Technology and Innovation Centres

Technologia comments

This document has been prepared for the Technology Strategy Board

Mick McLean & Giles Courtice
18 February 2011

Contents

1 Our response

1.1 Context

Technologia is a specialist in science, technology and high tech markets. The company was formed in 2008 through the management buy out of the former public sector practice of Sagentia, a leading international product development consultancy. Technologia has worked for UK government, regulators, HEIs and technology transfer functions, English RDAs, Scottish Enterprise, Invest Northern Ireland & Enterprise Ireland.

What Technologia does is mainly to help these public bodies justify investment in S&T and the institutions which support it, using our specialist knowledge of technology and business.

We understand that the TICs will be modeled loosely on Germany's Fraunhofer Institutes. They will be based firmly on the TSB's principal modes of operation: trying to *connect* private businesses to publicly funded advanced equipment and research teams to *catalyse* the creation of innovative products and services and facilitate their *commercialisation*.

In this context we have put down some thoughts in response to your questions.

1.2 Naming

The TSB rightly is seeking suggestions for a suitably prestigious and globally recognised name for the TIC network.

Given that the motivation for their creation came from two complementary reports by influential UK figures with an international reputation we suggest that the centres should be known as DysonHauser Centres – or 'DysonHausers' for short.

This 'brand' would have some resonance with the Fraunhofers upon which they are loosely modeled.

The identity of individual centres could be further reinforced by association with a successful historic British scientist, technologist or entrepreneur who has been eminent in their field of operation. The choice of such a 'figurehead' should, however, be left to the management of the centre.

Possible candidates include Joule – for an energy related DysonHauser - Watt, Maxwell, Grey, Napier, Kelman and, of course, Faraday.

Each centre could thus convey branding on subtly different levels. Thus officially "The Joule Centre for Automotive Energy Efficiency – part of the DysonHauser network" could be spoken of informally as the 'Joule' or the 'energy DysonHauser'.

1.3 Measuring success

The core funding agreements for the DysonHausers will, *inter alia* need to:

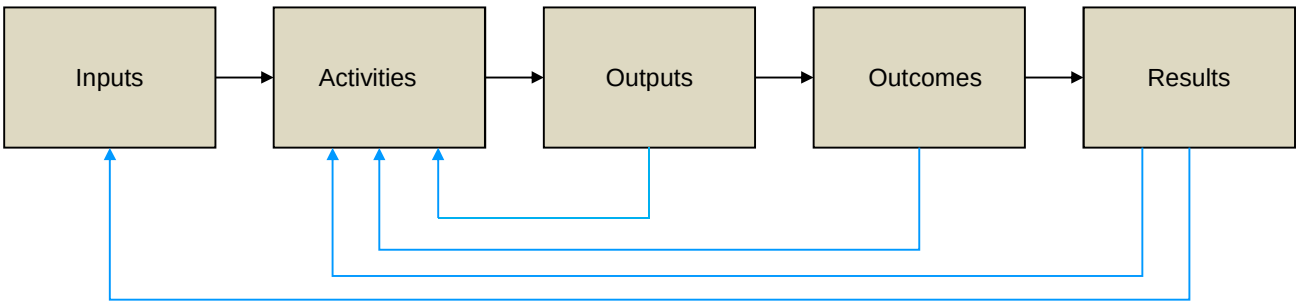
- define success metrics and performance measures (key performance indicators or KPIs);
- specify a reporting regime for the KPIs.

We have had plenty of experience of devising practical systems of KPIs. The first principle of successful KPIs is that they are based unambiguously on the stated objectives of the organisation.

Our experience has suggested that workable indicators should also be:

- simple – ease/low cost of measurement using data which are already available wherever possible;
- few in number (half a dozen or so) and closely related to strategy, objectives and activity portfolio;
- based on measuring tangible things that would not have happened without TSB action;
- reliable – not subject to substantial uncertainties;
- not likely to distort behaviour in undesirable ways (not always easy to foretell incidentally);
- adapted from existing measures/metrics where possible;
- organised by guiding principles and consistent with other frameworks (logic model, etc.).

The so-called 'logic model' – illustrated below - is a good starting point for any complete set of KPIs. This is essentially a simple five stage linear framework – what you put in, what you do and what comes out. It is widely used to articulate and assess performance of public sector programmes.



This approach is eminently practicable and it makes even more sense when the institution whose performance is being measured adds essential management processes - 'feedback' as shown by the blue arrows - to ensure that what happens in later stages influences the earlier stages. This makes monitoring KPIs not an externally imposed chore but an essential tool of management.

Furthermore a simple system of KPIs devised for the DysonHausers could also be later adapted and enhanced to cover the TSB's broad and diverse range of activities, mechanisms and objectives.

1.3.1 Suggested KPIs

The DysonHausers have to do something different from the plethora of existing institutions in the technology/business space – regional job creation won't do as a justification; they will have to 'make a difference' on a national and global level.

