The British Academy

British Academy response to the House of Lords Science and Technology Committee Inquiry on Delivering a UK Science and Technology Strategy

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The British Academy is the UK's national academy for the humanities and social sciences. We mobilise these disciplines to understand the world and shape a brighter future. From transformative ideas that have shaped our economy and welfare state, to feminism and pioneering new ways of understanding our past and its implications for the future, this country has given rise to many of the most ground-breaking ideas in history. At the heart of these ideas are insights from the SHAPE subjects (Social Sciences, Humanities and Arts for People and the Economy). These disciplines have been and will remain essential to our success as a country and we have previously outlined seven ways in which the government can harness the potential of SHAPE disciplines.[1]

Here, in our submission to the Inquiry on Delivering a UK Science and Technology Strategy, the British Academy sets out the evidence for each of the seven questions posed by the Committee.

1 www.thebritishacademy.ac.uk/documents/3505/british-academy-submission-spending-review.pdf

1. What would it mean for the UK to be a "science superpower?"

It is vital that any concept of the UK's "science superpower" status should be based on thinking which includes the entirety of the research base, and not just narrowly conceived material and technological sciences. The Academy notes the four scientific and technological priorities outlined by the Office for Science and Technology Strategy (OSTS); however, we point out that the social, ethical and political consequences of scientific and technological innovation cannot be understood without input from SHAPE disciplines.

Previous statements by the Academy have made the case that the breadth and plurality of the UK research base is one of its great strengths.[2] As just one example, the benefits of this breadth have been repeatedly demonstrated during the last two years of the COVID-19 pandemic; life and medical sciences have given us the vaccine, but it has taken the social sciences and humanities to tackle vaccine engagement.[3] As we move forwards into the economic and societal recovery from COVD-19, the new challenges produced by the social and cultural disruption of lockdown and the effects of disease will be understood, mitigated and turned to good if, and only if, the full strength of broad expertise is appreciated.

The strength of the research base in the UK is built upon the contribution of researcher-led, curiosity-driven research which advances knowledge across all disciplines and provides the foundation for ideas to innovate at the intersection of knowledge and societal need.[4] To sustain and grow a research base equipped to act in this way, the UK has a plurality of opportunities to attract the very best researchers and enable support for individual career trajectories at key stages. It is critical that this plurality is sustained, and that the UK must remain attractive to a breadth of talent if the research system is to thrive.

Becoming and remaining a "science superpower" will require consistent, long-term, measured, and high-profile leadership which protects and strengthens the research system while focusing on long-term benefits for the research base across the country. Recent years have been turbulent for the research sector; multiple one-year spending reviews, cuts to Official Development Assistance (ODA) funding, and uncertainty about Horizon Europe association have all contributed to a lack of stability. Similarly, participation in EU Framework Programmes has been a core feature of higher education competitiveness and research excellence.[5] There is strong evidence to show that association to Horizon Europe is critical to sustaining and strengthening the UK's comparative advantage in international research collaborations, and to attracting and retaining world-leading researchers.[6] Uncertainty related to associating to Horizon Europe is a major challenge to such comparative advantage, as is a lack of funding for international research and innovation.

This is particularly pertinent to realising "science superpower" status, as historically one of the best indicators for research excellence has been UK performance in open competitions such as the European Research Council (ERC) — arguably the most important body for discovery research in the world. It is a global competition, across all the sciences, on the same terms, with assessment done by the very best researchers internationally. The latest data on ERC Advanced Grants from 2020 shows that the UK received 51 of the 209 grants available, followed by 40 awarded to Germany. Social sciences and humanities (SSH) also performed exceptionally, as 38% of the

