

SUPPORTING STATEMENT – PART A
U.S. Department of Commerce
U.S. Census Bureau
Business R&D and Innovation Survey
(Forms BRDI-1 and BRD-1S)
OMB Control No. 0607-0912

A. Justification

1. Necessity of the Information Collection

Companies are the major performers of research and development (R&D) in the United States (U.S.), 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. In order 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 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 the NSF to fulfill this mandate is The Business R&D and Innovation Survey (BRDIS)—the primary federal source of information on R&D in the business sector. The NSF together with the Census Bureau, the collecting and compiling agent, analyze the data and publish the resulting statistics.

The NSF has published annual R&D statistics collected from the Survey of Industrial Research and Development (SIRD) (1953 – 2007) and BRDIS (2008 – 2013) for 60 years. The results of the survey 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 BRDIS will continue to collect the following types of information:

- R&D expense based on 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 innovation, and intellectual property protection activities.

The following changes were made to the 2012 BRDIS from the 2011 BRDIS.

- Section 2: Brought back from the 2010 BRDI-1 form break out of capital expenditures into 4 categories: “Structures”, “Equipment”, “Capitalized software”, and “All other capital expenditures for R&D operations.”
- Section 3: Broke out the “All other” category on previous survey year forms to include: “Department of Homeland Security”, “Department of Transportation”, “Environmental Protection Agency”, “The National Science Foundation”, and “All other, please specify” category.
- Section 4: Brought back from the 2010 BRDI-1 form the percentage of R&D that was directed towards business areas or product lines new to the respondent’s company, as well as percentages that pertain to defense applications, health or medical applications, or agricultural applications for both funded by company and funded by others.

The following changes were made to the 2013 BRDIS from the 2012 BRDIS.

- Section 2 and 3: We added the following to the list of Countries for both funded by company and funded by other sections: Hungary, Luxembourg, and Norway.
- Section 2: Brought back from 2010 BRDI-1 amount of R&D company plans to recoup through indirect charges on US federal government contracts (IR&D).
- Section 4: In 2013 we combined software and embedded products into one question. Previously we collected a software percentage and a software embedded in other products question. This was done for questions pertaining to both sections: section 2-for R&D paid for by the company and section 3-R&D paid for by others. Also a question was added for federally funded R&D paid for by others.
- Section 5: We added back a part of the education question for

employment from 2010 BRDI-1, asking them for the count of how many scientists, engineers and managers have PhDs.

- We added two business codes to the list of business codes on page 46-47. 32542-Biotechnology-based pharmaceutical and biological products (except diagnostics) and 51801-Cloud computing applications and internet based software services.

The following changes were made to the 2014 BRDIS from the 2013 BRDIS.

- Section 1: Moved foreign ownership question up above ownership question. Changed the EIN of owner to the ownership question instead of the foreign ownership question.
- Section 2: Added some questions to gather data on monetary gifts to academia.
- Section 6: Added a question on revenue from sale of patents. Added two questions in regards to how much the company paid others to purchase patents or license patents. Removed the question on how many agreements company entered into.

Information from the BRDIS will continue to support the following initiatives:

Science of Science and Innovation Policy (SciSIP), the NSF's program to foster the development of the knowledge, theories, data, tools, and human capital needed to underwrite fundamental research that creates new explanatory models and analytic tools designed to inform the Nation's public and private sectors about the processes through which investments in science and engineering are transformed into social and economic outcomes.

America Competes Act of 2007, which calls for the doubling of funding for basic research in physical sciences, improvement of math instruction, and expansion of low-income students' access to Advance Placement (AP) coursework through AP/International Baccalaureate Program to, as The White House fact sheet on the America Competes Act says, "encourage scientists to explore promising and critical areas such as nanotechnology, supercomputing, and alternative energy sources."

Rising Above the Gathering Storm, the National Research Council (NRC) report that recommends increasing America's talent pool by improving K-12 math and science education; sustaining and strengthening the Nation's commitment to long-term basic research; developing and recruiting top students, scientists and engineers from U.S. and abroad; and ensuring that the U.S. is the premier place in the world for innovation.

