

**SF-83-I SUPPORTING STATEMENT**

**for**

**Higher Education Research and Development Survey  
and Federally Funded Research and Development  
Centers R&D Survey**

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## LIST OF ATTACHMENTS

Attachment 1: OMB Notice of Approval 3145-0100

Attachment 2: FY 2016 Higher Education R&D Survey questionnaire

Attachment 3: FY 2016 Higher Education R&D Short Form Survey questionnaire

Attachment 4: FY 2016 Higher Education R&D Survey population review questionnaire

Attachment 5: FY 2016 FFRDC R&D Survey questionnaire

Attachment 6: First Federal Register Notice for the 2016 Higher Education R&D Survey

Attachment 7: Comment letter from Federation of American Societies for Experimental Biology

Attachment 8: Comment letter from Institute for Research on Innovation and Science, University of Michigan

Attachment 9: Comment letter from the Science Philanthropy Alliance

Attachment 10: Comment letter from the Bureau of Economic Analysis

Attachment 11: Memo on Investigation of Differences between Federal-Agency Reported R&D Obligations and FFRDC-Reported R&D Expenditures

Attachment 12: Draft contact materials for FY 2016 Higher Education R&D Survey

## **Supporting Statement June 2016**

### **A. JUSTIFICATION**

This request is for a three-year extension of the previously approved OMB clearance for the Higher Education Research and Development (HERD) Survey and the FFRDC R&D Survey. The surveys were last conducted for FY 2015. The OMB clearance for the surveys will expire on September 30, 2016 (Attachment 1).

#### **1. Need for Data Collection and Legislative Authorization**

The National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation (NSF) collects, maintains, and disseminates information on science and engineering resources in the United States. Specifically, Section 505 within the America COMPETES Reauthorization Act of 2010 directs NSF as follows:

“(a) Establishment- There is established within the Foundation a National Center for Science and Engineering Statistics that shall serve as a central Federal clearinghouse for the collection, interpretation, analysis, and dissemination of objective data on science, engineering, technology, and research and development.

(b) Duties- In carrying out subsection (a) of this section, the Director, acting through the Center shall--

(1) collect, acquire, analyze, report, and disseminate statistical data related to the science and engineering enterprise in the United States and other nations that is relevant and useful to practitioners, researchers, policymakers, and the public, including statistical data on--

(A) research and development trends;...”

The HERD Survey (Attachment 2) provides essential data on the resources devoted to research and development in the higher education sector where over one-half of the Nation's basic research is conducted. Conducted annually since FY 1972, the survey provides both summary data on R&D resources, by source and discipline, and data on individual institutions. Between 2007 and 2010, the survey underwent a full-scale redesign of both content and methodology. Beginning in FY 2012, institutions reporting \$1 million or more in R&D expenditures in the previous fiscal year were asked to respond to the full HERD survey in the current survey fiscal year, whereas institutions reporting under \$1 million were sent a short form version of the survey containing only a

few questions (Attachment 3). A population screener is sent each year to institutions not currently in the survey to determine eligibility (Attachment 4).

Results of this survey are combined with other NSF data for the federal and business sectors to arrive at national levels of R&D spending, as required by the law cited above. Without information from the HERD Survey, NSF policymakers and planners, as well as other policymakers in the Executive Branch, Congress and the states, would have an incomplete and inaccurate understanding of the Nation's R&D activities. Furthermore, the data from this survey are used in conjunction with information from other surveys of academic science and engineering (S&E)—such as the Survey of Graduate Students and Postdoctorates in Science and Engineering and the Survey of Scientific and Engineering Research Facilities—to provide the background statistics that are critical for obtaining a meaningful understanding of research activities in the academic sector.

Additionally, the population of academic institutions surveyed in the HERD Survey serves as the universe for a related survey effort mandated by the United States Congress: the previously-mentioned Survey of Scientific and Engineering Research Facilities (Section 108, Public Law 99-159 [1986]).

The HERD Survey is one of several surveys directed to universities and colleges collected by NCSES. These data have been integrated along with survey data from the Department of Education's National Center for Education Statistics (NCES) and other data sets into an on-line S&E resource data system, WebCASPAR. WebCASPAR provides an extensive and growing data library with multi-year statistics on the state of higher education in general and academic S&E resources specifically. WebCASPAR can be accessed at the NSF/NCSES web site: <http://webcaspar.nsf.gov>. The data in WebCASPAR provide basic information for planning and policy formulation regarding academic science and engineering resources.

