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FROM: MASSEY, Walter E.: NATIONAL SCIENCE FOUNDATION

TO: DR. D.A. BROMLEY

DATE OF CORRESPONDENCE: 12/04/91

SUBJECT: HE IS FORWARDING THE REPORT OF THE COMMITTEE ON PHYSICAL, MATHEMATICAL, AND ENGINEERING SCIENCES FOR FY 1991.

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DIRECTORATE ASSIGNED: STAFF ASSIGNED:

ACTION REQUIRED: STAFF ACTION:

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SENDER'S DUE DATE:

OSTP DUE DATE: STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

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PHYSICAL SCIENCES
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NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

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OFFICE OF THE DIRECTOR

December 4, 1991

Dr. D. Allan Bromley
Assistant to the President for
Science and Technology
Room 358
Old Executive Office Building
Washington, D.C. 20506

Dear Dr. Bromley:

As specified in the Charter of the Committee on Physical, Mathematical, and Engineering Sciences, I am transmitting a report of the Committee's activities during FY 1991. The Committee had a very productive year in 1991, and I look forward to a similar level of activity in 1992.

Sincerely,

Walter E. Massey
Chair
FCCSET Committee on
Physical, Mathematical,
and Engineering Sciences

Enclosure

Copy to: Dr. Victoria Sutton

FCCSET COMMITTEE ON PHYSICAL, MATHEMATICAL, AND ENGINEERING SCIENCES

ANNUAL REPORT
October 1, 1990 - September 30, 1991

The purpose of the Committee on Physical, Mathematical, and Engineering Sciences (CPMES) is to advise and assist FCCSET to increase the overall effectiveness and productivity of Federal R&D efforts in the physical, mathematical, and engineering sciences. The Committee addresses policy matters which cut across agency boundaries and provides a mechanism for interagency science policy coordination and exchanges of information regarding the physical, mathematical, and engineering sciences.

12 departments and agencies are members of CPMES: Defense, Interior, Agriculture, Commerce, Health and Human Services, Energy, Education, Office of Management and Budget, Office of Science and Technology Policy, National Aeronautics and Space Administration, Environmental Protection Agency, and National Science Foundation.

The CPMES held six meetings during the period October 1, 1990 to September 30, 1991. The meeting dates were October 31, 1990; December 18, 1990; January 22, 1991; April 18, 1991; July 22, 1991; and August 23, 1991.

For the most part, the accomplishments of the Committee are reflected in the activities of its Subcommittee and Working Groups. One Subcommittee and two Working Groups have been formed that report directly to the Committee:

* Subcommittee on High Performance Computing, Communications, and Information Technology
* Working Group on Access and Representation
* Working Group on the Structure of Science Support

<u>The Subcommittee on High Performance Computing, Communications, and Information Technology (HPCCIT)</u>

The HPCCIT Subcommittee of CPMES, the successor to the Executive Committee of the High Performance Computing and Communications Working Group, was formally chartered in summer 1991. The Subcommittee facilitates coordination of multi-agency activities in information technology under CPMES, including the Federal High Performance Computing and Communications Program (HPCC). The membership of the HPCCIT Subcommittee includes a representative from each member agency in the HPCC. Two new member agencies were added - National Institutes of Health and Department of Education - for a total of nine. HPCCIT has four discussion groups which track the four major elements of the HPCC program.

OMB Budget Process: The HPCCIT prepared a report on High Performance Computing and Communications which was approved by CPMES and transmitted to FCCSET to supplement the President's FY 1992 budget submission to Congress. Preparation of the FY 1993 Budget Notebook, according to OMB Terms of Reference, is a major contribution of the HPCCIT. This required the creation of a management plan subject to OMB approval, collegiate review of the individual agency budgets by the HPCCIT, presentation to and review by CPMES of the coordinated interagency plan, recommendations by CPMES to the individual agency heads on funding levels, and briefing and presentation to OMB of the Budget Notebook in September 1991. HPCCIT responded to fifty questions from OMB on the Notebook.

Outreach: In addition to implementing a general policy of initiating ties to other FCCSET cross-cut activities and making presentations to the high performance community at large, HPCCIT participated in several other outreach activities.

1. Congress: HPCCIT was responsive to the OSTP policy of keeping the Congress briefed on the content and meaning of the HPCC, and provided budget reviews. In the process, the Administration position on HPCC was negotiated.

2. CSPP: HPCCIT provided a briefing to the Computer Strategy Planning Project (CSPP) and welcomed their interest in the program. More cooperative interaction with CSPP is expected.

