UK DIGITAL STRATEGY

Ministerial foreword and executive summary

Digital technology has transformed our lives and will continue to do so. The UK's economic future, jobs, wage levels, prosperity, national security, cost of living, productivity, ability to compete globally and our geo-political standing in the world are all reliant on continued and growing success in digital technology. That is why the UK must strengthen its position as a global Science and Tech Superpower - and why the Government is taking steps to achieve it.

The UK starts with many advantages. Critical building blocks of the digital economy, from super-fast internet access across the UK to cyber security capabilities are already in place or being built. UK universities lead the world in fundamental and applied science. We already have comfortably more tech unicorns than any other European country – more than France, and Germany combined – and in 2021, a new UK unicorn was minted every 11 and a half days based on data from company tracking business Dealroom. We saw more private capital flow into UK tech last year than any other European country – £27.4 billion – around double the level of second-placed Germany, and more than triple the level of France in third place.

These are not just impressive figures; they represent thousands of high-skilled, high-paid new jobs right across the UK. In emerging fields such as artificial intelligence (AI), advanced semiconductor design and quantum computing, the UK is a world leader. And our global network of partners and allies provide the foundation to act as a force for digital good on the world stage.

As the UK's Minister for Tech and the Digital Economy I want us to go further and to go faster.

The UK should always enthusiastically celebrate the success of our digital businesses and champion our global leadership in areas such as fintech. The success and wealth created by investors and founders of digital business is a national success, to be applauded, encouraged and emulated – not criticised.

The UK will be the best place in the world to start and grow a technology business. The UK Digital Strategy sets out this vision and the actions required to deliver it. Estimates commissioned by the Government suggest that our approach to supporting and strengthening the digital economy could grow the UK tech sector's annual gross value added (GVA) by an additional £41.5 billion by 2025, and create a further 678,000 jobs.

Digital foundations

Our mission starts with strengthening the foundations of our digital economy. We are rolling out world-class digital infrastructure across the UK, harnessing the power of data and using the freedoms conferred by Brexit to implement a light-touch, pro-growth regulatory regime that protects citizens while encouraging both investment and innovation. This will lead to regulatory competitive advantages in areas such as AI, data, and digital competition.

We are also determined to ensure that the UK's tech and digital security is defended from hostile state threats, and that highly sensitive tech IP is appropriately protected.

Ideas and intellectual property (IP)

Ideas and intellectual property are at the heart of innovation which feeds digital businesses. Substantial and growing government investment in research and development (R&D) (up from £15 billion to £20 billion a year between 2020/21 and 2024/25), combined with enhanced R&D tax incentives to stimulate private investment will deliver this. We need to ensure that ideas can more readily be commercialised from the academic environment.

We must also actively seek to grow the UK's existing expertise in the foundational deep technologies of the future, such as artificial intelligence, next generation semiconductors, digital twins, autonomous systems and quantum computing.

The NHS is globally unique as the largest integrated health system in the world. This provides substantial opportunities to undertake research and development based on rich data that reflects a large population cared for in one system, which leads to innovative new healthcare products.

Skills and talent

This Government will ensure that UK technology businesses have access to the skills and funding they need to innovate, develop and grow. We will work with schools, universities, further education providers, and businesses to deliver the digital skills that the real economy

actually needs – including apprenticeships and skills training throughout people's careers - in a framework that is understandable and recognisable.

This Government is already funding 1,000 PhDs in artificial intelligence and 1,000 scholarships for master's degree conversion courses in AI and data science, is backing apprenticeships and has introduced T Levels. Digital Skills Partnerships are being rolled out around England, and the new Digital Skills Council brings together business and government to make sure digital skills are being enhanced. But more needs to be done in all of these areas.

It is also vital that the best and brightest from around the world can quickly and easily come to the UK. In addition to the comprehensive suite of visa routes already available to digital businesses, we are introducing the new High Potential Individual and Scale-up visas, so that UK digital businesses can easily recruit from anywhere in the world.

Financing digital growth

The UK has fantastic venture capital investment incentives through schemes like the Enterprise Investment Scheme (EIS), Seed Enterprise Investment Scheme (SEIS) and Venture Capital Trusts (VCTs) and many dynamic early-stage venture capital funds (VCs) which have helped embed a vibrant start-up sector. To continue the sector's growth, we need to ensure market failures inhibiting growth continue to be addressed.

The UK has a strong domestic investor market for companies at seed and early stage, as UK companies grow and raise capital to scale up, but there is more that can be done to facilitate the investment of UK capital into the UK's digital economy. There is an opportunity to enable UK financial institutions, such as pension funds, to allocate more capital to pre-Initial Public Offering (IPO) technology, as their US cousins do. This will stimulate more productive innovation and offer the potential of greater returns for pension savers.

This Government will encourage UK investors to increasingly take a long-term view and understand that growth investing does not often generate short-term dividend flow. We are supporting this through plans to remove well-designed performance-based fees from the list of charges which are subject to the regulatory charge cap.

This Government will continue to directly support innovation and growth financing through InnovateUK and the British Business Bank's initiatives, including British Patient Capital, British Business Investments and Enterprise Capital Funds, and will seek to use these to maximise investment by third-party financial institutions in the UK and internationally.

We will also continue to promote the London Stock Exchange (LSE) as the best place for our digital technology firms to list. There were 37 tech IPOs on the LSE in 2021, including world-leading firms such as Oxford Nanopore and Wise. With the changes to the rules to allow dual class shares, a reduction in the minimum free float to 10%, and special purpose acquisition company (SPAC) rules changes combined with planned prospectus rules changes to allow more forward-looking statements, we are determined that the LSE will be the go-to exchange for tech IPOs.

The whole UK: spreading prosperity and levelling up

We are enabling better access to the benefits of digital technologies across the whole of the UK, improving productivity and inclusion by funding the adoption of cutting-edge technologies by businesses in every region to accelerate productivity growth. This is supported by the Northern Powerhouse Investment Fund, which is investing over £500 million to boost small and medium businesses across the north of England. No one, and no place, should be left behind.

We recognise that some policy areas relating to digital technology are devolved and are subject to the digital strategies of the Devolved Governments (Scotland's digital strategy, the digital strategy for Wales, and Northern Ireland's digital strategy). We are committed to working with the Devolved Governments to ensure that the benefits of digital technologies are felt across the UK. This Government has invested in providing skills for the existing workforce and for future generations to ensure that all can share in the success of our digital economy.

The Cabinet Office (CO) has introduced wholesale reform to the UK's procurement legislation, which will allow public bodies, including the NHS, to take a more flexible and innovative approach to the way they procure technology solutions. This will help drive innovation and provide opportunities to break down barriers for small businesses in bidding for public contracts.

Enhancing the UK's place in the world

We will continue to work with our allies to develop systems of trade and governance that promote global digital trade and enshrine freedom and openness. We will work across the Government, particularly through the Foreign, Commonwealth & Development Office (FCDO) and the Department for International Trade (DIT), to promote digital exports, and seek to ensure that new free trade agreements have a digital chapter (including zero-tariff digital trade, cross-border data flows with trust, and IP and source code protection).

Building on our current efforts, there will also be a cross-government effort to promote inward investment into UK tech and UK VC funds by focusing on key target geographies, such as the Middle East, the Asia-Pacific region and North America. We are promoting the UK as a place for global technology businesses to launch IPOs. The forthcoming International Tech Strategy will set a common set of democratic principles to frame the UK's international engagement on technologies.

The UK will play a leading role in international fora - both multilateral and multi-stakeholder - such as the International Telecommunication Union (ITU), Global Partnership on Artificial Intelligence (GPAI), Organisation for Economic Co-operation and Development (OECD) and the UN Internet Governance Forum (IGF), to ensure that openness, freedom and a multi-stakeholder approach underpin global tech governance. The UK Government will also seek to develop partnerships with like-minded countries around the world on issues that benefit from supranational cooperation, such as highly complex R&D projects and semiconductor supply-chain resilience.

Successful innovative companies are essential to achieving our aims. The Innovation Strategy, published by the Department for Business, Energy & Industrial Strategy (BEIS) in July 2021, sets out the Government's plan for supporting innovation throughout the economy. The UK Digital Strategy builds on that with a focus on the role that digital, which sits within one of the 7 technology families identified in the Innovation Strategy, can play in supporting innovation.

The UK Digital Strategy sits alongside priority areas that are so important they require a specific strategy of their own. These include the Prime Minister's National Science and Technology Council's (NSTC) priorities, such as Artificial Intelligence (published in September 2021), semiconductors (due to be published later this year), and quantum technologies (due to be published later this year). The Kalifa review into the UK's highly successful fintech sector and the upcoming Creative Industries Sector Vision address plans in these high-priority areas for the UK.

This UK Digital Strategy is a wide-reaching statement of this Government's vision and ambitions. We will fulfil them with pace and clarity of action. A summary of the actions required to deliver this strategy is set out at the end of this document. The UK Digital Strategy is a roadmap we will follow to strengthen our global position as a Science and Tech Superpower. Our future prosperity and place in the world depends upon it.

Chris Philp MP

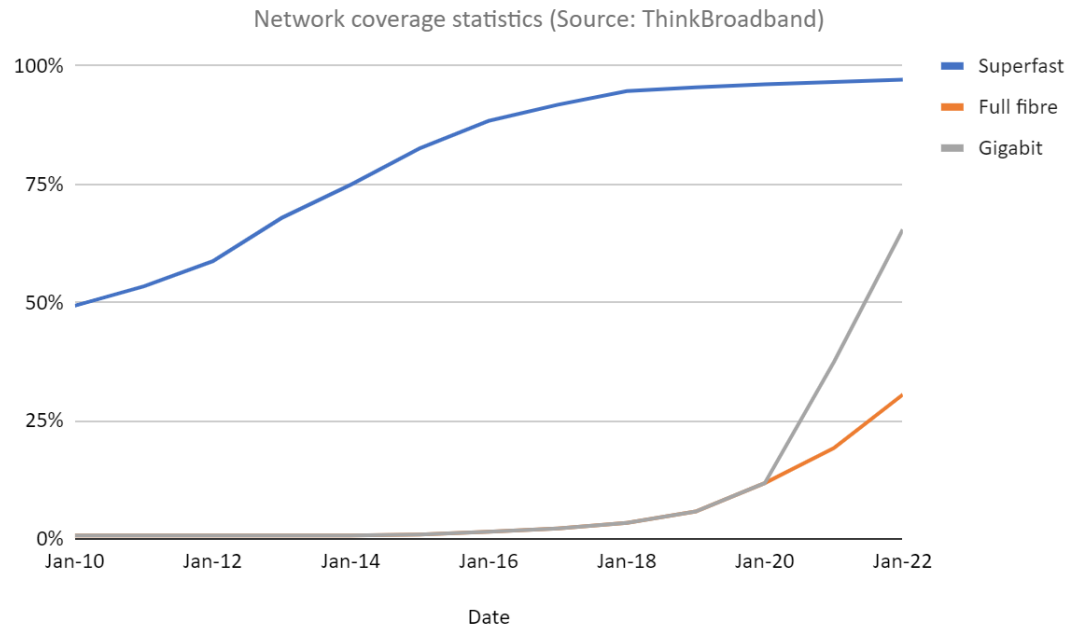
Minister for Tech and the Digital Economy
Department for Digital, Culture, Media & Sport

Where we are today

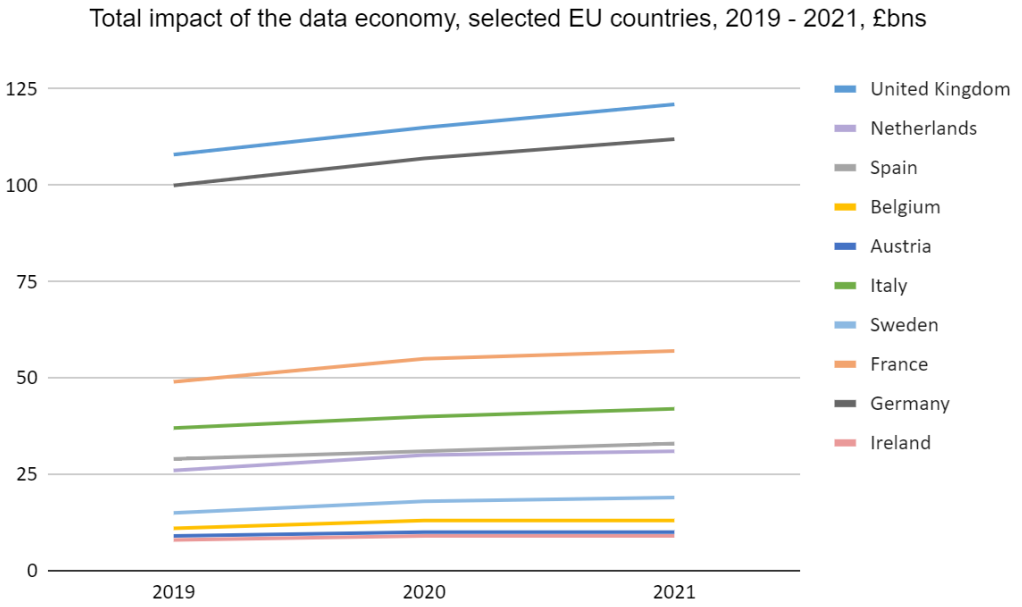
The UK is starting from a position of strength - our digital economy is flourishing. The digital sector contributed nearly £151 billion to the economy in 2019, and accounted for 9% of the national workforce. This is on the back of strong growth in the sector in recent years which, since 2015, has been almost three times stronger than that of the total UK economy in real terms (when compared to 2018 prices).

This growth has been possible because of the UK's strengths in the following key areas:

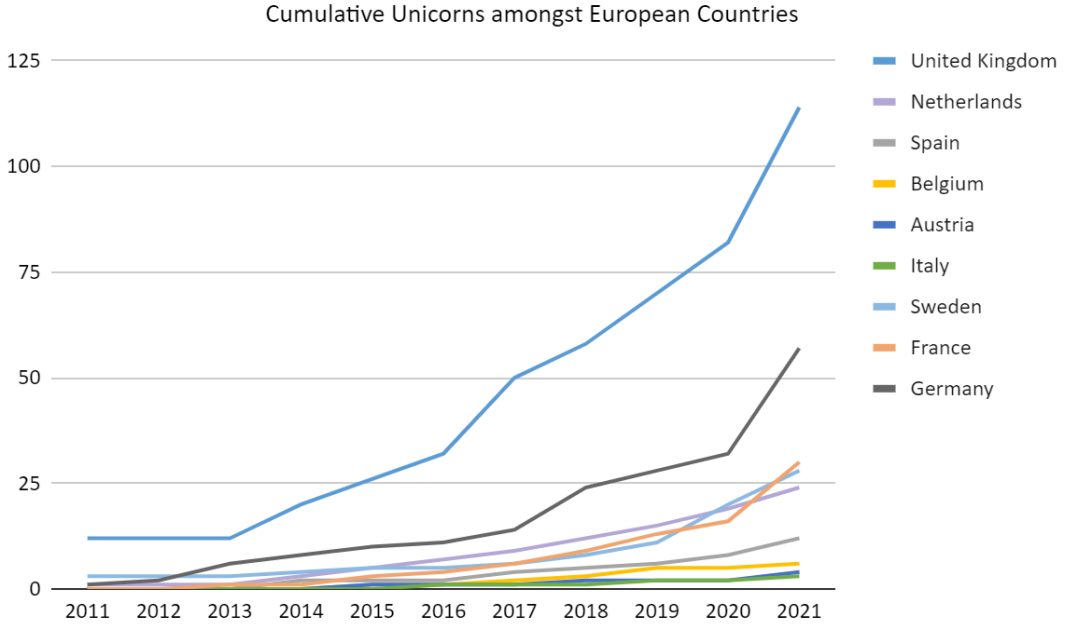
- **World-class digital infrastructure.** We have made excellent progress in delivering improved digital infrastructure, with superfast broadband coverage rising from 58% of UK premises in 2011 to over 97% today. Over 67% of UK premises can now access gigabit-capable broadband: a huge leap forward from July 2019, when coverage was just 8%. In addition, 92% of UK landmass is covered by a good 4G signal.