NSF utilizes a subset of questions from the HERD survey (Attachment 5) to collect R&D performance data and the funding sources from all FFRDCs (42 FFRDCs in FY 2015). According to responsibilities assigned to the NSF in 1990 under the Federal Acquisition Regulations as recorded in the Federal Register (vol. 55, no. 24, February 5, 1990), the NSF “maintains a list of FFRDCs... and information on each FFRDC, including sponsoring agreements, mission statements, funding data, the type of R&D being performed...” The data collected through this FFRDC R&D survey are used to inform the public on individual FFRDC R&D expenditures and to provide information on this sector's contribution to the national R&D total.

## **2. How, by Whom, and for What Purpose the Information Is to Be Used**

### Federal Uses

The HERD and FFRDC Surveys meet many information needs for federal policy makers. The data are used in policy formulation, implementation and evaluation, budget analyses,

congressional hearings, program planning, and annual publications mandated by Congress. The information is provided to Congress, the Office of Management and Budget, and the Office of Science and Technology Policy through published reports, briefings by the NSF Director and staff, and in special tabulations.

The National Science Board, the Director of NSF, and NSF program directors and managers use the HERD and FFRDC Survey data for long-range planning and policy formulation. Specific uses include the following:

(1) The NSF Office of Integrative Activities uses HERD data to help assess the need for and the impact of special NSF programs in the Office of Experimental Programs to Stimulate Competitive Research.

(2) Data from the HERD and FFRDC Surveys are incorporated into NSF's periodic analytical report, *National Patterns of R&D Resources*, and the National Science Board's biennial report, *Science and Engineering Indicators (SEI)*. The *SEI* report is mandated by Congress (42 U.S.C. 1863, Section 4(j)), as follows:

"The Board shall render to the President and Congress, no later than January 15 of each even numbered year, a report on indicators of the state of science and engineering in the United States."

(3) Data on HERD and FFRDC R&D expenditures are used in conjunction with other data sources for maintaining current information on funding, staffing, and impacts of the Nation's scientific, engineering, and technological activities. The data and related reports may be found on the NSF/NCSES website at <http://www.nsf.gov/statistics/>.

(4) The Bureau of Economic Analysis (BEA/DOC) uses data from the HERD and FFRDC Surveys for the development of R&D investment in the core accounts of U.S. gross domestic product (GDP) and other National Income and Product Accounts (NIPAs).

#### Professional Societies and Foundation Uses

Representative data users in this category include: the American Association for the Advancement of Science, the Association of Public and Land-grant Universities, the Association for Institutional Research, the National Research Council, the Council on Governmental Relations, the Association of American Universities, and the National Council of University Research Administrators.

#### State Uses

State governments frequently request R&D expenditures statistics that are unavailable from state records for cross-state comparisons. The data are requested regularly by individual state government agencies (such as state boards of higher education in Florida,

Maryland, Ohio, and Texas) and by national and regional state government organizations (such as the National Governors Association and the Southern Governors Association).

The data are also used in the compilation of the annual *Science and Engineering State Profiles* published by NCSES.

#### University Uses

Universities extensively utilize the HERD data for their own purposes. Requests for the data are received from hundreds of individual institutions, as well as from national academic organizations. Specifically, NCSES has an agreement with the Association of American Universities' Data Exchange Group to provide them with more timely and comprehensive data from the HERD survey. Institutional Profiles (summary reports containing institution-specific trend data on key data elements from several NSF surveys) are available electronically on the web (<http://www.nsf.gov/statistics/profiles/>).

Public universities and colleges often use R&D expenditures data in studies demonstrating the economic benefits of instruction and research to state legislatures.

#### Media Uses

HERD expenditures data are well reported by the press, including the *Washington Post*, the *New York Times*, the *Chronicle of Higher Education*, *Science*, *Chemical & Engineering News*, *USA Today*, and the *Wall Street Journal*.

#### International Uses

The Organization for Economic Cooperation and Development (OECD) has requested that NSF provide HERD and FFRDC survey data annually for use in their periodic publications and for international comparisons of total R&D efforts. Other foreign users have included the Association of Universities and Colleges of Canada, the Canadian Institute for Public Policy and Public Administration, King Abdullah University of Science and Technology, and the National Institute of Science and Technology Policy in Tokyo, Japan.

### **3. Consideration of Using Improved Technology**

The HERD and FFRDC Surveys are web-based data collection efforts, although respondents to the surveys may use an alternative approach, by downloading a PDF or Excel version of the form. The response via the web was 99.9 percent in FY 2015. The vast majority of respondents prefer the web version of the survey for the ease of submission and error resolution capabilities. Respondents are electronically sent the

survey package, including a letter of introduction, survey instructions and related materials.

