

Minutes
MPS Advisory Committee Meeting
November 3-4, 2011
National Science Foundation

Thursday, November 3, 2011
Morning Session

Welcome and Introductions

Dr. James Berger, Chair of the Mathematical and Physical Sciences Advisory Committee (MPSAC) opened the meeting at 8:00 a.m.

Dr. Berger welcomed committee members and asked committee members and MPS senior staff to introduce themselves. He discussed the agenda noting that there would be a presentation by NSF staff on the subject of merit review. He discussed logistics for the meeting and then asked Dr. H. Edward Seidel, the Assistant Director of MPS, to address the meeting.

Remarks by MPS Assistant Director

Dr. Seidel also reviewed the agenda for the meeting and noted that the discussion on merit review was part of the agenda because of the concern about the ever increasing workload on program directors and efforts to reduce this workload in the face of increasing numbers of proposals being submitted to NSF. He then discussed the budget. He noted that the budget for FY 2011 had not been signed until July of 2011, and as a result, decisions on awards had been relatively slow. There was, at present, no FY 2012 budget and NSF was operating on a continuing resolution through November 18. He remained optimistic about the final outcome of the FY 2012 budget for NSF. He could not comment on the FY 2013 budget, as this was embargoed, but he reviewed the process that would lead to the development of the FY 2014 budget request. In the area of personnel, he noted that Dr. Celeste Rohlfing was now the Deputy Assistant Director of MPS and that the recruitment of the Deputy Division Directors in Chemistry and in Mathematical Sciences was ongoing.

In the discussion that followed Dr. Michael Norman asked which programs within NSF were being held up because of the continuing resolution, and Seidel responded that a good example was the Cyberinfrastructure for the 21st Century. Dr. Juan Meza commented that at the April 2011 MPSAC meeting there had been concern expressed that MPS was very understaffed, and asked if there was any change. Seidel responded that similar arguments were being presented by other NSF Directorates, and it was important to bring this up when the MPSAC met with the Director. A question was asked as to how funding of proposals took place while NSF was under a continuing resolution, and Seidel responded that MPS had been authorized to allocate up to 90% of what it had received in FY 2011.

Seidel then turned to a discussion of the joint session that would be held with the Education and Human Resources Advisory Committee. He noted that technology was changing education with the availability of electronic textbooks and with the access students now had to real data being produced at a variety of facilities. Dr. Daniela Bortoletto asked how one could advance education and training in the instrumentation, and Seidel responded that this was mainly taking place in astronomy and in physics.

Joint Meeting with the Directorate for Education and Human Resources Advisory Committee

The MPSAC and the Education and Human Resources Directorate Advisory Committee (EHRAC) met in a joint session. After introductions and welcome by the EHR Assistant Director, Dr. Joan Ferrini-Mundy and the MPS Deputy Assistant Director, Dr. Celeste Rohlfing, the meeting heard an invited talk by Lisa Hunter, of the Institute for Scientist and Engineer Educators (ISEE) and the Center for Adaptive Optics (CfAO) at the University of California, Santa Cruz and the University of Hawaii

Institute for Astronomy entitled “Advancing Scientist- and Engineer-Educators: Transformative Professional Development in an NSF Science and Technology Center.”

Hunter noted that the CfAO had been an NSF Science and Technology Center and that the education and human resources activities carried out at the CfAO had resulted in the creation of the ISEE and the Akamai Workforce Initiative (AWI) at the University of Hawaii. The education model developed at the CfAO was now used at ISSE and at AWI. There are two major goals: to prepare graduate students and postdocs for their future teaching roles and to improve college-level persistence in STEM fields related to CfAO with inquiry as the heart of the activities. The Professional Development Program (PDP) bolsters early-career scientist and engineers’ preparation for careers with education training and practice and involves 50-60 grad students, postdocs, professionals, and college faculty through workshops & practical teaching experience. The focus areas are inquiry, diversity and equity, and assessment. They experience training workshops and design an inquiry laboratory activity with teaching team. The activities span a range of subjects, audiences. Participants teach activity with a team, reflect on the experience, and return for further activities with the PDP. From 2001-2010 there have been 176 “primary participants” who fully participated. Papers have been published on the professional development curriculum, PDP research & evaluation, and participant-developed curriculum.

Hunter addressed the question of why the CfAO had spent 10 years on inquiry, and noted that in addition to the body of evidence for effective learning and positive attitudes about STEM there is much to learn about inquiry teaching in learning in higher education across STEM disciplines – and how to do effective professional development. Employers value inquiry skills – industry and observatories in Hawaii seek employees with skills that are essentially “inquiry” and require problem-solving and critical thinking.

Hunter concluded her presentation by noting that inquiry supports much more than learning content and processes. It involves workforce development and inquiry has been key to “integrating research and education.” The CfAO experience has led to a model that is now institutionalized and continuing to spread.

Hunter’s presentation was followed by a presentation entitled “Expeditions in Education – Large Data Sets” by Dr. John Cherniavsky, Acting Division Director of the Division of Research on Learning in Formal and Informal Settings. He described the activities with three NSF Directorates – CISE, SBE, and OCI. The efforts treat education data mining as a field using publicly available data. Examples of projects include ITEST, which is a pulsar search collaborative where 60 high school teachers and 90 students work with astronomers to search for pulsars; IDEAS – an inquiry-based dynamic earth applications using supercomputers aimed at improving the use of computer data analysis skills in undergraduate meteorology; and CITEAM, which is aimed at enabling interactive visual exploration and remote collaboration for the geosciences and physical sciences (involves visualization methods and collaboration tools). He described a citizen science challenge had been quite successful, and gave the example of a gaming team that had solved protein structure related to HIV. He noted that there was a need for a shift in thinking on big data sets, and there was a need for more collaboration between education and the various science disciplines. He raised the question of the trust and faith students have of numerical data and the need to ensure that students understand limits/error bars. He concluded his presentation about the problems associated with finding and accessing stored data and the need for improved database searching.

