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Science and Innovation Strategy 2014

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3 Who are you representing?

Not Answered

Name of organisation or group:
Engineering Professors' Council

4 What more could be done to improve the innovation performance of UK business and boost business investment in research and development?

Tell us here::
Incentives to encourage and cement extensive and enduring relationships between business and universities are essential. There is a significant amount of innovative business-university collaboration in the UK, particularly in engineering, but this tends to be led and dominated by large businesses or small clusters of large businesses.

SMEs in particular (acknowledged as the “engines of growth”) tend to find the support that does exist more difficult to access, not least because they are unaware of them – and find it difficult to engage with universities in the R&D process and vice versa. Ease of access to information and a much higher profile given to these forms of support is essential.

The contribution of Catapults seems to need particularly detailed review. Whilst we appreciate the potentially important economic benefits and impact of these for work at higher Technology Readiness Levels, it appears that much of the current activity results in near-term applied research and development which industry should fund, or receive tax benefits for doing so, rather than further squeezing capital investment in sustainable strategic collaborations between universities and business.

5 What are the gaps in the capability of our people to develop science and deliver innovation in the UK and how should those gaps be addressed?

Tell us your views here::
While government support is welcome, we support the findings of Professor John Perkins in his Review of Engineering Skills that instead of government planning the skills needs of sectors, employers should collectively take ownership of the issues and, with the support of government (of whatever political party as long term and consistent support and incentives are key) and the education sectors, shape the provision that is needed. Government support needs to be re-configured to facilitate this and ensure long term sustainability.

Also, exercises which allocate significant funding to research and innovation such as the Research Excellence Framework in universities need to ensure they do not have the (unintended) consequence making it unattractive for universities to recruit academic staff/researchers from industry to help improve the instruction and research in activities closely related to industry. There are examples of overseas universities establishing specific career streams for such experienced staff, yet while the allocation of high proportions of research funding is still dependent on having staff who deliver highly cited academic publications, this is who universities will primarily recruit.

Other professions (such as medicine and law), plan and budget for their new recruits to be “apprenticed” in funded graduate training positions as new employees for a year or more with qualifying exams, before becoming fully operational professionals. Engineering and science rejects this (CEng for example, is optional). Structured and effective post-graduate training and qualification, would raise the incentives, professional and skill levels.

6 How can we strike the right balance between our investment in curiosity-driven researchand investment in solving societal challenges and other forms of applied research? And how can we encourage the interaction between these?

Tell us here::
Currently, there is a significant gap between what Research Councils will fund, and what is ready for exploitation by companies. There is no funding and little recognition or incentive for researchers in UK universities to bridge this gap (it does not lead to quality publications – see 2. above) and the research outcomes are too immature to be attractive to companies.

University funding models tend to separate funding for teaching and funding for research – with type of research (“blue skies” or “applied”) – often differently funded. In fact, funding policy needs to reflect the fact that research (of all types) and teaching the students who will go on to work on solving societal challenges

in their careers are inextricably linked – particularly for engineering where education at both undergraduate and postgraduate levels must occur within the context of industrial application. Industry expects graduates and researchers to be working with the latest tools and techniques (and developing new ones). Thus, investment in teaching laboratories are necessary for HE to be able to expose undergraduates and postgraduate to industrially relevant equipment and software if they are to have an impact on industry and solving societal challenges in the future.

Supporting and facilitating the development of long term relationships between universities and business who could then collaboratively make decisions about how to apply funding based on jointly developed long term strategies would help.

7 How can we support cross fertilisation of ideas, for example by encouraging interdisciplinary research and innovation? What are the risks and benefits of doing this?

Tell us here::

The approach described under 6) would go some way to a) solving the inequalities emerging from the current policy towards concentration in public research funding in a few large universities and b) in ensuring industry is receiving the skilled employees and access to research and development it needs. That said, the ”shareholder imperative” will inevitably drive industry priorities (particularly in times of economic austerity) and there will remain a need for government intervention to solve market failures.

8 In your view, what are the top 3 priorities for the UK science and innovation system by 2020 and beyond? Which criteria should we use to prioritise technologies for Government support?

Tell us here::
The UK has an ageing infrastructure which needs significant capital investment. Companies will not invest in the UK unless we can guarantee reliable infrastructure, fit for purpose. A developed country must ensure it has the capability to design the next generation of infrastructure it cannot rely on importing technological solutions.

The long term prosperity of the UK depends on our energy, telecommunication, transport and water networks. It cannot purchase a smart, low carbon transmission and distribution network from other countries, it must design and build it using UK expertise and facilities, while integrating internationally-sourced products.

The prioritisation criteria should seek to maximise the long term economic benefits for the UK. The 11 sectors identified in the Industrial Strategy, together with the 8 Great Technologies, provide the sector focus (and therefore, to some extent, the regional focus since industry tends to be regionally specialised). There should also be a strong element of high level skills development to ensure that the UK has the capability to satisfy its own technological needs and grow export opportunities.

• Match with national priorities now into the future
• Development of skills and capabilities (including collaborative capability)
• Sustainability of the project (do we pay once and it runs itself or is this something we need to keep paying money into to keep it running)
• Value for money and impact

Affordability, excellence and impact provide the underlying priorities for funding selection in the consultation document, however, we have also proposed skills development, efficiency and leverage here as important. An emphasis on a wide range of creative inter-organisational collaboration beyond the existing large companies already strongly embedded in UK research would seem to provide greater leverage to develop higher level skills across the nation as a whole.

In summary:

1. Providing medium sized, semi-specialized facilities and opportunities at the local and regional level to train and develop the next generation of researchers and provide access to technological innovation to nurture SMEs (open access research and training facilities suitable for academic or industrial researchers to use through a bidding process - either housed at a University or within a business park or similar). These should reflect regional industrial and economic potential and expertise. They would also act as an attractor for overseas investment in support of the regional economies.

2. Equipment and facilities suitable for the initial training of engineers and scientists. Currently these are insufficient for the numbers of engineers and scientists needed to sustain the current UK industry in these areas (Estimating the ability of UK university engineering departments to double their capacity to respond to the demand for trained engineers – Engineering Professors’ Council and Engineering UK, 2013). Doubling student numbers in universities in engineering, for example, will require substantial investment in the basic buildings and equipment infrastructure if we are to recruit to both the profession and to develop future engineering research capability.

3. Our over-riding priority for public funding should be to invest where science / engineering can make an impact on our national priorities for the future and in particular, where there is market failure which prevents this from happening.

9 Please feel free to add any additional comment or information that you consider important for the formulation of the Science and Innovation Strategy.

Additional information::