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Northern Ireland Research and Development 2018

Statistics Bulletin

Introduction

- This bulletin provides estimates on the level of Research and Development¹ (R&D) activity in Northern Ireland and includes R&D performed by businesses (BERD), higher education (HERD) and government (GERD).
- R&D is viewed as a key indicator of innovation in an economy. The [draft Industrial Strategy for Northern Ireland](#) is based around five pillars for growth, one of which is 'Accelerating Innovation and Research', and total spend on R&D is one of the indicators upon which success in this area will be measured.
- Progress towards some of the long-term goals and medium-term targets of the [Northern Ireland Innovation Strategy](#) is also measured using data contained in this statistical release.

Key Points

Total R&D Expenditure

- In 2018, £794 million (m) was spent on R&D by Businesses, Higher Education and Government in Northern Ireland (5.2% more than 2017).
- Of the £794m, 69.2% was spent by Businesses, 27.9% by the Higher Education sector and 2.9% by Government departments.

Business R&D Spend

- A total of 961 companies engaged in business R&D in 2018, an increase of 7.1% compared with 2017 (897 companies). The ten biggest spending companies accounted for one-third of all R&D spend in 2018.
- In-house R&D work accounted for the vast majority (95.4%) of spend in 2018 and the majority of this was self-funded by the company (62.1%).
- In 2018, there were 8,010 full-time equivalents working in R&D roles in NI; 41.0% worked as researchers, 30.4% as technicians and 28.6% were other staff.

¹ Following internationally agreed standards as defined by the OECD in the [Frascati Manual \(2015\)](#).

Definition: R&D comprises creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture and society – and to devise new applications of available knowledge.

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National Statistics

The United Kingdom Statistics Authority has designated these statistics as National Statistics following a full [assessment](#) in June 2012. The assessment was undertaken for [Statistics on Business and Trade in Northern Ireland](#) in accordance with the Statistics and Registration Service Act 2007 and signifying compliance with the [Code of Practice for Official Statistics](#).



National Statistics status means that official statistics meet the highest standards of trustworthiness, quality and public value.

All official statistics should comply with all aspects of the [Code of Practice for Official Statistics](#). They are awarded National Statistics status following an assessment by the Authority's regulatory arm. The Authority considers whether the statistics meet the highest standards of Code compliance, including the value they add to public decisions and debate.

It is NISRA's responsibility to maintain compliance with the standards expected of National Statistics. If we become concerned about whether these statistics are still meeting the appropriate standards, we will discuss any concerns with the Authority promptly. National Statistics status can be removed at any point when the highest standards are not maintained, and reinstated when standards are restored.

Since the assessment by the UK Statistics Authority, we have continued to comply with the Code of Practice for Statistics, and have made the following improvements:

- Redesigned the Research and Development report, providing more information on the importance of the statistics by setting recent changes within context of longer term trends;
- Provided clear information on the size of revisions made to all three types of measured research and development (Business, Higher Education and Government);
- Provided clear information on the sampling method and the size of imputations;
- Improved the presentation of R&D findings to include more easily accessible formats including increased infographics and graphical presentation;

1 Summary & Commentary

1.1 Context

Business expenditure on R&D (BERD) constitutes the largest component of total R&D activity and the data to inform this component are collected in the NI Research & Development Survey administered by NISRA Economic & Labour Market Statistics Branch. The questionnaire used follows the same structure and includes the same questions as that used by [ONS](#) to collect R&D data from GB businesses.

The data contained in this report covers R&D activity carried out in Northern Ireland in the year ending December 2018² and all figures quoted are in current prices unless otherwise stated.

All results contained in this bulletin are provisional and may be subject to revision to take account of any additional information received subsequent to publication. Throughout this publication, totals may not sum due to rounding (to 1 d.p.).

Detailed data tables can be accessed via the links in Section 6.

1.2 R&D Explained

R&D is broadly characterised by investigation or experimentation, the intended outcome of which is new knowledge including knowledge of culture and society (with or without a specific practical application), enhanced materials, products, devices, processes or services. R&D covers three types of activity:

1. **Basic research** – Work undertaken to acquire new knowledge without a specific application in mind;
2. **Applied research** – Work undertaken to acquire new knowledge with a specific application in mind;
3. **Experimental development** – Work using the results from basic and/or applied research for the purpose of creating new or improved products / processes.

Northern Ireland's R&D activity is measured by the amount of money spent performing R&D by an organisation, either in-house or purchased from another source, and must involve elements of the five criteria below:

1. **Novel** - To be aimed at new findings;
2. **Creative** – To be based on original, not obvious, concepts and hypotheses;
3. **Uncertain** – To be uncertain about the final outcome;
4. **Systematic** – To be planned and budgeted;
5. **Transferable/reproducible** – To lead to results that could possibly be reproduced.

² Companies were given the option of supplying data for a business year ending on any date between 6 April 2018 and 5 April 2019

2 Overall R&D Activity in Northern Ireland

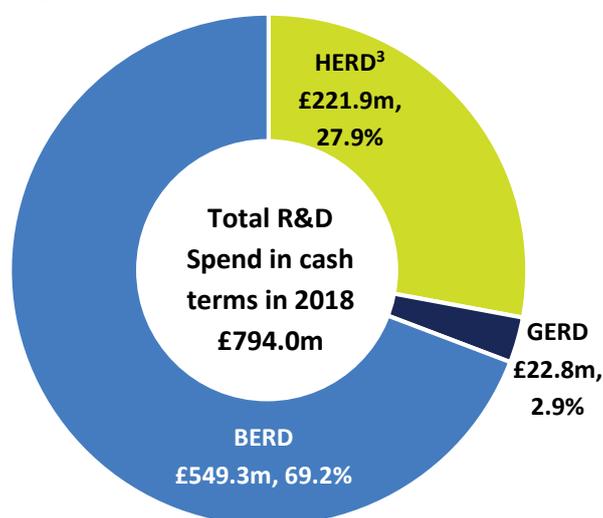
2.1 Total Expenditure on R&D in Cash Terms and Real Terms

Cash Terms

The total expenditure on R&D in Northern Ireland in cash terms was £794 million (m) in 2018. The majority of this (69.2%) was carried out by Businesses (BERD), while 27.9% was undertaken by Higher Education establishments (HERD) and 2.9% by Government departments (GERD).

Total R&D spend increased by £38.9m between 2017 and 2018. This overall increase was driven by increases of £25.8m in Higher Education spend; an increase of £10.7m in Business spend; and a £2.5m increase in Government spend (Section 6, Table 1).

Figure 1: Northern Ireland R&D spend in cash terms

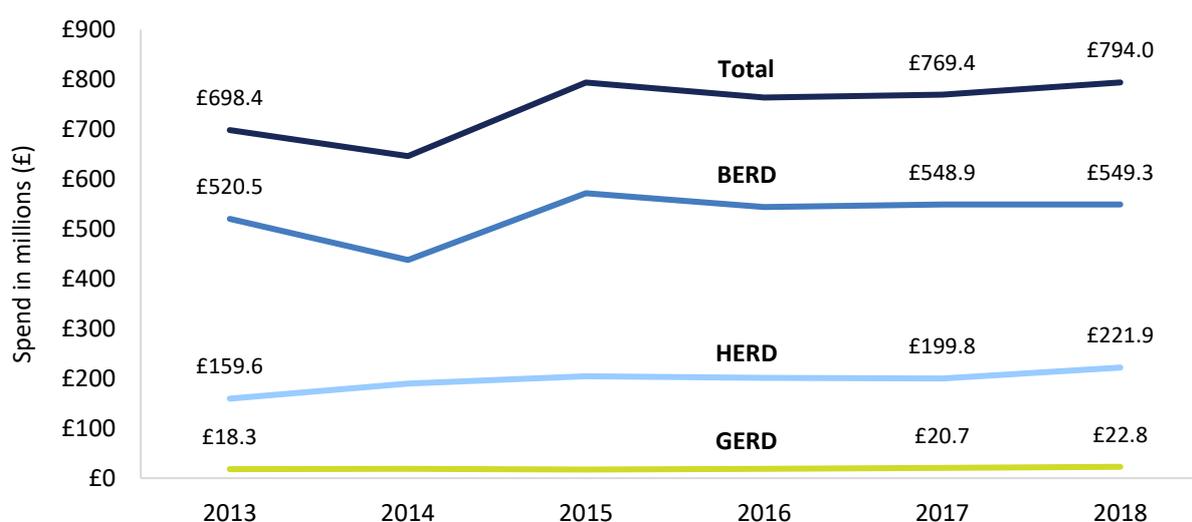


Real Terms

Total R&D spend increased by 3.2% in real terms between 2017 and 2018. Higher Education and Government expenditure on R&D both increased over the year by 11.1% and 10.1% respectively. Business expenditure on R&D has been relatively constant in real terms over the last 3 years.

Since 2013, there has been a 13.7% increase in total R&D spending in real terms (Business: +5.5%, Higher Education: +39.0%, Government: +24.7% (Section 6, Table 2)).

Figure 2: Northern Ireland R&D spend from 2013 - 2018 in real terms⁴



Analysis of company spend throughout the remainder of the report is detailed in cash terms.