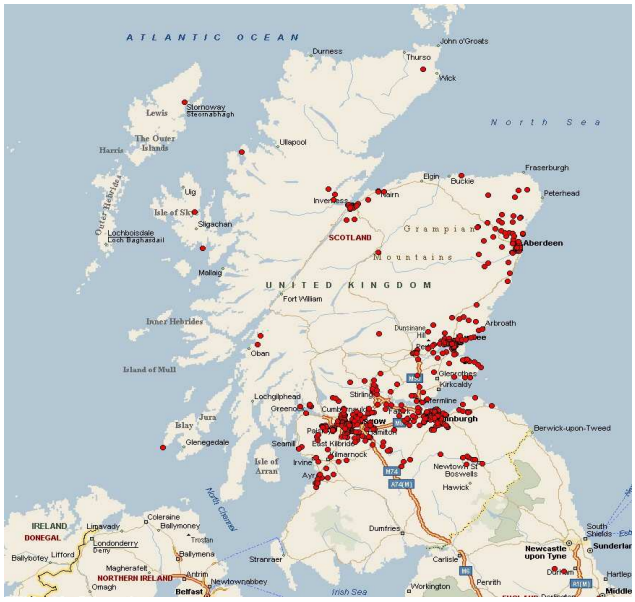
We suggest a simple set of KPIs to enable the DysonHausers to monitor their performance at each stage of the logic model and the TSB to oversee it. These are set out in the table below.

Stage	Objective	KPI	Measure/source
Inputs	Attract substantial investment Income from other grants Business contract income	Levels of co-investment Proportion of funding from other grants Proportion of funding from business	£/DH
Activities	World-leading capability	RAE type assessment of technical expertise, infrastructure, skills and equipment	Star ratings for individual subject areas/audit by external assessors
Outputs	Completed projects with industrial partners	Levels of satisfaction	Client feedback through DH quality system
Outcomes	Global impact in pre-commercial development	UK patenting within the area relative to global trends	UK patents weighted by coverage/DocDB and INPADOC patent databases (EPO)
Results	Wealth creation	Income generated by patented products and services	'Patent box' revenue/HMRC

1.3.2 More on the use of UK patenting as a KPI

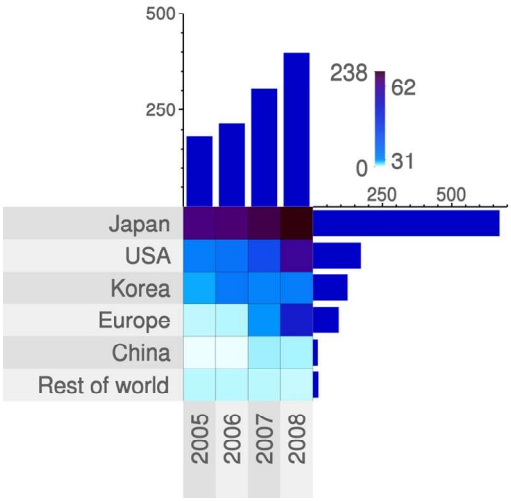
Another useful KPI indicator is provided by data on sectoral patterns of patenting. In most advanced engineering and high technology sectors patenting is a useful indicator of pre-competitive innovative activity and of levels of R&D. It also provides a forward looking indicator as patented inventions can take ten to fifteen years before emerging onto the market.

Since 2006 some 100,000 patents have been granted and published by the USPO and EPO with GB as a priority country. It is relatively straightforward to screen all these patents using well tried techniques (for example, the map on the right shows the geographical distribution of a sample of Scottish biomedical patents) to identify all patents related to inventive activity in



the field of each DysonHauser and classify them by cluster and sub-sector.

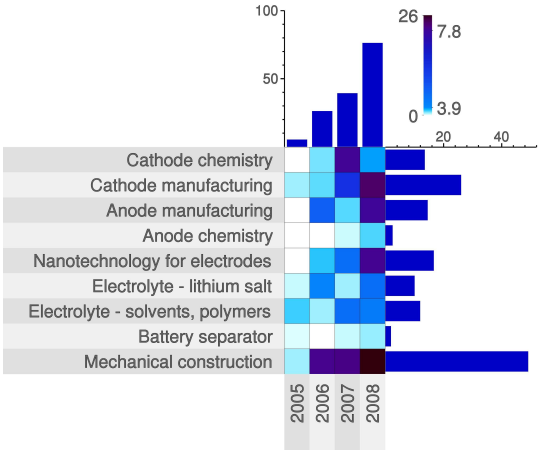
This patent mapping data should provide a useful benchmark for a patent related KPI. One essential advantage of patent data is that, unlike ONS statistics for example, they enable individual firms and other innovators to be identified. This would enable a direct causal chain to be traced, on a case study basis between particular patented inventions and the DysonHauser's activities.



KPIs could be based on simple numbers of patents in the field covered the mapping exercise could be updated at relatively low cost on a yearly basis. (Actually a better metric is a weighted semi-qualitative measure which gives more weight to patent families with broader geographical coverage – this is just as straightforward to implement.)

