

Minutes
MPS Advisory Committee Meeting
June 17, 2010
National Science Foundation

Thursday, June 17, 2010

Afternoon Session

Welcome, Introductions, and Agenda Overview

The meeting was brought to order at 2:00 PM EDT at the National Science Foundation (NSF) and Dr. Iain Johnstone, Chair of the Mathematical and Physical Sciences Advisory Committee (MPSAC) opened the meeting by noting that this was a special teleconference meeting of the MPSAC that had been convened to receive the two reports from the Chairs of the Committee of Visitors (COV) for Division of Mathematical Sciences (DMS) and the COV for the Division of Chemistry (CHE). He welcomed those present at NSF and noted that almost all of the members of the MPSAC participating in this meeting were doing so via teleconference.

The COVs had taken place in late May and early June as a result of the severe storms that had occurred in Washington at the time both COV meetings had been scheduled and resulted in the COVs being postponed till after the April 1-2, 2010 meeting of the MPSAC. The meeting would hear the reports from the Chairs of the two COVs and the MPSAC would be asked to vote on the acceptance of each report.

Dr. Johnstone congratulated Dr. H. Edward Seidel on his appointment as Assistant Director MPS. Dr. Seidel had been serving as Acting Assistant Director since mid-August 2010.

Remarks by MPS Assistant Director

Seidel thanked everyone for participating in this special meeting of the MPSAC. He welcomed Dr. Luis Orozco, who was present at NSF as was Dr. Sastry Pantula of the North Carolina State University. Dr. Pantula would assume the position of Director of DMS in September. Dr. James Ulvestad was now the Director, Division of Astronomy (AST) and Dr. Janice Hicks was now the Deputy Director, Division of Materials Research.

He noted that the white papers that the MPSAC working groups had produced and presented at the April 2010 meeting of the MPSAC had been extraordinarily helpful as MPS was preparing for the NSF FY 2012 budget request to the Office of Management and Budget (OMB).

The Committee of Visitors Report for the Division of Chemistry

Dr. Cynthia Burrows of the University of Utah and Chair of CHE COV gave a broad overview of the report. In her introductory remarks she noted that the CHE budget had received an above average increase. The COV had been composed of 5 subpanels

The COV Findings with respect to CHE operations were that CHE is doing an excellent job overall. The COV had high praise for the quality work of the Program Officers, staff assistants, Director Luis Echegoyen and Executive Officers Janice Hicks and Katharine Covert. However, high proposal pressure and low reviewer response are making the workload untenable.

CHE is performing very well in identifying and funding the best science, in processing proposals in a timely manner, in making appropriate use of ad hoc and panel reviews, in operating with a high level of integrity and avoiding conflicts of interest, in playing a leadership role in the community, and in informing the community. The ARRA funds were used particularly appropriately. Burrows commented that these are impressive accomplishments given the ever increasing volume of proposals and the financial constraints.

With respect to the research portfolio, the good news was that the diverse portfolio of CHE-funded projects has led to *high impact* basic science with ramifications in applied areas that are crucial to national priorities. Nobel prizes were awarded to CHE grantees Kornberg and Szostak, and the COV was pleased to note that the CHE budget had increased at a higher than average rate over the past 3 years.

However, the bad news was that the CHE budget was still the lowest in MPS. Of concern is that fact that many exceptionally good proposals with exceptionally good PIs are not being funded because of budget constraints. Furthermore, grant sizes are too small. She commented that transformational science is difficult with an average of about 1.5 coworkers. In addition, some of the best and brightest do not even apply to NSF for funding but direct their work instead toward applications-oriented agencies that have larger award sizes.

The COV concluded that CHE funds are leveraged for highly transformative research. It appeared that principal investigators use NSF funds for more exploratory, high-risk ideas, that CHE funds the core of chemistry as well as emerging disciplines, and that broader impacts are high.

The COV considered staff issues. It found that while proposal pressure is up scientific staff is slightly down, and program officers are stressed to the limit.

