

**SUPPORTING STATEMENT**

for

**FY 2015 and FY 2017 Science and Engineering Research**

**Facilities**

**3145-0101**

## **PART A: JUSTIFICATION**

### **A.1. Circumstances Necessitating Collection of Information**

The National Science Foundation Act of 1950, as amended by Title 42, United States Code, Section 1862, required the Foundation 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...” (Attachment A – NSF Act of 1950 and America COMPETES Reauthorization Act of 2010.)

The Survey of Science and Engineering Research Facilities (Facilities survey) conducted by the National Science Foundation’s (NSF’s) National Center for Science and Engineering Statistics (NCSES) is a congressionally mandated biennial survey that has been conducted since 1986. The Facilities survey collects data on “bricks and mortar” research facilities, including total research space by field, condition of research space, and expenses for construction, repairs and renovation of research space.

#### ***Background***

Academic research facilities in the fields of science and engineering (S&E) are an important national resource. Extensive hearings were held during the 99<sup>th</sup> Congress in the House and Senate committees on science and technology to examine the research facilities needs of universities and colleges. Both committees found “sufficient evidence to suggest the presence of a serious and growing problem...” and expressed concern that the Federal government did not have in place an ongoing analytical system to document the current status of and needs for research facilities by major field of science and engineering.

In recognition of the need for objective information about research facilities, Congress directed NSF, in the Authorization Act of November 22, 1985 (P.L. 99-159, Section 108) as follows:

The National Science Foundation is authorized to design, establish, and maintain a data collection and analysis capability in the Foundation for the purpose of identifying and assessing the research facilities needs of universities. The needs of universities, by field of

science and engineering, for construction and modernization of research laboratories, including fixed equipment and major research equipment, shall be documented. University expenditures for the construction and modernization of research facilities, the sources of funds, and other appropriate data shall be collected and analyzed. The Foundation, in conjunction with other appropriate Federal agencies, shall conduct the necessary survey every 2 years and report the results to the Congress.

In response to this directive, NCSSES has conducted fourteen biennial surveys. The National Institutes of Health (NIH) cosponsored the surveys with NCSSES beginning with the initial survey and ending with the 2009 survey. At the request of NIH, the survey also collected data from nonprofit, biomedical research organizations and hospitals that received NIH research funds.

Since 1986, NCSSES has modified the survey several times with the goals of improving data quality and reducing respondent burden. The original survey was limited to a small set of prescribed questions sent to a sample of institutions using NCSSES's Quick Response Survey questionnaire capability in order to meet the Congressional timeframes. Data collection was subsequently expanded to a census of institutions in order to make the data more useful to Federal and State agencies and to the higher education community.

NCSSES undertook a major review of the survey prior to the FY 2003 data collection. This included improving the research space questionnaire and adding a second questionnaire addressing the growing use of computing and networking resources (cyberinfrastructure) in conducting research. NCSSES has continually reviewed the second questionnaire in an attempt to stay current with the rapidly changing developments in academic R&D cyberinfrastructure. New questions have been added each cycle, while others have been removed based on feedback from field experts and survey participants.

Despite these efforts, NCSSES believes that the cyberinfrastructure questionnaire provides little utility to policymakers and researchers. A 2013 review of the survey by the NSF Division of Advanced Cyberinfrastructure (ACI) provided feedback on current shortcomings and potential changes to improve the survey. The assessment indicated that the "information is not useful for program planning at NSF and is probably not very useful to campuses either." Anecdotal evidence solicited through several interviews and meetings with groups of field experts indicates that these data are rarely used by those who are aware of this survey. This view was substantiated by analysis of low web traffic to the relevant data files on the NSF website. Further inquiries revealed that many potential data users believe the data would be difficult to incorporate into their decision making processes.

A large number of academic institutions have centrally-administered high performance computing (HPC) resources they provide to their researchers. This type of administrative structure appears to be increasingly more common. However, an analysis of the FY 2011 data indicated 10 of the top 50 and 21 of the top 100 institutions (based on research expenditures) were unable to provide data on HPC.<sup>1</sup> At least another 15 of the top 100 reported exceptionally low totals because only a small amount of their HPC resources are centrally-administered. The fact that many of the top research universities are unable to adequately report their research computing capacity severely undermines the utility of these data. These institution-specific differences limit the ability to present national totals and trends as well as the ability to compare many leading institutions.

NCSES posted a federal register notice (79 FR 35577) on June 23, 2014 to request comments on this discontinuation (Attachment B). The feedback was limited to one response, which was in agreement with the decision to discontinue the data collection. All participating institutional presidents were notified of this decision through e-mail in July. No comments were received. The White House Office of Science and Technology Policy (OSTP) also agreed with this decision in response to a memo outlining the decision.

