House of Commons Science and Technology Committee Consultation on the Science Budget and Industrial Strategy

A submission from the British Academy

November 2017

For further information, contact:
Chinara Rustamova

c.rustamova@britac.ac.uk

The coherence and links between the Industrial Strategy Challenge Fund and the 'sector deals'

1. The Academy welcomes the Government's commitment to a major new industrial strategy underpinned by science, research and innovation. The UK has a world-leading research base, which provides the foundation for new ideas and discoveries, and fuels economic growth and the creation of high-value jobs. This enables the UK to compete with other leading nations and to develop the capabilities needed to respond to national and global challenges now and in the future. The Industrial Strategy needs to harness the full breadth of this resource, and recognise the benefits that the arts, humanities and social sciences bring to modern economies, alongside those from science, engineering, technology, industry and manufacturing.

Sector deals

2. The Academy would urge caution in the development of 'sector deals'; the process for this must be transparent. Sector deals must not fall into the traps of the past, which often saw industries which were no longer economically viable supported for political reasons, and also saw some sectors supported which would have flourished without Government intervention or taxpayer subsidy. Government must avoid the past policies of 'picking winners' or propping up declining industries. Economic history would demonstrate that Government is not particularly strong or accurate when choosing which industries to back financially. Government must be a careful guardian of the public finances and must exercise great caution where the potential for protectionist developments are concerned. This is particularly vital as Britain leaves the European Union, and State Aid rules from the EU no longer apply. The end of the State Aid rules offer some opportunities to the UK, but also many pitfalls. Government must be mindful of these risks and ensure development of robust and rigorous systems for testing and measuring 'sector deals' before they are signed off.

3. Government will need to establish robust principles and oversight of sector deals, as well as ensuring they are not creating monopolies, are being fair to new entrants and that they are not entrenching the position of those already dominant in the market. Government must consider a range of measures as how best to do this and may wish to explore international examples. Government may wish to develop explicit criteria for deciding the ways in which it should intervene. Oversight of these deals is critical; a set of rules which are abided by should be in place, with an agency tasked to enforce these rules. A body such as the Competition and Markets Authority may be suitable to fulfil this function, although Government must be mindful of the administrative burden this may place upon such an agency. The improved emphasis by Government and economists on using competition to enhance productivity performance is welcome, and must not be threatened by the risks posed through sector deals.

4. Independent reviews of various sectors are helpful in pointing to evidence based policies to nurture productivity within those sectors. For example, Sir Peter Bazalgette's Independent Review of the creative industries recommends that the Industrial Strategy must recognise and encourage R&D activity in Creative

Industries and in order to do so must redefine how R&D is measured to capture the vital contribution of innovation in Creative Industries. Alongside these sector deals, we must encourage R&D to tackle cross-cutting challenges across sectors. From security to health, from climate change to demographic change, from technology to artificial intelligence, combining the humanities and social sciences with science and technology offers stronger and more innovative responses to seemingly intractable problems compared to a single discipline approach to "solutions".

The ISCF

5. Wave 1 of the Industrial strategy will be delivered through six challenge themes, broadly: The Faraday Challenge to develop world leading batteries; innovative medicines; AI and robotics; satellites; autonomous vehicles; and aerospace applications. The Academy understands that Wave 2 of the fund is now being developed, with funding to begin in 2018/19 and hopes that future waves of the fund, which will not need to be delivered on the same short timescale, and can involve a more transparent and inclusive decision-making process.

6. It has been recognised that the first wave of the ISCF was largely focussed on manufacturing and that subsequent waves need to concentrate more on services, since 80% of the UK economy derives from the services sector including financial, accounting and legal services, creative industries and communications. The Academy would strongly urge the Government to extend its challenge areas for investment to include both the cultural and creative industries and the wider service sector, areas which can be led by the humanities and social sciences, in order to maximise the potential economic return from the investment it plans to make and the engagement of the research base with the strategy. Without it the Industrial Strategy overlooks a major dimension of the UK economy, with the potential to drive future growth.

7. The Academy would recommend five challenge areas in particular for future iterations of the fund. (1) Cities, city regions and regional policies; (2) The integration of health and health care; (3) Pollution, environment and climate; (4) The ageing society; and (5) The role of technology and globalisation in the future of economic structure and employment.

The model adopted by the Faraday Challenge and its suitability for future investments in other sectors under the Industrial Strategy Challenge Fund

8. Challenge funding is one way of incentivising research to tackle the major problems of society. Interdisciplinary research is often needed to tackle such problems, which do not exist in neat disciplinary boxes but rather require insights from a broad and often innovative mix of different methods and understandings.

