

Investing in UK R&D

There is broad consensus across the political spectrum that investing in research and innovation now will deliver economic growth, societal benefits and position the UK at the forefront of the industries of the future.

The Prime Minister has stated that his ambition is for the UK to “become a scientific superpower”, to “tackle this country’s unresolved challenges” and to “level up”. Research and innovation are central to achieving these ambitions and the UK government has made welcome commitments to increase investment in research and innovation.

This document outlines the current investment landscape, progress against the government’s targets, why a longer-term target of 3% GDP invested in R&D is important and factors that should be considered to deliver it.

UK government commitments following Autumn Budget and Spending Review 2021¹:

- Increase public funding for R&D to £20 billion per year by 2024/25, with the aim to reach £22 billion per year in 2026/27
- Increase overall UK investment in R&D to 2.4% of GDP by 2027
- Secure our status as a Science and Technology Superpower by 2030².

What is R&D?

- R&D is defined as creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of humankind, culture and society and the use of this stock of knowledge to devise new applications and includes basic research, applied research and experimental development³.

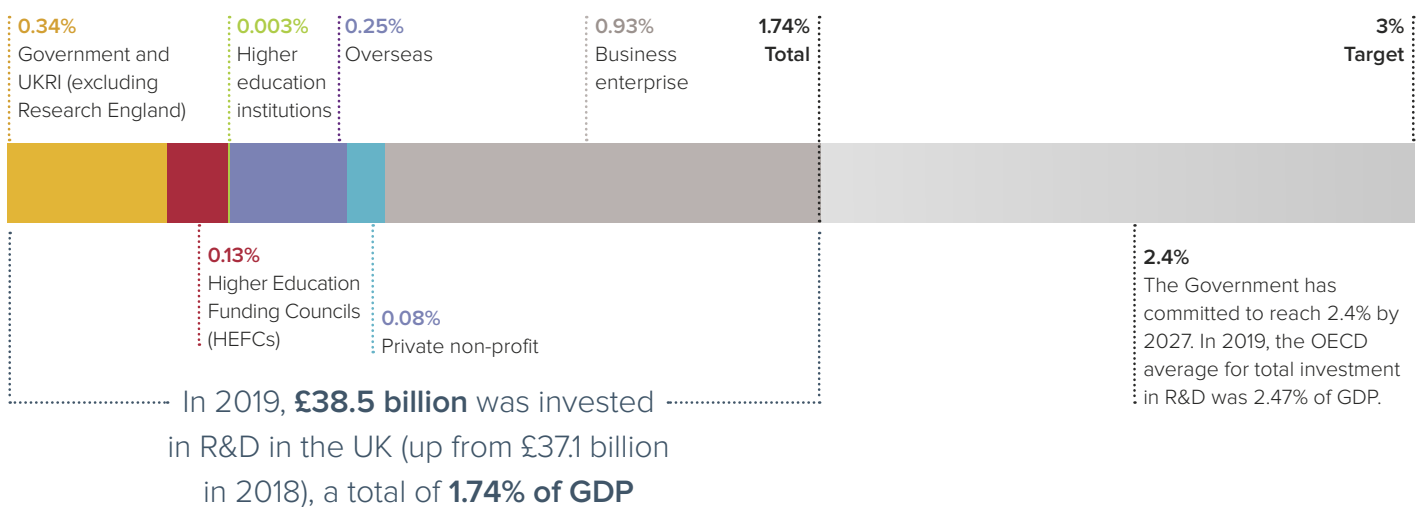
What is innovation?

- Innovation often draws on R&D, but R&D is not always part of the activity of innovation. An innovation is defined as the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations⁴.

In this explainer, we use the term ‘R&D’ in relation to official statistics and UK government targets, and the broader term of ‘research and innovation’ which better captures the range of activities involved.

In 2021/22, the UK government is investing approximately **£14.8 billion in R&D**⁵.