Following these presentations, the following suggestions were made for collaborations between MPS and EHR:

- Systematic work to prepare PhDs today for teaching;
- Study impact of PhDs educational preparation for teaching;
- Use big data as a resource for curriculum;
- Cognitive tutors;

- Networking among different types of NSF centers via meetings with center directors and outreach staff; and
- Determine how to connect students to scientists who produce the data.

The Merit Review Process

Dr. Candace Major from the Geosciences Directorate and Dr. Steven Meacham from the Office of Interdisciplinary Activities described current efforts within NSF on potential enhancements to the merit review process. They were part of a group created within NSF to address the process of merit review, and this topic was being discussed with all of NSF's advisory committees. The process is envisaged as a year-long process and they are about half way through at this point. The working group was focusing on the process and not on the merit review criteria. This activity was being carried out in order to reduce the burden on reviewers & proposers and to stimulate the submission of high-risk/game-changing ideas. Furthermore, these enhancements should be such that the process identifies/funds an appropriate portion of high-risk, game-changing ideas. Ideas should use technology to facilitate the merit review process, broaden participation in the review process, and maintain the quality of NSF's merit review process. The goal was to develop a design for a program of pilot activities, develop a framework for evaluating past and future pilots, and engage NSF staff and the research community in developing, testing, and assessing novel methods of proposal generation and proposal review.

They discussed trends in proposal pressure and some past concepts on proposal review. These concepts included ideas labs, where novel/high risk research project development are coupled with real-time peer review; the Charette, which is a community-driven design process in which stakeholders intensively discuss, modify and clarify transformative approaches that become the basis for IdeasLabs and EAGER proposals; the so-called "Big Pitch" review of short proposals that focus only on the main purpose and potential impacts of the proposed research; and the "Distributed Caucus" in which there is a simultaneous proposal review by assigned panel reviewers followed by discussion and reconciliation by the whole panel

A number of suggestions for potential enhancements to merit review have been received and they asked the MPSAC to help analyze these ideas in discussing the benefits and drawbacks of the concept, provide feedback and how some of the drawback might be mitigated.

Examples of potential new experiments included a PI response to reviews prior to decision, return non- competitive proposals based on Program Officer review, wiki-based reviews, increased use of virtual panels, more use of preliminary proposals, and double-blind review. Each of these concepts was then discussed.

Integration of Research and Education

Dr. Matthew Platz discussed the topic of putting entrepreneurship into the curriculum. He noted that US chemical industry employment trends had gone from 1,035,600 in January 1990 to 788,700 in January 2010. In New Jersey alone, the pharmaceutical industry has lost 100,000 jobs over the last 5 years: taking \$5 billion out of the economy.

The American Chemical Society's (ACS) Presidential Task Force on Innovation in the Chemical Enterprise, in commenting on new jobs for chemists had noted: "Professors in research universities typically work with industry as technical consultants, rather than as business collaborators or competitors. Generally, in chemistry departments (although not in chemical engineering and other fields), professors' words and actions promote the idea that basic research, and a career in academe, are the highest aspirations for topnotch students. This strategy is risky: If universities are indifferent to what society needs, society may reciprocate that indifference."

"In many universities, students graduate without ever being exposed to the idea that entrepreneurship might be a viable or desirable career option. They also receive little or no exposure to commercial science and technology. Educating the next generation of scientists and engineers to recognize and

consider entrepreneurial opportunities that have impact on society is essential for future cultural changes in the chemical enterprise.”

“Recommendation#3: ACS should work with academic institutions and other relevant organizations to promote awareness of career pathways and educational opportunities that involve or include entrepreneurship. “

He also described the situation with respect to finances at universities and the problem of increasing costs while revenue from student registration is, at best, beginning to level off. In the comments that followed it was noted that NSF has a unique role in research and perhaps some of these ideas could be incorporated into proposals. Many universities are offering entrepreneurship programs. Perhaps the Broader Impacts merit review criterium might include this concept. It is not at all clear that a Ph.D. is needed to be a good entrepreneur, and the problem remains of how ideas become products. How does one go from discovery to a commercial product? Incorporating simulation activities within courses would allow students to “play” with novel ideas. It was noted that venture capitalists come in at a later stage in the process, after research and design phases. It is NSF that comes in at the first (discovery) phase, and this is the mission of NSF. Seidel commented on NSF role as an innovation agency. NSF is in the business of generating knowledge and NSF must work closely with the modern research university in dealing with these issues.

Lunch Adjournment Followed by Divisional Breakout Sessions

MPSAC members had lunch with the MPS Divisions in the divisional breakout sessions.

Thursday, November 3, 2011

Afternoon Session

Reports from Divisional Breakout Sessions

The Chair opened the session at 4:35 pm and asked MPSAC members to complete the survey that had been distributed to members on communication between the NSF and the community that had been provided by NSF’s Office of Integrative Activities.

Division of Astronomical Sciences (AST)

Dr. Paul Butler thanked the AST group for their extraordinary efforts on behalf of the community and their service to AST. ALMA now had 16 antennas and was already doing cutting edge science. He noted that GEMINI had discovered the highest red-shift blazar and remarked on the fact that the sun is currently incredibly quiet, with no sunspots and the magnetic field declining. The new Advanced Technology Solar Telescope (ATST) is in the final design phases and ARECIBO is now under new management.

