

Department of Commerce
U.S. Census Bureau
OMB Information Collection Request
Business Research and Development Survey
(Form BRD-1)
OMB Control Number: 0607-0912

Supporting Statement Part A. Justification

1. Necessity of the Information Collection

The Census Bureau is requesting clearance to conduct the Business Research and Development Survey (BRDS) for the 2018-2020 survey years with the revisions outlined in this document. Companies are the major performers of research and development (R&D) in the United States, accounting for over 70 percent of total U.S. R&D outlays each year. A consistent business R&D information base is essential to government officials formulating public policy, industry personnel involved in corporate planning, and members of the academic community conducting research. To develop policies designed to promote and enhance science and technology, past trends and the present status of R&D must be known and analyzed. Without comprehensive business R&D statistics, it would be impossible to evaluate the health of science and technology in the United States or to make comparisons between the technological progress of our country and that of other nations.

The National Science Foundation Act of 1950 as amended authorizes and directs the National Science Foundation (NSF) "...to provide a central clearinghouse for the collection, interpretation, and analysis of data on scientific and engineering resources and to provide a source of information for policy formulation by other agencies of the Federal government." One of the methods used by NSF to fulfill this mandate is the BRDS—the primary federal source of information on R&D in the business sector. NSF together with the Census Bureau, the collecting and compiling agent, analyze the data and publish the resulting statistics.

NSF has published annual R&D statistics collected from the Survey of Industrial Research and Development (1953 – 2007), the Business R&D and Innovation Survey (2008 – 2016), and the Business Research and Development Survey (2017) for 64 years. The results of the surveys are used to assess trends in R&D expenditures by industry sector, investigate productivity determinants, formulate science and tax policy, and compare individual company performance with industry averages. This survey is the Nation's primary source for international comparative statistics on business R&D spending.

The BRDS will continue to collect the following types of information:

- R&D expense based on accepted accounting standards.
- Worldwide R&D of domestic companies.
- Business segment detail.
- R&D related capital expenditures.
- Detailed data about the R&D workforce.
 - R&D strategy and data on the potential impact of R&D on the market.
- R&D directed to application areas of particular national interest.
 - Data measuring intellectual property protection activities and technology transfer.

The following changes will be made to the 2018-2020 BRDS compared to the 2017 BRDS:

- Added questions collecting percent of R&D on artificial intelligence.
- Added questions collecting geographic detail of companies' R&D workforce
- Added question collecting headcount of temporary and leased employees working on R&D.

Beginning in 2018, the BRDS will collect new data about R&D on artificial intelligence, geographic detail of companies' R&D workforce, and leased and temporary R&D employees.

There is increasing interest among domestic policy-makers and in the international community, as well as among U.S. researchers in academia, government and industry, for more data on artificial intelligence.

Domestic and foreign geographic information for R&D workforce will address Bureau of Economic Analysis (BEA) requests on inputs for enhanced estimation and evaluation of gross domestic product by state, foreign direct investment in the U.S., and U.S. direct investment abroad.

As a result of the revision of the Frascati Manual: Guidance for Collecting and Reporting on R&D (OECD, 2015), countries are recommended to collect and separately report on both internal R&D workers (those who are employed directly by and are part of the R&D-performing business) and "external" R&D workers (consultants, contractors, and others who contribute directly to the R&D performance of the R&D-performing business, but are not an employee of the business). The collection of these R&D employees is to provide internationally comparable US data on total business R&D workers.

The survey form used in the BRDS is the BRD-1 (Attachment A).

Information from the BRDS will continue to support the America COMPETES Reauthorization Act of 2010 as well as other R&D-related initiatives introduced during the clearance period. Other initiatives that have used BRDS statistics include: the [Science of Science and Innovation Policy](#) (NSF); and [Rising Above the Gathering Storm](#) (National Research Council).

The survey is conducted under the authority of Title 13, United States Code, Sections 8(b), 131, and 182, and Title 42, United States Code, Sections 1861-76 (National Science Foundation Act of 1950, as amended).

