# UK Parliament: Science and Technology Committee

## Call for Evidence for a new UK Research Funding Agency

Submission from the National Centre for Universities and Business, July 2020

# Introduction

Set against the UK Government commitment to increase investment in R&D to 2.4% of GDP by 2027 and increase public funding for R&D to £22 billion per year by 2024 to 2025, the UK parliament's proposal to establish an ARPA style agency has the potential to drive and support breakthrough innovative technologies and basic research through de-risking R&D investment across long-term time horizons.

Driving forward the UK's strong position in research and innovation can only be facilitated through persistent efforts to improve the many ways in which the academic and business worlds bring benefit to one another. Against this background, the National Centre for Universities and Business (NCUB) was launched in April 2013, and works together with member universities and businesses to achieve growth and prosperity. Uniquely in the UK, the National Centre focuses exclusively on understanding and improving the relationship between businesses and universities.

Success for the proposed ARPA-style funding agency is no exception to the need to involve both universities and industry, relying on public funding for early- stage innovation but in the longer-term leveraging private investment, positioning the nation to take on the big societal challenges such as the Covid health crisis, climate emergency, ageing population and many more.

Our responses to the questions below are informed by our unique member perspective, championing the role of university and business partnerships and acting as a trusted advisor to Government.

## Section 1: What gaps in the current UK research and development system might be addressed by an ARPA style approach?

**A higher tolerance of failure**

- NCUB members and others[1] tell us that near-to-market 'technology-pull' is better funded within the research funding landscape than early-stage, high-risk, potentially high-impact venture capital. Limiting research funding to late stage research with near-guaranteed outcomes can stifle curiosity and innovative thinking. Historically, US-based DARPA has an 85 per cent failure rate. Therefore, success rate expectations for a UK-based ARPA would need to be adjusted to those associated with higher risk, big impact research.

**Greater flexibility**

- There is a need for greater flexibility in funding opportunities, both in scope but also in timing, delivery and size of programmes to allow more companies to access the right support at the right time to meet their business needs. The success of Innovate UK's funding programmes throughout the Covid crisis demonstrates the need for more open programmes that allow more companies to access rapid-response funding. The UK's innovation funding

[1] King, Baroness Julia, "ARPA: A critical condition to our Innovation Landscape", 2020. In *Visions of ARPA: Embracing Risk Transforming Technology,* edited by Iain Mansfield and Geoffrey Owen.

system has been criticised by some sectors for lacking agility compared to competitor countries, particularly in Asia, known for their high-tech, fast-moving R&D. This can make it harder for large and small companies in fast-moving sectors to compete where funding calls do not respond to business need and put applicants through a burdensome application process to succeed[2].

**Longer term funding**

- NCUB believes that there is a gap in the innovation funding landscape for researchers to access longer term funding. Research funding allocations (spanning at least 10 years) that give researchers the freedom and resources to unlock their ideas from concept stage through to commercialisation can help to attract and retain the best and brightest academics to come to the UK. An NCUB business member in the engineering sector confirmed that their largest R&D investment projects often span over 10 years to take an idea and deliver incremental improvements before it is commercially ready.
- A longer term view to innovation can also help to bridge the perceived gap in the UK innovation ecosystem between the realisation of early-stage, blue-skies ideas to late-stage commercialisation, with the proposed agency able to fund and support innovation at every stage of the development, and with the help of businesses encouraged to invest, eventually bringing innovative products to market.

**Commercialisation**

- A key feature of the new funding agency should offer opportunities for businesses to invest in products created by the new agency. The UK is a world leader in pure research and produces more world class research relative to its spend than any other major country. Indeed, evidence suggests[3] that using field-weighted citation impact as a proxy for research quality and with a global baseline of 1, the UK achieves 2.23 for UKRI-supported grants - the highest in the world. If the ARPA style agency were to make commercialisation part of its innovation funding, not just targeting financial investment but also enabling technical or marketing support, this would encourage businesses to get involved at different stages of new product/ innovation readiness and harness the strength of our world-class research. Business involvement at early stages can also help de-risk investment and act as a sign of quality to private investors and at later stages can enable products to reach a wider audience and market which can then go on to be sold by businesses.

[2] Royal Academy of Engineering, "Increasing R&D investment: Business Perspectives"
[3] Willets, David, "Designing a British DARPA", 2020. In *Visions of ARPA: Embracing Risk Transforming Technology,* edited by Iain Mansfield and Geoffrey Owen.