2. Need and Uses

Policy officials from many Federal agencies rely on these statistics for essential information. For example, total U.S. R&D expenditures statistics have been used by the Bureau of Economic Analysis (BEA) to update the System of National Accounts and, in fact, the BEA recently has incorporated R&D as a direct component of the System. Accurate R&D data are needed to continue the development and subsequent updates to this detailed satellite account. Also, a data linking project has been designed to augment the Foreign Direct Investment (FDI) data collected by BEA. The initial attempt to link the SIRD data with BEA's FDI benchmark files was successful, and plans now call for the annual linkage of the R&D data to the FDI and U.S. Direct Investment Abroad (USDIA) data. Further, the Census Bureau links data collected by the Survey 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 National Center for Science and Engineering Statistics (NCSES) *InfoBriefs* that announce the availability of statistics from each cycle of the Survey and provide detailed statistical table reports that contain all of the statistics the NSF produces from the Survey. Information about the kinds of projects that rely on statistics from the Survey is available from internal records at the 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 the 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. We also review to make sure we do not disclose a particular company's data.

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 extensive use of

R&D statistics in preparing tax legislation, contacting the NSF or the Census Bureau directly through their own staffs, one of the House or Senate science committees, or the Congressional Research Service.

The NSF staff also work closely with the Office of Science and Technology Policy (OSTP), providing R&D statistics and indications of emerging trends to assist the OSTP staff in their analyses of the status of science and technology in the United States. In addition, the NSF has frequent contact with the Office of Management and Budget (OMB), the Congressional Budget Office (CBO), the Congressional Research Service (CRS), and the Congressional Joint Economic Committee which use R&D statistics in their studies.

Statistics produced from the Survey also have been requested by officials from other Federal government and quasi-governmental agencies including the Departments of Agriculture, Commerce, Defense, Education, Energy, Health and Human Services, Labor, State, Treasury; the Bureau of Economic Analysis; Bureau of Labor Statistics (BLS); Congressional Joint Committee on Taxation; Consumer Products Safety Commission; Environmental Protection Agency; Federal Reserve Banks of Chicago, Dallas, New York, and San Francisco; Government Accountability Office; Government Printing Office; International Trade Administration; International Trade Commission; National Aeronautics and Space Administration; National Institute of Standards and Technology; National Institutes of Health; National Oceanic and Atmospheric Administration; Oakridge National Laboratory; Office of Naval Research; President's Council of Economic Advisors; Office of Trade Policy Analysis; U.S. Federal Trade Commission; U.S. Patent Office; and U.S. Small Business Administration.

As states and local governments seek to attract high-tech industries to their areas, the NSF and the Census Bureau are frequently asked to provide R&D funding and employment figures. Among the state governments and state organizations requesting industry R&D statistics have been Alabama, Arkansas, California Energy Commission, Center for Innovative Technology (VA), Georgia, Indiana, Maine Development Foundation, Maine Science and Technology Foundation, Maryland, Massachusetts Department of Revenue, Michigan Department of Labor and Economic Growth, Michigan Economic Development Corporation, Minnesota, Mississippi, New Jersey Research and Development Council, New York State Department of Taxation and Finance, New York State Economic Development Authority, North Carolina, North Dakota Department of Commerce, Ohio, Oklahoma, Pennsylvania, South Carolina, Southern Growth Policies Board (representing Alabama, Arkansas, Georgia, Kentucky, Louisiana, Missouri, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Virginia, and West Virginia), and Utah.

Information and statistics from the Survey also are supplied to the NSF internal 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 its effort to describe quantitatively the condition of U.S. science and research. Survey results are also included in the NSF's annual *National Patterns of R&D Resources* tabulations.