³To avoid double counting, higher education expenditure in Figure 1 and 2 excludes £1.0m in 2018 and £0.5m in 2017 that was reported to be carried out by businesses.

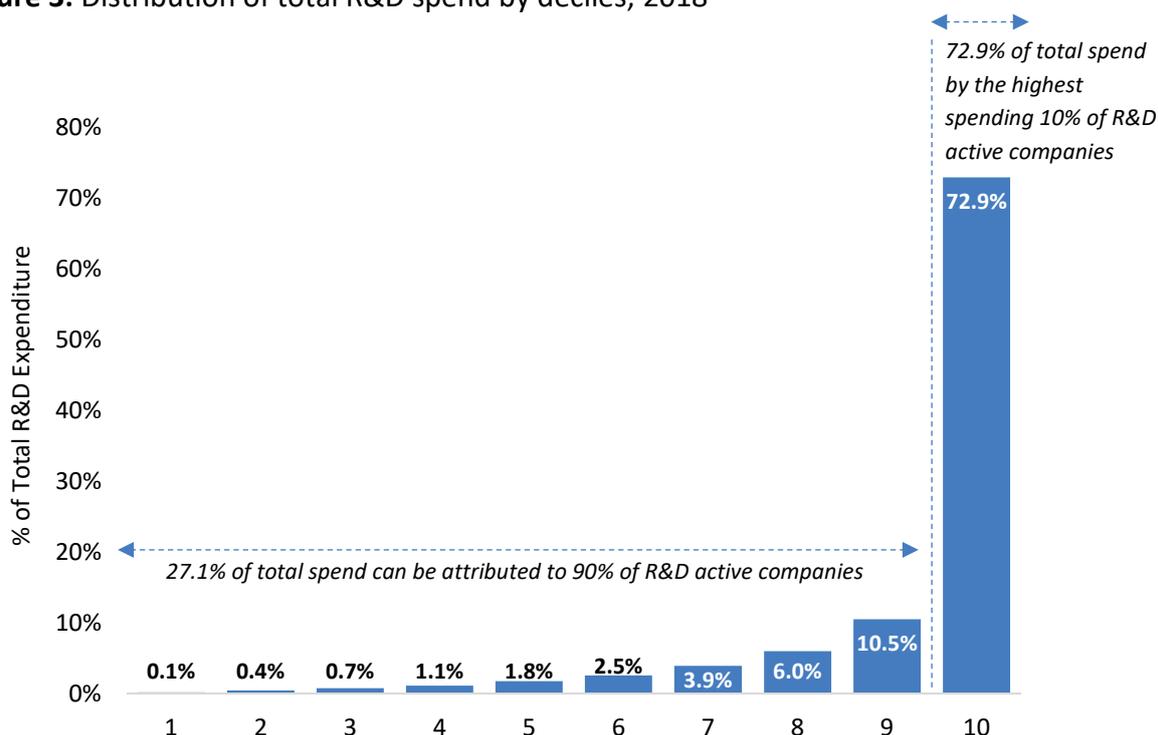
⁴GDP deflator used to convert cash terms to real terms: 2013 (92.068), 2014 (93.753), 2015 (94.298), 2016 (96.314), 2017 (98.136), 2018 = 100.00. Source: [ONS deflators at market prices, September 2019 \(Quarterly National Accounts\)](#)

3 Business R&D Activity in Northern Ireland

3.1 Business R&D: Spend Breakdown

In total, £549.3m was spent on R&D by 961 companies during 2018. Figure 3 below shows that the majority of spend (72.9%) was by the highest spending 10% of R&D companies. One-third of the £549.3m spent on BERD in 2018 was carried out by the ten biggest spending companies. Median spend on R&D per company was £120,000, however as is presented in this bulletin, spend varies due to a range of factors, e.g. nature of the business (industrial sector) or company size.

Figure 3: Distribution of total R&D spend by deciles, 2018



BERD consists of two broad components; in-house and purchased R&D. In-house expenditure accounted for 95.4% of total BERD spend in 2018 and purchased BERD for the remaining 4.6%.

The two components of in-house R&D expenditure are non-capital (salaries & wages and other costs) and capital expenditure (land & buildings and plants & machinery). Non-capital expenditure, including spend on salaries and wages, materials, supplies and services accounted for 90.2% of total BERD and 94.5% of in-house BERD.

Capital expenditure including spend on land, buildings, equipment and machinery accounted for 5.5% of in-house spend (Section 6, Tables 4, 5 and 12).

Figure 4: Breakdown of total BERD expenditure in NI in 2018

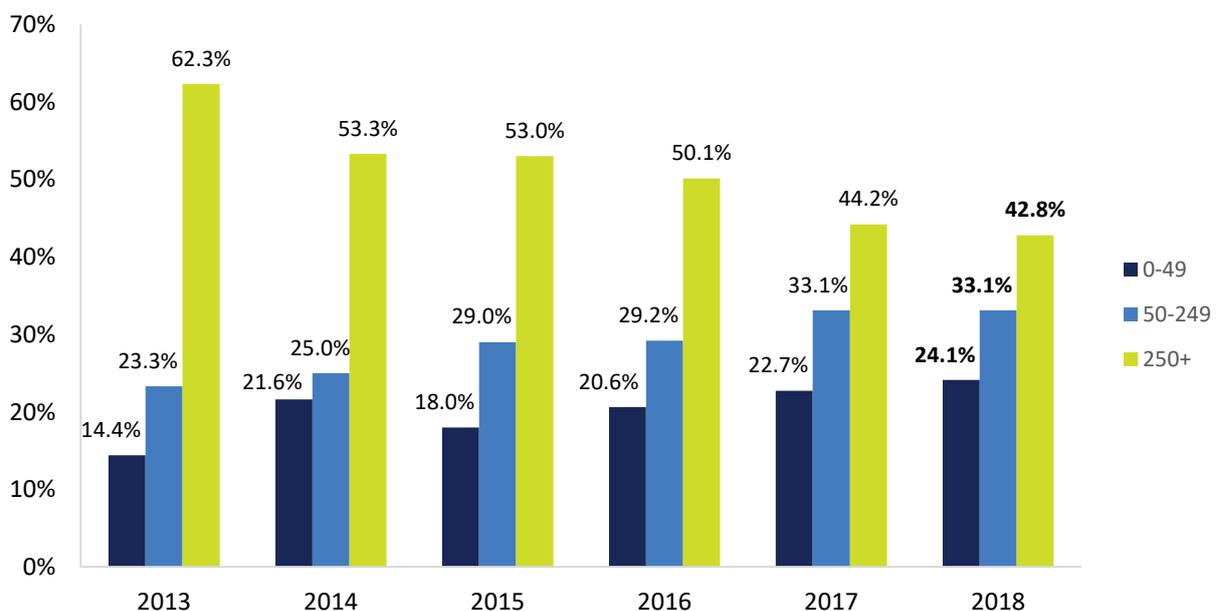


3.2 Business R&D: Company Size⁵

Large companies (with 250 or more employees) accounted for 42.8% of BERD in 2018, although they represented only 6.7% of all R&D performing companies. Small firms (those with less than 50 employees) accounted for 24.1% of BERD and represented 71.6% of R&D performing companies in 2018.

Figure 5 below shows that the proportion of BERD attributed to large companies has decreased over the last five years, from 62.3% in 2013 to 42.8% in 2018. In contrast, the proportion of BERD attributed to small and medium sized companies has increased (Section 6, Tables 6, 7 and 8).

