



April 14, 2006

Dr. David Lightfoot
Assistant Director, SBE
National Science Foundation
4201 Wilson Boulevard
Arlington, Virginia 22230

Dear Dr. Lightfoot:

As chair of the COV-like review of the Division of Science Resources Statistics (SRS) of the Directorate for Social, Behavioral and Economic Sciences (SBE), I am pleased to transmit the report from the Committee. We greatly accelerated our review writing, editing and transmittal process so that this report could be forwarded for discussion by you and the SBE advisory committee in light of the critical role that SRS needs to play in informing the national policy discussions on the future of the U.S. science and engineering enterprise. These discussions cannot wait.

Our report presents observations, suggestions and recommendations for addressing the challenges SRS faces today and reflects on future challenges and opportunities, especially in responding to Dr. Marberger's call for better science metrics.

I want to point out several aspects of the report that warrant your special attention: the concerns of the committee around issues of the timeliness of data release and the lack of balance between the methodological/survey and subject area/analysis roles of the unit. At the same time that we applaud the steps taken to enhance methodological rigor, we believe that it is time to re-examine the positioning of these roles within the unit.

Thank you again for the opportunity to work with you on these important issues.

Sincerely,

Shirley M. Malcom, Ph.D
Head, Education and Human Resources
Chair of SRS Review Committee

The Committee is pleased to note the stated desire of the ADISBE for increased interaction across the SBE divisions to bring SRS into greater contact with the research and issues that should inform the development of science metrics. But responding to this new initiative will require new strategies for staff utilization, staff interaction, and a management style where professionals are provided clear expectations, informed by user, methodological, and statistical inputs, and have associated responsibility for outcomes.

A handwritten signature in cursive script that reads "Shirley M. Malcom". The signature is written in black ink and is positioned above a horizontal line.

For the Committee
Shirley M. Malcom
Chair

April 11, 2006

Final Report

Committee of Visitors (COV)-like Review of
the Science Resources Statistics Division

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**2006 Committee of Visitors Report
Division of Science Resources Statistics**

EXECUTIVE SUMMARY

The first Committee of Visitors (COV)-like review of the Division of Science Resources Statistics (SRS) was conducted on March 27-28, 2006, at NSF. The review was structured primarily to address three specific recommendations from a 2000 National Research Council (NRC) report. The Committee was also charged to examine the Division's resources, organization, and management practices, and to address the Division's state of readiness for participating in the NSF-wide response to Science Advisor Dr. Marburger's call for a "Science of Science Policy".

The Committee's comments and recommendations are presented below in four categories that correspond to the first four topics of the charge (the subject of readiness for the science policy initiative is addressed within those categories). The principal theme of our recommendations is that of balancing the Division's noteworthy accomplishments in survey methodological proficiency with other important goals of a federal statistical agency, particularly with regard to product timeliness and to meeting the needs of policy users and researchers. Achieving that balance will necessitate a fresh examination of the Division's production processes, user input mechanisms, staffing plans and needs, and staff development practices. Without significant changes, SRS will not be well positioned to participate in the science policy/science metrics initiative.

The Committee wishes to commend the dedication and professionalism of the SRS staff and management. The range of efforts and activities for such a small agency is truly impressive. SRS has done an excellent job in becoming an integral part of the federal statistical community. Among other achievements, it was the first agency to develop new standards in response to the Information Quality Act of 2001, and pursued the first interagency data sharing agreement under the new confidentiality act. We also recognize that SRS has taken steps to maintain high-quality outputs in the face of two difficult challenges: the loss of the decennial census long form as a vehicle for a major SRS survey, and the decline in response rates to all of its surveys (a problem that affects the entire statistical system).

The Committee also wishes to express its appreciation to the Division management and staff for the quality, relevance, and ease of access of the many documents provided before and during the meeting. We also deeply appreciated their thoughtfulness and candor in responding to our oral questions.

Major Recommendations

A. Regarding Continuous Review and Renewal, SRS should:

1. Develop a clear, overarching vision statement that guides its priorities for data collection, analysis, and publication. Such a vision is critical for a small agency with an important, specialized workload. To implement the vision, SRS should prepare an annual plan outlining its goals and target deadlines, and use its web page and other means to publicize the plan and inform the user community of major changes or delays.
2. Balance its current emphasis on improving statistical methodology with an equal emphasis on relating to and learning from users. The Committee recommends a number of actions for achieving that balance, including the following:

- Clarify the Division's mission to emphasize providing data for research and policy analysis on issues of national importance.
 - Ensure that policy users and researchers are well represented on permanent advisory committees for major surveys.
 - Expand the community of analysts and researchers interested in microdata and tabulations.
 - Establish a dissertation grants program designed to address questions of interest for policy making, and a summer institute for research and policy users.
3. Develop a vigorous strategy to promote its products and make its work more widely used, more widely cited, and more widely known in a variety of communities, including within the Foundation.
 4. Develop a structured program to learn more from survey respondents and to keep them informed as to how their information is being used by survey managers to improve their programs.
 5. Carefully monitor how well the use of the General Social Survey module on public attitudes and science knowledge serves user needs with regard to content, capability for detailed analysis, timeliness, and other characteristics, to determine what improvements may be needed.

B. Regarding Becoming a Statistical Agency, SRS should:

1. Act to expedite the release of survey data. Some of the approaches recommended are to:
 - Create and use a timeliness indicator such as per cent of products meeting announced target dates.
 - Re-examine policies that in some cases inadvertently create delay (e.g., tying data release to the publication of reports).
 - Examine the steps and loops in the product review and approval process and eliminate those that do not clearly add substantial value.
 - Adopt the model used by many other federal statistical agencies of releasing preliminary data, followed by updated and corrected information.
2. Balance the current emphasis on staff training on survey methodology with a like emphasis on subject matter analysis.
3. Support professional survey staff more actively in analyzing data, attending conferences, presenting papers, and generally representing SRS to external stakeholders.