Reporting burden is stable or potentially reduced when the survey population is constant and institutions are accustomed to providing the data requested. In the case of these surveys, most respondents have established automated systems for assembling the requested data. In addition, the survey questions are intended to be as consistent as possible with the principles of financial accounting followed by institutions of higher education and FFRDCs. Generally, these data are readily available from year-end financial records and other records maintained regularly by most institutions. To obtain the full set of data requested in the survey, business officers of some institutions must sometimes consult with multiple colleagues, including heads of departments, research administrators, and other academic officials of the institution.

The web versions of the surveys have a real-time monitoring system, which allows NSF to monitor data, response status, and comments from respondents. From the perspective of the respondents, the web versions are more convenient and simplify the survey (e.g., by automatically calculating totals). NSF benefits from the use of the web versions by receiving improved data quality.

#### **4. Identification of Duplication**

The HERD Survey collects essential information on the financial resources allocated to research and development by universities and colleges. There are no other statistical sources of comprehensive national data for this information.

The U.S. Department of Education/National Center for Education Statistics' (NCES) Integrated Postsecondary Education Data System (IPEDS) finance survey series is related in that it collects data on a full range of financial resources and expenses in institutions of higher education including research expenses, while the NSF HERD Survey requests data on research and development expenditures. However, the IPEDS survey does not collect the following information requested by the NSF survey: (1) separately accounted for R&D expenditures by field, source of funding, and type of R&D; and (2) current fund expenditures for research equipment by field. NSF regularly consults with the NCES to ensure that the information sought by the HERD Survey is unavailable from other sources.

The Association of University Technology Managers (AUTM) collects annual data on university technology transfer activities such as patents filed and licensing revenues. The AUTM survey also asks for total R&D expenditures to be reported. However, the survey is only administered to approximately 200 AUTM member institutions and does not cover the full population of research-performing universities and colleges. It also does not collect any detailed data on the fields or types of R&D expenditures.

The FFRDC R&D Survey also collects information that cannot be obtained from any other existing statistical data source. Although NSF's Federal Funds for R&D Survey collect data on R&D obligations from the Federal agencies that obligate those funds, there are no other known sources of *total* FFRDC expenditure data.

## **5. Small Businesses Involvement**

The survey universe consists entirely of universities and colleges that perform R&D and of FFRDCs. There is no small business involvement.

## **6. Consequences of Less Frequent Surveying**

Academic R&D expenditures data were collected on a biennial basis for the period 1964 through 1972. The NSF Director and the National Science Board subsequently determined that annual information about academic R&D resources was necessary to support informed programmatic and policy analysis.

The availability of national totals of R&D resources on an annual basis provides a current and timely overview of the status of R&D activity in each sector of the economy. Given the sophistication and pace of science and technological development worldwide, it is anticipated that the need for annual data on national R&D expenditures will continue.

The experience of NSF staff, academic advisory group members, and workshop participants indicate that survey respondents prefer to report a consistent set of data items on an annual basis. Many universities and colleges and FFRDCs have automated their record keeping systems, facilitating their ability to respond to NSF on an annual cycle. These automated record systems considerably reduce the time required to assemble and report information needed for NSF concerning sources of R&D support, R&D expenditures by field, etc. Thus, collecting consistent data annually considerably reduces respondent burden for academic institutions with automated data systems, since the database and software are retained and kept current. Many responding institutions have indicated that if the data were to be collected on a less frequent basis, the database and related software might not be maintained, resulting in increased burden.

Furthermore, federal, institutional, and major data users have strongly expressed their need for R&D data on no less than an annual basis. As a specific example, annual HERD and FFRDC data are needed by the Bureau of Economic Analyses to use in updating the National Income and Product Accounts. Further, because NSF policies have a national impact, the timeliness of the data used to formulate policy, budget, and planning decisions is critical.

## **7. Special Circumstances**

No special circumstances.

## **8. Federal Register Notice & Consultation with Persons Outside the Agency**

An announcement of the NSF request for clearance was published in the Federal Register on Friday, April 8, 2016 (Volume 81, Number 68) (See Attachment 6). NSF received four public comments in response to the announcement.

One comment came from the Federation of American Societies for Experimental Biology. (See Attachment 7). They expressed support for the survey, stating that it is a unique data resource that they often use in development of their own reports and factsheets. They wrote that the utility of the survey would be enhanced if it were available on a more frequent basis and if the data were available more rapidly. NSF understands that data users need more timely data and thus we continually look for procedural changes to reduce the time required to collect and publish the data. Our changes have resulted in the survey data being published by November each year, approximately 6 months following the close of the survey and data follow up activities. Previously the data were not published until the spring of the following year, or one year following the official close of the survey. We plan to continue looking for ways to improve the timeliness of the survey data release, but we have no plans to survey institutions more frequently than annually at this time.