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 the Survey as its primary source for 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, Delegation of the European Communities, 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, , Industry Canada, Instituto Nacional de Estadística (Madrid), National Technology Agency of Finland, Natural Sciences and Engineering Research Council of Canada, Puerto Rico Planning Board, Office of the Representative of the Republic of Taiwan, Statistics Canada, and Statistics Quebec.

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, and one of the goals of the redesign is to increase the utility of the **information** for companies. 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 Census Bureau receive many requests for R&D information from business users. Some of the industries where users who have requested information are aerospace, telecommunications, healthcare, pharmaceuticals, chemicals, software, and motor vehicles.

In addition to industry researchers who utilize the R&D statistics directly from the NSF website and publications, there are many who use the Survey's tabulations in their own trade reports.

Other trade publications that regularly print statistics directly from the Survey include multiple Fortune 500 companies and various trade associations.

Unions also consider business R&D statistics relevant to their members' well-being. R&D statistics also are used by research organizations devoted to the study of industry, R&D, science and technology and related topics.

Other Users

Research undertaken at universities on innovation and economic growth has relied heavily on the detailed R&D time series from the Survey. Research projects that have used R&D statistics obtained from the Survey have been conducted at many colleges and universities.

In addition, inquiries are regularly received from the news media. And finally, Internet sites continue to link with the Survey's results.

The list below shows the type of requester and the percentage of industry R&D information requests received via telephone and email from each group during current year (CY) 2013. The "NSF and type of organization undefined" category includes, but is not limited to, requests from inside the NSF, libraries, and students below the university level. The percentages below **do not** include visits to the NSF website.

<u>Type of User</u>	<u>Percentage of requests</u>
University	22
The NSF and type of organization undefined	18
Research and nonprofit	12
Federal and State government	11

Industry	11
Consultants	7
Foreign government and International research	6
Media	4
Trade association	2
Congressional	1

In summary, each item in the Survey has been the subject of research by someone interested in business R&D performance. Although the consumers of the R&D statistics from the Survey 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 the Survey 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

Respondents are able to respond by either mailing the questionnaire back to the U.S. Census Bureau or electronically by using Centurion, the U.S. Census Bureau's internet reporting option. Explanatory materials accompanying the questionnaires notify respondents that they can access Centurion by going to www.census.gov/econhelp/brdis. 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 a paper or electronic version (pdf) of the completed form, and the ability to upload data from an excel spreadsheet. Respondents are also able to use the website to access the following information: the Secure Messaging Center where respondents can communicate with the Census Bureau in a secure environment, general information regarding the BRDIS, frequently asked questions, sample questionnaires, and worksheets for each question in various formats designed to allow respondents the ability to email the information to the appropriate person within their company to obtain the information. Respondents are also able to request an extension and update their contact information at the web site.

4. Efforts to Identify Duplication

The Census Bureau and the NSF jointly assess results with major respondents who also participate in other surveys to avoid possible duplication of R&D data collection. In addition, as mandated by law, the Census Bureau and the NSF 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 total national business R&D spending. 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 members of particular trade associations 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 Survey.

5. **Minimizing Burden**

R&D is a rare activity in businesses. Many companies surveyed by BRDIS have no R&D activity. Companies with R&D have a highly skew distribution with the vast majority of BRDIS R&D estimates coming from a relatively small number of companies. Rather than send the full 48-page Form BRDI-1 to all companies sampled by BRDIS, the NSF and the Census Bureau developed a much less burdensome, 8-page, form (Form BRD-1S) to administer to companies with less than a given threshold of R&D. Companies completing Form BRD-1S report only the high-level BRDIS data items. Those companies reporting over the threshold amount of R&D on Form BRD-1S are subsequently mailed Form BRDI-1 to collect additional detail. The threshold amount for the 2012 and 2013 BRDIS cycles was \$1 million. Assuming response rates do not differ between form types, increasing the threshold reduces overall respondent burden (fewer companies receive the longer form) at the cost of increased imputation rates for data items not collected on Form BRD-1S. Conversely, decreasing the threshold increases overall respondent burden but decreases imputation rates for data items not collected on Form BRD-1S. The NSF and the Census Bureau plan to review results of the 2012 and 2013 survey cycles in order to select future threshold amounts that best balance the need to minimize the handling of nonresponse with the desire to minimize respondent burden.

