

# Investing in UK R&D

There is broad consensus across the political spectrum to increase total investment in UK research and development (R&D). The Government has committed to investing £22 billion in R&D by 2024 – 25 as part of a target of 2.4% of GDP by 2027, and 3% in the longer-term. A wide-ranging R&D roadmap has been published to help shape and deliver this agenda.

To deliver an overall increase in R&D investment, the UK needs to foster research and innovation throughout public services, universities and businesses, and attract global investment, incentivising companies to locate their R&D here. Only by doing this will we enable research and innovation to help improve the health and wealth of the country.

In 2018, **£37.1 billion** was invested in R&D in the UK (up from £34.8 billion in 2017)<sup>1</sup>.

This document outlines the investment landscape in 2018<sup>2</sup>, why £22 billion and the longer-term 3% target is important and factors that should be considered to deliver it.

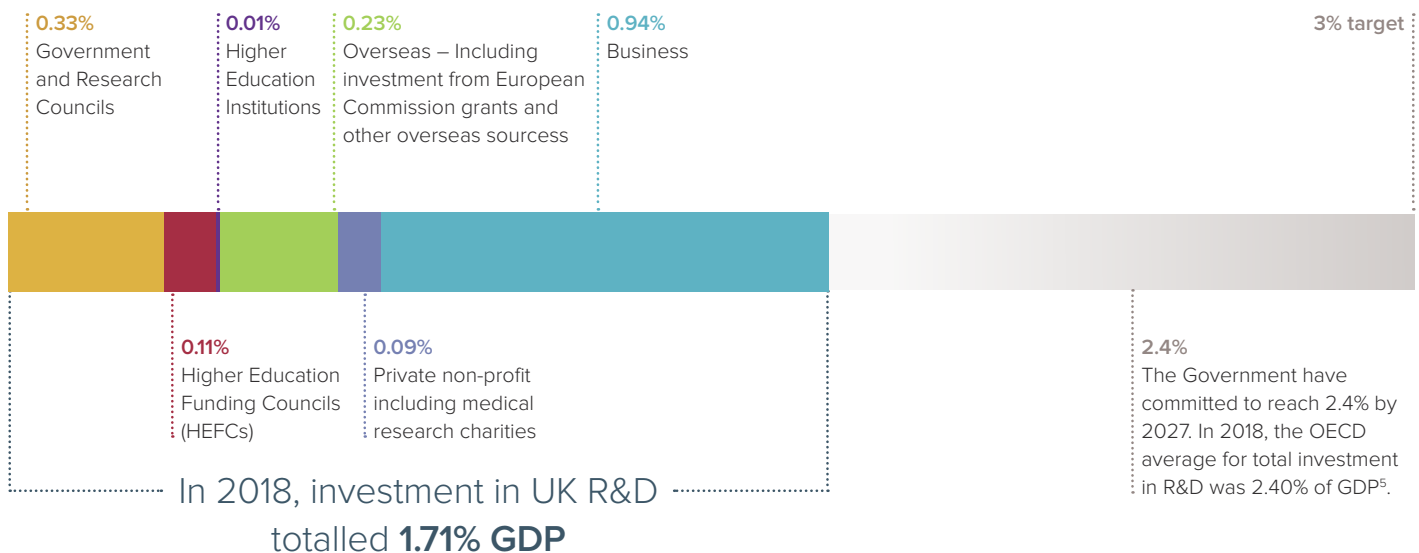
### What is R&D?

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 development<sup>3</sup>.

### 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 relations<sup>4</sup>.

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



Source: ONS (2020) UK gross domestic expenditure on research and development, 2018. Note – figures are rounded.

1. ONS (2019) UK gross domestic expenditure on research and development, 2018. Note – figures are rounded.
2. The most recent year for which data is available.
3. OECD (2015) Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development, The Measurement of Scientific, Technological and Innovation Activities. OECD Publishing, Paris.
4. OECD/Eurostat (2005) Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data, 3rd Edition, The Measurement of Scientific and Technological Activities. OECD Publishing, Paris.
5. OECD (2018) Main Science and Technology Indicators.

