CBI Response: The House of Lords' Science and Technology Committee Inquiry- Can the UK's research and innovation system deliver the Government's ambition for the UK to be a science superpower?

The CBI welcomes the opportunity to respond to the House of Lord's Science and Technology Committee's Inquiry into the UK's research and innovation system and whether it can deliver the Government's ambition to be a 'science superpower'. The CBI is the UK's leading business organisation, speaking for some 190,000 businesses of all sizes, sectors, and regions, that together employ around a third of the UK private sector workforce.

Overarching Priorities:

1. **Bold strategy and investment:** There must be swift delivery of various government strategies and roll-out of long-term public R&D spending to provide a stable direction for business to invest in the government's science and innovation ambitions.
2. **A more visible and navigable RDI landscape:** The research and innovation ecosystem and funding mechanisms must become more visible and easier to navigate for business.
3. **Support for business innovation:** Across the RDI landscape there must be a focus on supporting and incentivising innovation; sustaining underpinning research ecosystem strengths, and growing investment and support for the development and adoption phases of innovation.
4. **Harness levers:** BEIS must work across government to ensure levers are aligned to deliver on the various strategies government have produced, from procurement and trade deals to skills, regulation, and taxation.

Key recommendations:

- **Fast paced delivery coupled with strategic join up of all government strategies that contribute towards the UK becoming a science superpower.**
- **Innovate UK to develop a Shop Front online platform to make the RDI ecosystem more visible and navigable, providing support for business from end-to-end of the system.**
- **A long-term calendar of R&I funding opportunities should be published on the Shop Front, which should be aligned with strategic priorities and key tech families to enable businesses to look ahead and allocate resources to long term innovation programmes.**
- **BEIS and UKRI need to take a risk-based, proportionate approach to research bureaucracy, taking a portfolio approach to success measures. Complexity of funding applications, reporting requirements and monitoring should be proportionate to quantum of funding.**
- **HMT must ensure fiscal incentives for innovation are attractive and internationally competitive. The CBI continues to engage on review of the R&D tax credits system. As it continues, we would like to see an expansion of the scheme to include capital expenditure, and targeted green investment focused R&D tax mechanisms.**
- **The UK Government must continue to ensure priority is given to UK association to Horizon Europe, and BEIS must work closely with business to develop on an alternatives programme.**

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

For the UK to be a global leader in science and innovation, with a system that contributes to addressing society's biggest challenges, grows long-term business investment, raises living standards and creates jobs across the nation and accelerates economic growth. It would mean being recognised internationally as a global hub for research and innovation, attracting global talent and foreign direct investment and be home to scaling businesses, with the UK setting the global rules and standards in emerging technologies and sectors.

- *What would a science superpower look like?*

- A truly end-to-end research and innovation system delivered through the historic uplift in R&D funding that grows support for development, commercialisation, and adoption, positioning the UK as the best place to test, develop and bring to market new products and services.
- Growing investment (public and private) to match global leaders (Germany 3.1%, US 3%), with R&D spending as a percentage of GDP rising to 2.4% in the near term and firm plans to go beyond this. Reaching the 2.4% target sooner will accelerate ambition to become a science superpower.
- An innovation economy that raises living standards, provides solutions to society's biggest challenges, and drives a digital first economic recovery.
- The number one location globally for both high-skilled, innovative talent and for firms to locate, innovate and scale.

- *Does the UK have a coherent strategy and sufficient existing policies to make the UK a science superpower?*
  - There have been a number of different strategies produced which contribute to the UK's ambition to become a science superpower; BEIS' Innovation strategy, UKRI's strategy, Innovate UK's Plan for Action, The Levelling Up White Paper, The Integrated Review, the Prime Minister's 10-point plan for a green industrial revolution, National AI Strategy, National Data Strategy, and forthcoming Digital strategy. These are a good indication of the Government's ambition for the UK to be a science superpower and innovation nation, and delivery of these strategies at pace will be a key driver of investor confidence in the UK. However, they are missing strategic join up which must be provided to provide stability and clarity for business.
  - The CBI welcomes the first UKRI strategy, and Innovate UK's Plan for action, their four- and five-year timespans respectively signal longer term commitment to achieving science superpower/innovation nation status, however, for industry five years is still short term. Prioritising stability in structures and institutions where possible and minimising short term changes in direction would support business confidence to invest to invest long term.
  - UKRI has also received their first 3-year funding settlement, and business recognise the importance of multi-year settlements for UKRI. Where there have been longer term settlements such as Aerospace Technology Institute funding, this has enabled greater industry investment alongside in the long term. This is also something the duration of Horizon programmes enables. To genuinely grow long term business investment, it would be beneficial to consider how other programmes can signal long term direction and opportunity. This will be necessary to deliver on NSTC and OSTS ambition of bringing national benefit from areas of strategic advantage.