C. Regarding Data Collection on the S&E Labor Market. SRS should:

1. Create an on-going advisory panel for its Human Resources surveys, including significant representation by policy users and researchers.
2. Create a system of feedback to advisory groups and other users explaining how their recommendations have been considered and implemented.
3. Implement in the very near future the postdoctoral data collection that has been under consideration for several years.

D. Regarding Division Staffing, Resources, and Management, SRS should:

1. Add a position to the Division Director's Office for a chief social scientist/economist, preferably with broad expertise in S&T policy matters.
2. Assess how the review and approval process affects productivity, staff morale, and product timeliness, and make necessary improvements.
3. In conjunction with considering the likely effects of improvements in timeliness and work flow, analyze needs for, and request additional staff, especially among subject matter analysts. A thorough analysis of staffing needs is important for several reasons:
 - Realigning current workload to balance technical proficiency with increased attention to user needs and input
 - Relieving senior staff of tasks that are well within the capabilities of more junior staff
 - Developing plans for staff succession
 - Coping with unanticipated workload crises
 - Preparing to develop and implement the science metrics initiative.
4. Implement the desire expressed in the "white paper" on the science metrics initiative regarding increased interaction among SBE divisions, to bring SRS into greater contact with the research and issues that should inform the development of science metrics.

STRUCTURE OF THE REVIEW

This is the report of the first Committee of Visitors (COV)-like review of the operations of NSF's Division of Science Resources Statistics (SRS). The Committee met at NSF on March 27 and 28, 2006. In accordance with COV guidelines, membership was balanced across areas of technical expertise and drawn from a variety of communities that interact with SRS. The members were:

- *Shirley Malcom* (Chair), Head, Directorate for Education and Human Resources, American Association for the Advancement of Science, and former member, National Science Board
- *Constance Citro*, Director, Committee on National Statistics, National Academy of Sciences
- *Howard E. Jackson*, Dean of the Graduate School, University of Cincinnati (and Council of Graduate Schools/NSF Dean in Residence 2005-2006)
- *Nancy Kirkendall*, Director, Statistics and Methods Group, Energy Information Agency, U.S. Department of Energy
- *Paula Stephan*, Professor of Economics, Georgia State University
- *Stephanie Shipp*, Director, Economic Assessment Office, Advanced Technology Program, National Institute of Standards and Technology

The group was constituted as an *ad hoc* committee of the Advisory Committee for the Directorate for Social, Behavioral, and Economic Sciences (SBE), of which Dr. Stephan is a member.

SRS fulfills the legislative mandate of the NSF Act 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..." To carry out this mandate, SRS designs, supports, and directs eleven periodic surveys as well as a variety of other data collections and research projects. These activities yield the materials for SRS staff and others to compile, analyze, and disseminate quantitative information about domestic and international resources devoted to science, engineering, and technology. A major activity of the Division is developing, writing, and producing the biennial report *Science and Engineering Indicators* under the guidance of the National Science Board.

The Foundation's general COV process is designed to examine the procedures and outputs of NSF's typical competitive grants programs. Because SRS serves a different set of purposes, the detailed questions in the COV report template concerning, for example, proposal handling practices, are not applicable. Thus, SRS took an alternative approach by planning for a "COV-like activity" designed to provide a realistic review of the Division's activities. The plan was developed by SRS management with the input and concurrence of the Assistant Director, SBE (Dr. David Lightfoot) and the Committee Chair.

The plan called for the Committee to assess the SRS Division's performance on five topics. The first three are recommendations that resulted from a portfolio review commissioned by SRS and completed in 2000 by the National Research Council (NRC). The fourth focused on the Division's readiness for participating in the Foundation-wide initiative on "Science of Science Policy". Finally, as is the case for COVs generally, the fifth involved reviewing the Division's staffing, budget, and management practices.

The 2000 NRC report, *Measuring the Science and Engineering Enterprise: Priorities for the Division of Science Resources Studies*, contained ten recommendations, the following three of which were selected for review (the underlined phrases were used as headings for the Committee's findings):

1. *To keep its data relevant and maintain data quality and analytic capacity, SRS should adopt a strategy of continuous review and renewal of the concepts it seeks to measure, and revise its survey instruments, survey operations, and data analysis as needed to keep them current. To achieve this, SRS must strengthen the frequency and intensity of its dialogue and interactions with data users, policymakers, and academic researchers and develop internal processes to convert the feedback it receives from these stakeholders into changes in its surveys and analyses. A key element of this strategy is the creation of advisory committees for SRS surveys that would assist SRS in establishing priorities for future change.*

To expand the range of surveys that benefit from advisory committees, we strongly recommend the creation of such a committee for the Survey of Industrial Research and Development. We also recommend that the existing Special Emphasis Panel (i.e., advisory committee) for the Doctorate Data Project (DDP) advise SRS on the Survey of Earned Doctorates (SED), the content of all three SRS personnel surveys, and the design of the Scientists and Engineers Statistical (SESTAT) system. This panel already provides SRS advice on the SED and the Survey of Doctorate Recipients (SDR) and should also provide advice on the National Survey of College Graduates (NSCG) and the National Survey of Recent College Graduates (NSRCG).

2. *SRS should be seen as a federal statistical agency, and should be supported in its efforts to meet fully those standards set for federal statistical agencies for independence, professional staffing, data quality, and data analysis.*
3. *SRS should revise its data collection on the labor market for scientists and engineers to better capture the career paths of scientists and engineers. SRS should fill gaps in existing data on careers by collecting comparative data on the careers of humanities doctorates, and data on the nonacademic careers of scientists and engineers, on science and engineering field of work, and on the international mobility of scientists and engineers. The division should also work with the Special Emphasis Panel for the Doctorate Data Project to address content and design issues for the SESTAT system to be implemented in the next decade.*

The fourth focus, SRS's positioning for participation in the emerging NSF-wide science metrics initiative, is described in a "white paper" prepared by SBE's Assistant Director. The paper states that SBE aims to develop the data, tools and knowledge needed to form part of the basis for a new science of science policy (as called for by OSTP Director John Marburger). The goal is to reach a point where the nation's public and private sectors are able to evaluate reliably the returns they have received from past research and development investments in science and engineering and to forecast, within tolerable margins of error, likely returns from future investments. Some of SBE's efforts in this area will involve enhancements and additions to SRS surveys, and will include improving the comparability, scope and availability of international data.