# Why is investment in R&D important?

R&D and innovation benefits people in the UK and around the world by underpinning our industries, creating jobs and applications that improve the quality of our lives and enriching our cultural wellbeing.

Innovation is instrumental in delivering the economic and productivity gains associated with investment in research. The UK's world-leading research base provides an excellent source of new ideas and discoveries, which, through

innovation, can result in advances in our economy, social wellbeing and health. The increase in productivity boosts the capacity of the economy to produce more in the long term.

To innovate, we need to invest in research to drive new breakthroughs, and in the innovation system to develop these ideas into new and improved products, services and approaches.

## COVID-19

The effects of the COVID-19 pandemic on our economy, health and social wellbeing have been profound. Its impact is also being widely felt across the R&D sector. The crisis has created new challenges, exposed and exacerbated existing vulnerabilities. A successful research and innovation system is vital to our immediate recovery and to rebuilding as a prosperous, resilient and sustainable society. This requires people and infrastructure supported by meaningful investment to pursue research of all kinds, creating new knowledge, innovations and jobs, protecting our international position and ability to respond effectively to global challenges.

Clinical research can drive improvements in health and care. For example, the RECOVERY trial was the first study to identify a drug (Dexamethasone) shown to improve survival in patients with severe respiratory complications of COVID-19<sup>8</sup>.

In 2019, the creative economy accounted for **5.3 million filled jobs** and 15.7% of all UK jobs<sup>6</sup>.

The UK's pharmaceutical industry alone employs **63,000 people with 23,000 dedicated to R&D** (ABPI)<sup>9</sup>.

Firms that consistently invest in R&D are **13% more productive** than firms that don't invest in R&D<sup>7</sup>.

Every £1 invested in medical research **delivers a return equivalent to around 25p** every year, forever<sup>10</sup>.

6. Gov.uk (2019) DCMS Sectors Economic Estimates 2019: Employment.

7. Department for Business Innovation and Skills (2014) Innovation Report 2014: Innovation, Research and Growth.

8. The RECOVERY Collaborative Group (2020) Dexamethasone in Hospitalized Patients with Covid-19 — Preliminary Report.

9. ABPI (2020) 2020 Manifesto for Medicine.

10. Wellcome Trust, National Institute for Health Research, Academy of Medical Sciences, Medical Research Council, Arthritis UK (2017) Medical research: What's it worth?

