

Dr. Beyer asked about balancing the need for continuing time trend data with the need to change and redefine data series to reflect changing conditions. Dr. Norwood conceded that this was very hard to do. Even a small change creates the need to back-track to create a consistent time series. Dr. Shanks asked about different ways to organize changes. Dr. Norwood said that there is no perfect way of organizing, and that choice of how to do it depends greatly upon the people in the agency and their relationships. She said that in the 1950's at BLS the consulting company Booz, Allen and Hamilton had recommended a functional specialization pattern. However, this did not work because analysts must know something about how the data with which they are working are put together. She said that currently, at BLS, there are budget line-item "product groups", each with a Program Head. Each Program currently contains a statistics and methods division. In cases of disagreement between a Program Head and the statistics office, the matter comes to the attention of the Commissioner. Dr. Norwood added that there is also a small, but important, Research and Evaluation Office which works with all the groups.

Dr. Link asked how does the BLS know when a new occupation has emerged? Dr. Norwood said that BLS's labor and business advisory committees usually signal these changes sometime in advance. Also BLS' field personnel are sensitive to these changes, and they are encouraged to publish articles about changing occupational structures in refereed journals. BLS also experiences pressures from sister agencies to develop new data, such as the exhortations from the Bureau of Economic Analysis to develop a price index for computers.

Dr. Peter House. Future Scarcities of Scientists and Engineers

Dr. Peter House, Director of the STIA Division of Policy Research and Analysis (PRA) made an illustrated presentation on demographic and other factors which could affect the future supply of scientists and engineers.

His first chart on changes in the population of 22 year-olds from 1959 to 2009 depicted the mid-1990's trough in the size of the group, and the subsequent growth of the group back to approximately current levels. Another chart showed a 100 year trend in BA degrees and bachelor's level natural science and engineering (ns&e) degrees. Overall baccalaureates grew at about 4% per year until around 1970, when the rate slowed down to its current rate of about 0.3% per year. Similarly, ns&e degrees grew at about 3% per year until 1960, after which growth went flat. When the two sets are combined it appears that, over the past 30 years, ns&e degrees have constituted a fairly constant 4% of the 22 year-old cohort (with perturbations in the mid-1980's due to the emergence of computer science). Thus, Dr. House suggested when the two factors are put together -- the dip in the 22 year-old cohort, and no growth in ns&e degrees -- they, "provide one way in which you can forecast

the expected supply of natural scientists and engineers".

Dr Tufte took exception to one of the charts developed by Dr. House showing an apparently radical divergence in trend between ns&e and all other degrees. Dr. Tufte noted that the graphical presentation vastly exaggerated what were actually very small differences between the curves. Mr. Ausubel suggested that comparing ns&e degrees with "all other" degrees over time could be misleading because of significant changes in the composition of the group. He said that one needs to look at ns&e degrees in comparison with specific other traditional fields.

Dr. House presented a chart showing changes in the size of the 22 year-old cohorts in a number of different countries. He indicated that many of these countries will be experiencing downturns similar to that expected for the U.S. He noted that there was an implication in the recent immigration bill that something like 20,000 foreign ns&e's could be brought in under its provisions. He concluded, however, that his analysis suggests that the belief we can get these ns&e's by importing them from other countries may be incorrect because, "these countries may have the same need". Committee members expressed some methodological concerns with the comparisons of data for longer and shorter blocks of time, and the assumption of a constant rate of participation in higher education, even among countries undergoing rapid rates of modernization. They felt these concerns could make interpretation of the graph difficult.

Moving to a discussion of economic incentives for s/e careers, Dr. House presented trend data on starting salaries for graduates in ns&e fields, social sciences, humanities and business. He suggested that for a long time there have basically been two markets, and that the premium paid to ns&e's has not been enough to pull people out of business or other non-technical careers. Dr. Norwood questioned whether, over the 20-25 year period, there hadn't been significant changes in the composition of these groups which could strongly impact salaries. She also expressed doubts about the representativeness of the salary data.

Dr. House concluded his presentations with data on expected retirement of Ph.D.'s. He displayed a chart showing a large expected retirement group in the late 90's, which he said represented the coming of retirement age of those who began their careers during the great expansion of the universities in the 1960's. He indicated that these retirements could stimulate demand.

Dr. Tufte summed up his reaction to these presentations by Dr. House recalling Dr. Norwood's earlier observations concerning the care that agencies should take in not reaching too far with the data. He said, "an agency has to pay enormous attention to the care and the crafting of the underlying data, and to its credibility".

Handwritten notes:
 Tufte
 Ausubel
 Norwood
 House

If these requirements are not met then the conclusions arrived at can be seen as self-serving and be accordingly discounted. Dr. House agreed. *for the idea*

Mr. Ausubel queried whether, in the longer perspective, it is at all meaningful to talk about shortages or scarcities of s/e personnel in relation to national economic growth. He believed that real "gaps" have only been identified for very short periods of time, and only under very unique circumstances -- e.g., for a few years immediately after World War II, and maybe in France after World War I, when a whole cohort of young men was decimated. Therefore, if "shortages" have never really happened, historically, one has to question one's own methods for projecting into the future. Mr. Ausubel said he has been very unhappy about the "shortages" debates in the 1980's, and thought they had been misused on Capitol Hill and elsewhere. He said he thought the community does not do itself a service with this kind of analysis. *Very important study*

Dr. House responded by saying that he did not know whether there is a shortage. He observed that all he had done was to obtain the best possible data to show that a change in the population cohort was occurring together with a 30 year trend in slowdown of ns&e degree choice. *No*

Dr. Habermann asked Dr. House whether, given the abundant advice offered by the Committee in connection with his analyses, he might have some suggestions as to how future work might be done differently, so as to deal with some of the issues raised. Dr. House said that, in fact, the major policy-relevant findings such as the "four percent" are sent out for extensive comment and review. He noted, for example, that, "...the manuscript for the paper on which this talk is based was mailed to over 100 people across the country for review and comment." In other words, he said, "...there is a very extensive process ... and all we can do is state explicitly what we did." Dr. Norwood followed up on this, saying that what bothered her was the lack of knowledge about the quality of the data underlying some of these analyses. She suspected, in the case of the salary data referred to, that some of it, "...is just not good enough for the National Science Foundation." Dr. House responded by giving examples of cases where PRA had refused to use data because of quality problems -- despite strong pressures he had refused to disaggregate scientists and engineers. *U²*

Ms. Katherine Wallman and Dr. Daniel Melnick. Status and future directions of the Science & Technology Personnel Data System

After lunch, short presentations were made by Ms. Wallman of the Committee and Dr. Melnick, Senior Adviser to the NSF EHR Directorate on Research Methodologies (and former Division Director of SRS), on the status and future directions of the Science and Technology Personnel Data System (STPDS). Ms. Wallman recounted the

history of workshops and advisory reports on this issue, culminating in the 1989 National Academy study, *Surveying the Nation's Scientists and Engineers*, which was distributed to the Committee members. She said that the principal problem with the approach used was the three-part algorithm for identifying S/E's -- occupational identification, disciplinary identification and self-identification. Dr. Melnick agreed that "the algorithm is dead", but he pointed out that problems remain as to continuity and the integration of data from the various SRS S&T personnel surveys to produce national estimates. Dr. Melnick added that the SRS role was very similar to that of other Federal statistical agencies, with the exception that most SRS data collections are conducted either by contractors or other Federal agencies. Very few are conducted in-house.

In further discussion about problems with surveys, Dr. Melnick drew attention to the low item response rate (<40%) on the Industry R&D survey. This led to a lengthy discussion of the character and needs of data users, and how they can be identified.

Committee suggestions for future agenda topics

Dr. Liebman asked Dr. Ellis how this Committee could be of most use to the SRS. Dr. Ellis said he hoped for "global thinking" about the structuring of the personnel and R&D support data systems. This prompted several Committee members to express "wish list" requests for information and discussion topics. These included:

-- Dr. Shanks wanted information on the current requirements upon SRS for issuing reports, as well as information on SRS history and functions. Dr. Wallman asked for information on NSF statistical activities located outside of SRS or PRA.

-- Dr. Morgan wanted discussion of restoration of the NSF's data research program. He said, "NSF should conduct more than a data collection program". Dr. Habermann commented that the Committee should be aware that a recommendation for greatly increased extramural funding made by a committee formed largely of academics could appear to be self-serving.

-- review of the balance between in-house and extramural effort. Dr. Mowery thought that PRA ought to do more extramural work. He also wanted to consider the question of access to data bases by external scholars, and felt it would be useful to review the heterogeneous sources of data used by SRS.

-- Dr. Shanks felt there should be more discussion of the proximity and tensions between analysis and policy advocacy.

-- Dr. Goldman wanted more information on data about science and mathematics education. He also felt it important to explore the kinds of roles that S/E's play in the economy and society. He

provided analogy with "bean-counting" that captured the Committee's attention. He said that in a nation of bean-eaters, bean-counting is an important function. However, if the policy concern is with the nutritional value of the diet of the population then the counters should seriously consider counting corn and other nutritional elements. Dr. Willenbrock agreed, adding that a recent study showed that the biggest employer of new University of Illinois engineering graduates was Arthur Andersen, the accounting and consulting firm.

-- Mr. Howard said he felt it was increasingly important to know about the activities of U.S. R&D enterprises abroad. He wanted to know how much of this activity was currently being captured by SRS. Other Committee members also wanted to know about foreign sponsored R&D within the U.S.

-- Dr. Link wanted to "get a better handle" on who the users of SRS data are.

Remarks by NSF Acting Director, Dr. Frederick Bernthal

Late in the afternoon, the Committee was addressed by Dr. Frederick Bernthal, Acting Director of NSF. He welcomed the presence of the group and stressed the importance to NSF for its statistical activities to be well integrated into the professional community of statistical data gatherers and analysts. He pointed out that while NSF's statistical data gathering activities are principally located in the STIA Directorate, there are also other places in NSF where it is also important. For example, the new Presidential mandate that the US be first in science education by the year 2,000 places an important burden for data collection and analysis upon the EHR Directorate, requiring new approaches -- more mission-oriented and with the capability to evaluate progress. Dr. Bernthal praised Dr. Willenbrock's initiative in gathering this distinguished group to advise on this important function.