2. Need and Uses

Policy officials from many Federal agencies rely on these statistics for essential information. Businesses and trade organizations rely on BRDS data to benchmark their industry's performance against others. For example, total U.S. R&D expenditures statistics have been used by the Bureau of Economic Analysis (BEA) to update the National Income and Product Accounts (NIPAs) and, in fact, the BEA recently has recognized and incorporated R&D as fixed investment in the NIPA. Accurate R&D data are needed to continue the development and effect subsequent updates to this detailed satellite account. Also, NSF, BEA and the Census Bureau periodically update a data linking project that utilizes BRDS data to augment global R&D investment information that is obtained from BEA's Foreign Direct Investment (FDI) and U.S. Direct Investment Abroad (USDIA) surveys. Further, the Census Bureau links data collected by BRDS with other statistical files. At the Census Bureau, historical company-level R&D data are linked to a file that contains information on the outputs and inputs of companies' manufacturing plants. Researchers are able to analyze the relationships between R&D funding and other economic variables by using micro-level data.

Individuals and organizations access the survey statistics via the Internet in annual InfoBriefs published by NSF's National Center for Science and Engineering Statistics (NCSES) that announce the availability of statistics from each cycle of BRDS and detailed statistical table reports that contain all of the statistics NSF produces from BRDS. Information about the kinds of projects that rely on statistics from BRDS is available from internal records of NSF's NCSES. In addition, survey statistics are regularly cited in trade publications and many researchers use the survey statistics from these secondary sources without directly contacting NSF or the Census Bureau. Some of the users of the survey statistics and the types of information they request are described below.

Information quality is an integral part of the pre-dissemination review of the information disseminated by the Census Bureau (fully described in the Census Bureau's Information Quality Guidelines). Information quality is also integral to the information collections conducted by the Census Bureau and is incorporated into the clearance process required by the Paperwork Reduction Act.

Government Users

Government policy officials who are involved in assessing the role of the Federal government in promoting economic growth use R&D statistics in their decision-making processes since R&D results affect technological and economic progress. Members of Congress make use of R&D statistics in preparing tax legislation, contacting NSF or the Census Bureau directly through their own staffs, through one of the House or Senate science committees, the Congressional Budget Office (CBO), the Congressional Research Service (CRS), or the Congressional Joint Economic Committee.

NSF staff also work closely with the Office of Science and Technology Policy (OSTP), providing R&D statistics and indicators of emerging trends to assist the OSTP staff in their analyses of the status of science and technology in the United States. In addition, NSF has frequent contact with the Office of Management and Budget (OMB). Statistics produced from BRDS also have been requested by officials from a host of other Federal government and quasi-governmental agencies. Also, as states and local governments seek to attract high-tech industries to their areas, NSF and the Census Bureau are frequently asked to provide R&D funding and employment figures to state governments and state organizations. Further, information and statistics from BRDS also are supplied to internal NSF organizations. For example, survey statistics are used in the "Research and Development: National Trends and International Linkages" and "Industry, Technology, and the Global Marketplace" chapters of the Congressionally mandated Science and Engineering Indicators series, a biennial report in which the National Science Board continues to describe quantitatively the condition of U.S. science and research. Survey results are also included in NSF's annual National Patterns of R&D Resources tabulations and reports.

International Users

The international community uses R&D spending information as part of its comparisons of the economic performance among nations. U.S. R&D statistics are compiled in a format that can be compared with those of other countries. These statistics are transmitted to the Organization for Economic Cooperation and Development (OECD) that relies on BRDS as its primary source for comparative business R&D statistics for the United States. Also, R&D statistics are used by multi-national committees and subcommittees studying and maintaining the North American Industry Classification System (NAICS) and North American Product Classification System (NAPCS).

Other international and foreign entities that have requested statistics on U.S. business R&D expenditures include the Brazilian National Council for Scientific and Technological Development, Canadian Ministry of Treasury and Economics, CARSA (Spain), Central Research Institute of the Electric Power Industry of Japan, Credit Suisse Securities, Delegation of the European Communities, Deloitte-Touche Tohmatsu (Japan), Department of State and Regional Development (Australia), Department of Technology Policy (Austria), European Commission's Joint Research Center, French Embassy, French Federal Institute of Research, Embassy of Finland, Embassy of Germany, Hungarian Academy of Sciences, The Impact Group (Canada), Industry Canada, Instituto Nacional de Estadística (Madrid), London School of Economics, Natexis Capital (France), National Technology Agency of Finland, Natural Sciences and Engineering Research Council of Canada, Office of Pharmaceutical Industry Research (Japan), Oxford Institute for Energy Studies, Puerto Rico Planning Board, Office of the Representative of the Republic of Taiwan, Queens University (Canada), Research Center for Advanced Science and Technology (Japan), Royal United Services Institute for Defence and Security Studies (UK), Statistics Canada, Statistics Quebec, VM Institute (Japan), and the Universities of Auckland, Campinas (Brazil), Maastricht (Germany), Melbourne, Quebec, Shanghai, Sussex, and Tokyo. Domestic research organizations focusing on international issues also have requested survey statistics. These organizations include the U.S. Council for International Business and the Center for Strategic and International Programs.

