Survey of Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions: Fiscal Year 2015

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Technical Notes

Survey Overview

Purpose. The Survey of Federal Science and Engineering (S&E) Support to Universities, Colleges, and Nonprofit Institutions (Federal S&E Support Survey) is the only source of comprehensive data on federal S&E funding to individual academic and nonprofit institutions.

Data collection authority. The information from this congressionally mandated survey is collected under the authority of the National Science Foundation Act of 1950, as amended, and the America COMPETES Reauthorization Act of 2010.

Survey contractor. Synectics for Management Decisions, Inc.

Survey sponsor. The National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation (NSF).

Key Survey Information

Frequency. Annual.

Initial survey year. FY 1963.

Reference period. FY 2015.

Response unit. Federal agencies.

Sample or census. Census.

Population size. The survey is a census of all federal agencies that obligate money to academic or nonprofit institutions or consortia for S&E R&D or the construction or maintenance of R&D facilities. In the survey cycle for data collection on FY 2015, the population is 20 federal agencies.

Sample size. Not applicable; the survey is a census.

Survey Design

Target population. The target population was all federal agencies that obligated money in FY 2015 to academic or nonprofit institutions or consortia for S&E R&D or the construction or

maintenance of R&D facilities. For FY 2015, there were 20 agencies. (Twelve of the 20 agencies are department-level federal agencies (the Departments of Agriculture, Commerce, Defense, Education, Energy, Health and Human Services, Homeland Security, Housing and Urban Development, the Interior, Justice [Office of Justice Programs], Labor, and Transportation). Eight of the 20 are independent federal agencies (the Agency for International Development, the Appalachian Regional Commission, the Environmental Protection Agency, the National Aeronautics and Space Administration, the National Archives and Records Administration, NSF, the Nuclear Regulatory Commission, and the Social Security Administration). Because multiple subdivisions of a federal department were in some cases requested to complete the survey, there were 58 agency-level respondents (2 federal departments, 48 department subdivisions, and 8 independent agencies) and 33 program-office level respondents, for a total of 91 respondents.

Academic institutions are institutions of higher education in the United States that offer at least 1 year of college-level study leading toward a degree. Nonprofit institutions are legal entities other than universities and colleges, privately organized or chartered to serve the public interest, and exempt from most forms of federal taxation. Consortia are organizations formed by the membership of a number of institutions from one or more types of performers (e.g., academic, nonprofit) in order to promote and support efforts to enhance knowledge in one or more disciplines. For FY 2015, there were 1,016 academic institutions and consortia and 1,024 nonprofit institutions and consortia.

Sample frame. This survey is a census. Its population is derived from the federal agencies identified in the Survey of Federal Funds for Research and Development as providing R&D or R&D plant obligations to academic or nonprofit organizations.

Sample design. Not applicable.

Data Collection and Processing Methods

Data collection. The Federal S&E Support Survey uses a Web-based data collection system, but some agencies submit files offline that the survey contractor enters into the Web-based data collection system. The FY 2015 survey cycle began with an e-mail to each agency to verify contact information for each agency-level survey point of contact. Data collection began 17 February 2016. Information was collected for the federal fiscal year 2015 (i.e., 1 October 2014 through 30 September 2015). The requested due date for data submissions was 22 April 2016; however, data collection was extended until all of the surveyed agencies provided complete and final data.

Mode. Web data collection system; however, some agencies submit data offline. The FY 2015 Federal S&E Support Survey requested information from 58 departments, subdivisions, or independent agencies, but three (the Department of Agriculture's Agricultural Marketing Services, the Department of Homeland Security's U.S. Coast Guard, and the National Archives and Records Administration) reported no funds. Of the remaining 55 respondents, 44 respondents (80%) submitted data through the Web data collection system, and 11 respondents (20%) submitted data offline.

Response rates. 100%.

Data editing. The Federal S&E Support Survey data are checked through both manual reviews and automated data checks that include a comparison of current-year obligations by category of support and the corresponding prior-year obligations. Problems are referred back to the agency that submitted the data for correction.

Imputation. None.

Weighting. None.

Variance estimation. Not applicable.

Survey Quality Measures

Sampling error. Not applicable.

Coverage error. Occasionally, small amounts (less than $100,000) of R&D may be obligated to a university or college by an agency other than the ones listed above, and these amounts are not captured by this survey.

Nonresponse error. Agencies are encouraged to estimate information when actual data are unavailable. Although every attempt has been made to ensure complete response from the survey universe and for all items it is possible there may be some item nonresponse. The survey instrument allows respondents to enter data or skip data fields. NCSES assumes a blank field is zero for estimation purposes. There are several possible causes for nonresponse error for this survey to include data items incorrectly skipped by respondents; an incorrect assumption that blank fields indicate zeros; and incorrect estimates when data are unavailable.