At the Director's request, Dr. Liebman then summarized major points covered by the day's discussion, including:

- the National Academy report on surveys of S/E's
- budgets for statistical work
- the balance of in-house vs. extramural work
- the tensions between policy analysis and data collection
- public access to data bases vs. need for privacy/confidentiality
- need for quality control in the collection, reporting, and analyses of data
- need for openness, and the role of diversity of viewpoints in encouraging critical assessment
- the lack of knowledge about socio-economic functions of S/E's
- need for better data on the global marketplace

Dr. Bernthal agreed that the "fine line" issue of the tension between data collection and policy analysis and recommendations was

important, and that it was directly connected with the need for openness making public all assumptions and procedures in arriving at given factual conclusions. He also referred to the recent Leon Lederman study of the role of academic R&D in society, and agreed that NSF should probably do more on investigations of the economic consequences of the research effort.

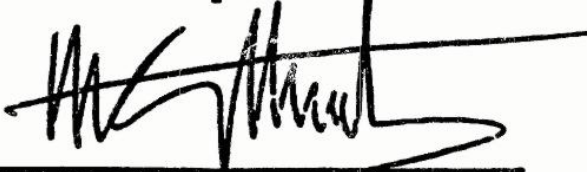
Concluding comments

In concluding the meeting, Dr. Liebman said that, based on today's discussion, she and Dr. Willenbrock would draft an agenda for future Committee work, and circulate it to the members.

Mr. Howard said that in formulating this agenda it might be helpful to consider what kinds of information would you like to have in 5 years time in order to inform science policy. Mr. Ausubel added that a useful model is provided by the recent Office of Technology Assessment (OTA) report on Statistical Needs for the US Economy, which asks many similar questions. He also mentioned that in connection with the personnel issues, Michael Teitelbaum of the New York based Sloan Foundation, has been reviewing the literature of studies of the S&T labor markets.

It was agreed that the Committee would meet again in late February or early March.

Preparation



Carlos Kruytbosch
Executive Secretary

Approval



Judith Liebman
Chairman

UNIVERSITY OF CALIFORNIA AT BERKELEY

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SANTA BARBARA • SANTA CRUZ

Walter A. Haas School of Business

350 Barrows Hall
Berkeley, California 94720

March 5, 1991

Dr. Donna Fossun
Acting Deputy Director
Science Resources Division
National Science Foundation
Washington, D.C. 20550

VIA FAX

Dear Dr. Fossun:

I regret to inform you that I will be unable to attend Thursday's meeting of the STIA Data and Policy Analysis Advisory Committee. As I informed Dr. Kruytbosch some time ago, my teaching schedule (Wednesday nights until 9:45 p.m. or so) renders Thursday meetings in Washington D.C. impossible. I will be returning my ticket under separate cover.

Although I once again tried to pass along my correct mailing address during our telephone conversation last week (the most recent attempt follows 3 or 4 efforts with Dr. Kruytbosch), the information does not appear to have reached your mailroom, which has a street address and ZIP code that are incorrect. I suspect that this incorrect mailing information may have something to do with my lack of a reimbursement check for the January 9 meeting of this committee, and would appreciate it if you could convey the correct mailing information to your mailroom:

Professor David Mowery
School of Business
350 Barrows Hall
University of California, Berkeley
Berkeley, CA 94720
415-643-9992
FAX: 415-842-2826

I have had an opportunity to briefly review the materials on "Proposed operating procedures for STIA data and policy analysis activities," and the "Publications management and review procedures." I think that both of these are excellent statements, but I would like to raise several issues related to both documents.

In my view, there is a serious need for a more comprehensive review of the SRS data structure and collection effort. As I noted during

Dr. Donna Fossum
March 5, 1991
Page Two

the January meeting (and as SRS staff and others have noted on numerous occasions), the "industry R&D" data (employment and \$\$) are increasingly useless for economic research. This declining utility reflects the peculiar conventions employed to organize these data, the absence of better data that distinguish among lines of business, the lack of good data on R&D performed by foreign enterprises in the U.S., the reduced frequency of publication of comprehensive tables (compare the "Selected data on R&D in industry: 1989 with the detail and volume of similar reports for the mid-1970s), and many other problems. These problems contribute to the progressive "privatization" of data collection and analysis. The continuing demands of private users, combined with the declining quality of publicly available data, create market opportunities for private collection and analysis of these data. Although these entrepreneurial activities are not harmful in themselves, when combined with the declining quality of public available data, we have serious problems of access for the impecunious scholarly community and for policy analysts generally.

The STIA operating guidelines and the SRS publication and review procedures do not address these larger problems. These problems are currently severe, they are getting worse, and a broad "charter statement" will not ameliorate them. The STIA guidelines seem to create opportunities for in-house or extramural researchers to examine the scope and severity of these and other problems with NSF/SRS data. I support such an examination, and hope that the guidelines will be interpreted to encourage it.

The STIA guidelines are also somewhat unclear about the charter for PRA. The guidelines clearly suggest that STIA will support in-house and extramural research on NSF databases and other activities in policy analysis. Will PRA be in charge of these activities? Do these activities include the exploration of new data needs or the development and analysis (on a pilot basis) of new databases not currently collected by NSF? Will PRA continue to serve the policy analysis needs of the Director and the NSB? It seems to me that PRA's responsibilities to the Director might more logically be handled by a separate unit, freeing PRA to fashion a more strategic, stable research program that would be conducted in-house and outside, so as to produce higher quality analysis than some of the materials presented at the January meeting.

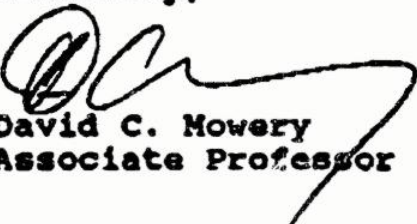
Finally, I think that 2(f) in the STIA guidelines needs to be given greater prominence and possibly, a specific mechanism for its accomplishment. The January meeting demonstrated some serious shortcomings in STIA's collection and analysis of R&D and other data. It is very important, especially in light of the Congressional mandates for STIA/SRS reports on human resources, that efforts be made to coordinate the NSF data collection and

Dr. Donna Fossum
March 5, 1991
Page Three

analysis efforts with those of other federal statistical agencies. These coordination efforts might well improve the quality of NSF data collection and analysis.

Again, I apologize for my absence from the Thursday meeting. Wednesdays and Thursdays will be infeasible for me through May 16. I will be in Washington during the week of March 25-29 (Berkeley's spring break), however, if you would like to meet informally to discuss these comments or the activities of the STIA committee. I also expect to be in Washington on April 12 for the AAAS R&D colloquium, if you wish to try to meet then. Alternatively, feel free to give me a call.

Sincerely,



David C. Mowery
Associate Professor

MEMORANDUM

DATE: March 6, 1991
TO: Assistant Director, STIA
FROM: Division Director, PRA
SUBJECT: Proposed Operating Procedures and Principles for PRA and SRS

The morning before discussion and approval by the Advisory Committee was the first time two documents important to PRA's productivity were made available to me. They are,

- "Proposed Operating Procedures and Principles for STIA Data and Policy Analysis Activities"
- "SRS Publications Management and Review Procedures"

Though the latter document is specific to SRS, I am given to understand that it might serve as a model for other STIA Divisions, and that INT has been talked to about it. INT doesn't recall such a discussion and none of the other Division Directors have seen it either.


The document, "Proposed Operating Procedures . . .," has a footnote stating, "Prepared by the staff . . .". I would like to go on record by saying that neither I nor any of my staff have had the opportunity to contribute to, or review the substance of either document during their preparation. We have not even had any information about discussions which have occurred during the formulation period. Also, if involved, we would have had the opportunity to devote the time and effort to think through the objectives, issues, options, and recommendations for each of these documents. Certainly, it is clear that whatever is adopted will affect seriously PRA procedures and activities and possibly the effectiveness and efficiency of the Division.

A quick reading of both documents reveals ambiguities and unanswered questions, especially for the "Proposed Operating Procedures and Principles for STIA Data and Policy Analysis Activities." For example,

- Item 1(b) states that PRA and SRS, in performing their tasks should "Consolidate existing data on science and technology, whether or not collected by STIA, into a publicly accessible electronic database." By law, detailed data collected for SRS on industry R&D cannot be made publicly available. PRA uses data on NSF proposals which by agency regulations cannot be made available to the public. True of several of the data bases.

- In the guidelines section, item 2(a) states "All research supported or conducted by STIA should be fully documented so that users can fully understand the procedures employed." In some cases, full documentation would make the report unreadable. For example, documenting in detail the procedures used to obtain universe estimates from the Doctoral Record File Survey requires 160 pages.
- Item 2(b) reads, "Reports should contain appropriate information about the sources and likely magnitude of uncertainty in the results." This guideline would wipe out use of foreign R&D data where specific information on reliability frequently is unavailable. It also would eliminate use of data for various aspects of U.S. domestic R&D activity and resources. I wonder what the S&E Indicators Report would read like with all the required caveats.
- Item 2(c) says, "When graphical presentations are used, they should clearly and objectively display actual data and results of analysis." What about presenting the results of forecast or projections, which are not "actual" data? Otherwise, of course.

Comments of this sort would not have been necessary if both PRA and SRS staff with detailed knowledge of the implications of various options had been involved in the development of the Procedures and Principles.



Peter W. House

cc: Judith Liebman, Chair

DRAFT DRAFT - March 1, 1991 - DRAFT DRAFT

**PROPOSED OPERATING PROCEDURES AND
PRINCIPLES FOR STIA DATA AND POLICY ANALYSIS ACTIVITIES***

1. STIA should perform the following data collection and policy analysis activities:
 - (a) Collect appropriate data to support the Foundation's activities, as well as to provide Federal agencies, the Congress, and the public with data about the status of science and technology and about science and engineering personnel.
 - (b) Consolidate existing data on science and technology, whether or not collected by STIA, into a publicly accessible electronic database. This facility should feature a common data dictionary and at least two levels of access, one for NSF and another for external users.
 - (c) Provide for analyses and research utilizing the database. These activities should take place both inside NSF and in the external community. STIA should facilitate access to these data and fund analytical and research efforts in cooperation with other Directorates.
 - (d) Establish and maintain staff capability to transform the results of this research into information relevant to decision-making and policy formation by NSF, the National Science Board, Executive Branch agencies, and the Congress.
 - (e) Provide for professional review of all STIA reports, and thoroughly validate all findings.
 - (f) Sponsor targeted research and, in cooperation with other Directorates, untargeted research in the methods and procedures for collecting, analyzing and disseminating statistical information.
 - (g) Disseminate reports to the public in appropriate formats.

