

**American Mathematical Society
Committee on Science Policy Meeting
April 1-3, 2004
Washington DC**

Summary Report

The Committee on Science Policy meeting was expanded this year and organized as a Forum to allow for free flowing discussion on issues of policy and funding for the mathematical sciences, as well as discussion of overall federal funding for science. The Forum provided an opportunity for participants to interact with Capitol Hill and federal agency staff.

The meeting was held immediately preceding the AMS Council meeting so Council members were invited to attend the Forum. In addition, as in past years, department chairs were also invited to participate in the Forum. It is hoped that the Forum will evolve into a yearly event that provides useful information for department chairs, much like the Department Chairs Colloquium of the Board of Mathematical Sciences and Applications did.

The Forum was well attended with over fifty participants and consisted of a focused open discussion, Thursday evening, followed by presentations from Administration and Congressional officials and federal agency representatives on Friday, and a wrap-up session Saturday morning.

Prior to the beginning of the meeting, the AMS honored Bernard S. McDonald, the Executive Officer of the Division of Mathematical Sciences at the National Science Foundation, who will be retiring soon. Jane Hawkins, CSP Chair, recognized Bernie's work on behalf of the mathematical sciences community. David Eisenbud, President of the AMS, and John Ewing, Executive Director of the AMS, thanked Bernie on behalf of the AMS. Several of Bernie's colleagues also made brief presentations. John Ewing presented Bernie with a certificate of appreciation from the AMS Committee on Science Policy.

Opening Discussions

The Forum kicked off with discussions centered around three questions:

- 1) Do enough mathematicians receive federal funding? (What percentage of academic mathematicians should be funded?)
- 2) Has the mathematical community been affected by the current U.S. visa regulations?
- 3) Do we really need more U.S. students in the mathematics pipeline?

Slides and graphs were presented to provide backup data on funding, enrollments and other quantitative information useful to the discussions. There was even some disagreement about the accuracy of the data provided, but the discussion soon made its way away from this discourse towards the substance of the questions themselves.

The size of grants and their success rates were discussed, as well as the fact that other fields have more avenues for research funding than the mathematical sciences. No consensus was reached on grant size, but most agreed that more mathematicians should receive federal funding.

The discussion then turned to visa regulations, particularly the way the law is administered since September 11, 2001. Some anecdotal evidence was given as to the current state of the system and all were encouraged to contact their Congressional representatives to bring the difficulties experienced at universities and elsewhere to light.

With regard to getting more students into the mathematics pipeline, it is known that a mathematical sciences degree offers opportunities beyond teaching or actuarial work, however, departments need to put more effort into identifying these opportunities for students.

Highlights from presentations given by Administration, Congressional and federal agency officials:

***Daniel A. Hitchcock, Ph.D. – Senior Technical Advisor,
Advanced Scientific Computing Research (ASCR), U.S. Department of Energy***

Dr. Hitchcock gave a summary of the work of the ASCR and the strategic issues it is focusing on within the Office of Science, such as providing high performance computing and network facilities and accelerating the transition from research to application. He then discussed the ASCR budget and gave an overview of ASCR programs. He explained that it takes a minimum of ten years to bring research to a point where software writers can put it in their codes, thus requiring a significant commitment and large investment.

Hitchcock spoke briefly about SciDAC (Scientific Discovery Through Advanced Computation), a program developed across the Office of Science a few years ago to accelerate the transition of software and mathematical ideas into application codes. He went on to discuss how important mathematics is to DOE and how applied mathematics contributes to ASCR strategic goals through well-posed mathematical models; mathematical analysis of model behavior; efficient algorithms for solving the discretized models; predictability analysis and uncertainty quantification for model reduction and to determine levels of confidence in the results.

He highlighted one of the areas ASCR will focus on next year – the mathematics needed for multi-scale systems. DOE will try to address the significant issues associated with multi-scale systems (such as those in materials, chemistry, biology, climate and ground water) that require new mathematical insight to understand them. They will hold a workshop in May 2004 to bring mathematicians and applications people together to talk about the challenges and opportunities for the future. A report will be issued on workshop discussions and ideas as to where future investments should be made. This report will be widely distributed.

