DEPARTMENT FOR SCIENCE, INNOVATION AND TECHNOLOGY
Government Response to the report of the House of Lords Science and Technology Select Committee on: "Science and Technology Superpower": more than a slogan?

Introduction

The Government thanks the Committee for its report *'Science and Technology Superpower: more than a slogan?',* published on 4 August 2022*.* We agree that science and technology are essential to the future of the UK.

The Committee is right to recognise the exceptional science and technology strengths of the UK. We have some of the best universities in the world, the strongest venture capital markets in Europe and deep ranks of talented and inspiring researchers and entrepreneurs, all of which are more important than ever in driving the UK's economic growth, prosperity and productivity as well as ensuring environmental sustainability, global health, and national and geopolitical security.

As the Committee will be aware, the Prime Minister announced the creation of the Department for Science, Innovation and Technology (DSIT) in February 2023. The new dedicated department will make sure the UK is the country where the next great scientific discoveries are made – and where the brightest minds and the most ambitious entrepreneurs will turn those ideas into companies, products and services that can change the world.

It will focus on optimising public R&D investment to support areas of relative UK strength and increasing the level of private R&D to make our economy the most innovative in the world; promoting a diverse research and innovation system that connects discovery to new companies, growth and jobs; supporting innovation across public services including the NHS and schools; strengthening international collaboration on science and technology in line with the Integrated Review; delivering key legislative and regulatory reforms to drive competition and promote innovation; and passing the remaining stages of the reformed Online Safety Bill.

Widely welcomed by the science and technology community, we hope the Committee agrees this is a positive announcement in relation to the issues the Committee rightly highlighted in its report to Government. It is important to recognise that the new Department's mission to ensure the UK is the most innovative economy in the world and a science superpower by 2030 requires long-term system-wide reforms, backed by a coherent long-term strategy and the Integrated Review.

The Government also welcomes the Committee's support for the National Science and Technology Council (NSTC). The NSTC brings Government and the science and technology community together to align UK capabilities behind science and technology advantage by identifying and signalling UK priority outcomes from science and technology. This new structure seeks to join up and add value to the work taking place across Whitehall to realise the Government's Science Superpower vision and turn our S&T capabilities into strategic advantage for the UK.

The Government recognises the importance of policy stability to ensure the nation's long-term science and technology ambitions are realised. As the Committee notes, the Government has set out its priorities through a suite of strategies, many of which are now brought within the responsibilities of the new Department. Some, including the R&D Roadmap[1], UK Innovation Strategy[2], and the Integrated Review[3] take a strategic or thematic overview, whereas others, such as the AI action plan,[4] Life Sciences Strategy, and Space Strategy, address the needs of specific sectors or technologies. This strategic vision is backed by a multi-million-pound increase in public investment in R&D capable of turbocharging the five technologies of tomorrow – Quantum, AI, Engineering Biology, Semiconductors and Future Telecoms – together with life sciences, space and green technologies.

The Government will continue to drive the UK's ambition to become a Science Superpower bolstered by the new strategic focus brought about through the creation of DSIT and the NSTC. Nevertheless, it remains clear that the mission to better harness the UK's world class research and innovation activity is not something that the Government can achieve on its own. The Innovation Strategy focuses on how we can boost private sector investment across the UK and identifies the key levers we need to pull across the whole of government to create the right conditions for all businesses to innovate.

These new structures will be the driving force behind HMG's commitment to growing the economy, improving the lives of everyone in the UK through stronger growth, better jobs and careers and new discoveries that advance the health and prosperity of society.

Response to Committee conclusions and recommendations

GOVERNMENT STRATEGY

1. We welcome the indication that the Government is thinking more strategically about UK science and technology and recognises that the UK cannot be "world-beating" at everything. But the ambition to become a science and technology superpower by 2030 risks not being realised, as there are few details about how this will be defined or delivered. The priority areas of science and technology that the Government has outlined are very broad and it is unclear whether these areas will be narrowed down. A strategy needs specific, measurable outcomes and a delivery plan. *The Government should set out specifically what it wants to achieve in each of the broad areas of science and technology that it has identified. There should be a clear implementation plan including measurable targets and key outcomes in priority areas, and an explanation of how they will be delivered.* (Paragraphs 17&18)

[1] https://www.gov.uk/government/publications/uk-research-and-development-roadmap
[2] https://www.gov.uk/government/publications/uk-innovation-strategy-leading-the-future-by-creating-it
[3] https://www.gov.uk/government/publications/global-britain-in-a-competitive-age-the-integrated-review-of-security-defence-development-and-foreign-policy
[4] https://www.gov.uk/government/publications/national-ai-strategy-ai-action-plan

2. We welcome the Office for Science and Technology Strategy's commitment to establish and to publish metrics, by the end of 2022, to define the "science and tech superpower" ambition. This is necessary if "science and tech" is to become more than slogan. *The Government should update Parliament on its progress on developing metrics by the end of 2022. Once metrics are available, an independent body should be empowered to monitor progress towards the Government's science and technology targets and to report annually to Parliament and government.* (Paragraph 20)

3. R&D is a long-term endeavour. It has been undermined by frequent policy changes especially when strategies that are supposed to be long-term are abandoned after a few years. *The Government should make every effort to establish science and technology policy for the long term, building on existing policies and with clear, cross-party support.* (Paragraph 27)

We agree that policy coherence is essential for the success of the UK's R&D mission. The newly formed Department for Science, Innovation and Technology will focus on positioning the UK at the forefront of global scientific and technological advancement.

It will be the driving force behind HMG's commitment to growing the economy, improving the lives of everyone in the UK through stronger growth, better jobs and careers and new discoveries that advance the health and prosperity of society whilst ensuring users are protected from harm online. The Department will do this while also working in lockstep with the Department for Business and Trade to promote our science and technology strengths internationally and drive inward investment in R&D sectors across the country.

It will build on our strong foundations of world-class research, a thriving technology scene and global networks of collaboration to create a golden thread from outstanding basic science to innovations that change lives and sustain economic growth.

Minister Freeman spoke about the Government's ambitions for science and technology in his speech to Onward in January. Minister Freeman outlined the Government's serious commitment to take science and technology to the next level.

Work to deliver these objectives will be supported by the Government's existing commitment to public funding rising by 30% in cash terms over this Spending Review (SR) period to £20 billion by 2024/25.

As well as the Government's ongoing investment in the R&D system, the Government continues to take action to implement the long-term visions set out in the R&D Roadmap[5], the Innovation Strategy[6], the Life Sciences Vision [7] (which builds on the 10-year Life Sciences Strategy of 2011), the People and Culture

[5] https://www.gov.uk/government/publications/uk-research-and-development-roadmap
[6] https://www.gov.uk/government/publications/uk-innovation-strategy-leading-the-future-by-creating-it
[7] https://www.gov.uk/government/publications/life-sciences-vision

Strategy[8], the Levelling Up White Paper[9], and the National Space Strategy[10]. In addition, action is underway to respond to the published Independent Review of UK Research and Innovation (UKRI)[11][12], and the forthcoming Independent Review of [13]. Detailed delivery plans are being developed across the Government.

In terms of metrics, the latest R&D statistics from the ONS suggest the UK has now surpassed its target for investing 2.4% of GDP in R&D. DSIT analysts are building on previous work at BEIS to review this target to ensure it is commensurate with the level of ambition that we have for economy-wide investment in science. We are considering how best to monitor progress towards the desired outcomes, with the aim of capturing measurable indicators across key priority areas.

DSIT is also continuing work with UKRI to share intelligence and data to map clusters of innovative firms. We will continue to look at existing and forthcoming R&D innovation infrastructure and investment to consider what government's role is in supporting clusters in different places across the UK.

4. The proliferation of disparate strategies is confusing and it raises concerns about a lack of coherence and delivery. *In defining an overarching implementation plan, the Government should consolidate existing sector-specific strategies that are working well and monitor progress against them to ensure that they provide a clear and consistent message.* (Paragraph 23)

Achieving our science and technology ambitions relies heavily on Government collaboration and coordination. The newly created Department for Science, Innovation and Technology places these ambitions at the heart of the Government's agenda and bring greater coherence overall in order to achieve our Science and Technology Superpower ambitions with a clear focus on delivery. The department will focus on positioning the UK at the forefront of global scientific and technological advancement. DSIT consolidates the relevant parts of the former Department for Business, Energy and Industrial Strategy and the former Department for Digital, Culture, Media and Sport, and brings together the five technologies of tomorrow under one department for the first time – Quantum, AI, Engineering Biology, Semiconductors, Future Telecoms, together with life sciences, space and green technologies.