2 www.thebritishacademy.ac.uk/documents/3505/british-academy-submission-spending-review.pdf
3 Please see www.thebritishacademy.ac.uk/news/local-knowledge-and-engagement-could-be-key-in-covid-vaccine-take-up-effort-finds-new-research-by-academics-in-the-uk-and-us/ and www.thebritishacademy.ac.uk/news/vaccine-hesitancy-threatens-undermine-pandemic-response/
4 See: www.bennettinstitute.cam.ac.uk/wp-content/uploads/2020/12/QR_Study_October_2021.pdf
5 See: www.thebritishacademy.ac.uk/publications/eu-higher-education-staff-and-students-in-the-uk/; www.thebritishacademy.ac.uk/publications/europe-futures-horizon-examining-value-research-collaboration/; and www.thebritishacademy.ac.uk/publications/europe-brexit-means/
6 See: www.thebritishacademy.ac.uk/publications/europe-brexit-means/; www.thebritishacademy.ac.uk/publications/europe-frontier-knowledge-future-gain-why-european-research-council-matters/; www.thebritishacademy.ac.uk/publications/association-erasmus-challenges-and-opportunities/; and www.ukcdr.org.uk/resource/case-studies-uk-funded-research-on-climate-change-and-international-development/

awards made in those disciplines went to UK-based award holders, demonstrating the comparative quality of SHAPE research internationally.[7]

To summarise, the long-term success of a scientific strategy depends on the Government recognising the strength of the UK's entire research base, its plurality and the centrality of talent, as well as how SHAPE disciplines are integral to its strategic priorities. Protecting and stabilising the research base will be critical, including ensuring that there are no gaps in international discovery research funding.

2. Are the right structures in place in Government to implement a science and technology strategy?

The Academy has welcomed the Government's commitment to science and research, and the increases in public investment, committed to 2024. The establishment of the National Science and Technology Council (NSTC) and the Office for Science and Technology Strategy (OSTS) could help to leverage wider strategic benefits from the UK's research base to tackle issues such as societal wellbeing, climate security and national growth.

However, there is still much to be explored in how relationships will work between these two new bodies, and with existing organisations, particularly on areas such as national security. There should be better clarity on how these new bodies and the principles they are based on will impact the way Government operates in relation to science and technology. There also needs to be more consideration paid as to how they will engage with the wider research ecosystem. This clarity is vital because the levers and motivations for achieving change are different across the ecosystem — of which Government is only one part. Broad collective support from across the research ecosystem will be needed to achieve the principles of a "science superpower" — this support will require deep, meaningful and long-term engagement with those who may not necessarily immediately agree with Government priorities. The NSTC and OSTS should be open to a diverse set of perspectives including independent voices, such as the UK National Academies.

As such, a plural and diverse funding system focused on enhancing a long-term enabling environment is essential for a "science superpower". The NSTC and OSTS should be wary of focusing on the immediate term and quick wins at the expense of failing to embed a flourishing and attractive foundation over the longer-term for the whole research base.[8] "Science superpower" status will not be achieved in one way or at one moment but needs to be seen as a generational ambition that looks to support decision-making now and the future, and which will enhance the health of the research base in the decades ahead. Thus, structures need to look well beyond the timeframes of spending reviews or parliaments.

3. Does the introduction of a science and technology strategy challenge the Haldane principle and UKRI's commitment to fund outstanding research?

The introduction of a science and technology strategy does not, on its own, challenge the Haldane Principle. As highlighted in the Academy's history of science policy, the UK has a long history of utilising science and technology strategies, innovation strategies, research and development roadmaps, and industrial strategies to drive the research agenda.[9]

The Academy believes that the integrity of research is best supported by the Haldane Principle – the principle that decisions on individual research proposals (and the allocation of funding) are

7 https://erc.europa.eu/sites/default/files/document/file/erc-2020-adg-results-sh.pdf
8 www.thebritishacademy.ac.uk/documents/3369/04-12-21-National-Academies-briefing-ARIA-Bill-Commons-Committee-stage-probing_w4tLLJf.pdf
9 www.thebritishacademy.ac.uk/documents/243/Lessons-History-UK-science-policy.pdf

best taken by researchers via peer review.[10] The UK's world-leading position in research is due in no small part to the academic freedom that researchers have to pursue lines of enquiry. It is also supported by the careful balance of research funding.[11] The Academy believes that it is critically important to think holistically about the research funding system, ensuring that there is a long-term funding strategy for the whole of the research base.[12] This includes maintaining a healthy balance of funding between pure, curiosity-driven research and challenge-based research.