Figure 5: Breakdown of total BERD expenditure by company size*, 2013 - 2018

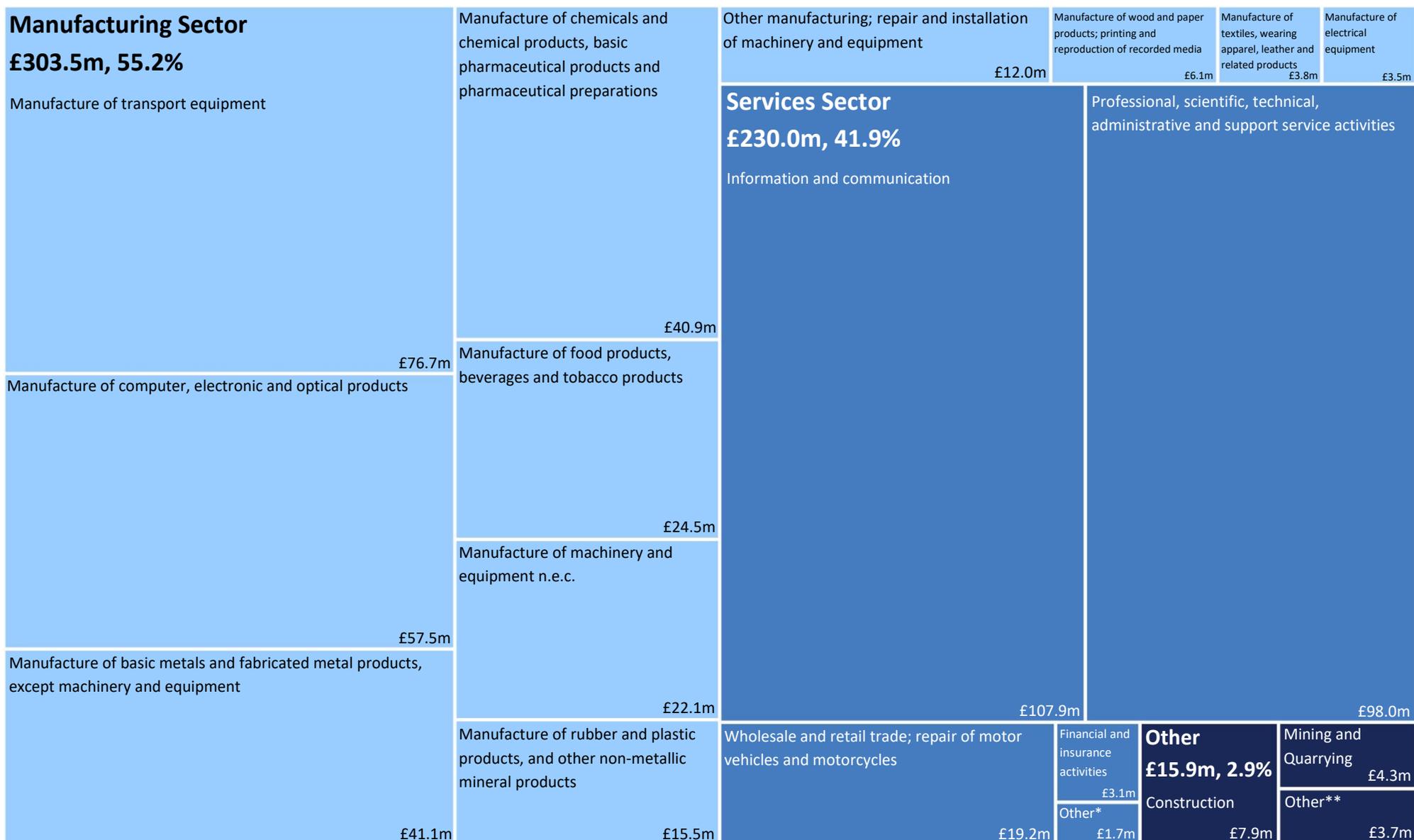


⁵The European Commission definition of Small Medium Enterprises (SME) used is defined as being enterprises with less than 250 employees and large companies as being enterprises with more than 250 employees.

*Company size based on persons on payroll.

3.3 Business R&D: Sectoral Breakdown

Figure 6: Breakdown of total BERD expenditure by sector (based on SIC 2007 classification)⁶, 2018



⁶The sectoral analyses are based on the Standard Industrial Classification 2007 (or SIC 2007) of industries. Data prior to 2009 are on a SIC 2003 basis. Care should therefore be taken when making comparisons with previous reports. More details on SIC 2007 are available via ONS online.

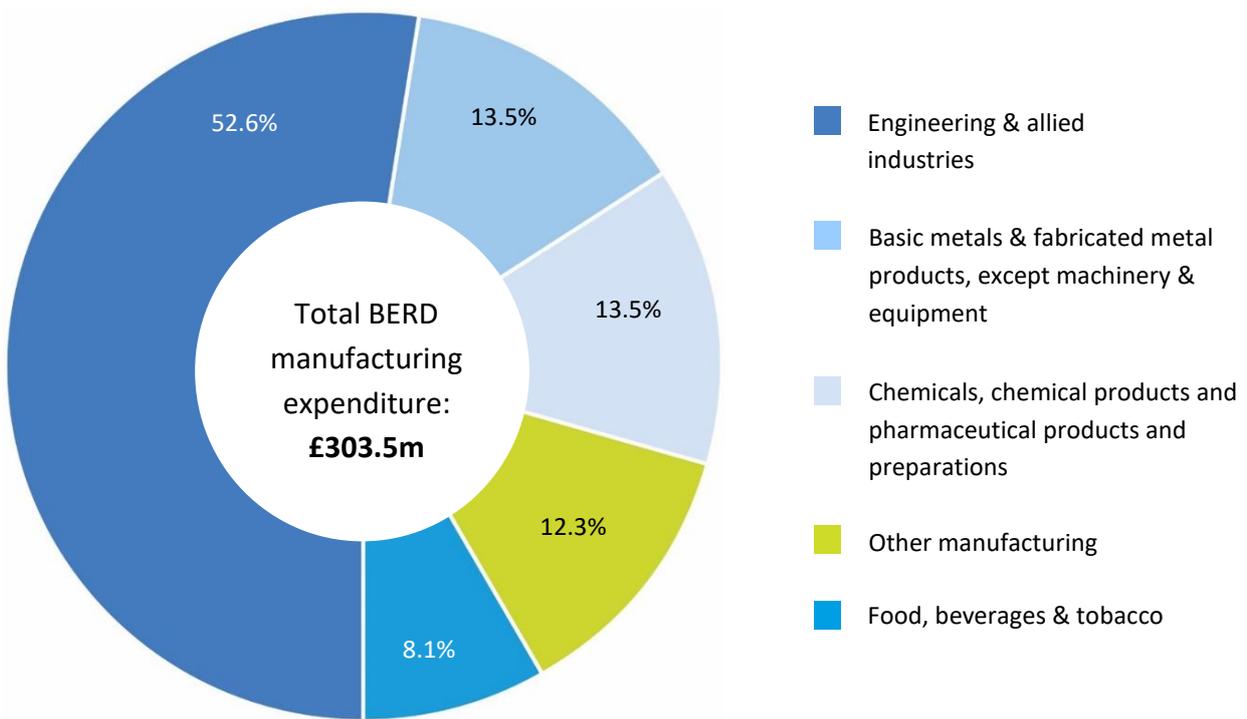
*Other service sectors include: H, Transportation and storage; O-Q, Public administration and defence, education, human health and social work activities; R-U, Other service activities.

**Other sectors include: A, Agriculture, forestry and fishing; D, Electricity, gas, steam and air conditioning supply; E, Water supply, sewerage, waste management and remediation.

The majority of R&D was carried out within the manufacturing sector (55.2%, £303.5m) with the remaining 44.8% (£245.9m) in the Services and Other sector.

In terms of individual sub-sectors, manufacturing of transport equipment (SIC classification: CL) accounted for one quarter of all manufacturing spend in 2018. Figure 7 below, highlights that just over half of spending within the manufacturing sector was accounted for by companies involved in Engineering & Allied Industries (CI, CJ, CK, CL).

Figure 7: Percentage of manufacturing spend by SIC 2007 subsections, 2018



Businesses in the information and communication sector accounted for 46.9% (£107.9m) of service sector spend in 2018. At £98.0m, businesses in the ‘Professional, scientific, technical, administrative and support service activities’ sector accounted for 42.6% of service sector R&D spend.

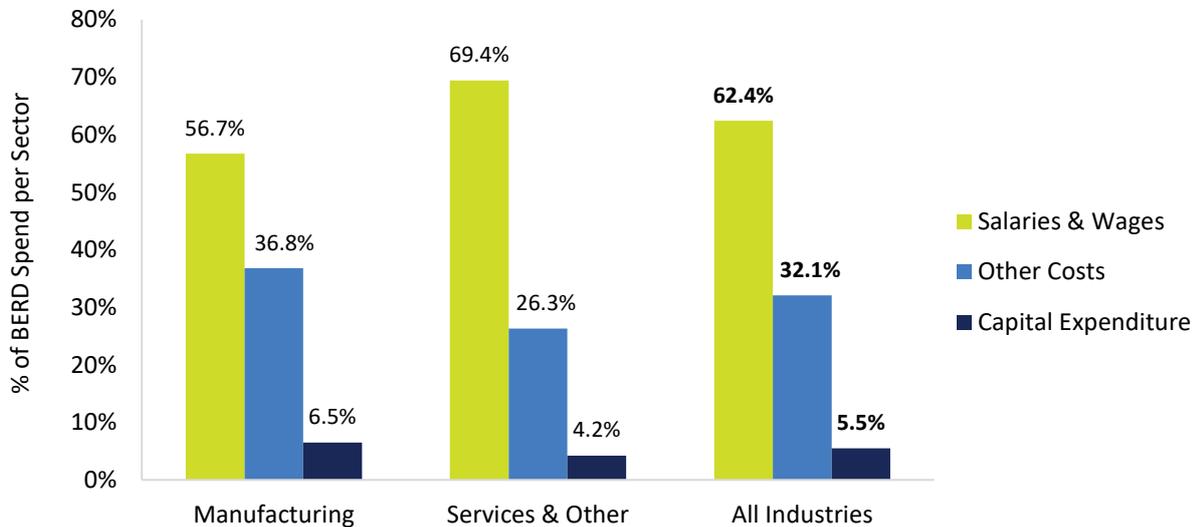
In-house spend accounted for the vast majority of spend in both sectors (see Table 1 below).