FIGURE 1 Where are we now? Total investment in UK R&D as a percentage of GDP⁶



Source: ONS 2021 Gross domestic expenditure on research and development, UK: 2019. See <https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/datasets/ukgrossdomesticexpenditureonresearchanddevelopment> (accessed 17 August 2021).

Why is investment in R&D important?

Investing in R&D is investing in the future. Research and innovation benefit people in the UK and around the world – they underpin our industries, create new jobs and applications that improve the quality of lives and health, enrich our cultural wellbeing, and help us respond to global challenges such as climate change.

Throughout the COVID-19 pandemic, we have witnessed the power of research and innovation in a global emergency. The UK's world leading research and innovation base, alongside

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“The single most important thing that we have learned [...] is the massive benefits to our country, to our society and to our economy of investing in science. You could not have a clearer object lesson than the discovery of the Oxford vaccine and the impact that is now having on our ability to open up our society in a way that otherwise, frankly, we could not.”

The Prime Minister on 7 July 2021⁷.

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Research and innovation can drive growth in local areas. A semiconductor cluster has formed in Wales, **contributing £172 million** to the economy in 2020 and supporting around 2,100 stable full time equivalent jobs⁹.

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Firms that consistently invest in R&D are **13% more productive** than firms that don't invest in R&D¹¹.

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The UK currently has **23 unicorn status businesses** (valued over \$1 billion) and three of the ten most dynamic regions for venture capital investment in Europe^{13, 14}. In 2020, the equity market reported a new record with investment reaching £8.8 billion, in part supported by the government's Future Fund¹⁵.

the wider international community, brought together a wealth of expertise and experience, to understand the COVID-19 pandemic and respond with new diagnostics, treatments and vaccines.

A knowledge and innovation-led economy remains the best strategy for future UK prosperity. R&D can support the UK economy's recovery and growth, and contribute to the delivery of the government's ambitions to build back better sustainably and to level up the country.

Clinical research drives improvements in health and care. The international RECOVERY trial, jointly funded through UK government and charitable investment, was the first study to identify the steroid Dexamethasone which by March 2021 **saved 1 million lives**⁸.

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In 2019, the creative economy accounted for **5.3 million jobs** and 15.7% of all UK jobs¹⁰.

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The UK is a major player in Artificial Intelligence research – in 2017 **the UK ranked fourth globally** in volume of AI research publications, behind China, the United States and India¹².

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We have the world's leading university system by size, with **four of the top ten universities in the world** and 18 in the top 100¹⁶.

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Every £1 invested in medical research delivers a return equivalent to around 25p every year, forever¹⁷.

How much does the UK invest in R&D?

In the Autumn Budget and Spending Review 2021, the UK government outlined its planned increase in public funding for R&D, from £14.8 billion in 2021/22 to £20 billion in 2024/25, with the previous target of £22 billion invested in R&D delayed to 2026/27¹⁸. This is a crucial first step to leverage other investment – from businesses, non-profit organisations (e.g. medical research charities), overseas investors and others in R&D – to reach 2.4% of GDP by 2027, and secure our status as a Science and Technology Superpower by 2030.

“Investment in infrastructure, innovation and skills will create the growth we need to pay for [world class public services].”

Rishi Sunak MP, Chancellor of the Exchequer¹⁹

FIGURE 2 UK R&D Budget allocations²⁰



Sources: HM Treasury (2021) *Autumn Budget and Spending Review 2021*.

BEIS (2020) *BEIS research and development budget allocations 2020 to 2021*.

BEIS (2021) *BEIS research and development budget allocations 2021 to 2022*.

Philip Duffy, Chief Scientific Adviser HMT (June 2020) *Oral evidence: UK Science, Research and Tech Capability and Influence in Global Disease Outbreaks* 5 June 2020.

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A race to the average: how does the UK compare to its global competitors?