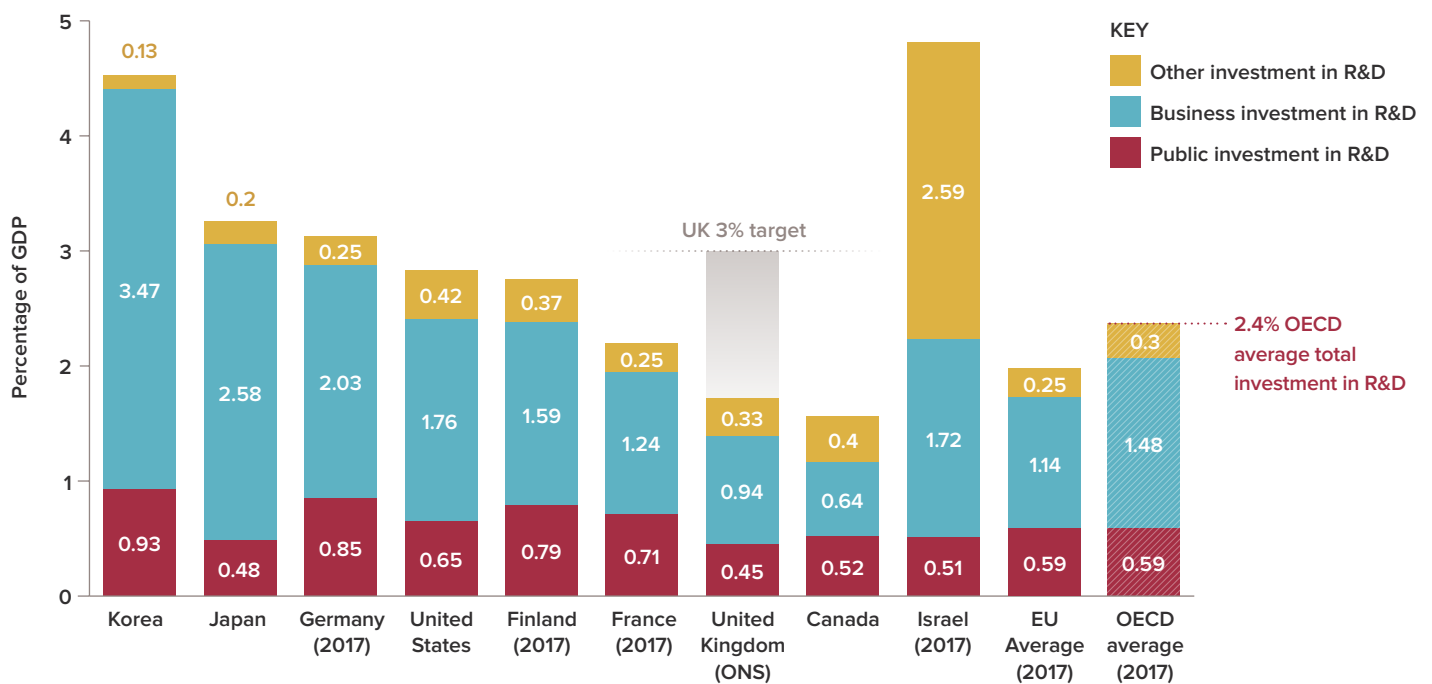
# A race to the top: how does the UK compare to its global competitors?

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 2018, total R&D spend across the OECD equated to 2.4% of GDP, up from 2.37% in 2017. The UK's 2.4% target is a race to the average, which is why the longer-term goal of 3% is important.

To compare data on investment with other OECD countries, publicly funded R&D has been grouped together. For the UK, public investment includes Government and Research Council investment as well as Higher Education Funding Council (HEFC) investment. Overseas, private non-profit and non-HEFC Higher Education investment are grouped under 'other investment in R&D'.

**FIGURE 2** How does UK investment in R&D compare internationally?



Please note, ONS data has been used for the UK for greater accuracy. Some countries have not yet published data for more recent years, in which case the latest available data has been used.

Sources: ONS (2020) UK gross domestic expenditure on research and development, 2018. OECD Main Science and Technology Indicators (2018). Data for comparator countries shown. Note – figures are rounded.

# Public investment in R&D

Since 2010 both the UK and the OECD as a whole have seen a general decline in the amount of public investment in R&D as a percentage of GDP. The UK Government's commitment to increase public investment to £22 billion per year by 2024 – 25 represents a significant real terms and proportionate increase.

The target of 2.4% of GDP also includes investment in R&D from business and non-profit organisations (e.g. medical research charities) and, while we know that government investment in research and innovation leverages other investment, this is harder to project.

