

National Center for Science and Engineering Statistics*
Response to 2009 Committee of Visitors-Like Review
2011 Progress Report

**In January 2011, the America COMPETES Reauthorization Act of 2010 was signed into law. Section 505 of the Act renames the Division of Science Resources Statistics (SRS) as the National Center for Science and Engineering Statistics (NCSES). The Center retains its reporting line to the Directorate for Social, Behavioral, and Economic Sciences within the National Science Foundation. The new name signals the central role of NCSES in the collection, interpretation, analysis, and dissemination of objective data on the science and engineering enterprise.*

Part A. Integrity and Efficiency of SRS's Processes and Management

1. SRS as a Statistical Agency

SBE appreciates the Committee's overall recognition that the Division of Science Resources Statistics (SRS) has continued to improve significantly in many aspects of its role as a federal statistical agency. As the report indicated, SRS has been working to improve the timeliness of its products and response rates and SRS will heed the Committee's advice to continue to pay attention to the timeliness issue. The Committee is correct that SRS does not have sufficient staff to work with all the slow and late responders to its surveys.

At several points in the report the Committee expresses concerns that SRS lacks a full fledged quality assurance/data quality program for its surveys, and that this must be addressed. This is a concern, but at this point SRS has neither the staff nor funding to support an ongoing quality assurance program for all its surveys. Similarly, SBE appreciates the Committee's statement that "SRS has done an impressive job of undertaking major redesigns of six large surveys and outlining plans for completing redesigns of its other surveys." The Committee then went on to indicate that SRS will need to prioritize its redesigns, as it does not have the resources to undertake all redesigns simultaneously. SBE agrees completely with this concern. Most significant to SBE, and high on its agenda to address is the need to work with the leadership of NSF to better address SRS's role within NSF as well as the broader S&E policy community.

The Committee notes that the panels of experts which SRS has established "did not provide an on-going means of consultation, supported within the NSF, to provide advice on current and future surveys. SBE and SRS may wish to consider the establishment of such an advisory function." SBE acknowledges that this is a very important point and has begun discussions on how to establish a better means of consultation, in addition to experts' panels, that would afford a stronger ongoing interchange between SRS and other components of NSF as well as the broader S&E community.

The Committee has recommended that SRS consider the value of using a subset of Data Documentation Initiative identified elements for documenting its data sets in the future. SRS will explore that suggestion.

SBE truly appreciates the Committee's commendation that SRS has been very creative in securing the control of the industrial R&D survey from the Census Bureau and concurrently maintaining a close cooperative working relationship with the Bureau.

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In FY2010, NCSES established a CNSTAT panel to examine how it disseminates data and information. Amongst other items, the panel has raised the timeliness issue and is definitely expected to have recommendations in this area. The panel's report is in final Academy review and will be released in early FY 2012.

SBE has taken explicit steps to insure that there are experts on the SBE Advisory Committee who have expertise and interest in disciplines directly related to NCSES. In addition, NCSES has established four experts panels in which knowledgeable individuals provide input in specific areas. These panels cover BRDIS, the new Microbusiness Innovation, Science & Technology (MIST) survey; the Human Resources Experts Panel (HREP) and a statistical experts panel.

NCSES has explored utilizing DDI in its data documentation work in several ways but has determined that it is not appropriate to adopt a DDI structure at this time. NCSES developed and put into all new procurements and existing contracts standard data delivery requirements and more detailed data documentation.

NCSES has pursued several ways to make its data more accessible to researchers, including establishing a data enclave at NORC on a pilot basis. NCSES has placed microdata from two surveys (the Survey of Earned Doctorates (SED) and the Survey of Doctorate Recipients (SDR)) into the data enclave and access to these data to a limited number of researchers is expected by the end of calendar year 2011. In addition, NCSES has begun discussions with the Census Bureau to place NCSES data files into its Research Data Centers. (Also see comments in section 3.)

Other COV recommendations that NCSES is implementing include increasing the number of innovation items in the BRDIS survey and continuing BRDIS-related company site visits.