The National Science and Technology Council (NSTC) will support the Government to align UK capabilities behind science and technology advantage. Clear implementation and delivery plans will be established for specific areas of science and technology most critical to achieving this. We are also working with the Devolved

[8] https://www.gov.uk/government/publications/research-and-development-rd-people-and-culture-strategy
[9] https://www.gov.uk/government/publications/levelling-up-the-united-kingdom
[10] https://www.gov.uk/government/publications/national-space-strategy/national-space-strategy
[11] https://www.gov.uk/government/news/independent-review-of-ukri-published
[12] https://www.gov.uk/government/publications/review-of-research-bureaucracy
[13] https://www.gov.uk/government/publications/research-development-and-innovation-organisational-landscape-an-independent-review

Governments and our partner organisations to ensure our objectives and actions are mutually supporting.

Sector-specific strategies such as the National Space Strategy [14], the Life Sciences Vision[15], the National AI Strategy[16], the UK National Cyber Strategy[17] and the forthcoming UK Quantum Strategy provide the rationale for increased innovation within those sectors and detail what specific action is needed to drive it. These are tailored to the individual characteristics of the relevant sector, have a consistent strategic focus, tackle specific barriers to innovation and are developed and delivered in partnership with industry, academia and government. These strategies consider the breadth of the innovation pathway from discovery to commercialisation, and how it can best empower the private sector, including researchers, industry and wider society.

Sector-specific initiatives sit within a wider strategic framework. The 2020 R&D Roadmap set out the importance of our broad R&D ecosystem and how we will nurture it. The 2021 plan for growth recognised the fundamental principle that innovation drives economic growth. The realisation of this type of growth is a core component of other strategies that are essential for the UK's future prosperity and security, including the Net Zero Strategy[18] and the Integrated Review[19]. The Innovation Strategy focuses on how we can boost private sector investment across the whole of the UK and identifies the key levers we need to pull across government to create the right conditions for all businesses to innovate. These cross-cutting enablers of innovation are relevant to all sectors of the economy.

The Government is also committed to maximising the contribution of innovation to levelling up. To this end, the Levelling Up White Paper set out commitments for growing research and innovation capacity across the UK, including a cross-Government mission to increase domestic public investment in R&D outside the Greater South East by at least 40% by 2030, and by at least a third over the Spending Review period.

Government is investing £100 million as part of piloting new Innovation Accelerators supporting three UK city regions (Glasgow City Region, Greater Manchester and West Midlands) towards becoming major, globally competitive centres for research and innovation. Innovation Accelerators are locally led partnerships involving leaders in local government, business and universities, working with national Government and R&D funders. The three local partnerships have developed innovation growth plans and are identifying transformational projects to grow their innovation ecosystem, to boost innovation and attract new R&D investment, building on local strengths and opportunities.

[14] https://www.gov.uk/government/publications/national-space-strategy
[15] https://www.gov.uk/government/publications/life-sciences-vision
[16] https://www.gov.uk/government/publications/national-ai-strategy
[17] https://www.gov.uk/government/publications/uk-national-cyber-strategy-2022
[18] https://www.gov.uk/government/publications/net-zero-strategy
[19] https://www.gov.uk/government/publications/global-britain-in-a-competitive-age-the-integrated-review-of-security-defence-development-and-foreign-policy

5. The own–collaborate–access framework is a useful starting point for approaching international science and technology policy. But it is insufficiently understood and poorly applied. It is not clear whether decisions have been taken on how the framework will apply to specific technologies. *The Government must clarify the own–collaborate–access framework by publishing the areas of technology where it will be applied, and by explaining how it intends to balance owning, collaborating or accessing in these areas.* (Paragraph 34)

The Government is working to ensure the UK benefits from transformative technologies where we have existing R&D strengths. Realising the potential of these technologies requires fostering and sustaining the ecosystem from which they emerge, and prioritising among those that emerge to generate strategic advantage.

Own-Collaborate-Access (OCA) is a concept for helping the UK make choices about how it strategically approaches critical technologies. This involves government making a clear, considered decision on its stance towards a given technology, either to: **own** – where the UK has leadership and the potential for end-to-end activities from discovery to large-scale manufacture and commercialisation. This will always involve elements of collaboration and access; **collaborate** – where the UK can make unique contributions that allow us to collaborate with others to achieve our goals; **access** – where the UK will seek to acquire critical science and technology from elsewhere, through options, deals and relationships.

The Government agrees that it is important to signal publicly its science and technology priorities. The Government is analysing which *specific* technologies should be priorities for the UK to assure its prosperity and security and will set these out in the near future. The Secretary of State for the newly created Department for Science, Innovation and Technology has stated her intention to use the department to build on our world leading strengths in AI, life sciences, quantum, fintech, and green technology to improve the lives of everyone across the UK.

6. The Government's inconsistent approach to international scientific collaboration has severely undermined the aspiration to be a "science and tech superpower." The UK's reputation and scientific capability have been damaged by the cuts to Official Development Assistance and the ongoing lack of association with Horizon Europe. The UK must be seen as a reliable partner, and the Government must recognise that it cannot reproduce the benefits of international collaborations domestically. *A cross-Government science strategy must recognise the importance of international collaborations and steps must be taken to rebuild the UK's reputation as a partner.* (Paragraph 42)

The Government absolutely recognises the benefits of international collaboration and the importance of the UK's reputation as a trusted and valuable partner in science and innovation. Dedicated cross-departmental governance has recently been established to bring greater coherence and coordination to the UK's international science and innovation activity in recognition of these benefits and the important role research collaboration plays in projecting a positive image for Global Britain. This work is helping to inform and prioritise the Government's approach to international collaboration alongside the principles set out in the Integrated Review, the Innovation

Strategy, the R&D Roadmap, the UK Government's Strategy for International Development[20] and in projecting a positive image for Global Britain.

The UK has been at the heart of mutually beneficial international research for decades and the UK's priority continues to support international collaboration in science and R&D.

The Government will drive international research and innovation partnerships that deliver for UK interests and global challenges strategically and with impact. We will embed what has been learnt and proven most effective from previous research funds, and work coherently across Government and with funders to ensure the UK continues to build our reputation internationally.

For example, in December 2021, Innovate UK signed an MoU with Enterprise Singapore committing a minimum of £10 million over 3 years (match funded) to support bilateral business co-innovation and R&D with Singapore. We will strengthen our research and innovation partnerships with Singapore developed over the previous two years, including partnership supported by the Eureka programme. In November 2022, the Government signed a MoU with Switzerland and is developing an enhanced partnership with Japan which will deepen the relationship between the countries' world-leading research and innovation communities. The arrangements will encourage a particular focus on co-operation in 'deep science' and 'deep tech' (including life science, energy technology, AI and Space), as well as commercialisation through innovation, and policy and diplomacy in science and innovation.

UK's Official Development Assistance (ODA) R&D has played a central role in driving forward development progress over the past two decades, while also delivering benefits to the UK – such as vaccine and drug discovery and more productive and resilient crop varieties. We are proud of these achievements and have committed to the continued use of excellent UK science and research to deliver development impact and international science partnerships.

The Windsor Framework delivers for the people and businesses of Northern Ireland. It ensures free-flowing trade in goods within the UK, protects Northern Ireland's place in our Union, and safeguards sovereignty in Northern Ireland. The Government look forward to continuing to work constructively with the EU on a range of issues and will take stock of progress on our future cooperation under the UK-EU Trade and Cooperation Agreement.

To mitigate the impact of the EU's delays to our association, on 21st November we announced an immediate package of investments (totalling up to £484 million). This funding will support staff retention and local talent strategies at eligible universities and research organisations; ensure the UK's labs remain world class and at the cutting edge of R&D; and offer universities and research organisations the discretion to apply the funding in ways that best suit their local needs. It will also provide a catalyst for the acceleration of growth in the UK's burgeoning fusion industry,

[20] https://www.gov.uk/government/publications/uk-governments-strategy-for-international-development

ensuring the UK can retain and build on its position as a global leader in fusion science.

This additional package of funding sits alongside the Horizon Europe guarantee set up in November last year which provides funding via UKRI to eligible successful UK applicants to Horizon Europe, enabling them to continue their work in the UK and with their international partners. UKRI have already issued grant offers of over £500 million for the guarantee.

