

# UK Business Enterprise Research and Development Survey QMI

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# 1 . Methodology background

<b>National Statistic</b>	
<b>Survey name</b>	Business Enterprise Research and Development Survey (BERD)
<b>Frequency</b>	Annual
<b>How compiled</b>	Sample based survey
<b>Geographic coverage</b>	UK (Country and Region)
<b>Sample size</b>	The UK sample size is approximately 5,500 businesses (4,000 in GB and 1,500 in NI). The response rate is normally around 92%.
<b>Last revised</b>	25 October 2017

## 2 . Executive summary

The purpose of the [Business Enterprise Research and Development \(BERD\)](#) Survey is to provide estimates of businesses' expenditure and employment relating to research and development (R&D) performed in the UK. It uniquely provides information on expenditure on R&D performed by UK businesses, the source of funding for this R&D work, and the employment of people working on R&D. The survey is conducted to provide estimates of overall R&D in the UK business sector, and to allow comparisons of the UK results with other countries. The estimates are used by major policymakers in the UK and in the EU and are used in EU aggregates. They are perceived as an important determinant of economic growth.

R&D and related concepts follow internationally agreed standards defined by the [Organisation for Economic Co-operation and Development \(OECD\)](#) and published in the [Frascati manual](#). This sets out the methodology for collecting and using statistics about R&D in countries that are members of the [OECD](#). The Frascati manual defines R&D as “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”. R&D must contain an appreciable amount of novelty.

The survey has been run annually since 1993. The sample is drawn from a continually updated register of known R&D performers in England, Scotland and Wales. In addition, businesses in Northern Ireland are surveyed by the [Department of Finance \(DoF\)](#) and their estimates added to those we collect to form UK totals. As part of the 2015 survey, approximately 5,400 (that is, 4,000 Great Britain and 1,400 Northern Ireland) questionnaires were sent to businesses known to perform R&D.

The results from the survey are published annually in a statistical bulletin, which reports business R&D performed in the UK, irrespective of the residence of the ultimate owner. The outputs are also transmitted to Eurostat to comply with [European Commission \(EC\) Regulation 995/2012](#).

This report contains the following sections:

- Output quality
- About the output
- How the output is created
- Validation and quality assurance
- Concepts and definitions
- Other information, relating to quality trade-offs and user needs
- Sources for further information or advice

## National Statistics

The UK Statistics Authority has reviewed this publication in its report [Assessment of compliance with the Code of Practice for Official Statistics: Statistics on Research and Development](#), which was published on 28 June 2012. This review recommended that the UK Business Enterprise Research and Development estimates be designated as National Statistics, subject to Office for National Statistics (ONS) carrying out certain requirements. We have carried out the necessary work to meet these requirements and on 3 June 2013, The Authority confirmed the National Statistics designation of the Business Enterprise Research and Development (BERD) publication.

## Completeness of coverage

As part of the assessment of “Statistics on Research and Development” by the UK Statistics Authority, a requirement was placed on us to review the methodology for producing R&D statistics to identify potential gaps in coverage and meet the coverage requirements of European System of Accounts 2010 (ESA 2010). To meet this requirement and to assist users in their understanding of this complex issue, an information note entitled [Coverage of the Business Enterprise Research and Development Survey](#) was published on 20 November 2012 to address this issue.

## 3 . Output quality

This report provides a range of information that describes the quality of the output and details any points that should be noted when using the output.

We have developed [Guidelines for Measuring Statistical Quality](#) these are based upon the five European Statistical System (ESS) quality dimensions. This report addresses these quality dimensions and other important quality characteristics, which are:

- relevance
- timeliness and punctuality
- comparability
- coherence and comparability
- accuracy
- output quality trade-offs
- assessment of user needs and perceptions
- accessibility and clarity

More information is provided about these quality dimensions in the following sections.

The Business Enterprise Research and Development (BERD) Survey covers estimates of UK businesses that are known to carry out research and development (R&D). The statutory basis of the [BERD](#) survey in Great Britain is the Statistics of Trade Act 1947 and in Northern Ireland, it is the Statistics of Trade and Employment (NI) Order 1988. The survey questionnaire for businesses in Northern Ireland is sent out by the [Department of Finance \(DoF\)](#).