9. The Academy's project on interdisciplinary research, chaired by Professor David Soskice FBA and summarised in the report 'Crossing Paths'[1], demonstrates the strong mono-disciplinary incentive structures that exist within the UK higher

[1] https://www.britac.ac.uk/sites/default/files/Crossing%20Paths%20-%20Full%20Report.pdf

education and research system. Challenge-based funding can incentivise researchers to break out of these structures, but reward and recognition structures on other dimensions of success often fall strictly within disciplines, which can be challenging for academics trying to build a successful career.

10. The Academy is aware of developing principles often based on models used in organisations such as DARPA. The Academy would urge government to consider which elements of such models are transferable to and appropriate for other contexts with different disciplinary approaches and ways of working. One important factor which government may wish to consider is the tolerance for risk and failure within such projects.

The rationale and coherence for the distribution of funding:
- between the Industrial Strategy Challenge Fund (and its individual ISCF schemes) and the rest of the Science budget;
- between the various initiatives to financially support innovation and commercialisation of research;
- between the two arms of the 'dual support' system — funding via the research councils and funding via Research England;
- between innovation and research.

11. The National Academies are working together to generate new evidence to ensure that future decisions on investment in research and innovation are informed by the best available analysis. With this project we aim to develop a better understanding of the ways in which research and innovation in the UK generates social and economic benefits, and the distribution of those benefits. The analysis will be commissioned in winter 2017 by an expert Steering Group, chaired by Lord David Willetts.

ISCF and the rest of the Science Budget:

12. The Industrial Strategy Challenge Fund will encourage impactful research on challenges that matter, but it will inevitably be selective and challenge areas cannot be set for everything that is important. Future waves of the Industrial Strategy Challenge Fund should be directed towards areas of the economy and society that would add most value to the UK. Many of these draw on a combination of research disciplines, with a central role for the humanities and social sciences.

13. A holistic approach to the Science Budget must also be maintained, recognising that a balance of funding streams is necessary to maintain a healthy ecosystem for excellent research. Crucially, as part of this, the UK Science Budget must encourage curiosity-driven research. There are powerful examples from the history of science, most recently perhaps the creation of graphene at the University of Manchester, of curiosity-driven research, having a significant economic, material and intellectual impact. The time lag of impact from research can be long and the process of impact is not linear.

14. The delivery of the Industrial Strategy will depend on the existence of a creative, well-trained workforce, the 'pipeline of talent for an innovative economy' described in the Green Paper. The Academy agrees that it is vital that the UK continues to be

able to attract the world's most talented researchers from across the world. Championing the UK as a hub of research and innovation to attract a diverse mix of international and national entrepreneurs and researchers is vital for long term socio-economic growth throughout the UK. We should also celebrate and encourage the benefits of postgraduate study.

Innovation and commercialisation

15. Initiatives to financially support innovation and commercialisation should not be concentrated in traditional sectors of the UK economy which no longer dominate. Consideration should be given to encouraging innovation in services, in design and in new technological areas such as Artificial Intelligence, where the UK is strong and where innovation and commercialisation processes can be different.

16. For example, tax credits are one mechanism of incentivising research and development in the private sector. Tax credits for R&D rely on a definition of R&D that does not capture the full range of research and innovation activity that underpins productivity in important sectors in the UK economy such as the creative industries[2].

Dual support

17. The dual support system is a necessary condition of the UK's research excellence. For the humanities and social sciences in particular, quality related (QR) funding is critical, and it underpins research activity across the disciplinary spread, allowing institutions to set long term strategies.

18. UKRI is an opportunity to drive forward a positive and expanded role for research and innovation, by developing a strategy and associated investment framework that can operate on a cross-disciplinary scale and be delivered more coherently, effectively, and efficiently.

19. UKRI will be responsible for distributing both elements of the dual support system. The dual support system and the balance of funding principle has been written into legislation through the Higher Education and Research Act, which is a positive first step. But the case must constantly be made for the importance of the unhypotecated element of this spend so that a health balance is maintained.

Innovation/Research

20. It is commonly held that the UK is strong in research but weak at innovation. The links between research and innovation are complex and diffuse and it is unhelpful to think about a hard split between the two. Effective adoption of technology throughout businesses and improvements in management and workforce skills depends on the understanding and insight which the humanities and social sciences can bring to the complexity of social phenomena and human behaviour. In this way, we can incentivise behaviours that increase worker productivity. Technological

[2] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/649980/Independent_Review_of_the_Creative_Industries.pdf

developments will alter the working patterns, and we will need a workforce that can exploit and manage opportunities, risks and disruptive changes it will bring. In the future, resilience, adaptability, flexibility, adapting to change, navigating uncertainty are some of the core skills which will be needed.

