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Dear Chair,

Fifty-Sixth Report of Session 2019-21: Industrial Strategy Challenge Fund (ISCF)

In the report following the Committee (PAC) Hearing on the management of the Industrial Strategy Challenge Fund (the Fund) on 04 March, the Committee set out a series of recommendations for UK Research and Innovation (UKRI) and our Department. I am writing to you in relation to recommendation 2 of the report which concerned UKRI's approach to the intellectual property (IP) arrangement of the Fund:

UKRI should re-examine its current approach of not holding a claim on intellectual property generated through the Fund. It should write to the Committee by July 2021 setting out the results of its review and explain how it intends to best protect the taxpayers' interests and maximise the value from taxpayer investment in the future.

The Department and UKRI are fully committed to ensuring that public investment in Research and Development (R&D) delivers real benefits to the UK's economy and society – maximising benefit to taxpayers. We have carefully assessed the recommendation, considering the purpose and intent of the Fund, as well as potential future benefits against the additional costs. This includes the opportunity costs that would be associated with introducing additional complexities and delay combined with the dampening effect on the willingness of universities and business to engage with

the Fund. In conclusion, we have decided not to pursue either IP ownership or revenue sharing approaches for ISCF.

The Design of the Fund

The Fund is a key part of the Government's Industrial Strategy: It was designed to be a new, highly directed approach to achieving technological outcomes that have the potential to bring major economic and social benefits to the UK. Delivered primarily through UKRI, it combines the UK's research strength funded through Research Councils with the business focussed, competitive approach of Innovate UK.

As set out in the business case, it is important to note that the 'industry-led' approach of the Fund is not just about commercialising UK university research, but also to improve the performance of our whole science and innovation system. University-business collaboration and engagement runs through the entirety of the Fund, this forms a part of the solution to help SMEs commercialising new products and processes, an area where UK has traditionally lagged behind other nations.

Research & Development (R&D) is the foundation of productivity and growth[1]. The rationale for Government intervention in R&D and innovation is well-established and based on a number of market and system failures which inhibit optimal private sector investment in R&D.

Return on investment from innovation and R&D is risky and uncertain, and finance markets are imperfect at providing funding at the right cost to the right organisations, and to areas which will yield the highest societal return[2]. Small companies in particular can struggle to raise funds, and larger companies can find it hard to internally justify early-stage investment due to the risk and uncertainty involved. Further evidence can be found in *The case for public support of innovation* published by the Department (2014).

Benefits to the British public

The current arrangement of having the IP owned by participating business and universities who undertakes the research is judged to be the best way to maximise the socio-economic benefits of the Fund and yields tangible benefits for UK taxpayers. The Fund was not designed to be a short-term, for-profit "venture capital investment" Fund, but a Government intervention to stimulate the UK R&D sector. Like all public funding for research and Innovation, the long-term benefit to the British public will outweigh the initial investment made by the Government. In light of the UK exiting the European Union, the Fund has acted as an enticement for businesses to set up R&D based activities and remain in the UK.

Successful commercialisation of ISCF projects not only creates local jobs, it encourages the development of innovations and products which will increase

[1] Multiple studies demonstrate the strong link between innovation and productivity, including Nesta (2010) Innovation Index which found between 2000 and 2008, innovation accounted for 51% of labour productivity growth and 63% of economic growth.

[2] *Kerr & and Nanda* (2014) Financing Innovation

productivity and, in turn, GDP and tax revenues, helping to solidify the UK's position as a science superpower. An overview of the benefits expected to be achieved by Challenges within the Fund in the short, medium and long term will be published later this year in response to a further PAC recommendation.

Early emerging evidence from UKRI indicates that participants of completed Challenge Fund projects estimate £900 million cumulative additional net revenue[3] (range £700 million to £1.1 billion) as a result of Challenge funding (from an investment of £196 million to date, based on closed projects). This is based on a set of 344 completed projects with 695 participant organisations since 2017.