In the event we do not associate, we will increase investment in our existing R&D programmes. The UK's proposed global Research and Innovation programme builds on our priorities as set out in the UK's R&D Roadmap and Innovation Strategy. It includes:

- **Transitional measures** to provide immediate stability and availability of funding for the UK sector, including the Horizon guarantee.
- A new **long-term offer** to take the best aspects of Horizon and build an alternative UK programme based on three pillars: a new long-term UK flagship **Talent offer;** a **single innovation programme**, investing to unite industry and academia in furthering the UK's Innovation Nation ambitions; and an ambitious new programme for supporting **Global Collaboration.** These three pillars will be underpinned by a horizontal strand focussed on **R&D infrastructure and Levelling-Up**, investing in new world class infrastructure assets across the UK.

These programmes will enable the UK to meet its global Science Superpower ambitions more quickly. We continue to develop these programmes and will formally share them with the research community in due course, as outlined in our publication in July 2022 "Supporting UK R&D and collaborative research beyond European programmes".

National Science and Technology Council (NSTC) / Office for Science and Technology Strategy (OSTS) Structure

The National Science and Technology Council remains a Cabinet Committee, chaired by the Prime Minister. Following the recent Machinery of Government changes, OSTS has now been integrated into the newly created Department for Science, Innovation and Technology, with its function to be determined by DSIT's Secretary of State.

7. We are concerned that the National Science and Technology Council has met only three times in the first year since it was established in July 2021. *The National Science and Technology Council should meet regularly and frequently. Given the importance of science and technology to the UK, ten to twelve times per year seems more appropriate than three or four.* (Paragraph 47)

8. We are also surprised that no substantive documents have been produced by the Office for Science and Technology Strategy. *The Office for Science and Technology Strategy should publish the outcomes of the Council's decisions,*

and its substantive plans for the specific areas of cross-government working that it has identified. It is critical that this strategy is communicated widely. **(Paragraph 48)**

10. Given the centrality of the Department for Environment, Food and Rural Affairs and the Department for Education to science and technology, there is a compelling case that they should be present at every meeting of the National Science and Technology Council. ***The Department for Environment, Food and Rural Affairs and the Department for Education should have representatives as full members of the National Science and Technology Council.*** **(Paragraph 51)**

11. We welcome the establishment of a cabinet level committee for discussing and directing matters of science and technology in the form of the National Science and Technology Council and its supporting body the Office for Science and Technology Strategy. But, a year after their establishment, the remits of these bodies remain unclear. We do not know how they will interact with existing bodies, such as UK Research and Innovation. Without clarification we cannot be confident that they will add any value to an already complex landscape. ***We urge the Government to clarify the remits of the National Science and Technology Council and the Office for Science and Technology Strategy. It should set out how they interact with existing Government bodies, especially UK Research and Innovation. These organisations should simplify and organise the science and technology landscape, not complicate it further.*** **(Paragraph 57)**

The Government has noted the Committee's interest in the role of the NSTC and other Cabinet Committees in developing science and technology policy, and its recommendations that the Government should publish details relating to committee discussions.

The Prime Minister decides – with the advice of the Cabinet Secretary – the overall structure of the Cabinet Committee system, including the chair, membership and the terms of reference of each Cabinet Committee. Other Ministers are invited to meetings as required by the agenda. It is a long-established precedent that information about the discussions that have taken place in Cabinet and its Committees is not normally shared publicly.

The Cabinet Committee structure supports the principle of Cabinet Collective Responsibility, ensuring that policy proposals receive thorough consideration without an issue having to be referred to the whole Cabinet. Ministers determine the frequency of meetings, prioritising milestones where their engagement in the policy development process will be the most effective.

The purpose of Cabinet and its committees is to provide a framework for ministers to consider and make collective decisions on policy issues. Cabinet Committees are not the only means for making progress on a policy issue. Much of the policy work takes place across government departments outside of the committee.

The [21]National Science and Technology Council, chaired by the Prime Minister and co-chaired by the DSIT Secretary of State, will consider matters relating to strategic advantage through science and technology. This will support the Government to deliver a plan to harness S&T for strategic advantage to support economic growth, national security and the UK's position on the geopolitical stage by driving forward action, resolving delivery issues and sending clear signals on government priorities for S&T.

DSIT is responsible for sponsorship of UKRI and Advanced Research and Invention Agency (ARIA). UKRI remains the UK's largest public funder of R&D and an integral part of the science and technology landscape across government. The DSIT Secretary of State will set UKRI's objectives, budget and the strategic direction for its funding and will sponsor UKRI using the established sponsorship model, which is based on improving engagement, promoting assurance, aligning strategically, and fostering talent. There is an expectation that any departments and agencies with a role in delivering the UK's science and technology advantage agenda will draw on the Government's decisions and priorities relating to science and technology advantage when planning their own activities.

The Government recognises the importance of a coherent R&D landscape. This is why the Government commissioned the Independent Review of UK Research and Innovation, the Independent Review of Research Bureaucracy and the Independent Review of the Research, Development and Innovation Organisational Landscape.

9. The right people and the right science and technology skills will be crucial to becoming a "science and tech superpower." *The Office for Science and Technology Strategy should include "people and skills" as a core strand in its work to coordinate a science and technology strategy across Government.* (Paragraph 50)

The Government agrees that the UK having the skills and talent to become a 'science and tech superpower' should be a core part of the Government's work. The Government will consider the UK's approach to talent and skills as key to securing a strategic advantage through science and technology.

The importance of talented people and teams to achieving the UK's 'science and tech superpower' ambition was clearly underlined in the Government's R&D Roadmap[22] and restated in both the R&D People and Culture[23], and Innovation Strategies[24]. This means attracting, developing, and retaining people of all ages and at all career stages into R&D roles.

The Government is already taking steps to continue attracting, developing, and retaining the best international talent:

[21] https://www.gov.uk/government/publications/the-cabinet-committees-system-and-list-of-cabinet-committees/list-of-cabinet-committees-and-their-membership#national-science-and-technology-council
[22] https://www.gov.uk/government/publications/uk-research-and-development-roadmap
[23] https://www.gov.uk/government/publications/research-and-development-rd-people-and-culture-strategy
[24] https://www.gov.uk/government/publications/uk-innovation-strategy-leading-the-future-by-creating-it

- Producing the Science, Technology, Engineering and Maths (STEM) skills needed by UK employers: The Skills for Jobs white paper set out a number of reforms to technical education, and area employers have highlighted a shortage of relevant skills. This includes expanding the flagship Institutes of Technology programme to every part of the country by the end of this Parliament – to spearhead the increase in higher-level technical skills in STEM – and introducing T levels, which are designed by employers with reference to the world's best technical education systems in subjects including Digital Production, Design and Development (from 2020), Science from (2021) and Design and Development for Engineering and Manufacturing (from 2022).
- Developing a focused immigration offer: Enabling talented people in STEM to come to the UK through a number of different routes, including Global Talent and Skilled Worker routes. Two new routes have also been introduced to enhance our excellent offer to talented individuals. The High Potential Individual visa, aimed at recent graduates of top global universities went live in May 2022 and was followed in August 2022 by the Scale-up Worker visa for individuals recruited by a UK-based high growth company.
- Developing a New Deal for postgraduate research students: The New Deal will look at how postgraduate research students are supported and developed both practically and financially. UKRI has undertaken a sector wide consultation on the New Deal as a first phase of this long-term programme of work.
- Improving the research and innovation working environment: The R&D People & Culture Strategy set out a number of actions that the Government is delivering on, working with the sector, to ensure the UK is home to a diverse, sustainable and inclusive research culture – with dynamic career opportunities and where bullying and harassment is no longer an issue.
- Improving the perception of the UK: The GREAT Talent campaign has been launched to showcase the strengths of the UK's science and technology sector. This included a web platform that brings together new, emerging and existing information and content from across the Government and supporting partners where they can find out practical and relevant information on moving, living and working in the UK in science, research and technology.
- More actively supporting talent: In the Autumn 2021 spending review it was announced that the Government is creating a Global Talent Network – launching in the Bay Area and Boston in the US, and Bengaluru in India – to find and bring talented people to the UK to work in key science and technology sectors.
- Should association to European programmes not be possible, Government will be ready to support the UK Research and Innovation industry with a flagship talent programme that will support talented people at all career stages.

12. There need to be clear lines of accountability for policies that cut across departments. It should be clear which individual is accountable. *The National Science and Technology Council and Office for Science and Technology Strategy must identify the areas of cross-departmental work they will coordinate. They should identify individuals to be accountable for specific elements of the strategy, and ensure they have appropriate levers to do so.* (Paragraph 58)

The coherence of Government policy on science and technology is bolstered by the creation of DSIT, the new and dedicated department for Science, Innovation and Technology which brings together the relevant parts of the former Department for Business, Energy and Industrial Strategy and the former Department for Digital, Culture, Media and Sport.