The fifth component of the review involved staffing allocations and training, budget trends, program structure, and other organizational and management topics.

Organizing our work around the five topics did not limit or constrain the Committee's considerations. Specifically, we reviewed the entire set of ten recommendations from the 2000 NRC report, as well as recommendations from a 2005 NRC report, *Measuring Research and Development Expenditures in the US Economy*. Because the latter report addressed some of SRS's R&D surveys, we chose here to address the Division's other major group of surveys, those that focus on S&T personnel issues. We did not undertake an examination of either *Science and Engineering Indicators* or the Division's program of small grants. However, our overall assessment and many of our suggestions apply to these areas as well.

Prior to the meeting, SRS provided the Committee with a CD and web site that included indexed copies and summaries of some 150 documents, ranging from major reports by and about the Division to its standards for data quality, publication review, and other activities. At the Chair's request, prior to the meeting SRS also developed materials relating to: 1) survey management processes and timing; 2) division staffing allocations; 3) challenges facing the Division over the next five years; and 4) a vision for meeting those challenges. During the meeting, the Committee requested and received such materials as detailed budget and survey cost information, staff directories from 2000 and 2006, and nuggets provided as examples in the GPRA process. In the course of the meeting the committee engaged SRS management and staff in discussions regarding a range of issues.

The Committee commends the Division management and staff for the quality, relevance, and ease of access of the many documents provided before and during the meeting. We also deeply appreciated their thoughtfulness and candor in responding to our oral questions.

After presenting a general overview, the Committee has organized its findings and recommendations by the following categories:

- A. Continuous review and renewal
- B. Becoming a statistical agency
- C. Improving data collection on the S&E labor market
- D. Staffing, resources, and management

The Committee's comments on the Division's potential role in the new initiative are presented within those categories.

GENERAL OVERVIEW

A statistical agency must have a commitment to maintaining the relevance and usefulness of its data, including the concepts that underlie the data and the content of particular data collections, just as it must have a commitment to high quality statistical methods and operations. In the documentation that SRS provided to the committee were examples of many useful and innovative mechanisms for obtaining input from a range of stakeholders and methodological experts. The level of activity in this regard seems, in the observation of committee members who have followed SRS, to have increased in breadth and depth over time. SRS has maintained high-quality outputs while taking steps to meet two difficult challenges: the loss of the decennial census long form as a vehicle for a major SRS survey, and the decline in response rates to all of its surveys (a problem that affects the entire statistical system).

The Committee compliments the efforts of SRS to undertake a number of outreach activities, including workshops, focus groups, panels, and others. We also commend the dedication and professionalism of the SRS staff, who are extremely hard working. For a small agency, SRS has increased its stature and recognition as a federal statistical agency, both nationally and internationally. The range of efforts and activities for such a small agency is truly impressive.

The Committee, however, has concerns about the effectiveness and direction of SRS's outreach, review, and renewal processes. SRS must have a clear, overriding vision that guides the priorities for its data collection, analysis, and publication programs. Such a vision is critically important for a small agency with an important, specialized workload. SRS should develop a yearly plan associated with its vision.

The Committee has not seen evidence of an ongoing feedback loop between the design and content of its data collection programs and the needs and interests of researchers and policy analysts who use or could potentially use the SRS data. Developing such feedback loops should be a priority for SRS.

Another concern is the timeliness of the release of SRS products. Timeliness has been a continuing problem for SRS, and was highlighted in the 2000 NRC report. The 2005 NRC review of the SRS's R&D surveys noted that timeliness had worsened, and our analysis of the times between survey administration and data release leads to the same conclusion for the human resources data.

The Committee notes the constrained in-house staff resources for NSF. It is concerned that SRS is not making the most effective use of its staff to achieve critical goals for outreach, timeliness, and renewals. In addition, as we articulate below, there are compelling reasons for additional staff in key areas.

SRS is to be commended for its efforts to reach out to leading statistical methodologists and to become knowledgeable of state-of-the-art survey research methods. SRS needs to balance these efforts with equally innovative, effective, and comprehensive mechanisms to relate to and learn from the key users—and potential users—of its data for social science research on understanding the science and technology enterprise and for analysis of alternative science policies. It needs to correct what appears to be an imbalance in the resources that are devoted to methodological renewal in contrast to substantive renewal.

The Committee notes that SRS's stated mission is to "provide high quality, comprehensive, quantitatively based information on the science and technology enterprise." SRS should explicitly acknowledge that its mission includes not only providing S&T data for monitoring trends (e.g., R&D expenditures, women and minorities in various S&E fields), but also, and very importantly, providing data for research and policy analysis on issues of public importance. In addition, because late-appearing data lose their relevance for tracking and understanding the dynamic world of S&T, the SRS mission must include a commitment to timely release of data.

The “science metrics” initiative will place increased demands on SRS to provide policy-relevant information. The emergence of the initiative has implications for SRS mission orientation, staffing, products, and processes. In the long term, participation may greatly benefit SRS by providing a conceptual, policy-oriented framework to guide data collection and the development of survey content and concepts.

A. CONTINUOUS REVIEW AND RENEWAL

The committee offers recommendations and suggestions for addressing the imbalance it has observed in its outreach programs to research users and potential users, other NSF divisions, and SRS respondents. The committee also addresses a general public relations strategy for SRS. The committee believes that outreach efforts must feature program managers and analysts who are knowledgeable of the SRS programs.

Outreach to Researchers and Policy Analysts

Actual and potential users of SRS data include authorities who make program and policy decisions at the agency and national levels as well as policy analysts and researchers interested in microdata and tabulations. It is imperative that SRS have mechanisms for obtaining ongoing input from all types of users; they are critical sources of information about research and policy data needs for understanding the S&E enterprise that can lead to innovative ways of enhancing the content of SRS surveys, revising key concepts to reflect changing realities, and rebalancing the SRS portfolio. They are also critical sources of feedback about the quality of the data. More generally, expanding the community of microdata users is essential to obtain an appropriate return on the substantial investment in SRS’s data collection programs, and addressing the needs of decision makers is essential to maintaining their support for the Division’s activities.