This delivers an average £0.9 million (+/-£0.2 million) in additional annual net revenue per project participant, with most of this going to small and micro businesses.

Further signs of emerging impact can be seen from interim independent evaluations such as the Faraday Battery Challenge which indicates that, as of April 2020, research efforts undertaken by Faraday Battery Institute have supported 16 patenting opportunities across seven projects, of which 5 have led to official IP disclosures suggesting progress towards commercialisation.

Government ownership of IP

The UK Government approach to IP exploitation has evolved to ensure that the responsibility lies with those best placed to deliver this.

Post World War II, Governments have taken various different approaches to exploit publicly funded IP for UK taxpayers' benefit. From post war until the early 1980s, management and exploitation of arising IP was Government's responsibility (as opposed to institutions such as universities). In 1948, the National Research Development Corporation was formed with the purpose of commercialising innovations that arose from public funded research. This was complemented in November 1975 by the establishment of the National Enterprise Board to implement the then-Government's policy of moving public sector industry into commercial private enterprise. These two organisations were merged in 1981 to form a new, non-statutory body - the **British Technology Group (BTG)**, which acted principally to license and commercialise the use of publicly funded developments.

In 1980 the USA enacted legislation, now known as the **Bayh-Dole Act**, that places responsibility on universities, non-profit research institutions and small businesses to own, patent and commercialize inventions developed under federally funded research programs within their organizations. This was subsequently described as having "unlocked all the inventions and discoveries that had been made in laboratories throughout the United States with the help of taxpayers' money. More than anything,

[3] Project Closeout Forms Apr 2021, net revenue cumulative to date, self-reported by participants, adjusted for bias and for estimated effect of shutdowns during 2020 pandemic.Net revenue includes turnover, licensing revenue, cost reductions and other revenue sources. Estimated additional revenue is extremely sensitive to the optimism bias rate used, with different optimism bias rates used to generate range

this single policy measure helped to reverse America's precipitous slide into industrial irrelevance."

Despite many commercialisation successes via BTG, there were many other opportunities being missed through a centralised arrangement. By the mid 1980s the UK government had subsequently adopted a similar approach to the US (i.e., that ownership of and responsibility for commercialising IP resulting from publicly funded research rests with the performing institution) and this is now underpinned in the UK by Patent Legislation and in the terms/conditions of grant funding allocated by funding bodies. Universities then began to establish their own arrangements to facilitate IP management and exploitation.

There is international consensus amongst a wide range of public funders, charities and others that this is the most appropriate and effective way to manage the exploitation of IP. There are few exceptions to this, though there are safeguards to allow funders to step in if required in certain circumstances. Exploitable IP is normally the result of accumulation of knowledge funded over extended periods, by many different funders and involving multiple researchers. Disaggregation at a level below that of the institution would be complex, costly and restrict exploitation, especially given the trend to funding more multi-disciplinary and multi-institutional collaborative research.

Universities now have well established and effective arrangements and the resources, expertise and capabilities to facilitate commercialisation of their IP. The Department and UKRI would require additional capacity and to enhance capability to effectively exploit the IP generated from the Fund. Although the Intellectual Property Office and the Government Office for Technology Transfer (GOTT) can provide advice about the management of IP and - in the case of GOTT, newly established from the Government's Knowledge Assets programme to support Government Departments and public bodies on how to identify, protect and exploit their knowledge assets as well as taking forward the implementation strategy for better management of knowledge assets - they do not have the in-house R&D capability to translate them into commercially viable products. This process also usually requires further significant R&D investment and specialist personnel.