- **Data-driven economy.** The UK is Europe's largest data market. Our data economy grew twice as quickly as the rest of the economy during the 2010s, making up about 4% of UK gross domestic product (GDP) in 2020. The UK data economy has the biggest overall impact of any EU country in absolute terms, an estimated near £125 billion in 2021. This is over double that of France, with only Germany as our closest competitor. In our National Data Strategy, we are already setting our framework for action aimed at unlocking the value of data to create growth, innovation and societal benefits, and to power the expanding ecosystem of data-driven technologies.

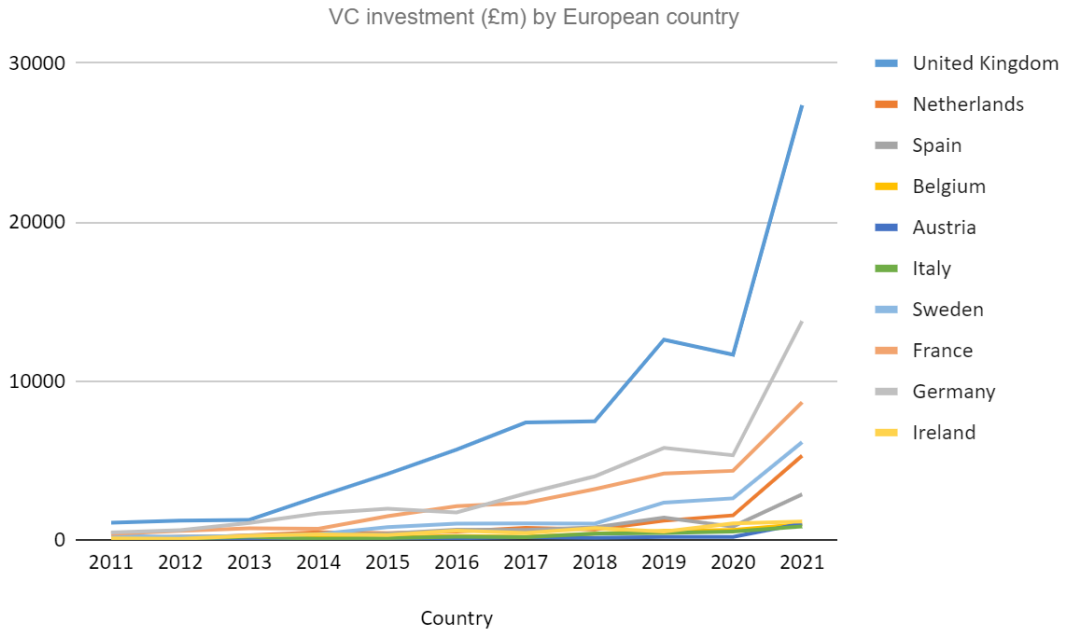


- **Pool of UK and global talent.** The UK had approximately 1.7 million filled jobs in the digital sector in 2020 (a 31.5% increase since 2011).
- **A thriving start-up scene.** A new tech business launched in the UK every half an hour throughout 2020, according to analysis of business figures by Tech Nation. The UK also outperforms its European peers in both the number of start-ups that have achieved unicorn status (companies with valuations over $1 billion), and potential



future unicorns (ranking the highest in Europe in 2021). In 2021, the UK had a total of 114 unicorns, more than France and Germany combined.

- **Vibrant investment community.** More money than ever is flowing into UK tech. In 2021 venture capital investment into the UK's tech sector grew 2.3 times to £27.4 billion from 2020's figures of £11.7 billion, (based on the annual average spot exchange rate from the Bank of England).The £27.4 billion raised by UK start-ups and scale-ups was almost double the figure raised in Germany (£13.8 billion), and over three times that raised in France (£8.7 billion). UK tech investment accounted for over a third of the total £79.3 billion that flowed into the European tech ecosystem this year.



- **Enduring spirit of innovation.** UK businesses spent over £5 billion on digital R&D in 2020, comprising 18.7% of total UK business R&D. This includes computer programming and information services, telecommunications, and software development. The UK ranks fourth on the World Intellectual Property Organisation's Global Innovation Index. Data from data provider Pitchbook shows that the UK also has the third-highest number of AI companies in the world after the US and China. The UK is home to the likes of Graphcore, Darktrace, and BenevolentAI, and is the second most likely global destination for AI researchers after the USA.

- **Global position as a great and safe place to grow a business.** The UK has the lowest corporation tax rate in the G7 and ranks ninth in the World Economic Forum's Global Competitiveness Report. Our regulators are world class, and the OECD's Review of International Regulatory Co-operation describes the UK as 'a leader in regulatory policy'. The UK also ranked 3rd in the Harvard Cyber Power Index, with the UK's cyber security sector now worth more than £10 billion and growing, supported by exports of £4.2 billion.

1. Digital foundations

To strengthen the UK's position as a Science and Tech Superpower, we need to maintain the strong foundations of our digital economy.

There are 4 foundational pillars upon which a vibrant, resilient and growing digital economy is built:

(1) robust digital infrastructure;
(2) unlocking the power of data;
(3) a light-touch pro-innovation regulatory framework; and
(4) a secure digital environment.

1.1 World class and secure digital infrastructure

Digital infrastructure plays a vital role in our daily lives and is the foundation of a thriving digital economy. Every part of the UK needs world-class, secure digital infrastructure that enables people to access the connectivity and services they need - where they live, work or travel. This is why enhancing digital connectivity is Mission Four of the Government's Levelling Up White Paper. Our goal is to ensure that everyone, wherever they live or work in the UK, can access the connectivity and services they need for the ever-digitising world.

The Department for Digital, Culture, Media and Sport (DCMS) is leading an ambitious programme of work to both accelerate the commercial delivery of nationwide gigabit broadband and ensure rural areas are not left behind. Thanks to our policies to encourage competition and investment, and remove barriers to deployment, industry is investing over £30 billion in one of the fastest broadband rollouts in Europe. Our aim is to achieve at least 85% gigabit coverage by 2025 and at least 99% gigabit coverage by 2030.

The UK is also making significant progress in rolling out wireless connectivity, with 92% of the UK landmass currently covered by a good 4G signal from at least one operator. The Shared Rural Network will further improve coverage for 280,000 premises and 16,000km of roads, with the biggest anticipated coverage improvements in rural Scotland, Northern Ireland and Wales.

Beyond 4G, our ambition is that the majority of the population will have access to a 5G signal by 2027. DCMS has invested almost £200 million in UK telecoms innovation, through the 5G Testbeds and Trials programme (5GTT), helping to establish our global leadership in this area, and supporting industry, academic institutions and local authorities to realise the benefits of 5G. We are also investing £250 million in R&D to deliver a diverse 5G supply chain, to ensure the security and resilience of our networks and deliver the Government's 5G Diversification Strategy.

Case study: West Midlands 5G
Operators face many challenges when rolling out 5G networks, including working with councils and private organisations to identify suitable sites prior to installation. This work is often hampered by navigating a complex legal framework, local planning guidance and other council priorities.

West Midlands 5G (WM5G) was established by the 5GTT programme. It has had great success, simplifying processes and accelerating 5G deployment in the region by more than six months. The West Midlands has now been recognised as the number one region in the UK for geographical 5G coverage.

We know that wireless networks will evolve significantly over the next decade. DCMS's upcoming Wireless Infrastructure Strategy will set out a strategic framework for the development, deployment and adoption of wireless networks in the UK.

1.2 Unlocking the power of data

Data is the driving force of modern economies. Research shows that businesses are more likely to be productive in today's digital-driven economy if they can use data effectively. In 2017, the publication of Transport for London live data led to reduced commute times and less congestion on public transport, by enabling the creation of more customer-facing products. The safe availability of data also enables innovation and research.

DCMS set out this Government's approach to taking advantage of the data opportunity in the National Data Strategy (NDS). We expect to bring forward primary legislation to reform the UK's data protection laws, by simplifying some parts of the UK General Data Protection Regulation (GDPR) ensuring high standards of data protection. This Government's view is that our reform of UK legislation on personal data is compatible with maintaining the free flow of personal data from Europe.

We will adopt a more flexible, outcomes-based approach for compliance, ensuring the Information Commissioner's Office (ICO) accounts for the increasing importance of its remit for competition, innovation and economic growth. This flexible approach will reduce burdens on business and innovation, which impede the responsible use of personal data. In addition, these changes will also provide scientists with the clarity and confidence they need to get on with life-enhancing and life -saving research.

We also outlined this Government's priorities for unlocking the value of data across the economy in the NDS Mission 1 Policy Framework. We have already made significant progress to ensure the framework's long-term trajectory by developing a programme of work led by the British Standards Institute (BSI), the UK's National Standards Body, to evaluate the current data standards ecosystem and present recommendations for government action. We have also established a joint UK/US Prize Challenge to accelerate the development of Privacy-Enhancing Technologies (PETs), which can enable data to be analysed and shared without compromising on the privacy or trust of data subjects.

The Government also committed to legislating for Smart Data in the Queen's Speech. These changes will provide consumers and small businesses with the power to enable trusted third parties to help them access, make sense of, and use their data. Recently, the Business Secretary set out a new programme of investments in Smart Data to drive industry and collaboration across sectors.

We are also running a call for views (Data Storage and Processing Infrastructure, Security & Resilience) to further our National Data Strategy commitment to develop a stronger risk management framework for the infrastructure upon which data use relies.

We will also resist unreasonable attempts at data localisation, and seek international trade agreements to facilitate the free flow of data with trust. You can find more information in the section on shaping international data governance.

Enabling secure digital identities is also critical to unlocking wider opportunities across the data economy. Forthcoming legislation will create a legal gateway that will allow public bodies to share data with organisations that follow the rules of the UK digital identity and attributes trust framework to validate a person's identity. The prototype trust framework has already been adopted as the basis for certifying digital 'right to work', 'right to rent' and criminal record checks. Alongside the UK Digital Strategy, we are also launching a revised version of the trust framework which has been updated to reflect testing and stakeholder feedback. Secure digital identities, while not compulsory, will help make everyday transactions safer and easier, improving people's experiences, privacy, access to services, and reducing fraud.

1.3 A light-touch and pro-innovation regulatory regime

Now that we are no longer part of the European Union, we have the opportunity to create an agile, light-touch and forward-looking regulatory ecosystem for digital tech. This will stimulate innovation and allow our tech sector to thrive, while protecting businesses and consumers. We want to avoid unnecessary layers of regulation or overly prescriptive approaches - seeking instead to create a competitive advantage through lighter-touch and better regulation.

Last year the Government set out our pro-innovation vision through the Plan for Digital Regulation. The Plan for Digital Regulation committed to ensuring a forward-looking and coherent regulatory approach for digital technologies. The cross-cutting and fast-moving nature of digital technologies means it is vital our approach is both flexible and well coordinated.

We are taking steps to improve the evidence base that underpins our regulatory approach. That is why we are publishing an initial outcomes monitoring framework for digital regulation. We are inviting stakeholder views on this initial framework to help us understand how we can further build the evidence base and refine our measurement approach.

In line with the Plan for Digital Regulation, we continue to make sure our digital regulatory approach is streamlined, coherent and pro-innovation. We will work with a range of key stakeholders, including TechUK and the CBI, to examine this approach. We will invite

practical recommendations for further opportunities to lighten our regulatory approach to unleash the power of the digital economy and support digital businesses to thrive and grow.

In the Plan, we set out our intention to explore innovative new approaches to the design and implementation of regulation. In response to our call for views, stakeholders emphasised how important it would be to take advantage of new techniques and practices. We will be undertaking further research into regulatory innovation for digital technologies, with the ambition of trialling innovative regulatory approaches in real-world cases. Through this, we will continue to ensure our approach to digital regulation is agile, streamlined and fit for purpose in the context of the broader objectives of the Plan for Digital Regulation.

We are also taking steps to make sure the regulatory landscape is fully coherent, well-coordinated and that our regulators have the capabilities they need. This includes our ongoing work with the Digital Regulation Cooperation Forum (DRCF), the UK's ground-breaking partnership of digital regulators. Through the DRCF's joint programme of work, it has a unique role to play in developing our pro-innovation approach to regulation. It has set a new standard for regulatory coordination that has inspired international equivalents in countries such as Australia (the Digital Platform Regulators Forum) and the Netherlands (the Digital Regulation Cooperation Platform). The DCMS Secretary of State recently wrote to the Digital Regulation Cooperation Forum, reiterating her support for the Forum's work and setting out her priorities for the overall landscape for the year ahead. We encourage the DRCF to engage closely with industry.

The DRCF has been an important step forward in creating a more coordinated regulatory landscape but we recognise that in some instances voluntary arrangements alone will be insufficient. That is why we have also consulted on further statutory measures to support coordination across specific regulatory regimes and will set out our position in our forthcoming response to the consultation on data reform.

By laying the foundations for the UK's regulatory framework for the digital economy, we want to encourage innovation and drive prosperity, while also minimising the harms of digital technology. As we look to the future and new technological horizons, we will ensure our regulatory approach is nimble, coherent and places responsible innovation at its core.

Promoting innovation and competition

A competitive and innovative digital economy will ensure the UK continues to be considered one of the most innovative countries worldwide and a competitive environment where technology businesses of all sizes can thrive.

To better support innovation within the UK's digital ecosystem, we are establishing a groundbreaking pro-competition regime for digital markets. The new regime will deliver lower prices for UK families, help entrepreneurs compete and grow, and give consumers more choice and control over the services they use online. Boosting competition and innovation in digital markets will increase productivity and encourage better-quality services for consumers and businesses alike. This will be done in a proportionate and light-touch manner to maintain the UK's attractiveness as an international tech investment destination. We recently published our response to the pro-competition regime consultation, and are

preparing to establish the new regime in statute when parliamentary time allows. Legislation will be published in draft form later in due course.

We are taking additional measures to strengthen innovation across our digital economy. We are planning to publish a white paper on the governance of AI by the end of the year, and will aim to ensure that any regulation of AI is pro-innovation and light touch. We will avoid creating unnecessary bureaucracy and ensure that research and innovation can flourish. We saw some years ago how the EU's heavy-handed approach to regulating GMO stifled innovation in Europe. We are determined to avoid repeating those mistakes.

We continue to pursue innovation and digital trade chapters in free trade agreements (FTAs) with international partners as appropriate.

Keeping the UK safe online and fighting disinformation

The UK has long been home to a strong and trusted digital economy, and this has been fundamental in driving economic growth. As digital technologies mature and play a greater role in our daily lives, we want to ensure that our rules and regulations keep pace.

Our innovative digital economy and widespread adoption of new technologies have also revolutionised how people interact with politics and democratic processes. There has been a huge increase in access to information, and wider political engagement online (as set out in research published by the London School of Economics) which research suggests has enhanced valuable citizen engagement with the UK's strong democratic institutions. The Digital Inclusion Strategy sets out that trust is a crucial element in encouraging more people to access online services. Some people are hesitant to go online because of security concerns for example, fearing a risk to the security of their personal data. We must manage the new risks that digital technologies can present to our democratic rights in the digital age.