He discussed the major issues facing AST. The workload on the staff is very heavy and doubts that sending proposals back without review would help because practically all the proposals are good and could be funded. A bigger problem is identifying panelists when only 20-30% of those who are asked will serve. Some of the other ideas proposed, such as limiting the number of proposals submitted, would result in protests from the community, so the MPSAC members urge that any changes that are made will not result in a one-size-fits-all model; divisions should have flexibility. The biggest problem facing AST is the budget. AST is looking at a possible 4% cut over the next few years, which translates into a 15% cut when inflation is included. AST does not fit into most of the initiatives, as the research is purely curiosity-driven. The work is not highly collaborative and does not result in a product at the end. AST does play well with data-enabled science. With tight budgets, this could be a lost decade for astronomy, not just from the NSF perspective but for the field as a whole. A big fraction of the budget goes to facilities, which have long-term agreements that it is hard to back out of. At the recommendation of the MPSAC the Division is undergoing a portfolio review. It appears that the Division has no choice but to phase out facilities. And at the end of the decade the Division will not have funded any new facilities. This will eviscerate the community.

Division of Physics (PHY)

Luis Orozco presented the report from the PHY breakout group. The highest priority for PHY is medium-scale instrumentation. This is missing in the division and will benefit a large number of projects. PHY is now working out a procedure that will review the science in the disciplinary program and then pass the requests of instrumentation, instrument development, or a piece of equipment that is too much for a particular program to a separate capitalization fund. This fund would not fund operations of the equipment. Physics is participating and expects to continue participating in the BIOMAPS program. It supports proposals with co-funding from BIO and PHY. PHY holds a deep commitment for Quantum Information Science. The recent Physics Frontier Center "Institute for Quantum Information and Matter" at CalTech is where some of the deeper questions on quantum information are being asked and answered.

With respect to the questions that were posed in the morning on the NSF review process he commented that the NSF review process is the gold standard in the world. Many other countries have been trying to implement a similar process. The real problem is the staff work load and not the review process. The review process is only a small part of the problem. The complexity of the proposals that PHY encounters usually adds to the workload. PHY needs both the ad-hoc and panel reviews in order to get a picture that allows for forward-looking decisions. The group urges NSF to be very careful about making changes since all of the choices that were presented in the morning can have major unexpected consequences. There is a bond of trust between the principal investigator (PI) and NSF, and it is important not only to keep the bond, but to strengthen it. The group felt that creativity extensions should be used, and PIs should be encouraged to apply for four to five years instead of three.

Division of Materials Research (DMR)

Juan de Pablo presented the report from the DMR breakout. He thanked the staff for their great presentations and noted that they had had an especially vigorous discussion of proposal issues. The breakout group had been given extremely effective presentations that were well organized and displayed a lot of preparation/work prior to presentation. There had been a thoughtful analysis of key issues.

With respect to the DMR budget, it appeared to be relatively flat in an era of materials-centric societal challenges. CAREER proposals had a success rate of about 28%, and there are not enough staff to handle extraordinarily large and steadily increasing number of proposals. The group was informed of the DMR initiatives for FY 2013. DMR is eager to develop *and lead* initiatives, and he described some of the proposed initiatives such as midscale instrumentation development; cyberinfrastructure and software institutes; instrumentation; the recovery of scarce/costly/rare materials; and smart materials for infrastructure developments.

There is a widespread effort to inform and engage DMR and general science and engineering (S&E) community such as the DMR large centers/facilities directors meeting, workshops on multiple subjects, and talks at national meetings.

COV recommendations and workload issues were also discussed. With respect to workload issues, there is a problem with the resubmission proposals that are nearly identical proposals to the original declined proposal. The breakout group had some recommendations on this problem and thought that PIs should include detailed statement of changes in resubmitted proposals. Perhaps DMR could request letters of intent and encourage/discourage submissions and consider various forms of "editor" model for rejection without review. DMR might consider moving from unsolicited proposals to solicitations that would include DMR specific requirements. Perhaps there could be a limit on the number of proposals, and decline proposals on the basis of two negative recommendations

Division of Chemistry (CHE)

Dr. Tanja Pietrass, the Acting Deputy Division Director in CHE, presented the report from the CHE breakout. She noted that the CHE group proceeded a little differently from in the past in that the Division did not make any presentations but that the Division Director asked the group to consider a number of questions:

Question 1: CHE spends roughly 75% of its budget on individual investigator awards, 15% on groups, 10% on centers, and 5% on education. In the event of a budget cut, should the Division cut across the board or target certain activities? The MPSAC group, while they agreed that across-the-board cuts are easiest, advised the Division to assess different programs and their relative status before making a decision. They advised against reducing award size, as awards are already small.

Question 2: In CHE the success rate for renewals is 50%, while the success rate for new proposals is 16-18%. Is this a problem that needs addressing or should the Division just let the review process take its course? The MPSAC members felt that this result was not surprising as the renewals come from experienced investigators. They did express the concern that one issue might be the difficulty PI's who have had their funding cut in getting back into the system and suggested that the Division might consider something like a small one year award that would enable a fresh start.

Question 3: Should the Division extend the normal award to four years? There was not much enthusiasm for this, although the group did suggest that consideration of a two-year extension would be useful.

Question 4: Should the Division discourage the submission of more than one proposal per year? The reply was that this might be possible if the workload is really severe, but that this would be more effective if this were an NSF-wide policy.

Question 5: A very large fraction of the CHE budget funds a small portion of the community. Should the award size be limited? The reply was that one might consider that no PI can have an award that is larger than a certain fraction of the average award size in the Division.