Some specific areas of science and technology are owned and led by the relevant Secretaries of State (and their departments) who are accountable for their own R&D policy objectives and for the budgets that support them.

The NSTC will continue to set the Government's direction by identifying clear areas of cross-cutting work on strategic advantage, and hold departments, government bodies and lead individuals accountable for delivering on the UK's strategic goals in achieving strategic advantage through science and technology.

13. We are concerned that the position of Minister for Science, Research, and Innovation was vacant at the time of writing. *Accountability for the delivery of the Government's overall science and technology strategy should sit with the minister responsible for science and technology, which should be a cabinet-level position.* (Paragraph 59)

The Rt Hon Michelle Donelan MP was appointed as the Secretary of State for DSIT in February 2023, and is a member of Cabinet. Minister Freeman was appointed as Minister of State for Science, Research and Innovation at the Department for Business, Energy and Industrial Strategy in October 2022 and is now Minister of State at the Department for Science, Innovation and Technology, alongside Minister Scully and a Lords Minister. Taken together, the new Cabinet seat and standalone Department gives science, innovation and technology even greater prominence in the Government's agenda.

18. The civil service needs more science capability, not just in specialist roles and not only by direct employment. It needs effective processes for drawing on outside expertise. The Government acknowledges the need for more scientists in the civil service and the ambition that we heard from Sir Patrick Vallance to approach 50 per cent of science and engineering graduates for recruitment to the civil service generalist fast stream is welcome. This target needs regular monitoring and reporting. *The Office for Science and Technology Strategy should monitor progress towards the target to increase the number of science and engineering graduates on the fast stream. The Government should record the number of scientists and engineers in departments and their specialisms.* (Paragraph 86)

Science capability is about having the right science systems, skills, infrastructure and funding in place across government in order to support development and delivery of government priorities for economic growth and security, as set out in the Science Capability Review published in 2019. An essential part of this is ensuring the Government has access to the rights skills and experience within the Civil Service in both specialist and non-specialist roles to make effective use of expert advice. The Government Office for Science manage the Government Science and Engineering

Profession (GSE) and S&T Fast Stream, under Sir Patrick Vallance as the Head of the GSE Profession.

The STEM degree discipline of fast streamers is recorded on appointment and monitored regularly. Departments hold workforce data on the number of scientists and engineers they employ.

The GSE Profession Strategy, published in 2021, sets out goals to provide opportunities for scientists and engineers to form connections and gain broad experience in and out of government. An example of this is the STEM Futures programme, which facilitates secondments and placements across the public sector, industry and academia. This programme will continue be grown and promoted further in 2023.

Civil servants are encouraged to consider an outward secondment to an external organisation as a valuable career development opportunity – a chance to lead and manage in a very different context gaining new knowledge and capabilities that can be brought to bear back in the Civil Service. External employers from all sectors are keen to partner with us on this and many speak of the positive experience they have had of seconding talented civil servants into their organisations. Equally the Civil Service is encouraging inward secondments that will allow us to bring in critical capabilities and innovative thinking from other organisations. Inward secondments encourage the Civil Service to be open to challenge and new ideas and offer those from other sectors a unique opportunity to spend time in a government department and experience up close how civil servants work with Ministers to shape and deliver complex policies.

ROLE AND ACCOUNTABILITIES OF UKRI

14. UK Research and Innovation is expected to deliver on a range of Government priorities as well as its core function of funding excellent research. It has to respond to priorities from multiple bodies, including the Department for Business, Energy and Industrial Strategy, its research councils, and now potentially the National Science and Technology Council and Office for Science and Technology Strategy. *The role and accountabilities of UK Research and Innovation and its board, particularly as they apply to wider Government policies, must be clarified. It is critical that the organisation is sufficiently and flexibly resourced, and well connected across government. It should not lose focus on funding blue-skies research.* (Paragraph 67)

The Government welcomes the Committee's recommendation. The independent review of UKRI, led by Sir David Grant, similarly discusses the role of UKRI's Board and recommends clarifying roles and responsibilities. DSIT is picking up where BEIS left off by working closely with UKRI to implement the recommendations of the independent review while overseeing UKRI's transformation programme, which includes a work stream focussed on governance and decision-making.

UKRI has engaged closely with the Office for Science and Technology Strategy (OSTS) to create a channel for the two-way flow of policy insight on R&D issues into

government. The incorporation of OSTS into the new Department for Science, Innovation and Technology, which sponsors UKRI, will facilitate this two-way flow.

UKRI's portfolio aims to support a broad and multi-disciplinary research base, which fosters collaboration and co-investment between business, universities and the wider research base. A central pillar of UKRI's 2022/27 Strategy is to develop more coordinated and collaborative approaches, including new funding opportunities for multi-disciplinary programmes aligned to UK strategic goals. UKRI's funding allocations also recognise the importance of blue-skies research, where applications are not immediately apparent. UKRI's total funding allocation is more than £25 billion across the next three years and will reach over £8.8 billion p.a. in 2024/25.

15. UK Research and Innovation is affected by numerous reviews despite only being established in 2018. It is not realistic to expect it to function as well as it could in such a context. *Once the reviews are finished, UK Research and Innovation should be allowed to operate in a more certain policy environment.* (Paragraph 68)

The Government has taken steps to ensure that UKRI has long-term policy and funding certainty. The 2021 Spending Review set out how funding will be allocated to UKRI over the next three years, with a total allocation of more than £25 billion across this period. Alongside this, UKRI have published its [25]2022/27 Strategy, [26]Corporate Plan, and [27]Strategic delivery plans, setting out its long-term strategic objectives and how they will deliver them.

The review of UKRI by Sir David Grant provides the first independent assessment of the organisation since its formation in 2018, providing a valuable third-party perspective. The Government is working with UKRI to implement the recommendations of the Grant Review, including drawing up a set of Key Performance Indicators (KPIs) for UKRI which will be published in a refreshed Framework Document.

The Government response to Professor Tickell's Review of Research Bureaucracy will put forward proposals to monitor progress on implementing the recommendations. This will focus in the main on the perspectives of those delivering and managing research. This evidence of progress will be sector-wide but will also help to ensure UKRI is the world's best R+D funding agency. UKRI itself is heavily involved in the review and response.

Sir Paul Nurse's Independent Review of the Research, Development and Innovation Organisational Landscape is nearing completion and will be published soon. Its recommendations will then be considered in a Government response.

16. We welcome the increase in research and development funding for Government departments. But we are concerned that this could result in duplication of work being done by UK Research and Innovation. Some

[25] https://www.ukri.org/about-us/strategy-plans-and-data/our-strategy-2022-to-2027/
[26] https://www.ukri.org/about-us/strategy-plans-and-data/corporate-plan/
[27] https://www.ukri.org/about-us/strategy-plans-and-data/delivery-plans/

departments have published areas of research interest, but some have not, and many have not updated them for some time. *Departments should co-ordinate with UK Research and Innovation on research activities to address their areas of research interest, and on managing grants, to avoid duplication. Departmental areas of research interest should be updated annually and specific research questions identified.* (Paragraph 74)

Areas of Research Interest (ARI) have been published by all government departments with an interest in engaging externally with academia and industry and many Non-Departmental Bodies. ARIs are documents published by Departments and Non-Departmental Public Bodies on gov.uk and are therefore agreed with Ministers, where applicable. ARIs represent an important part of government's external engagement with researchers and contribute towards developing the evidence base that Ministers can draw from in their decision making.

Nine departments have refreshed their ARI and five more are currently in the process of refreshing them. The Government Office for Science is engaging with all departments to provide support with the refresh of their ARIs.

To maximise the impact of the ARIs and share best practice, the Government Office for Science has established a cross-government group connecting all ARI officials, who meet regularly to share best practice and common priorities. Last year the Government Office for Science consulted extensively with departments to update and publish a [28]guidance document to help departments write and use their ARIs. Department feedback is that updating ARI annually is too frequent and instead the Government Office for Science currently recommends Departments should check annually if they need to be refreshed and update as appropriate.

The Government Office for Science and UKRI's Economic and Social Research Council are currently funding two Fellows to join up ARI work between departments and URKI. Other mechanisms are also in place to ensure broader coordination, avoid duplication of efforts and to strengthen the relationships between Chief Scientific Advisers (CSAs) and UKRI, including regular meetings between CSAs and UKRI leadership, which includes Executive Chairs of its Councils, and CSA attendance of UKRI's councils' Councils as ex-officio members.