The Committee urges that SRS include researchers and policy users on permanent advisory committees for the major SRS surveys. As recommended by the NRC (2000), a continuing advisory committee should be established for the S&E personnel surveys, including the new postdoctorate data collection, the SED, and the SESTAT surveys. Researchers should also be included on the new advisory committee for the Industry R&D survey. There should be regular mechanisms for input from these committees to reach the SRS survey managers and inform survey renewal. There should also be regular mechanisms to feed back to the advisory committees—and the broader user communities—the actions that SRS takes in response to their recommendations.

SRS needs to increase its efforts to publicize and promote the use of its data for research and policy analysis purposes and to build a research user community that brings in younger people in a variety of disciplines. Mechanisms for doing this include staff presentations at professional society meetings of S&E disciplines and regular user workshops.

SRS should propose to SBE that it establish a dissertation grants program designed to answer questions of interest for S&E policy using SRS data. Such a program could further the science metrics initiative as well as increase the use of SRS data for social science research. SRS should also propose to SBE that it establish a summer institute program for research and policy analyst users of the SRS data. The purpose of the program would be to interest researchers in working with the SRS microdata and train them in their use. Again, such a program could further the science metrics initiative as well as publicize the relevance of the SRS data for innovative research. Part of the institute should be sessions that bring researchers and SRS survey managers together to discuss ways in which SRS data could be more useful and relevant for analytic use.

SRS has taken important steps to improve its licensing approval process, as shown by the growth in the number of licensees. To further maximize the return on investment in the rich SRS microdata, SRS should review its licensing policies and practices to eliminate any unnecessary requirements and to further streamline the approval and renewal process. SRS should also consider the advantages of making synthetic microdata publicly available that would enable researchers to explore the data and test their analytical programs while waiting to receive approval for use of the actual microdata.

SRS should improve its Web page to facilitate the ability of users to determine the latest data that are available. SRS should use its Web page to inform the user community of its annual planning goals and targets and of any major changes, such as changes in periodicity of its surveys.

SRS has made an important change in how data on public attitudes and knowledge about science will be obtained in future years by opting to include a module on the General Social Survey in place of its stand-alone survey. SRS should carefully monitor how well the GSS module serves user needs with regard to content, capability for detailed analysis, timeliness, and other characteristics, to determine what improvements may be needed.

Enhancing Ties within NSF

SRS should continue to enhance its ties with staff throughout NSF, not only within SBE and with the other directorates, but with the Director's offices and the National Science Board. Program staff can be sources of input regarding important and emerging issues of S&E policy and channels by which to reach actual and potential respondents and users of SRS data. SRS has indicated that a handicap to such outreach efforts is the "rotator" system whereby a high proportion of NSF program officers and Division and Directorate leaders spend only two years at the Foundation before returning to their home institutions. The committee urges SRS to view efforts to build ties with visiting NSF staff as long-term investments that can have payoffs down the road in terms of seeding interest in and use of SRS data for science policy-related research. SRS should also explore ways to be more involved in relevant NSF-wide initiatives. Such involvement can help SRS keep abreast of new fields and changing emphases in S&T research and education.

Informing and Learning from SRS Respondents

SRS is to be commended for initiating record keeping studies with businesses and universities to learn how these organizations keep their records and ways in which SRS data collections can be tailored to elicit the most accurate and complete information from these respondents. As a means to improve response, SRS should take additional steps to inform respondents—including organizations as well as people—of the uses of the information being requested. In this regard, SRS should have an active program of dissemination of its Information Briefs to relevant groups such as the Association for Institutional Research. Such efforts can help achieve "buy-in" by organizations to support participation in SRS data collection programs.

Respondents are potential sources of feedback on important S&T issues, emerging concerns, and changes in the field. SRS should increase the use of focus groups and case studies as ways to learn from respondents. In addition, SRS should consider embedding experiments in its surveys to learn about emerging issues; for example, to learn how field nomenclature is changing, a subsample of the SESTAT respondents could be asked to write in their fields of occupation and training.

A critical element of a structured program to learn from respondents—and researchers—about emerging issues and changes in the S&T enterprise includes mechanisms to ensure that new information is proactively used by SRS survey managers to refresh their programs. Relatedly, in its leadership of the interagency effort to revise the classification of S&E fields used by federal research funding agencies in their submission of funding data, SRS should consider ways to update this classification periodically.

Public Relations Strategy

SRS has data that are valuable for the policy maker, for the administrator looking for guidance on directions to consider, for the potential researcher, and even for the naïve user who should be aware of this information but presently is not. SRS should consider a vigorous public relations strategy to promote its work and make it more widely used, more widely cited, and more widely known in a variety of communities. This strategy should be developed within SRS and might include a variety of activities, e.g. more use of the web for pushing out widely valuable products like InfoBriefs, increasing the number of presentations both internal and external to NSF, and identifying members of the S&T policy community who would be willing to comment to the media about the interpretation of important findings.

B. BECOMING A STATISTICAL AGENCY

As the NRC states in its 2005 report, *Measuring Research and Development Expenditures in the US Economy*, SRS “may be seen as a testbed for management of statistical programs in a non-standard, resource-constrained environment. With a skeletal staff, SRS is expected to meet accepted standards of any federal statistical agency.” The Committee commends SRS in striving to meet and accomplish many of the standards. They include independence, wide dissemination of the data via the website, commitment to quality and professional practice, an active survey methods research program, and cooperation with other statistical agencies.

SRS still faces many challenges to meet the full range of standards for a federal statistical agency. Their top priority should be to speed up the release of survey data. Of the 11 surveys, six are collected on an annual basis. A comparison of collection schedules and data release times shows that in some cases release of these annual data is taking two to three years. The biennial surveys appear to be closer to schedule, although to relieve production pressures the staff has considered conducting one or more of them on a three-year basis.