This approach also means that funding is available to maintain the research endeavour in all aspects of a discipline, not only on those areas which are central to current challenges, ensuring that UK expertise is maintained in topics in the case of the unforeseen or unexpected. An array of different funding mechanisms and funders are necessary to achieve this. For example, Quality-Related (QR) research funding includes the infrastructure – physical and intangible – that underpins the UK's entire research ecosystem (such as facilities, training, and seed-corn funding).[13] Research by the University of Cambridge has found that QR funding is vital in supporting the entire research endeavour of theory-based subjects and forward-looking, "blue skies" research.[14]

While there is a place for challenge-based research within the research system, it should not be at the expense of curiosity-driven, forward-looking research which offers more than space for experimentation — it offers the ability to follow new avenues yet unknown. Curiosity-driven research should also be considered a vital strategic priority for the long-term success of UK R&D alongside current Government research priorities.

4. Is the UK realising the potential of its research investment?

The UK Government has been clear in its ambition to harness the potential for research-performing organisations to increase knowledge and understanding through big advancements, innovations and solving global challenges. The UK's R&D landscape – when sustainable, well-coordinated and diverse – can deliver on the investments that have been made. The UK's current research and economic strengths sit across the breadth of disciplinary research, including the humanities and social sciences; the economy is 80% services based with a fast growing and internationally competitive creative industries sector.[15] The allocation of R&D funding must be drawn from an evidence base that considers this substantial contribution from SHAPE disciplines to UK economic growth.

In addition, it is important that the Government supports and incentivises interdisciplinarity by leveraging the existing plurality of the research funding system, including through UKRI and the National Academies, UK charities, trusts and private sector, as well as the ERC. This plurality is a vital factor in the flexibility and success of the UK's research ecosystem and the Academies are an important, independent component in the funding of world-class research in the UK. The British Academy supports the importance of interdisciplinarity as a key component in achieving world-class research across all disciplines, and that, in the context of a science and technology strategy, attention should be paid to enhancing interdisciplinary research which cuts across SHAPE and STEM. As highlighted above, the pandemic has demonstrated the need for research and researchers to collaborate on current and potential critical issues.[16]

10 The Academy is aware of the complex history and use of the "Haldane Principle" and use the term here in its popular meaning. For more information on the history of the use of the "Haldane Principle", see: www.thebritishacademy.ac.uk/documents/243/Lessons-History-UK-science-policy.pdf

11 www.bennettinstitute.cam.ac.uk/wp-content/uploads/2020/12/QR_Study_October_2021.pdf

12 www.thebritishacademy.ac.uk/news/the-british-academy-responds-to-budget-and-spending-review/

13 For further information on the value of QR funding, see: https://wellcome.org/sites/default/files/empowering-uk-universities-how-strategic-institutional-support-helps-research-thrive.pdf and www.russellgroup.ac.uk/media/5916/underpinning-our-world-class-research-base-the-importance-of-qr-feb-2021.pdf

14 www.bennettinstitute.cam.ac.uk/wp-content/uploads/2020/12/QR_Study_October_2021.pdf

15 www.thebritishacademy.ac.uk/documents/3324/JBA-9-p115-Bakhshi-Breckon-Puttick.pdf

16 Please see www.thebritishacademy.ac.uk/news/local-knowledge-and-engagement-could-be-key-in-covid-vaccine-take-up-effort-finds-new-research-by-academics-in-the-uk-and-us/ and www.thebritishacademy.ac.uk/news/vaccine-hesitancy-threatens-undermine-pandemic-response/

For researchers and their research to reach their full potential and to be able to act with agility and speed on urgent, critical issues, there needs to be a greater understanding of drivers and mechanisms which set the pace of research and those which protect quality. While reducing bureaucracy is desirable, and the current review is investigating opportunities to take such steps, it is vital to uncouple from any negative view of bureaucracy the important role that robust peer review and the free exchange of critical ideas plays at the core of research and innovation excellence. Peer review by researchers is essential in cementing the international prestige of UK research and so critical in the discussion of a "science superpower". For instance, the ERC is so highly valued in large part because of the high quality and internationally leading stature of its peer reviewers.

5. How should state funding for research and development be allocated between different organisations, who should make that decision and by what criteria?