The Government does not accept that there is a risk that increased funding for departmental R&D may duplicate UKRI funding. R&D carried out or commissioned by government departments is focused on specific objectives and is often intended to support development and demonstration of near-market solutions. Departments or their arm's length bodies, including public sector research establishments will work closely in collaboration with UKRI and the wider research base where this makes sense, and in some cases, departments may use UKRI, including Innovate UK, to deliver programmes on their behalf or undertake specific areas of research.

[28] https://www.gov.uk/government/publications/writing-and-using-areas-of-research-interest/writing-and-using-areas-of-research-interest

GO SCIENCE

17. The Chief Scientific Adviser network is effective and well-coordinated. It presents an important opportunity to align scientific objectives across Government and to support the role of the National Science and Technology Council. *The Government science capability review recommendations on Chief Scientific Advisers should be implemented. Every department should have an independent, external expert as Chief Scientific Adviser, and departments should be able to hire additional science advisers if expertise is required on a topic. Part of the role of a Chief Scientific Adviser should be in approving departmental research and development spending. (Paragraph 80)*

The Government agrees with this recommendation. Under the Government Chief Scientific Adviser (GCSA), the role of Departmental CSAs has evolved into a very effective joined-up network of advisers across government and a critical element of the science system within Departments. The role and responsibilities of a CSA are shaped by their department, taking into account the needs and structure of their science system and the advice of the GCSA. The GCSA advises on the recruitment of new CSAs, and departments are encouraged to recruit external experts for a 3-year CSA post, with an option to extend by a further 2 years. As of January 2023, there were 21 appointed CSAs in the CSA Network: 17 are externally recruited experts, 4 are permanent civil servants. The GCSA's ambition is for every department to have an externally recruited expert CSA.

Departments have the power to procure the scientific and technical advice they need and can do so in different ways which range from procuring ad-hoc research, contacting experts directly, and using expert committees and science councils. The Government Office for Science has been working with knowledge brokers in Academia and through Areas of Research Interest, to help departments identify relevant and diverse experts. Through implementation of the [29]Science Capability Review (SCR), the Government Office for Science is improving government science systems and access to evidence ensuring high quality of research informs government decisions with other initiatives such as: the ARI Guidance and ARI Fellows, [30]Research Integrity Concordat Guidance and the recent review of the [31]Code of Practice for Science Advisory Councils and Committees (CoPSAC) which sets out extensive guidance for the set up and use of Scientific Advisory Councils. The Government agrees that part of the role of a CSA should be in approving departmental R&D spending and this was part of Recommendation 11 of the SCR.

The Government Office for Science is working with departments to understand current sign-off mechanisms for R&D spending and what does and does not work well with these processes. The findings will help identify best practices and key barriers, and the Government Office for Science will work with departments to overcome these barriers and implement the recommendation of this review and recommendation 11 of the SCR. As well as this recommendation, the Government Office for Science is working closely with CSAs to deliver all SCR recommendations.

[29] https://www.gov.uk/government/publications/government-science-capability-review
[30] https://www.gov.uk/government/publications/implementing-the-concordat-to-support-research-integrity-within-government/guidance-to-implement-the-concordat-to-support-research-integrity-within-government
[31] https://www.gov.uk/government/publications/scientific-advisory-committees-code-of-practice

The GCSA and the CSA Network team at the Government Office for Science regularly review their processes to ensure that the network is as strong and impactful as possible.

2.4% of GDP

19. We welcome the substantial planned uplift in Government spending on research and development towards the 2.4% of GDP target. It has the potential to be transformational for UK science and technology, even though it would still leave the UK behind other OECD countries. But increasing research intensity to such an extent is highly ambitious and previous attempts have failed. It will not be achievable with business-as-usual policies. (Paragraph 94) We are concerned that the economic context may threaten the Government's commitment to research and development. ***A boom-and-bust cycle in research and development funding must be avoided. The Government should go beyond an abstract percentage of GDP target and explain what benefits it wants to achieve with the additional funding.*** **(Paragraphs 94 and 95)**

The Government has been consistent in its support of R&D funding. Government expenditure on R&D has grown every year since 2011 in cash terms, reaching £15.3 billion in 2020, more than 50% higher than the £10.1 billion in 2010.[3233] In addition, at Autumn Statement 2022, despite the fiscal challenges, the Government reaffirmed the commitment to public investment hitting £20 billion per annum by 2024/25. This represents a cash increase of around a third compared to 2021/22 and is the largest ever increase over an SR period.

Furthermore, the recommitment at Autumn Statement 2022 to increase R&D spending to £20 billion by 2024/25 will contribute to driving increases in private sector investment, supporting the Government's key aim of raising economic growth by boosting productivity and thus raising living standards across the country. In lockstep with this, the 2021 Innovation Strategy put forward a plan to increase private investment across the UK by taking action in areas such as regulation and procurement.

As a result of ONS methodological improvements, latest statistics show that expenditure on R&D that was performed in the UK reached almost £62 billion in 2020, with businesses performing £44 billion of that investment. The ONS has not published R&D as a percentage of GDP, to make clear that they have not yet incorporated the improvements to the measurement of R&D in the business and higher education sectors into the calculations of GDP. BEIS previously estimated it would have produced a figure between 2.9% and 3.0% of GDP for 2020. DSIT is currently considering the implications of this update, but a stronger baseline does not change the underlying rationale for growing economy-wide investment in R&D.

[33] Tables 3 and 4 of ONS – R&D expenditure by the UK government: 2020 https://www.ons.gov.uk/economy/governmentpublicsectorand/researchanddevelopmentexpenditure/bulletins/ukgovernmentexpenditureonscienceengineeringandtechnology/2020

This increased funding is more than just a numerical target; it is about delivering a range of economic, national security and societal benefits for the UK. R&D investment is central to tackling the major challenges we face, from reaching Net Zero by 2050 to delivering on our Levelling Up ambitions. Long-term productivity improvements are strongly correlated with innovation and R&D activities, with businesses that consistently invest in R&D being 13% more productive than firms that do not invest in R&D[34]. Driving productivity improvements is central to improving living standards across the country.

26. To increase private sector research and development spending towards the 2.4% target, a step change in the level of engagement with industry is needed. Industry witnesses welcomed the idea of a strategic approach to science and technology, but were often unclear about the Government's plans and policies. ***The Office for Science and Technology must engage intensively with industry to define and implement a science and technology strategy in order to meet the 2.4% of GDP target.*** **(Paragraph 124)**

Our goal is to maximise our potential to deliver growth through R&D, and this is why implementing the Innovation Strategy in lockstep with delivering the record R&D settlement from the 2021 Spending Review is so important: the Innovation Strategy's primary aim is to boost private sector investment across the whole of the UK, reflecting that innovation is vital to future economic growth.

The Government is intensifying its strategic engagement with the private sector in order to drive private investment in R&D. For example, the Business Innovation Forum has been established to galvanise action from the business community and to garner their expertise to better leverage private investment through Government's interventions. The Forum is used to drive forward the implementation of the Innovation Strategy and hold the Government to account on the defined actions.

The Department for Science, Innovation and Technology is also working closely with the Department for Business and Trade, leveraging their global and business connections and insights, to ensure UK R&D strengths and opportunities are promoted internationally to drive inward investment.

27. Outside the life sciences sector, the UK has a limited manufacturing base. A successful science and technology strategy will need to recognise the existing structure of the UK economy and have a plan to grow the UK's manufacturing base, if that is the intention. ***The Government should explain what role the services sector will play in increased research and development spending and outline how the 2.4% target fits with the structure of the UK's economy.*** **(Paragraph 128)**

The Government wants all sectors of the economy to invest in research, development and innovation, to drive productivity and create new and better paying jobs. The United States, similar to the UK, has a service-based economy, but invested over 3% of GDP on R&D in 2019. This highlights that the makeup of the UK economy should not hold us back from driving up economy-wide R&D investment.

[34] Cefis, E., and Ciccarelli, M. 2005. cited in BIS 2014. Innovation Report. Access here.

In November 2022, the latest ONS data showed that the value of expenditure on R&D performed by UK businesses in 2021 was approximately £47.0 billion.[35] R&D in services has been growing faster than manufactured products over the last decade and it is plausible that this pattern will continue in future. In addition, much of the R&D for manufactured products is performed by service sector companies, such as clinical trials of pharmaceutical products, a key sector in life sciences.[36]

In addition to the life sciences sector, the UK has growing strengths in sectors such as space, where the UK has a strong satellite manufacturing base; and fusion, in which it is a world-leader in the most promising fusion technologies.