SRS manages 11 surveys with a staff of 40 + employees. As the NRC report concludes, “an elevation of the visibility of the resource base for SRS would be a positive step and would serve to direct attention to the needs of the program for sustainment and improvement.” This appears to be even truer today than when the report was written.

Perceptions of SRS

SRS has done an excellent job in becoming an integral part of the federal statistical community. One example is their commitment to pursue the first data sharing agreement (with BEA, BLS, Census) under the new confidentiality act, CIPSEA. A second is their work to add a question to the American Community Survey to make up for the loss of the long form of the Decennial Census. A third is their acceptance of the responsibility for coming up with new standards for the fields of science and technology used by federal agencies to report R&D funding. Helping OMB revise these standards is a major undertaking. It will require resources and commitment.

At least according to the budget information available to the Committee, SRS has certainly become more important to NSF, based on budget increases since 2002. Whether this is because of its status as a statistical agency is difficult to determine.

Quality Standards and Guidelines

SRS provided numerous documents reporting data quality standards, publication review and production standards, statistical standards, and other standards (web, PowerPoint). These standards are detailed and appear complete. SRS is to be commended on being among the first statistical agencies to develop standards as a result of the Information Quality Act of 2001.

The Committee does have some concern that the review process associated with the new standards may be too time consuming relative to the additional quality added. This may be contributing to delays in releasing data. Review should address conformity with standards, accuracy, and readability, but not hinder timeliness of release by requiring *ad hoc* changes in table formats, terminology, and other features that are not critical to the usefulness of the product. SRS should also consider ways to expedite the availability of detailed data—for example, not necessarily tying release to the preparation of reports. In addition, because the need to improve response rates in an increasingly difficult climate may lead to delays in the completion of the data for a survey, SRS should consider adopting statistical methods to release preliminary data, followed by updated information, in line with the model of such agencies as BEA, BLS, and Census for business statistics.

The timeliness of SRS products (date of reference period to date of release) was noted as an issue in the 2000 CNSTAT study (see NRC, 2005: Ch.8), and appears to have become worse since timeliness was dropped as a GPRA measure in 2000. Many statistical agencies have a timeliness indicator among their PART measures. The most common measure used is the percent of products meeting their pre-announced release dates. This measure requires the agency to announce its intended release dates publicly on the web, then to monitor how well it meets those dates. Whether the timeliness measure actually flows into NSF PART measures does not matter; it is a critical measure for SRS because it relates to managing customer expectations, and is one that most other statistical agencies have adopted.

Professional Capacity of Staff

We are impressed with the professionalism, energy, and dedication of SRS staff. The indicators concerning training provided to SRS staff on statistics and methodology are also impressive. These have obviously been key areas of needed training. However, there needs to be better balance with training related to the subject matter of the surveys (labor force, job transitions, academic training options, industry innovation, etc.). Understanding of the subject matter is key to conducting relevant surveys.

Currently, SRS staff focuses on survey research methodology and preparation of tables and Infobriefs in order to release survey data, leaving little time for subject matter analysis. Allowing more time for analysis would lead to increased professional capacity of staff. Doing so will require both streamlining current procedures and providing additional resources, especially in the survey operations groups (see Part C below). Professional survey staff should be more actively supported in attending conferences and presenting papers. These staff activities would serve multiple roles: heightening visibility for SRS and its products; providing outreach to user communities; and developing professional capability of staff.

NRC (2005) proposed that SRS hire enough staff to develop more SRS expertise in economics and statistics. In particular, it recommended hiring both a senior statistician and a senior economist. “These people should not be saddled with administrative chores. Instead, they should be devoted to innovation and exploratory work on the R&D surveys. Each of them should work on analyzing the data, one with a focus on meeting their needs, and one with a focus on providing the best methodology for the surveys.” NSF has assigned a senior statistician to the redevelopment of the Industry R&D survey. It still needs to add a senior social scientist/economist. Adding more staff also provides an opportunity to hire and train junior staff, which is important for succession planning and crisis management as well as workload distribution.

C. IMPROVING DATA COLLECTION ON THE S&E LABOR MARKET

SRS is in the process of revising data collection to meet certain changes in the S&E workforce. A prime example is the effort to add U.S. PhDs who have left the country (or indicated they planned to leave the country) in the sampling frame of the SDR. SRS is also cognizant of certain holes in the data that can only be addressed by funding new sampling frames and/or creating new surveys. An example of the need for a new sampling frame is the topic of S&E doctorates working in the U.S. who received their doctoral degree outside the U.S. This group is currently included in the NSCG, but since the NSCG in the past was only updated every decade, using the decennial census, it has not been possible to refresh the sample during the decade. In the future, and depending upon the wording of the American Community Survey, it may be possible to refresh the sample more frequently. It may also facilitate including foreign doctorates as a component of the SDR. An example of the need to create new data collections is one designed specifically to study postdoctorates, which will require identifying appropriate sampling frame(s),

Examples of additional SRS data improvement initiatives include the following: (1) actively seeking funding to add the humanities to the SDR sample (but to date funds have not been forthcoming); (2) cognitively testing a salary question in the 2006/2007 SED; (3) continued development of special modules for the SESTAT surveys; and (4) a policy for linking the Human Resources data to other databases, such as Thompson-ISI data and USPTO data. Regarding item (4), it is far too early to assess the degree to which individual researchers will avail themselves of the possibility and the workability of these linkages.

There has been little change in the surveys relating to non-academic careers. SRS has explored the possibility of matching the verbatim files (original uncoded responses on names of employers) to Dun and Bradstreet records. A match such as this could provide more information on the work context of individuals in non-academic careers, especially in industry.

SRS currently does not have an ongoing committee to advise it in its efforts to collect timely data on the S&E labor market. SRS has convened several workshops to address specific issues, such as adding a salary question to the SED, but it is not clear how the results of those workshops were incorporated into survey operations.

SRS will need to implement changes to be well positioned to be an effective participant in the new science metrics initiative. For example, they will need to engage additional staff with expertise in science policy and have increased interaction with researchers in the science policy area. They should also consider augmenting the data on scientists and engineers with performance measures. Science metrics requires not just measures of inputs but also measures of output.