2. Redesign of the Survey of Industrial Research and Development

SBE appreciates the Committee's commendation that in addressing the 2005 National Research Council's recommendation for a redesign of the Survey of Industrial Research and Development SRS was highly responsive and employed systematically planned and

phased-in actions. SRS specifically and intentionally included, as part of the redesign activities a very detailed set of activities. These included: initiation of joint planning activities with Census; extensive consultation and interaction with a wide set of individuals and organizations; meetings with data users; and consultations with data providers, which included convening and meetings of Business Expert Panels and several rounds of cognitive testing with prospective respondents of possible questions to be placed on the redesigned Business R&D and Innovation Survey (BRDIS).

SBE agrees with the Committee that the steps taken to inform the survey redesign should be formalized, including both (i) the implementation of an on-going or rotating panel of users who could inform the survey design process and (ii) regular and continuing site visits to companies. SRS intends to soon reestablish a business advisory panel consisting of both data users and company representatives. Further, as part of the evaluation process for the pilot survey, site visits and cognitive interviews are being planned with Census methodological staff. Pending available funds and staffing, SRS intends to personally participate on several of these site visits. Even though SRS agrees that continuing company visits will better inform the survey design process as well as educate SRS staff on what the survey measures, resource constraints may limit such activities.

SRS agrees that more work is needed on improving the web questionnaire. The use of the Census web software, Census Taker, has proven more successful than previously expected, but still has inherent limitations (for example, only one form can be sequentially used within a company) that need to be addressed. SRS is pleased that Census has directly involved us in the redesign of Census Taker (now called Centurion) and that SRS will be able to influence its development to specifically accommodate BRDIS data collection requirements.

In terms of question and topic coverage, SBE is pleased that the Committee concludes that the redesigned survey holds the promise of providing a much needed set of U.S. government statistics on important aspects of industrial R&D, including differentiation between R&D expenses (which are maintained in accounting terms) and R&D performance (which is the basis for international R&D reports), on domestic and international sources of industrial R&D, on collaborative R&D arrangements, on sources of new technologies, and on innovative behavior (as distinct from performance of R&D). In particular, the redesign effort emphasized research on and the development of new questions that will support analysis of R&D outsourcing to both domestic and foreign companies, and collecting R&D data at the line-of-business level—both strong recommendations of the 2005 NRC report. SBE agrees with the Committee that the development of BRDIS questions may help position the U.S. to influence subsequent revisions to the Frascati Manual. At the upcoming June 2009 OECD meeting of National Experts on Science and Technology Indicators (NESTI), SRS will be presenting preliminary findings with respect to response rates, coverage, and potential problem areas on the questionnaire. In future international meetings, SRS will provide BRDIS results and survey recommendations stemming from our findings.

Acknowledging that Section 6 (Intellectual Property, Technology Transfer, and Innovation) of BRDIS was a "late addition" to the redesigned survey, SBE agrees that considerably more work is needed on addressing innovation questions (covered in greater depth in question 3, below). In particular, for future activities on innovation, SBE agrees with the COV report that "a well-defined, transparent consultative process" is needed, similar to the process employed in informing and redesigning the R&D funds, employee, and management questions that are the core of BRDIS. However, current staffing constraints probably limit moving aggressively forward in both consultations and the development of new questions.

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NCSES has implemented the following COV recommendations: "(i) the implementation of an on-going or rotating panel of users who could inform the survey design process and (ii) regular and continuing site visits to companies". NCSES has established a 2011-2012 business experts panel to provide input for the Business R&D and Innovation Survey which met in summer, 2011. NCSES has also continued to have Census staff conduct numerous debriefing visits in relation to the BRDIS survey, and NCSES accompany them as time and limited travel funds permit.

NCSES and its consultant, Don Dillman, led the reworking of the web version of the BRDIS instrument. Substantial improvements were made in the web version, primarily because of NCSES's involvement and insistence on change. NCSES and Census make continuous quality improvements to the BRDIS web instrument. Several test versions were implemented in FY 2011 regarding placement of the innovation questions on the BRDIS web questionnaire.

The data from the full-scale pilot of BRDIS for the 2009 calendar year are considered final and will be included in Science and Engineering Indicators 2012 (although marked preliminary), the annual National Patterns of R&D Resources report, and a series of InfoBriefs as well as a Detailed Statistical Tables report.

See comments in next section related to innovation.