## 4 . About the output

### Relevance

(The degree to which the statistical outputs meet users' needs).

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padding:10px 5px;border-style:solid;border-width:1px;overflow:hidden;word-break:normal;} .tg th
{font-family:Arial, sans-serif;font-size:14px;font-weight:normal;padding:10px 5px;border-style:solid;
border-width:1px;overflow:hidden;word-break:normal;}
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What it measures	The <a href="#">Business Enterprise Research and Development (BERD)</a> survey collects information on total expenditure on research and development (R&D) undertaken by UK businesses, total R&D employment, and sources of funds for the R&D performed.
Frequency	The survey is conducted on an annual basis (results are published in the November after the reference year).
Sample size	The UK sample size is approximately 5,400 businesses (that is, 4,000 in Great Britain and 1,400 in Northern Ireland). There were approximately 4,600 responses in 2015.
Periods available	The BERD Survey estimates have been produced annually since 1993.
Sample frame	The sampling frame is a reference list of all known R&D performers in Great Britain and Northern Ireland.  The reference list is updated annually, from a range of other sources, such as a question on the Annual Business Survey, but it should be noted that there is no definitive list of businesses that perform R&D.
Sample design	For Great Britain, a stratified random sample is used where the strata are defined as: - businesses that have previously reported R&D expenditure above a threshold (greater than £5.4 million for the 2015 survey (referred to as “large R&D performers”)). - the remaining businesses identified as (or potential) R&D performers (referred to as “smaller R&D performers”) are allocated into strata using their employment and industry product group  For Northern Ireland, a census survey is carried out of the approximately 1,400 known R&D performers.
Weighting and estimation	R&D estimation uses simple matched pairs methodology and ratio estimation.
Outliers	For the 3,600 smaller responders that receive the short questionnaire, an outlier ratio is calculated and the top 5% and the bottom are trimmed. The outlier ratio is calculated by dividing R&D employment by total business employment.

The sample and survey results only cover “business enterprises” as defined in the [Frascati Manual](#). This excludes government organisations, higher education establishments, and non-profit organisations.

Smaller businesses identified as R&D performers are sampled using various sampling fractions. The selected businesses are sent a shorter version of the R&D questionnaire, which requests just the R&D expenditure and employment totals. The detailed information for these businesses that is not collected on the short questionnaire is estimated using the data received from the questionnaires of larger R&D performers. The totals for the unsampled businesses are estimated using ratio estimation with business employment as the auxiliary variable, a variable held on the Inter-Departmental Business Register (IDBR).

## Users and uses

The information is used by government departments and other organisations for planning, policy and monitoring purposes.

A primary use of the Business Enterprise Research and Development ([BERD](#)) output is that it is an important component in measuring the UK's gross domestic expenditure on R&D. The other components are the UK government, the higher education sector and the non-profit sector. Gross expenditure on R&D in the UK performed by all sectors of the economy is reported separately, in the [GERD](#) publication.

Changes introduced as part of the amendments to the System of National Accounts (SNA) in 2008 and European System of Accounts (ESA) in 2010 specify that R&D, from 2014 onwards, should not be considered as an ancillary activity and therefore used up in the production process as intermediate consumption. Instead, expenditure on R&D should constitute investment in R&D assets, which as a consequence needs to be capitalised in the UK National Accounts. Since this change, R&D expenditure has contributed to the compilation of the value of the UK's net worth and has been included as part of gross domestic product (GDP) estimates. Please see our [ESA 2010](#) page for more information.

There are numerous other users within and outside government who use these data to produce various analyses and to inform policy decisions. These include Eurostat and the Organisation for Economic Co-operation and Development (OECD).