Measurement error. The major source of nonsampling error in this survey is measurement error. Agencies are not always able to provide the precise information requested. For example, federal agencies are not always able to identify which branch of a university receives funding from them. Thus, complete disaggregation by actual university may not be feasible for some universities.

Other problems include agency difficulties in matching program descriptions with the proper funding category (e.g., R&D, facilities and equipment for instruction in S&E) in the federal S&E support database. At least one agency has said that the "general support for S&E" and "other S&E" categories are a catchall for programs that do not fit anyplace else (See the "Report on the NSF Federal S&E Support Survey Issues Workshop" held on 20 May 1999).

Data Comparability

Data revisions. Annual data are available for FYs 1963-2015.[1] In some instances, prior-year data have been modified based on discrepancies noted during the consistency reviews of the data across years. To obtain accurate historical data, data users should use only the most recent publication, which incorporates corrections agencies have made in prior-year data. Do not use data published earlier.

Changes in survey coverage and population. Eight federal agencies supplied data for FYs 1963–67 (data collection began in 1965). The initial 1965 survey elicited information about academic

institutions only. Additional agencies have been included in the years since then. The survey has been conducted annually since 1968. Information on nonprofit organizations was added in 1968.

- Since FY 1990 NSF has not published data on detailed field of S&E for obligations in R&D and fellowship, traineeship, and training grant programs (FTTGs) to academic institutions.

- Since FY 1990 the Department of Defense (DOD) has reported research obligations separate from development obligations.

- Beginning with the FY 1993 annual report, NSF no longer publishes data collected for non-S&E support to universities and colleges.

- Beginning with the FY 1998 survey, NSF collects S&E obligations for U.S. Service schools.

- Beginning with the FY 1999 survey, NSF no longer collects data for Federally Funded Research and Development Centers (FFRDCs).

Changes in questionnaire. A Web-based data collection system was developed for the FY 1998 survey cycle.

Changes in reporting procedures or classification.

- Starting with FY 2009 survey, survey information has been requested in actual dollars rather than rounded in thousands.

- As of the FY 2013 cycle, the criteria used to determine nonprofit institutions for the Federal S&E Support Survey was broadened from Internal Revenue code 501(c)(3) organizations to Internal Revenue Code 501(c) organizations.

Changes in reporting.

Since data were first collected for FY 1963, there have been some changes in reporting. The most recent of these changes include the following:

- As of FY 2015, two institutions were reclassified from nonprofit institutions to academic institutions (Cold Spring Harbor Laboratory and Erikson Institute), two institutions were reclassified from nonprofit institutions to academic consortia (Association of Universities for Research in Astronomy and Oak Ridge Associated Universities), five institutions were reclassified from nonprofit consortia to academic consortia (Consortium of Universities for the Advancement of Hydrologic Sciences, Consortium of Universities of the Washington Metropolitan Area, Marine Environmental Sciences Consortium, Southeastern Universities Research Association, and Southwestern Ohio Council for Higher Education), and six institutions were reclassified from nonprofit consortia to nonprofit institutions (Center for Regional Economic Competitiveness, International Anesthesia Research Society, Maricopa Integrated Health System, Patuxent Partnerships

Inc., Saint Alphonsus Regional Medical Center, Inc., and Vaccine Research Institute of San Diego); these changes were also applied retroactively. As a result of those changes, data were revised, replacing previously published data.

- As of FY 2014, the obligations of the Department of Transportation (DOT), Office of the Assistant Secretary for Research and Technology's University Transportation Centers (UTCs) were moved from R&D to Other S&E; this change was also applied to FYs 2005–13.

- As of FY 2014, all data for Texas A&M Engineering Experiment Station and Texas A&M AgriLife Research were moved from nonprofit institutions to academic institutions (set as branches of Texas A&M University).

- After the close of the FY 2013 data cycle, the Department of Health and Human Services (HHS) National Institutes of Health revised its data for FYs 2009–12.

- After the close of the FY 2013 data cycle, NSF revised its data for FYs 1999–2012.

- MITRE Corp. data prior to FY 2011 include obligations for federally funded research and development centers (FFRDCs) that it administers.

- For FYs 2009 and 2010, data from the HHS Centers for Disease Control and Prevention were excluded due to their poor quality.

- After the close of the FY 2009 data cycle, the HHS Health Resources and Services Administration revised its FY 2008 and FY 2009 data.

- After the close of the FY 2009 data cycle, the Department of Education (ED) revised its FY 2008 and FY 2009 data.

- Data for FY 2009 and FY 2010 include American Recovery and Reinvestment Act of 2009 obligations.