* Prepared by the staff at the request of the chair on basis of the discussions at the last meeting.

2. STIA should adopt the following guidelines:
- (a) All research supported or conducted by STIA should be fully documented so that users can fully understand the procedures employed.
 - (b) Reports should contain appropriate information about the sources and likely magnitude of uncertainty in the results. In the case of future projections, reports should present scenarios clearly indicating the effects of assumptions on the possible outcomes.
 - (c) When graphical presentations are used, they should clearly and objectively display actual data and results of analyses.
 - (d) Data users inside and outside the Foundation should play a role in establishing priorities.
 - (e) STIA should establish a publications review system including peers as well as review by STIA management. Reviewers should consider the quality of data and the validity of the analyses.
 - (f) STIA should strengthen ties to the Federal statistical community and maintain state-of-the-art professional standards.

MEMORANDUM

March 6, 1991

From: Director, Division of Policy Research and Analysis

To: Assistant Director, STIA

Subject: Corrections to Minutes of January 9, 1991 Meeting of STIA Advisory Committee on Data And Policy Analysis

Thank you for transmitting the subject minutes at close of business yesterday, March 5, 1991, nearly two months after the meeting. I am disturbed that our division was not given an opportunity to review and comment on the minutes before they were put in final form, and I hope the other participating staff and guests were given that courtesy. It is unusual for the technical participants to be ignored in preparation of minutes to technical meetings. Had we been invited to comment on the minutes, this detailed memorandum would have been unnecessary. I believe the work of the committee would be much more valuable if the Committee were provided with full and accurate technical documentation of the presentations at the meeting, and hope we will be given the chance to contribute to this documentation in the future.

My presentation on natural science and engineering personnel issues dealt with a very complex system, and several omissions, oversights, and errors in recording the minutes attribute statements and positions to PRA that are factually wrong. Furthermore, in nearly every case when a technical question was presented, either my staff or I provided a technical response. Most of the comments by my staff have been omitted from the minutes.

The summary Future Supply of Scientists and Engineers on page 2 of the minutes should be corrected as follows:

Second Sentence: Should be revised to "He noted that combining demographic factors and degree data provides a means of forecasting the supply of *new natural science and engineering B.S. degrees* personnel. (S&E "personnel" in general is a more complex issue. Our simple model applies only to annual NS&E B.S. degrees.)

Third Sentence: The last word ("personnel") should be changed to *Ph.D. scientists and engineers*. Our analysis of retirements did not include S&Es at the bachelors level.

Fourth Sentence: No conclusions were derived in my presentation. Therefore, the sentence should be revised as follows: "Committee members discussed the sources of data underlying these analyses and expressed reservations about *deriving* conclusions ~~derived~~ from them.

Sixth Sentence: I agreed with the concerns of the committee and explained that PRA checks and rechecks all our data for reliability, credibility, and consistency. Many available data series from SRS and other sources are rejected because they fail one or more of these tests. A concluding sentence should be added to this effect.

Similar corrections should be made to the extended description of my presentation on page 5 of the minutes.

Second paragraph

Second Sentence: Should be revised to "Another chart showed a 100-year trend in *national participation (ratio of annual number of degrees to the population of 22-year-olds in that year)* in all *baccalaureate BA* degrees and bachelor's level natural science and engineering degrees."

Third Sentence: Revise to "~~Overall,~~ *The participation rate for all baccalaureate degrees grew at about 4% per year until around 1970, when the rate slowed down to its current rate of about 0.3% per year.*"

Fourth Sentence: Revise to "Similarly, *the NS&E B.S. degrees participation rate grew at about 3% per year until 1960, after which growth ceased went flat.*"

Fifth Sentence: Revise to "~~When the two sets are combined, it appears that~~ *Over the past 30 years, NS&E degrees have constituted a fairly constant 4% of the 22-year-old cohort (with perturbations in the mid-1980s due to the emergence of computer science).*"

Sixth Sentence: Revise to "Thus, Dr. House suggested, when the two factors are put together--the dip in the 22-year-old cohort, and *stable NS&E participation no growth in NS&E degrees*--they "provide one way in which you can forecast the expected supply of *new natural science and engineering scientists and engineers bachelors degrees.*"

Third Paragraph

First Sentence: After Dr. Tufte's comment on the exaggerated graph scales, I presented a stacked area chart of the same data ("Field Composition of U.S. Bachelors Degrees"), including detailed disciplines. Dr. Tufte thought this version to be a more appropriate presentation. A sentence should be added to document this sequence of events and to balance the initial pejorative statement.

Fourth Paragraph

Last Sentence: Again, my responses to the Committee have been deleted. A concluding sentence should be added to the effect of "*Dr. House agreed that these estimates were very rough, and that they have been sent to our peers in the other nations to elicit better data on this issue.*"

Ninth Paragraph

It is vitally important that my response to Dr. Ausubel be accurate and precise so as to eliminate his confusion on this issue. My main point was that I deliberately avoid using the term "shortage," since I don't have data to show whether a shortage exists or not. Ausubel introduced the term "shortage," and his comments were directed at others who have misused our analyses. We have projected a *declining annual number of new NS&E bachelors degrees, based on a highly reliable estimate of future 22-year-olds and an observed 30-year stability in the NS&E participation rate.* We have not done a detailed study of demand for new graduates with these skills. People who believe that U.S. production of such individuals should be monotonically increasing perceive the downturn as a possible problem. People who believe in the employment market mechanism argue that there

will be no shortage in the sense of unfilled jobs, and that therefore there will be no problem.

Last Paragraph

The quotation attributed to me is incorrect. It should be as follows: ". . . the manuscript for *The State of Academic Science and Engineering*, which contains our pipeline analyses, ~~the paper on which this talk is based~~ was mailed to over 100 people across the country for review and comment."

Once again, our responses to Committee assertions have been omitted. Dr. Boylan of my staff described in detail the various data sources used and our analysis of their quality. Thus, the paraphrase of Dr. Norwood's concerns should state ". . . what bothered her was *her* the lack of knowledge about the quality of the data underlying the analyses." Our policy analysts are painfully aware of the quality of the data used in the analysis, since we have been studying such data in detail for the last six years.

I urge that this memorandum be added to the official records of the committee and distributed to all members and observers. I look forward to closer involvement with the Committee in the future.

Peter W House

cc: Judith Liebman, Chair

MEMORANDUM

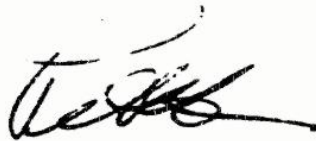
DATE: March 7, 1991

TO: Assistant Director, STIA

FROM: Director, Division of Policy Research and Analysis

SUBJECT: Revision of Minutes of January 9, 1991 Meeting of STIA Advisory Committee on Data and Policy Analysis

As I indicated to Dr. Liebman, I fully support the review of the subject minutes by those who gave formal presentations. I sympathize with the burden imposed on the new Executive Secretary, but believe the record should be corrected. Given the confusion with the technical aspects of my presentation, I am offering Dr. Rolf Piekarz of my staff to assist Dr. Donna Fossum in redrafting the minutes. Dr. Piekarz will also be available for any assistance needed regarding today's meeting or developing the agenda for the next meeting.



Peter W. House

cc: Dr. Judith Liebman
Dr. Rolf Piekarz

Mar 11 12:15 1991 Page 7

>>> inbox:1463

Date: 11 Mar 91 10:15 EST
To: kwillenh
cc: wellis,
dmelnick
From: dfossom
Subject: advisory committee follow-up

Kerl

I am making arrangements to use the recorder in the Board room to listen to the tapes of the meeting and prepare the minutes. A sizable part of the discussion focused on the principles so I will be listening with great care to this exchange. I intend to make a list of suggested changes and incorporate them into the principles and then circulate another draft of them. If all goes as planned, I should have this done by Friday.

If you envisioned some other plan of attack, please, share it with me. I am open to all suggestions. As the possessor of the tapes, it is clearly up to me to decipher them initially and then share the information in whatever way seems best.

Donna

Down
Suggest you concentrate on this principles section first. The answer you caught this part done the better. I think we are going to have to reconst the structure - "guides & principles" don't make much sense. So we don't need a transcript - just a list of ideas

sent (see attached)

16:50 1991 Page 1

re: Mon, 11 Mar 91 16:27:33 EST
 from: "F. Karl Willenbrock" <kwillenb@note.nsf.gov>
 subject: Advisory Committee Follow-up

----- Blind-Carbon-Copy

To: dfossum
 Subject: Advisory Committee Follow-up
 Date: Mon, 11 Mar 91 16:27:33 EST
 From: "F. Karl Willenbrock" <kwillenb@note.nsf.gov>

Donna:

Re your note of this morning, I suggest you concentrate on the principles section first. The sooner you can get this part done the better. I think we are going to have to recast the structure -- "guidelines" and "principles" don't make much sense. So we don't need a transcript -- only a list of ideas.

Karl

- ----- Forwarded Message

Received: from note2.nsf.gov by Note.NSF.GOV id aa00d79; 11 Mar 91 11:41 EST
 Received: from prelay by Note2.nsf.gov id aa1017d; 11 Mar 91 11:39 EST
 From: dfossum
 To: kwillenb
 cc: wellis,
 dmelnick
 Subject: advisory committee follow-up
 Date: 11 Mar 91 10:15 EST
 Message-ID: <9103111139.aa1017d@Note2.nsf.gov>

Karl -

I am making arrangements to use the recorder in the Board room to listen to the tapes of the meeting and prepare the minutes. A sizable part of the discussion focused on the principles so I will be listening with great care to this exchange. I intend to make a list of suggested changes and incorporate them into the principles and then circulate another draft of them. If all goes as planned, I should have this done by Friday.

