
Strategic priorities for science and research funding

Institute of Physics response to
Department for Business, Innovation and
Skills call for input

A full list of the Institute's submissions to
consultations and inquiries can be viewed
at www.iop.org

17 May 2013

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Professor Sir John O'Reilly
Director General, Knowledge and Innovation
Department for Business, Innovation and Skills
1 Victoria Street
London SW1H 0ET

IOP Institute of Physics

Dear Sir John,

Strategic priorities for science and research funding

The Institute of Physics (IOP) is a leading scientific society. We are a charitable organisation with a worldwide membership of more than 50,000, working together to advance physics education, research and application. We engage with policymakers and the general public to develop awareness and understanding of the value of physics and, through IOP Publishing, we are world leaders in professional scientific communications.

The IOP welcomes the opportunity to provide input to inform forthcoming spending decisions for the Science Budget for the extended Spending Review period of 2015/16. The attached annex details our response to the call for input.

If you need any further information on the points raised, please do not hesitate to contact me.

Yours sincerely,

A handwritten signature in black ink that reads "Peter Knight". The signature is written in a cursive style with a large, stylized 'P' and 'K'.

Professor Sir Peter Knight FRS
President

Strategic priorities for science and research funding

Summary of key issues

We urge the government to make a long-term commitment to increased investment in UK science and innovation as a proven route to growth in the UK economy.

Since the 2010 Spending Review, inflation has eroded the flat cash settlement for science and research funding hindering the ability of the sector to invest strategically in the science base for the long term benefit of the nation. A continued flat-cash settlement for the Science Budget would represent a clear threat to the survival of the UK science base as a world leader. Thus, a significant ring-fenced science and research budget needs to be put in place. Within this, the government should consider re-establishing capital funding for research as an annual component of the Science Budget, coupled with a matched increased in exploitation funding.

It also needs to support the role of the Technology Strategy Board in bolstering innovative businesses that bring knowledge out of the research base to the market. The overall science and innovation budget needs to grow in real terms, balance support between curiosity-driven and targeted research, and support innovation and commercialisation.

Without these commitments the UK is in grave danger of losing its hard-earned position as an internationally leading knowledge-base, as its competitor nations, and rapidly developing nations such as China and India, which are investing heavily in scientific R&D, move ahead in terms of the volume and quality of scientific output and take pole position to attract the best global talent and investment.

The mini-spending review 2015/16

It is widely recognised that publicly-funded science and technology research is key to enabling the UK to maintain its position as an internationally leading knowledge-based economy. Developments in science and technology result in significant contributions to the UK's GDP, whilst creating new jobs, improving the quality of life for its people, and allowing it to respond to global challenges and opportunities.

The Comprehensive Spending Review (CSR) in 2010 recognised the value of UK science to the economy, and allocated a cash protected ring-fenced Science Budget of £4.6bn, which excluded capital spending of approximately £1.5bn. The CSR also protected funding for the Technology Strategy Board and increased support through the Catapult initiative.

In the current mini-spending review, the Institute and the community that it supports and represents are under no illusion that funding for science and innovation will not be subject to the same scrutiny and pressure of fiscal austerity as all other major government functions. However, we would urge the government to find the funding

needed not only to maintain the science settlement but to restore it to real-terms growth.

The UK needs a vision for long-term economic prosperity. Science and technology can supply that vision, but only with adequate investment in research.

Maintaining the science and research ring-fence

While the existing ring-fence protected science and research funding from immediate cuts in 2010, continuing inflation of 2.7% means that Science Budget will have reduced in real terms by over 10% over the current CSR period. Annual erosion of resource due to inflation has substantially reduced the volume of research being funded, resulting in some internationally leading areas of UK research being significantly underfunded. Loss of capacity in these areas will potentially have serious ramifications in the future in terms of wealth creation and in responding to global challenges.

The ring-fence provided reassurance to the science and engineering community of the importance the government places on their work and the contribution that science and research makes to the UK's long-term prosperity and well-being. It is therefore essential that the principle of the ring-fence is maintained for all future settlements but that the funding within it is index linked to allow the research councils to plan effectively the allocation of their budgets over a Spending Review period and not be at the mercy of inflationary deficits.

Additionally, while a strong science and innovation base is essential for economic growth it is not enough on its own. The broader Department for Business, Innovation and Skills and cross-government programmes in supporting innovation take the products of the research base to the market, and also allows innovative companies to feed back into science. This process is equally essential for the maintenance of a world-class science and innovation base – without new technologies and innovations, cutting edge blue skies research in areas such as genomics and particle physics would not be possible.

A significant science and research budget that grows in real terms and that balances support between curiosity-driven and targeted research allied with a long-term framework for innovation funding is needed if the UK is to retain its strength in research and promote growth in its science and technology-based businesses.

Maximising the contribution to UK economic growth

Since its re-launch the Technology Strategy Board (TSB) has been the key government agency supporting innovation in business and creating an environment where businesses are encouraged to invest in R&D and knowledge exchange between universities and business. Its returns on investment, even at what could be described as a very early stage of its existence, have been significant, with figures of 700% recently quoted. However, the true impact of the TSB will be seen in the long term and it, and the government, should retain that focus. A more relevant short-term indicator should perhaps be the positive responses of companies that have engaged with the agency's programmes.