Business Users

Although the primary purpose of the survey is to provide accurate R&D statistics for well-informed public policy decisions, business users also benefit from the survey figures. There is a special obligation to keep the survey relevant to industry users particularly because business personnel spend time answering the annual questionnaire. Firms and trade associations in all industries, whether large or small in terms of R&D performance, are interested in making intra-industry comparisons, as well as comparing other industries' performance with their own. Each year the NSF and the Census Bureau receive many requests for R&D information from business users of the statistics.

In addition to industry researchers who utilize the R&D statistics directly from the NSF website and publications, there are many who use BRDS statistics and information in their own trade reports. Trade associations that have contacted NSF include aerospace Industries Association, American Chemical Council, American Entrepreneur Association, American Forestry and Paper Association, American Iron and Steel Institute, American Power Association, American Society for Engineering Education, Center for Automotive Research, Elsevier Engineering Information, Inc., Gas Operations Innovation Alliance, Manufacturers' Alliance, Hartford (CT) Area Business Associates, Industrial Research Institute, National Center for Manufacturing Sciences, Natural Gas Supply Association, Pharmaceutical Research & Manufacturers of America, Refractories Institute, and the Small Business High Tech Institute. Consultants to trade associations and industry also contact NSF. Among them have been: Booz-Allen Hamilton; Boston Consulting Group; DRI, Inc.; Ernst and Young, J. Orban and Company; Mayer, Brown, Rowe, and Associates; McKinsey and Company; Northstar Economics, Inc.; PricewaterhouseCoopers; SRI International; Stroock and Stroock and Lavan LLP; Waldman Associates; William Blair and Company; and the William Burn Company.

R&D statistics also are used by research organizations devoted to the study of industry, R&D, science and technology and related topics. These organizations include the Academy of Technology Entrepreneurs and Innovators; Boston Analytics, Competitiveness Policy Council; Corporation for Enterprise Development; Council for Chemical Research; Council on Competitiveness; Information Technology and Innovation Foundation, National Academy of Sciences' Academy of Engineering, Committee on National Statistics, National Research Council, and Board on Science, Technology, & Economic Policy; National Economic Research Association; Potomac Knowledgeway Project; Research and Development Council; United Technologies Research Center; The Urban Institute, and World Wildlife Federation. The statistics also are the basis for R&D spending projections published by the Battelle Memorial Institute.

Other Users

Research undertaken at colleges and universities on innovation and economic growth has relied heavily on the detailed R&D time series from NSF's business R&D surveys. Research projects that have used R&D statistics obtained from the surveys have been conducted at a host of colleges and universities including American, Clemson, Columbia, Georgia Institute of Technology, Georgia State, George Mason, Georgetown, George

Washington, Harvard, Harvard Business School, Kansas State, Lehigh, Macalester, Marshall, Massachusetts Institute of Technology, Michigan State, New York University Stern School of Business, Ohio State, Pennsylvania State, Princeton, Purdue, Rutgers, Texas A&M, Tufts, Southern Methodist University, Virginia Polytechnic Institute, Yale, and the Universities of California, Delaware, Florida, Georgia, Maryland, Michigan, Minnesota, New York, North Carolina, Oregon, Pittsburgh, South Carolina, Tennessee, Texas, Virginia, and Wisconsin. Some researchers at the institutions above and at others access business R&D data via the Census Center for Economic Studies' network of Research Data Centers throughout the United States.

In addition, inquiries are regularly received from the news media. Inquiries have been received from: Aviation Daily, Business Week, Chemical & Engineering News, Chemical Week, Chicago Tribune, DRI/McGraw-Hill Publications Co., Elsevier Science Publishing, Forbes, flatironreport.com, Fortune, Indianapolis Star, Information Week, Journal of Commerce, Los Angeles Times, Manufacturer, Manufacturing News, Modern Maturity Magazine, National Geographic, Newsweek, New York Times, Owner-Manager Magazine, Physics Today, Research & Development, Research and Technology Management, Science, Science & Government Report, USA Today, U.S. News & World Report, Wall Street Journal, Washington Post, and Washington Times. And finally, Internet sites continue to link with NSF's business survey results.