The CHE group also discussed the change to the single target date per year to better align with the budget cycle. The MPSAC group expressed understanding for this but also concern that PI's would not be disadvantaged at renewal. There was some discussion on the new emphasis on sustainable chemistry, which met with a positive response from the MPSAC group.

Division of Mathematical Sciences (DMS)

The DMS report out was given by Dr. Kevin Corlette. He noted that the DMS staff had presented an overview of the year with the new Division Director. The Division has a record number of rotations in and out of Program Director (PD) positions, with eight new PD's now in place. The Division also noted that they had a heavy involvement with data. In addition, there was an institute competition, and one new institute was formed. There was a discussion of how to deal with the current vagaries associated with the budget and how DMS works with this. They also discussed the various budget drivers and how they operate and how input from the community fits in. This went on into a discussion of how the workload had changed. DMS has the largest number of proposals in MPS. DMS has already made many changes to deal with this, so much so that there is no more efficiency to be squeezed out, so a lot of what was presented by the merit review working group would not help. Practically the only choice remaining is to reduce the quality of the feedback to the PI, which would be bad as the difference between the proposals that are funded and declined is not drastically different. The final point of discussion revolved about the proposed name change. The subgroup did not feel able to comment on this but suggested that a subgroup of the MPSAC be formed to consider it.

General Discussion

Dr. Mike Norman noted that workload seemed to be a critical issue and suggested that it would perhaps be a good idea to conduct a survey and find out exactly how much time each step in the

process was taking. Then one could better decide where to make changes. Perhaps one could hire assistants to do the routine tasks.

Dr. Vernon Pankonin noted that in AST the real problem was in identifying panelists and getting them on board. Dr. Irene Fonseca commented that a few years ago NSF moved over to panel review. Perhaps this shift was adding layers of complication that could be removed if one did not have panels. Dr. Hank Warchall indicated that the move to panels was to try to increase efficiency and make it easier to make decisions on a group of proposals. With ad-hoc reviews six reviewers might be needed for one proposal, whereas in a panel 15 panelists could handle 50-60 proposals.

Dr. Juan Meza said he was somewhat disconcerted by the fact that PHY and DMR wanted longer award periods while CHE appeared to want shorter periods. A comment was made that that this was not what was said. CHE did not want two-year awards but two-year extensions. It might be a good idea to collect data on exactly how much time was spent on doing various things. Then one could better decide on where one really needed to spend one's time and redistribute the work. Dr. Dennis Matthews commented on the merit review problem and asked if there might be some way to spread the review effort out to the community.

Invited Talk by Dr. Tom Peterson, Engineering Directorate (ENG) Assistant Director

Dr. Tom Peterson gave his talk via teleconference. His remarks were on the ENG perspective on the extent and depth of the collaboration between MPS and ENG. He noted that the interaction has a long history and at present the two Directorates are in particularly tight alignment. There is a clear overlap in scientific areas. Some examples include the connection between chemistry and chemical engineering and between electronic materials and electrical engineering. Mathematics and physics are at the basis of what engineers do, although there is less direct interaction between ENG and PHY and AST, for example. However, many of the advances in astronomy rely on advances in engineering. There is a new strong focus on NSF-wide investments in initiatives that have commercial interests, as, for example, nanotechnology. A good example of current interactions is the joint MPS-ENG working group on energy. MPS and ENG were looked to in the formulation of the final step. CIF21 should also have some commercial interest. MPS and ENG have been able to capitalize on administration priorities as outlined by OSTP and OMB. Examples are robotics, challenges with regard to the radio spectrum, and the materials genome project. A number of great personal relationships exist between ENG and MPS. This begins at the AD and DAD levels and works down. Two examples are Steve McKnight from CMMI and Ian Robertson on the materials genome and advanced manufacturing activities and Matt Platz and John McGrath on sustainability.

Trying to draw a line between basic and applied research is too simplistic an approach and is false. An example is iCorps. Although the structure was put together by ENG and CISE, the Directorate with the second-largest number of awards was MPS. He is thrilled by the opportunities that are offered and hopes that NSF can take advantage of them.

Adjournment

The meeting was adjourned at 6:00 P.M.

Friday, November 4, 2011

Morning Session

The MPSAC convened at 8:00 A.M.

Report from CEOSE

Dr. Eugenia Paulus, the Committee on Equal Opportunities in Science and Engineering (CEOSE) representative to the MPSAC, provided a report on current CEOSE activities that took place at the October 17-18, 2012 meeting of CEOSE. Topics included plans for the Mini-Symposium on the Science of Broadening Participation, beginning the discussion on potential efficiencies for “Revitalizing the Scientists and Engineers Statistical Data System (SESTAT) for this Decade” (SESTAT), presentations on the broadening participation activities of the Directorate for Computer and Information Science and Engineering (CISE), and the Directorate for Biological Sciences (BIO), and discussions on various diversity and inclusion topics by federal agency liaisons to CEOSE.

With respect to SESTAT, undergraduate experience will be explored for “young graduates” (below cutoff age 25 yrs) and “recent graduates”(within 2 yrs). There are challenges in the collection of data. CEOSE has liaisons with NOAA, the Smithsonian Institute, NIST, NIH, EPA, and USDA. Co-ordination between agencies, and the differences in broadening participation between different government agencies were discussed.

Dr. Farnum Jahanian, the Assistant Director of CISE, discussed diversity activities within CISE and noted that there was an underproduction of degrees and under-representation of minority groups in CISE disciplines. He noted that only 49 of the 1772 PhDs awarded in computing went to African Americans or Hispanics.