The relatively small amounts of domestic funding given to the SHAPE disciplines in relation to other disciplines does not reflect the make-up or excellence of the research community. In 2019-20 the SHAPE disciplines accounted for approximately 46% of UK academic staff,[17] while in 2020-21 the two main research councils for these subjects received a combined 5.1% of the UKRI budget.[18] This does not reflect the widely recognised value of the human, cultural, social and economic perspectives necessary in solving global challenges. We would encourage increased transparency in how resources are allocated across disciplinary areas and for Government and UKRI to consider scaling-up funding to support the translation and exchange of fundamental research.

The Academy believes that, considering the turbulence of recent years, fundamental structural changes to the research system would be unhelpful at this stage, including any dramatic change in the commissioning of R&D. Instead, new and relatively young structures, such as the OSTS, NSTC and UKRI should be allowed to settle over the coming years, supported by a multi-year funding settlement. Science policy history demonstrates that R&D policies can have significant long-term effects that are hard to reverse.[19] As such, the Academy would emphasise that Government should support the UK's successful plural and diverse funding system to further foster a vibrant R&D landscape.

There is a strong evidence base to show that public investment in research and innovation is taxpayer money well spent: driving productivity, raising living standards and boosting our international reputation.[20] To support this return on investment, we need the right investments in people to create a long-term vision for the research and innovation system. To sustain and grow our excellent research base, we need to train and retain the very best talent, empower researchers with the skills to lead teams to deliver advances in knowledge, and support individuals to develop and create a positive research culture.[21] The role of universities within the system is both as research-performing organisations and as providers of a steady supply of skilled researchers — whose contributions as students may help stimulate new directions for research — as well as graduates and postgraduates with essential skills needed for business and innovation in all sectors of the economy. The UK research community offers a strong foundation to build upon and a depth of expertise that can inform decisions taken about future structural and resourcing opportunities. Decisions should be taken in partnership with, rather than in isolation from, the sector and its representative bodies.

17 Defined as academic staff covered by HESA cost centres: Administrative and business studies; social studies; humanities and language-based studies & archaeology; design, creative & performing arts; and education. www.hesa.ac.uk/data-and-analysis/staff/areas.
18 www.ukri.org/wp-content/uploads/2021/07/UKRI-200721-AnnualReport2020-2021.pdf
19 www.thebritishacademy.ac.uk/documents/243/Lessons-History-UK-science-policy.pdf
20 www.thebritishacademy.ac.uk/publications/rd-investment-UK-research-development/
21 For more information on research culture and researcher development, see: https://researcherdevelopmentconcordat.ac.uk

6. What more should be done to encourage private-sector investment in research and development in the UK?

To achieve its ambitions and be globally competitive, the UK must sustain an attractive environment for research and innovation that encourages greater private investment and increases research and innovation activity. Public investment is a key part of this, creating the certainty needed to attract further investment from the private sector.

So too is an accurate evidence base of the R&D performed in the UK. The Academy believes current measures do not provide this accurate evidence base, impacting the ability of policymakers to incentivise collaboration between the public and private sector. British Academy supported research has shown that while the UK uses the OECD Frascati Manual to define R&D within its tax credit programme, HMT and BEIS both explicitly exclude the Arts, Humanities and Social Sciences from this definition in tax relief. This leads to discrepancies in R&D survey instruments, in which SHAPE R&D is in principle captured, but is less likely to be self-reported by businesses who are largely recording R&D for tax purposes. The research has also found that many businesses view government support for SHAPE R&D as essential, both through R&D tax relief and by other policy interventions.[22] As such, there should be a concerted effort to accurately capture data on UK R&D in accordance with the Frascati Manual to foster compelling incentives for investment.

Not only has research shown that we have an incomplete picture of how businesses invest in innovation, but there has also been sustained criticism of the "linear model" of innovation, with its emphasis on traditional science and technology indicators.[23] By only thinking about innovation through a linear lens we can miss important "hidden" innovation activities as well as the complexity of interactions between research institutes and businesses, which lead to successful innovation.[24] There should be increased focus on building and sustaining broad, deep networks created across institutions, sectors and systems, based on authentic relationships working on mutually beneficial collaborations and exchanges of knowledge.[25] The Academy's Innovation Fellowships scheme, for instance, has been funded by BEIS in order to enable SHAPE researchers to partner with organisations in the creative and cultural, public, private and policy sectors in order to address challenges that require innovative approaches and solutions.[26]

Finally, SHAPE disciplines — including but not limited to economics, business & management, psychology, design, and education — are essential to understanding local growth and productivity, as well as providing insights into broader societal wellbeing that underpins growth. For example, evidence shows that the success of innovation adoption programmes is regional: replicating such success requires a specific understanding of businesses and their practices in a particular place.[27] Local innovation ecosystems are unique, and models must be tailored, utilising the expertise of SHAPE disciplines, to successfully strengthen innovation in different places.