The UK provides statistics measuring R&D activity to the European Union's Statistical Office (Eurostat) in accordance with the European Commission Regulation No. 995/2012 of the European Parliament and the Council. The business estimates in this publication are used to provide information that is consistent with other EU member states and to enable benchmarking to be achieved. [Europe 2020 targets](#) for economic growth include 3% of the EUs' gross domestic product (GDP) (both private and publicly-funded) to be invested in R&D by 2020. This means that these estimates are essential in monitoring progress towards this target. It should be noted that at the time of the BERD publication each year, Eurostat would have already published provisional estimates for EU member states gross expenditure on R&D for the following year. These estimates include business sector data. The provisional estimates for the UK are based on projections and therefore when making comparisons with other countries, users are advised to use estimates from the BERD release for UK business R&D expenditure, rather than Eurostat's provisional estimates for the UK.

The [OECD](#) uses [BERD](#) data for constructing internationally comparable data tables and producing regular statistical publications such as the Main science and technology indicators (MSTI) and the Annual business enterprise research and development statistics (ANBERD).

The data are also used for analytical studies, which underpin economic analysis and policy reviews:

- the [Department for Business, Energy and Industrial Strategy \(BEIS\)](#) uses [BERD](#) data to assess policy impact and inform debate; R&D data underpin their assessments of UK R&D performance as well as international work in the field
- the [Welsh Government \(WG\)](#) and the [Scottish Government \(SG\)](#) use [BERD](#) data as an important indicator for measuring the performance of their respective economies within the UK, as well as to monitor and develop R&D policies that seek to increase R&D investment
- [HM Revenue and Customs \(HMRC\)](#) uses BERD data to support analysis and advice on policy development; [BERD](#) is one of the main data sources for policy evaluation
- the [Department of Finance \(DoF\)](#) carries out its own annual survey into R&D and then provides us with the Northern Ireland R&D data for inclusion in the UK published results
- the [Research and Development Society](#) is a UK-based organisation formed to promote the better understanding of R&D in all its forms and it holds regular meetings, usually at the Royal Society in London – the Research and Development Society use BERD data, as a main source of information, for understanding how much UK businesses are investing in R&D on an annual basis and to inform wider debates about R&D

Requests for [BERD](#) data are made from a variety of sources including academics, government departments and economic consultants. This means that the data are used in various publications. For example:

- in 2011, the [Royal Society](#) published “Knowledge, Networks and Nations: Global scientific collaboration in the 21st century”, which included data published in our BERD 2009 statistical bulletin as part of the scientific landscape in 2011
- in one of a series of working papers by the Social, Technological and Environmental Pathways to Sustainability (STEPS) centre
- the [Economic and Social Research Council \(ESRC\)](#) published “Trends in the Global Distribution of R&D since the 1970s: data, their interpretation and limitations”, which refers extensively to BERD data
- in June 2013, the National Audit Office published “Research and Development funding for science and technology in the UK”; this report was published in response to a request from the House of Commons Science and Technology Committee, and provides an overview of R&D spending in the UK since 1985

For users of business statistics, there is a [Business and Trade Statistics community](#) on the StatsUserNet website. [StatsUserNet](#) is the Royal Statistical Society’s interactive site for users of official statistics. The community objectives are to promote dialogue and share information between users and producers of official business and trade statistics about the structure, content and performance of businesses within the UK. Anyone can join the discussions by registering via either of these sites.

## Timeliness and punctuality

(Timeliness refers to the lapse of time between publication and the period to which the data refer. Punctuality refers to the gap between planned and actual publication dates.)

For the Business Enterprise Research and Development ([BERD](#)) survey, the time between the end of the reference year and the publication date is approximately 11 months. The results are usually published in November each year. An internal investigation was carried out in 2012 to identify if it is feasible to publish these results earlier. It concluded that due to reliance on the external provision of Northern Ireland data, which cannot be provided before mid-October each year, the UK aggregates cannot be published earlier than November.

As part of this investigation we sought the views of some of the known users of this publication. They unanimously stated that they were content with the current publication timetable.

It is important to note that improvements have been made to the process underpinning the production of these estimates over the last few years and as a consequence timeliness has been improved. For example, 2007 data were published in January 2009, that is, 13 months after the end of the reference year. In contrast, the 2014 statistical bulletin was published less than 11 months after the end of the reference year.

