve within its current resource limitations. The TSB does draw on a range of independent experts, such as its contacts within industry, but it could make more use of this independent advice. It should work more closely with the science base and with organisations such as the Royal Academy of Engineering, the Royal Society and the professional engineering institutions in order to extend its technical expertise without requiring significantly more resource.

Financial and commercial expertise, in terms of assessing whether innovations are likely to benefit the UK, is also of crucial importance to the TSB. The recent appointments of Board members will be helpful here, but again greater utilisation of independent expertise will be of value.

There were some concerns regarding the impartiality of some of KTNs leads and staff. As these are typically seconded from industry or RTOs, their impartiality and independence is frequently difficult to verify.

Although independence from ministerial influence would be desirable to an extent, its status as an agency of Government means that the TSB cannot realistically be independent of Ministerial influence. Furthermore, Ministerial influence can be advantageous in that it flows both ways, with the TSB providing a conduit for policy makers to be influenced by industry and academia. With the UK's biggest policy priority being growth, the TSB should be playing its part to support the Government's growth agenda, working alongside BIS to explore how innovation can help Infrastructure UK reinvigorate the nation's transport, ICT and utilities infrastructure.

Given that TSB income is decided as part of the CSR, which is shaped by political priorities, a good relationship with Ministers will be valuable in safeguarding funding. (Though it should be noted that the TSB's shared funding model is critical in both increasing the leverage of public funding and ensuring that both private and public sector share the risk associated with innovative technology development.)

However, to achieve the right balance, political influence should be minimised, especially in the case of decisions on individual projects. The TSB does occupy a difficult position in that it has similar status to the Research Councils, requiring it to be independent from Government, whilst being a Government agency with expertise relevant to policy. Generally, it is felt that the TSB does seem to maintain a reasonable balance, and Fellows were gratified to see the continuity of support for the TSB across the change of Government.

## **7. How does the work of the TSB relate to that of bodies such as NESTA and the Research Councils? Is there unnecessary overlap between the remits of these bodies?**

The relationship between these bodies is sound. The TSB helps significantly to reduce overlap and the co-ordination was less effective before TSB was introduced.

The TSB needs to complement, and to an extent, overlap with these other bodies and thus far it appears to do so. The TSB and Research Councils are part of a continuum and there should be some overlap to ensure continuity of actions and support (as discussed above). Currently there appears to be good alignment with RCUK priorities in terms of co-funding of project activities that span the TRL3 – 5 boundary.

The UK is nevertheless poor at exploitation of research. The best way for funded research to get to exploitation is through the middle TRLs via TSB funding. However, there are concerns at the level of TSB funding that goes to the universities – this is valid if it is genuinely directly supporting industry led projects in TRL 4 to 6, but not if it is a substitute for when Research Council funds are not available. Similarly, Research Council funds to encourage commercial exploitation could become too much of an overlap with the TSB role.

TSB collaborates with NESTA in supporting reports and small programmes. However, NESTA is no longer a public body since in April 2012, NESTA's projects, staff, assets and liabilities were transferred to two new charities: a charitable trust and its corporate trustee, a charitable company. Therefore, the TSB has a different standing to NESTA.

There is room for more coordination, and apportioning functions between these organisations - 'cradle to grave' strategy requirements needed by industry are not necessarily consistent with the remit of the Research Councils or the TSB. The linkage of Knowledge Transfer Networks to the TSB is also vital to ensure that the TSB is linked effectively to business need and future direction.

#### **8. Are there alternative, preferable ways that the TSB's function could be delivered?**

The majority view was that the TSB is the best option for delivering its function. Certainly it would be premature and disruptive to change the system at this point. The TSB is a relatively recent innovation and organisations such as this require time to build trust and yield the benefits from their investment of public funds. Changing the system at this point would only cause confusion in industry and create breaks in continuity of support.

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