If you envisioned some other plan of attack, please, share it with me. I am open to all suggestions. As the possessor of the tapes, it is clearly up to me to decipher them initially and then share the information in whatever way

MEMORANDUM

DATE: March 11, 1991
 TO: Assistant Director, STIA
 FROM: Director, Division of Policy Research and Analysis
 SUBJECT: Problems Associated with a Combined SRS/PRA Advisory Committee

I think it is unfortunate that the Data and Analysis Advisory Committee was given the impression that STIA, as reflected in the agenda and in the operating and review principles distributed, does not sufficiently understand the fundamental differences between the work of SRS and PRA. The Committee was correct, I believe, in their opinion that the discussions of many of the principles and procedures should be explicitly separated, but that the agenda was constructed as if the Divisions are essentially the same organization. The purpose of this memo is to make clear that PRA agrees with the Committee's request for more precise ground rules.

I have attached charts (that you have seen before) distinguishing the two Divisions for your reference. In a nutshell, SRS is the principle statistical unit for science and engineering data for the federal government. PRA steps in when there is no specific data to answer a question or when the question is more complex than data tables alone can answer.

As was suggested by the Committee, these differences have real significance for the formation of an Advisory Committee. Without a grant program, PRA is primarily a demand driven policy analysis organization. Its performance is primarily judged on its responsiveness. It is certainly expected to be professional in every sense of the term and the tests of soundness are often specifically different than those of scholarly organization. For example, its output is traditionally presented before a group and subject to intense scrutiny, on the spot. It has to be able to answer questions of credibility immediately. It does not typically prepare journal articles. It does not footnote, or prove by reference, or have the time to present all of the other possible outcomes, or display "error bands", etc. It presents what it can about a question it is asked and explains how confident it is in the results and where and how the holes in the data might make the analysis weak. It presents all known sides of an issue and engages in discussion of other theoretical activities only when the particular audience it is serving is interested in same.

SRS, on the other hand, is an original source organization. It has the responsibility for collecting data and information on a range of subjects and making these available to a large user community. It has to do this in a fashion that all can understand how the data was collected and what it says after it is -- with what confidence. The better organizations like SRS do their mission, the less difficult is the job of the analyst who uses the data. The work

of such organizations is closely akin to the standard rules of scholarship and responds well to academic-style review at every stage of the process. Data analysis groups have to be scrupulous about procedures and take the time it takes to do the job right. When not given "adequate" resources, they have to be able to design protocols to do the best job possible--and to report the limitations of the resulting information.


This is not the place to be exhaustive about the myriad of differences between the worlds of the policy analyst and the data collector, but the attached charts at least bring to the surface, once again, the questionable wisdom of having a single Advisory Committee for both functions. The type of people who do and use policy analysis in the area of science policy are not apt to be the advisors that would be the most use to SRS. The persons who are members of the statistical community and the users of science-related data are not apt to be interested in the type of work done in a typical policy analysis shop. We are fortunate in the NSF that SRS and PRA get along so well as these organizations are often adversarial and the people who are affiliated with the constituent communities are many times at odds (remember the discussion of the antagonisms at BLS during the first meeting. Our guest from the data collection community made quite clear her feelings about the work done by her Agency's policy analysis group). Subjecting a policy analyst to a group of academic statisticians or a data collector to a group of policy scientists is asking for misunderstanding. The present Advisory Committee, as you have constituted it, has no one whose academic specialty is policy science, who works in the fields of science policy, or has any experience in actually doing policy analysis.

Having an Advisory Committee that is trying to advise both PRA and SRS is likely to lead to frustration on the Committee's part. For another, it makes them more likely to provide meta-advice, and put forth suggestions the Divisions cannot effect: e.g. the suggestion by Jesse Ausable to move PRA out of STIA and into the Front Office, or having PRA take on a grant program in Policy Science, the desire of Dr. Morgan. To the extent that they want you to involve them in micro-management at all, (Rich Nicholson), they want clear distinctions between management decisions that apply to SRS, to PRA, or to both. (Merill Slanks).

In general, the Committee suggested three ways to accommodate the differences between the Divisions: deal with the groups separately, make them as alike as possible, or deal only with those features that are similar. To continually have the group searching for a mission and purpose is not useful to us and insulting to them (Hugh Loweth).

During the first meeting of this group you suggested that it would review and give advice on all of the data collection and analysis in the Foundation. At the time, members of the group expressed some concern as to how they would do this. Also, it would not be appropriate for STIA to run a Committee that presumed to look at work done in OBAC, OLPA, EHR, and BBS. You then suggested that the group was to advise on the data related work of STIA. Danek and Senich's Divisions publish analyses about as frequently as PRA (almost never), and are not a part of the Divisions under the purview of the Committee. INT, which has both a data collection and analysis function, is not represented, nor has their work been discussed. There is just the persistent attempt to meld PRA and SRS together,

ignoring their differences. A reconstituting of the group into one that deals with data collection and all its ramifications might be in order. The question of the necessity for and membership of a policy analysis Advisory Committee becomes a separate issue, as does a separate one for INT.



Peter W. House

cc: Dr. Judith Liebman

bcc: Hugh Loweth
Dr. Richard Nicholson

Objectives of NSF Statistical and Analytical Units

Science Resources Studies

Serve as principal Federal statistical unit for data on the national science and engineering enterprise, including R&D and education.

Conduct periodic surveys of personnel, agencies, and institutions to ascertain characteristics of S&E resources by field in the U.S. and other nations.

Acquire information on S&E resources from nonprofit and private groups, and other Federal agencies such as Census, BEA, BLS, NCES, NCHS.

Analyze data sets to determine accuracy, precision, reliability, and comparability.

Make information available to the general public.

Policy Research and Analysis

Serve as principal NSF source for quantitative analyses of agency, Federal, and National science and engineering policy issues.

Conduct statistical, economic, mathematical, and simulation analyses of current and emerging policy issues facing the Nation's S&E community and its infrastructure characteristics.

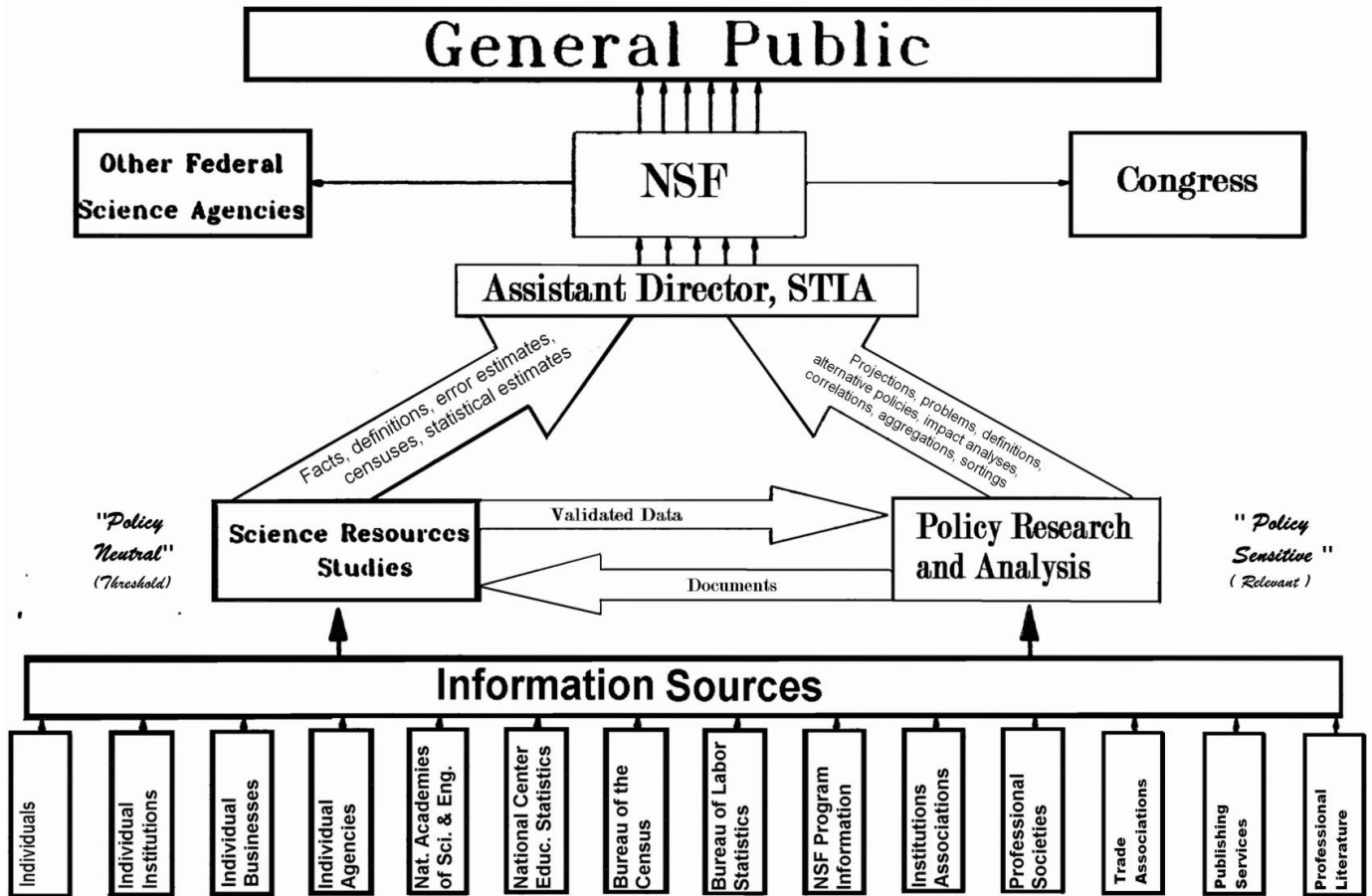
Develop data access and analysis systems which allow rapid response to urgent policy questions.

Conduct detailed studies of perennial S&E policy issues, examining validity of issues, quantification possibilities, alternative solutions, and related costs and benefits.

Make information available to the general public.