In the unlikely event of a change to the release dates, public attention will be drawn to the change and the reason fully explained as set out in the [Code of Practice for Official Statistics](#).

For more details on related releases, the [GOV.UK release calendar](#) is available online and provides 12 months’ advance notice of release dates. If there are any changes to the pre-announced release schedule, public attention will be drawn to the change and the reasons for the change will be explained fully at the same time, as set out in the [Code of Practice for Official Statistics](#).

## 5 . How the output is created

## Data collection

Two types of questionnaire are sent to businesses requesting a calendar year report. If this is not available, businesses are asked to provide the dates of the 12-month period they are reporting for. Estimates are acceptable if actual figures are unavailable.

Long questionnaires (approximately 400) are sent to businesses in Great Britain that have previously returned research and development (R&D) expenditure above a certain threshold in the previous year's survey (£5.4 million for the 2015 survey) regardless of the number of employees that they have. Businesses receiving this questionnaire are requested to provide:

- a breakdown of capital and non-capital expenditure on in-house R&D
- description of the type of R&D performed (product group) and the type of research undertaken
- how in-house R&D expenditure for the relevant year was funded
- how much R&D was purchased
- number of employees working on R&D and the full-time equivalent (FTE)
- type of employees (researchers, technicians and support staff)
- postcodes which relate to the workplaces where R&D is carried out

All businesses known to be performing R&D (around 1,400) in Northern Ireland receive a similar long questionnaire.

With R&D being capitalised in the UK National Accounts, additional questions were added to the 2011 long form to collect information on the owner of the R&D assets, and also how long the business would expect to benefit from an investment in R&D.

Short questionnaires (approximately 3,600) are sent to all other businesses in Great Britain in the sample. Businesses receiving this questionnaire are requested to provide expenditure on in-house R&D; whether R&D relates to civil and/or defence; how much R&D was purchased; and the number of employees working on R&D.

## Sample and design

The sample and survey results cover "business enterprises" as defined in the [Frascati manual](#). This excludes government organisations, higher education establishments, and charities.

The UK Business Enterprise Research and Development ([BERD](#)) Survey covers estimates of UK businesses that are known to carry out R&D. Using the whole UK business population would not be suitable for this survey, as R&D takes place in only a small proportion of businesses. A list of approximately 31,400 UK businesses (30,000 in Great Britain and 1,400 in Northern Ireland) is used as a sampling frame and is updated annually before the survey selection begins. Stratification of the survey in Great Britain is by level of R&D expenditure, employment size band, and industry product group.

The three employment size bands are: under 100, 100 to 399, and 400 plus.

Businesses in Great Britain sent the long questionnaire are asked to select an industry product group that best describes the type of R&D activity they undertake. The short questionnaire responders are allocated an industry product group from their businesses Standard Industrial Classification (SIC) 2007, which is held on the Inter-Departmental Business Register (IDBR), and describes the type of activity undertaken by the business.

All businesses in Great Britain previously reporting R&D in-house expenditure of approximately £5.4 million or more are included in the sample and receive the long questionnaire. The £5.4 million may vary slightly each year, as the threshold needed to identify the top 400 businesses with the highest R&D expenditure, may change each year.

Smaller businesses in Great Britain identified as R&D performers are sampled using various sampling fractions. The detailed information for these businesses is estimated using the data received from the questionnaires completed by larger R&D performers in Great Britain. Totals for the unsampled businesses are estimated using ratio estimation with business employment as the auxiliary variable, a variable held on the IDBR.

All known Northern Ireland R&D performers are sent the long questionnaire.

## **Product groups**

The 400 largest R&D performers are asked to select the industry product groups that best describe the type of R&D activities they undertake. In 2010, these product group descriptions were updated to better reflect the current SIC 2007 descriptions. For the smaller R&D performers, no product group data were collected. However, the businesses' SIC 2007 codes are known from the IDBR. An assumption is therefore made that R&D expenditure is for the detailed product group that corresponds to the individual businesses' dominant SIC 2007. This approach must be regarded as an approximation since, in practice, an individual business can perform R&D for a range of product groups.