Table 1: In-House and Purchased R&D Expenditure by Sectors, 2018

Sector	In-house		Purchased		TOTAL BERD	
	£millions	% of BERD	£millions	% of BERD	£millions	% of BERD
Manufacturing	289.6	52.7%	13.9	2.5%	303.5	55.2%
Services & Other	234.6	42.7%	11.3	2.1%	245.9	44.8%
All Industries	524.1	95.4%	25.2	4.6%	549.3	100%

At almost 70%, salaries & wages constituted a larger proportion of in-house spend in the Services & Other sector in comparison to the Manufacturing sector (56.7% (Section 6, Tables 9, 10, 11 and 12)).

Figure 8: Percentage of BERD in-house spend per-sector, 2018



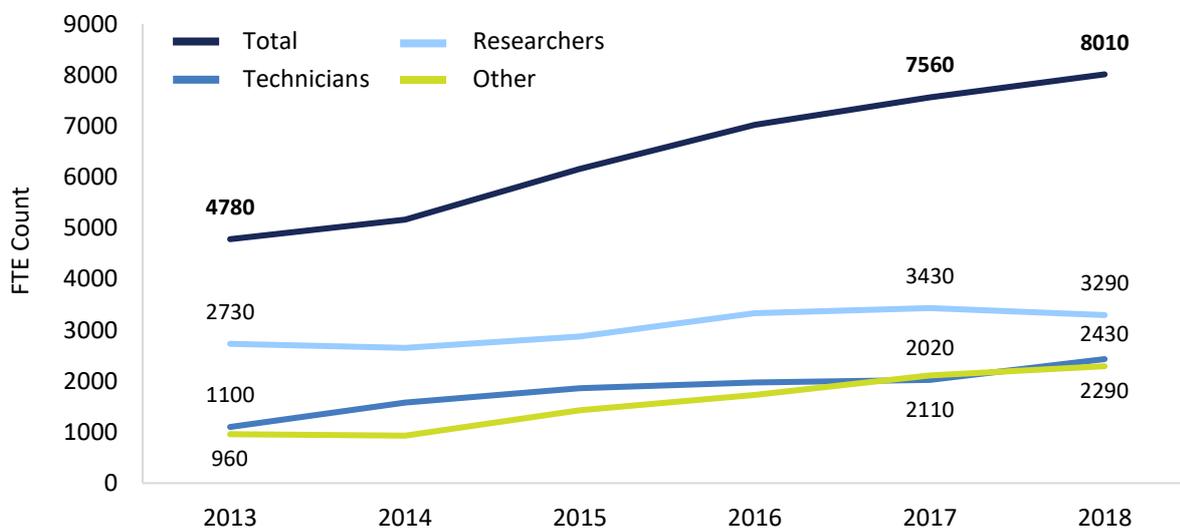
3.4 Business R&D: Employment⁷

Full-time equivalents (FTEs)

Estimates of employment in R&D are best produced on a full-time equivalent (FTE) basis whereby businesses convert employee hours working on R&D into full-time equivalent figures, providing a better indication of total labour input than a simple headcount. The FTE figure for 2018 was 8,010, 5.9% higher than in 2017 and 67.4% higher than 2013.

Figure 9 below shows the trend in FTE numbers overall, and for researchers, technicians and other staff separately, since 2013.

Figure 9: FTE employment, 2013 – 2018

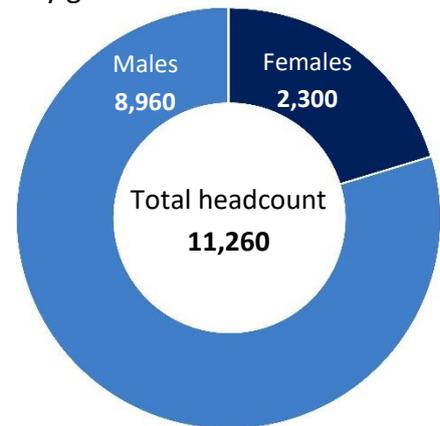


R&D Employee Headcount

Surveyed companies reported a total R&D employee headcount of 11,260 employees in 2018. This equates to 11.7% of all employees in these companies.

Of the 11,260 R&D employees, 36.4% were researchers (PhD students, graduates and scientists), 28.5% were technicians (those who perform scientific and technical tasks under the supervision of researcher) and 35.2% were “other” staff (support, secretarial and clerical staff involved in R&D work). Overall, males represented four-fifths of all R&D staff.

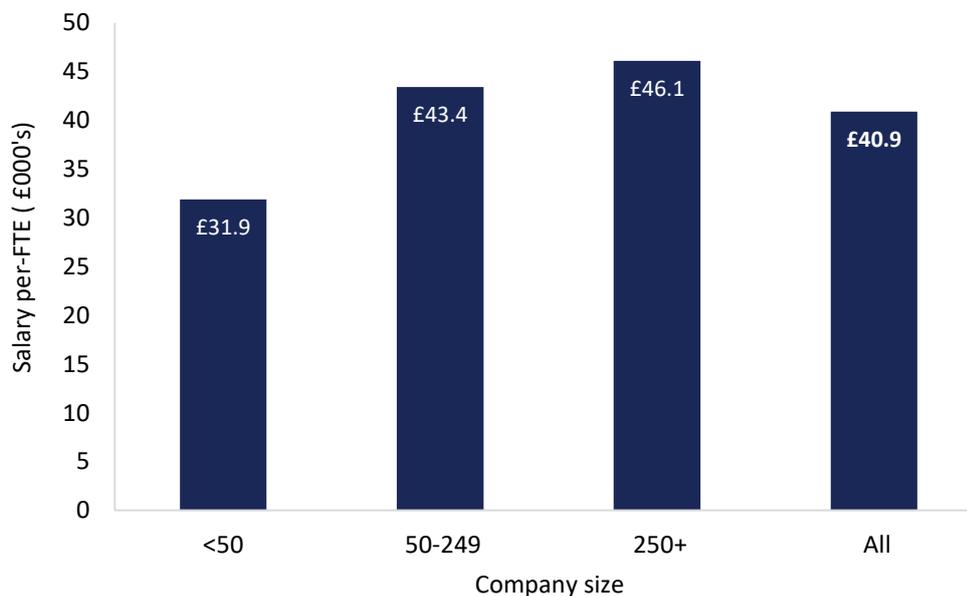
Figure 10: R&D headcount split by gender



Salary spend for R&D employees

Overall, spend on salaries per R&D FTE was £40,900, 3.7% higher than in 2017. Salaries per R&D FTE tended to increase with company size, ranging from £31,900 in companies with less than 50 employees to £46,100 in companies with 250+ employees (Section 6, Table 13, 14, 15 and 16).

Figure 11: Salaries per-FTE by company size*, 2018

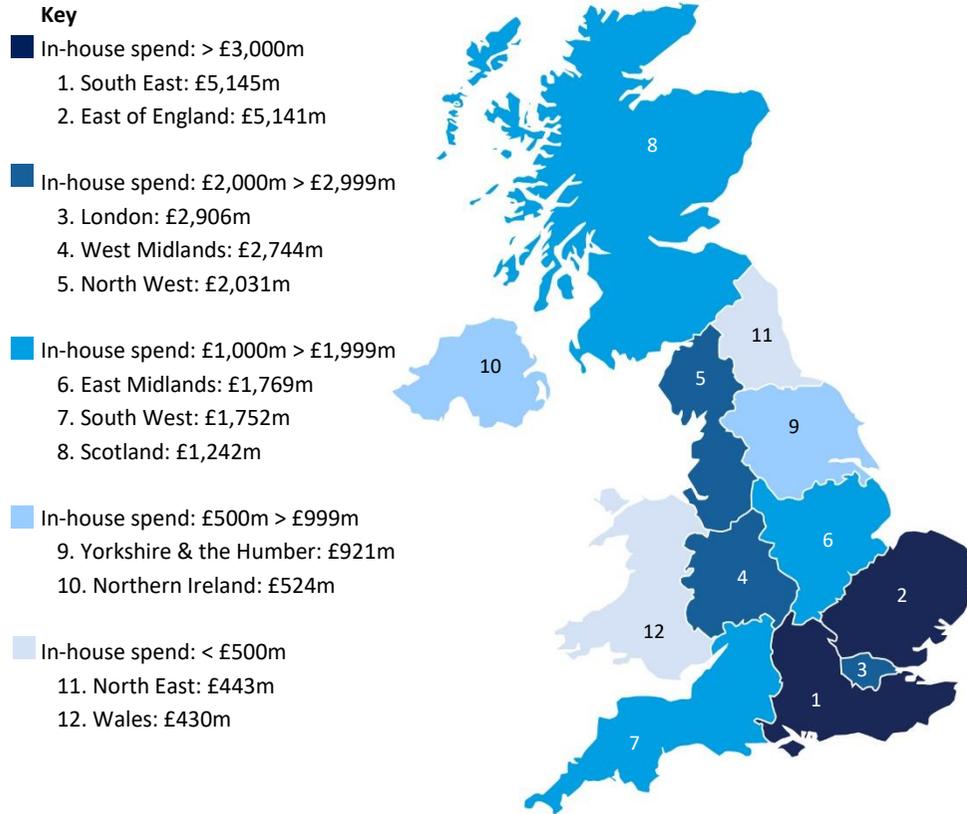


⁷All employment data is rounded to the nearest 10.

*Company size based on persons on payroll.