BEST COPY AVAILABLE

Science and Engineering Policy Data and Analysis at NSF

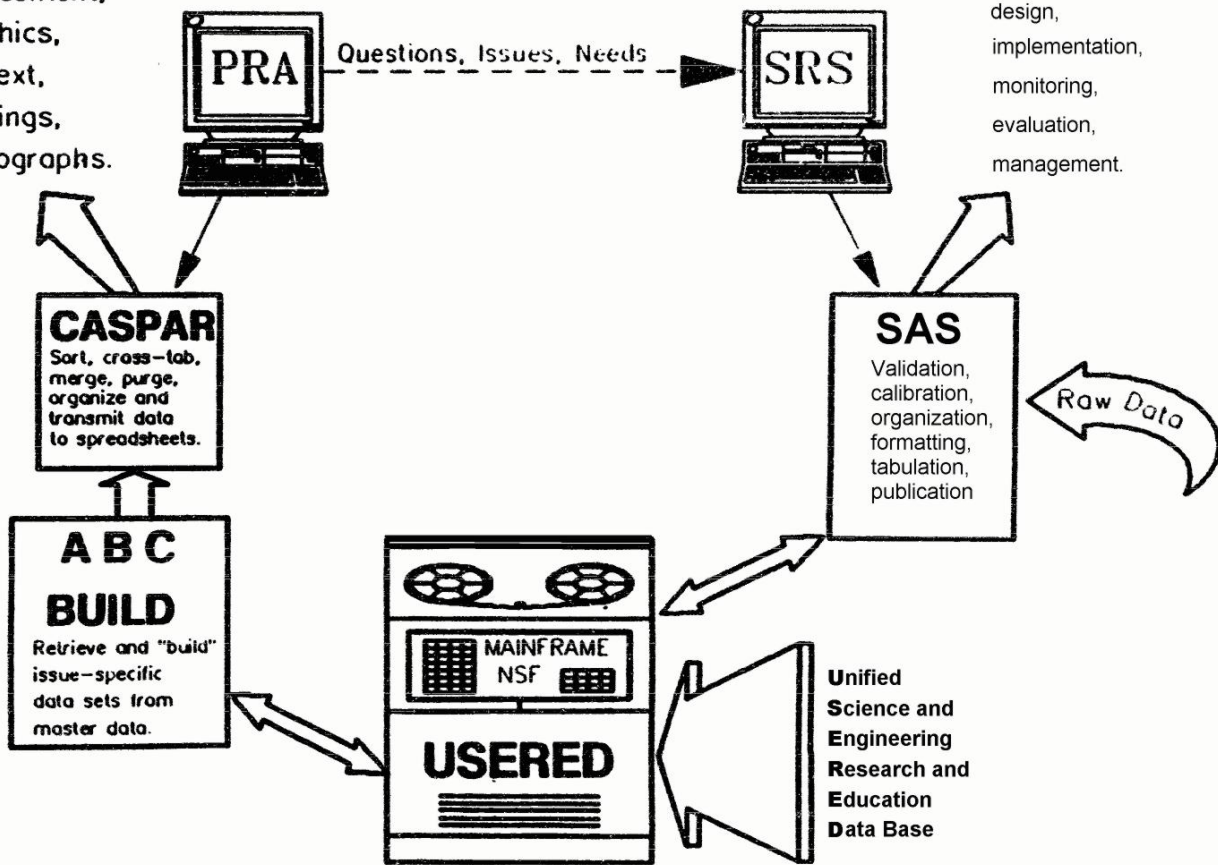


SRS/PRA

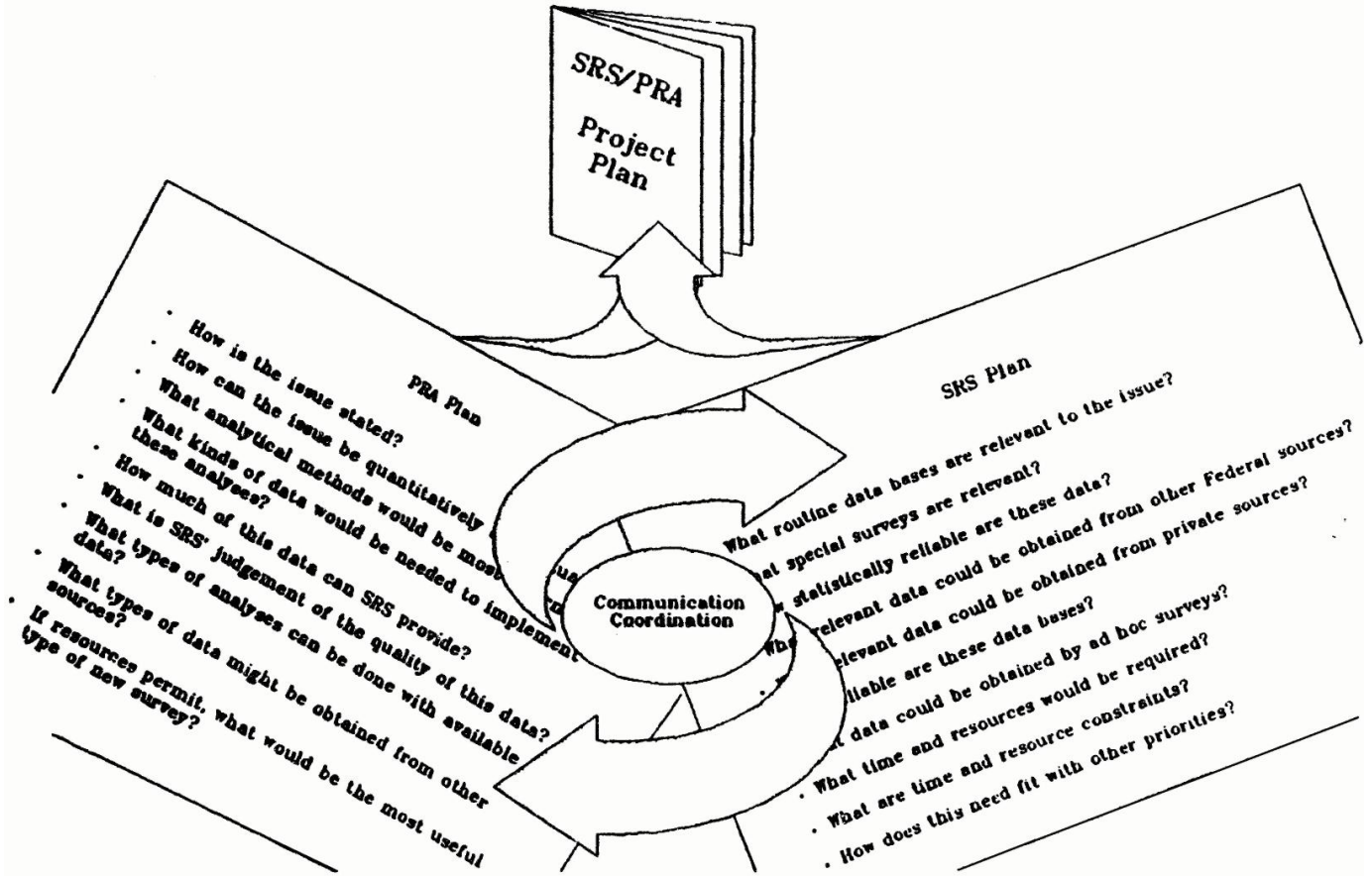
Unified Science and Engineering Research and Education Data Base

Analysis,
assessment,
graphics,
context,
briefings,
monographs.

Planning,
design,
implementation,
monitoring,
evaluation,
management.



SRS/PRA Coordinated Special Project Planning



The Contrasting Vocabularies of PRA and SRS

SRS	PRA
Biases	<i>Aggregations</i>
Confidence limits	<i>Alternatives</i>
Consistency	<i>Analyses</i>
Definitions	<i>Assessments</i>
Nonresponse	<i>Comparisons</i>
Nonsampling errors	<i>Correlations</i>
Populations	<i>Costs</i>
Questionnaires	<i>Disaggregation</i>
Reconciliation	<i>Efficiency</i>
Reliability	<i>Estimates</i>
Reproducibility	<i>Evaluation</i>
Respondents	<i>Hypothesis</i>
Sampling errors	<i>Optimization</i>
Security	<i>Options</i>
Standard errors	<i>Policies</i>
Statistical estimates	<i>Rankings</i>
Survey design	<i>Risks</i>
Tabulation	<i>Simulation</i>
Validation	<i>Special interests</i>
Variance	<i>Synthesis</i>
Verification	<i>Tradeoffs</i>

**FINAL MINUTES
OF THE STIA ADVISORY COMMITTEE ON
DATA AND POLICY ANALYSIS
NATIONAL SCIENCE FOUNDATION**

March 7, 1991

Committee Members Present

Dr. Judith Liebman, University of Illinois at Champaign-Urbana,
Chairperson
Dr. Alan Goldman, Johns Hopkins University
Mr. William Howard, National Academy of Engineering
Dr. Albert Link, University of North Carolina at Greensboro
Mr. Hugh Loweth, Consultant
Dr. Robert Morgan, Washington University
Dr. Richard Nicholson, American Association for the Advancement of
Science
Dr. Merrill Shanks, University of California at Berkeley
Ms. Katherine Wallman, Council of Professional Associations on
Federal Statistics
Mr. Jesse Ausubel, Rockefeller University (attending as
representative of the STIA Advisory Committee)

Committee Members Absent

Dr. Janice Beyer, University of Texas at Austin
Dr. Edward Tufte, Yale University
Dr. David Mowery, University of California at Berkeley
Dr. Kenneth Flamm, Brookings Institution
Dr. Stephen Lukasic, TRW, Space and Defense Sector

Executive Secretary

Dr. Donna Fossum

Participating NSF Staff

Dr. Karl Willenbrock, Assistant Director, STIA
Dr. Mary Clutter, Assistant Director, BBS
Dr. Roberta Miller, BBS/SES
Dr. William Ellis, STIA/SRS
Dr. Peter House, STIA/PRA
Dr. Daniel Melnick, EHR

Also present

Mr. Michael Neff, GSA Committee Management Secretariat

Opening Remarks

The meeting was called to order by Dr. Liebman at 8:30 a.m. After introductions, possible additions to the day's agenda were discussed. No additions were suggested.

The minutes from the January 9, 1991, meeting were discussed. All committee members were asked to submit any changes or correction as soon as possible so that they can be finalized. Dr. Morgan sent his comments ahead. Ms. Wallman noted that Hermann Habermann's name was misspelled.