The COV had the following recommendations for CHE:

- CHE individual investigator award budgets should grow, and as the CHE budget grows, priority should be given to increasing individual investigator award (IIA) budget sizes before expanding the number of investigators supported.
- CHE should continue to stress the importance of fundamental studies in molecular sciences as a foundation for our nation's economy and security.
- CHE should continue to fund Centers for Chemical Innovation that address Grand Challenges with outstanding teams. However, these funds should not detract from the IIA program.
- CHE should monitor the balance of international and domestic programs. International collaborations and international REU programs grew substantially from 2007-2009. This is appropriate as long as the best science is being funded.
- CHE should study the success rate for PIs across career stages, including post CAREER, mid-career, and senior.
- CHE should urge thorough reviews from ad hoc and panel reviewers and choose panel members wisely.
- It should continue and improve "PO Comments" for declined proposals and strive toward "perfection" in making consensus decisions in a timely fashion.
- It should explore additional mechanisms for review (cyberconferencing, *etc.*) to encourage broader participation from reviewers and more meaningful comments. Such mechanisms might reduce PO workload.
- The COV recommends that NSF improve its reviewer database for better searching and tracking of reviewers.
- It should continue to educate PIs and reviewers about the Broader Impacts criterion and provide guidance, if possible, on how these two criteria are weighted for different proposal types.
- CHE should finish an assessment of the impact of the broader impacts criterion on funded work.
- It should inform the community about the realignment of programs in CHE and the opportunities available in new grant mechanisms (EAGER, *etc.*).

With respect to the recommendations of the 2007 COV, CHE did develop a strategic plan. It did this with broad input from the community. Major outcomes were a realignment of programs into 21st Century topics, establishment

of goals for organizational excellence, and definition of areas of critical need. Furthermore, the COV recommends that the Strategic Directions document continue to be updated and reevaluated. The program realignment should be clearly communicated to the community and periodically reassessed.

With respect to the 2007 COV recommendation for the need to improve feedback to PIs: CHE responded by creating “PO comments” from the review analysis documents. This procedure seems to be working well.

The 2007 CHE recommended that CHE demonstrate leadership in broadening participation: CHE has supported workshops on the topics of gender equity, underrepresented populations, and persons with disabilities, and has worked toward reflecting the “face of America” in its review and support mechanisms.

While the 2007 COV recommended that COV increase the number of permanent scientific staff members, CHE has increased the permanent rotator ratio but the division remains understaffed.

Burrows concluded her presentation by stating that the COV members wished to commend the CHE staff for their highly professional organization of meeting materials and very helpful presentations and discussions throughout the process. Special thanks are extended to Acting Executive Officer Katharine Covert.

Johnstone thanked Burrows for her presentation and opened the floor for discussion. Dr. Elsa Reichmanis, a member of the MPSAC who was also a member of the CHE COV commented that the organization of the COV had been excellent. She wished there had been more time to look at the awards and declinations, but the time allotted had been reasonable. The review had provided a great sense of the research supported by CHE. She felt that as new initiatives are developed by NSF and CHE, one had to be vigilant not to lose sight of the basic research efforts of the CHE community. The review process for proposals had to be handled very carefully and required in-depth analysis and understanding by reviewers. Perhaps it would be wise to develop a broader data base and to examine what the professional journals were doing with respect to obtaining new reviewers. CHE had to be careful to develop a proper balance between individual investigator awards (IIA) and support for centers. With respect to centers, which the community had been initially resistant to the concept, it was gradually coming around to the idea.

Dr. Juan de Pablo commented that the CHE programs had been run very effectively and he recommended that CHE devote more time to strategic activities.

Dr. Joseph DeSimone asked about the plan to evaluate the effect of the CHE realignment that had been put in place as of July 1, 2009. Burrows responded that some programs could be split further, but the next COV should look at this. DeSimone added that the COV should examine the quality and the level of innovation of the research that had resulted from the CHE restructuring. Hicks commented that the COV was retrospective in nature, and looked at activities that had taken place prior to the reorganization. There would be future workshops in this area and several had already taken place. She did not feel that the size of the programs was a problem. Burrows commented that the restructuring was more than just administrative in nature. Having a new name would encourage new investigators to apply and would encourage frontier research.

Dr. Eric Cornell commented on the size of grants, and the effort involved in writing proposals, having them reviewed, arranging for panels, *etc.* He felt all of these were arguments for larger awards. Burrows agreed, stating that larger awards would encourage applicants, and there would be less work if awards were larger. Dr. Dennis Matthews thought this was a good idea, but asked where the funds would come from to make this possible. Somehow one had to keep the rejection rate on proposals as low as possible. Burrows thought that CAREER awards were a good idea, or perhaps some other mechanism could be developed, and this could be a topic for discussion at a future MPSAC meeting.