The implementation of SIC 2007, in 2010, resulted in some businesses' R&D moving to a different product group than previously published. The largest impact was with businesses with "publishing activities" as these moved out of the manufacturing sector and started to be included under "miscellaneous business activities". There was also an increase in the "other manufactured goods" product group due to businesses being reclassified from "textiles, clothing and leather products", "pulp and paper products", "rubber and plastic products", "fabricated metal products", "machinery and equipment" and "precision instruments and optical products".

The broad product groups consist of aggregations of the detailed product groups to categorise R&D by total "manufacturing", "services" and "other".

## **Standard Industrial Classification (SIC)**

The UK Statistics Authority placed a requirement on us, as part of the assessment of R&D statistics, to "review the statistical disclosure practices for BERD statistics, with a view to presenting industry statistics in BERD, and publish the results".

The SIC was first introduced into the UK in 1948 for use in classifying business establishments and other statistical units by the type of economic activity in which they were engaged. The classification provides a framework for the collection, tabulation, presentation and analysis of data, and its use promotes uniformity.

Estimates by SIC 2007 are derived by allocating business expenditure to industry classifications using the IDBR. The IDBR is a database of UK businesses that we maintain and holds information on the business activity (based on SIC 2007) of every business.

Estimates of R&D expenditure on an industry basis can be found in Table 27 of the BERD bulletin.

## Employment

Employment estimates are provided by businesses on the basis of “full-time equivalent” staff, averaged over the year. The categories of employment used are:

- researchers (scientists and engineers) – engaged in the conception or creation of new knowledge, products, methods and systems
- technicians – perform scientific and technical tasks normally under the supervision of researchers
- others (administrative) – support staff including skilled and unskilled craftsmen, secretarial and clerical staff participating in R&D projects

## Small and medium enterprises (SMEs)

A table providing estimates of R&D expenditure by small and medium enterprises (SMEs) is included as part of the BERD publication (Table 26). The SME definition used is that under the European Commission Recommendation (2003/361/EC) of 1 January 2003, in which SMEs are defined as enterprises with fewer than 250 employees. In addition, a criterion of independence is used to exclude enterprises that are part of a larger enterprise group, so that only true SMEs are evaluated. This criterion is important in the context of R&D estimates, given that R&D activity is often carried out by smaller businesses that form part of larger, sometimes multinational, businesses. To apply the SME definition, historic information on business ownership has been obtained using that currently held on the IDBR. Caution should therefore be exercised in making comparisons over time.

## Country or regional data

The following process is used to produce regional estimates of R&D. Businesses receiving the long questionnaire (the 400 largest R&D performers) accounted for approximately 75% of total R&D expenditure in 2015. Each business is asked to provide the workplace postcodes for all the sites at which the business performed R&D and to allocate the total expenditure figures of the business to the sites on a percentage basis.

Data for businesses receiving a short form and those not sampled, which in 2015 accounted for 22% of total expenditure, had their regional proportions estimated by using the county region code for each of these businesses on the business register as a proxy for where their R&D is being performed. The Northern Ireland returns accounted for the remaining 3% of the UK total.

Aggregation is undertaken at broad product group and county level. Estimates for regional breakdowns by product group cannot be accurately measured. Regional estimates are compiled by asking for all workplace postcodes where in-house R&D is performed and the percentage of the R&D carried out at each workplace. Where there are multiple product groups and multiple regions, R&D for all product groups is pro-rated according to the reported postcode breakdown.

## 6 . Validation and quality assurance

### Accuracy

(The degree of closeness between an estimate and the true value.)

## Sampling error

Sampling error arises when estimates are based on a sample rather than a full census of the population. The difference between the estimates derived from the sample and value that would be obtained from a census is referred to as the sampling error. The Business Enterprise Research and Development ([BERD](#)) Survey has provided standard errors information in the past but the methodology for estimation of the standard errors used to measure these is currently under review and therefore the standard errors were withdrawn from the 2014 statistical bulletin.