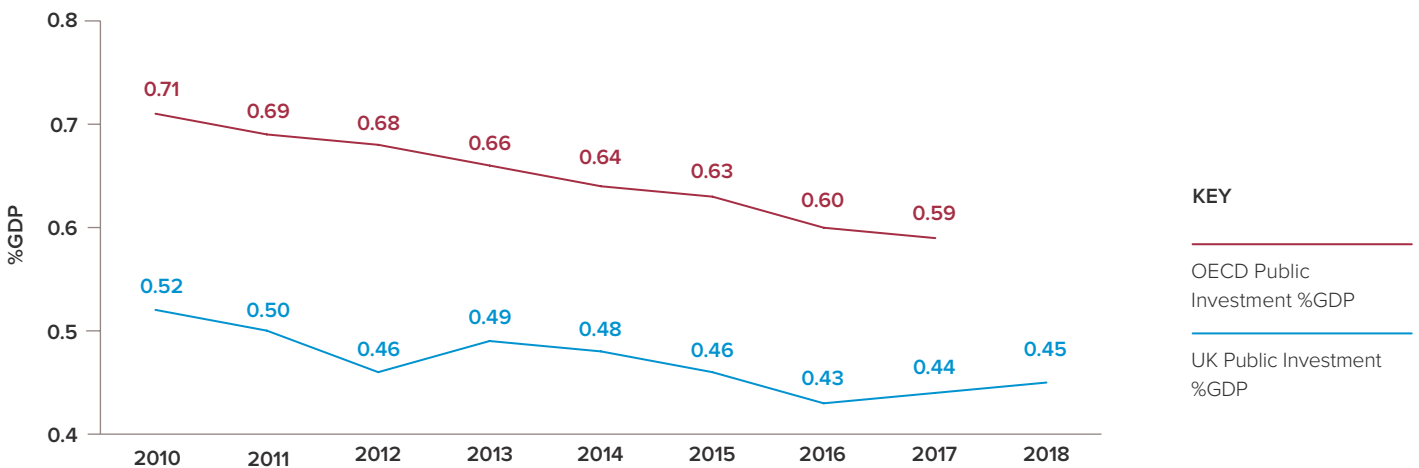
Overseas investment, including from EU funding programmes (such as Horizon Europe and European Structural and Investment Funds), also makes a significant contribution towards total investment and leverages funding from other sources. Maximising the potential of UK R&D will be problematic without realising the closest achievable association with EU research and innovation programmes.

In 2018, public investment in UK R&D totalled **£10 billion**.

Over the current Horizon 2020 spending period, UK organisations have received circa **€2.01 billion** in ERC funding, and **€1.06 billion** under the MSCA grants<sup>11</sup>.

The Government has committed to increasing investment in science and innovation annually up to 2025.

**FIGURE 3** Public investment in UK R&D: 2010 – 2018



Sources: ONS (2020) UK gross domestic expenditure on research and development, 2018. Note – figures are rounded. OECD Main Science and Technology Indicators (2016)

11. European Commission (2020) Horizon 2020 Dashboard.

# Delivering 3%: Factors we need to consider

Increased public investment in R&D is welcome. To ensure that the UK research and innovation system can make best use of increased funding, changes to other aspects of the system, including infrastructure, mobility and regulation are necessary.

For every £1 spent by the government on R&D, private sector R&D output rises by 20p per year in perpetuity, by raising the level of the UK knowledge base<sup>12</sup>.

39% of UK firms have difficulties recruiting staff with skills in science, technology, engineering and mathematics<sup>15</sup>.

Seed corn funding, small amounts of funding in areas where little funding is available, or funding that offers researchers mobility and encourages collaborations can have a bigger impact than monetary values might suggest<sup>13</sup>.

The UK must increase business R&D to deliver the 3% target. Business investment into UK R&D currently represents 0.94% of GDP, of which 53% is made by foreign-owned businesses<sup>16</sup>.

The UK's fastest growing scientific collaborators are elsewhere in Europe. Between 2014 and 2018, 33.5% of UK research papers were co-authored with other EU and associated countries<sup>14</sup>.

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 nations<sup>17</sup>.

12. Haskel J, Hughes A, Bascavusoglu-Moreau E (2014) The Economic Significance of the UK Science Base. A report for the Campaign for Science and Engineering.