- After the close of the FY 2007 survey cycle, DOD discovered a programming error that was made during the FY 2005 survey cycle and caused each advanced technology development dollar to be reported twice: as advanced technology development and as major systems development. Data for FYs 2005–07 were revised.

- Between FY 2006 and FY 2007, the National Aeronautics and Space Administration's (NASA's) R&D obligations decreased for two reasons: (1) in FY 2007, NASA excluded projects that were operational in nature that were not excluded in FY 2006; and (2) there was an overall decrease in obligations between FY 2006 and FY 2007, which accounts for the remainder of the decrease.

- In FY 2004, NASA implemented a full-cost budget approach, which includes all of the direct and indirect costs for procurement, personnel, travel, and other infrastructure-

related expenses relative to particular programs and projects. Data for FY 2004 and later years may not be directly comparable to data for FY 2003 and earlier years.

- For the FY 2003 survey cycle, the Department of Homeland Security (DHS) could not provide S&E obligations (with the exception of the U.S. Coast Guard) broken down into the categories shown in this report.

- Because the U.S. Coast Guard, formerly part of DOT, moved under DHS for FY 2003, its data were not part of the FY 2003 detailed statistical tables (DSTs). The U.S. Coast Guard's overall S&E obligations for FY 2003 are the following:

    - Total academic S&E, $2,159,000

    - Academic R&D, $1,824,000

    - Academic R&D plant, $335,000

    - Nonprofit R&D, $924,000

- Beginning in FY 2000, NASA reclassified the Space Station as a physical asset and Space Station research as equipment and also transferred funding for the program from R&D to R&D plant. According to NASA, this classification change had a negligible impact on the data reported in this report for FY 2000. However, this classification change was reflected in the FY 2001 academic totals, which showed an R&D plant increase for NASA nearly five times over the FY 2000 R&D plant total.

- Beginning with the FY 1999 survey cycle, NSF determined that federal agencies would no longer report obligations to academic or nonprofit FFRDCs. Obligations to FFRDCs were deleted from all previous years shown in this report.

- Beginning with the FY 1996 survey cycle, NSF determined that federal agencies would no longer report obligations for fields of S&E.

- Since FY 1994, NSF has collected data on DOD development dollars in two categories: advanced technology development, and major systems development. These categories better differentiate between that part of the federal R&D budget that supports "science and key enabling technologies" (including military and nondefense applications) and the part that primarily concerns "testing and evaluation of large technical systems prior to production" (of mostly defense-related systems).

- Before FY 1993, NSF published data on a seventh obligations category (see "Categories of Support") covering non-S&E activity. At that time, however, ED made major software modifications to the automated system from which its federal S&E data were produced. The revamped coding structure introduced major trend differences for the department's institution data. Consequently, because ED accounted for 91% ($5.9 billion) of the total federal support for non-S&E activity ($6.5 billion) for FY 1993, NSF no longer publishes non-S&E totals. To explain ED's downward academic R&D trend between FY 1993 and

FY 1994 (from $95 million to $49 million), the agency stated that academic R&D programs in FY 1994 either were not funded, did not have an S&E component, or received reductions in funding.

- As of FY 1990, the Department of Defense (DOD) reports research separately from development. DOD states that more than 90% of its development obligations reported for universities and colleges are performed at university-administered laboratories that are separate from academic departments. Furthermore, DOD states that much of its development obligations are for major systems development, that such obligations differ from its obligations for advanced technology development, and that DOD total development obligations are therefore not comparable with development obligations at other federal agencies.

- During the FY 1987 survey cycle, DOD determined that some funds reported in prior years as R&D obligations to The Johns Hopkins University Applied Physics Lab (APL) were more appropriately classified as other S&E. Data for FYs 1984–86 were revised, but DOD was unable to revise data for earlier years. In FY 2009, APL accounted for more than 90% of DOD's total S&E funding of $522 million to The Johns Hopkins University.

- Beginning in FY 1978, two laboratories that were formerly considered academically administered federally funded research and development centers became part of their respective institutions: the Applied Physics Laboratory (Johns Hopkins University) and the Applied Research Laboratory (Pennsylvania State University). Data for these laboratories are included in academic figures beginning in FY 1978.

- Draper Laboratories separated from the Massachusetts Institute of Technology as of FY 1974 to become an independent nonprofit institution; data for this laboratory are included in the Massachusetts Institute of Technology's figures prior to FY 1974.

Definitions

The terms used throughout the survey have remained relatively unchanged from the FY 1971 survey cycle to the present. Note that the variables in this survey use definitions comparable for R&D and R&D plant to those used by the Office of Management and Budget (https://www.whitehouse.gov/omb) and the Survey of Federal Funds for Research and Development (Federal Funds Survey, https://www.nsf.gov/statistics/srvyfedfunds/).