Full ownership approach

The Department understands the Committee's rationale for wanting to generate direct return on public investment by taking ownership of IP. There are indeed some situations in which Government Departments have claimed ownership of arising IP. However, unlike the COVID-19 Ventilator example suggested by the Committee in the report - where Cabinet Office funded the R&D cost in almost its entirety - an important feature of the ISCF is that businesses are not simple subcontractors to Government who is effectively procuring the outcomes, but also contribute significant amounts of their own co-investment to the projects, and will also have to invest further in the

subsequent development phases in order to take the innovations and products through to market.

At the time of NAO report publishing (February 2021), industry had contributed £567 million against the Fund's co-investment target of £2.8 billion. As of July 2021, the industry contribution had increased to £1.3bn. The co-investment criteria increased for Wave 3 at the then-Secretary of State Greg Clark's request. If the Government were to claim the ownership of IP generated in full, businesses and universities would become simple contractors, and this arrangement would be unlikely to attract this additional co-investment, thus undermining both delivery of the specific objectives of the ISCF and the Government's wider commitment to raise UK's R&D spending to 2.4% of its GDP. It is also likely to undermine the purpose of this Fund to address market failures around private investment in R&D.

This would disproportionally affect innovative SMEs, where ownership of IP resulting from their activities is critical to their business, and risk further decreases in their participation in these sorts of collaborative R&D activities where they often engage in higher-risk research. In addition, many innovative SMEs are backed by venture capital investors who would be unwilling for the SME to give up IP rights to Government.

If the Government were to claim direct ownership of only a portion of the arising IP, this would require detailed negotiation of the IP arrangements for each project. Depending on the extent of co-investment associated with each project (its technology readiness, the extent of background IP which each university and business partner is bringing to the project, and the scale of future investment which the businesses would need to invest to take through to market etc), it would significantly increase the complexity of the partnership arrangements and introduce additional delay (as IP negotiations could not begin in detail until UKRI have selected the winning project bids, and projects could not be initiated until IP arrangements had been fully negotiated). This would also generate significant additional administration requirements and costs within UKRI to negotiate these detailed arrangements. It is unlikely that businesses would participate unless they were assured of exclusive access to this IP.

IP negotiations can be long, complicated and resource intensive, and can range from several months to a year, with the increased risk that projects fall through due to the inability to reach an agreement. Individual negotiations on IP would add significant delays to the already lengthy approval process, causing severe risks to the financial planning of UKRI, the Department, and HM Treasury. If an agreement could not be reached in a timely fashion and the project falls through, there would be reputation damage for the Government. Finally, the requirement of an IP negotiation itself may act as a deterrent for potential applicants.

Government and UKRI would require additional capacity, resources and to enhance expertise to invest further in taking the arising IP to market directly themselves. Thus in order to ensure that the IP generated was then taken forward through to commercialisation, Government and UKRI would need to negotiate at the outset with

each project and collaboration the appropriate licensing arrangements which would enable the business to do so.

Revenue sharing approach

A revenue sharing approach towards IP generated from public money is an established practice in various Government Departments and is potentially applicable to the Fund. It has been successful in Public Health England, where this arrangement produces direct financial reward for the public investment while not deterring collaborators. A revenue sharing approach would however still introduce added complexity, uncertainty, and delay, as it would still require negotiation on the terms depending on the technology, stage of development etc – and require additional resources, administration and expertise within UKRI to undertake.

As the Fund is aimed at addressing market failures in the early stages of R&D process, public funding from ISCF would usually only amount to a fraction of the final R&D cost. To translate the generated IP into profit-making product would require a significant amount of further investment. For example, it is well documented that the majority of R&D cost of pharmaceuticals are spent on clinical trials and not the pre-clinal stages. In such projects, the Government would at best only receive a minor revenue return at the point at which products finally reached the market and started generating sales.

Given the increased complexities, delays, costs and uncertainties created by the above approaches, it is likely that some businesses would disengage from the Fund, with the consequence that Committee's aim of maximising benefit to taxpayers would be unlikely to be achieved. The Department would also need to reassess what additional incentives or Government funding would be needed in order to encourage business themselves to invest further in R&D.