***David Trinkle, Staff Specialist
Office of Management and Budget***

David Trinkle began his presentation with an overview of the Office of Management and Budget (OMB) and the federal budget process in general. OMB is the largest White House office in terms of staff and fulfills a number of roles including helping to prepare the President's budget, overseeing the day-to-day operations of federal agencies, and management and implementation of any long term management initiatives. Trinkle, an examiner of the National Science Foundation (NSF), looks at broad research issues across the government.

Now that the FY2005 budget request is out, the OMB is focusing on the FY2006 budget. Presently, OMB is developing FY2006 budget guidance, which agencies will follow in constructing their budgets. Agencies will present a first draft of their FY2006 budgets to OMB in September. OMB and the agencies will work together through the end of the year finalizing the FY2006 budget.

The President's request for FY2005 was founded on certain priorities including the war on terrorism, homeland defense, and economic recovery. Growth in discretionary spending is held down in favor of funding for defense related expenses. When defense and homeland security are taken out of the equation, discretionary spending grows by only 0.5 percent. Even with this cap, the NSF will increase by 3.0

percent for FY2005. Trinkle's expectation is that the FY2006 budget will be similar to FY2005, possibly even more restrictive given that the Presidential election will have happened.

Several questions were posed to Mr. Trinkle from the Forum participants, including one related to the shift of funds from the Mathematics and Science Partnership (MSP) Program at NSF to the Department of Education. He explained that MSP and DoEd had parallel programs and the desire was to put the program in one agency only. The administration of the program already funded through the MSP at NSF will continue through the NSF (many of which are five years in duration). Other questions focused on how funding is prioritized, what impact the President's Mars initiative will have on future budgeting and what, if anything, can be done to get back on track with doubling NSF's budget in five years as outlined in Public Law 107-338, passed in 2002.

***Michael Stephens, Professional Staff, Minority
House Appropriations Subcommittee on VA, HUD & Independent Agencies***

Michael Stephens spoke about the legislative environment surrounding the appropriations process for the FY2005 budget. He characterized the FY2005 budget as being very bleak in terms of growth. The current federal budget deficit of \$521 billion has created a funding environment that is hugely constrained. However, the legislative process is one of individuals making choices among large numbers of priorities both at the macro and micro levels, so the possibility for surprises is significant.

The situation for science funding, particularly for NSF, is that there is enormous support for federal investment in science and the long term value of this support is a recognition that a significant amount of high quality research is being left unfunded to the detriment of the country. In Stephens' estimation, the House did not overtly "buy in" to Public Law 107-338, but rather would like to see significant increases in the NSF budget without prescription for how to get there. Up until last year the NSF had been receiving 7-13% increases. Last year, the NSF received an increase of 3.9%. A similar situation appears likely for the FY2005 budget, with a currently proposed increase of just 3%.

With current federal finances such as they are, it is extremely difficult to see where any additional resources will come from. There may be an ability to move some monies around within the NSF budget, but it is unlikely that the foundation will receive more than a 3% increase overall for FY2005. In addition, the near term does not look optimistic for increases in discretionary spending even as far out as FY2008, even if there no change in Administrations.

Stephens took questions from Forum participants that included how the No Child Left Behind (NCLB) initiative impacts the budget process. He feels NCLB is a large factor both politically and programmatically because next to veteran's health care, it is the most urgent political challenge for Congress. NCLB has a constraining influence on money being available for other things. Other questions had to do with congressional earmarking, the Mathematics and Science Partnership program being moved to the Department of Education from the NSF, and increasing budget dollars going to community colleges.

***Patrick Looney, Assistant Director for Physical Sciences and Engineering
Office of Science and Technology Policy***

Patrick Looney began by giving an overview of the Office of Science and Technology Policy (OSTP), an executive office of the President at the White House. He discussed OSTP's mission in assisting the President to evaluate the federal effort in science and technology. He also presented the factors influencing the direction of research and development, which he broke down into three components: scientific 'push,' which represents opportunities; societal 'pull,' representing demands; and the R&D environment, representing capacity and infrastructure.

With the President's priorities for the country in mind, OSTP and OMB are currently defining the areas of emphasis for science and technology for the FY2006 budget and will issue a priorities memo to the agencies as part of the budget process. These areas of emphasis have not changed in the last four years and they include research and development for: homeland and national security; nanotechnology; networking and information technology; environment and energy; and molecular level of understanding of life processes.