13. The British Academy (2016) Crossing paths: Interdisciplinary institutions, careers, education and applications.

14. Royal Society (2019) Submission to the Adrian Smith Review.

15. Confederation of British Industry (2015) Inspiring Growth: CBI/Pearson education and skills survey 2015.

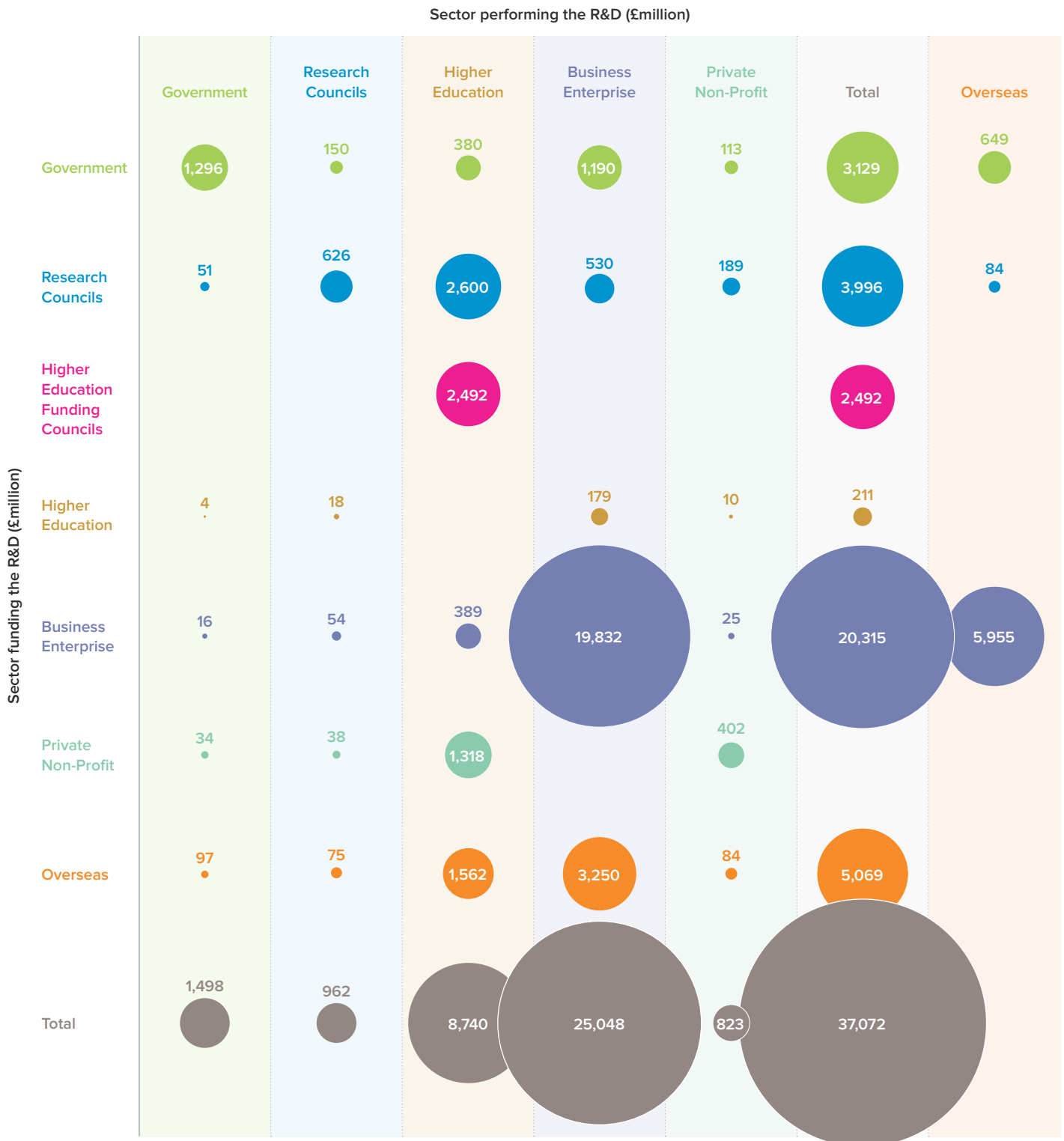
16. ONS (November 2019) Business Enterprise Research and Development, Dataset 23: Expenditure on R&D performed in UK businesses, UK or overseas ownership