CEOSE discussed plans for a mini-symposium on the “Science of Broadening Participation” that would be held in October 2012. This symposium will bring together scientists engaged in the social, behavioral and economic sciences relevant to broadening participation with those engaged in the design and implementation of specific programs to increase the representation of women, minorities and persons with disabilities in STEM fields. The goals for this mini-symposium include contributing to the development of a vision of the Science of Broadening Participation; dissemination of social, behavioral and economic research that might inform the development of effective intervention strategies; using the experiences of practitioners to inform a research agenda for the science of broadening participation; developing an understanding of what makes successful programs successful; making recommendations to CEOSE and to funding agencies as to promising lines of inquiry in the science of broadening participation; and making recommendations to CEOSE as evidence-based strategies for increasing representation of women, minorities, and persons with disabilities in STEM fields.

Other presentations at the CEOSE meeting included a presentation by Dr. Joann Roskoski, the Acting Assistant Director of BIO who described broadening participation activities in BIO. Dr. Wanda Ward, Senior Advisor to the Director gave a presentation entitled “BP in the STEM Enterprise: The NSF Role.” She discussed the NSF Career Life Balance Initiative aimed at reducing the rate of departure of women from STEM and to ensure an excellent STEM workforce. Other topics included innovation through Institutional Integration, fostering connectivity, veterans education and addressing underrepresentation. There was also a presentation by Dr. Joan Ferinni-Mundy, the Assistant Director of EHR on broadening participation activities in EHR, and a meeting with the NSF Director, Dr. Subra Suresh.

During the discussion period that followed Dr. Paulus’ presentation, it was noted that NSF emphasizes programs and not people. However, programs last for a short time, but the timeline for people is much longer than a specific program or grant length. How should/can NSF find the continuity needed to keep people in the pipeline longer? NSF focuses on individuals at career stages much later than K-12,

but K-12 may be where huge problems are. How could NSF "incentivize" students to take more science in K-12? Also, diversity is a fundamental tenet of innovation, as was pointed out by the MPSAC Working Group on Broadening Participation.

Report on the ACERE Meeting

Dr. Fred Roberts reported on the Advisory Committee for Environmental Research and Education (ACERE) meeting. The EREAC was founded in 2000, and up until 2010, its primary job had been interpreted to be "advocacy" for the topics it deals with. Given the substantial new initiatives at NSF on environmental research and education, the role of the ACERE is moving from advocacy to implementation. The new role will require rethinking of the tasks of the committee. The new NSF Initiative SEES (Science, Engineering & Education for Sustainability) has become a highly visible and significant part of the NSF endeavor – and this puts a new responsibility on the ACERE. In this regard, the key components of Obama administration priorities are to protect US from economic/strategic risks from dependence on foreign oil and corresponding climate change; and to advance energy and climate security via economic recovery, and clean energy manufacturing. OMB/OSTP FY 2012 priorities include reducing dependence on energy imports/curb greenhouse emissions; climate change; and managing competing demands on land, fresh water, and oceans. The National Science Board (NSB) has stated that NSF should increase its emphasis on sustainability.

Much of the discussion centered around the new NSF SEES initiative, with the the FY 2012 budget request for SEES being \$998M, more than 10% of the entire NSF budget. The emphasis in FY 2010 involved climate change (at that time SEES was the "Climate Change Initiative") whereas in FY 2011 the emphasis in on energy, scientific workforce needs, and the integration of energy and climate. In FY 2012 the emphases are advancing a clean energy future, nurturing the emerging SEES workforce, expanding research, education, and knowledge dissemination, developing interdisciplinary research networks, and engaging with global partners. The social science-physical science interface is important, and every SEES solicitation has social science and the human dimension in it. A challenge will be how to evaluate SEES: outcomes.

Roberts also described how the relationship between ERE and "Cyberinfrastructure for the 21st Century" (CIF21). This is a major NSF initiative, and cyberinfrastructure is a major tool for ERE. Modern science has become data intensive and new paradigms are required for dealing with the data. Other topics discussed by the ACERE included coordination of federal agencies in the field of climate change, the development a decadal strategic plan, and the need for international collaboration since environmental challenges don't recognize international borders.

An update from OSTP was provided by the OSTP Assistant Director at Large, Dr. Steve Fetter. As noted earlier, OMB-OSTP science and technology priorities include sustainable economic growth and job creation; a clean energy future; climate change (awareness, mitigation); and competing demands on land, fresh water, oceans, fiber, fuels, etc. Sample energy research and development priorities include advanced biofuels, cheaper photovoltaic cells, fuels from sunlight, offshore wind, inexpensive approaches to CO2 capture and storage, and improved batteries and fuel cells.

There was a presentation on merit review similar to the discussion that had taken place at the MPSAC, but there was more discussion on current review criteria of intellectual merit and broader impacts. The ACERE also met with the NSF Director, the topics being budget, multidisciplinary, innovation and international collaboration.

In the discussion following Roberts' presentation comments included how the scientifically-oriented part of NSF is taking advantage of, or interacting with the cultural/sociological aspects of sustainability as the latter may be the determining issues on whether sustainability is effective. Note that the US Global Change Research Program involves many of the sociological bodies in the international realm.

Report from the MPSAC Interdisciplinary Working Group

Dr. Naomi Halas presented a report on the activities of this working group. She noted that Seidel had informed the group that interest in interdisciplinary research is very high across NSF and that conversations are taking place across NSF on this subject. NSF is taking a new look at how activities within NSF can be integrated and this includes the concept of interdisciplinary proposals.

The charge to the working group was to identify and recommend procedures, structures, and policies that will facilitate the effective evaluation and administration of IDR proposals within MPS and with other Directorates. Such recommendations should lead to increased transparency to the external community of the processing of interdisciplinary research proposals.