REGULATION

20. The Government wants to become a "regulatory superpower". Regulations can make countries more attractive to investors, but companies operating in international markets are concerned about regulatory divergence. *The Government should work with industry and the research base to identify the areas, such as artificial intelligence, in which the UK can take a global lead in regulation.* (Paragraph 107)

The OECD Indicators of Regulatory Policy and Governance (iREG) scores, positions the UK's regulatory framework as world leading. For example, the UK's Regulatory Impact Assessments are ranked 1st in the OECD, Ex Post evaluation of regulations are ranked 2nd, and Stakeholder engagement is ranked 9th. Now that the UK has left the EU, we have the freedom and opportunity to further improve our leading system, to re-design the way we regulate to unleash innovation and growth, support enterprise, and reach our Net Zero Targets.

The Government is seeking to build and maintain our strategic advantage to ensure the UK has a competitive edge globally in critical and emerging technologies, such as Artificial Intelligence. The UK's Innovation Strategy explains how the independent Regulatory Horizons Council (RHC) can help use the opportunity of EU Exit to create the world's most agile regulatory system and the strategy commissioned the RHC to review high-level guiding principles for regulation – the RHC published its 'Closing the Gap' report on this in June 2022.

At the Autumn Statement 2022, the Chancellor announced that the Government would task the Government Chief Scientific Adviser (GCSA) and National Technology Adviser (NTA), Sir Patrick Vallance, to lead work to consider how the UK can better regulate emerging technologies, enabling their rapid and safe introduction. This project will identify opportunities and enablers for the pro-innovation regulation of technology sectors with high potential to attract investment and enable the growth

[35] ONS Business enterprise R&D, UK: 2021
https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/bulletins/businessenterpriseresearchanddevelopment/2021

[36] ONS Business enterprise R&D, UK: 2020
https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/bulletins/businessenterpriseresearchanddevelopment/2020

of UK-based businesses and the economy. Sir Patrick's review will make action-focussed recommendations to improve the regulatory landscape for digital technologies, green technologies and life sciences, with further work to follow on creative industries and advanced manufacturing. Sir Patrick's review is separate and distinct from other work happening across government reviewing retained EU laws, which the GCSA/NTA is not involved in.

The pace of new technology - from AI in healthcare to drone delivery - is creating a huge opportunity for the UK to be a global leader in testing new technologies and setting appropriate regulatory standards, which are key to investor and customer confidence. Deploying our Innovation Strategy and Taskforce on Innovation Growth & Regulatory Reform (TIGRR) reforms, and harnessing advice from the Regulatory Horizons Council, is key to making the UK a global testbed and innovative regulator. Funding from the Regulators Pioneers Fund will support 24 pioneering testbeds to experiment and innovate, while helping our brightest businesses in bringing game-changing products and services to market.

The UK is also seeking to reform its better regulation framework and actively engage in International Regulatory Cooperation (IRC) in line with the UK's recently published IRC Strategy to position ourselves as a science superpower. The Government is also utilising the "Agile Nations" Network to collaborate on science and technology priorities to support more effective regulation and standards, and agile approaches to regulatory governance.

21. Deregulation for its own sake will not automatically spur innovation, and regulations can incentivise innovators by providing a clear direction of travel. It is not at all clear what role the Government envisages for regulatory reform in a science and technology strategy. *Sector-based taskforces should be established, providing a single point of contact with industry, to identify opportunities for regulatory reform, explaining how they will encourage innovation.* (Paragraph 108)

Co-ordination and collaboration are important features in helping create regulated settings which enable innovation to flourish. The Government recognises that technological innovation is fundamental to unlocking growth and is committed to growing the UK's global reputation for regulatory best practice and capitalising on our Brexit freedoms. Building on plans outlined in the Innovation Strategy and by the Taskforce on Innovation, Growth and Regulatory Reform, the UK is fostering a regulatory approach that will promote innovation, growth and inward investment.

At the Autumn Statement 2022, the Government announced a review of EU regulations in key growth industries – including digital technology, life sciences, green industries, financial services, and advanced manufacturing – to identify changes that can be made over the next year which have the greatest potential to unlock growth. This work is already underway in several of these sectors, including the Government's ambitious programme of reforms in financial services. The creation of the new Technologies and Regulatory Innovation Directorate in the Department for Science, Innovation and Technology will drive further progress on this front.

As part of this approach, the Government will take action to consider the development and/or reform of regulation in science and technology areas where necessary but encourage the use of alternatives wherever possible. In particular, market-led technical standards are a crucial part of the wider science and technology ecosystem. They can support self- and co-regulation, facilitate knowledge dissemination and interoperability between science and technology applications, and open markets. The Government will continue to work in collaboration with the British Standards Institution (BSI), the National Physical Laboratory (NPL) and the UK Accreditation Service (UKAS) to implement a joint [37]Action Plan on Standards for the Fourth Industrial Revolution. This plan champions an agile approach to standardisation to respond to fast-paced technological change and foster synergies between standardisation, government policy and science and technology priorities that are needed to underpin commercial applications across sectors.

As noted above, the Government has also tasked the GCSA/NTA to bring together the best minds to advise how the UK can better regulate emerging technologies in high growth sectors, ensuring that the UK's regulatory environment realises its ambition to be the most innovation-friendly globally.

In addition to these new initiatives, much has already been achieved in this Parliament. In digital market settings, the Digital Regulation Cooperation Forum (DRCF) was established in 2020. The DRCF brings together four UK regulators (CMA, ICO, Ofcom and FCA) tasked with regulating digital services to collectively drive greater regulatory co-operation and deliver coherent approaches to digital regulation. By enabling coherent, informed and responsive regulation of the UK digital economy citizens and consumers can be better served, regulatory burdens for industry reduce where appropriate, and the global impact and position of the UK enhanced. Furthermore, as part of the Government's plans for Freeports, the Freeport Regulation Engagement Network (FREN) has been established. The FREN is a network of regulators and Freeports forming part of the broader Government Freeports programme, which aims to help businesses operating in Freeports to overcome the regulatory challenges of developing, testing and applying new ideas and technologies.

Regulation has a critical role to play in enabling innovation and the commercial application of science and technology by providing a reliable market framework for the products and services of the future, de-risking investment and fostering trust. At the same time, overly prescriptive regulation can stifle innovation, locking in outdated technologies and placing unjustified burdens on businesses. The Government is using the opportunity afforded by Brexit to re-shape the UK's approach to regulation through the reform of the Better Regulation Framework. This will ensure future regulation is proportionate and outcome-focused, making the UK more attractive for investment.

The rate of innovation frequently exceeds the speed at which regulatory systems can adapt. Furthermore, innovation increasingly blurs the lines between sectors and cuts across traditional regulatory boundaries. This provides a strong rationale to take into

[37] https://www.gov.uk/government/publications/standards-for-the-fourth-industrial-revolution-action-plan

consideration the cross-cutting nature of science and technology developments and their potential applications, such as, big data, machine learning and AI, when identifying new regulatory opportunities and improvements.

As the business-facing front-end of regulation, regulators have a key role to play in supporting and responding to science and technology applications. The Government will encourage regulators to adopt pro-innovation approaches and work collaboratively across remits and with businesses and innovators, including and where applicable, through sandboxes, testing, regulatory advice services and others, to enable experimentation and co-creation of regulatory responses. Government supports such activities across all regulators, in particular through a new round of the [38]Regulators' Pioneer Fund, which will invest up to £12 million for regulator-led and local authority-led projects. The Fund will help to keep the UK at the forefront of regulatory thinking and experimentation, creating a UK regulatory environment that encourages business innovation and investment. In addition, the Government seeks to provide access to UK regulation through an enriched machine-readable dataset through development of the Open Regulation Platform (ORP). The ORP will enable government, businesses and third parties to develop tools and products that can help others navigate and comply with regulation in smarter and less burdensome ways. In this manner, the ORP will stimulate innovation within the Regulatory Technology (RegTech) sector.

MAKING THE BEST USE OF PUBLIC INVESTMENT

22. The Government wants to use public procurement to encourage the development and deployment of new technologies but has not identified the technologies that will be supported. Value for money rules governing expenditure of public money are vital, but they do not always work for investments in developing companies and technologies: risk is inherent in the process and benefits may accrue only in the long-term. *The role that public procurement will play in a science and technology strategy needs to be clarified. The Government should set out which technologies, or areas of technology, it will support through public procurement. A proportion of public procurement spending should be set aside to support defined areas of technological priority, with the value for money rules being interpreted appropriately. The flexible interpretation of value for money rules should apply to future funding decisions, not just the initial procurement decision.* (Paragraph 116)

The Government agrees that procurement presents a significant opportunity to drive the development and deployment of new technologies. At £300 billion, public procurement accounts for around a third of all public expenditure. The Innovation Strategy highlighted the potential to make better use of this spend to provide a route to market for innovative products and services. The Government will consider the role of procurement as one of several related areas central to securing strategic advantage for the UK.