17. Royal Society (2019) UK Science and immigration: why the UK needs an internationally competitive visa offer.

# 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 actors.

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

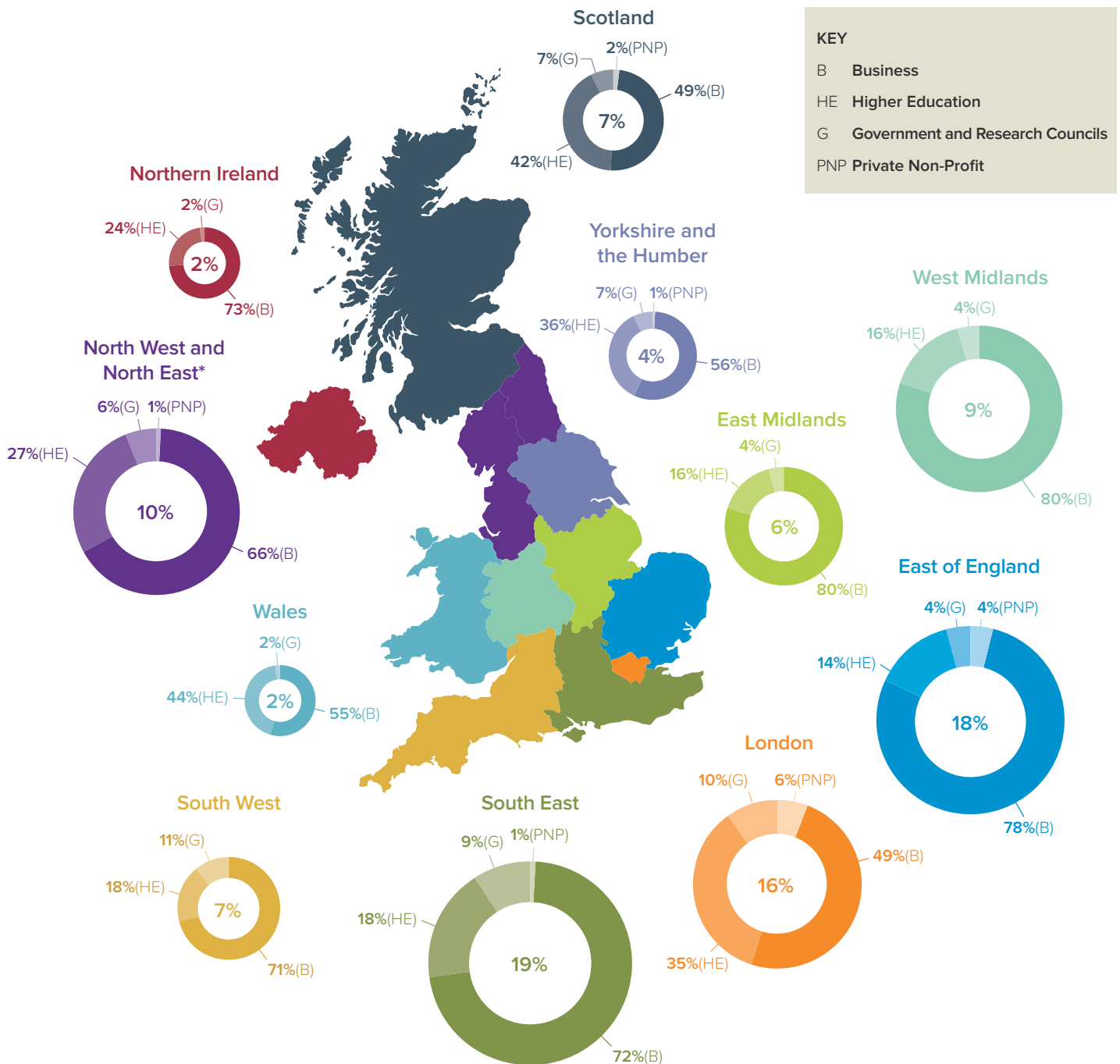


Source: ONS (2020) UK gross domestic expenditure on research and development, 2018. Note – figures are rounded.

# Different UK regions have different strengths and dependencies

R&D spending varies from region to region, with each having different strengths and dependencies. A successful research and innovation system should be guided by a national vision and benefit the whole country, while recognising that the UK and its industries are not uniform.