NSF Update by Dr. Willenbrock

Dr. Willenbrock provided an update of activities at NSF, beginning with the official swearing in of Dr. Walter Massey as the new Director of NSF on March 4, 1991, and the NSF FY92 appropriations hearings before the House Subcommittee chaired by Representative Traxler of Michigan. He then discussed the status of the permanent appointments of the Director and Deputy Director of SRS, noting that interviews would begin shortly for both, starting with the Director and following thereafter with the Deputy Director. He reiterated that the charge of this committee is to help improve the quality and credibility of data and policy analysis of the NSF and SRS in particular.

Dr. Willenbrock introduced Dr. Donna Fossum as the new Executive Secretary of the Advisory Committee. Carlos Kruytbosch, the previous Executive Secretary of the Advisory Committee, has temporarily replaced Jennifer Bond as the Director of the Indicators Project in SRS.

He concluded by introducing Dr. Mary Clutter, Assistant Director for Biological, Behavioral, and Social Sciences (BBS), by noting that there were three directorates in NSF that had primary roles in data and analysis. The three being STIA, Education and Human Resources (EHR) headed by Dr. Luther Williams from whom the Advisory Committee heard at its first meeting, and BBS. He also introduced Dr. Roberta Miller, the Director of the Division of Social and Economic Science, BBS. He noted that BBS is envisioned as being the locus of untargeted research efforts complementing STIA and EHR which are the loci of targeted research.

Inter-Directorate Activities and Opportunities

Dr. Clutter reviewed the recent appropriations hearings on Capitol Hill, noting that 1991 may well be the best fiscal year for NSF for the decade of the 1990's. General expectations are that NSF fund all the sciences, but unfortunately, the budget to do so does not follow. Inter-directorate relations at NSF are better than she can recall, resulting in greater productivity. BBS supports basic research in such areas as improving the quality of data, primarily through the leadership of Dr. Roberta Miller of BBS's Division of Social and Economic Science (SES).

Dr. Miller reiterated the community of interest between BBS, STIA, and the Advisory Committee. She described the research efforts of BBS's SES as three-fold, covering basic research, data collection,

and methodological areas. She reviewed activities in each of these areas, including a detailed description of the various data bases maintained by SES and the procedures for accessing them to conduct secondary analyses. She noted that SES has seven research programs and described a "shadow" program coordinated with other disciplinary programs. She also noted that research is being done on international issues as well as public-private cooperative efforts with theoretical and commercial dimensions.

Dr. Miller concluded by describing several upcoming initiatives of SES, the review procedures for each, and distributed several documents elaborating on various projects. She responded to questions, including ones dealing with the standards used by researchers to ensure that their data bases are made publicly available. She discussed upcoming SES competitions, including one soliciting proposals to study the supply and demand of scientists and engineers.

Dr. Clutter then fielded questions, including ones on the possibility of a Social Science Directorate in NSF and the Task Force on Looking Toward the 21st Century for BBS which is taking a global look at the various disciplines and making recommendations to strengthen BBS.

Dr. Miller then responded to a question on the quality of NSF data bases and the utility of NSF products. She noted that she had some difficulty answering such a question but that she had participated in several efforts to evaluate NSF data in conjunction with outside committees. She also responded to questions on the relationship between various review evaluations and award decisions, the policy of releasing information on such, the size of proposals funded, and how choices are made as to what types of research to fund.

Dr. Goldman requested that the Advisory Committee be given a review of the ideas included in the proposals received by SES in response to its solicitation for projects on how to determine the supply of and demand for scientists and engineers. Both Drs. Miller and Clutter agreed to do so.

Current and Past Publications of SRS

Dr. Liebman introduced Dr. William Ellis, the Acting Director of SRS.

Dr. Ellis provided an overview of SRS's publications, focussing especially on the ones shared in advance of the meeting with the members of the Advisory Committee. He described the five organizational units of SRS -- the Director's Office and the four Programs covering Science and Engineering Personnel, Education and Human Resources, Activities, and Indicators -- and reviewed their activities. He then described a variety of dimensions of SRS including personnel and budget, noting that the staff size had

decreased from about 60 to 47 in the past several years. Funding and the difficulty supporting the required studies was described.

He then reviewed the details of each of the four programs inside SRS, connecting the various activities to related surveys and publications. He discussed the cooperative survey efforts underway between the EHR directorate and STIA. SRS program directors were introduced to the Advisory Committee along with Dr. Daniel Melnick of the Education and Human Resources Directorate who serves as EHR's liaison to STIA. The floor was opened up for questions.

Questions covered such topics as the extent of SRS's quick response survey capability, efforts of SRS to track K through 12 data via case study, library searches, and contacts, and broadening the focus of educational surveys. Dr. Ellis emphasized the need to bring more of SRS's analytical capabilities back inside the institution as opposed to being contracted out. Discussion continued on retention rate studies, feedback on publications and guidance from users, the difficulty of getting good data on industrial R&D surveys and how the survey is being improved, efforts to improve industry samples through cooperating with BLS to develop a comprehensive establishment sampling frame, user information on SRS products, efforts to correct identified problems with SRS products, markets for SRS products and how to identify them, development of a publicly accessible data base, the adequacy of data on hand to answer a variety of questions, and the increased use of directed studies.

Proposed Operating Procedures and Principles

Dr. Liebman begin the discussion of the draft Proposed Operating Procedures and Principles for STIA Data and Policy Analysis (attached). Dr. Willenbrock suggested that the discussion progress item by item beginning with 1(a).

Comments on 1(a) were as follows:

- it is not a procedure but a mission statement, which would be helpful, and
- "appropriate" can, at least in part, be determined by ascertaining needs of users.

Comments on 1(b) were as follows:

- use word "relevant" instead of "existing,"
- NSF's CASPAR database already exists and is designed to do much of what is proposed, and
- differentiate "external user" category into more explicit categories.

Comments on 1(c) were as follows:

- does "provide" mean to support financially?
- would the review be internal or external or both?

- first sentence is too restrictive, why just focus on the database? (Suggested re-wording - "Provide for analysis and research on significant science and technology policy issues utilizing the database as well as other information that may illuminate those issues"),
- should statistical considerations and policy analysis be combined,
- what data base are we referring to? CASPAR?
- convert to active voice so that STIA can help to define the questions as well as react to questions,
- does this mean that STIA should have a grants program? - what is difference between policy research and policy analysis and where should each be housed? and,
- should we focus just on data and exclude policy research?

Comments on 1(d) were as follows:

- none

Comments on 1(e) were as follows:

- add word "published" before reports,
- need to divide policy analysis and data analysis, as their needs, and standards are very different, and
- see comments in Mowery letter (attached).

Comments on 1(f) were as follows:

- does targeted mean according to NSF?
- not too broad, it is too narrow, why just methods and procedures? why not other areas? and
- is scope of research too restrictive? Why just on methods and procedures? Why not add at the end..."as well as research on important science and technology policy issues."

Comments on 1(g) were as follows:

- needs to embody the feedback of users, and
- should include understanding of market, customers, and desire to get feedback from users.

Comments on 2(a) through (f) were as follows:

- does (c) imply that only graphs need to have integrity?
- how can one accomplish (b)? What is truly capable of being reported?
- how realistic is (b)?
- why just data users in (d), why not data and policy analysis users, also priorities for what?
- what does (f) means? Should say "Should have strong ties" and second phrase should be a principle on page one, and
- add a periodic review of questions to (b) to determine if whole weight of effort is well distributed.

Proposed Guidelines for the Technical and Policy Review of STIA Data and Policy Analysis Publications

After lunch, John Gawalt, an analyst on the staff of SRS, reviewed several questions that had been raised in the morning about detailed methodological and error presentations in SRS publications. Dr. Liebman then turned the program over to Dr. Willenbrock who set the stage for Dr. Ellis to overview the Proposed SRS Publications Management and Review Procedures.

Dr. Ellis noted that the proposed review procedures had not been reviewed by the entire SRS staff and that eventually a STIA-wide review procedure was contemplated. He then gave an overview of the proposed procedures and asked for comments.

Mr. Ausubel noted that the proposed procedures were very responsive. He suggested that SRS might want to institute a requirement that a dissemination plan for each report be prepared and presented with the proposed review procedures for a particular report.

Dr. Willenbrock noted that to the maximum extent possible the names of authors should be presented on reports.

Ms. Wallman asked if a distinction should be made between preliminary and final reports and that each report include a note on what data are final and where documentation will appear.

Mr. Ausubel suggested that 3 or 4 standard report types be adopted and used; perhaps having three categories of covers (Class 1, Class 2, Class 3).

Dr. Liebman noted that Dr. Morgan suggested that the cover formats be standardized to tie the NSF reports together in such categories.

Mr. Ausubel suggested that Dr. Tufte's expertise in graphics and presentation be drawn upon by STIA.

Dr. Link asked if there were supposed to be a review of data presented that was separate from the review of publications. Should not outside reviewers be concerned about the accuracy of the data as well the assertions in the text? Is this too late in the process to be checking the accuracy of the data? Should not a bigger concern be - Are we asking the right question? Are we gathering the best information? Should external review process also get comments on "Are we doing the right thing?" as well?

Dr. Ellis noted that the data collection for a subsequent survey should not be the focus of comments precipitated by the review of a specific report.

Mr. Ausubel suggested that every 3 or 4 years there should be a thorough in-depth review of the entire line of SRS publications. He also found the composition of the editorial board interesting, but thought it might also include constituencies from the Hill, CRS, NRC, etc.

Dr. Nicholson noted that the role of NSF advisory committees traditionally does not involve reviewing specific procedures. Perhaps this committee should look at the portfolio of activities and determine if that is the optimal use of resources.

Dr. Ellis noted that there were two kinds of functions being discussed of equal importance -- the portfolio review and the editorial review. Both are very important but they should be separate and distinct.

Dr. Melnick suggested that table shells should be reviewed early in the process.

Dr. Link noted that the quality of the data included in the report or the quality of the interpretation are separate questions, one being much broader than the other. A distinction should be made between the two.

Mr. Ausubel suggested that it might be helpful for the next meeting to provide the committee with a list of publications and an estimate of the level of effort put into each. Dr. Ellis said that he would be willing to provide such, using the appropriate confidence interval on the effect estimates.

Dr. Link emphasized the need to understand the users of the various products and the effort put into producing various products.

Dr. House noted that the wide variety of data produced by SRS will make it very hard to pick and choose between what to keep and what not.