3. Development of Information on Innovation

SBE acknowledges and concurs with the Committee's observations that progress on collecting, analyzing, and promoting external research on innovation-related data is necessary but not yet well-developed. SBE also appreciates, however, the positive recognition that the Committee extends to SRS on the initial steps that have been taken. In particular, it is agreed that considerably more progress is needed in advancing innovation-related questions on BRDIS or other surveys. As noted by the Committee, SRS drew upon considerable international work to inform the process and product innovation question used in the pilot survey.

The Committee recommends that SRS "develop the internal capacity to analyze the data" and in subsequent rounds "probe organizational innovation and business practices and market development." Further, the Committee notes that SRS must develop a blueprint for future work and that "SRS staff will have to be deeply engaged in site visits with firms and with data users" in order to restore NSF to a leadership position in the OECD regarding innovation data. SBE agrees with each of these observations, and notes that the Committee's repeated admonition that such activities will require SRS to receive additional resources cannot be over-estimated. For instance, under existing resource constraints (both staffing and budget), SRS may not be able to pursue the requisite systems approach for collecting innovation data that was implemented in redesigning the business R&D collection.

As recommended by the Committee, SRS is continuing its cooperation and interaction with other parts of NSF responsible with promoting the research community's development of science metrics. SBE agrees that such interactions will help inform SRS on the appropriate design of new survey innovation questions. It is agreed that such interaction should be expected with other SBE divisions and elsewhere in NSF. Subject to the availability of staff, SRS will investigate the possibility of a series of internal NSF meetings regarding innovation data and science metrics, as well as external meetings with potential data users, possibly utilizing the interagency working group on science policy.

Discussions have begun with OMB/ Statistical Policy, which will be followed up with future discussions with Census, on possible approaches for allowing researchers better access to data which SRS has supported. Most definitely this is an issue that cannot be solved by a single agency, but SBE is committed to moving forward in proposing new approaches to the Census Bureau. Researchers must however, realize that it will take considerable time and effort to effect changes at the Census Bureau.

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NCSES has moved forward on several fronts that will enhance its ability to collect more comprehensive data on innovation. For the short term, the questions on innovation on BRDIS were expanded somewhat from the 2008 full-scale pilot to 2009 full-scale implementation. In addition, the placement of the questions on innovation within the BRDIS instrument was changed for 2009. In the pilot, 2008 survey, the questions on innovation were at the very end of the instrument. The item response rates for the items were considerably lower than for other items. The placement of the innovation items at the end may have contributed to the higher item nonresponse. In particular, respondents who did not perform R&D may not have realized that they were supposed to respond to the innovation items. Therefore, for 2009 the innovation items were put at the front of the instrument and NCSES will explore whether the response rate to these items are higher in 2009 than in 2008. Very preliminary analysis of the responses to the innovation questions for 2009 indicates that placement has not made a significant difference in the results.

NCSES has funded a grant to the OECD to support a study of how to improve how data on innovation is collected. The project is also supported by Eurostat, the statistical office of the European Union. The multi-year activity will include cognitive testing of existing questions and development of new questions as well as exploration of alternative sampling frames.

NCSES has continued to pursue the development of a survey of very small firms (less than 5 employees). The focus of the survey will be on innovation and the entrepreneur as well as on R&D, because it is thought that such firms are particular hot beds of innovation. NCSES will conduct a workshop to gather ideas about the content and uses of such a survey of small firms. An experts panel is also being formed for this survey. An Interagency Agreement has been signed between IRS and NSF and for the last six months two NCSES staff members have been working with IRS data (at the IRS site). In addition, a contract has been awarded to design a pilot of this new survey. The first stage will be more detailed questionnaire, the second a very small pretest to evaluate the feasibility of the instrument, data collection mechanism, and use of IRS data. Depending upon the results of the pretest and the NCSES budget, a full scale survey will follow.

NCSES is designing, for the 2010 survey, several experiments using the exact wording of the CIS to determine if wording changes may have been responsible for a portion of the difference in nonresponse and response rates. Further, NCSES intends to conduct significant cognitive tests of the innovation questions in time for changes on the 2011 survey.