3.5 Business R&D: Regional Spend

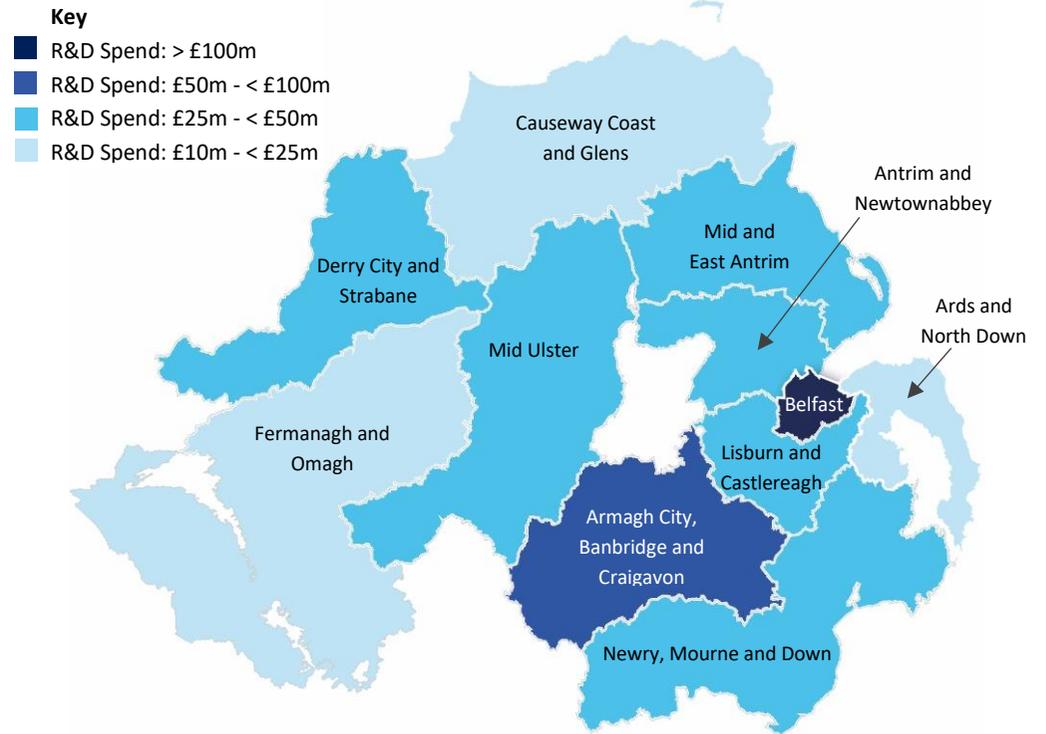
Figure 12: In-house spend by UK region, 2018



In-house spend in NI increased by 3.1% since 2017. Across the UK, annual changes ranged from a decrease of 7.0% in the North West, to an increase of 16.3% in the East Midlands.

UK expenditure data obtained from latest ONS R&D publication:
www.ons.gov.uk/economy/researchanddevelopmentexpenditure

Figure 13: NI R&D Spend by Local Government District (LGD), 2018



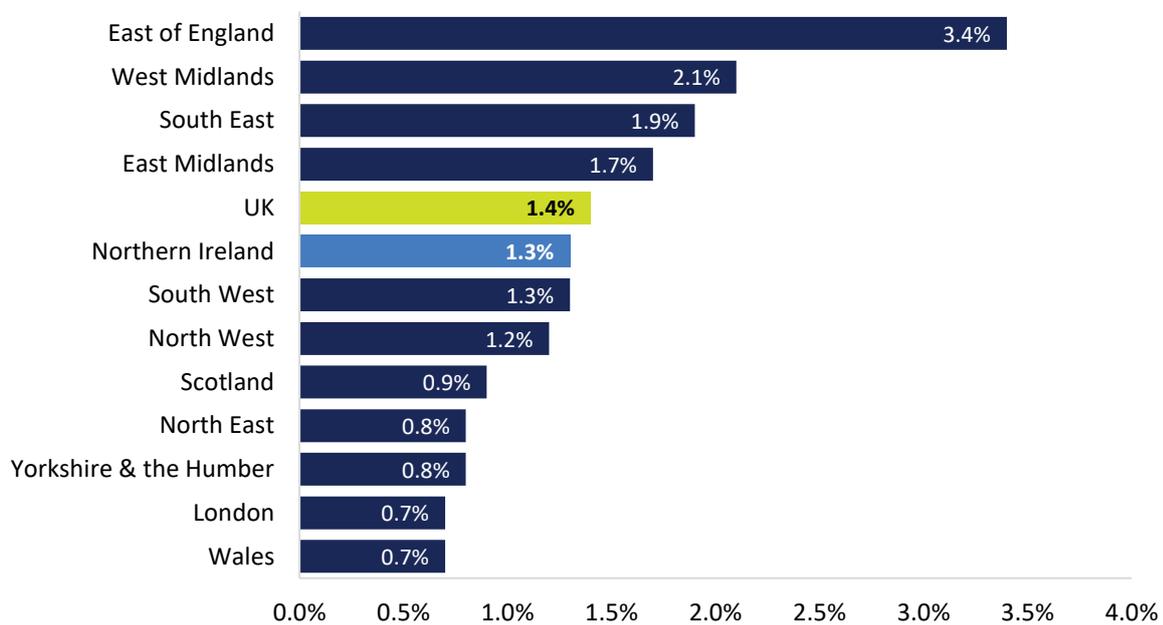
Almost two-fifths (£213.0m, 38.8%) of BERD was attributed to companies in the Belfast LGD. At £85.9m, companies in Armagh, Banbridge & Craigavon LGD accounted for 15.6% of total BERD in 2018.

3.6 Business R&D: Regional GVA⁸

Total business expenditure on R&D as a percentage of GVA is one of the medium term targets for measuring progress in the [Northern Ireland Innovation Strategy](#). In 2017 BERD equated to 1.4% of GVA. 2018 GVA figures are not available until December 2019 (Section 6, Tables 17, 18, 19 and 20).

The Office for National Statistics (ONS) presents business R&D as a proportion of GVA solely in terms of in-house expenditure. For comparison purposes, Northern Ireland's in-house R&D spend in 2018, as a proportion of 2017 GVA is presented in Figure 14 below.

Figure 14: In-house R&D expenditure as a percentage of 2017 GVA for all UK regions, 2018



At 1.3% in-house R&D expenditure in Northern Ireland as a proportion of 2017 GVA is close to the UK average (1.4%).

UK Business Expenditure on Research and Development (BERD) results were released on 21st November 2019 and can be found at the below link:

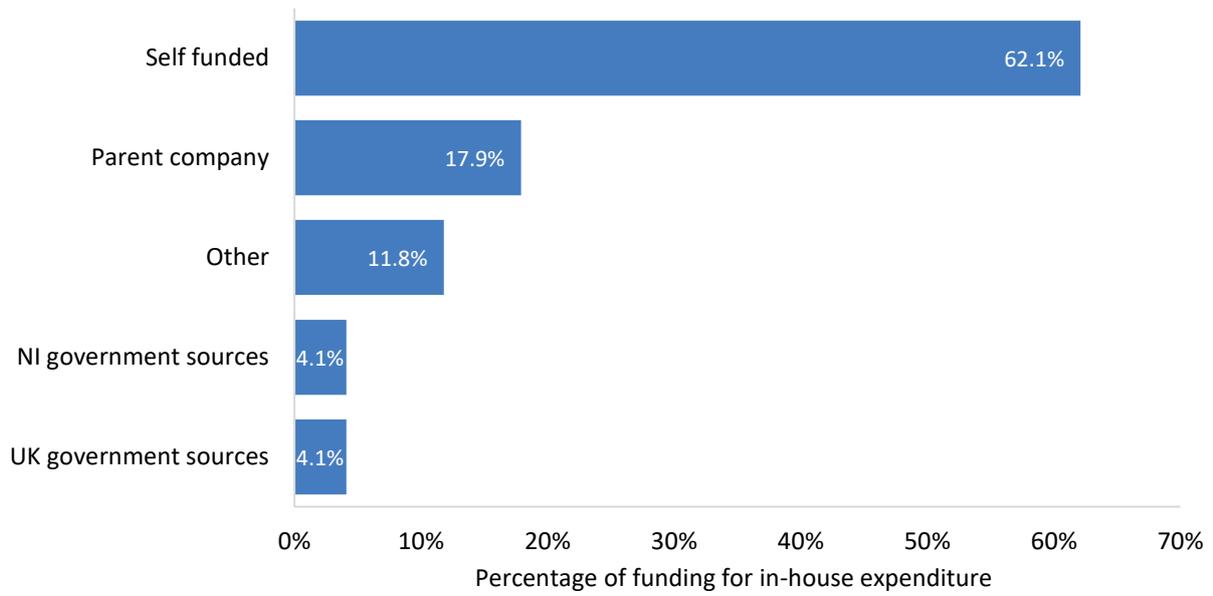
www.ons.gov.uk/economy/researchanddevelopmentexpenditure

⁸2018 GVA figures are not available until December 2019. Table 19 in accompanying data will be updated when 2018 GVA data becomes available.