## Section 2: What should be the focus be of the new research funding agency and how should it be structured?

**Clear mission-based research aims**

- The demonstrable benefits of agile, innovative funding opportunities through Innovate UK in response to Covid19 has led to further recognition that there needs to be much larger-scale innovation funding that can respond to societal needs. NCUB believes that an ARPA style agency can serve as the UK's funding arm for 'moonshot' ideas as proposed within the UK R&D Roadmap- even where there is limited or no market for the product yet, such as hydrogen energy. As the UK leaves the EU with an ambitious R&D Roadmap that aims to establish the UK as a scientific leader, an ARPA style agency would provide a framework for matching innovation with longer term thinking on the areas of greatest need for scientific innovation in the UK. Combined with longer research periods, mission-based research would also enable researchers to focus on one area of research, eliminating the need to continually apply for more government funding through grants over shorter periods of time.
- ARPA should be given a small number of clear, strategic missions, each addressing a major societal challenge or scientific area, such as climate change, health, artificial intelligence or ageing. These missions – ideally between two and four – should be determined by a committee comprising both industry and academic leaders. Each mission would in turn include a number of specific research projects thereby preventing the potential for a monopoly and spreading funding amongst a number of different innovative ideas.

**An ARPA-style agency should sit within the wider research landscape**

- NCUB believes that an ARPA style agency should fit within a broader innovation landscape that includes support for early-stage blue sky research *and* later stage incremental development through existing agencies such as UKRI including Innovate UK. Importantly, ARPA should not be viewed as a substitute for other sources of R&D support but instead serve as a complementary piece of a diverse innovation system. This will mean alignment between all government agencies contributing to a healthy research and development ecosystem that will attract a steady pipeline of talent flowing into the UK economy, from both the public and private sector.
- The US- based DARPA is independent from the existing innovation structure in the US. NCUB believes that even **if** the proposed ARPA were to sit outside of UKRI , a close relationship will still be vital as UKRI will be responsible for creating the wider research environment. The whole UK innovation ecosystem will need to work in collaboration to meet the broader goal and pull towards the 2.4% R&D target. From the perspective of a university or business, the experience of engaging with ARPA should appear seamless and integrated within the research system.

**The role of universities in a new agile funding ecosystem will need to be sharpened and made more flexible**

- In the same way ARPA funding will be agile and high-risk, funding across the entire ecosystem should complement the role of ARPA. Universities will play a key role in the research infrastructure and will need to be able to respond with the same agility that is required of its business partners. Former NCUB Board Member Baroness Julia King writes, "Universities… aren't used to potentially large tranches of funding that start quickly and can suddenly stop. The implications for recruiting research staff and then potentially terminating their contracts would be a real inhibitor. Universities will need core funding that covers flexible research staff who can be moved from one project to another when funds come and go to be able to cope with this, most universities don 't have resources in this way at the moment."[4]
- A UK based ARPA cannot operate in isolation. NCUB believes that its success will be tied to its ability to find mechanisms for ongoing engagement with industry and universities, awarding funding to successful innovative concepts that work across sectors and industries and which are able to identify their aligned strategic interests and strengths.

## Section 3: What funding should ARPA receive, and how should it distribute this funding to maximise effectiveness?

- While the proposed agency needs to be allocated an appropriate budget to enable it to adequately fund and resource high-tech innovation, a balance between the ARPA budget and the Balanced Funding Programme needs to be found in the context of increasing public R&D&I funding. Therefore, funding the wider ecosystem that produces the broader knowledge and talent and leverages future private investment has to be equally balanced to enable a free-flow of benefits.

[4] King, Baroness Julia, "ARPA: A critical condition to our Innovation Landscape", 2020. In *Visions of ARPA: Embracing Risk Transforming Technology,* edited by Iain Mansfield and Geoffrey Owen.

## About the National Centre for Universities and Business

The National Centre for Universities and Business (NCUB) is a public-private partnership with the sole purpose of increasing the value, intensity and diversity of university-business collaboration.

In short it is focused on building stronger connections between universities and business with a three- pronged agenda.

- First, to ensure that universities deliver the skills that businesses require against a fast changing technological and market landscape.
- Second, to ensure that businesses large and small can both leverage and support the research and innovation capabilities of Britain's universities across the UK.
- And the third plays to both of the first two agendas – a specific focus on how collaboration and partnership can support the needs of different places.

Our membership base draws together over 75 universities from across the UK with 40 corporate businesses spanning a unique mix of different sectors and technologies. This membership base is committed to the benefits and value derived from university-business collaboration. And this agenda is supported by a Council of senior representatives from each member to champion and push boundaries in collaborations.

Our network extends and includes our partners in Government where we have strategic relationships and funding support through UK Research and Innovation and Research England as well as the Devolved Administrations in Scotland, Wales and Northern Ireland.