Looney then discussed some ongoing OSTP activities and went over the FY05 R&D budget, both in terms of the basic research budget and in terms of R&D as a share of discretionary spending. He pointed out that although non-defense R&D spending hasn't changed over the last 40 years, the distribution of these funds across agencies has changed significantly. The portfolio balance has shifted over time and most areas of science are flat in constant dollar terms, with the exception of health.

In conclusion, he pointed out that the U.S. will spend \$60 billion in non-defense R&D this year and that we spend more today in constant dollars than we ever have. In addition, overall R&D spending has accelerated since 2000.

***Deborah Lockhart, Acting Executive Officer
Division of Mathematical Sciences, National Science Foundation***

Deborah Lockhart began her presentation by reviewing the structure of the NSF in terms of directorates, divisions and programs. She then discussed some new activities and programs in the Division of Mathematical Sciences (DMS).

There is a new, broad activity within DMS called "Enhancing the Mathematical Sciences Workforce in the 21st Century." This builds on the existing VIGRE program and has three components: Research Training Groups (RTG); Mentoring through Critical Transition Points in the Mathematical Sciences (MCTP); and Interdisciplinary Training for Undergraduates in Biological and Mathematical Sciences (UBM).

- RTG was designed for groups of researchers with related research goals based in mathematical sciences and covers undergraduates, graduates and post docs. The award size is up to \$500,000 per year and the duration is one to five years. The FY04 awards will be announced this summer.
- MCTP facilitates mentoring devoted to points of transition in a career path in the mathematical sciences. The projects may be comprehensive efforts by many individuals or focused involving a few individuals, and the transition points may range from points in undergraduate studies to early years in a tenure track position. The award size is up to \$500,000 per year and the duration is one to five years. The FY04 awards will be announced this summer.
- UBM was introduced last year and was designed to enhance undergraduate education and training at the intersection of the biological and mathematical sciences. The award size is \$250,000 per year and the duration is one to five years. The deadline for this is April 26, 2004.

Lockhart then discussed the priority areas within the DMS including fundamental mathematics and statistics, connections with other science disciplines and engineering, and addressing mathematical sciences education through research. She also reviewed the criteria used to judge proposals received including intellectual merit and the broader impact of the proposed activity. She encouraged participants to visit their website to know what to address in proposals for funding and also to visit <http://www.fastlane.nsf.gov/> to get a list of awards and abstracts of awards.

Lockhart announced the upcoming event entitled “Dialog 2004: DMS and the Mathematical Sciences Community.” It will be held April 30 – May 1, 2004 and is hosted by AMS, ASA, MAA, SIAM.

***Catherine Woytowicz, Science and Technology Diplomacy Fellow
Office of Science and Technology Cooperation, U.S. Department of State***

Catherine Woytowicz discussed what the Office of Science and Technology Cooperation is responsible for. She explained that science and technology agreements in bi-lateral treaties increase cooperation between the U.S. and foreign science enterprises and show that the U.S. values science as a priority.

Woytowicz discussed the process by which these bi-lateral agreements are formed and she talked about the implementation and funding of such agreements. She explained that the challenge of these agreements was creating implementing arrangements under them. The process involves finding partners to collaborate with where the science and technology priorities are comparable.

She identified three fellowship programs at the U.S. Department of State: Embassy Science Fellows, American Association for the Advancement of Science Fellows and the Jefferson Science Fellows. She gave a brief overview of the AAAS and Jefferson Science fellows programs. She then detailed the Embassy Science Fellows program and explained that it places scientists in overseas posts to serve a specific function and to address a specific problem. She suggested that there may be opportunities for mathematicians in this program, especially if they are already employed by the government. In the future, her office hopes to expand the program by bringing in scientists from outside the government to participate.

Woytowicz then took questions from participants, which centered on security clearances and visa applications. She explained that visa applications are processed through the U.S. Department of State, but visa policy is set by the U.S. Department of Homeland Security. She emphasized that the U.S. Department of State understands that foreign visitors contribute significantly to the development of science and technology in the U.S. and that visa applications should be submitted early so as to accommodate travel effectively.