[38] https://www.gov.uk/government/publications/apply-for-the-regulators-pioneer-fund-round-3

The Procurement Bill, currently going through Parliament, includes the new Competitive Flexible Procedure which will support the procurement of innovative solutions by public sector buyers to meet business needs.

The Competitive Flexible Procedure will encompass the existing SBRI and Innovation Partnership procedures, providing a route from initial development of new innovative solutions to policy challenges to larger scale deployments of the most promising solutions. Accompanying guidance will facilitate better and more consistent procurement of innovation from the private sector by departments.

In addition, there is an opportunity for the Government to allocate funding to provide support for the early adoption of defined areas of technological priority, including through procurement. Proposals are being developed as part of the work on Horizon alternatives.

23. The Government has identified risk aversion as a cultural factor that limits Investment in research and development in the UK. This may be true, but we have not heard any concrete proposals on how to change it. *The Government must explain how it will address any cultural risk aversion in the UK. It needs to set out its own approach to risk when it comes to public money. It should adopt a portfolio approach to risky investments, supported by appropriate expert input, and it must acknowledge that some failed ventures are an inevitable part of the process.* (Paragraph 117)

The Government recognises that failed ventures are an inevitable part of a healthy R&D ecosystem. The key principle for Government funding should be to maximise the impact of public funds to unlock private funding – not substitute it but help support key blue-sky R&D infrastructure and programmes which private funding cannot provide but relies on. Indeed, through the creation of the Advanced Research and Invention Agency (ARIA) we have created a new funding body that is optimised to support high-risk research, with £800 million allocated by 2025/26. ARIA will enable exceptional scientists and researchers to identify and fund transformational research that leads to new technologies, discoveries, products and services. The ARIA Act 2022 provides the new agency with an explicit acknowledgement that it can give particular weighting to the value created by research projects which have a high-risk of failure but opportunity for high returns. We are delighted that ARIA launched on 25 January 2023, with Dr Ilan Gur and Matt Clifford MBE as CEO and Chair, respectively. They are beginning to design ARIA's operations and its initial set of research programmes.

Government's R&D spending includes investment in fundamental research with the ability to deliver scientific breakthroughs in the long-term, such as the COVID-19 Oxford AstraZeneca vaccine that benefitted from years of UK research in medicine and biochemistry. Alongside this, government invests in close to market applied R&D, in areas such as the Aerospace Technology Institute to drive innovation in zero-carbon emission aerospace. R&D by its very nature is risky and not always guaranteed to succeed, but a portfolio approach means that government can take risks and ensure public R&D investment continues to deliver the research needed to deal with the societal challenges we face whilst also driving the private sector investment needed to boost economic growth.

Due to high R&D costs and the length of time to commercialisation, breakthrough technology companies typically require more capital – and often over a longer duration - than other firms to fuel their growth. The British Business Bank (BBB), through several of its programmes, seeks to de-risk investment in these firms and crowd-in additional private investment in innovation where there are gaps in private markets. Future Fund: Breakthrough (FF:B), for example, is a £375 million UK-wide scheme that aims to encourage private investors to co-invest with government in high-growth, R&D intensive, innovative firms.

24. The Government has identified potential levers to increase research and development spending, such as tax credits, reforming pension fund rules and public procurement. But many of these areas for reform are perennial suggestions and we heard concerningly few specifics about why this attempt will be different. ***The Government should work with stakeholders to identify how tax credits, pension fund rules and public procurement will need to change, how these changes would support innovation and how this would lead to different outcomes from past attempts to stimulate business research and development investment. These changes must be communicated clearly to potential investors.*** **(Paragraph 118)**

As part of the ongoing R&D tax reliefs review (HMT lead), the Government announced reforms to R&D tax reliefs in the recent Autumn Statement to ensure taxpayer's money is spent as effectively as possible, improve the competitiveness of the R&D expenditure credit (RDEC) scheme, and take a step towards a simplified, single RDEC-like scheme for all.

From 1 April 2023, the RDEC rate will be increased to 20% from 13%, the SME deduction rate will be reduced to 86% from 130%, and the SME credit rate decreased to 10% from 14.5%. This reform will save £1.3 billion per year by 2027-28, leave the level of R&D investment in the economy unchanged, and reduce error and fraud in the SME scheme. The Government will consult on the design of a single scheme, and ahead of Budget work with industry to understand whether further support is necessary for R&D intensive SMEs, without significant changes to the overall cost for supporting R&D.

The Government is taking action to remove barriers and make it easier for pension schemes to access a broader range of investments, including those in the UK's science and technology sectors where savers stand to benefit from potentially higher returns.

One such barrier that stakeholders have highlighted is performance fees and how the existing regulatory pension charge cap may limit pension schemes investment in illiquid assets.

Following consultation, the Department for Work and Pensions recently set out regulations and guidance that remove performance-based fees from the regulatory charge cap that applies to Defined Contribution pension schemes. This will provide schemes with greater flexibility and will enable them to take advantage of a fuller

range of investment opportunities if they believe these investments are in their members' best financial interests.

The Procurement Bill currently going through Parliament was produced following an extensive process of stakeholder engagement, including public consultation on the Transforming Public Procurement Green Paper[39], which received 619 written responses. There were a number of questions included in the Green Paper specifically about how the new procurement regime could best be designed to foster innovation; further detail on these is available in the Government's response to the consultation[40]. The legislation, partnered with guidance and a training programme associated with its implementation, will create the flexibility to allow more innovative procurement and support public sector buyers to adopt procurement approaches that will stimulate innovative solutions.

25. ***Reforms to tax credits, intellectual property regulations and public procurement could be driven by government taskforces in each area, providing a single point of feedback for stakeholders to propose reforms. These should be headed by individuals given accountability for the delivery of each element of reform across government.*** **(Paragraph 119)**

The Innovation Strategy recognised the importance that Intellectual Property (IP) plays in providing a platform on which UK business can develop their ideas and how this framework creates an incentive for R&D investment. It helps innovators reap the rewards of their investments and gives investors confidence. More than half of UK firms' investment is in intangible knowledge assets; just under half of these intangibles are protected by formal Intellectual Property (IP) rights. It is clear from recent consultations that both individual users of the IP framework, and businesses, both large and small, believe the UK IP system works well. However, there is an appetite for business to receive improved education on how the IP system is accessed and used.

The Intellectual Property Office (IPO), whose responsibility it is to lead on IP policy and delivery, has an ambitious programme to drive forward innovation, ensuring IP is recognised as a key part of any business model. The IPO is especially keen in looking at ways to remove barriers. For example, in 2020 it was noted by a Government taskforce that Standard Essential Patents (SEPs) had the potential to serve as a considerable barrier to diversification for business. The IPO has been at the forefront of following up on the taskforce recommendation and recently concluded a call for views exercise. A summary of those responses was published in early August.

In 2021 the Government launched a review of research and development (R&D) tax reliefs. The Government has engaged stakeholders regularly through the review,

39 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/943946/Transforming_public_procurement.pdf

40 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1038516/Transforming_Public_Procurement-_Government_response_to_consultation.v3_.pdf

including through a wide-ranging consultation in 2021, with a summary of responses published alongside the R&D Tax Reliefs Report at Autumn Budget 2021.

Following consultation, a number of reforms have been announced in addition to those referenced in the response to recommendation 24. At Spring Statement 2022, the Government confirmed that the definition of R&D for tax reliefs will be expanded by clarifying that pure mathematics is a qualifying cost. In addition, qualifying costs will be expanded to include data and cloud computing and the reliefs will be refocussed towards innovation in the UK. These changes will be legislated in Spring Finance Bill 2023 and apply for accounting periods beginning on or after 1 April 2023.

The Government has continued to engage stakeholders on the implementation of these reforms.

The review is ongoing and any further reforms to the reliefs will be considered in the round through the fiscal event process, in the usual way.

The development of the Green Paper on Transforming Public Procurement drew heavily on the advice of a specially constituted Procurement Transformation Advisory Panel of business leaders, academics and industry experts, including from other countries across the world. There is a dedicated Procurement Bill team in the Cabinet Office which has undertaken extensive stakeholder engagement on procurement reform over the past few years. There is an SRO accountable for delivery of the bill.