6. **Consequences of Less Frequent Collection**

During 1999 and 2000, the National Academy of Sciences (NAS) conducted an NSF-sponsored portfolio review of the NSF's statistical

program and published the results in a report entitled *Measuring the Science and Engineering Enterprise-Priorities for the Division of Science Resources Studies*¹. Among the aspects of the NSF statistical program that were reviewed was the consequence to Federal program or policy activities if data collections, including the collection by the BRDIS, are not conducted or are conducted less frequently, and the technical or legal obstacles to reducing burden. Also, the BEA has emphasized the importance of an annually updated series recently because of the linkage with the BEA FDI and USDIA data and inclusion of an R&D satellite account in the System of National 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 May 30, 2014 the Census Bureau published a notice in the Federal Register (Volume 79, No. 104, pages 31087 - 88) inviting the general public and other Federal agencies to comment on plans to submit this request. One comment was received during the 60-day comment period, which was from BEA, strongly supporting this data collection because it is the primary source for developing key components of BEA's economic statistics.

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. Census and the NSF routinely present research findings at various conferences both internal and external.

Based on the terms of clearance on 1/5/12, the Census Bureau and the NSF have analyzed the feasibility of producing "bridge tables." We first discussed basis for possible bridge tables and decided that the analysis would focus on the collection methodology changes and the BRDIS classification methodology.

The BRDIS did not represent a change in any of the definitions for the key data variables that were collected on the SIRD. BRDIS did implement a new collection methodology that asks the respondent to first report the accounting definition of R&D expense that publically traded companies are required to report to the SEC and then has them derive the performance concept by subtracting the outsourced R&D from the total R&D expense. The 2007 SIRD asked the respondents to report the R&D performance concept without reference to the accounting definition. We

analyzed the 2008 BRDIS and the 2007 SIRD using publically available information from company financial statements. This review highlighted common reporting errors in both SIRD and BRDIS that should receive ongoing scrutiny during the review of BRDIS data and during the design of future years' survey forms and instructions but we did not find conclusive evidence that there was a break in the time series.

The 2008 BRDIS implemented a classification methodology that used company-reported business information. Industry classification was based on the largest reported business code in terms of total domestic R&D performance. The 2007 SIRD implemented a classification methodology that started by generating an industry code using establishment level payroll data from the Census Bureau's Business Register. Companies were assigned industry codes based on the industry that had the greatest payroll value after summing the establishment level detail. In cases where this method classified companies with large amounts of R&D into wholesale trade (NAICS 42), scientific R&D services (NAICS 5417), or management of companies and enterprises (NAICS 55), analysts were tasked with reviewing and possibly correcting the industry classification. We compared the final classification from the 2007 SIRD to the 2008 BRDIS and found that companies accounting for over 10% of the 2007 estimate for total domestic R&D performance would have been classified into a different 2-digit NAICS sector using the BRDIS classification methodology. As a result of this finding, Census and the NSF are in the process of developing ad-hoc tables for key data items showing the 2007 SIRD estimates restated using the 2008 BRDIS classification. It should be noted that we will not be able to isolate the impacts of the new methodology given that we did not collect 2007 data on the 2008 BRDIS.

The NSF published an *SRS InfoBrief*: "NSF Announces New U.S. Business R&D and Innovation Survey (BRDIS)" (The NSF 09-304) at <http://www.nsf.gov/statistics/infbrief/nsf09304.>] prior to the publication of the BRDIS data that highlighted the changes and the additional data that would be available from the new survey. The NSF has handled the communication with data users regarding the impacts of the new survey on the historical time series on a case by case basis.