The second comment came from Jason Owen-Smith, Executive Director, Institute for Research on Innovation & Science (IRIS) at the University of Michigan. (See Attachment 8). He expressed support for the survey and asked NSF to consider linking the administrative data maintained by IRIS into the HERD survey data to increase the survey data's utility. NSF is very interested in the administrative data maintained by IRIS and was an active participant in the Star Metrics project (predecessor of UMetrics). We will contact Dr. Owen-Smith to discuss the possibilities for data linking in the coming year.

The third comment came from Marc Kastner, President of the Science Philanthropy Alliance (See Attachment 9). He expressed support for the survey and requested more data on the amount of funding devoted to basic research versus applied research. Currently the survey does measure the split between basic research, applied research and experimental development by overall federal and nonfederal totals. We have no plans to expand the survey to obtain this split by all sources of funding or field due to the burden that would place on universities in responding to the survey.

A fourth comment came from the Bureau of Economic Analysis (BEA). They expressed general support for the survey and requested a few additional data elements to be considered for future collection (Attachment 10). NSF is in regular contact with

BEA about their data needs and the feasibility of adding questions to the HERD or FFRDC Surveys to address these needs. As part of the survey redesign, NSF added several items requested by BEA to the questionnaire, where the additional detail posed no significant increase in burden for the institutions. NSF will continue to consider additional items in future years while still prioritizing respondent burden. There are no plans to incorporate these data items on the HERD or FFRDC Surveys for FY 2016.

Since 2013, NSF has conducted 22 cognitive interviews and 9 usability tests. These interviews and tests provided a wealth of information on the impact of the survey's current and planned data requests upon academic respondents. Copies of the summary reports from these activities are available upon request and were the basis for modifying—with OMB approval—the 2016 HERD survey to include questions on the composition of reported foreign financed R&D, new examples for basic research, applied research, and experimental development, a new organizational structure for the fields of R&D, as well as information on R&D expenditures by federal agency source for the 2016 FFRDC survey.

## **9. Payments or Gift to Respondents**

There will be no payments or gifts to respondents.

## **10. Assurance of Confidentiality**

No items on the FFRDC R&D Survey are deemed confidential. All items on the HERD Survey are reported at the institutional level except for the breakdown of institution funds within question 1 (institutionally financed research, cost sharing, and unrecovered indirect costs), and the amount of recovered vs. unrecovered indirect costs in question 12. These items are presented only as aggregate totals in resulting publications. The following confidentiality statement, covering these excepted survey items, is included on the questionnaire:

"Information from confidential items is not published or released for individual institutions; only aggregate totals will appear in publications. In accordance with the National Science Foundation Act of 1950, as amended, and other applicable federal laws, your responses will not be disclosed in identifiable form to anyone other than agency employees or authorized persons."

The confidentiality statement may need to be revised at a later date based on the work and findings of the SCOPE Confidentiality Pledge Revision Subcommittee.

## **11. Sensitive Questions**

There are no sensitive questions in the HERD or FFRDC R&D Surveys. Data are collected at the institution level.

## **12. Estimated Response Burden**

Data for the FY 2013 HERD Survey were collected from 874 institutions (635 standard HERD survey and 239 Short Form Survey). The FY 2014 survey was collected from 866 institutions (617 standard HERD survey and 249 Short Form Survey). The FY 2015 survey included 930 institutions (646 institutions standard HERD survey and 284 Short Form Survey). NSF expects modest increases in both the HERD and the Short Form populations each year as new institutions meeting the threshold are added. For purposes of estimating total burden during this clearance period, NSF assumes a total HERD population of 1,000 (700 in the full survey and 300 in the Short Form).

The FY 2013-15 FFRDC R&D Surveys have included the full population of FFRDCs each year (40 in FY 2013, 41 in FY 2014, and 42 in FY 2015). The size of the FFRDC population has been highly stable over time.

High response rates have consistently been obtained: in FY 2013 the response rate for the HERD Survey was 98.1%, in FY 2014 it was 96.8%, and in FY 2015 the response rate was 96.8%. The FFRDC R&D Survey response rate has been 100% each year.

Based on past experiences and limited changes to the surveys, NSF is estimating only slightly increased burden hours to previous years. For FY 2016-18, NSF is estimating an average annual burden of 1 hour for the HERD population screener, 55 hours for the HERD Survey, 8 hours for the HERD Short Form, and 12 hours for the FFRDC Survey.