Key recommendations:

- Ensure implementation of various strategies are delivered at pace and with strategic join up, this can be overseen by the new NSTC and OSTS.
- HMT to create a long-term spending strategy that goes beyond the current spending cycle setting out clearly how the UK will reach 2.4% R&D target and then how it will go beyond this.

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

The RDI landscape is already extremely saturated, therefore the existing structures must be clearly defined to increase the navigability and visibility of the system for business.

- The CBI welcomes the creation of the NSTC, OSTS, as this signals the position of science and technology at the heart of government business. These new structures must provide strategic direction and leverage the UK's science and technology capability for both strategic advantage and for the benefit of society.
- The NSTC must also consult a wide array of relevant industry members when undertaking sector specific reviews. We are aware the council are currently undertaking a semiconductor strategy review; however, it is not clear how relevant businesses have been consulted.
- We also welcome the creation of ARIA to provide a mechanism to fund higher risk R&D and achieve bigger breakthroughs. Successful delivery will depend on the agency having clear channels for business engagement, long-term funding, a brand and focus to attract international talent and investment, and a clearly defined market and end customer.
- The Catapult network is also a core element of the UK's translational capabilities, and their concept is welcome. However, their visibility, role within the innovation ecosystem and relevant KPIs need to be better communicated with a business audience in mind. This, coupled with a long-term commitment to supporting the network will enable them to be more strategic and fully embedded into R&I ecosystem. Best practice can be taken from countries like Germany, the Netherlands, Taiwan, and South Korea who have better funded, embedded networks of institutions supporting the development and commercialisation of technologies.
- Catapult centres could also take on a bigger convening role and address a mix of current and emerging industrial and societal challenges. Currently, where specialist infrastructure and capability exist, it can suffer from sub-optimal returns due to lack of visibility and promotion.

- *How should Government coordinate science policy across different departments, with different strategic priorities such as levelling up?*
    - There must be greater coordination between different departments most notably BEIS, DCMS, DIT, DfE, DLUCH to ensure strategic join up on science and technology. The NSTC can oversee this, and committees for science and technology (HofP and HofL) can play a key role in holding government to account on this strategic join up and delivery.
    - To commit to levelling up the UK, the Government must promote strong private sector led clusters which harness local, regional, and national science and technology expertise. Investment must build on local capabilities and strengths and the RDI system should address place-based opportunities and challenges, reducing the extreme concentration of activity in the Greater South-East.
    - DFE must also address skills gaps and tailor action to strengthen areas where the UK has a comparative advantage.

Key recommendations:

- The remit of each structure and funding body in the RDI landscape must be clearly defined, detailing their priorities, how they interact with each other and how external stakeholders can interact with them. This will make it easier to have a more joined up approach across government departments.
- As outlined in Innovation Strategy, Innovate UK should funnel specific resource to deliver on new remit around innovation adoption and diffusion. This must provide strategic join up with existing initiatives such as Be the Business, Made Smarter and Growth Hubs, and Catapults can play a significant role in accelerating this.

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

An increased focus on development and commercialisation is needed to ensure the benefits of UK research are realised. The quantum of funding, rigidity of time frames and notice periods for funding rounds and disproportionate bureaucracy limits the UK from realising the potential of its investment.