The Online Safety Bill, now before Parliament, is a piece of ground-breaking legislation which will set a global precedent and equip the UK with the powerful regulatory and legal tools to keep internet users, especially children and vulnerable individuals, safe. Services that allow users to post content online or to interact with each other, as well as search services, will need to remove and limit the spread of illegal content and do more to protect children from being exposed to harmful content online. At the same time, the Bill will defend freedom of expression and the invaluable role of a free press. We expect that other significant jurisdictions around the world will seek to emulate the Online Safety Bill, and social media firms may then choose to adopt its requirements on a global basis.

Disinformation can be incredibly harmful, and the UK Government has a multi-faceted approach to addressing it. The Counter Disinformation Unit, led by DCMS, brings together monitoring and analysis capabilities to understand the scope, scale and reach of disinformation. It also works with social media firms to promote the responsible dissemination of information in the UK, and to take measures against harmful content that breaches their terms of service. Recently, the focus has been on tackling disinformation related to COVID-19 and Russia's invasion of Ukraine. The Online Safety Bill also requires companies to take action against misinformation and disinformation within the scope of the

Bill, giving Ofcom the power to hold them to account for failing to deal with this damaging content on their sites.

The Government has introduced legislation to further counter state threats through the National Security Bill, which brings together vital new measures to protect the British public, modernise counter-espionage laws and address the evolving threat to our national security from hostile activity by foreign states. This includes the proposed foreign interference offence, which will capture a number of state-sponsored disinformation efforts.

Through our Online Media Literacy Strategy, we are working to build audience resilience to misinformation and disinformation and empower citizens to feel more confident in safely navigating the Internet. As part of the online media literacy action plan which supports the strategy, the Government has also established the Media Literacy Taskforce which focuses on improving the reach of media literacy provision to citizens who are disengaged or do not have access to support.

Through our Online Advertising Programme (OAP), we will take steps to increase transparency and build trust in the online advertising sector, and develop an agile and proportionate regulatory system. In March 2022, DCMS launched a consultation seeking views on reviewing the regulatory framework for paid-for online advertising and tackling harmful, offensive and misleading adverts.

The UK is supporting the growth of the safety technology sector, one of the fastest-growing areas of our digital economy, which provides companies with the products and services they need to detect and address harmful and illegal content online. We are taking action to support sustained growth of this high-potential sector. This includes: running the Safety Tech Challenge Fund, establishing the Safety Tech Innovation Network, creating a world-first Safety Tech Expo, and leading a programme to strengthen online safety data infrastructure.

1.4 Security and the digital economy

We are placing security at the heart of our approach, because we know that a digital economy whose security is assured provides the necessary stability for continued growth and further cements the UK's position as a Science and Tech Superpower. Without this core component we risk undermining the progress and innovation that sets our digital economy apart.

As our lives become increasingly reliant on digital technology, the importance of making sure that digital systems and services are secure from threats or failure is critical. From protecting our national security to improving the safety standards of everyday digital devices, we are taking action to make sure that everyone can continue to benefit from digital technology in a safe and trusted way.

Security of our tech sector

The UK's tech sector is a valuable economic asset, generating jobs, growth and services which the nation relies on. We are taking action to support the resilience of our tech sector and ensure the protection of the UK's national security.

The UK's National Security and Investment Act ('the NSI Act'), which commenced in January 2022, ensures that investment in the UK can continue with predictability and transparency while protecting national security. It gives the Government the powers to scrutinise and intervene in acquisitions of control of entities and assets that may pose risks to national security. It is important to note, however, that the vast majority of acquisitions are unaffected

by these powers, and will neither be assessed by the Government nor have any conditions attached.

The NSI Act is not the only way we can mitigate risk to our tech sector from economic transactions. Export controls also allow us to control the transfer of sensitive technologies overseas. In December 2021, the Secretary of State for International Trade announced a package of measures to update the export controls regime for military, dual-use and other sensitive goods and technologies, which strengthens global security and facilitates responsible exports. By broadening the military end-use control to capture a wider range of potential risks, it helps to ensure that the UK's vibrant tech sector can continue to benefit from international trade while managing security risks.

We will keep export controls under review to ensure they reflect our obligations under international export control regimes. We will additionally continue to provide support to the research community, including through the Department for Business, Energy and Industrial Strategy's (BEIS) Research Collaboration Advice Team, to ensure that university research is not being funded by, or being conducted in collaboration with, inappropriate entities with links to hostile states, which may pose risks to the UK's national security.

The NSI Act will be exercised carefully and proportionately to avoid deterring investment and, while use of these powers will remain rare, where action is needed we will not hesitate to take it in order to protect highly sensitive technology and maintain domestic capability in critical areas. Export controls will be used to prevent transfers of sensitive technology that would be inconsistent with the Strategic Export Licensing Criteria.

We have also introduced the Telecommunications (Security) Act 2021 ('the Telecommunications Act') to protect our public networks and services against security threats, now and in the future as technologies grow and evolve. The Act includes new duties on public telecoms providers to identify and prevent security compromises, and new powers for the Government to make security regulations and issue codes of practice. It also includes new national security powers for the Government to impose controls on public communications providers' use of designated vendors' goods, services and facilities in UK telecoms networks. The Government has since announced advice that telecoms operators should remove Huawei equipment from public 5G networks by 2027, and has consulted on proposals to give that advice legal effect using the powers in the Telecommunications Act.

We recently held a public consultation on a set of draft Electronic Communications (Security Measures) Regulations and a draft code of practice. We are currently considering the consultation responses received, to inform further development of the regulations and code.

A resilient digital environment for individuals and businesses

Beyond the national level, we must equally consider the security of individuals and businesses within the digital environment. In line with our overarching ambition to keep our digital systems, platforms, devices and infrastructure secure, we are investing more than £2.6 billion over 3 years. This will ensure that the UK continues to be a leading responsible

and democratic cyber power, able to protect and support our interests in and through cyberspace to achieve our national goals as set out in the National Cyber Strategy. This includes a £114 million increase in funding for the National Cyber Programme, accompanied by enhanced funding for critical cyber skills training, infrastructure, research & development, innovation, defence, and intelligence.

Increasing the resilience and trust of our online public services is also crucial, as more and more of our daily lives are administered online. Since 2020, the Department for Levelling Up, Housing and Communities (DLUHC) has run a programme to help local councils improve their cyber resilience. By the end of financial year 2021/22, this programme had supported over 120 councils and distributed more than £13.9 million in grant funding to address cyber security vulnerabilities.

Digital security is also increasingly important in citizens' homes with the average UK home now containing nine internet-connected devices, such as smart TVs and smartphones. We are leading work globally to ensure these are secure. As well as major contributions to the development of a new European Standard on cyber security for consumer connected devices, we are legislating to ensure these products have a standardised level of security.

We are going further, having recently published a call for views on app security and privacy interventions which proposes a voluntary Code of Practice for app store operators and app developers that sets baseline security and privacy requirements. It will significantly help protect users across a range of devices by making sure that apps used by people across the country are secure. We are also working to ensure secure Connected Places ('smart cities') technology is adopted in a secure way to safeguard associated data.

We also need to support businesses online. Our research shows that in the past year alone, 4 in 10 UK businesses suffered a cyber breach or attack. We have just concluded a public consultation and are analysing feedback on our proposals to strengthen cyber resilience and improve our regulatory framework in the context of rapidly developing threats and technology. We are also providing free advice on what people can do to protect themselves from cyber breaches and attacks online through the Cyber Aware programme and will continue to promote the Cyber Essentials standard to increase cyber resilience within organisations and across the economy. Additionally, the National Cyber Security Centre at GCHQ continues to support UK business in fighting cyber attacks.

Case study: The Product Security and Telecommunications Infrastructure Bill

The Bill was introduced in Parliament in November 2021 and will ensure that UK consumers are better protected against insecure consumer connected devices.

These new standards set minimum security requirements that will protect or enhance the security of consumer connectable products and their users, requiring manufacturers to build more secure technology.

The UK is considered a global leader in this space, with our approach influencing the development of international standards and being followed by Australia, Singapore,

Vietnam and India amongst others. We continue to shape international norms in this space through our membership of both the Five Eyes and Agile Nations working groups on the cybersecurity of consumer ‘internet of things’ (IoT) devices. The UK is a member of the World Economic Forum’s ‘Trustworthy IoT Coalition’ and in February 2022, the World Economic Forum endorsed our approach.

2. Ideas and intellectual property

Ideas and intellectual property (IP) are fundamental to any technology business and are vital prerequisites of a successful digital economy. The UK is a world-leading innovator, both in universities and businesses, and has a world-renowned IP system. The Innovation Strategy set out the Government's long-term plan for enabling innovation-led growth. We need to build on these strengths.

2.1 Supporting universities to develop new ideas and technologies

United Kingdom Research and Innovation (UKRI) will continue to play a crucial role in accelerating innovation by driving investment in R&D in business and academia. Since 2007, Innovate UK (part of UKRI) has helped 8,500 organisations create around 70,000 jobs, and added approximately £18 billion of value to the UK economy. The Government is committed to growing this work further, and as part of the 2021 Spending Review, we announced an increase in public R&D spending to £20 billion by 2024/25.

Also at Spending Review, UKRI received its first full, multi-year settlement across all parts of its budget, with expenditure increasing to £8.9 billion by 2024/25 (an increase of over £1 billion from 2021/22), and in total worth over £25 billion over the Spending Review period.

This investment will allow UKRI to deliver an ambitious agenda through its nine councils, supporting a vibrant research and innovation system and increasing productivity across the UK. UKRI will continue to build on the decades of investment which underpin the UK's position as a leader in this area, within and across the 7 technology families identified in the Innovation Strategy (including AI and quantum technologies, as well as advanced semiconductor research). Investments will continue to take a strategic and coordinated approach to respond with agility to emerging opportunities. Active effort will be made to crowd-in private sector funding alongside this public investment.

Increased funding through UKRI allocations will benefit research and innovation activity within the digital and tech sector. UKRI councils have a major role in supporting the UK's R&D ambitions, and will publish their own Strategic Delivery Plans in Autumn 2022, alongside UKRI's corporate plan. On top of this, UKRI will transition to working in a collective manner across talent initiatives worth £2 billion. This will allow the organisation to further harmonise their talent investments and reduce bureaucracy.

Our universities are at the forefront of technological research. Converting academic research into commercial businesses is critical if we are to remain a leading technology-based economy. In 2019-2020, £2.82 billion of external funding was invested into university spin-offs, a 54% increase from the previous year. The performance of UK universities is now competitive with the USA in terms of patents, spin-offs, income from IP and proportion of industrial research.

This global leadership has been enabled by creating incentives for universities to improve the way they engage with the investment community. For example, the Higher Education Innovation Funding (HEIF) programme generates £8.30 for every £1 of funding, plus a further £1.80 through investment in spin-offs. It is vital we strengthen university collaboration with business and research commercialisation across the UK to fuel tech growth, product innovation and create jobs. Some universities in the UK are world leaders in commercialising their research, but we must continue to enhance the technology transfer skills and expertise of a broader range of universities and make UK universities more accessible for investors.

We will increase funding for HEIF from current levels of £250 million per year to support this. We are also funding (through Research England, part of UKRI) a University Commercialisation and Innovation Policy Evidence Unit (UCI) to further build our evidence base on commercialisation. We will support the sector to develop and publish (by March 2023) a suggested best-practice blueprint for delivering the commercialisation of university-based research. This will draw on the 'term sheet recommendations' produced by top US universities, and include suggested terms (advisory and not mandatory) proven to be most effective in successful spin-outs.

The Minister for Science, Research and Innovation has instigated an extensive review of the Research Excellence Framework (REF), with counterparts in the Devolved Governments, which will consider how any future assessment system continues to incentivise institutions to maximise the social and economic benefits of their research. The funding bodies are consulting closely with representatives from industry to ensure that appropriate indicators and processes are in place to support this. The review is due to report by the end of 2022.

Case study: the Belfast Region City Deal

The Belfast Region City Deal is a collaboration between the UK Government, the Northern Ireland Executive, local councils and partners, which will see an overall investment package of more than £1 billion to accelerate economic growth in the region in an inclusive and sustainable way. This includes a £350 million investment from the UK Government to transform the region's digital and innovation capabilities, and will support projects enabling future tech innovation, including at two universities.

Projects within the City Deal include the Global Innovation Institute, led by Queen's University Belfast, which will aim to make Northern Ireland a global leader in the fields of cyber security, wireless connectivity, artificial intelligence, machine learning and scalable computing approaches. Funding will also support the establishment of the Centre for Digital Healthcare Technology, led by Ulster University, which will provide a world-class space for academia, industry and clinicians to come together to innovate and boost the productivity of the Life and Health Sciences sector.

2.2 Incentivising businesses to innovate

We understand the critical importance of R&D in allowing businesses to gain competitive advantages, create high-skilled skilled jobs and boost national productivity.

We believe more can, and should, be done to unlock finance and stimulate innovation from high-tech firms in the private sector. To incentivise the most innovative businesses in the tech sector and support the use of cutting-edge computational R&D, we are expanding R&D tax reliefs to cover cloud computing and data acquisition. The Government is continuing the review of R&D tax reliefs and further announcements will be made in the autumn. The objectives of the review are to ensure: that the UK remains a competitive location for cutting edge research; that the reliefs continue to be fit for purpose; and that taxpayer money is effectively targeted.

As announced at the 2022 Spring Statement, the Government is looking to understand why HM Revenue and Customs (HMRC) evaluations suggest the Research and Development Expenditure Credit (RDEC) scheme generates more additional private R&D expenditure than the small and medium-sized enterprise (SME) scheme, and what further changes might be needed. To ensure the effective targeting of the UK's R&D relief the Government will consider increasing the generosity of RDEC to boost R&D investment in the UK. The Government is continuing its review of R&D tax reliefs and will consider further reforms ahead of the autumn. These steps would help to further stimulate private sector investment in UK R&D.

We also recognise that businesses seldom innovate in isolation. They require networks of information and knowledge, skills, and collaboration with other firms or universities. The Innovate UK Knowledge Transfer Network (KTN), a delivery partner of UKRI, supports innovation collaboration across sectors throughout the UK. Through collaboration between businesses, entrepreneurs, academics and funders, the KTN facilitates the exploitation of R&D, which in turn drives long-term productivity.

We can also support innovative businesses, particularly those in areas such as quantum computing technology and AI, by ensuring there is adequate provision of, and access to, large-scale, high-performance computing. The £210 million Hartree Centre in Warrington exemplifies the potential for this approach to stimulate innovation and create value for partner organisations, by accelerating the adoption of high performance computing, big data and cognitive technologies.

We are continuing to invest in the UK's network of internationally competitive, high-quality and accessible research and innovation infrastructure. This includes providing £1.2 billion for the world's largest dedicated weather and climate modelling computer. We are also investing £79 million into world-class advanced computing resources for UK science and industry in ARCHER2.

The Government has recently announced an external review into the Future of Compute, which will provide recommendations to form the basis of a long-term plan for the Government's approach to compute. Additionally, the Innovation Strategy identified that an ecosystem of connected digital and physical systems could be considered an innovation infrastructure on which future products, services and business models are built. This is explored further in the recently published consultation on Cyber-Physical Infrastructure.