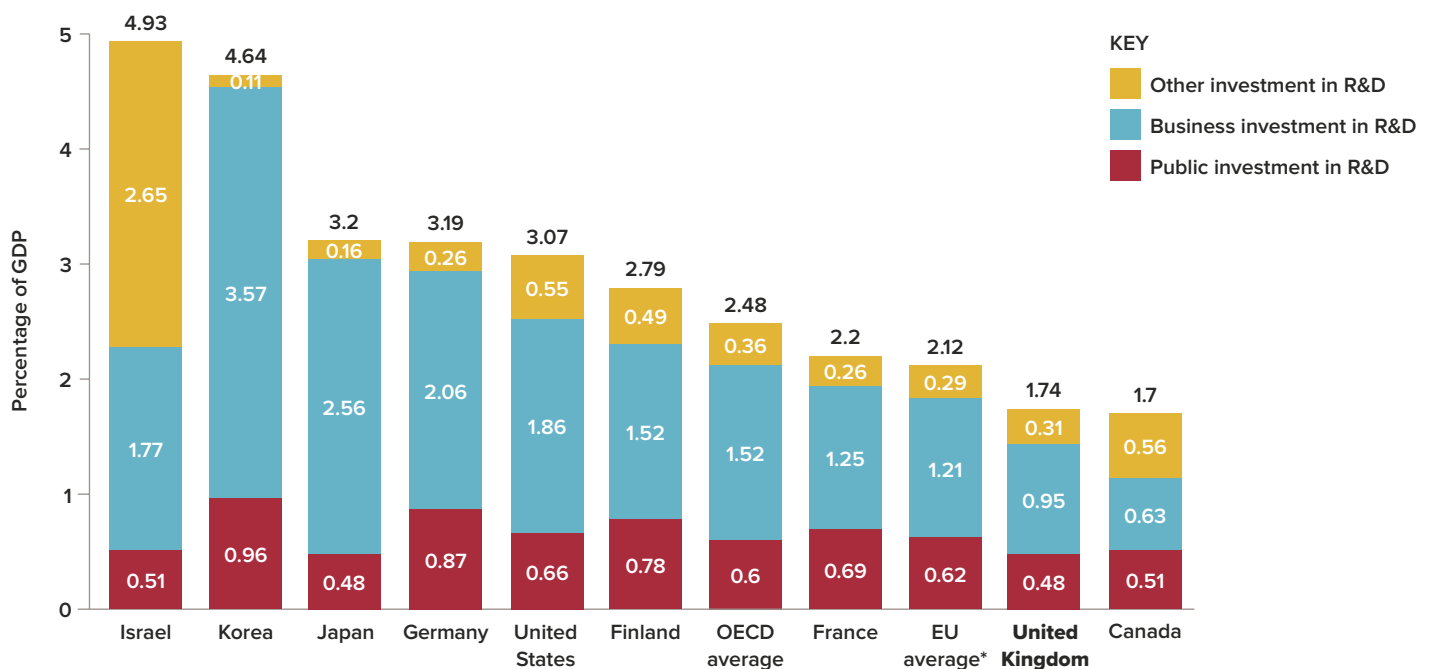
Most companies, including those established in the UK, have to make global decisions about where to situate their high-value R&D activities. In this highly competitive and internationalised climate, countries must offer a competitive research, innovation and business environment if they want to attract skilled people and companies.

The UK invests a lower percentage of GDP in R&D than most of our competitors, many of whom have also launched specific strategies targeted at boosting their innovation performance, including increasing their R&D investment. In 2019, average total R&D spend across the OECD equated to 2.5% of GDP²¹.

The UK's 2.4% target is a race to just below the average, which is why the longer term goal of 3% is important:

- US investment in R&D is at 3% of its GDP²².
- China's investment in R&D is at 2.2% of its GDP and it plans to increase its R&D spending by more than 7% annually for the next five years²³. In 2020, China's spending on R&D hit a record \$377.8 billion²⁴.
- Israel's investment in R&D is at 4.9% of its GDP²⁵.
- Germany's investment in R&D is at 3.19% of its GDP²⁶.

FIGURE 3 How does UK investment in R&D compare internationally?



Please note, ONS data has been used for the UK for greater accuracy.