NCSES conducted a review from 2010 to 2015 of the S&E fields used in its portfolio of surveys to ensure consistency and comparability across national academic surveys. The review resulted in a modified taxonomy of S&E discipline that reassigned a number of subfields and relabeled some field names. These changes will be employed by all NCSES academic surveys on a rolling basis, including the Facilities survey.

The need for consistency of S&E fields across surveys was echoed in several Facilities Survey research space questionnaire interviews conducted in 2014-15 (see A.8.) The new NCSES taxonomy of disciplines will affect the Facilities survey as follows: the data collection field of “agricultural sciences and natural sciences” will be divided into two fields: 1) agricultural sciences and 2) natural resources and conservation. “Physical sciences, group 1: atmospheric, earth, and geological sciences; meteorology; and oceanography” will be renamed “geosciences, atmospheric, and ocean sciences,” and will include appropriate subfield examples. “Physical sciences, group 2: astronomy, astrophysics, chemistry, materials sciences, and physics” will be renamed “physical sciences,” and will include appropriate subfield examples. “Health and clinical sciences” will be renamed “health sciences.” Some

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<sup>1</sup> The FY 2011 Facilities survey relied on the FY 2010 NSF Higher Education Research and Development (HERD) survey for frame development. Data were sorted to rank institutions with the highest research expenditure totals.

subfield examples will be updated in the various major S&E fields. Data are collected by S&E field through questions 2, 6, 7, 9E, 11, 13, 15, and 17.

### *General survey description*

NCSES now requests approval to conduct the next two cycles of the Facilities survey for fiscal years 2015 and 2017. The following is a broad overview of the survey. The complete questionnaire can be found in Attachment C.

Contact information is not collected on the questionnaire. Rather, it is collected through the president's office of each eligible institution. Greater detail is provided in section B2 under Survey Procedures.

Questions 1 through 5 request data on the amount of space used for science and engineering research. The questions request specific information about institutional research facilities (e.g., how much research space is located in medical schools) because different kinds of space have different costs and requirements for preparing and using the space.

Question 6 asks about the condition of the research facilities because of a recurring concern about aging research infrastructure in the U.S. Also, this question may provide data on whether existing research space is appropriate for the rapidly changing needs of scientific research.

Questions 7 and 8 ask about the costs of repairs and renovations in the current and immediately previous fiscal year. Similar to Question 6, these questions also relate to the issues of a potentially aging infrastructure and the changing needs of science, but from a financial perspective.

Question 9 and an accompanying project worksheet ask about new construction in the current and immediately previous fiscal year. New construction allows institutions to increase the total amount of research space, to replace inadequate facilities, and to adjust to the changing needs of science. The worksheet requests information on individual projects such as costs per square feet of new construction.

Question 10 asks about the sources of project funding for repairs/renovations and new construction to determine the roles various sectors play in funding research facilities.

Questions 11 through 14 ask about planned new construction and planned repairs and renovations over the next two fiscal years. These provide data on the extent to which institutions are addressing their research space needs.

Questions 15 through 18 ask about deferred repairs/renovation and new construction. These provide another measure of institutions' anticipated need for space, while also examining the ability of institutions to meet their needs.

Question 19 is an open field where participants can comment on the research space questionnaire.

## **A.2. Purposes and Use of the Data**

Data from this survey serve several audiences. At the national level, the data provide Congress and federal agencies with a broad, quantitative picture of the inventory and condition of existing S&E research space at research-performing academic institutions. The survey also provides data on the current and future capital expenditures for research facilities by universities and colleges; sources of funding for research facilities at these institutions and; plans for future repair/renovation and new construction of science and engineering research facilities. Congress uses the Facilities survey data to assist them in estimating appropriations and programmatic decisions.

At the state and local level, state legislatures, state agencies, and individual universities and colleges use the data to assist them in making budgetary decisions and in planning future activities. Private sector architectural, engineering, and construction firms use the data for several purposes including forecasting the demand for their products and services. Finally, professional associations such as the Association of American Medical Colleges and the Federation of American Societies for Experimental Biology use the data to assist them in assessing needs related to their associated fields of science.

Data are publicly available through an InfoBrief and detailed statistical tables on the NSF website at <http://nsf.gov/statistics/srvyfacilities/>. Users can run custom data reports from the Facilities survey and other NCSES surveys through the Integrated Science and Engineering Resources Data System at <https://ncesdata.nsf.gov/webcaspar/>.

### **A.3. Use of Improved Information Technology**

The survey is a mixed mode survey: respondents have the option of completing a printable PDF version or a web version. The large majority of institutions (99% in FY 2013 cycle) respond to the survey via the web.