Dr. Liebman requested a picture of the flow of data to provide the Committee with an idea of the interaction between the various SRS reports.

Dr. Goldman highlighted 1(e) regarding validating findings and the need to discuss it in greater depth. Dr. Melnick described a variety of validation efforts to identify possible errors. He noted that the statement is intended to require customary and usual standards employed for social science verification. Dr. Goldman noted the difficulty in applying this to data as compared to substantive conclusions. Dr. House noted the difficulty in validating certain types of findings especially with models.

Dr. Shanks reemphasized the need to separate the treatment of data work and policy work inside STIA, with appropriate yet probably

different procedures for each. Dr. House agreed.

Review of Significant Issues

Dr. Liebman requested each Committee member to review their observations and recommendations. They are as follows:

Dr. Link expressed his concern about the need to know more about the users of the information and how they use the information, noting that the answer to these questions should define the word "appropriate" in 1(a) of the Proposed Operating Principles. Also it would help in terms of the general review process that incorporates a review of the final product as well as a review that includes a critical examination of the inputs that go into the final documents.

Mr. Ausubel noted the qualitatively different problems between SRS and PRA. SRS needs an overall evaluation that occurs continually that reviews all things done. In addition, SRS needs to have better contact with users and markets in order to make these evaluations and set priorities. Basically, SRS needs a permanent mechanism that will help it set priorities. PRA actually serves as a strategic unit for the Director of NSF and really should not be housed with a data unit such as SRS that serves a national mandate. He endorsed the written comments of Dr. Mowery. He also endorsed comments of Dr. Morgan which noted that if there is a need to grow it should be done extramurally.

Mr. Howard endorsed the comments of Dr. Link and Mr. Ausubel and echoed the importance of user feedback, especially using the dissemination process as an inexpensive way of tracking users. His chief concern centered on the state of industrial data which is skewed too heavily toward traditional academic and governmental NSF clients rather than the industrial community. These comments apply to both the completeness and the scope of the data. Industrial data should distinguish between domestic and international activities. The issue of whether or not we have a shortage of scientists and engineers is directly related to activities of multinational companies and the flow of funds and people. Also there appears to be a profound change taking place in the structure in which R&D is taking place, it is increasingly dependent on governmental activities. These changes do not appear to be reflected. There is a need to reflect the flow of funds and people nationally and internationally and between the private and public sector.

Mr. Howard continued by requesting that the following items be placed on the next agenda - How are SRS data activities evolving to meet future needs? Who's prioritizing the various issues? How is SRS planning to address the national policy issues? What is the vision of the STIA's data role in both the NSF and in the national S&T policy debate? What is STIA doing to adapt to it?

Dr. Goldman proposed for the next agenda a discussion of perennial and emergent policy issues and how they relate to the currently available data and offer indications of additional data needs.

Dr. Nicholson did not think that getting down too much in detail is valuable to this group.

Ms. Wallman noted that the committee may want to see the procedures but not spend time commenting on them in detail. She liked the idea of prioritizing the portfolios. Is the role of the Committee to establish the procedures for the portfolio review or actually conduct the portfolio review?

Dr. Shanks noted that reacting to proposed procedures and policies was putting the cart before the horse because there is not a proposed mission statement. Not surprisingly there is some confusion as result. He anticipated that all would pretty much agree on the mission statement for SRS, while the one for PRA would engender a difference of opinion as to the emphasis of that organization. He asked about the authority to resolve the resource issues, especially when SRS is spread so thin.

Mr. Loweth noted that committee has been searching for its own mission.

Dr. Liebman noted the need to help structure a report for Wallman for the STIA Committee. Dr. Fossum will provide a summary and minutes quickly to circulate very soon for comment. Dr. Liebman recommended that the committee use electronic communication rather than meetings only to exchange ideas.

Dr. Willenbrock then shared a draft mission statement for SRS prepared by Dr. Ellis and noted the PRA's would be shared after it had been reviewed. Dr. Willenbrock then discussed the relationship between STIA's overall Advisory Committee and the Advisory Committee on Data and Policy Analysis. He recognized a large series of unknowns were present in the immediate future, because of the change in the Director of the Foundation. He also noted the problem of trying to do a lot of things with very few resources. With current resources, SRS and PRA need to do fewer things. He mentioned the Office of Technology Assessment (OTA) report on data and information needs due out around April 1st. Congressman George Brown, Chairman of the House Science, Space and Technology Committee, noted that he wants to hold hearings on this report. Additional data analysis clearly has cost implications, as noted in the OTA report. The NSB has a committee on industrial R&D that will issue a report regarding the adequacy of data from the Department of Commerce and SRS, noting that it is inadequate for policy needs. He mentioned two other developments on the statistical front. First, Dr. Hermann Habermann's proposal for the Center for Survey Methods for current and prospective Federal government employees in the statistical system which would be a

degree granting program like a statisticians ROTC program. It is expected to be at a university in the Washington metropolitan area with support from NSF (it is in the FY 92 BBS budget). Second, a major initiative is underway to upgrade economic statistics as proposed in the FY 92 budget. This may impact NSF through an R&D satellite account.

Adjournment


Drs. Liebman and Willenbrock expressed their thanks to the Committee for their time and effort. The meeting adjourned at 2:45 p.m.

Preparation

Approval



Donna Fossum
Executive Secretary



Judith Liebman
Chairperson

Attachments: Letter to Dr. Fossum from Dr. Mowery
Proposed Operating Principles and Procedures for
STIA Data and Policy Analysis Activities
SRS Publications Management and Review Procedures

UNIVERSITY OF CALIFORNIA AT BERKELEY

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Walter A. Haas School of Business

350 Barrows Hall
Berkeley, California 94720

March 5, 1991

Dr. Donna Fossum
Acting Deputy Director
Science Resources Division
National Science Foundation
Washington, D.C. 20550

VIA FAX

Dear Dr. Fossum:

I regret to inform you that I will be unable to attend Thursday's meeting of the STIA Data and Policy Analysis Advisory Committee. As I informed Dr. Kruytbosch some time ago, my teaching schedule (Wednesday nights until 9:45 p.m. or so) renders Thursday meetings in Washington D.C. impossible. I will be returning my ticket under separate cover.

Although I once again tried to pass along my correct mailing address during our telephone conversation last week (the most recent attempt follows 3 or 4 efforts with Dr. Kruytbosch), the information does not appear to have reached your mailroom, which has a street address and ZIP code that are incorrect. I suspect that this incorrect mailing information may have something to do with my lack of a reimbursement check for the January 9 meeting of this committee, and would appreciate it if you could convey the correct mailing information to your mailroom:

Professor David Mowery
School of Business
350 Barrows Hall
University of California, Berkeley
Berkeley, CA 94720
415-643-9992
FAX: 415-642-2826

I have had an opportunity to briefly review the materials on "Proposed operating procedures for STIA data and policy analysis activities," and the "Publications management and review procedures." I think that both of these are excellent statements, but I would like to raise several issues related to both documents.

.. In my view, there is a serious need for a more comprehensive review of the SRS data structure and collection effort. As I noted during

Dr. Donna Fossum
 March 5, 1991
 Page Two

the January meeting (and as SRS staff and others have noted on numerous occasions), the "industry R&D" data (employment and \$\$) are increasingly useless for economic research. This declining utility reflects the peculiar conventions employed to organize these data, the absence of better data that distinguish among lines of business, the lack of good data on R&D performed by foreign enterprises in the U.S., the reduced frequency of publication of comprehensive tables (compare the "Selected data on R&D in industry: 1989 with the detail and volume of similar reports for the mid-1970s), and many other problems. These problems contribute to the progressive "privatization" of data collection and analysis. The continuing demands of private users, combined with the declining quality of publicly available data, create market opportunities for private collection and analysis of these data. Although these entrepreneurial activities are not harmful in themselves, when combined with the declining quality of public available data, we have serious problems of access for the impecunious scholarly community and for policy analysts generally.

The STIA operating guidelines and the SRS publication and review procedures do not address these larger problems. These problems are currently severe, they are getting worse, and a broad "charter statement" will not ameliorate them. The STIA guidelines seem to create opportunities for in-house or extramural researchers to examine the scope and severity of these and other problems with NSF/SRS data. I support such an examination, and hope that the guidelines will be interpreted to encourage it.

The STIA guidelines are also somewhat unclear about the charter for PRA. The guidelines clearly suggest that STIA will support in-house and extramural research on NSF databases and other activities in policy analysis. Will PRA be in charge of these activities? Do these activities include the exploration of new data needs or the development and analysis (on a pilot basis) of new databases not currently collected by NSF? Will PRA continue to serve the policy analysis needs of the Director and the NSB? It seems to me that PRA's responsibilities to the Director might more logically be handled by a separate unit, freeing PRA to fashion a more strategic, stable research program that would be conducted in-house and outside, so as to produce higher quality analysis than some of the materials presented at the January meeting.

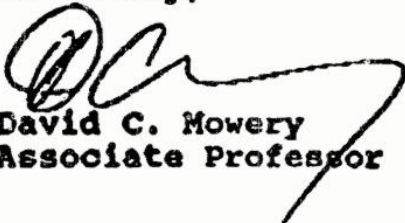
Finally, I think that 2(f) in the STIA guidelines needs to be given greater prominence and possibly, a specific mechanism for its accomplishment. The January meeting demonstrated some serious shortcomings in STIA's collection and analysis of R&D and other data. It is very important, especially in light of the Congressional mandates for STIA/SRS reports on human resources, that efforts be made to coordinate the NSF data collection and

Dr. Donna Fossum
March 5, 1991
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analysis efforts with those of other federal statistical agencies. These coordination efforts might well improve the quality of NSF data collection and analysis.

Again, I apologize for my absence from the Thursday meeting. Wednesdays and Thursdays will be infeasible for me through May 16. I will be in Washington during the week of March 25-29 (Berkeley's spring break), however, if you would like to meet informally to discuss these comments or the activities of the STIA committee. I also expect to be in Washington on April 12 for the AAAS R&D colloquium, if you wish to try to meet then. Alternatively, feel free to give me a call.