Source: ONS 2021 Gross domestic expenditure on research and development, UK: 2019.

See <https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/datasets/ukgrossdomesticexpenditureonresearchanddevelopment> (accessed 17 August 2021).

OECD Main Science and Technology Indicators (2019).

Delivering 3%: factors to consider

To achieve its ambitions and be globally competitive, the UK must build an attractive environment for research and innovation that encourages greater private investment and increases research and innovation activity. Public investment is a key part of this, creating the certainty needed to attract further investment from the private sector. The UK must also train, attract and retain skilled people; create a regulatory environment and build infrastructure that fosters research and innovation through public services, universities and businesses; and attract global investment, incentivising companies to locate their R&D here.

To be a global science superpower, the UK needs to grow its domestic science, research and innovation capabilities, develop and train our domestic talent base and attract research and innovation intensive industries and talented people from around the world to work in and collaborate with the UK.

Investment by foreign-owned business makes up **almost half (48%)** of UK private R&D expenditure in the UK²⁷.

Each £1 of public R&D expenditure stimulates £0.41 – £0.74 of private R&D in the same year, which becomes £1.96 – £2.34 after five to 15 years²⁸.

Business expenditure on R&D is quite concentrated: five enterprise groups (enterprises under the same owner) accounted for **17% of expenditure** on R&D performed in UK businesses in 2019²⁹.

Following the reduction in the Official Development Assistance investment target in Spending Review 2020³⁰, ensuring the UK is a partner of choice should be a focus moving forward in building the UK as a research and innovation superpower by 2030³¹. Spending Review 2021 sets out **£3.3 billion R&D Official Development Assistance** between 2021/22 and 2024/25 and forecasts that fiscal tests will be met in 2024/25 to return to 0.7% GNI invested in ODA³².

The upfront cost of work and study visas for researchers and innovators considering working in the UK can be **up to six times higher** compared to other leading science nations³³.

The UK Innovation Survey 2019 found that **38% of UK businesses were innovation active**, down from 49% in 2014 – 2016. Lack of qualified personnel and costs were two of the main barriers cited³⁴.