Dr. Theresa Maldonado commented that creation of a reviewer data base was a problem across NSF. Burrows added COV members have been journal editors and if there is a problem in finding the best reviewers, how should this be addressed? Maldonado commented that CHE had been a leader in workshops on increasing diversity in CHE and asked what had been the result since these workshops had been held. Burrows responded that the issue of diversity within the CHE community had been discussed by the COV and the workshops had had a major impact.

This concluded the discussion of the CHE report and Johstone asked the MPSAC to vote on acceptance of the report. The MPSAC unanimously accepted the report.

The Committee of Visitors Report for the Division of Mathematical Sciences

Dr. David Levermore of the University of Maryland and Chair of the DMS COV gave a broad overview of the report. In his introductory remarks he thanked DMS for the effort it had put into preparing for the COV.

He noted that the current award size was approximately right, and that smaller awards had not been a success. Operation of DMS is excellent (but not perfect) and the DMS portfolio is balanced and healthy. Funded proposals were of high quality and it is unfortunate that many worthy proposals did not get funded even with additional funding from ARRA. However, the ARRA funds were managed well. The COV found that the DMS leadership has been impressive and inspires confidence. Its engagement with the community has been especially commendable.

Levermore then discussed the COV's findings with respect to the DMS review process. Panels have worked well. While there has been a better understanding of the assessment criteria by reviewers, misunderstanding persists for proposers. The COV recommends that "Dear Colleague" letters addressing "Broader Impacts" and "Intellectual Merit" be created that would serve to inform both the proposers and reviewers with links to these on every solicitation page. DMS should continue experimenting with having reviewers score each criterion separately. This would provide good feedback to both proposers and DMS.

The COV found that conflict of interest situations were handled well, but some were discovered late in the process. NSF and DMS should think about ways to catch potentially disruptive ones as early as possible.

Levermore then described the COV's findings with respect to DMS' use of ARRA funds. ARRA funding was used effectively across all areas and the COV was particularly impressed by the ability of the mathematics institutes to work together to respond to short term postdoc funding opportunities in 2009. There was a significant increase in the participation of new investigators and women. The COV found that there had been exceptional NSF performance at every level of DMS under extreme workload and time constraints.

With respect to the disciplinary programs in DMS, the quality of funded research is high. In fact, 10 of the 20 plenary speakers at the 2010 International Congress of Mathematicians (ICM) are principal investigators funded by DMS. However, funding for core programs appears flat, and the COV felt that interdisciplinary proposals could be handled better. There has been progress with respect to support of female principal investigators, but the situation for underrepresented minorities is still not very good.

Interdisciplinary programs within DMS serve a valuable role and work well. Levermore gave the example of D. Levy's work on optimizing Leukemia treatments (NIGMS). The COV found that mixed panels are effective that cross disciplinary funding is crucial, and that expansion of these programs is desirable.

The evolution of workforce programs has been good and there is great potential from unsolicited proposals to develop new programs and tailor proposals to individual institutions. There has been a major increase in the number of graduate students and postdocs because of ARRA. The COV felt that investment in assessment in this area is essential.

The COV found that the mathematics institutes were, overall, very strong and the DMS portfolio of 10 institutes had a well-balanced set of activities. The institutes quickly responded to emerging research and educational opportunities. The 2007 COV recommended that DMS carry out an assessment of the institutes, and the current COV endorses the DMS response to 2007 COV request for an assessment. The assessment appears to be progressing well. However, there is a wide disparity between institutes in terms of how well they disseminate the outcomes of their research and educational activities, but they have helped create opportunities for women.

With respect to infrastructure, the COV found that travel and conference grants were important for promoting community diversity and that the evolution of equipment grants has been healthy.

The COV feels that DMS is understaffed in both Program Officers and Administrative Staff (AS). It was pleased that time had been made available to meet with administrative staff, and wished it had had the opportunity of meeting with program officers. The path to advancement for administrative staff should be clear and training should be followed by opportunities to practice what has been learned. The rationale for decisions that affect the AS workload should be communicated to them.

Livermore then described recommendations the current COV had with respect to future COV meetings. As panels play such a large role in the DMS proposal evaluations, it would be helpful to future COVs if it were more transparent as to how to query the reviewer data base in a more panel-centric ways. Some panel-centric data should be provided and DMS should consider adding a meeting with program officers to discuss general issues affecting them, such as workload.