3.7 Business R&D: Funding

The funding of in-house R&D expenditure comes from a number of sources: the companies' own funds, NI government departments including Invest NI, other UK Government bodies, overseas funding (e.g. EU), higher education establishments and other businesses and organisations.

Figure 15: Percentage share of funding sources for in-house expenditure, 2018



Just over three-fifths (62.1%) of all funding in 2018 was self-funded by the companies carrying out the R&D work. Approaching one-fifth (17.9%) of funding came from a parent company, while NI and UK government sources each contributed 4.1% of total in-house funding. The nature of funding differed slightly by company size and a detailed breakdown is available in Section 6, Table 21.

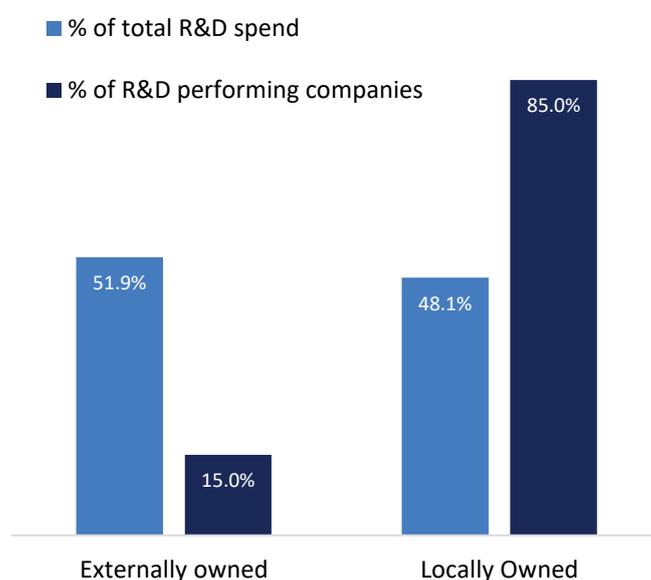
3.8 Business R&D: Ownership

The majority of the 961 companies engaged in R&D were locally owned (817, 85.0%) and they accounted for 48.1% of total R&D spend in 2018. Expenditure by locally owned companies increased by 13.2% (£30.8m) in cash terms between 2017 and 2018.

While externally owned companies accounted for 15.0% of all R&D performing companies, they accounted for just over half (£285.0m) of all R&D expenditure in 2018. Expenditure by externally owned companies decreased by 6.6% (£20.2m) in cash terms over the year (Section 6, Table 22).

Median spend on R&D was £105,000 per locally owned company in 2018, compared with £449,000 per externally owned company. Median spend was higher among small (0-49 employees), medium (50-249 employees) and large (250+ employees) externally owned businesses, compared with locally owned businesses (See Table 3 below).

Figure 16: Ownership of company analysis, 2018



Company ownership by sector and business size

Table 2: Percentage of total R&D spend and median spend per business, by ownership and sector

Ownership by sector	% of BERD		Median spend per business	
	Services & Other	Manufacturing	Manufacturing	Services & Other
Externally-owned	37.1%	63.8%	£507,000	£371,000
Locally-owned	62.9%	36.2%	£117,000	£88,500
Overall	100%	100%	£137,000	£106,000

Externally owned companies accounted for more than three-fifths (63.8%) of R&D spend in the manufacturing sector in 2018. In contrast, more than three-fifths (62.9%) of R&D spend in the services and other sector can be attributed to locally owned companies.

Table 3: Percentage of total R&D spend and median spend per business, by ownership and size

Ownership by company size	% of BERD			Median spend per business		
	<50	50-249	250+	<50	50-249	250+
Externally-owned	22.3%	46.6%	72.6%	£218,000	£855,000	£1,134,000
Locally-owned	77.7%	53.4%	27.4%	£72,000	£288,000	£632,000
Overall	100%	100%	100%	£76,000	£318,000	£1,030,000

More than three-quarters of R&D spend by companies with less than 50 employees was by locally owned firms. Locally owned companies also accounted for just over half of R&D spend among companies with 50 to 249 employees. Almost three-quarters (72.6%) of R&D spend in companies with more than 250 employees was attributed to externally owned companies.

3.9 Business R&D: Type of Research

Non-capital expenditure can be analysed in terms of the nature of the research carried out. 'Experimental development' accounted for half of non-capital spend in 2018 (51.0%, £252.5m).

'Applied research' and 'Basic research' accounted for 44.5% (£220.6m) and 4.5% (£22.3m) respectively (Section 6, Tables 27 and 29).

Type of research by company size

Almost half of non-capital spending on 'experimental development' was by large companies (£120.0m, 47.5%).

Seventy-six percent of spend (£167.6m) on 'applied research' was covered by medium and large enterprises in equal amounts (Section 6, Table 28).

Figure 17: Share of non-capital expenditure by research type

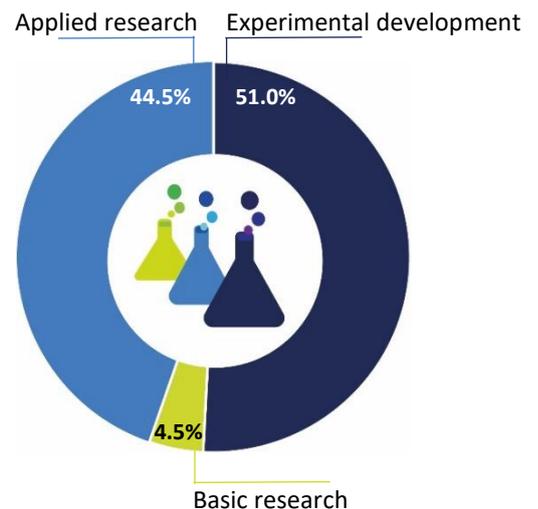
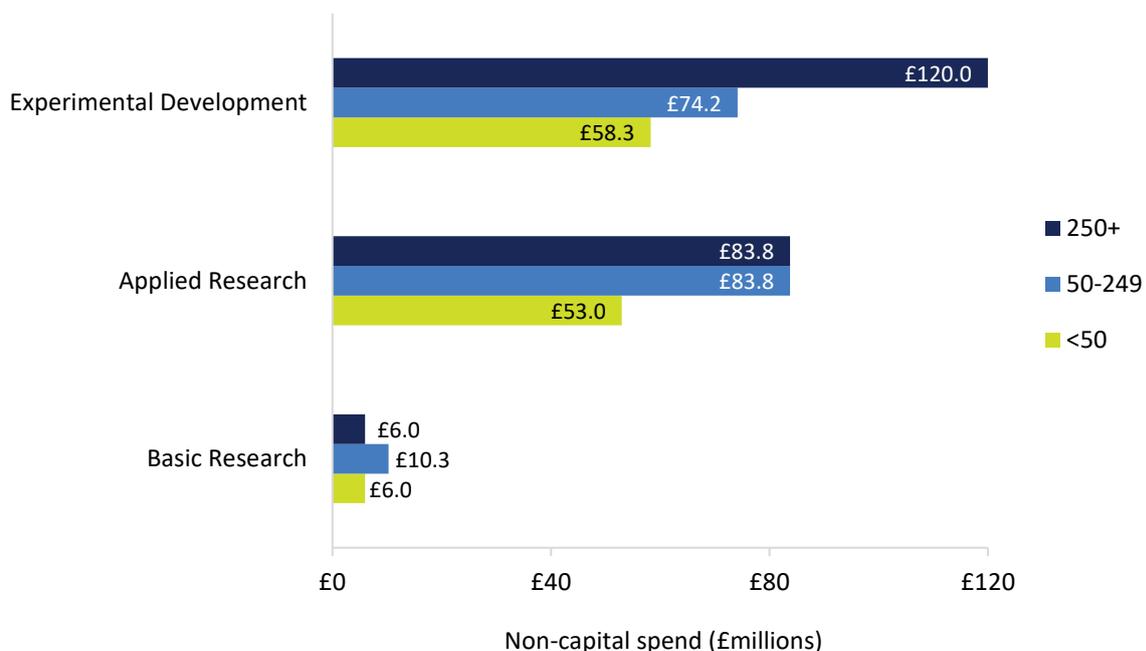


Figure 18: Type of research spend by company size*, 2018

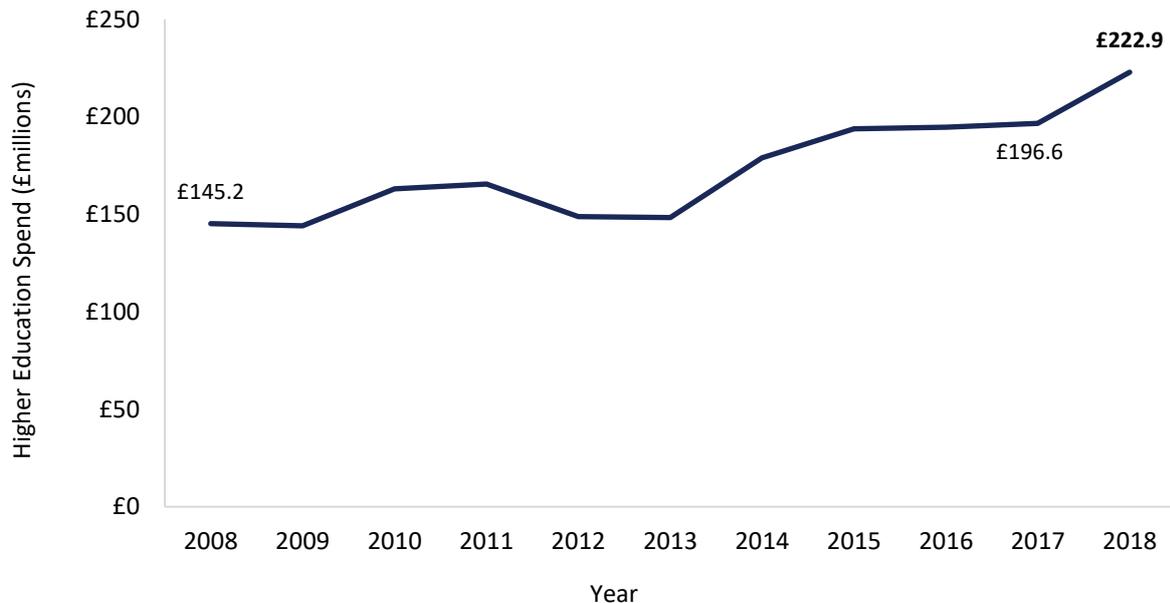


*Company size based on persons on payroll.