Innovation in digital media

Ideas and innovation are central to the UK's creative industries. UK content creators take their ideas from page to screen, generating exciting and innovative stories that are highly valued internationally, both culturally and economically. Retaining IP allows UK creators to connect with digital platforms and generate new revenue streams by reaching new audiences, fans and players via streaming, merchandising deals and ongoing community engagement. In addition, the creative industry tax reliefs aim to promote the production of culturally British film, programmes, and video game development in the UK. We are planning to publish a Creative Industries Sector Vision in summer 2022, to unlock the potential of this highly innovative sector.

In the music sector, there are challenges around creator remuneration from music streaming, with older artists in particular being potentially disadvantaged by the rise of streaming. DCMS and the Intellectual Property Office are exploring these issues alongside digital streaming platforms and the music industry. We are due to report on our findings in the autumn, and will consider the type of action needed to ensure a fairer music streaming market for all.

2.3 Innovation in the NHS

The NHS, partnering with the Life Sciences Vision, will continue to harness digital and data-driven innovation in order to improve treatments, models of care, and how the health and care system functions. The NHS and the wider health and care sector will also harness innovation more effectively, creating an environment where clinically proven and cost-effective innovations are rapidly adopted and spread across the country.

This is all while ensuring the highest levels of privacy, patient safety and responsible use of data. As part of this, the health and care system will be using Secure Data Environments, including Trusted Research Environments, to provide researchers and analysts with secure access to appropriate levels of data. By providing access to data instead of data sharing, the NHS will greatly reduce the risk of data breaches or other misuse. The Department of Health and Social Care (DHSC) is setting out more detail in the final version of the data strategy for health and social care, 'Data saves lives', as well as in an upcoming plan for digital health and social care due to be published in spring 2022.

The NHS also actively encourages and enables innovation through initiatives and programmes. The NHS AI Lab supports the safe, ethical and effective adoption of AI in health and care and has committed over £100 million to accelerate testing and evaluation of over 80 AI technologies. More recently, a joint funding package of up to £200 million between NHS England, DHSC and BEIS was announced, for the NHS data infrastructure to support data-driven research and innovation.

Case study: Fracture Detection Algorithm funded by the National Institute for Health and Care Research (NIHR)

The DHSC-funded NIHR supports life science companies to develop and test new therapeutics, medical devices, diagnostics and digital technologies, to provide the evidence needed to accelerate their adoption. For example, a team led by Manchester University NHS Foundation Trust (in collaboration with Optasia Medical Ltd, the University of Manchester, and the Royal Osteoporosis Society) have developed an AI algorithm which detects vertebral fractures in patients undergoing CT scans.

This work was funded by an NIHR Invention for Innovation Award. The AI algorithm analysed more than 9,800 scans, and detected 2,019 NHS patients with previously undiagnosed spinal fractures who were then referred for further treatment. The team are now developing the service to make it simpler to integrate into hospital IT systems, and help healthcare staff to manage the expected increase in patients being treated.

3. Digital skills and talent

Increasing the supply of digitally and tech enabled workers at all levels will be crucial for our long term economic prosperity and is integral to unlocking productivity improvements across the economy. The digital skills gap is estimated to cost the UK economy £63 billion per year in lost potential gross domestic product (GDP) and is expected to widen, resulting in a workforce inadequately equipped to meet the demands of the digital age. Employers say that only 48% of people leaving full-time education have the advanced digital skills required, and many companies cite lack of available talent as the single biggest constraining factor to their growth. Improving the availability of digital skills not only unlocks the full economic potential of businesses, it helps individuals and opens up careers in interesting, sustainable, and well-paid jobs across the economy.

It is the ambition of this Government to ensure the development of digital skills across the whole of the UK. As education is a devolved matter, many of the relevant policies are the responsibility of the Devolved Governments. This section of the UK Digital Strategy largely focuses on government policy for England. Further information on other devolved approaches can be found in the recent digital strategies of Scotland, Wales and Northern Ireland.

3.1 Strengthening the digital education pipeline

Improving digital education in schools, and increasing undergraduate numbers in Science, Technology, Engineering and Mathematics (STEM subjects), will raise the base level of skills of the next generations to enter the workforce.

We have already taken positive steps in this area. England was (as part of the UK) one of the first G20 countries to introduce coding into the primary curriculum. Each year, 77,000 pupils take Computer Science GCSEs, over 12,000 pupils take Computer Science A levels, and 85,000 students take Computer Science undergraduate degrees. We want to encourage the uptake of both GCSE and A-Level Computer Science, sustaining its status as a vital STEM subject.

As such, the Department for Education (DfE) will continue to support schools to deliver computing alongside a full range of subjects over the course of a week. The benefits of a broad and balanced curriculum are widespread, including giving pupils the necessary skills and development opportunities to succeed in later life and access jobs in important growth sectors such as digital.

Knowledgeable and confident teachers with a passion for their subject are key to ensuring the computing curriculum is taught well in schools. Through the National Centre for Computing Education (NCCE), DfE will ensure that every school in England is equipped with the knowledge to teach computing and ensure that children have the digital skills they need to participate in a digital society. To date, over 19,000 schools have engaged with the NCCE.

DCMS will facilitate the NCCE to strengthen its links to digital employers and industry through the recently announced Digital Skills Council.

DfE has also created clear technical education options for 16-19 year olds in England. Introduced in September 2020, T Levels are new, high-quality technical courses offered across England that offer students a mixture of learning in an educational setting and 'on-the-job' experience during an industry placement of at least 315 hours (approximately 45 days). There are 3 T Levels in digital subjects, all available now: Digital Business Services; Digital Production, Design and Development; and Digital Support Services. In addition, all T Level programmes include digital skills that are relevant to the occupations in question, giving employers the confidence that T Level graduates will have the proficiency needed for employment.

DfE is rolling out T Levels to strengthen the skills pipeline into fulfilling careers in sectors the economy needs, including digital skills. We want to work with the sector to ensure that all T Level students have the opportunities they need to develop key skills and workplace experience, by delivering at least 15,000 high-quality industry placements by the financial year 2024/2025.

The Office for Students (OfS) quality registration conditions are clear that providers must deliver well designed courses that provide a high-quality academic experience for all students and enable a student's achievement to be reliably assessed. The Secretary of State for Education and Minister for Higher and Further Education have asked the OfS to investigate where subjects taken by large numbers of students have variable outcomes, with the intention of driving up the quality of these subjects across the sector. In cases where the OfS finds that a provider has delivered a low, and unacceptable, quality of teaching, and has breached, or is at risk of breaching, the conditions of registration, the OfS can be expected to take action. This could include imposing a specific ongoing condition of registration requiring an improvement in performance from the provider, or, where a breach is confirmed, formal sanctions including financial penalties and ultimately the suspension or removal of the provider from the register (and with it, access to student finance).

Raising standards in tech education is important. To this end, the Office for Standards in Education, Children's Services and Skills (Ofsted) has two publications underway on computing education. The first paper, published last month, explored the literature relating to computing education and identified factors that can contribute to high-quality school computing curriculums, assessment, pedagogy and systems. Ofsted will use this to examine how computing is taught in England's schools. It will then publish a subject report to share what it has learned. Ofsted plans to publish the report in 2023. DCMS and the Digital Skills Council welcome this independent research by Ofsted and await the outcome of its report into computing education in England.

In September 2021, DCMS launched a pilot programme to test effective ways of teaching foundational data skills to all students. Universities taking part in the pilot are Birmingham City university, Teesside University, Lancaster University, The University of Hull, University of Newcastle-upon-Tyne, The University of Wolverhampton, and Solent University.

DfE is investing an additional £750m over the next three financial years (2022-23 to 2024-25) to support high quality teaching and facilities in higher education (HE) – including in science and engineering, subjects that support the NHS, and degree apprenticeships. This includes the largest increase in government funding for the HE sector to support students and teaching in over a decade. As part of the additional £750 million funding for HE providers, DfE is providing £450 million in capital funding to invest in teaching and learning facilities which meet the Government's strategic priorities, including high-cost STEM subjects. DfE is also providing £300 million in recurrent Strategic Priorities Grant (SPG) funding, the majority of which goes to supporting the provision of courses in high-cost subjects.

Finally, in the 2022-23 financial year, over 50% of the total £1.397 million SPG recurrent funding budget will be directed towards the provision of high-cost subjects that support the NHS and wider healthcare policy (e.g. medicine and dentistry); science, engineering and technology subjects; and specific labour market needs.

3.2 Increasing awareness of pathways into digital occupations

It is critical that young people are aware of, and can access, the breadth of careers and opportunities available. In England, the Institute for Apprenticeships and Technical Education has continued to develop its Occupational Maps to demonstrate to learners and employers how technical qualifications and apprenticeships can provide them with the skills they need, aligned to an occupation. DfE's work with the Careers & Enterprise Company helps ensure that young people have access to inspiring encounters with the world of work, including work placements, work experience and other employer-based activities. The National Careers Service also provides free, impartial, careers information, advice and guidance to adults in England, ensuring they are informed and aware of the wide range of learning and work opportunities that are available to them.

To ensure everyone in England has access to high quality careers information, and in line with the Skills for Jobs White Paper commitment, DfE is updating the National Careers Service website to become a single source of government-assured careers information.

Case study: providing career inspiration for cyber occupations

Making technology exciting and inspiring is one of the aims of the new Cyber Explorers programme. Aimed at children aged 11-14, the programme's ambition is to use interesting stories based on cyber incidents to introduce young people to innovative technology, including AI, during those important years where children make decisions about the subjects they will study at GCSE and equivalent.

The first phase of the programme runs until June 2022, and DCMS is aiming for it to reach 30,000 students.

3.3 Developing advanced digital skills

Advanced digital skills are essential to develop the talent required to support our cutting edge digital sector.

In 2019, the Government funded universities to create new AI and data science conversion courses, which included 1,000 scholarships for people from underrepresented groups. The conversion courses provide people with the opportunity to develop new digital skills or retrain, to help them find new employment in the UK's cutting-edge AI and data science sectors, even for those who had no previous experience in the field.

The scholarships ensure the AI that is built and used in the UK reflects the needs and make-up of society. In the first year of the programme, 76% of the scholarships awarded have gone to women, 45% to black students, and 24% to students with disabilities. To continue to build a diverse and inclusive workforce, DCMS will continue to support this programme and recently announced a further 2,000 scholarships to be delivered between 2023 and 2025.

Government also provided funding for 1,000 PhD places in AI through 16 Centres for Doctoral Training. These have so far received £100 million public funding (alongside leveraging £78 million from project partners and £23 million from universities). In the Spring Statement, the Government announced the creation of 1,000 new AI PhDs, building on this existing commitment. The Government will invest £117 million which is expected to allow the additional cohorts of PhDs to start studying in 2024/25.

Cyber skills are also at the forefront of advanced digital skills. The Government provides a number of ways for adults to reskill for roles in the cyber sector. These include Skills Bootcamps, the DCMS cyber retraining programme and the CyberFirst bursary scheme. The UK Cyber Security Council, the new professional body for cyber, will inspire and guide those interested in cyber careers towards an appropriate specialism.

DCMS will work with DfE and other government departments to identify specific topics that are critical to supporting future technologies, such as quantum computing and advanced semiconductors.

3.4 Lifelong digital skills

It is important that adults have the digital skills they need to participate fully in modern society, and thrive in traditional non-digital roles. 30% of skill-shortage vacancies involve a lack of basic digital skills (for example, Microsoft Office and use of digital applications). Reskilling the existing workforce is crucial, as 80% of the 2030 workforce is already in work today.

Facilitating inclusion through digital skills

Digital skills, as well as access to digital infrastructure and accessibility, are fundamental to addressing barriers associated with digital exclusion. Across the Government, we are supporting people to use computers and the Internet in the following ways:

- DfE is providing essential digital skills training for adults through the digital entitlement. This will equip adults in England with a full range of essential digital skills needed for life, work, and further study.
- The Department for Work and Pensions (DWP) is supporting claimants in developing their digital skills through the Claimant Commitment. To support adults who are online but lack the essential digital skills for work, DWP is working to develop a framework to effectively identify claimants' digital skills level and, where appropriate, refer claimants to foundation digital skills courses, Essential Digital Skills qualifications (EDSQs), and Skills Bootcamps.
- DCMS is providing a trusted network of accessible locations offering free Wi-Fi and digital support to users through public libraries.

The Digital Entitlement allows adults across England with no or low digital skills (below level 1) to study the new Essential Digital Skills qualifications (EDSQs) for free. ESDQs equip adults with the full range of essential digital skills needed for life, work and further study. From August 2023, DfE is going further by introducing new digital Functional Skills Qualifications (FSQs), which will provide standardised content and assessment, providing a clear benchmark of digital skills for employers.

As part of Skills for Life, the Government has launched Skills Bootcamps in England, which offer free, flexible courses lasting up to 16 weeks. Skills Bootcamps include areas such as

software development, digital marketing, and data analytics. With a fast track to interview, this training offers a direct route to digital or technical roles for participants. In the financial year 2021/22, up to 16,000 people participated in a Skills Bootcamp. DfE is significantly scaling up delivery in 2022/23, with up to £150 million of additional funding.

The Government launched the level 3 'free courses for jobs' offer in April 2021. This gives adults aged 19+, who do not hold a full qualification at level 3 (A-level equivalent), access to fully-funded courses to help them gain in-demand skills. The qualifications funded through this offer have been identified for their strong wage outcomes and ability to meet skills needs. They include subjects such as digital, computer science, and cyber skills. From April 2022, the policy has been expanded to also include any adult who is unemployed or earning under the National Living Wage, even if they hold a level 3 qualification or higher. This will initially run as a trial basis over this Spending Review period and will support even more adults to retrain in in-demand subjects such as digital.

DfE is rolling out reforms to strengthen progression pathways between training offers. By the end of the decade, most post-16 technical education and training will be aligned to employer-led occupational standards and will correspond with occupational routes approved by the Institute for Apprenticeships and Technical Education (IfATE). These occupational routes will develop to account for pathways to and from specialist providers, including for digital skills.

Across England, employers in this sector have so far developed 26 high-quality apprenticeships in a range of occupations, including data science, cyber security, digital and technology solutions, AI, data and creative digital design. DfE has made changes to apprenticeships to make them more flexible and accessible for employers, introducing a range of flexible training models, such as front-loaded apprenticeships and accelerated apprenticeships. Accelerated apprenticeships allow progression from T levels, traineeships and Skills Bootcamps, giving young people the chance to build up sector-specific skills to build a pipeline opportunity into apprenticeships. Some of the learners who took part in the first digital Skills Bootcamps have already progressed into accelerated apprenticeships.

DfE is supporting sectors with short-term, project-based work, like Digital, through the new Flexi-Job Apprenticeship Agency scheme. DfE is also inviting training providers to help pilot Portable Flexi-Job Apprenticeships, to put the apprentice in the driving seat, making it easier for apprentices to move between employers, and stop and start their apprenticeship as project-based sectors demand. Four digital apprenticeships standards are included in the Flexi-Job Apprenticeships pilot.

We want to encourage more levy transfers amongst larger employers so are making it easier for larger employers to find other employers who wish to take on apprentices and transfer funds to them, giving larger employers even more control over their levy funds. We are also making it easier for SMEs to benefit from levy transfers through a new online service.

The Institute for Apprenticeships and Technical Education is continuing to explore the need for new standards with employers. We are working closely with stakeholders in the digital

sector to identify opportunities for improvements that support digital growth and are delivering sector campaigns via trusted sector voices, including TechUK and BCS (British Computer Society, The Chartered Institute for IT), to inspire and inform SMEs to recruit apprentices.