The balance between different parts of the country in Government funding of research/innovation, the effectiveness of such place-based financial support, and how planned place-based funding might affect that balance in future

21. To realise fully the Government's vision for the industrial strategy, we need to exploit the insights and benefits that the arts, humanities and social sciences have to offer. If we do not, we risk developing a narrow strategy that distorts and destabilises the UK's drive towards geographically balanced and sustainable growth. Innovation, productivity, and competition all require an understanding of human behaviour, including its influence upon the take up of key technologies. The nexus between technology and creativity is increasingly recognised as the driver for the industries of the future. It is also the most likely lever for promoting regional growth beyond London and the South East, so helping to regenerate cities and foster dynamism so as to help even out disparities in all the nations of the United Kingdom. The AHRC's cultural value project shows us clearly the value of culture led urban regeneration and research institutions have the potential to attract and retain high skilled people.

22. Jointly with the other national academies, the British Academy recently documented the UK's spend on research and development through the Science Budget. This shows that R&D spend varies from region to region, with each having different strengths and dependencies. A successful Industrial Strategy should present a national vision while recognising that the UK and its industries are not uniform. The data is available here.

What further measures the Government should take to use its spending and facilities to strengthen innovation, research and associated 'place'-based growth

23. The Academy would like to highlight the need for skills growth across all sectors of the economy, with a recognition by Government of the role played by the humanities and social sciences in both the service sector and wider economy. As we seek to boost STEM subjects and the skills level of the UK in general we must recognise the benefits provided to the economy of the skills provided by the arts, humanities and social sciences. The service sector, which includes financial services, the creative industries and professional services, accounts for 80% of the UK economy, and has been and will continue to be an engine for economic growth and the creation of new jobs. For example, the economic value of the legal services is estimated to be £25.7bn, and the legal sector grew by 3.3% per year between 2005 and 2015[3]. In 2014, financial and insurance services contributed £126.9bn in GVA to the UK economy.[4]

[3] The Law Society (March 2016). Economic Value of the Legal Services Sector: www.lawsociety.org.uk/news/.../legal-sector-economic-value-final-march-2016/

[4] House of Commons Library (February 2015), Financial Services: contribution to the UK economy: researchbriefings.files.parliament.uk/documents/SN06193/SN06193.pdf

24. The British Academy believes there should be more emphasis on potential future jobs, and the potential good, and threats, for the labour market posed by a growth in areas such as robotics and artificial intelligence. Government should explore what likely patterns of work and employment in 30 – 50 years' time, and plan accordingly to invest in skills in schools as well as lifelong learning opportunities to help improve the resilience of the labour force. Government should be ambitious, forward thinking and working with those institutions who are undertaking modelling activities, posing questions about the future world of work. Such steps should support productivity and enable the population to weather changes in the workplace, as have been seen in the last decade with the development of the 'gig economy', and the strengths and weaknesses it brings to the UK economy, as well as to the individual worker. Our recent skills project has found that the skills developed through study of arts, humanities and social sciences provide a strong basis in preparing individuals for a future in which high level skills, adaptability, entrepreneurship, digital, data and language skills will be crucial.

25. More focus needs to be given to enabling women to re-join the workplace after career breaks owing to childcare, or other responsibilities; this should form an important focus of the next stage of the Industrial Strategy. Addressing imbalances in earnings between men and women, as well as the ability to participate in the labour market, will have strong benefits for the UK economy. The Academy would recommend a joined-up approach with other relevant Government departments looking at what more can be done to make it easier for women to stay in and return to the labour market, as well as having the opportunity to gain new skills while on maternity or other leave. The Academy stands ready to offer further advice on this.

26. The growth of Local Enterprise Partnerships (LEPs) and the changing devolution settlement in some regions of the UK should help economic development in those regions, provided adequate resources are placed at the disposal of new combined authorities. Government must be aware of the limitations placed on some Local Authorities in recent years to undertake such development work, owing to local government funding cuts, and must assess how best to support Local Authorities and Chambers of Commerce, amongst others, to assist economic development opportunities. While devolution to some areas, such as the North West, is well developed, it is far less so in other areas of Britain. There is a risk of some areas of the UK doing well economically in 'pockets', while other regions, or even rural areas of the same regions, are left behind due to a lack of a devolution deal or adequate powers to support local firms trying to export or grow. BEIS must address this working in an integrated way in conjunction with local authorities and the Department for Communities and Local Government (CLG). The Academy understands that following the closure of Regional Development Agencies there are only a small number of Whitehall civil servants with responsibility for directly linking with specific geographic areas. Government should explore whether it would be effective to develop a cohort of civil servants with responsibility for liaising and monitoring, or developing policy to boost economic growth, in specific geographic areas. The devolved objectives for each region or area should be clear so success at a local level can be measured.