Facilities and equipment for instruction in S&E include all programs whose principal purpose is to provide support for construction, acquisition, renovation, modification, repair, or rental of facilities, land, works, or equipment for use in instruction in S&E.

If the instructional facilities are part of a larger facility devoted to other purposes as well, the funds should be distributed among the categories of support involved as appropriate. In general, the other category most likely to be involved is R&D plant.

FTTGs include all fellowship, traineeship, and training grant programs that are directed primarily toward the development and maintenance of the scientific and technical workforce.

The total amounts pertaining to such awards (stipends and cost-of-education allowances) are reported in terms of the institution at which the recipient performs research and/or study.

Excluded are projects that support research and educational institutes, seminars, and conferences such as teacher-training activities provided through teacher institutes, short courses, research participation, and in-service seminars; activities aimed at the development of educational techniques and materials for use in S&E training; and programs that provide special opportunities for increasing the scientific knowledge and experience of precollege and undergraduate students. These activities are to be reported either under other S&E or not reported if they are not S&E-related.

General support for S&E includes activities that provide support for nonspecific or generalized purposes related to scientific research and education. Such projects are generally oriented toward academic departments, institutes, or institutions as a whole. "General support" implies a spectrum of varying types of support. At one extreme is support provided without any specification of purpose other than that funds be used for scientific activities. Another kind of general support is to be found in projects that provide funds for activity within a specified field of S&E but without specifying an explicit purpose. The distinguishing feature of general support for S&E projects is that they permit a significant measure of freedom as to purpose (research, faculty support, education, institutional support, etc.).

R&D includes all direct, indirect, incidental, or related costs resulting from or necessary to performing R&D by private individuals and organizations under grant, contract, or cooperative agreement. Demonstration projects designed to test or prove whether a technology or method is, in fact, workable are considered to be within the scope of R&D if they are designed to produce new information and are accomplished within a given time period. The following activities are excluded from R&D but should be reported under one or more of the other five S&E categories:

  - Routine product testing
  - Quality control
  - Topographical mapping and surveys
  - Collection of general-purpose statistics
  - Experimental production
  - Demonstrations designed to exhibit new technologies or methods or to disseminate information thereon
  - Scientific and technical information activities
  - R&D facilities and fixed equipment

- *Research* is systematic study directed toward fuller scientific knowledge or understanding of the subject studied. Research is classified as either basic or applied according to the objectives of the sponsoring agency. In basic research, the objective of the sponsoring

agency is to generate knowledge of the underlying foundations of phenomena and of observable facts without specific applications toward processes or products in mind. In applied research, the objective of the sponsoring agency is the creation of knowledge or understanding necessary to determine the means by which a recognized and specific need may be met.

- *Research equipment* is any item (or interrelated collection of items comprising a system) of nonexpendable tangible property or software having a useful life of more than 2 years and an acquisition cost of $500 or more that is used wholly or in part for research. Research equipment is included under R&D.

- *Development* is systematic application of knowledge and understanding gained from research directed toward the production of useful materials, devices, systems, or methods, including design and development of prototypes and processes.

  Advanced technology development represents DOD budget activity 3.

  Major systems development represents DOD budget activities 4 through 7 (Advanced Component Development and Prototypes [ACD&P], System Development and Demonstration [SDD], RDT&E Management Support, and Operational System Development).

R&D plant includes all projects whose principal purpose is to provide support for construction, acquisition, renovation, modification, repair, or rental of facilities, land, works, or fixed equipment for use in scientific or engineering R&D. A facility is to be interpreted broadly to include any physical resource important to the conduct of research or development. All costs—direct, indirect, and related expenditures—are to be included.

If the R&D facilities are part of a larger facility devoted to other purposes as well, the funds should be distributed among the categories of support involved as appropriate. In general, another category that is likely to be involved is facilities and equipment for instruction in S&E. Excluded from the R&D plant category are expendable research equipment and office furniture and equipment and all other activities (i.e., those not specifically related to S&E). See the definition of *research equipment*.

Other S&E include all academic S&E activities that cannot be meaningfully assigned to one of the five categories previously set forth. Among the types of activities to be included in this category are support for scientific conferences and symposia, teacher institutes, and activities aimed at increasing the scientific knowledge of precollege and undergraduate students.

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[1] The data from this survey are published annually in the series Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions (https://www.nsf.gov/statistics/fedsupport). Data for major data elements are available for FY 1963 onward. Data from this survey are also available in the Academic Institutional Profiles (https://ncsesdata.nsf.gov/profiles/) and in the WebCASPAR data system (https://ncsesdata.nsf.gov/webcaspar/).