- The UK's development and commercialisation capabilities are consistently highlighted by businesses as an area that must be improved within the UK RDI ecosystem.
- The skew of public R&D funding towards research limits the ease of development and commercialisation of new technologies and limits the ability of researchers to leverage cutting-edge science and technology to do more commercially oriented R&D and to do it at pace.
- There must be a more systematic approach to commercialisation within UKRI to ensure that ideas and businesses do not fall through the cracks of support. As UKRI develops its commercialisation framework it should continue to consult with business.
- Testing and demonstration capabilities or facilities are often a vital step in route to market. But rarely will one company alone be able to fund or host such a facility or function. They often involve 'live' real world environments, so may need regulatory flexibility or local government buy in, or they are too expensive for one company to fund and see a return but have wide sector applicability. Availability of and access to testing and demonstration facilities, as well as a means by which to support strategic investment in new capabilities, is a key gap in the UKs current offer. There needs to be a business demand-led route for funding new testing and demonstration capabilities where it is in line with strategic priorities.
- *Do bureaucratic processes hinder research and development in the UK?*
    - Some bureaucracy is necessary to ensure proper oversight, fairness, and accountability for grant funding, however, this burden of compliance must be proportionate to the investment risk.
    - The majority of grant applications are unsuccessful, so the process needs to reflect this. Businesses do not have the bandwidth to repeatedly engage in long bureaucratic processes to apply for grant funding, simplifying the process will incentivise business engagement.
- *How can government better incentivise and support interdisciplinary research and innovation?*
    - Flexibility within the R&I funding mechanism to support projects and applications that do not fit neatly into one discipline or research area.
    - Within the Innovation Strategy the creation of the innovation missions programme, seven key technology families and then later setting of four key priorities by the OSTS outline areas that are necessary for competitive advantage and are strategically importance for the UK. This must be followed up with a clear strategy for how government will fund these areas, so business can invest alongside and have long-term confidence in this investment.
    - Public procurement can also incentivise interdisciplinary research and innovation, as well as ensuring a greater commercialisation of any innovative solutions or products. To realise this, further progress must be made in addressing the identification, management, and tolerance for risk within the public sector. This should include fully embedding the principles around risk outlined in the Cabinet Office's Commercial Playbooks. The upcoming Procurement Bill must also seize the opportunity to support

innovation through new procurement procedures and more emphasis on longer-term partnerships with business.

Key recommendations:

- Test and demonstration facilities support growth of innovation ecosystems/districts where new tech and business models can be tested at scale, and this can also be supported by public procurement. As part of the uplift in public investment in innovation, UKRI should create a fund that would enable businesses to bid in for funding related to test or demonstration facilities/capabilities where they can demonstrate sufficient business demand and opportunity for the UK. This investment must build upon and be in partnership with existing local/regional capabilities, facilities, and stakeholders.
- BEIS and UKRI to deliver on result of Tickell review of research bureaucracy ensuring it becomes more risk-based, and proportionate. Work required to apply for funding should be aligned to the level of funding that has been applied for.

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

For a thriving end to end R&I system, there needs to be the full spectrum of funding from curiosity driven research through to support for commercialisation and adoption. Within business innovation funding, there needs to be funding for open calls enabling businesses to put forward innovative ideas, through to funding aligned to national strategic priorities and shared business challenges. Success rates for business funding opportunities should also be monitored, and where success rates are low resulting in quality applications not being funded, this should trigger a review of funding levels.