**FIGURE 5** Where is investment in UK R&D spent?

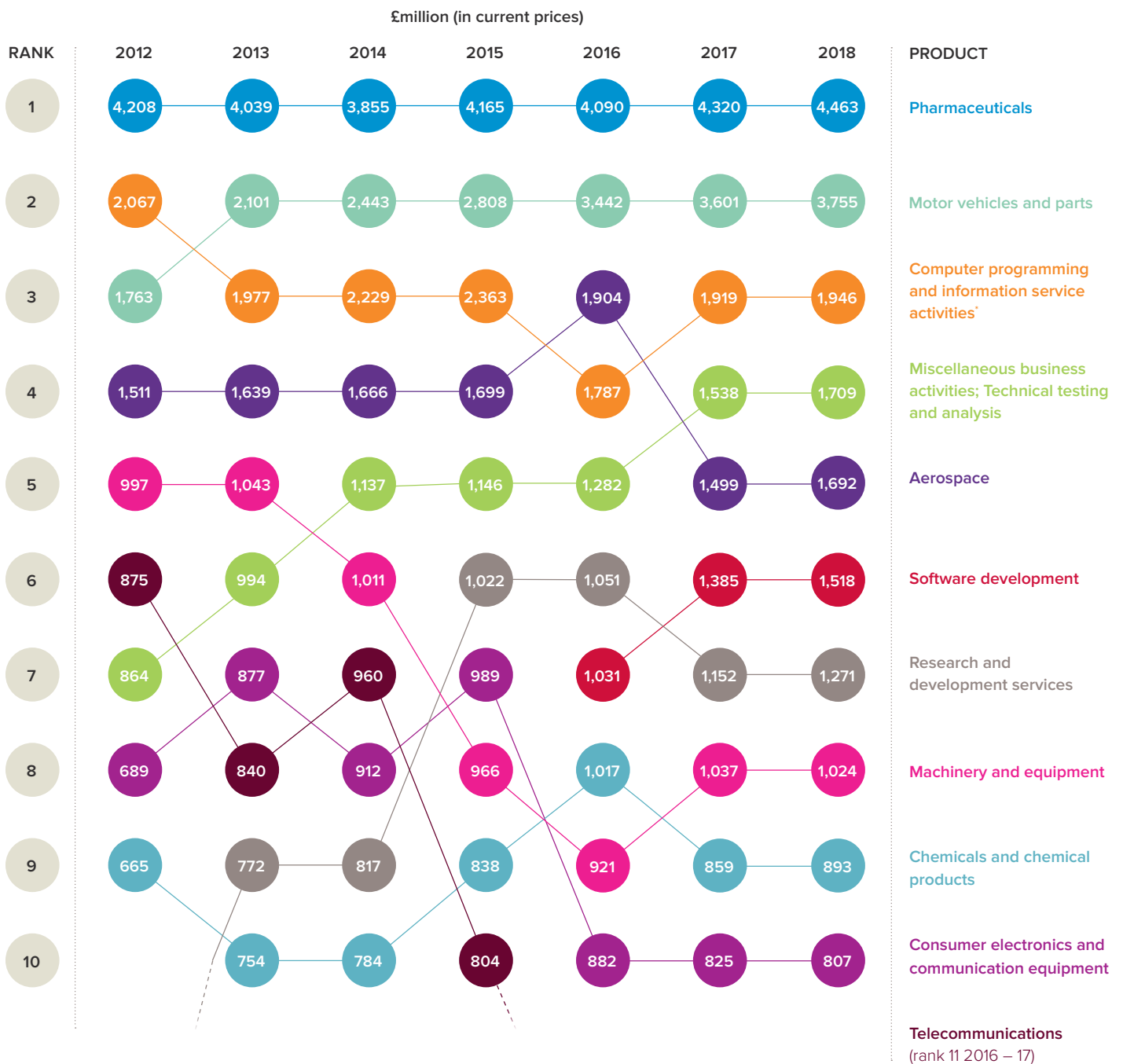


Source: ONS (2020) UK gross domestic expenditure on research and development, 2018. Note – figures are rounded.  
 \*North West and North East regions' data were combined in 2018 due to confidentiality.

# 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 (2020) Business enterprise research and development, 2018. Note – figures are rounded.

\*Prior to 2016 'Software development' is included in the product group 'Computer programming and information service activities'.

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