After the conclusion of Levermore's presentation, Johnstone asked for comments from the AC members who had been on the COV. Dr. Kevin Corlette commented that the COV process had been all consuming. Activities within DMS appeared to be running very smoothly. He felt that in responding to underfunded or unfunded proposals the principal investigators could be given a better explanation of the outcome of their proposals.

Maldonado asked if there had been any discussion of workforce programs, and Levermore responded that whereas principal investigators were supported on awards for about three years, postdocs were primarily supported by the mathematics institutes. Dr. Irene Fonseca commented that there had been discussion about improving the interaction with the statistics and the computational communities. Levermore responded that in computation there was support by the Department of Energy (DOE) and that the COV had members who were receiving support from DOE. Corlette commented that the program wasn't perceived as important by DOE, and computational mathematics was not as clearly defined as it could be. Dr. Peter March commented that computational mathematics was a large, sprawling area, including support by agencies other than NSF. This was an opportunity for examining where this field should fit within DMS and then bringing its budget into alignment with other areas supported by DMS.

At the conclusion of the discussion Johnstone thanked Levermore for his presentation and service as Chair of the DMS COV and asked for a vote from MPSAC members on the DMS COV report. The report was unanimously accepted by the MPSAC.

Concluding Remarks

Seidel thanked the members of the COV for their service to NSF, and to the CHE and DMS staff. He thanked Dr. Luis Echegoyen, Division Director of CHE and Dr. Peter March, Division Director of DMS for their outstanding service to NSF and to their communities. He also thanked outgoing members of the MPSAC and asked members to send him recommendations for new members.

Johnstone thanked MPSAC members and NSF staff for their participation in the meeting.

Adjournment

The meeting was adjourned at 3:30 PM.

APPENDIX I

ATTENDEES

MPSAC Members Present at NSF

Luis Orozco, University of Maryland

MPSAC Members Present via Telecom

Hector D. Abruna, Cornell University

James Berger, Duke University

Daniela Bortoletto, Purdue University

Eric Cornell, JILA and the University of Colorado

Kevin Corlette, University of Chicago

Juan J. de Pablo, University of Wisconsin-Madison

Joseph M. DeSimone, University of North Carolina, Chapel Hill

Irene Fonseca, Carnegie Mellon University

Sharon C. Glotzer, University of Michigan

Suzanne Hawley, University of Washington

Iain M. Johnstone, Stanford University

Theresa A. Maldonado, Texas A&M University

Dennis L. Matthews, University of California, Davis

Ramesh Narayan, Harvard-Smithsonian Center for Astrophysics and Harvard University

Elsa Reichmanis, Georgia Institute of Technology

Geoffrey West, Santa Fe Institute

MPSAC Members Absent

Taft Armandroff, W. M. Keck Observatory

Barbara J. Finlayson-Pitts, University of California, Irvine

David E. Keyes, Columbia University (present by phone)

Jerzy Leszczynski, Jackson State University

Sharon L. Neal, University of Delaware

John Peoples, Jr. Fermilab

James W. Mitchell, Howard University

Fred S. Roberts, Rutgers University

Joel E. Tohline, Louisiana State University

MPS Staff

Morris Aizenman, Senior Science Associate, MPS

Carol Bessel, Division of Chemistry, MPS

Denise Caldwell, Deputy Director, Division of Physics

Joseph Dehmer, Director, Division of Physics

Susan Hamm, Budget Director, MPS

Janice Hicks, Deputy Director, Division of Chemistry

Deborah Lockhart, Executive Officer, Division of Mathematical Sciences

Peter March, Director, Division of Mathematical Sciences

Celeste Rohlfsing, Head, Office of Integrative Activities

Edward Seidel, Acting Assistant Director, MPS

Visitors

Cynthia Burrows, University of Utah (via teleconference)

C. David Levermore, University of Maryland (via teleconference)

Sastry Pantula, North Carolina State University

John Zoshak, British Embassy

APPENDIX II

September 14, 2010

Dr. H. Edward Seidel,
Acting Assistant Director
Directorate for Mathematical and Physical Sciences
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230

Dear Ed:

I have reviewed the final version of the minutes of the Directorate for Mathematical and Physical Sciences Advisory Committee meeting that was held June 17, 2010 (attached), and am pleased to certify the accuracy of these minutes. Morris Aizenman has done an excellent job in recording the most significant parts of the discussion.

Sincerely,

Signed

Iain Johnstone
Chair, Mathematical and Physical Sciences Advisory Committee