- *How should state funding be used to leverage private sector funding?*
    - The public funding ecosystem can be difficult to navigate especially for SMEs. Flexibility through changes in bureaucracy and to funding and increased clarity through the 'Shop Front' can incentivise private sector engagement with state funding structures.
    - There also needs to be strategic join up across different funding levers to ensure public funding is aligned with the OSTS priorities, the innovation missions programme and technology families.
    - R&D within key strategic technologies and missions must be approached with a sense of urgency, through setting 'moonshot' timescales with big prizes for the winners, innovation will happen faster and more efficiently, whilst accelerating the UK's strategic strengths and tackling global challenges.
    - New investment, if coupled with a focus on development and commercialisation, offers an opportunity to redress the balance of R&D funding and ensure the UK converts its world-leading research capabilities into commercial success and societal benefit.
    - Grant-funded R&D needs to be more flexible, with regular funding rounds, extended time frames for calls, and longer notice periods to allow for business to include them in their annual financial planning. This must be coupled with reasonable levels of match funding.
    - Public investment in R&I is on the understanding that innovation involves risk and due to spill over and wider civic and societal benefits of R&D it is appropriate for public investment to be used to share that risk. However, the UK, compared to its international peers tends to have a lower appetite for risk, limiting potential benefits of investment in innovation.
    - The creation of ARIA demonstrates there is political recognition for the necessary role risk has in innovation. But excitement, spark and creativity require predictable and sustained investment and strategy. A good outcome for ARIA would be support for a greater recognition of what 'success' in innovation funding looks like and building that into other funding and support mechanisms. The programmes and institutions funded and supported under the banner of the innovation strategy should be set on appropriately long-term footing with outcome-based measures at a portfolio rather than project level.

Key recommendations:

- Funding for Innovate UK's Smart grants should be increased.
- UKRI should work at pace to publish a long-term calendar of all business funding opportunities enabling businesses to look ahead and allocate resources to long term innovation programmes.
- The small business research initiative (SBRI) is a well-established process to connect public sector challenges with innovative ideas from industry. It is underused. Each government department should be required to allocate budget towards SBRI projects and to publish information on what steps they have taken in support of the 2.4% R&D target.

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

Strategic levers such as tax credits, public procurement, and regulation must be used to incentivise private sector investment. This must be coupled with a more navigable system for business and measures to remove barriers to collaboration between businesses, universities, and innovation centres.

- Behind the headline figures the delaying of spend and backloading of the increases to public R&D funding over the three-year Spending Review period will reduce the overall leverage potential. Added to strong headwinds facing businesses across the economy, the UK will have to double down on wider measures to attract and grow business investment and flaunt the UK's credentials as an innovation economy.
- The navigability and visibility of the UK RDI system must be improved to support greater private investment in R&D. In the CBI Tech Tracker survey, when asked to name just one thing that would have the biggest impact on their ability to innovate, 10% of SMEs and 12% of large businesses responded being able to better understand and navigate existing business innovation support[1]. We support Innovate UK in their development of a Shop Front to improve this navigability and visibility.
- *What policies could incentivise private sector research spending in the UK?*
    - Attractive and competitive fiscal incentives for innovation across the board are crucial to stimulating private sector investment in R&D.
    - The R&D tax credits system has proven effective at stimulating private investment in the UK – generating £2.70 for every £1 invested according to HMRC[2] – but the regime could be better targeted to support truly innovative businesses and the CBI supports and continues to contribute to HMT's review of both the SME and RDEC schemes to achieve this.
    - The CBI welcomes the decision announced by the Chancellor in the Spring Statement to extend the scope of qualifying expenditure to include a broad range of data and cloud computing costs (including storage), and the costs of pure mathematics. While the CBI remains concerned that the decision to limit overseas spending could have a negative impact on some of the UK's world-leading international collaborations in the R&D space, we support the Chancellor's decision to exclude key areas of concern where the activity cannot be undertaken in the UK.
    - As the R&D tax credits system review continues, we would now like to see:
        - Targeted 'Green' investment-focused capital allowances and R&D tax mechanisms, to ensure the tax system can be leveraged to accelerate progress towards the UK's net zero target.
        - Expansion of the scheme to include capital expenditure, which could be a key driver in levelling up UK regions and increase international competitiveness.
        - A consultation on the benefits of the two schemes to ensure all innovative businesses can benefit from a 'best of both worlds' approach.
    - The Patent Box is also valued by members as it supports business investment in high-risk R&D and ensuring key intellectual property.
    - The UK must use its exit from the EU to transform the UK into a global regulation rule-setter. Ensuring that our regulatory systems have aims beyond protecting low prices for consumers and fair competition and include UK competitiveness, investment, and innovation.
    - We have already seen there are prizes on offer when we get regulation right. The UK's joined up approach on FinTech has led to record levels of investment, with an increase of 217% to $11.6bn in 2021. Almost half of all fintech investment in Europe
    - Given that a market for their innovation is a factor in investment decisions and that budgets for innovation often coming from profits, driving innovation adoption is another tool to improve the environment for investment in R&D in the UK. To accelerate innovation adoption, the government must undertake the following actions coupled with communication and collaborative delivery offering the best service to time-poor firms:
        - Expand the scope of technologies covered under the Help to Grow Digital scheme to enhance SME technology adoption.
        - Build on the success of the Made Smarter Programme, scaling it up to be a national programme to accelerate the uptake of advanced technologies.
        - Expand Made Smarter and fund a pilot to support AI adoption in sectors beyond manufacturing starting with transport, construction, and hospitality sectors and should seek to carry out additional research to identify other sectors which would benefit from this and apply a similar scheme to stimulate adoption. The CBI's Seize the Moment report highlighted that AI diffusion could add £38bn to UK GVA in 2030 and provide a potential 1.4% uplift in productivity across sectors, through automation of tasks[3]