In summary, SRS's efforts to revise data collection on the labor market for scientists and engineers could be enhanced, in the opinion of the committee, if SRS were to (1) hire more subject matter specialists/analysts; (2) enable increased participation of staff at professional meetings which requires staff having the time and expertise to engage in analysis; (3) provide the opportunity for increased interaction of staff with external users of the data; and (4) create an on-going advisory panel.

As noted earlier, SRS needs to work to close the loop between recommendations from advisory groups, other data users, and from within their own group for improvements in the S&E workforce data and follow up actions by SRS. The Division also needs to expedite the process by which it moves forward with new initiatives. As an important example, SRS needs to move forward in the very near future with implementing the postdoctoral data collection, which is needed to illuminate a science policy issue that has been of concern for many years.

D. STAFFING, RESOURCES, AND MANAGEMENT

A series of management issues were identified by the Committee based on our review of documents and interactions with staff. First, the management is to be commended for providing the guidance and vision to enhance the statistical and methodological staffing of the division. It clearly demonstrates the attention given to moving SRS toward its mission as a federal statistical agency. (NRC Recommendation 2).

Staff levels have remained fairly constant for the past five years while the budget for the division will have increased by over 70 per cent from FY2000 to FY 2005. The Committee is concerned as to whether, as a small agency being asked to do more, the multiple roles being assumed by staff are “stressing the system.”

Upon exploring this question with staff, it was determined that a great deal of frustration exists. While part of this was likely related to overall staffing levels, some was likely related to staff deployment decisions that have led to an increased focus on methods, perhaps at the expense of other core functions, including analysis, feedback of analysis into survey design/renewal, outreach to the community, and revamping processes to support more timely release of data.

In regard to staff deployment, we observe that the following position changes took place between 2000 and 2006: an increase of one survey methodologist and two mathematical statisticians in the Director’s office; an increase of four staff in the Information and Technology Services program; an increase of one person in the R&D Statistics group; a decrease of four staff in the Human Resource Statistics group; and a decrease of three staff in the S&E Indicators group (taking into account the former Integrated Studies Program).

In this era of matrix management, we realize that position reallocations may not fully reflect the range of changes in staff functions and responsibilities, but they do serve as a “marker” for a shift in priorities. We support added statistical expertise, but strongly recommend increased subject matter expertise as balance. In particular, we recommend that the Director’s office add a chief social scientist who is well-versed in S&T policy matters. We also encourage SRS to bring in junior staff, who can assist senior survey managers and learn and grow in their positions.

The review process looks excellent as designed on paper, but it evidently does not work operationally, especially with respect to upper level management’s approval of publications and data releases. SRS needs to think through the goals of each step in the review process and how each step contributes to value. SRS should also assess how the review process affects productivity, staff morale, and timeliness and make necessary improvements.

The Committee was impressed with the professionalism of all the SRS staff with whom it interacted. With almost no notice, staff responded thoughtfully to our many questions and requests for information. Staff with whom the Committee met in closed session were candid and professional in their comments.

It is not clear what overall levels of professional opportunities are made available across the Division. The examples cited within the documentation seemed to be focused heavily on methodology. There was a strong sense that interaction with the user and professional community has been minimized/de-emphasized for survey and analytical staff.

The Committee is concerned about the staffing levels, staff utilization, and amount of time required to fill vacancies. There is also concern that workplace climate and staff morale are affecting the work of SRS, especially the timeliness of its outputs.

The Committee is pleased to note the stated desire of the AD/SBE for increased interaction across the SBE divisions to bring SRS into greater contact with the research and issues that should inform the development of science metrics. But responding to this new initiative will require new strategies for staff utilization, staff interaction, and a management style where professionals are provided clear expectations, informed by user, methodological, and statistical inputs, and have associated responsibility for outcomes.

For the Committee
Shirley M. Malcom
Chair

Appendix 1

AGENDA

**SRS COV-like Review
Room 920**

| Date | Time | Activity | Lead |
|-------------|-------------|--|--|
| 27-Mar | 8:00 - 8:30 | Refreshments | |
| | 8:30 - 9:00 | Welcome, Introductions, and Science Metrics | Shirley Malcom, COV Chair David Lightfoot, AD/SBE |
| | 9:00 - 9:45 | Overview of COV, Confidentiality, and Conflicts of Interest | Fae Korsmo, OIA/OD |
| | | Why SRS is Having a “COV-like” Review Rather Than a COV | Lynda Carlson, DD/SRS |
| | | Overview of Document Database, Working Drive, COV Schedule, Housekeeping | Lawrence Burton, SRS |
| | 9:45: 10:00 | Review/Revise Agenda for Remainder of Meeting | Shirley Malcom, COV Chair |
| | 10:00-10:15 | Break | |
| | 10:15-12:00 | Begin Discussing Topics Relating to Recommendations, Report Template Parts A and B | |
| | 12:00-1:00 | Working Lunch | |
| | 1:00 - 3:00 | Continue Discussion | |
| | 3:00 - 3:15 | Break | |
| | 3:15 - 5:45 | Continue Discussion | |

| | | | |
|--------|--------------|--|---|
| 28-Mar | 8:00 - 10:00 | Begin drafting report; Refreshments | |
| | 10:00-10:15 | Break | |
| | 10:15-12:00 | Continue drafting report | |
| | 12:00 - 1:00 | Working Lunch | |
| | 1:00 - 1:30 | Executive Session: Report to SBE Senior Management | Drs. Malcom, Lightfoot, Ward, other COV members |
| | 1:30 - 3:00 | Begin finalizing report, integrating draft text of members | |
| | 3:00 - 3:15 | Break | |
| | 3:15 - 4:00 | Overview of COV Findings | Drs. Malcom, Lightfoot, Ward, Carlson, Frase, other COV members |

NOTE: The COV will determine when sessions are open or closed, and may invite SRS staff or management to answer questions at any time.