3. S&T Agreement: U.S. cooperation under the U.S.-Japan Science and Technology Agreement is overseen by OSTP. In July, 1991, HPCCIT participated in the Joint Working Level Committee Talks in Tokyo and led the Working Group Meeting on Supercomputing. The U.S. has initiated the first joint project in high performance computing under the Agreement - a workshop on supercomputer performance evaluation conducted with the Japanese in Hawaii in July. In Tokyo the Japanese demonstrated a keen interest in joint research in advanced robotics systems incorporating supercomputer technology. HPCCIT has not been successful to date in stimulating U.S. interest in joint research with the Japanese in high performance computing although there is general agreement on HPCCIT that joint development in applications software could be advantageous to the U.S.

4. NACS and Micro Tech 2000: HPCCIT members have participated in the activities of the National Advisory Committee on Semiconductors (NACS) and have provided support in planning and in the preparation of reports. HPCCIT members participated in the workshop that produced the Micro Tech 2000 report, a blueprint for the achievement of a balanced U.S. capability to manufacture a gigabit SRAM by the year 2000. The report may become the basis for future U.S. activity in the pursuit of such a goal.

The Working Group on Access and Representation

The report of the Working Group was received by the CPMES and discussed at the April 18, 1991 meeting. No formal action has been taken on the report.

The Working Group on the Structure of Science Support

The Working Group briefed the CPMES on its progress throughout the year. The draft report of the Working Group was circulated to all members of the Committee in September 1991. One of the first activities of the CPMES in FY 1992 will be to recommend the next step for this report.

Potential New Issues for CPMES

A few topics surfaced during the course of the year as possible issues for CPMES consideration. The Committee heard a presentation on mathematics as a subject for future FCCSET action. A discussion group was formed to investigate agency plans in this area and to clarify the role of mathematics in ongoing FCCSET cross-cuts. The findings of the discussion group will be reported to the Committee early in FY 1992. The health of academic research infrastructure and telecommunications were also suggested as possible CPMES topics, but both are in too early a stage to yet be considered serious candidates. Both topics will be explored more fully in FY 1992.

Vernon Pankonin
Executive Secretary/CPMES
November 26, 1991

"Document Control"

TYPE: Information DOCUMENT NUMBER: 9129015
ORIGINATOR: 03 STATUS DIRECTORATE STATUS C

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FROM: Ratchford, Tom

TO: DAB

DATE OF
CORRESPONDENCE: 02/28/91

SUBJECT: Dr. Ratchford is suggesting that FCCSET add a subcommittee dedicated to mathematics in response to a January 15 memo from Steve Olson and January 8 letter for Phillip Griffiths.

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DIRECTORATE ASSIGNED:

STAFF ASSIGNED: Karl Erb

ACTION REQUIRED:

STAFF ACTION:

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SENDER'S DUE DATE:

OSTP DUE DATE:

STAFF DUE DATE

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FCCSET PM&ES - Math
9129015

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20506

February 28, 1991

MEMORANDUM FOR D. ALLAN BROMLEY

FROM: TOM RATCHFORD

SUBJECT: REQUEST BY MATHEMATICS COMMUNITY FOR FCCSET COMMITTEE

I am responding to your note to Steve Olson's memorandum of January 15, 1991 on the above subject. His memorandum noted the request by Ed David and Phillip Griffiths that FCCSET consider establishing a committee on the mathematical sciences.

The David and Griffiths letter to you of January 9, 1991 is quite persuasive in its argument for a focal point for Federal action in a number of areas crucial to mathematics and this country. If "permanent structural changes in the way the mathematics community does business" are desirable, and I suspect they are, interagency leadership and coordination through FCCSET is necessary.

I suggest you consider establishing a mathematics subcommittee under the FCCSET Committee on Physical Sciences and Engineering. Such a subcommittee could have a limited charge and lifetime, with the understanding that a careful review of its progress would be made 12-18 months from inception.

cc: D.A. Henderson
Bill Phillips
Gene Wong
Ken Yale
Karl Erb
Maryanne Bach

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20506

January 15, 1991

MEMORANDUM FOR D. ALLAN BROMLEY
GENE WONG
TOM RATCHFORD
BILL PHILLIPS
D.A. HENDERSON
KEN YALE
KARL ERB
MARYANNE BACH

FROM: STEVE OLSON S.O.