[1] Tech Tracker: The innovation imperative (CBI, 2020)

[2] Evaluation of Research and Development Expenditure Credit (HMRC, 2020)

[3] Seize the moment: How can business transform the economy? (CBI, 2021)

    - Government departments must create a coherent package of technology policy and regulation to avoid a fragmented approach for business and support innovation. Regulators and business alike are facing an expeditious and significant step-change in the regulatory landscape, particularly digital regulation as digital technologies and markets advance rapidly. Business understands and recognises the vital role regulation plays in building public trust in technology, keeping citizens safe online, and providing the guardrails that give businesses the confidence to invest and innovate. The government must ensure that regulators have sufficient funds to effectively manage their growing digital portfolios (including building in-house expertise) and encourage regulators to think innovatively in their approach towards digital regulation. Government and regulators should consider novel approaches towards digital regulation that reflect the dynamic nature of the technology in question. This approach should include expanding the use of regulatory sandboxes to explore the role of regulation and its impact on emerging technologies such as cloud computing and AI. Regulators should also investigate the role of sandboxes beyond the initial stages of regulatory and product development, focusing on creating a regulatory environment that enables innovative newcomers to scale rapidly after proof of concept. Such scale-up sandboxes would allow regulators and businesses to better understand and navigate the regulatory challenges and wider societal implications that emerge with widespread usage of new digital products and services.
- *What more could be done to incentivise collaborations between academics and industry? Are there barriers preventing this collaboration that could be removed?*
    - Businesses consistently cite the strength of the UK's academic research base as an attractor to invest in R&D in the UK, and collaboration is a core part of many businesses research strategies. This is reflected in global businesses forming long-term strategic research partnerships with universities across the UK in relevant areas of specialism. The Higher Education Innovation Fund has been a successful incentive mechanism and could be expanded.
    - UKRI plans to support and facilitate bi-directional flows of researchers between the public and private sector is welcome. Knowledge Transfer Partnerships are also valuable and could be expanded. iCASE PhD studentships also can generate industrial investment in facilities and capabilities and could be increased in number.
    - Businesses continue to consider the approach to IPR by many universities as a barrier to greater collaboration. Practice varies between institutions but a there must be a greater understanding of the levels of investment required to commercialise new technologies.
    - Academia should be more flexible in the way it rewards research assessment in a way that better recognises commercialisation, the CBI would welcome further progress in this direction.
- *What contribution should public procurement make to achieving the aims of the science and technology strategy?*
    - Public procurement is consistently raised by businesses large and small as a critical part of the innovation puzzle in the UK that is currently missing. Public procurement can focus R&D, address real challenges, meet customer needs, and help bridge the valley of death for capital intensive technologies. The power of public procurement to accelerate innovation through to commercial and societal benefit was repeatedly demonstrated in the collective response to the covid pandemic with ventilators, PPE, and vaccines. Some of the lessons learned from that period are set out clearly in the Innovation Strategy.
    - Following industry engagement, the upcoming Procurement Bill has set out some key changes to support innovation in public procurement, including the new Competitive Flexible Procedure, a change from Most Economically Advantageous Tender to the Most Advantageous Tender to recognise value instead of cost, and a greater emphasis on upfront dialogue between suppliers and contracting authorities to design solutions. However, these changes need to be accompanied by a comprehensive learning and development package for civil servants to ensure they can understand and implement these changes. Business is keen to work with government on the guidance accompanying the legislation to guarantee that the benefits of innovation are fully embraced by the public sector.