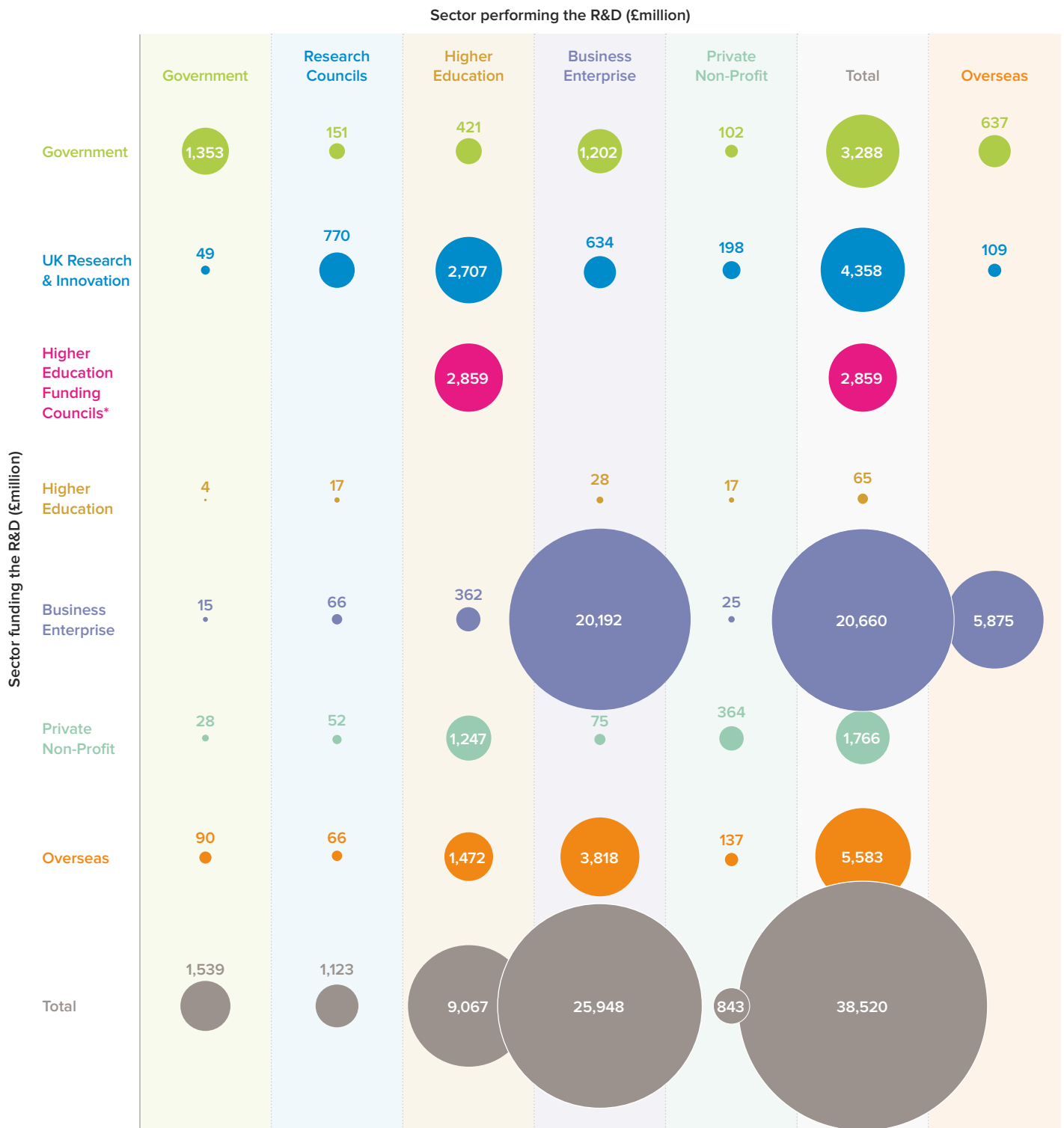
Public perception and engagement matters – 82% of people agree that science is such a big part of our lives that we should all take an interest in it, and yet only 47% of people believe that innovation has had a positive impact on people like themselves^{35, 36}.

Maximising the potential of UK R&D will be enhanced by achieving association with European Union research and innovation programmes as set out in the UK-EU Trade and Cooperation Agreement.

UK R&D is funded and performed by multiple organisations

R&D is funded and performed by many different public, private and overseas players. Multiple interdependencies exist between these different organisations.

FIGURE 4 Relationship between funders and performers of UK R&D



Source: ONS. 2021 Gross domestic expenditure on research and development, UK: 2019 (Table 1).