4 Higher Education Research & Development

4.1 Higher Education Research & Development (HERD)⁹

Figure 19: Research and Development Spend among Higher Education Establishments in Northern Ireland, 2008 - 2018

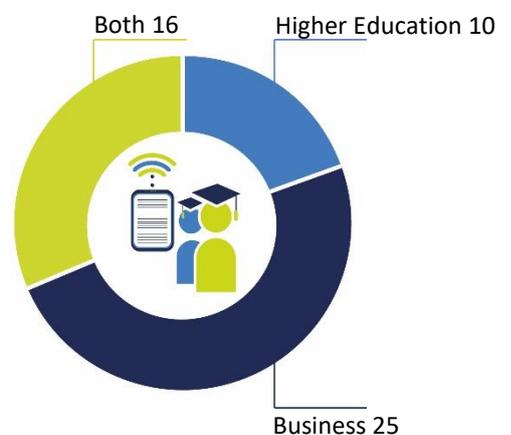


HERD expenditure increased by £26.3m over the year to £222.9m in 2018. This increase was composed of increases in both capital (+ £8.7m) and non-capital expenditure (+ £17.7m). Block grants remained the largest source of funding for HERD work (45.5% of total HERD funding) Section 6, Tables 30 and 31)).

4.2 Joint Projects

In 2018, 51 R&D spending companies reported that their R&D work was part of a joint project with a source outside of their company. Of these 51 projects, 25 were with another business, 10 with a higher education establishment and 16 with both (Section 6, Table 32).

Figure 20: Count of R&D joint projects



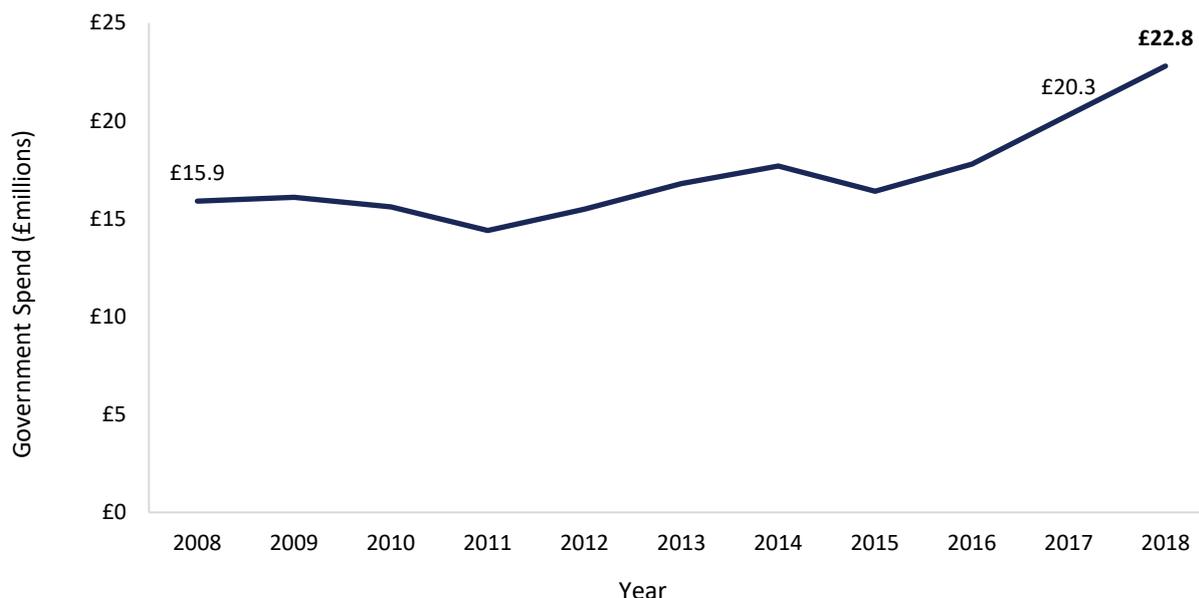
⁹Expenditure for 2018 includes £1.0 million of expenditure funded by Northern Ireland Businesses (£0.5m in 2017). Therefore, net HERD in 2018 was £221.9m (this is as detailed in section 2.1).

All university expenditure on R&D is in-house expenditure i.e. R&D work carried out within the university.

5 Government Research & Development

5.1 Government Expenditure on Research & Development (GERD)

Figure 21: Research and Development Spend among Government Departments in Northern Ireland, 2008 - 2018



The UK Office for National Statistics (ONS) collects data on R&D expenditure within government establishments. Combining these data with BERD and HERD data provides a more complete picture of R&D expenditure in Northern Ireland.

Government R&D expenditure increased by £2.5m over the year to £22.8m in 2018. With the exception of 2015, there has been an upward trend in GERD spend since 2011 (Section 6, Table 33).

6 Data tables

Overall R&D Activity in Northern Ireland

[Table 1: BERD, HERD* and GERD R&D Spend by Year in Cash Terms, 2008-2018 \(£millions\)](#)

[Table 2: BERD, HERD and GERD R&D Spend by Year in Real Terms*, 2008-2018 \(£millions\)](#)

Business R&D Activity in Northern Ireland

[Table 3: Distribution of total R&D spend by deciles, 2018](#)

[Table 4: Breakdown of Business Expenditure on R&D in Cash Terms, 2017-2018 \(£millions\)](#)

[Table 5: Five Year Comparison of Business Expenditure on R&D, 2013-2018 \(£millions\)](#)

[Table 6: Total BERD spend among small, medium and large companies*, 2013-2018 \(£millions, persons on payroll\)](#)

[Table 7: Percentage of total BERD spend by small, medium and large companies, 2013-2018 \(persons on payroll\)](#)

[Table 8: Small, medium and large business counts 2018 \(persons on payroll\)](#)

[Table 9: BERD spend by manufacturing, services and other subsections, 2017-2018 \(£millions\)](#)

[Table 10: Percentage of manufacturing expenditure by SIC 2007 subsections, 2018 \(£millions\)](#)

[Table 11: In-house and purchased R&D expenditure by main sectors, 2018 \(£millions\)](#)

[Table 12: Breakdown of in-house R&D spend by sectors, 2017-2018 \(£millions\)](#)

[Table 13: R&D full-time equivalent \(FTE\) employment, 2008-2018 \(rounded to the nearest 10\)](#)

[Table 14: R&D employment type by gender, 2018 \(total headcount to the nearest 10\)](#)

[Table 15: Salaries per-FTE by company size \(persons on payroll\), 2017-2018 \(per annum\)](#)

[Table 16: R&D employee headcount, 2008-2018 \(rounded to the nearest 10\)](#)

[Table 17: In-house expenditure of UK businesses by country or region, 2017-2018 \(£millions\)](#)

[Table 18: Total R&D spend by Local Government District, 2018 \(£millions\)](#)

[Table 19: Total R&D expenditure by NI businesses as a proportion of GVA](#)

[Table 20: In-house R&D expenditure by UK businesses as a proportion of the previous year's GVA \(£millions\), 2018](#)

[Table 21: Proportion of in-house BERD funding by source and company size, 2017-2018 \(persons on payroll, £millions\)](#)

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Deciles, Revisions and Annexes

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7 Background Notes

The survey of NI BERD during 2018 was undertaken by the Northern Ireland Statistics and Research Agency (NISRA). The sample and survey results only cover business enterprises as defined in the "Frascati" manual (<http://www.oecd.org/sti/inno/Frascati-Manual.htm>). This excludes government organisations, higher education establishments and charities.

The definition of R&D adopted for the purposes of the NI inquiry is the same as that used by ONS for the equivalent GB survey:

"The guiding line to distinguish between research and technological development activity (R&D) from non-research activity is the presence or absence of an appreciable element of novelty or innovation. If the activity departs from routine and breaks new ground it should be included; if it follows an established pattern it should be excluded".