Key recommendations:

- The CBI fully supports Innovate UK's intention to create a 'Shop Front' online platform that improves the navigability and visibility from end-to-end of the RDI landscape. And the CBI will work closely with Innovate UK to be a sounding board for minimum viable products, adopting a test and learn approach. The platform should:
    - Improve the accessibility and information available on different funds and grants available for businesses as well as facilities, capabilities and support businesses can access for later stage development and commercialisation.

    - Include a section for international investors showcasing the range of funding, facilities, and infrastructure available across the UK.
    - Learn from international examples such as, Innovation Canada and Enterprise Singapore which provide a more visible, comprehensive, and user-friendly offer than currently provided by gov.uk.
- The CBI continues to engage on review of the R&D tax credits system, as it continues, we would like to see an expansion of the scheme to include capital expenditure, targeted green investment focused R&D tax mechanisms and a consultation on the benefits of the two schemes to ensure all innovative businesses can benefit from a 'best of both worlds' approach.
- To accelerate innovation adoption the government must expand the scope of technologies covered under Help to Grow Digital, scale up the Made Smarter Programme to a national level and expand it to fund a pilot to support AI adoption in sectors beyond manufacturing. Communication and collaborative delivery should be encouraged between these schemes to offer the best service to time-poor firms.
- Establish a new Office for Competitive Regulation to coordinate regulation across government and provide strategic direction as a well as consumer protection this would subsume the responsibilities of the Better Regulation Executive to assess the impact of proposed legislation on growth and global competitiveness. This would report to the Cabinet Office giving cross-government oversight and independence to drive an innovative regulatory agenda.

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

The UK is highly successful in its collaboration with international partners; however, it is vital this is maintained and accelerated, notably through UK association to Horizon Europe.

- The UK is already very good at collaborating with international partners, however, a further delay in the association to Horizon Europe and possibility of exclusion from the programme altogether could be incredibly damaging for the UK's collaborative research and innovation.
- Research and innovation are an area that needs collaboration to thrive. International collaboration gives organisations access to a broader range of expertise, knowledge and assets than could be accessed in a single country alone. It drives up the quality, impact and influence of research and innovation outputs[4] . The openness of the EU FPs has fostered international scientific cooperation and helped strengthen the reputation, success and competitiveness of EU research and innovation.
- The UK is embedded in global research and innovation networks. Over half of published UK research is the result of collaborations with global partners[5]. Alongside participation in EU FPs the UK participates in a range of bilateral research and innovation partnerships across the world, with the 31.69% of collaborations happening with the US[6]. It is therefore important these relationships are maintained in any bilateral decision making.
- The UK-Australia FTA included the first innovation chapter of its kind. This entrenches a commitment to strengthen collaboration on innovation and future-proof the trade deal by establishing a Strategic Innovation Dialogue, especially for AI and other emerging technologies.

Key recommendations:

- UK Government to secure UK association to Horizon Europe. In the case the UK is not able to associate for BEIS to ensure an alternative programme prioritises international collaboration, accessibility, people & skills and longer-term funding for research and innovation programmes than is currently available in domestic schemes.
- DIT, UKRI and BEIS should work together to develop a compelling, global pitch setting out 'why the UK is the best place to locate and grow your R&D activity'. This should include strategic inclusion in DIT promotional activity, including the GREAT campaign.
- DIT should ensure Innovation chapters are included in UK FTAs, building on the precedent set by the UK-Australia FTA.

For any further queries please contact charlotte.kelly@cbi.org.uk

[4] Interim Evaluation of Horizon 2020. Staff Working Document. SWD (2017)220. (European Commission: 2017)
[5] The implications of International Research Collaboration for UK Universities (Digital research reports: 2016)
[6] UK: Collaboration by percentage share, (Nature Index: 2021)