Appendix 2

Charge to the Committee

January 24, 2006

Dear (COV member):

Thank you for agreeing to serve on the Committee of Visitors (COV) to review activities of the Division of Science Resources Statistics (SRS). NSF policy requires that each program be reviewed periodically by outside experts. These reviews provide Foundation officials and others throughout the government with an independent assessment of the performance of NSF's programs.

The COV is an *ad hoc* subcommittee of the NSF Advisory Committee for the Social, Behavioral, and Economic Sciences (SBE). Your COV is charged to produce a written report assessing SRS's performance in various areas, including (a) the integrity and efficiency of SRS's processes and management, and (b) outputs and outcomes of NSF investments.

COVs are ordinarily organized around questions pertaining to grants activities, but grants are only a minor part of what SRS does. The focus of this "COV-like" activity will be SRS's response to three recommendations from the review of the SRS portfolio in 2000 by the National Research Council (NRC). We will adapt the standard NSF template of questions for COVs to take into account the differences between this "COV-like" activity and a normal NSF COV. You will receive the template and background materials well in advance of the COV, which is scheduled to meet at NSF March 27 and 28, 2006.

The Chair of the COV will be Dr. Shirley M. Malcom, Head of the Directorate for Education and Human Resources Programs, American Association for the Advancement of Science. The COV report goes to the SBE Advisory Committee, which will comment. I will provide a response setting forth actions to be taken on each of the COV's recommendations. Your report and my response will be forwarded to the Director of NSF, and will be made available to the public.

Lawrence Burton, Facilitator for the SRS COV (lburton@nsf.gov), will send you all of the materials you will need to conduct this review. As a member of the COV and a Federal employee, you will receive reimbursement for lodging costs and the standard per diem.

Thank you for your willingness to assist NSF with this important part of its mission.

Sincerely,

//signed//

David W. Lightfoot
Assistant Director

Appendix 3

Glossary

ACS – American Community Survey

BEA – Bureau of Economic Analysis (U.S. Department of Commerce)

BLS – Bureau of Labor Statistics (U.S. Department of Labor)

Census – U.S. Census Bureau

CIPSEA – Confidential Information Protection and Statistical Efficiency Act

CNSTAT – Committee on National Statistics (of the National Academies)

DDP – Doctorate Data Project

GPRA – Government Performance and Results Act (Congressional requirements for review of program outputs)

GSS – General Social Survey

NSCG – National Survey of College Graduates

NSRCG – National Survey of Recent College Graduates

OMB – Office of Management and Budget (Executive Office of the President)

OSTP – Office of Science and Technology Policy (Executive Office of the President)

PART – Program Assessment Rating Tool (OMB tool for review of program merit)

R&D – Research and Development

S&T – Science and Technology

S&E – Science and Engineering or Scientists and Engineers

SDR – Survey of Doctorate Recipients

SED – Survey of Earned Doctorates

SESTAT – Scientists and Engineers Statistical Data System

Thompson Scientific – Firm that produces, among other things, indexes to journal abstracts and references (formerly known as Thompson ISI)

USPTO – United States Patent and Trademark Office

Appendix 4

Biographical Sketches

Members, SRS 2006 COV-Like Review

Shirley Malcom is Head of the Directorate for Education and Human Resources Programs of the American Association for the Advancement of Science (AAAS). The directorate includes AAAS programs in education, activities for underrepresented groups, and public understanding of science and technology. Dr. Malcom serves on several boards, including the Howard Heinz Endowment and the H. John Heinz III Center for Science, Economics and the Environment, and is an honorary trustee of the American Museum of Natural History. She serves as a Regent of Morgan State University and as a trustee of Caltech. In addition, she has chaired a number of national committees addressing education reform and access to scientific and technical education, careers and literacy. Dr. Malcom is a former trustee of the Carnegie Corporation of New York. She is a fellow of the AAAS and the American Academy of Arts and Sciences. She served on the National Science Board, the policymaking body of the National Science Foundation, from 1994 to 1998, and from 1994-2001 served on the President's Committee of Advisors on Science and Technology. Dr. Malcom received her doctorate in ecology from Pennsylvania State University; master's degree in zoology from the University of California, Los Angeles; and bachelor's degree with distinction in zoology from the University of Washington. She also holds thirteen honorary degrees. In 2003 Dr. Malcom received the Public Welfare Medal of the National Academy of Sciences, the highest award given by the Academy.

Constance Citro has been with the Committee on National Statistics for 20 years. She was appointed director of the committee in May 2004. She is a former vice president and deputy director of Mathematica Policy Research, Inc., and was an American Statistical Association/National Science Foundation research fellow at the U.S. Census Bureau. For the committee, she served as study director for numerous projects, including the Panel to Review the 2000 Census, the Panel on Estimates of Poverty for Small Geographic Areas, the Panel on Poverty and Family Assistance, the Panel to Evaluate the Survey of Income and Program Participation, the Panel to Evaluate Microsimulation Models for Social Welfare Programs, and the Panel on Decennial Census Methodology. Her research has focused on the quality and accessibility of large, complex microdata files, as well as analysis related to income and poverty measurement. She is a fellow of the American Statistical Association. She received a B.A. degree from the University of Rochester and M.A. and Ph.D. degrees in political science from Yale University.

Howard Jackson is the Council of Graduate Schools (CGS)/NSF Dean in Residence 2005-2006. He has served as Vice President for Research and is currently University Dean of the Graduate School, Professor of Physics, and Distinguished Teaching Professor, at the University of Cincinnati. Dr. Jackson is a past chair of the Council on Research Policy and Graduate Education (CRPGE), one of the Councils of the National Association of State Universities and Land Grant Colleges. At the University of Cincinnati he established and directed the first "Summer Research Program for Undergraduate Women in Science and Engineering," now institutionalized as a WISE program. He is a former director of the Preparing Future Faculty Program and he has served on the boards of the Ohio Aerospace Institute, BioStart and Emerging Concepts.