Following the last spending review, the TSB has been tasked with doing more on a budget that has remained largely unchanged, with a remit stretching from the promotion of innovation in the English regions following the abolition of the Regional Development Agencies, through to supporting the new 'Catapult' technology and innovation centres. Existing programmes such as the Knowledge Transfer Partnerships and Knowledge Transfer Networks have shown success in bringing university departments and innovative businesses together and it is unfortunate that the recent changes have required the TSB to reduce the investment in these areas.

The TSB has made imaginative efforts to cope with this reduction of funding. However, there is some concern amongst businesses that TSB grants are heavily oversubscribed and, as a result, chances of successful applications are very low. If the government is serious about promoting innovation and commercialisation, it will need to fund properly the key government agency tasked with working in this area.

It is essential for the TSB to work and liaise closely with the research councils to increase the commercialising the fruits of UK research. It would be illogical in this case to move money from one area to another – what is needed is a strong research base coupled effectively to a strong means of promoting innovation and commercialisation. If the government sees science and innovation as a route to rebuild the UK's economy, then new money must be found to support the remarkable progress made to date by the TSB.

Capital funding for research

The reduction in capital funding announced by the CSR of 2010 applied not only to expenditure in relation to the construction of large facilities and upgrades to existing facilities, but also included maintenance costs associated with existing facilities, and the funding available for university-based laboratory equipment.

Even though significant amounts of capital funding have been released for scientific infrastructure in recent times, they still do not equate to the total amount that was cut from the CSR of 2010. In addition, the allocations appear to be related to political considerations rather than being science-driven. This can be a hindrance to allocating capital funds to where they are most needed (e.g. upgrades to existing national facilities) and make long-term planning difficult for both the community and the research councils. For this reason, the Institute would urge that capital funding for research is re-established as an annual component of the Science Budget and increased to its historic level of funding.

Furthermore, it is imperative that the UK's world-leading national facilities – the Diamond Light Source, ISIS and the Central Laser Facility (CLF) – are utilised in the optimum way to ensure that both academic and industrial researchers obtain the maximum benefit from them. This requires a long-term perspective, and short-term variations in expenditure are particularly hard for large facilities to accommodate, since baseline costs typically represent 90% of operating costs. Thus, even a small cut in the operating budget could result in a major reduction in the running time for the delivery of the science programme. Therefore, clear joined-up thinking between the research councils is critical (i.e. between the short-term objectives of the research councils and STFC's mandate to operate, maintain and develop these facilities for the benefit of the UK). As part of this, it is equally important that the user communities of each of the national facilities are consulted in order to have a full picture of the likely demands for beamtime access and to maximise the scientific output of each facility.

Excellence by impact

Many technological advances have their origins in curiosity-driven research, where the outcomes of the research cannot be easily predicted. Physics research has an excellent track record in making significant contributions to UK GDP. For example, PET, MRI, X-rays, lasers and semiconductors are all technologies which are widely used in many aspects of our lives, and are enormously beneficial to society.

The continued emphasis on immediate impact has the potential to distort the UK's funding system in order to focus on narrow areas that result in short-term economic gains. This, in the medium to long-term, will undermine the UK's ability to retain the highly trained, inventive and innovative scientists and engineers who will maintain and strengthen the UK's international competitiveness. This will not be in the UK's long-term interests.

There is a need to find a healthy balance between the need to fund curiosity-driven research and the translation of knowledge into products and services that can contribute to UK GDP, as well as the need to prioritise research that addresses major societal challenges such as global warming. The research councils must retain the ability to set the UK's long-term strategy for science and engineering independently of the government. This has been a difficult task for the research councils which, over the years, have been under increasing pressure with shorter-term economic objectives set by the government in relation to the advancement of technology by favouring the funding of targeted research over responsive-mode research. It is important that this 'mission drift' does not undermine other important objectives, such as the advancement of knowledge not immediately linked to commercial or societal needs. The role of the TSB and particularly the Catapult centres should be to pick up where the research councils stop, focusing on innovation support and application-led research that is essential for the UK economy.

The Science Budget needs to grow in real terms and balance support between curiosity-driven and targeted research and support innovation and commercialisation. Within this, the government should consider reinstating capital funding for research, coupled with a matched increase in exploitation funding. It also needs to support the role of the TSB in bolstering innovative businesses that bring knowledge out of the research base to the market.

2015/16 and beyond

Looking beyond 2015/16, we concur with the national academies that it is important for the government to make a long-term statement about its commitment to the UK science and innovation sector to help steer the UK out of recession. A stable 10-year investment framework will provide the necessary basis to attract and retain the best talent from across the globe and secure the UK's position as a leading knowledge-based economy.

The UK has an excellent track record of attracting talented people. However, there are challenges on the horizon. If investment in UK science and innovation continues to stagnate or decrease, the best UK-based scientists may consider moving overseas. The UK has recently reversed the brain drain and it will be most unfortunate to lose this new talent. In addition, there is the distinct possibility that overseas students and researchers will no longer view the UK as a leading nation in terms of scientific endeavour and discovery and its universities may lose out on the

fee income from overseas undergraduates and postgraduates, and on the pool of world-class researchers who may decide to seek employment in the UK's leading competitor nations.

We urge the government to make a long-term statement about its commitment to UK science and innovation to promote long-term growth in the UK economy.

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