The web version of the survey is a .NET application with a real-time monitoring system, which allows NCSES to monitor data, response status, and comments from respondents. From the perspective of the respondents, the web version is more convenient and simplifies the survey (e.g., by automating skip patterns, and automatically calculating totals). NCSES also benefits from use of the web version by receiving improved data quality. Data quality is improved using several techniques such as data checks, skip pattern checks, and consistency checks. For example, data checks are used to calculate totals and inform respondents if percentages do not add to 100. For inconsistent data, respondents will receive messages while completing their survey if their responses do not appear consistent with their responses to other relevant questions.

### **A.4. Efforts to Identify Duplication**

NCSES monitors the availability and release of higher education facilities data. While some sources provide data on amount of construction or costs of construction, no organization provides data on higher education research facilities, individual fields of science, or science and engineering in the aggregate. For example, at the national level, data on the book value of higher education physical plant assets is collected periodically on the National Center for Education Statistics' Integrated Postsecondary Education Data System. However, these data are only collected in the aggregate for an institution; the data are not available for research space, and the data are not available by S&E field. The Facilities survey is the only survey to collect data from research-performing higher education institutions on research space and fields of S&E. The data do not duplicate statistical data from any other sources.

### **A.5. Collection of Data from Small Businesses**

Data are not collected from small business.

#### **A.6. Consequences of Less Frequent Data Collection**

The Congressional mandate requires that data collection occur every two years, which ensures that the data are current. This also lessens burden when compared with an annual survey. Conducting the survey less frequently could adversely affect the relevance of the data both for policymakers and other data users. NCSSES has consulted with numerous individual institutions on the periodicity of data collection (see section A.8. on public comment and consultations outside the agency). These institutions believe that more frequent data collection would not benefit the data-user community due to the relatively slow processes of space management (construction, repairs and renovations). It would only result in greater burden on the institutions.

#### **A.7. Special Circumstances**

No special circumstances.

#### **A.8. Public Comment and Consultations Outside the Agency**

From 2012 to 2014, NCSSES consulted research cyberinfrastructure field experts through a workshop, interviews and attendance at field conferences. These sources reinforced internal analyses indicating that the computing and networking (cyberinfrastructure) questionnaire did not provide useful data and that it should be discontinued. The Federal Register Notice posted in June 2014 resulted in one response in support of the discontinuation and no negative responses. No university of college presidents responded negatively when informed of the intention to terminate the questionnaire. The OSTP also supported the decision.

In 2014-2015, a total of thirty-two institutions were interviewed for the purpose of conducting exploratory interviews to identify potential problems with question interpretation and data reporting as well as discussing areas for potential question development on the research space questionnaire. Eight of the interviews were conducted at the site of the institutions. The remaining twenty-four interviews were conducted over the phone. This review will continue through 2015. Thus far, no areas of major concern have been identified. Interviewees generally felt the research space questionnaire addressed appropriate metrics, even if all questions were not relevant to the particular institution. Some potential areas for question development were raised such as adding subfields of science and engineering,



ensuring more uniform S&E fields across surveys, and collecting data on research personnel. NCSES will continue to examine these new areas and the feasibility of expanded questions.

NCSES published a 60-day Federal Register Notice (80 FR 16030) on March 26, 2015 to solicit public feedback on the reinstatement and approval of data collection for the Facilities Survey (Attachment D). No comments were received.

Based on information from these consultations and review activities, NCSES is discontinuing the computing and networking capacity questionnaire, while the only changes to the FY 2013 research space questionnaire are the division of “agricultural sciences and natural sciences” into the separate fields of “agricultural sciences” and “natural resources and conservation,” the slight modification of three major field labels, and the rewording of some subfield examples to ensure consistency and comparability across national academic surveys. See above and page 1 of the survey questionnaire for “changes from previous cycle” in attachment C.

#### **A.9. Payments or Gifts to Respondents**

Respondents will not be paid or receive gifts.

#### **A.10. Assurance of Confidentiality**

Data on individuals are not collected. Based on the idea that the data should be available to all interested parties and that making the institutional level data more accessible will provide institutions with a reason to respond to the survey, NCSES makes the data publicly available at the institution level with a few key exceptions (see section A.11 on sensitive questions). Institutions are clearly informed of NCSES’s confidentiality policy at the front of the survey and the confidentiality of specific questions. Institutions are informed of the plans for public release of institution-level data before they complete the survey. This information is included in the questionnaire. In addition, institutions are informed that the survey is voluntary and they can decline to answer any or all questions.