SUBJECT: REQUEST BY MATHEMATICS COMMUNITY FOR FCCSET COMMITTEE

Attached is a letter from Phillip Griffiths, the head of the Mathematical Sciences Board at the National Research Council, and Ed David that was delivered to Dr. Bromley at a briefing I attended last week. The one specific request for action made at the briefing was that FCCSET consider establishing a committee on the mathematical sciences to coordinate programs across agencies and foment an ongoing "cultural change" within mathematics that would breach some of the barriers between mathematicians and other scientific and educational groups. Dr. Bromley was skeptical about the possibility of a FCCSET committee but promised the group that he would raise the issue with the Council.

I'm sending around the letter because it does include some interesting material about the efforts some mathematicians are making to break out of their self-imposed isolation. In particular, it mentions tying summer support directly to educational activities, refocusing federal support on cross-disciplinary activities, and giving block grants to departments to address such needs as mathematical support for materials research and studies of the global environment.

Perhaps there would be some way for FCCSET to consider some of these "cultural" changes -- quite independent of funding -- not only for mathematics but for many of the sciences.

Tom R.
How best to react to this?
I don't think we need a
new FCCSET committee.

PM&ES FCCSET

EDWARD E. DAVID, JR.
P.O. BOX 435
LAMINGTON ROAD
BEDMINSTER, NEW JERSEY 07921

January 9, 1991

The Honorable D. Allan Bromley
Assistant to the President for
Science & Technology
Executive Office of the President
Washington, D.C. 20506

Dear Allan:

You recall that we have discussed the state of U.S. mathematics research in connection with the recent NRC report on the subject. There has now been considerable additional activity, reports on other dimensions of mathematics, and discussions with the concerned federal agencies. We believe now is the time for coordinated action involving all these agencies. Let me summarize our logic.

The U.S. has some 3,000-4,000 productive research mathematicians in academia. These people, with help from mathematicians in industry and government labs, give the U.S. a strong position in world mathematics. However, very little of this intellectual power is being used to improve science and math education, economic competitiveness, materials research, and the global environment. Among the reasons for this gap is the long-held academic value system which puts research in core mathematics well ahead of applications and education. This system is reinforced by academic departmental structures and by the federal system of support for mathematics.

That support is out of balance compared to other sciences. Specifically the percentage of researchers in math who are supported is much smaller than in the other sciences. At NSF, the number of funded principal investigators has been constant or shrinking. We estimate that government-wide, the number of P.I.'s should be around 2,600 rather than the current 1,600 to give adequate support to other sciences and engineering, and for the academic departments to renew themselves as retirements accelerate in the 1990s.

These and related problems can be solved simultaneously in our opinions. Since the support of mathematicians is relatively inexpensive, small amounts of new federal dollars could redirect the energy and talent of a portion of the mathematics community toward these critical issues. The culture in the mathematics community has changed enough in the past five years to support such a redirection of effort. It is important that funding be used to support permanent structural changes in the way the mathematics community does business, so that, in the future, the community can react quickly and effectively to educational and applied challenges.

The objectives for the mathematical sciences should be:

1. Address seriously human resources problems:

   a) to insure that there are sufficient researchers/ teachers to assure renewal of math activities as retirements increase;

   b) to improve the training of Ph.D's, both broadening it and including teacher training;

   c) to aggressively recruit women and minorities into the profession.

2. Dramatically increase the interaction of the mathematical sciences community with the other sciences, with the national labs, and with industry and non-profits.

3. Improve the effectiveness of the mathematical sciences community in meeting its educational responsibilities by training mathematicians, educating scientists\ engineers, and contributing to the improvement of K-12 education.

These goals should be accomplished by incentives, not legislation, and will require serious, coordinated long-range planning between the federal agencies and the leadership of the mathematics community. Examples of steps that could be taken include:

1. A policy that makes it increasingly difficult with age for a P.I. to secure two months summer support for research in core mathematics without addressing human resource, education, or interface issues.

2. A complete re-evaluation of the distribution of current support categories, salary, equipment, conferences, student support, etc., across the agencies, to change the modes and categories to accomplish the above objectives.

3. Cooperation and joint planning by the mathematics components of the agencies to meet the above goals, including pooling of resources and a new peer review process uniform across the agencies.

4. Block grants to departments in response to proposals that address critical needs as a unit.

5. Training grants to departments for educating Ph.D's and Postdocs with the broadened objectives listed above.

When we last talked, you suggested that FCSSET was the preferred instrument for accomplishing these goals by coordinating agency and departmental programs. We agree with that suggestion, and believe that it is urgent to proceed. We will be happy to assist in setting an agenda. The effort should be pointed at truly innovative initiatives to change the culture in the mathematical sciences community and to put new structural and institutional mechanisms in place.

Yours truly,

Ed David Phillip A Griffiths

Phillip Griffiths
Edward E. David, Jr.

cc: Frank Press