The example weighted patent map shown on the left (showing recent patenting in automotive energy storage) uses a quality measure and indicates the relative strength of the innovation systems of particular nations and the EU in global patenting in this specialist field as a time series.

Even better, and possible in future when the Government's plans to introduce the 'Patent box' tax regime are implemented, would be a commercialisation measure based on patent related income. The income figures used would be those declared to the revenue as associated with a particular patent family – these data could easily be linked to individual patents in the map (by unique patent number) and the income presented on an anonymous basis.



The detailed category map shown on the left (this one for Lithium automotive traction batteries) illustrates how appropriate categories could be derived from the DysonHauser mission statement.

We believe that the essential compromise that successful DysonHausers will have to make (see 1.4 below) between broad scope and narrow focus will mean that the activity space of each will be perfectly suited to a category based patent map.

A detailed map like this could be updated, say, quarterly and could prove a useful management tool - as well as a KPI – by giving management an objective view of the global context in which they were operating.

It should be noted that we are very firmly not recommending that the level of patenting by the DysonHauser itself should be used as an output performance indicator. This would inevitably distort behaviour undesirably towards the largely unsuccessful model adopted by the Scottish Intermediate Technology Institutes.

1.4 Areas of focus

In addition to the 'fast-track' advanced manufacturing centre, the TSB suggested that others could be established within the broad areas of:

- energy and resource efficiency;
- transport;
- healthcare;
- ICT;
- electronics, photonics & electrical systems.

Given a broad understanding of what we are good at commercialising in the UK and what is happening in global markets, this list covers most of the economy and is clearly a good starting point.
The TSB has adopted a 'bottom up' approach to the final selection by inviting bids from interested parties and consortiums and selecting the most attractive. While it would be impossible to derive a definitive desirable set of DysonHausers from a top down planning exercise this is the most practicable way to proceed.

But to be successful, any bid-based selection process needs a strong strategic steer. While the form and governance of the DysonHausers has been set out in some detail in the call consultation, their degree of focus and specialisation is left entirely to market forces. Inevitably each DysonHauser will have to devise a working compromise between breadth of scope and a narrow focus. Some guidance along these lines from the TSB would be helpful. Such a steer could be given in response to the consultation in further guidance for the first wave of DysonHausers. It would clearly be desirable, for example, if at least some of them addressed areas complementary to, and challenges already targeted by, existing TSB projects and platforms.

Also a stronger lead on degree of focus and possible areas of operation would help avoid the mistakes of the MNT centres. These were spread too thinly - each lacking a clear focus and strategic mass.

In our view then most attractive bids will be based on real (rather than aspirational) strengths and market prospects, and come from existing institutions and consortiums which recognise that a DysonHauser should be securely grounded in addressing a deep vertical problem/market area - and preferably one that bears some relationship to existing TSB initiatives.

A Transport DysonHauser, for example, would inevitably be stretched too thinly over too broad an area and would suffer from internal tensions generated by the claims of rival transport modes.

It might be tempting to concentrate on the interface between different transport modes and propose a DysonHauser for 'Integrated Transport'. But this proposal would highlight another issue – that the problem focus of a DysonHauser should broadly be amenable to solution or amelioration by technology.

It is evident that the main causes of the relative failure of integrated transport in the UK are not technology related but rather lie in the complex and diverse institutional structure of our transport sector which in turn stems from the unique history and politics of land transport in Britain. Structural issues of this nature are unlikely to be solved by a fresh injection of novel technology.

Another possible focus within transport might be low carbon vehicles – but even here there is inevitable dilution of critical mass and internal tension between the rival approaches of conventional internal combustion; hybrid and all-electric propulsion. The UK may not in any case have sufficient research strengths in hybrid and electric vehicles to justify a DysonHauser. (As the patent map above illustrates, Japanese and Korean multinationals dominate the patent landscape. Second-tier leaders are more international in nature and include Ford, General Motors, Robert Bosch and, not surprisingly, the Chinese BYD.)

One further point - a high degree of problem focus should not prevent a DysonHauser from being cross cutting and multidisciplinary. The Hauser report cites TWI as an example of a successful model, and to us it demonstrates how an institution formed with a fairly narrow focus can – if it retains the right support from industry – come to cover a wide range of areas of collaborative research and development.

Technologia

The best of both worlds for the public sector

From its origins as a spin-out from a leading product development consultancy, Technologia is developing its own skill base in policy consulting, innovation support, business case development, appraisal of R&D propositions in technology, and due diligence. It has access to an extensive network of experts in specific technologies and markets. Technologia, like its clients, can truly have the best of both worlds.

We believe our distinctive name brings clarity to our market position and our market proposition. We continue to help public sector clients achieve their objectives through an intelligent engagement with technological change.

TECHNOLOGIA

Technologia Ltd
Harston Mill
Harston
Cambridge
CB22 7GG
UK

T. +44 208 690 9164