A summary of the annual burden estimates is included in the table below. At an estimated cost of \$34 per hour (based on the Bureau of Labor Statistics May 2015 average hourly wages for “Financial Analysts” and “Budget Analysts” within NAICS 611300 - Colleges, Universities, and Professional Schools, accessed on June 16, 2016 at <http://data.bls.gov/oes/>), the total annual cost to respondent institutions is \$1,412,836 (\$1,164 per respondent).

**Table A-12.1. Annual Burden Estimates for FY 2016-18 Surveys**

<b>Category</b>	<b>Estimated # of Responses</b>	<b>Respondent Burden (hours)</b>	<b>Total Burden Hours</b>	<b>Total Cost Burden</b>
HERD population review	150	1	150	\$5,100
HERD Survey	700	55	38,500	\$1,309,000
HERD Short Form	300	8	2,400	\$81,600
FFRDC Survey	42	12	504	\$17,136
Total annual burden	1,192	-	41,554	\$1,412,836

### **13. Estimate of Annual Cost Respondent Burden**

Not Applicable. There are no capital or startup costs to the respondents to the HERD Survey.

### **14. Estimate of Annual Cost to Federal Government**

The total contractual cost to the government for the FY 2016 - FY 2018 HERD and FFRDC Surveys is approximately \$3.39 million over a period of 36 months, for an annualized cost of \$1,128,611. Including labor costs for NSF staff of approximately \$250,000 (project manager (full time), mathematical statistician (part time), program director (part time) and other staff), the total annualized cost to the federal government is \$1.38 million.

### **15. Changes in Burden**

The FY 2016 HERD survey will include an expansion to Question 2 (R&D expenditures funded by foreign sources) and a revised definition and new examples of basic research, applied research and experimental development on Question 6. The change to Question 2 is being made to enable more precise accounting of foreign funding for “National Patterns of R&D Resources”, an NCSES publication that combines all of our R&D survey data to estimate total U.S R&D funding and performance. The change to the definitions in Question 6 is being made to reflect definitional changes in the revised OECD Frascati Manual, published in 2015. The new examples were added in response to respondent requests for non-S&E examples of basic research, applied research and experimental development.

Changes to the organization of the fields of R&D are also being made for FY 2016. These changes will better reflect the R&D currently being conducted at universities and colleges and also make fields more consistent with those used by other NSF surveys and the Department of Education’s Classification of Instructional Programs. While these changes to the survey and the fields of R&D will add time to complete the survey, we

anticipate this time will be minimal based on the feedback from our cognitive interviews. Therefore, NSF increased the burden hours by 1 hour for HERD respondents.

We are also adding a question to the FFRDC survey to obtain federal agency sources of funding for the R&D expenditures. Over the past several years as recommended by OMB, we have worked on investigating the differences between the R&D obligation amounts to FFRDCs as reported by federal agencies on our Federal Funds for R&D Survey and the R&D expenditures reported by the FFRDCs on the FFRDC R&D Survey. This analysis and followup with selected agencies and FFRDCs yielded useful findings on the reasons for the differences, and minor adjustments were made to the instructions in FY 2015 to attempt to reduce the differences between the surveys' totals. Unfortunately, we continue to see large differences between the two surveys. We expect the addition of the agency source question will enable easier analysis and attempted reconciliation of survey differences in future years. (see Attachment 11). Due to the findings of the cognitive interviews for this new question, NSF increased the burden hours by 1 hour for FFRDC respondents.

## **16. Schedules for Data Collection and Publication**

The FY 2016 survey will begin with a population review and screening in late summer 2016. The HERD and FFRDC Surveys will be sent electronically to all institutions in the FY 2016 survey population and meeting our R&D expenditures threshold of \$150,000 in November 2016 with a due date of January 31, 2017. Actual closeout of the surveys will be in approximately mid-May 2017, in order to allow time for late responses, corrections, and updating of previous years' data.

The contractor is responsible for all data collection and processing activities, including editing data submissions to resolve errors. For FY 2016, the same procedures will be used as those used for FY 2015 survey. For the FY 2016 survey, following the closeout of data collection in May 2017 the contractor will generate inflator/deflator factors to impute for non-response, based on data reported by responding institutions. After closeout, data for non-respondent institutions will be machine-imputed using an imputation plan developed and approved by NSF.

The data from the FY 2016 survey will be analyzed in an NCSSES Info Brief to be published in the late fall of 2017. A report containing detailed tables showing institution-level data will also be available on the web.

## **17. Displaying the OMB Expiration Date**

The OMB number and expiration date will appear on the survey form.

**18. Exceptions in Item 19 on Form 83-I**

No exceptions sought.