The Department for Education is investing in Institutes of Technology, which are collaborative interventions between providers and employers. Provision is designed to be responsive to local labour market demand. Institutes of Technology specialise in level 4/5 provision in STEM subjects. The Government will work closely with the sector to ensure we are maximising opportunities for digital skills. Through the Digital Skills Council, we want to work with the sector to build industry connections and investment into Institutes of Technology, and to help them flourish by shaping curriculum design and spearheading the increase of level 4 and 5 skills in STEM.

Developing digital skills within the civil service

The UK Government is publishing a cross-government digital and data strategy. As part of this strategy, we are developing Her Majesty's Government (HMG) as a digital employer of choice and developing digital skills capabilities within the civil service, upskilling senior civil servants and increasing early talent.

Through the Digital, Data and Technology (DDaT) capability framework, departments will strengthen their offer to existing and prospective talent. Senior Civil Servants are being upskilled in digital and data essentials, ensuring they can use the benefits of digital for the UK economy, and early talent is being increased and developed through new entry routes and training programmes.

Finally, public libraries play an important and inclusive role in making sure everyone can access the digital economy. 2,900 public libraries in England offer free Wi-Fi, computers, and other technology, along with some digital support. Almost a third of people visit their local library, and nearly 80% of libraries have reported seeing a constant or increasing volume of requests for digital skills support. Libraries also help to tackle the combined barriers of skills, confidence, and motivation, by offering skills training and user support.

Digitally upskilling the ‘hidden middle’

The Lloyds Essential Digital Skills Report 2021 estimates that there are around 11.8 million adults in the UK who are online, but lack the essential digital skills for work. This 'hidden middle' between digital exclusion and those with advanced digital skills, also highlighted in research by FutureDotNow and their partners, comprises around one-third of the UK's workforce.

Upskilling the ‘hidden middle’ requires a significant commitment from employers, individuals, third sector organisations and the Government. To support adults who lack the

essential digital skills for life, DWP is developing 3 employment and skills pathfinders to ensure better local delivery alignment between employment and skills delivery, to support claimants into work and to progress in work (In-Work Progression). This intervention will build on existing work to identify claimants' digital skills levels and, where appropriate, refer claimants to foundation digital skills courses, Essential Digital Skills Qualifications (ESDQs) and online learning, and Skills Bootcamps.

3.5 Collaborating with the private and third sector on digital skills

The private and third sectors have vital roles to play in developing the digital skills capabilities of the workforce.

There is an impressive range of private sector initiatives which deliver digital skills. For example, Amazon provides Web Services Bootcamps, AWS Digital Training and Cloud Practitioner Essentials. Similarly, Google and Microsoft provide Digital Garage and apprenticeships, respectively. Finally, DWP has partnered with Google to provide 9,000 jobseekers across the UK with scholarships to gain a Google Career Certificate.

The third sector also has a number of initiatives to support digital upskilling. Code Your Future targets refugees and disadvantaged people by testing if they are suitable for a coding role. If they pass, they are offered a Full Stack course with a tailored job upon completion of the course. FutureDotNow has worked across industry to create a playbook that collates insight and best practice to help organisations identify and close essential digital skills gaps across their teams.

As the Chancellor set out in a recent speech, the Government is encouraging businesses to offer more high-quality employee training and is exploring whether the current tax system, including the operation of the Apprenticeship Levy, is doing enough to incentivise businesses to invest in the right kinds of training.

Convening private sector partners to fuel our digital skills base and upskill our workforce

DCMS is launching the Digital Skills Council, which will work closely with powerful private sector partners to address some of the specific challenges we want to tackle. Chaired by the Minister for Tech and the Digital Economy, and Phil Smith (former UK CEO of Cisco systems), the Digital Skills Council will set an ambitious agenda to tackle the digital skills needed for the workforce of the future. This may cover areas such as schools, universities and lifelong learning.

The council will encourage employers to:

- **Invest** in employer-led digital upskilling of the existing workforce. The Government will support industry partners to explore incentive and recognition schemes, to

promote employer-led training. Employers have a vital role to play in supporting the UK workforce to keep up with the pace of digital change.

- **Inspire** the next generation to see digital and tech as an essential career path into a broad range of careers. Recognising the power of technology to transform jobs and career paths, industry is best-placed to use its marketing might and inspirational capability to help young people to understand and embrace digital skills for digital careers.
- **Include** a more diverse range of candidates in industry's vision of the digital workforce. Too many recruiters have high expectations of the ready-made skills they can 'buy in'. The lack of diversity in the UK's digital workforce is hampering digital growth by excluding potential workers and consumers from the sector's development. DCMS will work with industry to promote diverse and inclusive recruitment and retention practices within the industry, and ensure that people from a wide range of ethnic and socioeconomic backgrounds are encouraged into digital roles.

3.6 Attracting the brightest and best globally

Talent from overseas contributes to the intellectual capital of a company, upskilling employees in the process, creating a multiplier effect and complementing our domestic digital skills pipeline. As a consequence, we are acting to ensure that UK digital companies have access to the best talent from anywhere in the world quickly and easily.

Incentivising management and team members with equity exposure in fast-growing and scaling businesses is critical to attracting and retaining talent, especially in an international context where highly skilled people are globally mobile. The Chancellor announced at the recent Spring Statement that the Government will consider if the other discretionary tax-advantaged share scheme, the Company Share Option Plan, should be reformed to support companies as they grow beyond the scope of the Enterprise Management Incentive scheme (EMI).

The Global Talent visa provides a pathway for leaders and potential leaders in academia, research, arts, culture and digital technology. The Government has expanded the route to provide a fast-track visa pathway for holders of the most prestigious international prizes and awards, including the Nobel Prize.

The new Global Business Mobility routes will bring together, reform and expand a number of existing routes to allow overseas businesses and innovative companies greater flexibility in transferring workers from anywhere in the world to the UK. For the first time, teams of workers will be able to undertake assignments connected to a business's expansion to the UK, thereby facilitating inward investment. The new provision for secondments is a world first in enabling collaboration between UK and international businesses.

Creating a Global Talent Network to attract talent

The Global Talent Network is planned to launch in 2022. It will bring highly skilled people to the UK in our vital science and technology sectors. The network will work with UK businesses to identify skills needs and source talent in overseas campuses, innovation hubs and research institutions. The network will launch in the US and India, before expanding worldwide in 2023.

The new Scale-up visa recognises the benefits high-growth businesses offer to the UK, and the need to ensure they are fully supported in maintaining this growth at a key time, with a bespoke visa offer. Launching in the summer, the route will allow those with a job offer at the required skill and salary level from a recognised UK scale-up to qualify for a flexible visa. The growth threshold to qualify as a scale-up which can bring people into the UK is 20% annual growth in headcount or revenue over a 3-year period.

The Scale-up visa offers a more flexible work visa and, unlike other sponsored routes, the Scale-up route will only require individuals to be sponsored for the initial six months on the route. This will enable UK businesses to compete for the internationally sought-after and highly skilled workers they need, and help maintain the UK's status as a leading international hub for emerging technologies.

The UK Government is expanding the UK's Global Entrepreneur Programme (GEP), which attracts international mobile entrepreneurs and helps them scale and internationalise their innovative, IP-rich businesses in the UK. The expansion has intensified GEP's engagement with entrepreneurial networks around the world, with dealmakers based in Argentina, India, Poland, Singapore, South Africa, South Korea, Thailand, and Turkey. This has significantly increased the range of high-skilled migrant talent establishing their global base in the UK.

The table below sets out immigration routes for the tech sector.

Visa type	Commencement and processing times	Select key requirements
Innovator visa	Key requirements to be revised from Autumn 2022. Once all documents have been received and identity confirmed, a decision will normally be made within 3 weeks for those outside the UK, or 8 weeks for those inside the UK.	➢ **For individuals and founding teams setting up and running an innovative business in the UK.** ➢ Must have an approved business idea - business must be 'different to anything on the market' and endorsed by an endorsing body. From Autumn 2022: ➢ The UK Government will remove the funding requirement, provided the endorsing body is satisfied the applicant has sufficient funds to grow their business. ➢ The route will be supported by new endorsing bodies (contracted by the Home Office) to

		make the scheme more useful, friendly, and accessible. ➢ These endorsing bodies will deliver effective assessments ensuring endorsed businesses have a high potential to grow and add value to the UK, and are innovative. ➢ Introduction of a fast-track route, if accepted into the Global Entrepreneur Programme. ➢ Removal of restrictions on doing work outside of the applicant's primary business.
Start-up visa	Launched in 2019. Once all documents have been received and identity confirmed, a decision will normally be made within 3 weeks for those outside the UK, or 8 weeks for those inside the UK.	➢ **For those setting up innovative businesses for the first time.** ➢ Endorsed by a UK Higher Education Institution or business organisation. ➢ Business needs to be a new idea.
Skilled Worker visa	Launched 1 December 2020 (replacing previous Tier 2 General route). Once all documents have been received and identity confirmed, a decision will normally be made within 3 weeks for those outside the UK, or 8 weeks for those inside the UK.	➢ **For employers to recruit people to work in the UK in a specific job.** ➢ A Skilled Worker must have a job offer in an eligible skilled occupation from a Home Office-approved sponsor. ➢ The skills threshold has been expanded to include all jobs at Regulated Qualifications Framework 3 and above (including junior managerial roles and skilled trades). ➢ The salary threshold has been reduced to £25,600. ➢ This can be reduced further (to a minimum of £20,480) through tradeable points - for example, if the job is in a shortage occupation. ➢ Applicants must have a lower intermediate (B1) level of English or higher.
Global Talent visa (Digital Technology)	For most individuals there is a 2-stage application process. Stage 1 will normally be considered within 5 to 8 weeks, reduced to 3 weeks if the application can be considered under fast-track requirements.	➢ **For individuals who can demonstrate they have been recognised as leaders or potential leaders in tech**. ➢ Endorsed by Tech Nation. ➢ No language or salary requirements. ➢ Individuals must demonstrate significant technical skills, or business skills in product-led digital technology companies. ➢ Winners of acceptable global technology prestigious prizes automatically qualify without the need for endorsement (such as a Turing Award or ACM prize).

	At stage 2, once all documents have been received and identity confirmed, a decision will normally be made within 3 weeks for those outside the UK, or 8 weeks for those inside the UK.	
Global Business Mobility route	New route launched on 11 April 2022. Once all documents have been received and identity confirmed, a decision will normally be made within 3 weeks for those outside the UK, or 8 weeks for those inside the UK.	➢ **For overseas businesses to temporarily send employees to the UK for a specific corporate purpose that could not be done by a resident worker.** ➢ There are 5 routes available for the sponsored Global Business Mobility route. ○ **Senior or Specialist Worker** ○ **Graduate Trainee** ○ **UK Expansion Worker** ○ **Service supplier** ○ **Secondment Worker** ➢ Depending on the category of worker, employees can stay in the UK for between 6 months and 9 years. The worker must be: ● an existing employee who has worked for the sending business outside the UK for a minimum length of time (normally 12 months) ● working in a job at the appropriate skill level ● paid at the appropriate level for the job they are doing ● sponsored by a business in the UK that is licensed by the Home Office.
High Potential Individual visa	New route from 30 May 2022. Once all documents have been received and identity confirmed, a decision will normally be made within 3 weeks for those outside the UK, or 8 weeks for	➢ **For high potential international graduates of top global universities**. ➢ Eligible applicants are those who have a bachelor's degree, master's degree, or PhD, awarded by an institution on the Home Office Global Universities List. ➢ No requirement of a job offer or sponsorship. ➢ Successful applicants will be given a 2-year work visa (3-year for those with a PhD) and can work in any sector. ➢ Individuals cannot extend their visa, but can switch to a different visa (for example, a Skilled

	those inside the UK.	Worker visa) once they have found a suitable job.
Scale-up visa	New route from 22 August 2022 available for individuals and businesses. Once all documents have been received and identity confirmed, a decision will normally be made within 3 weeks for those outside the UK, or 8 weeks for those inside the UK.	<u>For individuals</u> ➢ Job offer from a scale-up sponsor for a graduate level role and a minimum £33k salary. ➢ Demonstrate English language proficiency. ➢ Requires individuals to be sponsored for the first six months of their permission, permitted to undertake employment and projects in addition to working for their sponsor. <u>For businesses</u> ➢ Must be a UK business and hold a Scale-up sponsor licence. ➢ Businesses will be eligible for a Scale-up licence if they meet the published definition of a scale-up, which can be verified through checks with HMRC. ➢ Qualifying businesses must be VAT-registered and should have: ○ an annual average revenue *or* employment growth rate over a three-year period greater than 20%; and ○ a minimum of 10 employees at the start of the 3-year period.

4. Financing digital growth

Any digital or technology concept needs capital to start up and grow. Funding across all stages of a digital business lifecycle is an essential prerequisite of digital growth. The UK has deep pools of capital and an excellent funding ecosystem for technology companies to use.

The UK is the clear tech hub of Europe, with the UK tech sector raising £27.4 billion in private capital in 2021. This is more than any other European country and is double the level of second-placed Germany, and over triple that of third-placed France. In 2021, UK companies secured more $100+ million financing rounds than in any other European country, and the UK also saw more tech IPOs than any other European exchange. But there is more we can do.

We would like to see the UK's institutional investors, especially pension funds, take a more proactive approach to growth technology investing – as their US cousins do - and examine where this may bring benefits for their clients. This means taking a longer-term view and understanding that growth often comes in place of short-term dividend flow, but that it ultimately yields higher returns. It is also a more productive use of capital, creating new IP and new businesses. The 2017 Patient Capital Review identified and analysed this problem, and since 2017 the Government has undertaken significant work to make progress on these issues. We recognise that more still needs to be done to address the UK's relative lack of patient capital.

We appreciate that in addition to funding, smaller technology businesses need access to effective business support schemes to expand their networks, accelerate growth and create jobs. Over the last 6 years, DCMS has funded the activities of Tech Nation, an important growth platform providing dedicated support to tech start-ups and scale-ups. This support has contributed to 11 IPOs, and 29% of all UK unicorns have been through a Tech Nation programme. DCMS will continue to invest in the acceleration of technology start-ups and scale-ups across the UK, and will run a Digital Growth Grant competition over summer 2022.

4.1 Seed investment

The UK has a strong track record in very early stage seed investment. This feeds the pipeline of growing companies which go on to attract venture capital funding and eventually float, and provides a rich ecosystem of diverse innovation which allows the next generation of ideas to be identified and to flourish.

This ecosystem has been very substantially supported by tax incentives – in particular the Seed Enterprise Investment Scheme (SEIS), the Enterprise Investment Scheme (EIS) and Venture Capital Trusts (VCTs). Since EIS was launched in 1994, more than 32,000 companies have received investment of around £24 billion, and since SEIS was launched in 2012-13, 13,800 companies have received investment of around £1.4 billion.

Encouraging investment in early-stage businesses is vital to maintaining the flow of innovation and start-ups in the UK tech sector, which often become the unicorns of tomorrow. Both the EIS and SEIS tax reliefs have been hugely successful in stimulating seed and

early-stage investment by private individuals into the tech sector. The Government will keep these reliefs under review to see if there is any opportunity to improve them further.

4.2 Early stage and scale-up investment

The UK has a mature and deep finance ecosystem, particularly for earlier stage venture capital (VC) investing in Series A and Series B funding rounds, where domestic, UK-based investors provide the majority of capital. However, at later-stage scale-up rounds (typically from Series C onwards), investment predominantly comes from non-UK sources and non-UK VCs.