## Non-sampling error

Non-sampling errors are not easy to quantify and include errors of coverage, measurement, processing, and non-response. There is some difficulty in identifying the population of actual or likely research and development (R&D) performers and also problems in ensuring that businesses adhere to the [Frascati manual](#) R&D definitions. However, response rates are high and response bias was minimised due to a questionnaire design review undertaken prior to the 2007 survey.

The [BERD](#) Survey uses a reference list of known R&D performers to select the sample of businesses that receive the questionnaire. The reference list is updated annually, which minimises the selection of wrongly classified businesses and dead reporting units. The sample design takes into account previous years [BERD](#) returns, to ensure main respondents are included in the sample each year. The reference list is updated from many sources including filter questions on our other surveys such as the Annual Business Survey, the Annual Trade in Services Survey and the Innovation Survey. We also request information on new businesses undertaking R&D from both the Welsh and Scottish governments and also the Department for Business, Energy and Industrial Strategy (BEIS).

An [information note](#) was published by us on 20 November 2012, providing an overview of the BERD survey design, with a focus on the methods and sources used to annually update the sampling frame. The focus of this paper was the extent to which there may be under coverage in the BERD universe. It concludes that “there is not sufficient information on how much money businesses not covered by the BERD sampling frame spend on R&D to recommend a robust methodology for adjusting for under coverage.”

Once a business has been identified as an R&D performer, it is added to the reference list until it is selected and returns a questionnaire to say that it does not perform R&D, or until the business ceases trading, according to the Inter-Departmental Business Register (IDBR). This means that there is also the potential for some businesses to remain in the universe after they have ceased to perform R&D, resulting in potential over coverage. We have not identified to what extent this is an issue, but we intend to carry out analysis to investigate this issue further.

Response rates provide an indication of the likely impact of non-response error on estimates. For the [BERD](#) survey, the response target for Great Britain for 2015 was 83% for short questionnaire responders and 93% for long questionnaire responders. Questionnaires are dispatched annually in mid-February with a return date of early April. To achieve optimum response, two written reminders are sent to businesses, the first in mid-April and the second in mid-May. All businesses who have a significant impact on the survey (known as “key responders”), who have not replied, are also telephoned before the first set of results are produced. Northern Ireland achieved 79% response in the 2015 survey.

## Survey procedures

Returned questionnaires are scanned by our Survey Processing Centre with Optical Character Recognition (OCR) used to create an image. Images are stored on the computer system, reducing paper handling, retrieval and storage. Due to confidentiality issues, the paper version is shredded and then recycled.

Once the data are recorded on the database, a series of credibility checks are applied to aid data validation.

Results are processed for the three size bands within each industry product group.

Information for large performers in Great Britain (receiving the long form), who are non-responders, is estimated using firstly a matched pairs methodology, which involves calculating the growth between the previous 2 years' data and applying it to the most recent of these two previous returns. If 2 previous years long form data are not available, the growth is estimated using information from all responders in the same industry product group as the non-responder or if this is not available, historic data are used.

For the non-responding businesses receiving the short form and un-sampled businesses, R&D expenditure is estimated separately in each strata using business employment as the auxiliary variable.

The calculation is conducted at cell level. Outliers are removed before estimation and added back in after estimation has been conducted. An outlier is an observation that appears to deviate markedly from other members of the sample in which it occurs. The top 5% and the bottom 5% in each cell are trimmed as long as the cell contains 20 observations or more.

A per capita ratio is calculated for each of the long questionnaire cells and applied to the corresponding short questionnaire cells. Ratio estimation methods are used to estimate the short questionnaire estimates from the long questionnaire detail.

To estimate for short questionnaire employment figures, total business employment for all businesses in the sampling frame is calculated for each cell. All inliers have their R&D employment aggregated, and this is divided by the aggregate total business employment to give a per head value to use as a base for the cell to be weighted by. The sample frame employment for each cell is then multiplied by the per head R&D employment to give a weighted value for that cell. The outliers then have their question values aggregated together and added to the weighted figure.