NCSES has pursued having BRDIS data placed in the Center for Economic Studies (CES) at Census to make BRDIS data available to researchers at CES. In addition, Census and NCSES have entered into an arrangement to establish a Survey Sponsor Data Center (SSDC) as a separate entity in the NCSES space at NSF. This will be a secure room with Census agents on site and selected NCSES staff will have access to the National Survey of College Graduates or the Business R&D and Innovation Survey onsite at NSF.

Part B. Results of NSF Investments

SBE appreciates the Committee's recognition that SRS, especially as a result of its major efforts in quality improvements and redesigns has not only enhanced SRS's standing as a federal statistical agency, but perhaps more significantly made the Division an important resource to the rest of the Foundation. SRS's data, especially as it redesigns the surveys, are as the Committee noted, an important part of the nation's research infrastructure. SBE acknowledges that SBE and SRS must determine how best to improve the Foundation's appreciation and utilization of the expertise and knowledge of SRS in NSF programs and planning activities.

Based on the suggestions of the COV, SRS has already created a new dissertation fellowship program under the rubric of the Science of Science and Innovation Policy (SciSIP) and is taking the appropriate steps to disseminate information on the program. The following is now on the SciSIP website: “For program specific guidelines on the Doctoral Dissertation Improvement Grants in SciSIP, please visit: [Doctoral Preparation Checklist](#). The [Division of Science Resources Statistics \(SRS\)](#) will provide special support for Doctoral Dissertation Research Improvement Grants that utilize SRS datasets.” SRS is and will continue to expand its ongoing relationship with SciSIP especially to insure that SRS’s data development activities taken the needs of SciSIP researchers into account. Just such an activity is taking place now as SRS works to add a series of American Recovery and Reinvestment Act (ARRA) related questions to its surveys for future SciSIP researchers.

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NCSES continues to expand its relationships and interactions with the SciSIP program. The most significant activities are those related to Star Statistics, which is an exploration encouraged by OMB of the transformation of the Federal Surveys from year data collections to the use of agency records to obtain the necessary data. In FY2011, NCSES used an existing staffing slot to hire an analyst to begin to explore and evaluate the feasibility of using administrative data to supplement its data collection activities.

In FY2011, NCSES continued to develop a formal approach to the management of the taxonomies used in its surveys and reports. Work began on fields of study taxonomies. Additional effort was expended on identifying and evaluating taxonomy management software, with a decision to be made in FY2012.

Part C. Other Topics

In Part C the Committee took an important prospective view of SRS’s role in SBE and NSF and expressed a series of concerns directed specifically to NSF. As noted earlier, the Committee commended SRS for the major improvements it has undertaken but in this section the Committee stressed that there are costs to improving significantly and producing high quality work. The cost is that SRS will be called upon increasingly to provide a broad range of data and analyses about science, technology and innovation as these topics are becoming of major importance at the highest levels of the U.S. government. The Committee notes that SRS is severely underfunded and understaffed and stressed that it is very important for SRS to undertake a strategic planning exercise, exploring the mission, priorities, and activities of SRS within the Foundation. SBE has already begun to explore how best to address these concerns through a series of preliminary discussions with respect to the relationships of SRS with SciSIP, the SBE research divisions and the broader NSF context.

SRS, subject to resource constraints, will explore the Committee's suggestion to establish a panel study of selected firms in similar industries to help SRS both study the dynamics of innovation and to determine what data can and cannot be collected.

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NCSES has not made as much progress as it might like in engaging in a strategic planning process. A task order was awarded that would assist NCSES in engaging in such planning, but the start of that activity has been delayed because of short staffing and the press of other activities. While NCSES was unable to engage in a division-wide process, the Human Resources Statistics Program (HRS) completed a series of strategic planning and team-building sessions focused on the surveys and staff of that program. Next, HRS plans to obtain input from internal and external customers to identify data needs and emerging issues that will provide a framework for shaping Program goals.

To raise its visibility and prestige, with the support of NSF and SBE leadership, the division proposed changing the name of the organization from the Division of Science Resources Statistics to the National Center for Science and Engineering Statistics, a name similar to those for the federal statistical agencies for education and health statistics, the National Center for Education Statistics and the National Center for Health Statistics respectively. As part of the America Competes Act, which was signed on January 4, 2011, the name change came into law. A coordinated plan was developed by the NCSES Deputy Division Director and relevant NCSES staff to "roll out" the new name. The full transition was in place by February 28, 2011.