Sincerely,



David C. Mowery
Associate Professor

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**PROPOSED OPERATING PROCEDURES AND
PRINCIPLES FOR STIA DATA AND POLICY ANALYSIS ACTIVITIES***

- 1. STIA should perform the following data collection and policy analysis activities:**
 - (a) Collect appropriate data to support the Foundation's activities, as well as to provide Federal agencies, the Congress, and the public with data about the status of science and technology and about science and engineering personnel.**
 - (b) Consolidate existing data on science and technology, whether or not collected by STIA, into a publicly accessible electronic database. This facility should feature a common data dictionary and at least two levels of access, one for NSF and another for external users.**
 - (c) Provide for analyses and research utilizing the database. These activities should take place both inside NSF and in the external community. STIA should facilitate access to these data and fund analytical and research efforts in cooperation with other Directorates.**
 - (d) Establish and maintain staff capability to transform the results of this research into information relevant to decision-making and policy formation by NSF, the National Science Board, Executive Branch agencies, and the Congress.**
 - (e) Provide for professional review of all STIA reports, and thoroughly validate all findings.**
 - (f) Sponsor targeted research and, in cooperation with other Directorates, untargeted research in the methods and procedures for collecting, analyzing and disseminating statistical information.**
 - (g) Disseminate reports to the public in appropriate formats.**

* Prepared by the staff at the request of the chair on basis of the discussions at the last meeting.

2. STIA should adopt the following guidelines:
- (a) All research supported or conducted by STIA should be fully documented so that users can fully understand the procedures employed.
 - (b) Reports should contain appropriate information about the sources and likely magnitude of uncertainty in the results. In the case of future projections, reports should present scenarios clearly indicating the effects of assumptions on the possible outcomes.
 - (c) When graphical presentations are used, they should clearly and objectively display actual data and results of analyses.
 - (d) Data users inside and outside the Foundation should play a role in establishing priorities.
 - (e) STIA should establish a publications review system including peers as well as review by STIA management. Reviewers should consider the quality of data and the validity of the analyses.
 - (f) STIA should strengthen ties to the Federal statistical community and maintain state-of-the-art professional standards.

MEMORANDUM

TO: SRS Staff
FROM: William W. Ellis
Acting Division Director
DATE: February 28, 1991
SUBJECT: SRS Publications Management and Review Procedures
(As revised)

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MANAGEMENT CHANGES

I have determined that the publications process will be greatly enhanced by the centralization of certain editorial and publications management functions. To that end, I am creating the position of Publications Manager in the Office of the Director, SRS. For the time being, I am assigning Richard E. Morrison to my Office for the purpose of organizing and executing these functions until such time as that position can be officially created. He will be making proposals to me on the detailed organization of this work. Millicent Gough and Elizabeth Michael will be assigned to assist him in discharging these responsibilities, and contracted editorial and publications support services will be coordinated through this office. Morrison will participate in the activities of my Office as a member of the senior staff and will have my full backing in discharging his responsibilities.

PROVISIONAL REVIEW PROCEDURES

The following review procedures are in effect until further notice. They are designed to make it possible for us to get our work adequately reviewed to assure that it is of the highest possible quality, without imposing an unreasonable burden on authors or reviewers. They build on earlier efforts to improve the SRS review process. Standards pertain to (1) review and (2) physical production.

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(I) Review Procedures

Authors have primary responsibility for producing manuscripts that present information clearly, accurately, and at the appropriate level of detail.

- It will greatly ease our work and diminish misunderstanding if an outline or plan is approved in advance by the Program Director and, when the report is long or highly sensitive, by the Office of the Division Director.
- A review procedure and production schedule for each report should be agreed upon at this stage. Specific external review procedures should be indicated, if they are to be included.
- When the draft manuscript is produced, authors are responsible for certifying the accuracy of all data and charts.
- All review copies should be provided in electronic media, either on diskettes or on appropriate network files when we have determined how to use this capability of the network to best advantage. Conversion of hard copy text and graphics to electronic format is the responsibility of the originating Program.

Program Directors are responsible for the first level intensive review of each draft manuscript developed by members of their Program Groups.

- The Program Director should determine that each manuscript is what was expected in scope and treatment of the data, as anticipated by the outline or plan and previously approved by the Program Director (and Division Director, if applicable).
- Before a manuscript leaves a Program Group, it should be edited and revised to meet the standards of lucid and concise English, and should be free of typographical errors.
- In addition, the Program Director should arrange a documented, independent check of all data, whether in tables or charts.
- The Program Director should pay special attention to the relationship of a particular manuscript to other documents produced by the Program and Division.

Division responsibility. The Publications Manager, Office of the Division Director, will review each manuscript for conformity to NSF policies and for consistent relationship to other SRS publications. This Office will also conduct both substantive and technical editing, as appropriate and as personnel resources permit.

- The substantive review will be conducted by the Division Director or Deputy Director, or, at their option, they will identify professionals from other programs in the Division to conduct substantive reviews.
- Technical editing and proofreading will be conducted by staff in the Director's Office.

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- Every effort will be made to adhere to the agreed upon production schedule specified earlier in the process.

External review. External review is a vital part of the production of any body of professional literature, and SRS reports are not only professional in their importance and content, but of vital interest to our attendant publics in the Executive Branch, the Congress, professional associations, the higher education community, nonprofit organizations, and industry. External review will assure that our reports are standard authorities in these circles.

- The extent of external review will be specified in the review procedure and production schedule, and will vary from document to document, with the same or very similar procedures and schedule pertaining to similar reports. Some documents may not be subjected to external review at all; examples might include early release tables and similar noninterpretive documents.
- In consultation with the Assistant Director/STIA, the STIA Advisory Committees, and outside organizations, an Editorial Board for our publications will be established, representing the broad array of skills and expertise in our work.
- Under most circumstances, two persons will be selected from this Board by the Office of the Division Director to review a document that is submitted to external review, and the external review plan will be included as part of the review procedure and production schedule.
- External reviewers will be asked to focus their attention on substantive concerns, with technical editing to remain the province of our own editorial capabilities. External reviewers will be asked to provide comments in writing, and will be given clear deadlines.
- External reviewers' comments will normally be considered in a conference including the Office of the Division Director, Program Director, Publications Manager, and author(s). On some occasions, however, the comments may be so limited that a meeting may not be necessary.
- Documents such as Detailed Statistical Tables may be handled differently. For example, the Office of the Division Director may elect to have them reviewed in groups periodically with the goal of improving the general approach of the presentation, as opposed to addressing the particularities of a specific report.
- Publications prepared or edited under the guidance of outside contractors are subject to the same review procedures as those prepared or edited internally.

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STIA role. The Assistant Director/STIA is responsible for all of our publications, and hence, has an important and legitimate role in our review process. However, the institution of a systematic external review procedure, supported by a functional SRS Editorial Board, will vitiate the need for detailed and time-consuming STIA reviews. It is anticipated that such reviews will become *pro forma*.

The Division Director will bring to the notice of the Assistant Director/STIA any aspect of a publication that merits special attention. In particular, reports that have substantial public policy content and include include controversial information will be highlighted.

(2) Physical production

General. SRS should make every effort to streamline the production of manuscripts.

- Text, graphics, and tables prepared by authors or other staff may be initially generated either by hand or by computer, depending on the skill level and preference of the author. But before they are passed on for editing, they must be in machine readable format on diskettes or, when we have determined how to do this, on the network.
- Survey contractors or SRS staff will be expected to produce camera ready tables for Detailed Statistical Tables and appendices for reports.

Release of data. We will be generating a clear policy on the release of data that will be fully cognizant of relevant law, regulations, and practices. Until we have that in place, we will continue to do all data releases on an *ad hoc* basis, with guidance from Donna Fossum, the Acting Deputy Division Director.

[end]

M E M O R A N D U M

DATE: March 11, 1991

TO: Assistant Director, STIA

FROM: Director, Division of Policy Research and Analysis

SUBJECT: STIA Advisory Committee Meeting

I just received a memo from Dr. Cehelsky concerning the STIA Advisory Committee meeting scheduled for the end of this month. Since STIA Data and Policy Analysis Activities are to be a topic I want to make sure (1) that if this item is really to be on the agenda, PRA is included in the planning this time and (2) that the recent Data and Policy Advisory Committee meeting is used as an opportunity for the STIA Senior Staff to discuss once again the need for so many Advisory Committee meetings.

Last week, the Advisory Committee on Data and Policy Analysis clearly indicated that the purpose of its meeting was obscure. In fact, one of the members went so far as to describe the agenda of the Committee as "searching for an agenda"! In this time of very scarce PD&M funds, it is unfortunate that we send a message to the outside world that we have funds to burn, by having so many Advisory Committee meetings.

If it is still felt that such a meeting is necessary, I think that we should talk as a group about what we want to achieve. In the Data area, we have already described the reorganization of SRS at the last two meetings. I am not too sure what you have in mind to talk about for PRA. There certainly isn't anything that happened during last week's Advisory Committee meeting with which we want to waste the STIA Advisory Committee's time. I can't see how European S&T discussions could take more than half hour, and I cannot imagine that the STIA Mission Statement is going to take more than 15 minutes. The only new agenda item in evidence appears to be the TENTATIVE speaker's talk on NEH outreach. Interesting, perhaps, but not relevant to the STIA Advisory Committee. Can we please have a STIA staff meeting to discuss why this meeting is being called and what is expected of the Division Directors.

I am attaching a copy of the draft SRS guideline for publications in case it becomes agenda item. Ellis noted that it was still very preliminary and he was going to evolve it in time. You mentioned, as did Bill, that this document might become the prototype for all publications of the Directorate. It might be useful for the other Division Directors to review and critique such guidelines before we set in motion the substantial bureaucratic overhead they imply. This has not been done to date. To be clear, I am not suggesting that we discuss the efficacy of the guidelines for SRS, only how relevant they are to the rest of STIA. PRA, for instance, works as a team, and thus would find the requirement for a single author

meaningless. Because of the nature of our work, setting up such a system might be seen as a PYA exercise. It is unclear how these exercises ever "protect" anybody. Those responsible are responsible, regardless. Finally, having only had one publication during the history of PRA (and that one under special circumstances), implementing such guidelines would be a true bureaucratic exercise.



Peter W. House

Attachment

cc: Joseph Danek
Rich Ries
Don Senich
Bill Ellis
Gerry Glaser
Marta Cehelsky

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MEMORANDUM

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DATE: February 28, 1991
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