Discussions within the working group noted that there are anecdotes that interdisciplinary proposals to NSF fall between the cracks. Should alternative processes for review of interdisciplinary proposals be developed? Disciplinary panels are highly focused and their structure militates against interdisciplinary activities. Panels could be created that would be oriented to addressing interdisciplinary proposals. At present the burden is placed on program directors when dealing with interdisciplinary proposals and much depends on the program director. The group wondered whether a Division should have a program director dedicated to handling interdisciplinary proposals or whether one could designate several program directors within a division to have responsibility for handling interdisciplinary proposals. The question of whether a different structure within MPS or NSF better serve the purpose of interdisciplinary proposals and the conclusion was that it would probably not be a good idea.

The discussions turned to the working group's need for hard data on the outcome of interdisciplinary proposals to NSF. Aizenman provided the working group with the most recent data and the statistics definitely indicate that the funding rates for proposals reviewed in more than one panel are higher than review by a single panel. However, the community has just the opposite impression and the question is how can NSF communicate this fact?

The group then discussed how interdisciplinary research proposals could be handled. They considered whether there should be a box checked by the PI on the cover sheet indicating that this was an interdisciplinary proposal and what the program director should do when in receipt of such a proposal. However, at the present time, irrespective of the process, the proposal will still end up being the responsibility of a single program director and subject to that individual's efforts. It was not obvious how one should proceed with recommendations on changes given the complications of work load, etc.

Following the presentation, there was speculation as to whether self-identification of multidisciplinary would make a difference in a study of the fates of multidisciplinary proposals.

European Science Foundation update

Dr. Mats Gyllenberg, Chair of the European Science Foundation's (ESF) Physics and Engineering Sciences Council provided an update on the current status of the ESF. The key point he raised was that the ESF would be phased out and would be replaced by ScienceEurope. However a formal vote leading to the demise of ESF had not yet been taken. Science Europe had a founding meeting about two weeks ago and the driving forces for the creation of ScienceEurope have been Germany, the United Kingdom and other large countries. They will be financing ScienceEurope in the future. It is not quite clear how ScienceEurope would function. The European Research Council is funding top researchers, while ESF was working primarily on science strategy and initiatives with its science funding role involving networking among scientists, collaborative research programs, etc.

Merit Review Response

The MPSAC continued the discussion of the merit review process that had been initiated the previous day. They noted that is not clearly understood what aspect of the workload is the most onerous and where the bottlenecks arise. Being on a panel requires more time and energy than reading material at home, so one may find fewer senior people willing to come to NSF to serve on a panel. This could result in panels quite different from what a remote review panel would be. DMR and DMS say they get senior people, but this may not be the case in AST. There seem to be a lot of NSF programs

launched where no data are gathered to see if the past program has been successful, so this is an issue both for merit review and the workload issue for program officers.

Other points and suggestions that were raised included scheduling panels ahead of time to get on travel schedules earlier and doing a better job of explaining workload. One view was that principal investigators in the 2nd or 3rd year of an award owed some service to NSF, even to one suggestion that NSF consider adding a "citizenship" section to the proposal spelling out what panels the principal investigator had served on. Creativity extensions could be useful. The reason for this is that since CHE reports 50% success rate on renewals, it may be the case that the renewal is a foregone conclusion. The suggestion was also made that NSF should investigate and possibly learn from the practices and cultures of other funding agencies.

Preparation for Meeting with NSF Director and Acting Deputy Director

The discussion then turned to preparations for a meeting with the Director and Deputy Director at noon.

Science Drivers for FY 2014

Material Genomes Initiative: Dr. Ian Robertson, Division Director, DMR, described DMR involvement in the Materials Genome Initiative (MGI). This is a driver in FY 2013 and will continue to be one in FY 2014, and is aimed at designing and making new materials and new products twice as fast and at much lower cost than is presently possible. Its applications apply to national security, health, energy, and workforce development. In addition, a driver will be a mid-scale instrumentation program in association with MGI initiative. Dr. Joseph DeSimone asked a question concerning workforce development given this changing landscape. He wondered how this would impact how one would structure workforce development efforts. Robertson responded that part of advanced manufacturing will provide new tools and new ways of producing products and one will have to change how people think and are taught to develop new systems. He also noted that MGI is a partnership between CHE, DMS, DMR and three divisions in the ENG. Norman asked about data resources that this activity was counting on. Robertson responded that the problem the materials community has is how to handle data sets we already have. One needs to get the materials community to the point of understanding what it is to share data, work with large data sets. We're behind in those areas, but we're looking to catch up. We want to all use the same set of data when we start. It's the biggest challenge we have within the initiative. Dr. Juan Meza asked if Robertson was referring to new algorithm development or optimizing existing algorithms. Robertson responded that it was not about optimizing existing algorithms. DMR wants to see the next stage of development to push the frontiers rather than use what we currently have.

Sustainable Chemistry: Dr. Matthew (Matt) Platz, Division Director, CHE began his presentation by commenting that Congress had reauthorized the America Competes Act. Section 509 of this Act called for creation of green sustainable energy program. In response NSF has created a program called SusCHEM – Sustainable CHEmistry, Engineering, and Materials. Many parts of NSF will contribute. Each division will have its own unique focus, but there will be areas of overlap and MPS is looking forward to working together in those areas and doing co-funding.

In the light of a rapidly rising world population, the SusCHEM program has five priorities for CHE. These priorities are funding discovery of new chemistry that will allow us to replace rare/toxic chemicals with abundant/non-toxic ones; funding discovery of new separation sciences so we can recycle rare chemicals that cannot be replaced; funding discovery of new synthetic chemistry ; funding discovery of new catalysis chemistry – chemical processes performed at room temperature (lower energy) and catalysis that will not consume a great deal of fresh water; and funding innovations in education that will promote entrepreneurship so scientists in the academy will have the tools and skill set to translate that to companies, employment, and wealth creation.