***James Turner
Chief Counsel, Minority – House Committee on Science***

Jim Turner presented a federal legislative update, focusing on research and development funding. He pointed out that the federal share of R&D as a percentage of GDP is in decline – life science (NIH) R&D has doubled in the last five years, but physical science research has continued its decline and will be down in absolute dollars in 2005. He identified the increasing pressure on the federal budget from deficits and unfunded Social Security and Medicare liability as a cause for the decline.

Turner went through what he deemed the R&D winners and losers in the FY2005 budget – the largest winner is the Department of Homeland Security, whose funding will increase in 2005 by 15 percent; the biggest loser is the Department of Defense science and technology budget, which will decrease by 15 percent next year.

He then discussed some trends that he has seen on Capitol Hill. Increased Congressional earmarking is one of those trends. He has seen a tenfold increase in earmarking in the last three years and this is due in large part to the pressures placed on Members of Congress to deliver to their constituencies. Another trend worth noting is the decrease in the length of time that people stay in Congress or on Congressional staffs. A reason for this trend is that the pension system for Congress and staff changed in 1984, significantly reducing the benefits for those starting after 1984. This causes newer personnel to move on

to other jobs more quickly and creates a problem with the most senior, knowledgeable people on Capitol Hill retiring earlier and leaving behind much less experienced Congressional staffs.

Turner then stated his feeling that the appropriations process for the FY2005 budget would not produce an overall budget that is larger than the President's proposal. He then discussed how far the science community has come in the last five to ten years on increasing the visibility for science and technology in Congress and that this success is due in large measure to the work of the AMS and other professional societies in their collaborative efforts.

***Scott Weidman, Director
Board on Mathematical Sciences and their Applications***

Scott Weidman introduced the Board on Mathematical Sciences and their Applications (BMSA) to participants, identifying those individuals associated with it. He then discussed the four major themes of BMSA's programs: new directions for the discipline, risk analysis, data overload, and computational modeling. The process of the Board's work is to identify major program themes, then the federal agencies decide whether to move forward with a study or a workshop, and if so a workshop is funded.

Related to the theme of new directions for mathematics, the BMSA has had several studies and workshops in area of: computational biology; the interface between mathematical and computer science; the mathematical and statistical challenges in data mining and pattern recognition; and the detection and epidemiology of bioterrorist attacks.

In addition, under the major theme of risk analysis, an enterprise risk management workshop was held in January 2004 and studies on systemic risk in the financial sector and risks in the Army's future combat system are currently being defined.

Weidman went on to discuss a current major BMSA theme, data overload. Several workshops on massive data streams and the mathematical sciences role in homeland security have been held. Another workshop focused on computer models.

CSP Activities at Joint Mathematics Meetings, Atlanta 2005

Historically CSP panels at the Joint Meetings have had poor attendance. This fact initiated discussion on how what to do to increase interest in CSP activities. One idea centered around sponsoring a special session at the Atlanta meeting.

Sam Rankin and David Eisenbud have already had some discussions with NIH representatives about areas of opportunity for collaboration between the mathematics and biomedical research communities. Those discussions have produced the idea of the AMS working with the National Institute for General Medical Sciences (NIGMS), one of the NIH institutes, to set up a special session to discuss how the mathematical sciences contribute to biomedical research. The committee decided to move forward with this idea.

Report from the Washington Office

Sam Rankin gave a brief report on the recent work of the Washington office including preliminary work on the FY2006 federal budget and plans to meet with the new director of the NSF. He reported that the AMS recently joined the "Bridging the Sciences Coalition," an initiative spearheaded by the Biophysical Society to encourage interdisciplinary involvement in biomedical research. Also, the AMS gave joint testimony before the House Appropriations Subcommittee on VA, HUD and Independent Agencies in support of increased funding for NSF. Jane Hawkins, CSP chair presented the testimony for the AMS.

Rankin spoke in more detail about the federal budget process and current difficulties that will likely prohibit efforts to substantially increase funding levels in FY2006. Even so, he discussed the work being undertaken to try to affect the process, including meetings with Congressional offices, working through coalitions, and implementing letter writing campaigns.

Date of Next Meeting

The next meeting of the AMS Committee on Science Policy was scheduled for Thursday-Saturday, April 7-9, 2005 in Washington, DC.

Submitted by Anita Benjamin
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