The [BERD](#) Survey collects R&D employment under the headings of "civil" and "defence". To obtain R&D employment values at the industry product group level the following procedure takes place. For each business, the ratio of salaries and wages for the first product group to the total expenditure on salaries and wages for all product groups is calculated. This is then multiplied by each employment category, for example, "scientists", "engineers and researchers", "technicians" and "other" staff. This gives the estimate for R&D employment by product group. This process is repeated for each civil and defence product group. Civil and defence estimates are treated separately.

## Coherence and comparability

(Coherence is the degree to which data that are derived from different sources or methods, but refer to the same topic, are similar. Comparability is the degree to which data can be compared over time and domain, for example, geographic level.)

In response to a [UK Statistics Authority](#) requirement to improve published information on the coherence of R&D statistics, which was reported in the [Assessment of Compliance with the Code of Practice for Official Statistics: Statistics on Research and Development](#), we published an [information note](#) on 20 November 2012. This information note concludes "that BERD and GERD statistics are consistent with most other National Statistics relating to R&D available from other departments."

The introduction of Standard Industrial Classification (SIC) 2007 in 2009 has resulted in some businesses' R&D data moving to a different product group than previously published. The largest impact has been on businesses with publishing activities as these have been moved from the manufacturing sector and are now included under miscellaneous business activities. Other changes are documented in the background notes of the latest [BERD](#) publication.

## 7 . Concepts and definitions

(Concepts and definitions describe the legislation governing the output, and a description of the classifications used in the output.)

Research and development (R&D) and related concepts follow internationally agreed standards defined by the Organisation for Economic Co-operation and Development ([OECD](#)), and published in the [Frascati manual](#). An updated version of the manual was published in 2015 and this included the updated definition of R&D, defined as “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”.

R&D activity is distinguished by the presence of an appreciable element of novelty. If the activity follows an established pattern it is excluded; if it departs from routine and breaks new ground it is included. For example, activities such as routine testing, market research, patent applications, trial production runs and artistic work are excluded. Overheads of R&D projects are included. Value Added Tax (VAT) is excluded.

The UK has an obligation to collect and provide R&D data to Eurostat under European Commission (EC) Regulation No. 995/2012. The whole UK economy is covered and estimates are published at product group level. The previous regulation was reviewed as part of the requirements under Article 4 of implementing Decision 1608 /2003/EC of the European Parliament and of the Council.

## 8 . Other information

### Output quality trade-offs

(Trade-offs are the extent to which different dimensions of quality are balanced against each other.)

The Business Enterprise Research and Development (BERD) data are published approximately 11 months after the end of the reference year and the data undergo extensive checks prior to publication. The response rates are required to be very high because research and development (R&D) can be unpredictable in a business from year-to-year, so to keep the data quality high, we require actual data to be returned. Although data will usually be revised in the next publication due to misreporting and late returns, the initial estimate is an important requirement of both the UK and the EU.

### Assessment of user needs and perceptions

(The processes for finding out about users and uses, and their views on the statistical products.)

Some users would like more regional data breakdowns and also more detailed information on R&D employees. The size of the survey means that it is very difficult to produce these extra variables as the number of respondents would be so small that they would be considered statistically unreliable. The additional cost and burden on respondents is also an important factor in not increasing the sample size.

The reclassification of R&D as an intangible asset in the European System of Accounts 2010 (ESA 2010) resulted in us carrying out the work to implement the change from treating R&D as intermediate consumption, to gross fixed capital formation.

## 9 . Sources for further information or advice

## Accessibility and clarity

(Accessibility is the ease with which users are able to access the data, also reflecting the format in which the data are available and the availability of supporting information. Clarity refers to the quality and sufficiency of the release details, illustrations and accompanying advice.)

Our recommended format for accessible content is a combination of HTML web pages for narrative, charts and graphs, with data being provided in usable formats such as CSV and Excel. We also offer users the option to download the narrative in PDF format. In some instances other software may be used, or may be available on request. Available formats for content published on our website but not produced by us, or referenced on our website but stored elsewhere, may vary. For further information please contact us via email at [RandD@ons.gsi.gov.uk](mailto:RandD@ons.gsi.gov.uk).

For information regarding conditions of access to data, please refer to these links:

- [Terms and conditions](#)
- [Accessibility](#)