Cyber and Large Data Sets: Dr. Sastry Pantula, Division Director, DMR noted that the Cyberinfrastructure for the 21st Century (CIF21) had its roots in the MPSAC. The common and unique

needs in data within big domain sciences involve developing core technologies and tools in computational, math, and statistical sciences and developing a national infrastructure of services, tools, software, data centers, and big data projects. The larger vision is to develop big data multi-disciplinary teams and grand challenges as well as developing workforce and career paths for data scientists. In this regards, we need a long-term, sustainable model, activities must be interlinked, we need multi-disciplinary data-enabled research, we need to connect to existing projects, and we need to leverage international investments

In the discussion that followed Pantula's presentation DeSimone asked about the type of business plans that have been drawn up to interface with massive data centers. Seidel responded that there had been a lot of conversation with the private sector. NSF had a number of programs experimenting through CISE to look at how we might use cloud technologies for new data-intensive scientific applications. He had just been at CERN and they had talked about working with the European Commission to develop private-public partnerships, specifically in area of data-intensive sciences. NSF wants science groups to drive the path forward. Norman commented that commercial cloud providers sell services for profit. So there's a fundamental tension between researchers and commercial providers. At the San Diego Supercomputing Center (SDSC) they've deployed the same technology that exists at Amazon or Google, but the SDSC does on a cost-recovery basis. Its infrastructure is up and available and is called SDSC Cloud. One can Google it. He hoped that the research community realizes there's a data-sharing platform out there that they can access on a cost-plus basis and we can start building up repositories. On the commercial side, however, one never knows what will happen with costs. If it gets to the point that it's cheaper to do it in commercial cloud than in private cloud, then SDSC will push their data to the commercial cloud. At the present time commercial clouds are not cost competitive. Commercial clouds for storage will not get much uptake from research community.

Complex Systems: Dr. Henry (Hank) Warchall, Acting Deputy Division Director, DMS discussed the possibility of focused research on complex systems. A complex system is defined as a system composed of interconnected parts that as a whole exhibits properties not obvious from the properties of the individual parts. Such systems are ubiquitous in nature and in human activities. Understanding complex systems underpins progress in every field of science and engineering. Increased knowledge can further scientific understanding of natural, built, and social systems and inform policy and provide improved information for decision-makers in a broad spectrum of crucial questions of national importance. Complexity application areas include, among many others, geosciences, biological systems, astrophysics, systems chemistry, materials research, and quantum information science. The connection with national needs includes medicine, power grids, finance and economics, information systems, nuclear power and transportation, and infrastructure resilience. There are also related NSF interest in the areas of computational infrastructure, engineering, and the computer sciences.

Dr. Joseph Dehmer commented that at present there is no theory of complexity, and Meza agreed, stating that this is a ripe area for DMS and that there was a lot of low-hanging fruit here. Dr. Sharon Glotzer agreed, stating that it would be a great area for NSF. It was an ideal area that DMS could be leading, as it ties together many "bubbles" in the underlying mathematics.

BioMaPS: Dr. Denise Caldwell, the Deputy Division Director in PHY described the ongoing BioMaPS program. This has been an ongoing activity for the last 2-3 years, particularly as the growth of programs within MPS that address the living world has been initiated in every division. There are now programs that specifically address questions coming from the living world. What BioMaPS has tried to do is make a better connection between the math/physical sciences and biological sciences. MPS received \$5.7 million to do this, with the same amount being provided to the BIO directorate. Implementation of the use of these funds took place by the issuance of a Dear Colleague. Thirty-five awards were made in FY2011, of which 19 had their primary home in MPS, and 16 had their primary home in BIO. The FY2012 request includes a significant increase in funding for BIOMAPS – in MPS there would be an additional \$20 million, BIO would receive an addition \$27 million, and ENG \$17 million. It is hoped that by FY2014 BioMaPS would be firmly embedded in programs.

Accelerator physics and plasma physics: Dr. Joseph Dehmer, Division Director, PHY began his presentation by noting that one of the qualities of plasma science is that plasmas are ubiquitous in the universe. Plasmas are involved in materials manufacturing, lighting, defense, and other areas of industry. Plasma science is an active part of the American Physical Society, but in terms of funding primary support comes for the Department of Energy. MPS has always supported plasma physics as part of the Atomic, Molecular and Optical Program (AMOP). The national academies had suggested an NSF/DOE partnership. This exists and has been renewed several times. It's very successful but is at a very low level (couple million dollars from NSF and twice as much from DOE) and support primarily goes to universities. The Department of Defense (primarily Navy) no longer supports plasma science research, and as a result there is a lot of proposal pressure in this area.

With respect to accelerator physics the DOE Office of High Energy Physics is the primary steward of this area. The question arises as to why NSF should play a role. Over the last several decades many of the technical leaders and ideas for the accelerator complex have come from the activity at Cornell with their electron collider, CESR. The field is at a turning point, and the need for accelerator physics (with its many applications) is high. In order to sustain an honest effort research in this area has to involve universities and student examining questions at the frontier of this field.