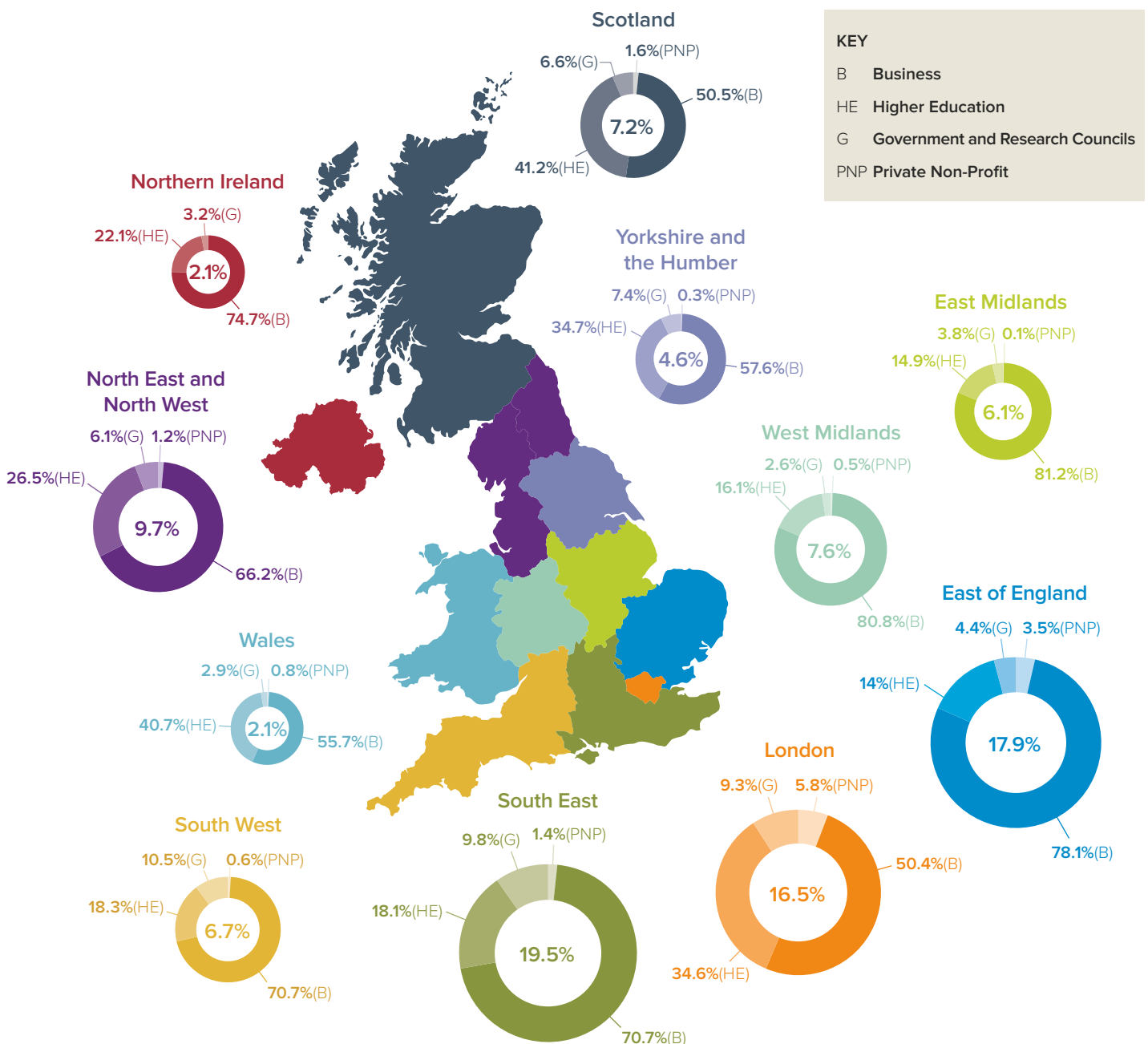
See <https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/datasets/ukgrossdomesticexpenditureonresearchanddevelopment> (accessed 17 August 2021).

*including Research England

Different UK regions have different strengths and dependencies

There is strong research and innovation activity across the UK, but more can be done to stimulate greater collaboration within and across regions and jurisdictions. A successful research and innovation system should benefit the whole country, recognising that the UK and its industries are not uniform and creating opportunities for local strengths to transform areas by acting as a driving force for social innovation, local growth and improved productivity.

FIGURE 5 How is R&D investment in the UK's nations and regions divided?



Source: ONS 2021 Gross domestic expenditure on research and development, UK: 2019 (Table 6).
 See <https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/datasets/ukgrossdomesticexpenditureonresearchanddevelopment> (accessed 17 August 2021).

The UK's industries are not uniform and investment in R&D changes over time

The level of R&D investment by different UK business sectors has changed over time. Realising the benefits of increased investment in research and innovation will mean considering how to capitalise on the existing strengths within sectors as well as taking advantage of upcoming opportunities in emerging sectors and technologies.

FIGURE 6 Top 10 business sectors performing R&D in the UK



Source: ONS (2021) Business enterprise research and development, UK 2020 (Table 2).
 See <https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/datasets/ukbusinessenterpriseresearchanddevelopment> (accessed 26 November 2021).

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