7. How well does the UK collaborate on research with international partners and what can it learn from other countries?

UK research excellence has a global reputation. The university sector sits at or near the top of many global university rankings across a wide range of subjects; significant numbers of overseas graduate students apply to study in UK universities; and the UK has significant success in international research funding, as discussed above.

22 www.thebritishacademy.ac.uk/publishing/journal-british-academy/9/understanding-rd-in-arts-humanities-social-sciences
23 Ibid.
24 www.nesta.org.uk/report/hidden-innovation/
25 www.thebritishacademy.ac.uk/documents/3359/Knowledge-Exchange-in-the-SHAPE-subjects.pdf
26 www.thebritishacademy.ac.uk/funding/innovation-fellowships-scheme-route-a-researcher-led/
27 www.thebritishacademy.ac.uk/documents/3242/Place-Based-Approaches-Research-Funding.pdf

A vital area of this UK excellence lies in transformative research, based on UK capacity to bring social science and humanities expertise together with natural and health sciences to address global challenges (and transformations to sustainability, security and prosperity). Since all these issues are international and interconnected, the UK needs to continue to forge links internationally and especially with countries most under stress from such forces: the global South, hot-spots of violence, and hot-spots of migration-related tensions. Recent funds such as the Global Challenges Research Fund has successfully enabled researchers to bridge geographical divides to build teams and collaborate across continents.[28] Sustaining such positive relationships is critical and other countries with longer time horizons for research funding look to the UK to match their commitments.

However, as others have also recognised, there is currently a mismatch in the ambition and aims of the current Government, as set out in the R&D Roadmap and the Integrated Review, and our ability to pioneer novel approaches and be a hub for the world. Collaboration is key to bringing world-class talent into the UK's research system. Yet, the Government's own commissioned research has highlighted indications that the UK is losing ground.[29] There are likely many reasons for this including the upfront cost of work and study visas for researchers and innovators considering working in the UK, which can be up to six times higher compared to other leading research nations.[30] This will be detrimental to the UK's academic research base; almost 3 in 10 UK academics are non-UK nationals,[31] and at the time of the UK's withdrawal from the EU, 36% of academics in economics, 35% in modern languages and 25% from politics and international relations were from EU countries.[32]

Another factor causing serious impact on the UK capacity for international leadership is the limited numbers of those with expertise and understanding of foreign languages. The decline in foreign language teaching in UK schools and universities has been documented extensively, but the rationale for learning languages to enable scientific advances, economic opportunities, and support understanding of foreign societies is undeniable.[33] Careful consideration is required as to how to reverse this trend to support the growth of global partnerships.

Finally, the recent cuts to funding of Official Development Assistance have damaged the global reputation of UK research. These cuts have seriously impacted research in collaboration with low- and middle-income countries and placed the UK as a far less attractive partner globally at a time of increased global competition. A "science superpower" cannot renege on its commitments to researchers anywhere in the world, especially those in the global South. Recovering the UK's position will be a major challenge in the coming years.

28 https://www.thebritishacademy.ac.uk/funding/global-challenges-research-fund-challenge-led-grants/
29 www.elsevier.com/research-intelligence?a=507321
30 www.thebritishacademy.ac.uk/documents/3653/Investing_in_UK_RD_-_2022_update2776.pdf
31 www.thebritishacademy.ac.uk/documents/3391/EU-Higher-Education-Staff-and-Students-in-the-UK-Briefing.pdf
32 www.thebritishacademy.ac.uk/publications/europe-brexit-means/
33 www.thebritishacademy.ac.uk/publications/towards-national-languages-strategy-education-and-skills/