#### **A.11. Sensitive Questions**

While NCSES decided to make the large majority of the survey data publicly available, three survey items are deemed particularly sensitive. The public release of data on those questions could make institutions less inclined to respond to the survey. Also, during pretests of the 2001 survey

redesign, respondents expressed concern about the confidentiality of the following survey items: condition of research space (question 6) and the amount of research animal space (questions 3 and 9f). Publicly reporting the condition of research space might motivate institutions to overstate their facilities' condition as a way to recruit researchers or gain research funding. Animal research space has always been a sensitive area due to public concerns of animal treatment. Based on the 2001 pretest and the 2014-15 interviews, NCSES believes these data points might not be responded to correctly, if at all, if they were published on the institutional level. Therefore, data on these fields are only published at the national level.

#### **A.12. Estimated Response Burden**

##### ***Burden hours***

The Facilities survey is a biennial survey of approximately 600 academic institutions. The burden for any particular institution will be affected by two major factors: the size of the institution (in terms of number of S&E departments and/or the number and size of research facilities) and the status of the institution's computerized central records system. Previous surveys showed that many institutions, as part of their compliance with OMB Circular A-21, have created centralized databases, including a measure of space devoted to research.

Because of these factors, the completion time varies among institutions. A question on survey completion time was added to the FY 2013 questionnaire. The time to complete the research space questionnaire ranged from 1 to 225 hours with an average of 19 hours. Assuming a 98% response rate (based on the FY 2011 - 2013 response rates), this would result in an estimated total burden of 11,172 hours in FY 2015 and a similar burden in FY 2017 (.98 response rate x 600 institutions x 19 hours x 2 data collection cycles = 22,344 total burden hours over the total clearance period.).

##### ***Costs to responding institutions***

Costs that will be incurred by responding institutions involve the completion time of the survey and the time of an institutional coordinator associated with managing the distribution of survey forms and transmittal to the contractor. The institutional coordinator makes the initial contacts with the relevant individual offices at the institution informing them of the survey, distributes the forms, follows

up on the return of the forms or data to the coordinator's office, and transmits the forms or data to the contractor.

At an estimated cost of \$36 an hour for institution staff (based on the Bureau of Labor Statistics May 2014 average hourly wages for "Administrative Services Managers," "Budget Analysts" and "Financial Analysts" within NAICS 611300 - Colleges, Universities, and Professional Schools), the average cost to each academic institution is \$684 for FY 2015 and a similar cost for FY 2017. Assuming a 98% response rate, the total respondent costs for the FY 2015 survey are estimated to be \$402,192 (.98 response rate x 600 institutions x \$684).

These costs are expected to be similar for the FY 2017 cycle of the survey.

**A.13. Annualized Cost to Respondents**

There are no capital or startup costs for the respondents of the Facilities survey.

**A.14. Annualized Cost to the Federal Government**

The estimated total cost of the FY 2015 Facilities survey to the Federal Government is approximately \$1,740,000 over a period of 24 months, for an annualized cost of \$870,000. The estimate includes labor costs of \$280,000 for NCSES staff [project manager (full time), NCSES management, and statistical support] and the survey management contractual cost of \$1,460,000.

The contract will include all direct and indirect costs of data collection, analysis, reporting, and the production of public and proprietary data sets. These costs are expected to be similar for the FY 2017 survey cycle.

**A.15. Reasons for Program Changes**

No program changes.

**A.16. Publication Plans and Project Schedule**

The FY 2015 survey implementation is scheduled to begin in October of 2015. Data collection will take place over a six-month period in order to provide institutions adequate time to identify a coordinator and to gather the appropriate records and data. Data collection is expected to end in the spring of 2016. The data collection for the FY 2017 cycle will begin in October of 2017 and will end in the spring of 2018.

The contractor will submit draft data tabulations within three months following completion of data collection. These will be reviewed and revised as needed by NCSSES before production of final data tabulations. NCSSES will be responsible for electronic dissemination of the tables to NSF offices, participating academic institutions, professional associations, and others who may request information about the survey.

The contractor will also provide a public use data file that will be accessible via the NSF website and includes electronic data files for use on personal computers. The data files, including documentation, will contain institutional data and will be delivered within 3 months of data collection. In addition, the contractor will provide a methodology report detailing all survey activities, materials, and procedures.

NCSSES produced an Infobrief on the results of the FY 2013 survey in March of 2015. The Infobrief includes a presentation of major findings, charts and graphs relevant to the survey, and relevant statistical tables. It also refers the reader to additional information about survey limitations and other technical information.

NCSSES anticipates a similar schedule for the FY 2015 and FY 2017 survey cycles.

**A.17. Approval for Not Displaying the Expiration Date for OMB Approval**

Approval not requested.

**A.18. Exceptions to the Certification Statement**

There are no expectations.