28. The UK supports many start-ups, but companies often leave when they reach a certain size because of the capital or expertise available in countries like the United States. This is a long-standing problem which has proved difficult to address. It is welcome that the Government has identified mechanisms to increase scale-up funding, but specific policy changes in these areas have not been set out. *The Government must develop clear incentives to encourage late-stage investors and support companies to scale-up. The recommendations of the Life Sciences Scaleup Taskforce should be published. The Government should explore mechanisms to recoup investments from companies that have received public money if they move abroad.* (Paragraph 135)

The Government must develop clear incentives to encourage late-stage investors and support companies to scale-up.

Government recognises that improving opportunities for scale-ups is a very key area for the UK. Now that we have such a vibrant start-up ecosystem, the key is to make it easier for high growth businesses to raise scale-up finance (£100m-£1bn) in the UK instead of having to seek private overseas investors or go to NASDAQ.

As set out in the Innovation Strategy, the Government actively encourages late-stage investment and supports companies of all sizes to scale up. This is crucial for knowledge and capital-intensive sectors such as Life Sciences, where companies

require long-term investment – over multiple funding rounds, linked to scientific progress – to finance growth whilst weathering early R&D setbacks.

British Patient Capital (BPC) drives private sector investment into later stage UK businesses. Since its launch in 2017, BPC has become the largest domestic investor in UK venture and venture growth funds and invested over £1.3 billion to a growing portfolio of over 500 high-growth UK firms. Since 2021, the majority of BPC's portfolio has been in venture growth stage (Series B onwards), increasing the size of the late-stage VC market. BPC crowds in private investment, leveraging £2.81 for every £1 of public money invested.

To increase investment in late-stage science and technology firms, the Government launched two further programmes in 2021:

- **Life Sciences Investment Programme,** a £200 million programme which crowds in an additional £800 million from Mubadala in the UAE to cornerstone specialist funds investing into UK Life Sciences companies.
- **Future Fund: Breakthrough**, a £375 million programme that enables direct co-investment into the most promising later stage R&D intensive businesses.

The Government remains committed to its long-term objective to unlock more institutional investment into productive areas of the economy, ensuring that savers stand to benefit from the growth of the UK's most innovative companies. We are taking action to deliver this objective and meet the manifesto commitment to 'unlock long-term capital in pension funds to invest in and commercialise our scientific discoveries, creating a vibrant science-based economy post-Brexit'. The Government is taking forward important regulatory changes such as reform of the pensions regulatory charge cap, providing clarity for industry and ensuring pension savers stand to benefit from higher potential investment returns.

Our competitive tax regime helps innovative firms to scale up. The Government provides three tax advantaged venture capital schemes: the Enterprise Investment Scheme (EIS), Seed Enterprise Investment Scheme (SEIS) and the Venture Capital Trusts (VCTs). These schemes provide a range of tax reliefs for investments into primarily early-stage companies.

Innovate UK offers a wide range of support to high-growth UK companies – including grant and loan funding, access to earlier-stage private equity investment through the successfully piloted Investor Partnerships programme, its Knowledge Transfer Network and Innovate UK EDGE. Between 2011 and early 2021, £7.7 billion of venture capital funding was secured by companies after Innovate UK support across ~2,000 deals. This figure increases to £35.9 billion when all deal types, including mergers and acquisitions, are considered.

The recommendations of the Life Sciences Scaleup Taskforce should be published.

To understand the specific needs of the Life Sciences sector, last year the then Business Secretary convened a Life Sciences Scale-up Taskforce – a key commitment in our Life Sciences Vision. This industry-led group were asked: (i) to

better understand the barriers around scale-up; and (ii) to consider the possible solutions to addressing these barriers.

In December last year, the Taskforce wrote to the then Business Secretary setting out their advice, which included recommendations on unlocking institutional investment in the UK and boosting human capital to support scale-up. The Government is now considering these recommendations as it takes forward implementation of the Life Sciences Vision.

The Government should explore mechanisms to recoup investments from companies that have received public money if they move abroad.

Through our tax system and the other incentives outlined above, we are seeking to ensure the UK has the best possible environment for companies to start, scale and remain in the UK. A large range of funding delivered by Innovate UK, and the BBB is conditional on firms either being UK registered or having a significant UK presence.

The Government has a range of standardised conditions for funding, such as grants, which would enable monies to be recouped in certain situations where a project does not fulfil its requirements. Our approach is consistent with the UK's international obligations and commitments to subsidy control.

Ultimately, the UK is an open, global-facing economy; the Government recognises that it is for individual firms to make decisions in the best interests of their company and stakeholders.

29. The Government discusses using public funding in a number of ways: to support companies in their early stages; to de-risk investments for the private sector; to provide later-stage capital for a smaller number of focus areas; and to encourage scale-up of industries in the UK. It is not clear how the Government sees its role as a technology investor. *The Government should explain what it wants public innovation investment to achieve, which technologies and sectors it wants to support, and which mechanisms it will use to provide funding in each case.* (Paragraph 142)

R&D is vital for economic growth, driving up productivity and creating better-paid jobs. Government invests in R&D to address a range of market failures, including investment in early-stage fundamental research which the private sector is not incentivised to fund. This can include investments that are important to Government objectives; as well as investing in research talent programmes which attract and develop the next generation of industrial and academic R&D talent; investment in large scale R&D infrastructures which provide the foundations for world class science; and funding commercialisation programmes to drive the diffusion of knowledge across the economy. The Government investments in R&D are targeted at strengthening our R&D system, driving innovation and productivity, boosting private sector investment and levelling up R&D across the UK.

The 2021 Innovation Strategy outlined how we can support businesses to innovate by making the most of the UK's research, development and innovation system. At the 2022 Autumn Statement, the Government recommitted to increasing public

expenditure on R&D to £20 billion per annum by 2024/25. This included an increase in funding for core Innovate UK programmes by 66% to £1.1 billion in 2024/25. This reflects that unleashing innovation is a top priority for Government and is at the heart of our plan for growth. Our R&D budgets will be deployed and specifically targeted to strengthen Britain's comparative advantages, supporting the best ideas to become the best commercial innovations.

Individual R&D programmes are targeted at resolving specific market failures to create the conditions for the private sector to innovate. These market failures vary across the system but include an inability to capture the full value of early-stage research, or infrastructure providing benefits to a variety of businesses that cannot coordinate to pay for it.

The establishment of the Department for Science, Innovation and Technology has now brought together the five technologies of tomorrow under one department for the first time – Quantum, AI, Engineering Biology, Semiconductors, Future Telecoms, together with life sciences, space and green technologies - to start a hugely exciting and new chapter in the UK's future spanning from scientific innovation, through commercialisation to start up and scale up.

UKRI's five-year strategy sets out their key role in delivering the Government's ambitions for the UK as a global leader in research and innovation. UKRI's £25.1 billion budget from 2022/23 to 2024/25 will allow them to continue making the kind of far-sighted investments that have contributed to the strength of the technologies where the UK has existing strength, such as the £112 million Robots for a Safer World Challenge, which has leveraged over £512 million of new investment. Innovate UK's action plan for business innovation 2021 to 2025 sets out how Innovate UK will support business innovation in the UK between 2021 and 2025.

Alongside public funding, the UK Government seeks to crowd-in additional private investment in innovation where there are gaps in private markets. Due to high R&D costs and longer commercialisation timescales, breakthrough technology companies typically require more capital than other firms to fuel the later stages of their growth. The BBB is a key part of the UK innovation funding system and will continue its efforts to facilitate investment in innovative companies. Funds supported by the Bank are more likely to invest in technology and intellectual property-based businesses than the overall equity market – 47% of deals supported by the Bank are in this sector, compared to 39% of the wider market.[41] There are several BBB programmes currently deployed that support the Government's technology priorities[42]. For example, British Patient Capital which is supporting UK businesses with high growth potential to access the long-term finance they need to scale up, and Future Fund: Breakthrough, a £375 million UK-wide scheme launched in July 2021 that will encourage private investors to co-invest with government in high-growth, R&D intensive, innovative firms.

[41] British Business Bank (2021) 'Small Business Equity Tracker 2021', p72. Available from: https://www.british-business-bank.co.uk/small-business-equity-tracker-2021/

[42] Other interventions include the National Security Strategic Investment Fund (NSSIF), Life Sciences Investment Programme (LSIP), Enterprise Capital Funds (ECF)