To understand the dynamics of financing innovative companies, the Government commissioned the Patient Capital Review in 2017. Amongst other findings, the review identified a relative lack of institutional UK capital flowing into the UK VC market, which is one of the drivers of the patient capital gap between the UK and the US. We are glad that international investors prize UK assets, but we also want to see UK pension savers benefiting from the UK's ingenuity and enterprise, and being given the opportunity to secure higher returns to enjoy during their retirements. As a country, we have the opportunity to unlock hundreds of billions of pounds allocated by UK institutional investors, and use it to back the innovative, high-growth companies – including in our thriving tech sector – to build the ecosystem that sits around scale-up VCs and create prosperity across the UK.

Though choosing which assets to invest in to secure the best outcomes remains a matter for pension fund trustees and other custodians of institutional capital, the Government believes that UK institutional investors are under-represented in owning UK assets. For example, over 80% of UK defined contribution pension funds' investments are in mostly listed securities, which represent only 20% of the UK's assets.

We recognise the responsibility of the Government to remove obstacles and costs to making long-term, illiquid investments in the UK. The Government will continue to do everything possible, short of mandating investment, to encourage pension funds and other institutional investors to take advantage of available routes to invest in the UK's most productive assets such as venture capital.

In March 2022, DWP consulted on new proposals to require pension schemes to have a stated policy on investment in illiquid assets, such as private equity and venture capital. DWP also announced in early 2022 that it will be taking forward proposals to remove well-designed performance fees, often paid when investing in private markets, from the cap on charges that applies to workplace pensions. Government continues to work with the industry-led Productive Finance Working Group to encourage investment in long-term, illiquid assets. A focus of this group has been supporting the launch of the new Long-Term Asset Fund (LTAF) structure. This is a new fund structure that will enable pension schemes and other investors to invest in illiquid assets, such as VC, more easily.

The Government is also reviewing Solvency II to better tailor the UK's prudential regulatory regime for the unique features of our insurance sector. One objective of the review is to support insurance firms to provide long-term capital to underpin growth, including investment

in infrastructure, venture capital and growth equity, and other long-term productive assets, within the prudential regulatory framework. The Government is consulting on reforms that could unlock tens of billions in capital for long-term investments.

All of this shows that the Government has already taken important steps towards these objectives, including to address barriers to investment for pension funds and in supporting the creation of Long-Term Asset Fund structure. However, many pension funds, including in the public sector, say that they do not have the scale or expertise to invest in VC funds. We will therefore continue working closely with UK institutional investors to identify, understand and address remaining barriers to investment, to encourage and facilitate the development of the capabilities to invest in private markets, and to challenge industry to change mindsets and behaviour.

Since 2017, the Government has also undertaken significant work to deliver progress on this issue, including through the British Business Bank and its Enterprise Capital Fund and British Patient Capital programmes. The BBB works with a wide range of private-sector partners, offering solutions to help young and fast-growing small companies in the UK. At the Spending Review, the Government provided over £1.6 billion for the British Business Bank's (BBB) regional funds, which provide debt and equity finance to SMEs to improve sustainable growth and prosperity across the UK. This funding will expand these funds into the North East and South West of England. It will also provide for the BBB to set up new regional funds in Scotland (£150 million) and Wales (£130 million), and to build on its existing programmes in Northern Ireland (£70 million), working closely with the Devolved Governments.

Case Study: Ultraleap (BBB's Future Fund: Breakthrough)

Launched in the summer of 2021, Future Fund: Breakthrough is a £375 million, UK-wide programme that invests alongside private investors to increase the size of later-stage funding rounds for R&D intensive companies. In November 2021, British Patient Capital announced the first investment under this programme, as part of a £60 million Series D funding round for Bristol-based company Ultraleap.

The new funding will allow Ultraleap, which employs 150 people globally, to continue to bring its machine-learning-based hand-tracking software, Gemini, to more operating systems, as well as continue to invest in R&D in its mid-air haptics platform.

Access to scaling capital and the opportunity to raise this through larger, later-stage funding rounds has been supported by British Patient Capital which, since its launch in 2018, has become the largest domestic investor in UK venture and venture growth funds and this will continue.

4.3 Making the UK the global tech IPO capital

Capital markets are an important source of financing for growth businesses. 2021 was an excellent year for the London Stock Exchange (LSE), which hosted more than twice as many transactions as the next most active European market and saw £16.9 billion raised through initial public offerings (IPOs) alone. However, with growth in international markets largely driven by tech companies, more must be done to attract top innovators to go public in the UK.

The Government's response to Lord Hill's UK Listing Review means significant steps have already been taken to attract more tech businesses. The Financial Conduct Authority reforms have seen the free float requirement reduced from 25% to 10% across all Regulated Markets, including the Premium segment of the LSE's Main Market, and a targeted approach to allowing dual class share structures on the Premium Listing segment adopted.

Rules were also updated in August 2021 to reduce barriers to listing via special purpose acquisition companies (SPACs), while ensuring appropriate protections. The venture capital group Hambro Perks launched the first SPAC in the UK since the rule change last November, and more are expected in 2022.

HM Treasury (HMT) has consulted on the UK's Prospectus Regime, proposing to improve the efficiency of public capital raising by simplifying regulation, facilitate wider participation in the ownership of public companies, and make the regulation in this area more agile. Industry stakeholders were overwhelmingly supportive of HMT's proposals, and on 1 March HMTconfirmed its intention to proceed largely as per its consultation. HMT also launched the

UK Secondary Capital Raising Review in October 2021 to look into improving further capital-raising processes for publicly traded companies in the UK. Further, DCMS will offer a roundtable with founders on secondaries, to explore and better understand the challenges to be addressed.

The UK is home to the world's most international stock exchange, the LSE, and is well placed to become the world's tech IPO capital. We will work actively with the LSE to seek to attract leading tech companies globally, as well as in the UK, to list on the UK stock market. We are excited about what the future holds and the UK's ability to compete on the evolving global stage.

Case study: the UK's largest tech unicorn, Checkout.com

Since its 2012 launch in London, the technology platform Checkout.com has transformed how enterprises accept digital payments and move money around the world.

On 12 January 2022, the company announced the completion of a $1 billion Series D fundraising round at a valuation of $40 billion. This made it the UK's most valuable venture-backed fintech, and the second-largest unicorn in Europe. The extra funding will allow the company to create 600 new jobs in the UK and remain on the cutting edge of Web3 innovation.

5. The whole UK: spreading prosperity and levelling up

Our vision is to enable everyone, from every industry and across the UK, to benefit from all that digital innovation can offer.

5.1 Supporting the UK's businesses through digital adoption

There are demonstrated productivity improvements to businesses that adopt digital technologies. SMEs which use two or more business management technologies exhibit productivity gains of up to 25%. But digital adoption supports more than the user of the technology - greater use of digital innovation across the economy will provide larger markets for the UK's digital businesses, fuelling their continued growth and success.

One of the greatest barriers to the adoption of technology by SMEs is understanding what product to choose. 44% of SMEs think that 'there is too much confusing information' about established technology solutions. To support businesses to overcome this challenge, DCMS supported the development and launch of Digital Boost, which matches small businesses and charities with a network of digital experts willing to offer pro bono 1:1 mentoring, and directs them to digital skills-related content, courses and webinars. To date, Digital Boost has helped 3575 organisations through 1:1 mentoring.

SMEs are more likely to succeed with technology adoption if their leadership and employees are appropriately skilled and supported. Help to Grow: Management is an intensive, UK-wide training programme that aims to support SMEs by boosting their leadership and management capability. The scheme was developed in partnership with industry, and gives participants the opportunity to understand how to innovate their business model, and consider how to adopt and invest in new digital technologies. Participants receive ten hours of 1:1 mentoring and work with business experts to help develop a uniquely tailored Growth Action Plan and embed the changes within their business model.

Delivered by the UK's leading schools with Small Business Charter accreditation, the programme is 90% funded by the Government, meaning participants only pay £750 for this targeted support and upskilling. The scheme aims to support 30,000 SMEs to digitally transform their business model over the 4-year lifetime of the programme.

Businesses often face lengthy, difficult processes to select new technology solutions and obtain financing. Help to Grow: Digital gives eligible businesses a financial discount of up to 50% of the cost of an approved technology solution, up to a maximum of £5,000. There is also a dedicated online support service providing free and impartial advice on what technology is best for businesses, as well as guidance on steps to take before purchasing the software. The scheme currently offers financial discounts on Customer Relationship Management (CRM) and digital accounting software. E-commerce will be added shortly. This

is just the start of the new scheme; over time it will expand, and we are exploring new discounted products that will help SMEs to grow, including new software to help businesses maximise their sales online. Over the next 3 years, Help to Grow: Digital will support up to 100,000 businesses.

Beyond CRM, accounting and ecommerce software, the 2017 Made Smarter Review identified the opportunities for UK manufacturing from industrial digital technology (IDT), including AI, Digital Twins, and Industrial Internet of Things (IIoT). The review found that IDT can increase manufacturing productivity, add £455 billion GVA, reduce CO2 emissions by 4.5% and create 175,000 new jobs over a decade.

Made Smarter Adoption supports SME manufacturers in England by providing intensive expert advice, capital grants, and leadership training. The programme has already delivered substantial benefits for regional businesses: the Made Smarter Adoption North West pilot ran from 2019 to 2021, and is expected to add up to £68 million GVA to the region and 800 new jobs.

The Government's investment of more than £147 million into the Made Smarter Innovation programme is helping drive the development of the next generation of digital solutions for manufacturing. At the 2021 Spending Review, £24 million in new funding was secured for the Made Smarter Adoption programme, continuing government support for Made Smarter over the next 3 years. In 2021 the programme was scaled up to add support for manufacturers in the West Midlands, North East, and Yorkshire and the Humber – levelling up and spreading opportunity more equally across the UK.

The barriers to adopting more advanced technologies are significant and differ by sector. One of the pillars of the National AI Strategy is to ensure that AI benefits all sectors and regions by promoting greater AI adoption. UKRI will support the transformation of the UK's capability in AI by launching a National AI Research and Innovation (R&I) Programme to stimulate the development and adoption of AI technologies in high-potential, lower-AI-maturity sectors. The AI Action Plan provides a snapshot of progress in delivering against the AI strategy, including the actions to increase AI adoption throughout the economy.

5.2 Improving public services

Public services have undergone much digital transformation over the last decade, including through the use of automation and AI. Digital improvements across government include the development of One Login for Government, the use of data in the social care system, and the Home Office's (HO) Future Borders and Immigration reforms. Opportunities for the adoption of automation, for example by the Home Office in its use of Electronic Travel Authorisations and eVisas, are also being explored. We recognise that digital transformation offers benefits for citizens and users, but also provides an important market for innovative UK businesses.

HMRC's Making Tax Digital (MTD) programme helps businesses reduce avoidable errors and get their taxes right, while offering an improved experience of the tax system. The Office for Budget Responsibility (OBR) has certified that MTD is predicted to provide £2.8 billion additional tax revenue by the tax year 2026/27. HMRC is also providing further investment to create the Single Customer Account, which will support taxpayers to manage all of their tax affairs from one place.

To enable the creation of a modern, efficient and caring welfare service, the 2021 Spending Review reserved £2.6 billion for the DWP's Digital With Purpose Plan. This includes £535 million of new investment to support the digital transformation of the welfare system.

As part of its reform agenda, DHSC will publish its plan for digital health and social care for England in the spring, which will set out the Government's vision for digitally transformed health and care services. Data saves lives, the Government's data strategy for health and social care in England, also sets out a range of changes to address how we can better support local and national decision-makers with data.

However, data quality among public services is inconsistent and too often inadequate, in part due to the systems in which it is stored. Effective data sharing between departments is limited by both real and perceived risks.

Work is already underway to enable better use of data. The Government will continue to support data-led decision-making through the Integrated Data Service. The service consists of a cloud-based platform and will transform ways of working. Under robust security and ethical protocols, and through a Trusted Research Environment, the service will enable analysts and researchers to access, link, analyse and disseminate a range of data to help inform policy decisions. The Cabinet Office's Algorithmic Transparency Standard recommendations will also help public sector organisations to provide clear information about the algorithmic tools they use to support decision-making. The Data Standards Authority will continue to work to improve how the public sector manages data, by establishing standards and making data-sharing across government more effective.

While there are some examples of great practice in digital services and data, the Government still faces many challenges in achieving digital change at scale. To tackle this, the Cabinet Office will publish a cross-government digital and data strategy in 2022, setting out a vision for how the Government will improve the use of digital, data and technology across all public services.

5.3 Supporting access to public procurement opportunities

At around £300 billion every year, public sector procurement accounts for around a third of all public expenditure. As set out in the National Procurement Policy Statement, we will use the huge power of this expenditure to support smaller businesses and encourage innovation.

The Cabinet Office has introduced wholesale reform to the UK's procurement legislation, which will allow public bodies, including the NHS, to take a more flexible and innovative

approach to the way they procure technology solutions. This will help to drive innovation and provide market opportunities by breaking down barriers for small businesses in bidding for public contracts.

The recently published Digital, Data and Technology Playbook sets out plans to help enable innovative approaches to public service procurement, to improve efficiency in our commercial processes around digital, data and technology (DDaT).

5.4 Levelling up our regional economies

The Levelling Up White Paper highlighted the importance of digital connectivity to every region and community in the UK. Historically, London and the South East have benefitted from a vibrant digital economy, but in recent years regions across the UK have begun to develop thriving digital economies of their own. In 2021, almost £9 billion of all venture capital invested in the UK went into start-ups and scale-ups outside London and the South East.

The Government understands that tailored support and localised interventions will be important to successful economic growth across the regions. Our digital ecosystems report identified several regions as digital and tech growth hubs across the UK. Strengthening these regional digital ecosystems could grow the digital sector's gross value added (GVA) by an additional £41.5 billion by 2025, creating an additional 678,000 jobs.

This year, the Government announced £2.6 billion of localised funding through the UK Shared Prosperity Fund (UKSPF). This scheme will give areas across the UK the ability to fund interventions in their local communities based on their local priorities, including interventions that have relevance to the digital and technology sectors. This includes funding for digital skills, funding to develop angel investor networks, funding for incubators and accelerators for local enterprise, and funding to support local entrepreneurial ecosystems.

Overcoming historical challenges relating to digital connectivity across the UK is essential if we are to ensure that both urban and rural regions across the UK have the tools and skills to navigate online services and benefit from this growth. As outlined in the section on world-class and secure digital infrastructure, the Government is investing in infrastructure to improve connectivity, and will continue to work with Devolved Governments to ensure access to the benefits of digital technology are felt across the UK.

As noted in the section on digital skills and talent, internet skills and access are vital for prosperity. Digital exclusion remains at its highest outside London and the South East - most notably in the North East, Yorkshire and the Humber, and Northern Ireland, where over 10% of the population are "internet non-users". To ensure that the whole UK benefits from the investments we are making in infrastructure, the Government will continue to support local digital projects by providing access to digital skills training, boosting opportunities for investment, and creating more digital jobs.

Case study: Local Digital Skills Partnership

With support from DCMS, the Local Digital Skills Partnership Programme, currently operating in eight regions in England, brings together employers, regional academia, and local public sector and training providers to develop targeted digital skills programmes.

The Heart of The South West partnership has upskilled a total of 8,000 people in Devon, Somerset, Plymouth, and Torbay, and secured over £3 million in additional skills investment to set up and run programmes mapped to regional need.