In summary, each item in BRDS has been the subject of research by someone interested in business R&D performance. Although the consumers of the R&D statistics from BRDS are diverse, there is one common element underlying all the uses of the survey statistics—an attempt to gain a better understanding of some aspect of the nation's scientific and technological resources. The detailed statistics provided by BRDS are the most complete set of elements for assessing the impact of R&D on business development and the nation's economy.

3. Use of Information Technology

The 2018 BRDS will follow a primarily electronic collection strategy, where all respondents will be directed to use the internet reporting platform, Centurion, but paper forms will be made available to those who call to request one and will be included in an optional fourth follow-up mailing.

The Centurion instrument will mirror the paper form, BRD-1 (Attachment A). Advantages to using Centurion include: reduced time and expense to report, improved data quality through automatic data checks, the ability to exit the form and resume at a later time without losing the data already entered, the ability to save an electronic version (pdf) of submitted data for their own records, and the ability to consolidate and upload data directly from Excel spreadsheet versions of the survey.

Through the Economic Respondent Portal, respondents will have access to frequently asked questions and general information about the survey. They will also have direct access to Centurion, and will have the ability to request time extensions, check their filing status or send secure email messages to the Census Bureau.

4. **Efforts to Identify Duplication**

The Census Bureau and NSF jointly assess results of discussions with respondents who also participate in other surveys to avoid possible duplication of R&D data collection. In addition, the Census Bureau and NSF maintain close liaison and share information with other Government agencies that have an interest in R&D statistics to ensure that duplication of data collection does not occur.

The Survey is the only annual survey measuring national business R&D spending of businesses with 10 or more employees. The Securities and Exchange Commission (SEC) collects only partial data on R&D expenditures and R&D scientists and engineers employed by U.S. companies on Forms 10-K and 10-Q and these data are not aggregated to a national total. In addition, privately held companies, regulated utilities, transportation companies, and companies with only small amounts of R&D spending do not report R&D expenditures to the SEC.

Occasionally, various interested groups, such as the Aerospace Industries Association, Pharmaceutical Manufacturers Association, and the Industrial Research Institute conduct R&D canvasses of their own members. These studies cannot, however, be used as the basis for national R&D totals, nor do they have the variety of R&D detail necessary for policy decisions. There is, therefore, no other source for the R&D data collected by the BRDS.

5. **Minimizing Burden**

R&D is a rare activity in businesses. Many companies surveyed by BRDS have no R&D activity. Companies with R&D have a highly skewed distribution with the vast majority of BRDS R&D estimates coming from a relatively small number of companies.

Companies reporting \$0 R&D are skipped through almost the entire survey, only seeing 19 questions (out of 120). Companies reporting less than \$1 Million R&D are skipped through more than half of the survey, only seeing 48 questions. These skip patterns significantly reduce the response burden for vast majority of companies in the survey, historically about 38,000 of the 45,000 companies sampled.

Additionally, the sampling methodology is based on selection probabilities that are proportional to a measure of size. The measure of size is R&D costs for companies that are known to perform or fund R&D and is annual payroll for companies with unknown R&D activity. This makes smaller companies less likely to be selected for the sample. More information on the sample design can be found in Part B of the Supporting Statement.

6. Consequences of Less Frequent Collection

Users who depend on BRDS statistics in NSF's annual Business R&D and Innovation detailed statistical tables reports, the National Patterns of R&D Resources reports, and the National Science Board's Science and Engineering Indicators reports require annual updates to create and analyze the size of and trends in the national R&D enterprise. Also, the Department of Commerce's Bureau of Economic Analysis (BEA) has emphasized the crucial importance of an annually updated series for the R&D portion of the National Income and Product Accounts (NIPAs), Industry Economic Accounts (IEAs) and linkages with the BEA Foreign Direct Investment and U.S. Direct Investment Abroad data. Without annual BRDS data, BEA would be unable to estimate R&D investment and output in its accounts.

7. Special Circumstances

This information collection will be conducted in a manner consistent with OMB guidelines and there are no special circumstances.

8. Consultations Outside the Agency

On August 24, 2018 the Census Bureau published a notice in the Federal Register (Volume 83, No. 165, pages 42866-42867) inviting the general public and other Federal agencies to comment on plans to submit this request. We received no comments in response to that notice.