University IP rights

The Department and UKRI do not agree with the PAC view that "UK Academia does not have a strong record of protecting IP rights". Robust arrangements and mechanisms are in place to protect university IP generated from public funding. The Government requires UK universities to have exploitation arrangements in place as a condition of the transfer of IP ownership (for example, in Research Council grants). The exact mechanism chosen to protect and exploit IP depends on the nature of the opportunity, so Government does not dictate the terms or nature of these arrangements.

The Department leads on intellectual property through its sponsorship of the Intellectual Property Office (IPO), and the IPO supports universities to develop effective intellectual property management strategies through toolkits and guidance, such as the guide on Intellectual Asset Management for Universities. In addition, Government also incentivises the application and commercialisation of research results, through a range of mechanisms. Over the last 20 years, UK universities have sought to contribute to vibrant ecosystems for knowledge asset exploitation. This has

also contributed to building academic excellence, with the best universities acting as central nodes in the modern knowledge economy, attracting talents and investments to the UK from across the globe.

Universities are required to report annually through the "Higher Education Business and Community Interaction" Survey (HEBCI)[4] on a range of knowledge exchange (KE) activities, including those related to management of IP: patents, IP revenue, numbers of spinouts & other start-ups, as well as collaborative and contract research undertaken with businesses and others. International comparison of key metrics indicates that overall UK's university technology transfer performance is competitive with the USA[5], in terms of patents, spinouts, income from IP and % of industrial research income per £1 of research. This is something we want to build on. In fact, key UK universities are world leading, for example international review[6] showed that based on level of funding raised by spinouts, UK has 5 universities in the top 10 in the world – with Cambridge (1) (ahead of both Stanford (2) and Harvard (4)), and Oxford (5) (ahead of MIT (6)).

In 2019-20, despite COVID-19 and EU Exit pressures, 160 new spin-off companies were formed from university-owned IP, and universities were granted 2027 patents and generated over £295 million of revenue from IP. In addition, external investment in spinouts and start-ups has held up impressively well, with university spinouts/start-ups attracting £3.32 billion, up by £1.09 billion (49%) on 2018-19. Of this, external investment in university spinouts (i.e., companies based on IP) was £2.82 billion in 2019/20, up 54% on 2018-19 (at £1.83 billion).

Conclusion

We have assessed the purpose and intent of the ISCF, balancing potential future benefits against additional costs, including opportunity costs, risks associated with additional complexities and delays, the extra administration required and the potential dampening effect this would have on the willingness of university and business to engage with the Fund. The Department's conclusion is that the best outcome for the ISCF is not taking further steps on either IP ownership or revenue sharing approaches.

The Department and UKRI remain fully committed to ensuring that public investment in R&D delivers real benefits to the UK's economy and society. We will continue to monitor that this is being delivered effectively by businesses, and through the commercialisation and collaborative R&D engagement activities of universities.

We will also be making the most of the Department's responsibility for, since April 2021, the Government's Knowledge Assets programme. This programme will support the exploitation of Government-owned intangible assets by establishing the GOTT and fund to improve how we manage, develop and invest in public sector knowledge

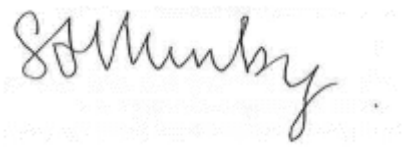
[4] https://www.hesa.ac.uk/data-and-analysis/providers/business-community

[5] Comparison of latest data from US AUTM Licensing Survey and UK HEBCI Survey for 2018-19

[6] https://globaluniversityventuring.com/2013-17-data-review (Independent US Report)

assets such as IP, data, R&D, expertise and knowledge. GOTT will support government departments and public bodies to protect and exploit their knowledge assets and will of course be working with UKRI amongst others.

I am copying this letter to the Treasury Officer of Accounts.



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BEIS Permanent Secretary