The Government will continue to support smaller businesses through the British Business Bank. £1.6 billion will be provided for investment funds in Wales, Scotland, Northern Ireland, the South West of England, the Midlands, and the North of England. In particular, the Northern Powerhouse Investment Fund (NPIF) supports SMEs in Northern England at all stages of their development. As of December 2021, the fund had directly invested £310 million in 968 SMEs across the Northern Powerhouse region, in deals that have attracted an additional £411 million of investment from the private sector. Due to its ongoing success, the Chancellor of the Exchequer announced a further £660m for the next generation of the NPIF, including an expansion into the North East of England, as part of the 2021 Spending Review.

The Government will invest to directly support innovators and entrepreneurs outside London and the South East, and support local digital businesses to export, network, and grow. This will include partnering with local government, local businesses and academia, for example through the UK Cyber Cluster Collaboration, and the Creative Industries Cluster programmes. As set out in the Levelling Up White Paper, this Government will invest £100 million between 2022/23 and 2024/25 to pilot new Innovation Accelerators. The Accelerators will be locally-led partnerships supporting three UK city regions (Glasgow, West Midlands and Greater Manchester) to become major, globally competitive centres for research and innovation.

This Government has been a great supporter of innovation. Catapults (not-for-profit, independent technology and innovation centres) were created in 2011, and over the past 11 years we've created 9 Catapults spanning 40 locations across the UK. Since 2011, Catapults have been responsible for directing over £2.5 billion of private and public sector investment into innovative, industrial research and advancing the UK's capability in cutting-edge global markets.

Case studies: regional digital projects

Yorkshire

- The DCMS Digital ecosystems report identified Yorkshire's digital industry as the fastest growing in the UK. DCMS and Leeds City Council supported the creation of a tech hub at Platform, with £2 million dedicated to funding over 1,000 digital tech jobs between 2018-2028. Leeds has successfully attracted large digital sector employers such as Sky's digital technology division and Channel 4's new national HQ.

South Wales

- £44 million is being invested to boost research and development projects in South Wales through the UKRI's flagship Strength in Places fund. The project will benefit from a share of the UK Government's £186 million investment and a portion of the £230 million investment from private companies and local authorities.
- The Community Renewal Fund will also see a funding boost for over 160 projects across Wales, with the ambitions of getting people into work, boosting productivity and delivering net zero.

Hereford

- The Towns Fund is promoting interventions to solve disconnection, with £1.8 million being awarded to the Skills Foundry: Digital Culture Hub in Hereford. This money will go towards aggregating a contemporary space where creative technologies can raise skill levels and enrich cultural entrepreneurs, SMEs, and local Voluntary, Community, and Social Enterprise groups.

5.5 Supporting net zero

The UK's global leadership in digital and data provides us with a strong foundation to address the challenges posed by climate change. The development and deployment of innovative digital and data solutions will aid decarbonisation. In parallel, we must continue to support work to reduce the carbon impact of digital technologies, smart devices, and data.

Digital and data enable enhanced understanding, monitoring, optimisation and flexibility which can support wider efforts to reach net zero. Acting now will cement the UK's position at the forefront of large, expanding global markets and allow us to capitalise on export opportunities in green technologies, and related industries. The UK is already ahead of the pack, and is third in the world for 'impact' technology investment, behind only the United States and China.

The Government is running the £1bn Net Zero Innovation Portfolio to accelerate the commercialisation of low-carbon technologies, systems and business models in power, buildings, and industry. As part of this, BEIS has started the up to £65m Flexibility Innovation Programme, of which £2 million is going towards the Automatic Asset Registration competition, launched in April 2022. This competition aims to support the development of an automated secure data exchange process for registering small-scale energy assets, and collecting and accessing small-scale energy asset data. DCMS has also funded private sector-led initiatives. Tech Nation's Net Zero growth programme, established with government finance, supports green technology businesses and is the first of its kind in Europe.

Demand for climate related data is high, and stakeholders have been clear that data access is one of the key limiting factors they face when trying to make progress in this space. UKRI (NERC) has funded the launch of the £5 million UK Centre for Greening Finance and Investment, which has a core focus on addressing data challenges to support green finance. An additional £5 million is being made available through Innovate UK to commercialise ideas coming out of the centre.

Deployment of digital technologies will also support the achievement of net zero. The UK's first Energy Digitalisation Strategy presented a suite of actions for digitalising the energy system. The flexibility enabled by system digitalisation could help to reduce the amount of energy generation needed to decarbonise, as well as creating 24,000 jobs and saving up to £10 billion per year by 2050.

DCMS has engaged with industry to support emissions reductions and helped launch industry initiatives to encourage decarbonisation. In June 2021, Tech Nation, with DCMS support, launched the Tech Zero Taskforce, a group of tech businesses committed to setting ambitious net zero targets and emissions measurement programmes.

Finally, we are providing funding and support to the data centre sector to enable its transition to more sustainable energy usage. We have made financing available to data centres to support improvements to cooling systems and waste-heat recovery. This consists of £315m of support available through the Industrial Energy Transformation Fund (IETF) for sites in England, Wales and Northern Ireland, with Scottish sites able to apply for a share of the funding through the Scottish IETF. The IETF will reduce energy costs and carbon emissions for UK industry in the near-term, and bring down the costs and risks of industrial decarbonisation technologies through demonstration.

6. Enhancing the UK's place in the world

Digital technologies are an incredible force for change across the world. As the Internet and digital technologies underpin ever more aspects of our lives, the way we, and our international partners, choose to govern them will have huge implications for our shared prosperity and security. Digital technology will take on increased geo-political significance in the coming years, as it becomes more central to economies and the ability of governments to project influence beyond their own borders.

In the Integrated Review of Security, Defence, Development and Foreign Policy, the Prime Minister set out a vision for the UK in 2030. This called for the UK to be a recognised Science and Tech Superpower that is at the forefront of global regulation on technology, cyber, digital and data. Following this, the Prime Minister established the National Science and Technology Council (NSTC) and the Office for Science and Technology Strategy to ensure that the Government aligns UK capabilities towards this ambition. The forthcoming International Tech Strategy will also set a common set of democratic principles to frame the UK's international engagement on technologies.

6.1 Global leadership: Governance and values

The UK is stepping up its international leadership to shape the future of digital, data and technology in a way that drives global progress and allows societies to flourish. Our ambition is that international norms, rules, regulations and standards reflect our democratic values, create prosperity for all and protect our security.

We are using our influence and building on our leadership in traditional multilateral fora and multi-stakeholder organisations. For example, the UK is establishing itself as a global leader in Artificial Intelligence (AI), one of the 7 technology families identified in the Innovation Strategy. We are a founding member of the Global Partnership on Artificial Intelligence (GPAI), and played a leading role in the development of the OECD AI Principles. We are building international coalitions to improve cooperation and capacity in shaping global rules.

We can use this influence to work towards ensuring the international rules that govern digital, data and technology evolve in a way that enshrines openness at their core, preserves the existing multi-stakeholder governance models, and counters authoritarian states seeking to export their approaches.

To do this, we intend to increase the UK's formal representation in global digital technical standards bodies. In 2022, the UK is running for election to the International Telecommunication Union (ITU) Council, where we are championing an agenda for the ITU to work effectively for all its members, increase worldwide connectivity, and bridge the digital divide.

Working through the OECD, the G7 and the UN will also cement our leadership role in shaping international norms, rules, regulations and standards. We will work with the OECD on setting international norms, shaping the Secretary-General's vision for digital transformation to focus on the highest-impact policy areas which align with wider global work and UK priorities on digital and tech. We will also use the G7 as a forum to champion open society principles in tech, while seeking agreement with G20 partners on global initiatives that promote these principles. Through the UN, we will champion digital and tech as a tool to push for sustainable development and promote the enjoyment of human rights.

Case study: artificial intelligence

The UK is piloting an AI Standards Hub to expand our international engagement and thought leadership around the development of global AI technical standards**.** We are working with the Alan Turing Institute, the British Standards Institution and the National Physical Laboratory to improve the governance of AI, complement pro-innovation regulation and unlock the huge economic potential of these technologies to boost investment and employment.

The DCMS Centre for Data Ethics and Innovation (CDEI) has launched the AI Assurance Roadmap which sets out the roles different groups will need to play, and the steps they will need to take, across 6 priority areas, in order to develop a responsible AI assurance ecosystem.

Ensuring the Internet remains open, interoperable, reliable and secure

The UK will continue to advocate for a positive vision of the future of the Internet which is pro-prosperity, enabling innovation and competition; supports democracy, open society values, and accessibility; is governed through inclusive and effective multi-stakeholder processes; maintains its vital security and resilience; and is technically scalable, interoperable, open and global.

The UK will oppose efforts to bring management of the Internet under restrictive inter-governmental control, and will champion the multi-stakeholder model of Internet governance. We are building international coalitions to improve cooperation and capacity in shaping global standards to protect the global technical core of the Internet, its openness and its interoperability.

We will continue to work with stakeholders who share our values, to enhance the effectiveness of Internet governance processes. This includes the Internet Corporation for Assigned Names and Numbers (ICANN), the Internet Governance Forum, and important international discussions in the lead up to the UN General Assembly dialogue in 2025 on the future mandate of the World Summit on the Information Society.

Shaping international data governance

We believe in championing the flow of data and shaping an accessible, interoperable international data ecosystem that enables us to harness the power of responsible data use, promote growth, and position the UK as the forerunner of the next wave of innovation. International data governance is evolving and adapting at speed, and involves many actors. We will build on the progress made with the G7 members on the concept of Data Free Flow with Trust during the UK's presidency, to influence global data governance to create the right global framework of infrastructure, standards and rules for data flows.

The Government will work to ensure that international data flows are enabled through our work on international data governance in international fora. We will oppose unjustified data localisation, including by seeking to ensure that the free flow of data and anti-data localisation provisions are included in trade agreements, such as free trade agreements, that we reach with other countries. This will be crucial to achieving our ambitions to help UK businesses and protect UK national security interests, building trust and confidence in how data is used and extracting economic, technological, scientific and social value from global data.

We have already published a comprehensive overview of our approach to international transfers of personal data, and announced 10 priority countries for UK data adequacy partnerships. We have agreed ambitious data provisions in trade deals with Australia; the EU; Norway, Iceland and Liechtenstein; Japan; New Zealand; and Singapore. We are in the process of securing important regulatory cooperation and other agreements on data and data governance, including with the US.

We have published, and will continue to develop, policies, principles for intervention and priority areas for where the Government will take action on increasing data access and availability. This is whilst ensuring we protect our national security interests.

The International Data Transfers Expert Council is also leading a programme of work to identify what the UK can do to ensure that global data flows are frictionless, sustainable and stable, for the long-term, to the benefit of both the UK and global economy. A landmark report, with associated policy recommendations, will be published by the Expert Council and presented to the Minister of State for Media, Data, and Digital Infrastructure in early 2023.

6.2 Promoting digital exports and inward investment

The UK is a global leader in digital trade, collaboratively working with our international partners to champion open markets and take advantage of the opportunities digital trade presents. We are delivering cutting-edge digital trade provisions in new trade deals to open up new opportunities for our digital sector.

As we complete new trade agreements, we will seek the inclusion of a chapter on digital trade containing ambitious provisions on tariff-free digital trade, source code protection and free flow of data measures.

We will continue to be a leading voice for free and modern trade. The UK is, and will continue to be, at the forefront of forging trade deals that are cutting edge and champion digital.

The UK has signed its first major trade deals as an independent trading nation with Japan, Australia, and New Zealand. These deals directly benefit the UK's digital economy, providing UK firms with greater opportunities to trade digitally with these markets.

Going further, in 2022 the UK and Singapore signed a Digital Economy Agreement, the most innovative trade agreement in the world. Under this agreement, the UK and Singapore will explore the mechanisms needed to promote compatibility and interoperability between our respective digital identity regimes and reduce friction in cross-border trade - the first UK cooperation agreement of its kind.

The UK is a leading voice internationally in shaping ambitious, modern rules for digital trade. The 'digitisation' of how we trade is just as important as the digital goods and services that we trade. During the UK's G7 presidency, we brought member states together to agree on a ground-breaking set of G7 Digital Trade Principles which will guide the G7's approach to digital trade. The G7 also agreed that electronic transmissions – including the transmitted content – should be free of customs duties.

And we will do more. We will legislate to allow electronic versions of trade documents to be used in the UK for the first time. Additionally, we are working with other countries to reform the World Trade Organisation, to deliver modern rules on digital trade that will provide certainty to businesses and consumers on several important aspects of digital trade, through the E-Commerce Joint Initiative.

The Government's Export Strategy sets out a framework to grow our economy through exports and achieve our ambition of reaching £1 trillion in exports before the mid-2030s. We are already taking significant steps to support businesses that trade digitally. For example, we are embedding specialist e-commerce advisors within the International Trade Advisors' Network, who are offering specific e-commerce and broader digital commerce advice as part of the Digital Exporting Programme.

DCMS, DIT and FCDO will actively work to identify key large target markets, and promote UK exports of leading UK technologies. Building on work since the 2017 Patient Capital Review, we will also work together to identify potential foreign direct investors into UK tech growth companies and VC funds, in a way that is complementary to the catalytic work of the British Business Bank and British Patient Capital. Sovereign Wealth Funds will be a particular focus for this. A working group will be established by September 2022 with relevant industry participants to progress this work.

As we pursue these priorities, we will remain mindful of the need to protect national security. We will use the export control regime and the new National Security and Investment Act judiciously and proportionately to protect vital national interests while not unduly undermining investment and trade. We expect interventions to remain rare, but we will not hesitate to make them where needed, especially in areas of heightened sensitivity.

6.3 Achieving our priorities through international partnerships

A strong and varied network of international partnerships will support the achievement of the UK's objectives on digital, data and technology. We will form alliances with like-minded partners on topics that require supra-national cooperation, such as highly complex R&D projects, semiconductor supply chain resilience and telecoms supply chain diversification. DCMS is developing a UK strategy to ensure that we support the UK's domestic semiconductor industry: to help cement the UK's global position as a Science and Tech Superpower, while also yielding a resilient and assured supply of chips.

In 2021 the UK hosted the Future Tech Forum (FTF) in London, bringing together 20 like-minded countries and over 100 global leaders from the tech sector, civil society organisations and academia. The forum discussed the future of digital technologies and the collective responsibility we share in realising the positive vision of tech. The conversations sparked at FTF are ongoing, and demonstrate the increasing value and importance of convening multi-stakeholder events to lead the conversation and build consensus around the future of tech.

We are playing a central role in developing and supporting international initiatives that champion our values and vision for the future of digital technologies. In April 2022, the UK, alongside other democracies, signed the Declaration for the Future of the Internet, which commits international governments to support and promote a positive shared vision for an open, free, global, interoperable, reliable, secure, and multi-stakeholder internet.

We are also building bilateral alliances with like-minded countries to achieve shared digital and tech ambitions. The Digital Chapter within the UK-EU Trade Cooperation Agreement incorporates ambitious digital trade provisions as a strong basis for future collaboration.

Last year, the Prime Minister and President Biden committed to developing a UK-US Tech Partnership, to strengthen UK-US cooperation in areas such as:

- the resilience and security of critical supply chains;
- data dialogue;
- R&D on emerging technologies, including artificial intelligence and quantum;
- improving the accessibility and flow of data to support economic growth;
- online safety;
- regulation;
- supporting scientific and technological progress.