The Census Bureau and the NSF conduct annual debriefings with respondents to the survey. These debriefings inform the agencies on potential improvements to the survey or survey processes. NSF and the Census Bureau routinely present research findings at various conferences both internal and external.

9. Paying Respondents

No payments or gifts are given to respondents of the BRDS.

10. Assurance of Confidentiality

The information collected in this survey is confidential under Title 13, United States Code, Section 9. Title 13, United States Code, Sections 224 and 225 make reporting mandatory.

Respondents are informed of the confidentiality of their response and the mandatory nature of the survey in our initial letter (Attachment B1), follow-up letters (Attachments B2 and B3), paper form (Attachment A), and Electronic Instrument (Attachment C).

11. Justification for Sensitive Questions

There are no questions on the BRDS that are commonly considered sensitive.

12. Estimate of Hour Burden

The total annual burden estimate we are requesting for this collection is 148,600 hours.

According to the May 2017 Occupational Employment Statistics from the Bureau of Labor Statistics (BLS) website, the average wage rate for a staff level accountant is \$37.46 per hour. The total dollar cost for all respondents annually surveyed will be approximately $(148,600 * 37.46) = \$5,566,556$.

Changes to the form – adding new question on artificial intelligence R&D spending and adding new question on leased and temporary employees working on R&D – should not have a substantive effect on burden.

See Table A for details of the burden estimate. The average burden per response is developed through discussions with respondents. Additionally, we include a question on the form asking the length of time it took to complete the survey.

Table A.

	Out of Business / Acquired by another U.S. company	\$0 Total R&D	Both R&D Paid for by the Company and R&D Paid for by Others < \$1 Mil	One of R&D Paid for by the Company or R&D Paid for by Others > \$1 Mil	Both R&D Paid for by the Company and R&D Paid for by Others > \$1 Mil	TOTAL
Count of Companies	1,600	30,000	6,800	6,000	600	45,000
Burden Estimate	.25 Hours	.5 Hours	1.5 Hours	18 Hours	25 Hours	Between 15 minutes and 25 hours, with an average of 3.3 hours.
Total Burden Hours	400	15,000	10,200	108,000	15,000	148,600

13. Estimated Cost to Respondents

It is expected that respondents will not incur any cost other than that of their time to respond. The information requested is of the type and scope normally carried in company records and no special hardware or software is necessary to provide answers to this information collection. Therefore, respondents are not expected to incur any capital and startup costs or systems maintenance cost in responding. Further,

purchasing of outside information collection services, if performed by the respondent, is part of usual and customary business practices and not specifically required for this information collection.

14. Costs to the Federal Government

We expect the total cost to the Federal Government to be approximately \$5.4 million per survey year. This cost is expected to be relatively constant for 2018-2020. The U.S. Census Bureau pays 20% of costs and the National Science Foundation pays 80%. The cost includes, but is not limited to, costs associated with data collection, processing, data review, data tabulation, disclosure avoidance, overhead, printing, postage, and support staff.

15. Reason for Change in Burden

There is no estimated change in burden. The three new questions will only be asked of companies reporting more than \$1 million in R&D costs – about 7,000 companies out of the 45,000 company sample. Additionally, the new questions ask for data that is not generally considered to be burdensome for companies to answer.

16. Project Schedule

Task	Time Frame
2018 Survey Launch/Initial Mail-out	February-2019
2018 Micro Data Review	Mar -> Dec 2019
2018 Survey Closeout	Late December-2019
2018 Macro Data Review	January-2020
2018 Table/Disclosure Review	Jan -> Mar 2020
2018 Data Tables Delivered to NSF	Mar -> Jun 2020
2019 Survey Launch/Initial Mail-out	February-2020
2019 Micro Data Review	Mar -> Dec 2020
2019 Survey Closeout	Late December-2020
2019 Macro Data Review	January-2021
2019 Table/Disclosure Review	Jan -> Mar 2021
2019 Data Tables Delivered to NSF	Mar -> Jun 2021
2020 Survey Launch/Initial Mail-out	February-2021
2020 Micro Data Review	Mar -> Dec 2021
2020 Survey Closeout	Late December-2021
2020 Macro Data Review	January-2022
2020 Table/Disclosure Review	Jan -> Mar 2022
2020 Data Tables Delivered to NSF	Mar -> Jun 2022

17. Request to Not Display the Expiration Date

The expiration date of OMB approval will be displayed on questionnaires.

18. Exceptions to the Certification

The collection of information for the BRDS complies with 5 CFR 1320.9 without exception.