9. Paying Respondents

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

10. Assurance of Confidentiality

The information collected in this survey is confidential under Title 13, U.S. Code. A notice on the first page of each questionnaire announces to the respondent "By Title 13, U.S. Code, **YOUR CENSUS REPORT IS**

CONFIDENTIAL” and that it may be seen only by persons sworn to uphold the confidentiality of the Census Bureau information and may be used only for statistical purposes and that copies retained in respondents’ files are immune from legal process.

The survey is conducted under the authority of Title 13, U.S. Code, and in our cover letters (see Attachment A), we inform respondents that the Survey is mandatory.

11. Justification for Sensitive Questions

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

12. Estimate of Hour Burden

For the 2014 BRDIS, approximately 7,000 companies will receive Form BRDI-1 (see Attachment B and C) and approximately 38,000 companies will receive Form BRD-1(S) (see Attachment D and E), for a total sample size of approximately 45,000 companies. See Tables A and B for details of the burden estimates. Table B includes BRD-1S respondents who reported R&D that were mailed a BRDI-1 form the same year. Using the average wage rate for a staff level accountant from the BLS website of \$34.15 per hour, the average dollar cost per company surveyed will be approximately \$96.00.

Table A BRDI-1

Type of Respondent	Companies	Burden Estimate	Total Burden Hrs.
Companies that were Out of Business or Merged	500	.5 Hrs.	250
Zero R&D	1,000	.5 Hrs.	500
Companies with R&D Expense and Funded R&D	600	25	15,000
Companies with ONLY Funded R&D	500	18 Hrs.	9,000
Companies with ONLY R&D Expense	4,400	18 Hrs.	79,200
	7,000		103,950

Average Burden = 14.85 Hrs.

Table B BRD-1(S)

Type of Respondent	Companies	Burden Estimate	Total Burden Hrs.
Companies that were Out of Business or Merged	1,200	.5 Hrs.	600
Zero R&D	30,000	.5 Hrs.	15,000
Companies with R&D Expense and Funded R&D	300	1.5 Hrs.	450
Companies with ONLY Funded R&D	300	1 Hrs.	300
Companies with ONLY R&D Expense	6,200	1 Hrs	6,200
	38,000		22,550

Average Burden = 0.59 Hrs.

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 agency 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 million. The U.S. Census Bureau and the National Science Foundation share this cost.

15. Reason for Change in Burden

The total burden estimate for the 2014 BRDIS has increased due to an increase in amount of companies that are receiving the longer Form BRDI-1 from 3,000 to 7,000. The increase in the number of companies receiving form BRDI-1 is the result of lowering the R&D threshold for receiving the longer form from \$7 million to \$1 million. At the same time the burden on companies receiving the shorter form has been reduced. Prior to 2012 the shorter form (Form BRDI-1A) was 32 pages (168 response fields). The current shorter form (Form BRD-1S) is 8 pages (61 response fields).

The increase in burden also reflects a slight increase in the total number of companies in the sample from the prior OMB submission.

16. Project Schedule

Task	Time Frame
2014 Pre-survey letter mailed	Nov-Dec 2014
2014 Mail-out	Jan-March 2015
2014 Non-response follow-up	June – Sept. 2015
2014 Micro Data Review	Feb-Aug 2015
2014 Macro Data Review	Nov 2015 - Jan 2016
2014 Table/Disclosure Review	Feb-Apr 2016
2014 Data Tables delivered to the NSF	Mar – June 2016
2015 Questionnaire Complete	Sept 2015
2015 Pre-survey letter mailed	Nov-Dec 2015
2015 Mail-out	Jan-March 2016
2015 Non-response follow-up	June-Sept 2016
2015 Micro Data Review	Feb-Aug 2016
2015 Macro Data Review	Nov 2016 -Jan 2017
2015 Table/Disclosure Review	Feb-Apr 2017
2015 Data Tables delivered to the NSF	Mar-June 2017

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 Survey complies with 5 CFR 1320.9 without exception.

¹ National Academy Press, Washington, DC, 2000. Note that NSF's Division of Science Resources Studies is now the National Center for Science and Engineering Statistics.