The NI questionnaire follows the same structure and includes the same questions as the GB questionnaire, although there were some modifications to tailor the questions asked for use in NI.

The survey covers expenditure in the year ending 31st December 2018, although companies were given the option of supplying data for a business year ending on any date between 6th April 2018 and 5th April 2019.

It is worth noting that variations may occur in NI R&D data from year to year due to the influence of one or two large-scale projects. Spend as it is presented also varies due to a range of factors including company size, ownership of the company and whether it is externally or internally owned, and what sector it falls into.

7.1 Survey Design

R&D surveys pose special problems for survey design – R&D takes place in only a small proportion of businesses but a comprehensive list of these businesses does not exist. A simple random sample of the business population would not be suitable for an R&D survey because many of the sample businesses would not undertake R&D and many significant R&D performers would be missed in such a sample.

The solution is to implement a stratified sample design. The stratification variable was the known level of R&D performance of the businesses. This information was gained from previous surveys (mainly the 2017 survey) and extra information from various sources such as the Office for National Statistics (ONS), Invest NI and filter questions on the Annual Business Inquiry and Business Register and Employment Survey. For the purposes of the 2018 survey, businesses were stratified into 4 groups:

(i) Businesses responding to the 2017 survey who returned or had estimated a total R&D expenditure value greater than zero;

(ii) Businesses reporting positively to the R&D filter question in the Annual Business Inquiry and Business Register and Employment Survey; other identified potential R&D performers (principally, those companies who had received assistance from Invest NI during 2018); and companies newly identified to ONS as R&D spenders;

(iii) Companies who have been identified as 'not R&D performers' when selected for past surveys;

(iv) The remainder of Northern Ireland businesses.

The businesses making up strata (i) and (ii) formed a register of R&D performers and the sample for the 2018 survey was derived from this register. Indeed, each of these businesses was issued a questionnaire – in effect, therefore, a census of R&D performers was carried out. Strata (iii) and (iv) were not included as they were assumed to have zero R&D expenditure.

7.2 Survey Response Rate, Revisions and Deciles

For the 2018 survey, 1,344 forms were sent out to business believed to be performing R&D. Completed forms were returned by 949 businesses representing a response rate of 70.6%. The total number of companies spending on R&D rose to 961 in 2018 (up from 897 in 2017). Due to non-response, spend was imputed for 335 of these companies based on their most recent return. 85% of companies for whom spend was imputed had submitted a return within the last three years (accounting for 94% of total imputed spend in 2018).

Estimates for Invest NI companies were based on the value of offers made to promote R&D investment and the contribution of Invest NI's assistance to total planned R&D expenditure. Estimates for Invest NI companies make up 2.5% of the total non-responding company spend. The remaining 97.5% are non-Invest NI estimates. Most of the imputations are calculated using the median change in total R&D spend across the year among responders within a given SIC code and applying this change to estimate spend for those businesses in the same SIC code that failed to reply to the survey. The remainder were based on historical information and other administrative surveys within NISRA's Economic and Labour Market Statistics Branch. Non-responding companies which reported zero R&D spend the previous year are imputed to have zero spend for the current year.

Overall, estimates make up 19.6% of total BERD spend for 2018 (compared with 16.0% in 2017). Estimates for Invest NI companies account for 0.5% of total BERD spend in 2018, and estimates for non-Invest NI companies account for 19.1%.

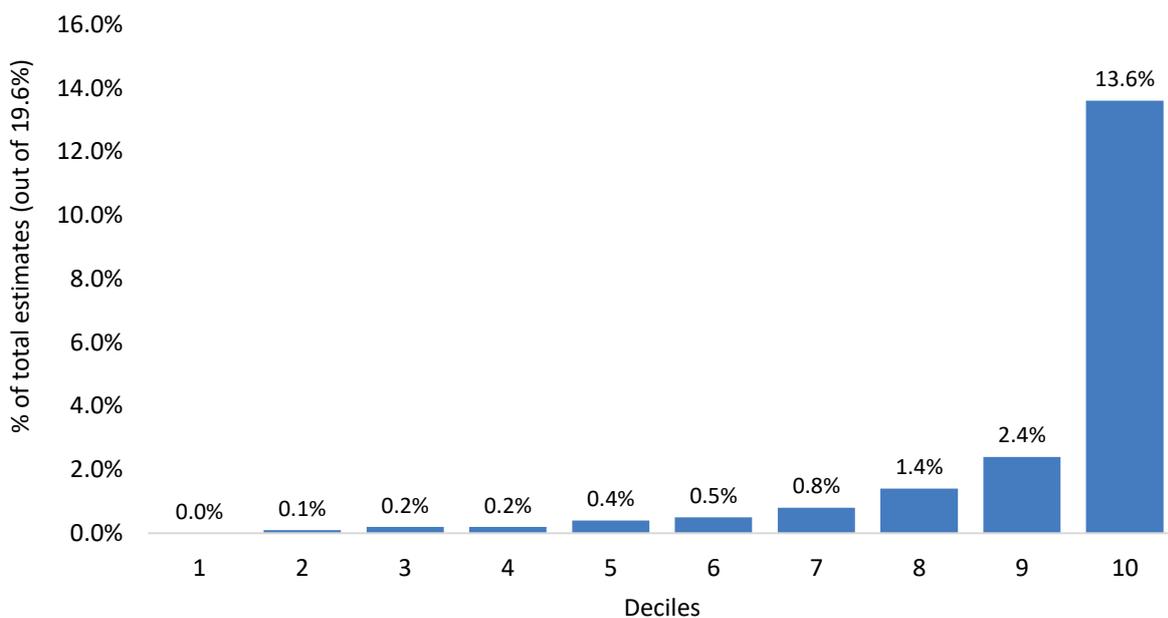
These results are provisional and are subject to revision should additional information become available. As part of this release, business, government and higher education estimates of R&D performance for 2016 and 2017 have been revised to take account of late returns and misreporting.

Figures contained within all tables in this release may not add due to rounding. All annual changes and percentages detailed in the text have been calculated using raw figures prior to rounding. Percentages calculated on rounded figures may therefore differ from those detailed in the text.

Table 4: Size of Revisions to Previously Published Data, 2016 – 2017 (£m)

<i>R&D Spend Type</i>	<i>2016</i>			<i>2017</i>		
	<i>Published £m</i>	<i>Revised £m</i>	<i>Difference £m</i>	<i>Published £m</i>	<i>Revised £m</i>	<i>Difference £m</i>
Expenditure by Businesses	£523.8	£523.9	£0.1	£542.8	£538.7	-£4.1
Expenditure by Higher Education	£193.8	£193.8	£0.0	£195.8	£196.1	£0.3
Other Expenditure by Government	£21.7	£17.8	-£3.9	£20.5	£20.3	-£0.2
Total R&D Expenditure	£739.3	£735.5	-£3.8	£759.2	£755.1	-£4.0

Figure 22: Deciles of estimates as a percentage of 2018 BERD data



Estimates make up 19.6% of total 2018 BERD spend. When estimates are ranked according to descending size of spend, the top two deciles (i.e. the top 20% of companies) account for 81.9% of all estimated BERD spend, indicating that most of the estimates were small in magnitude. The bulk of the value of the estimates has been accounted for by a relatively small number of companies (Section 6, Table 34).

7.3 Definition of Terms

Type of R&D Expenditure

Total Expenditure on R&D - This covers expenditure by businesses, expenditure by higher education and other expenditure by government.

Expenditure by Higher Education – NISRA carries out an annual survey of R&D expenditure in Higher Education Establishments in Northern Ireland. The figures shown in Figure 19 provide combined results from the two Northern Ireland universities - i.e. Queen's University Belfast (QUB) and the University Of Ulster (UU). The data collected refers to the academic year i.e. 2017/2018 ending 31/7/2018. The universities have made data available for this period on the basis of Transparency Review data collected within each respective institution.

Other Expenditure by Government - The ONS collects annual data on total UK government expenditure on science, engineering and technology (SET). SET expenditure by the UK government includes expenditure by government departments, Research councils and Higher Education Funding Councils (HEFCs). It also includes expenditure on R&D conducted within Government Departments.

By utilising this data in conjunction with the results from the NISRA survey, it has been possible to compile a more complete picture of total expenditure on R&D in NI. The figures described in Section 2.1, expenditure by businesses, higher education and other expenditure by Government complement each other; i.e. is no double counting.

The 2018 ONS Report is available at the following link:

<https://www.ons.gov.uk/researchanddevelopmentexpenditure>

In-house R&D - This is R&D carried out within the company and was previously referred to as intramural expenditure.

7.4 Quality reporting

The quality report for the R&D survey and analysis can be found at

<https://www.nisra.gov.uk/publications/archive-publications-rd>

This report describes in detail the quality of the statistics presented in this publication (in terms of relevance, accuracy, timeliness and punctuality, accessibility and clarity, coherence and comparability, trade-offs between output quality components, assessment of user needs and perceptions, performance, cost and respondent burden and confidentiality, transparency and security).

Next Publication

Analysis of the 2019 results will be published in November 2020, and will be available at:

<https://www.nisra.gov.uk/statistics/business-statistics/research-and-development>

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