Dr. Jackson has published widely in the area of light scattering from solids. His recent research contributions have centered on understanding the electronic landscape of self-assembled quantum dots, the behavior of vertical cavity surface emitting lasers at high spatial resolution, and photonic crystal behavior. He has been a visiting scientist at the Clarendon Laboratory, Oxford University, Oxford, England, and the University of Southampton, Southampton, England. His research is presently supported by the National Science Foundation.

He holds a B.S. in physics from the University of Rochester and the Ph.D. from Northwestern University. Dr. Jackson is a member of Sigma Xi, a Fellow of the American Physical Society, and a Fellow of the Graduate School of the University of Cincinnati.

Nancy Kirkendall started her public service career in 1980 as a mathematical statistician in the Energy Information Administration's (EIA) Office of Energy Data Operations. She moved to the Office of Statistical Standards in 1983 and served as EIA's Chief Mathematical Statistician until 1996. From 1996 through 1999 she worked in the Statistical Policy Branch of the Office of Management and Budget. In that position, she was the desk officer for the Census Bureau, the chair of the Federal Committee on Statistical Methodology, and a leader or liaison for many interagency projects of the Federal statistical system. Dr. Kirkendall returned to EIA as a senior level SMG mathematical statistician in 1999, and became director in 2002. In all her EIA positions she has focused on the identification and resolution of data quality issues and the implementation of quality programs.

Dr. Kirkendall's private industry experience includes working as a systems engineer at the MITRE Corporation on technical issues related to air traffic control; as an operations research analyst at Computer Sciences Corporation in Saigon, South Viet Nam on management information systems; and as a member of the technical staff of BELLCOMM, supporting the space program. Dr. Kirkendall is an adjunct professor in the Engineering Management and Systems Engineering Department at the George Washington University where she teaches forecasting. Dr. Kirkendall has been an active member of the Washington Statistical Society (she is a past president) and the American Statistical Association (she is a past vice president). She received the prestigious American Statistical Association Founders Award in 2000 for her contributions to the discipline of statistics and the association. Dr. Kirkendall received B.S. and M.S. degrees in mathematics from Ohio State University. She received a Ph.D. in statistics from George Washington University.

Stephanie Shipp is Director of Economic Assessment, Advanced Technology Office, National Institute of Standards and Technology, Department of Commerce. She has served in that position since 2000. Before then she served as the Senior Advisor to the Office of the Secretary, Office of Budget (on detail), directing all activities related to completion of the Department's Strategic Plan for FY '00-'05. Prior positions also include serving as the Assistant Division Chief, Housing and Household Economic Statistics Division, Census Bureau; as Branch Chief for the Division of Consumer Expenditure Survey, Bureau of Labor Statistics; and as a research assistant at the Federal Reserve Board. Shipp currently serves as board Secretary and has served as the President of the Department of Commerce SEA chapter, 2003-2004; Shipp also was a member of the Chapter's Executive Board from 2001-2004. She has been honored as an Elected Fellow for the American Statistical Association and as an elected member for the International Statistics Institute. Dr. Shipp received a B.A. from Trinity College and a Ph.D. in Economics from the George Washington University

Paula Stephan is Professor of Economics, Andrew Young School of Policy Studies, Georgia State University. Her research interests focus on the careers of scientists and engineers and the process by which knowledge moves across institutional boundaries in the economy. Stephan's research has been supported by the Alfred P. Sloan Foundation, the Andrew Mellon Foundation, the Exxon Education Foundation, the National Science Foundation, the North Atlantic Treaty Organization and the U.S. Department of Labor. She has served on several National Research Council committees including the committee on Dimensions, Causes, and Implications of Recent Trends in the Careers of Life Scientists, Committee on Methods of Forecasting Demand and Supply of Doctoral Scientists and Engineers, and the Committee to Assess the Portfolio of the Science Resources Studies Division of NSF. She is a regular participant in the National Bureau of Economic Research's meetings in Higher Education and has testified before the U.S. House Subcommittee on Basic Science. She currently is serving a three year term as a member of the Advisory Committee to NSF's Directorate for Social, Behavioral and Economic Sciences.

Dr. Stephan graduated from Grinnell College (Phi Beta Kappa) with a B.A. in Economics and earned both her M.A. and Ph.D. in Economics from the University of Michigan. She has published numerous articles in journals such as *The American Economic Review*, *Science*, *The Journal of Economic Literature*, *Economic Inquiry* and *Social Studies of Science*. Stephan coauthored with Sharon Levin *Striking the Mother Lode in Science*, published by Oxford University Press, 1992. The book was reviewed in *Science*, *Chemical and Engineering News*, *Journal of Economic Literature*, *The Southern Economic Journal* and *The Journal of Higher Education*. Her research on the careers of scientists has been the focus of articles in *The Economist*, *Science* and *The Scientist*. Stephan is a frequent presenter at meetings such as The American Economic Association, the American Association for the Advancement of Science, and the Society for the Social Studies of Science. Stephan reviews regularly for the National Science Foundation and a number of academic journals including *The American Economic Review*, *The American Sociological Review*, *Economic Inquiry*, *The Journal of Political Economy*, and *The Journal of Human Resources*.

SRS Memorandum
March 28, 2006

To: David Lightfoot, AD/SBE
Via: *Lynda T. Carlson*
Lynda T. Carlson, Director, SRS
From: Lawrence Burton, Senior Analyst, SRS *LTB*
Subject: FY2006 SRS COV: Demographics and COI

The following is relevant information about the composition of the COV and procedures taken to resolve conflicts.

The COV had 6 members, as follows:

Gender: 5 female, 1 male
Underrepresented minorities: 1 African American, 5 white
Geographic distribution: 4 Central Atlantic, 1 Midwest, 1 South
Institutions: 2 government, 2 non-profit, 2 academic

All six members of the COV completed signed Form 1230P prior to the meeting and these were delivered to the General Counsel. The introductory session on March 27 included a conflicts briefing and review of confidentiality requirements. It should be noted that this COV-like review was concerned with the Division of Science Resources Statistics which awards very few grants so no access to proposals, awards, and declinations was required. Nevertheless none of the COV members had financial interests in the topics discussed.

Lawrence Burton