We are strengthening our digital and tech collaboration in the Indo-Pacific region. In April 2022, the Prime Minister and Prime Minister Modi welcomed strengthened tech cooperation between the UK and India. In May 2022, the DCMS Secretary of State announced deepening digital cooperation with Japan. We will continue to build on our successes by negotiating the UK's accession to the Comprehensive and Progressive Agreement for Trans-Pacific Partnership, further deepening our relationships with the Asia-Pacific region, and building a global network of international agreements that support productivity, jobs and growth across the UK.

The DCMS-DIT Asia-Pacific Digital Trade Network supports UK and Asia-Pacific collaboration on digital tech. This network led to the establishment of the new Association of South-East Asian Nations (ASEAN)-UK Digital Innovation Partnership, which is laying the groundwork for an effective and ambitious UK-ASEAN partnership on the digital agenda.

As part of the wider UK Digital Access Programme, the International tech Hub Network (led by FCDO and DCMS) continues to support digital entrepreneurship, stimulate local digital economies and forge mutually-beneficial tech partnerships between the UK and digital sectors in partner countries.

In March 2022, BEIS allocated £6.8 billion of funding, until 2025 (over the current Spending Review 2021 period) to Horizon Europe and other European Union programmes, to enable UK researchers and business, including those in the digital and technology sectors, to participate. In the event that the UK is unable to associate to Horizon Europe, the funding allocated to the Horizon association will be directed instead to UK Government R&D programmes, including those to support new international partnerships.

Developing global tech capacity

The UK is working internationally to support inclusive, responsible and sustainable digital transformation in partner countries. DCMS is partnering with FCDO and other government departments to implement this agenda. Through closer technology partnerships with developing countries, and by strengthening the economies and capabilities of our allies, we will provide our developing partners with reliable and secure technological choices for their digital and critical national infrastructure investments.

Annex - Summary of Key Actions

Digital foundations

A thriving digital economy must start with the right foundations. Digital infrastructure, data, and a competitive, trustworthy online environment are the core foundations fundamental to the development and use of digital technologies that benefit our economy and society.

- By 2025, we will have achieved at least 85% coverage nationwide of gigabit broadband through the Project Gigabit programme, increasing to at least 99% gigabit coverage by 2030 (DCMS).
- By 2025, we will have expanded mobile network coverage to 95% of the UK through the Shared Rural Network (DCMS).
- By 2027, we are aiming for the majority of the population to have access to 5G signal via the 5G Trials and Testbeds programme (DCMS).
- By 2030, we are aiming for 35% of mobile network traffic to be delivered by open networks as part of delivering 5G supply chain diversification (DCMS).
- We will publish the Wireless Infrastructure Strategy later this year (DCMS).
- We are introducing legislation reforming the UK's data protection laws in this parliamentary session, which will also make the UK a leader in legislation that will enable the flow of data across borders (DCMS).
- We are establishing the joint UK/US Prize Challenge to accelerate the development of Privacy-Enhancing Technologies (PETs), which can enable data to be analysed and shared without compromising on the privacy or trust of data subjects (DCMS).
- We are introducing Smart Data legislation in this parliamentary session (BEIS).
- We are establishing a Smart Data Council in 2022 (BEIS).
- We will establish Smart Data pilots in 2023/24 (BEIS).
- We will launch the Smart Data challenge prize in 2023/24 (BEIS).
- We are enabling secure digital identities with a commitment to lay legislation when parliamentary time allows (DCMS).
- We have launched a revised version of the digital identity and attributes trust framework (DCMS).
- We are running a call for views ("Data Storage and Processing Infrastructure, Security & Resilience") to further our National Data Strategy commitment to develop a stronger risk management framework for the infrastructure upon which data use relies (DCMS).
- We are publishing our response to the data protection regime consultation (due June 2022) (DCMS).
- We are continuing to implement the Plan for Digital Regulation (DCMS).
- We have published an initial outcomes monitoring framework for digital regulation (DCMS).
- We will work with a range of stakeholders to make sure our digital regulatory approach is pro-innovation (DCMS).
- We are establishing a pro-competition regime for digital markets as soon as parliamentary time allows (DCMS).
- We will publish the forthcoming AI White Paper (DCMS).
- We are leading the way globally with legislation that will mitigate online harms via the Online Safety Bill (DCMS).
- We have introduced legislation to counter disinformation produced or sponsored by hostile states (HO).

- We will continue to use the National Security and Investment Act 2021 to protect the digital sector from national security risks (BEIS).
- We will keep export controls under review to ensure they reflect our obligations under the international export control regimes (DIT).
- We will continue to provide support to the research community to ensure that university research is not being funded by, or being conducted in collaboration with, inappropriate entities with links to hostile states, which may pose risks to the UK's national security (BEIS).
- We are using the Telecommunications (Security) Act 2021 to protect our public networks and services against security threats (DCMS).
- We are considering responses to the consultation on the draft Electronic Communications (Security Measures) Regulations (DCMS).
- We are strengthening the UK's cyber capabilities through the £2.6bn funded UK Cyber Strategy (CO).
- We are running a call for views on app security and privacy interventions which proposes a voluntary code of practice for app store operators and app developers (DCMS).
- We are progressing the Product Security and Telecommunications Infrastructure Bill, to further improve the UK's cyber security through minimum standards for connected devices (DCMS).

Generating ideas and intellectual property

A prosperous and secure economy is built upon good ideas and innovation. We will continue to drive a strong innovation culture and support the successful development and commercialisation of new ideas.

- We will increase UKRI expenditure from £6.1 billion in 2020 to £8.9 billion by 2024 (BEIS).
- We will increase R&D investment to £20 billion a year by 2024/25 (BEIS, HMT).
- We will consider increasing the generosity of RDEC to boost R&D investment in the UK (HMT).
- We will continue to review R&D tax reliefs to ensure they are internationally competitive and well targeted (HMT).
- We will support the commercialisation of university-based research by publishing a suggested best-practice blueprint by March 2023 (BEIS).
- We announced an external review into the Future of Compute to inform our long-term approach to the technology (DCMS).
- We are publishing a final version of 'Data saves lives', the data strategy for health and social care' (DHSC).
- In spring 2022, we are due to publish a plan for digital health and social care (DHSC).

Digital skills and talent

Ensuring the UK has a digitally skilled workforce is crucial to strengthen our position as a Science and Tech Superpower and vital to our longer-term economic prosperity. We are strengthening the digital education pipeline, increasing awareness of pathways into digital occupations, developing advanced and lifelong digital skills. We are also collaborating with the private and third sector and attracting the brightest and best talent globally.

- In England, we are ensuring that every school in England is equipped with the knowledge to teach computing through the National Centre for Computing Education (DfE).
- In England, we are expanding education routes through 3 digital-specific T Levels. We want to work with the sector to ensure that all T Level students have the opportunities they need to develop key skills and workplace experience, by delivering at least 15,000 industry placements by the financial year 2024/2025 (DfE).
- In England, we are promoting a DCMS-funded pilot to test effective ways of teaching foundational data skills in universities (DCMS).
- We are investing an additional £750m over the next three financial years to support high-quality teaching and facilities in higher education (DfE).
- In England, we have worked with the Careers & Enterprise Company to ensure that young people have access to inspiring encounters with work (DfE).
- In England, we are updating the National Careers Service website to become a single source of government-assured careers information (DfE).
- We will continue to support schools to deliver computing alongside a full range of subjects (DfE).
- In England, we will examine how computing is taught in schools through Ofsted, which plans to publish a report in 2023 (DfE).
- We will work across government to identify specific topics that are critical to supporting future technologies (DCMS, DfE).
- We launched the level 3 ‘free courses for jobs’ offer in 2021 (DfE).
- We are aiming to reach 3,000 students through the Cyber Explorers programme (DCMS).
- We are creating a further 2,000 scholarships in AI and data science in England (DCMS, OAI).
- In England, we announced the creation of 1,000 new AI PhDs. The UK Government will invest £117 million to create the PhDs through Centres for Doctoral Training (cross-Government).
- We are investing £12m in the CyberFirst programme to inspire young people to pursue careers in cyber security (DCMS).
- We are simplifying pathways into and through cyber careers through the UK Cyber Security Council, as well as raising quality through professional standards (DCMS).
- Across England, we are developing digital apprenticeships at levels 3-7, which provide work-based training in technical occupations (including cyber security and data science) with a range of flexible models to address structural barriers (DfE).
- In England, we are providing free training for adults with low digital skills on new Essential Digital Skills qualifications via the Digital Entitlement and from August 2023 on new digital Functional Skills (DfE).
- We are supporting claimants in developing their digital skills through the Claimant Commitment (DWP).
- In England, we are expanding Skills Bootcamps (DfE).
- We are investing in Institutes of Technology, and through the Digital Skills Council we will work with the sector to build industry connections and investment in Institutes of Technology (DfE, DCMS).
- We are developing the Government as a digital employer of choice, and developing digital skills and capabilities within the civil service (CO).
- We will launch the Digital Skills Council, chaired by the Minister for Tech and the Digital Economy, and Phil Smith (former UK CEO of Cisco systems). The council will set an ambitious agenda to tackle the digital skills needed for the workforce of the future (DCMS).

- We are enabling the best and brightest international tech talent to work in the UK via the Home Office suite of work visas, including the new Scale-up visa (HO).
- We are sourcing the best overseas talent from universities and innovation hubs through the Global Talent Network (DIT, OST).

Financing digital growth

We will continue to support our digital tech sector - the engine behind all the digital tech and tools we take advantage of today. We will make sure the next generation of innovative tech companies can access the capital they need to flourish in the UK and abroad.

- We will run a Digital Growth Grant competition over summer 2022 and continue to invest in the acceleration of tech start-ups and scale-ups across the UK (DCMS).
- We are consulting on new proposals that will require pension schemes to have a stated policy on investment in illiquid assets (DWP, HMT).
- We are taking forward proposals to remove performance fees from the cap on charges applying to workplace pensions (DWP, HMT).
- We are reviewing Solvency II to better tailor the UK's prudential regulatory regime for the unique features of our insurance sector (HMT).
- We are increasing funding for the British Business Bank and British Patient Capital (BEIS).
- We are reforming London markets and reviewing the UK's Prospectus Regime (HMT).
- We will offer to host a roundtable with founders on secondaries to explore and better understand the challenges to be addressed (DCMS).
- We will continue to assess and tackle the barriers seed-stage enterprises face in access to finance (HMT).

The whole UK: spreading prosperity and Levelling Up

Greater digital prosperity is dependent on spreading the innovations and tools from the tech sector across the UK. These technologies and tools can help to tackle key economic and societal challenges such as weak productivity, public service inefficiencies and the climate crisis.

- Through the Help to Grow: Management scheme, we aim to support 30,000 SMEs to digitally transform their business model over the 4-year lifetime of the programme (BEIS).
- Through Help to Grow: Digital, we will support up to 100,000 businesses over the next 3 years (BEIS).
- We will continue to ensure that Made Smarter supports manufacturing productivity by investing £24m over the next 3 years (BEIS).
- We aim to drive prosperity across the country through a joint programme led by the UK Government and UKRI, to increase AI adoption in sectors located outside London and the South-East (OAI).
- We will publish a cross-government Digital and Data Strategy in 2022, setting out a

vision for digital transformation of government (Central Digital and Data Office, CO).
- We will make service improvements, including additional upcoming improvements to Making Tax Digital (HMRC) and the Digital with Purpose Plan (DWP).
- We are supporting smaller businesses and encouraging innovation, as outlined in the National Procurement Policy Statement (CO).
- We are remedying the UK's procurement legislation to allow public bodies to be more flexible in the way they produce technology solutions (CO).
- We are supporting innovative approaches to public procurement, as outlined in the Digital, Data and Technology Playbook (CO).
- We are making the Government's online services more accessible through One Login for Government (CO).
- We are publishing the final version of 'Data saves lives', the data strategy for health and social care, in spring 2022, and will also set out how we can better support local and national decision-makers with data (DHSC).
- We are supporting SMEs through the British Business Bank by providing £1.6 billion of investment funds, of which £660 million will support the next generation of the Northern Powerhouse Investment Fund (HMT, BEIS)
- We are supporting regional innovation by providing Innovate UK £100 million to support pilot Innovation Accelerators (BEIS).
- We are continuing to support Local Digital Skills Partnerships which bring together employers, regional academia, the local public sector and training providers to develop targeted digital skills programmes (DCMS).
- We are supporting the Catapults programme through £1.2 billion of direct public funding over a 5-year period (2018 to 2023) (BEIS).
- We will invest £1 billion into the Net Zero Innovation Portfolio, including up to £65 million for the Flexibility Innovation Programme (BEIS).
- We are creating and implementing a new data-focused approach to green finance through a £5 million UKRI investment (UKRI).
- We are ensuring that the growth of the digital economy aligns with net zero by providing £315 million of funding to support sustainable transitions in industry, including in the data centre sector (BEIS).

Enhancing the UK's place in the world

As a Science and Tech Superpower, the UK will lead the global debate on digital technologies to seize opportunities and become a global leader. The UK is well-placed to be an international influencer, ensuring that the global ecosystem aligns with our values and using our strategic advantage in digital and tech to shape global decisions. We want to be at the forefront of shaping international thinking around digital innovation, developing common standards and supporting open trade as we move into a borderless digital age.

- In the Integrated Review of Security, Defence, Development and Foreign Policy, the Prime Minister set out a vision for the UK in 2030 to be a recognised Science and Tech Superpower. The National Science and Technology Council (NSTC) will be responsible for making key decisions on this ambition (cross-Government).
- The UK is a founding member of the Global Partnership on AI and played a leading role in the development of the OECD AI Principles (DCMS, BEIS).
- We are running for a seat on the International Telecommunication Union (ITU) Council in 2022 (DCMS, FCDO).
- We will use the G7 as a forum to champion open society principles in tech (DCMS).
- We will work through the OECD Committee on Digital Economy Policy to shape

global consensus on digital governance (DCMS).

- We are delivering the AI Standards Hub to expand international engagement and thought leadership around the development of global AI technical standards (DCMS, BEIS).
- The Centre for Data Ethics and Innovation launched the AI Assurance Roadmap setting out 6 priority areas to develop a responsible AI ecosystem (CDEI, DCMS).
- We will enhance the effectiveness of Internet governance processes, such as the Internet Corporation for Assigned Names and Numbers, the Internet Governance Forum and the World Summit on the Information Society (DCMS).
- We have agreed ambitious data provisions in trade deals with Australia; the EU; Norway, Iceland and Liechtenstein; Japan; New Zealand; and Singapore, and will continue to develop policies, principles for intervention and priority areas (DCMS, DIT).
- We are securing regulatory cooperation and other agreements on data and data governance (DCMS).
- We are taking our work forward on securing UK data adequacy partnerships with priority countries and designing alternative transfer mechanisms (DCMS).
- We are agreeing commitments in trade and other agreements, as well as promoting action across multilateral fora, to remove unjustified barriers to the free flow of data and prevent unjustified data localisation measures (DCMS, DIT).
- In 2022, we will launch the semiconductor strategy (DCMS).
- We will legislate to allow electronic transferable records for trade (DCMS).
- We are developing the UK-US Tech Partnership (DCMS, BEIS, FCDO).
- We are establishing a working group by September 2022 with relevant industry participants, to progress work to promote UK exports of leading UK technologies (DCMS, DIT, FCDO).
- We are launching a UK-Japan digital group to deepen bilateral collaboration with Japan on digital and data (DCMS).
- We are implementing the UK-India Strategic Tech Dialogue (DCMS).
- We are negotiating the UK's accession to the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (DIT).
- We are implementing the UK-Singapore Digital Economy Agreement (DCMS, DIT).