Mid-Scale Programs: Dehmer began by noting that there is a significant gap in funding between individual investigator grants and MREFC support (a few million dollars versus \$140 million). The gap is noticeable for multiple divisions in MPS, and has substantial effect on program balance and the ability to execute science. The divisions have different needs and approaches to the problem. There is no specific "science goal" of a mid-scale program, so how do you make it a priority? Dr. Francis DiSalvo commented that in both the mid-scale and large facilities, there's a growing recognition that instruments are used in multiple science areas, and this is so across directorates, but the current support for such things tends to come from one directorate or division. He was not sure that this model still makes sense. Dr. Luis Orozco commented that in the universities we need to maintain support for mid-scale instrumentation. NSF has a good program for supporting graduate students, postdocs, and summer salaries, but when it comes to needing a couple million dollars for a piece of equipment that would be useful for years, that is also necessary and would really enable great science to happen. Dr. Daniela Bortoletto felt that this is a critical NSF program need. Such a program needs to have flexibility because different parts of NSF will benefit differently. But it has to be science driven.

Lunch with NSF Director Dr. Subra Suresh and Dr. Cora Marrett

Berger welcomed Dr. Subra Suresh, NSF Director, and Dr. Cora Marrett, NSF Deputy Director. Dr. Suresh stated that given the current budget uncertainty, NSF is looking at the process of planning and strategizing on the basis of three approaches: First, no matter what the budget is, how does NSF frame its activities on the basis of principles that are aligned with the core mission of NSF? Second, NSF is looking for strategies to move NSF ahead, irrespective of the budget, while it continues to work behind the scenes to make a case for as high a budget as possible under the circumstances. NSF is trying to position itself well in the national and international scene. Third, for the last year NSF has been trying to create the collective notion of OneNSF to bring together activities that have a common platform to elevate them to agency-wide activities. As to how one chooses such activities, one first looked to NSF strategic plan and in all of these activities NSF's goal is to use the prestige of NSF to leverage activities that will have major national and international impact. NSF is also looking at internal operations, such as merit review.

Suresh announced that Seidel's term as Assistant Director was coming to its mandatory conclusion at the end of August 2012 and stated that NSF was beginning the search for a new MPS Assistant Director. He wished to give the MPSAC the opportunity to suggest members of the search committee and candidates to fill the position. He hoped that the new AD would be named and on board by July 2012 in order to ensure a smooth transition.

Dr. Elsa Reichmanis commented on the workload issues facing MPS and NSF staff. The number of proposal submissions to NSF in general, but particularly to MPS, is increasing, but the number of staff has stayed roughly constant. That is creating significant pressure on the individuals. Technology

advancements can help relieve pressure, but there will still be problems. What is NSF doing to address these issues? Suresh responded that he had made a decision that for NSF's budget process he would do everything possible to protect NSF staff numbers. However, in this climate, NSF won't have increases in staff. NSF does not want to go down the path that other agencies have in decreasing staff. Technology is just one solution. With respect to proposal review as the number of proposals increases, NIH has developed a triage system. NSF has resisted adopting such a system and there has been an NSF-wide group examining the question of new ways of conducting merit review. One of the reasons for appointing this merit review working group was to come up with all the things NSF could potentially do. He mentioned several examples – in some divisions, say, 10% of proposals have no hope of being funded and it is quite obvious. Should NSF consider triaging? Then there are community expectations – if different science communities have different expectations, then a problem exists. NSF wants to look at all possible solutions and consider them.

Dr. Cora Marrett commented that the NAS Deputy Assistant Directors and Directorate Executive Officers are looking at the number of working groups that exist in NSF and across agencies, and how to establish priorities with respect to the existence of these groups. Dr. Joseph DeSimone asked about whether NSF was considering benchmarking relative to other agencies on the workload issue and whether NSF could accept monies from existing private foundations.. Suresh responded that in the area of education NSF was benchmarking all federal agencies. NSF supports about 40% of federal STEM education research. He would be meeting with NIH next week to talk about coordination of policies and activities between agencies. With respect to private foundation funds, NSF has been authorized by Congress to accept private foundation money. Also, some private individuals have donated money to NSF in the past, and the BIO directorate has a project with the Gates Foundation. NSF has set up a separate account to receive funds. Strategic leveraging of resources from around the world resulted in the SAVI with India.

Halas noted that with respect to interdisciplinary activities, in the spirit of OneNSF, an MPSAC working group has been trying to understand the problem of the public perception that some interdisciplinary proposals are falling between the cracks at NSF and understand if there's information to determine if this is a correct perception. The working group is still in the fact-finding process and its goal is to try to solve this problem. She felt that MPS is a great organization to provide leadership to the agency as a whole. Bartoletto asked how NSF was preparing for budget cuts and dealing with the outcome of the budget supercommittee. Suresh responded that NSF was continuing to have conversations with Congress, including members on the supercommittee. Roberts commented that the MPSAC had spent a fair bit of time talking about the SEES initiative. It cuts across all the MPS divisions and the MPSAC was concerned with the significant budget request to SEES. Suresh replied that NSF has been discussing how to take a large program such as SEES that cuts across most of NSF and determine how to parse out what constitutes individual research versus major initiatives. NSF had had major discussions this year about how to move forward with both pessimistic and optimistic budget scenarios.

Norman commented that everyone knows that research has been transformed by computer technology. How is NSF moving forward with the CIF21 initiative, which requires significant investment now, in light of the current budget challenges? Suresh responded that CIF21 will continue to be an area of major interest. Computational analysis is critical to nearly every field, and that is not going to change. NSF is continuing to examine the form CIF21 will take. NSF is already discussing what's already being done across NSF and coherence of activities across NSF. Dr. Dennis Matthews commented that it was great that BioMaPS is forecast to grow and he thanked Suresh for promoting it, and asked that he keep the MPSAC informed as to how to keep it growing. Dr. Sharon Glotzer commented on entrepreneurship and the role of universities considering STEM education. What is his vision on the role of NSF in this? Suresh responded that innovation is a contact sport. While NSF brings together large numbers of scientists, NSF doesn't always bring them in contact with the entrepreneurship community. That's one of the goals of iCorps.

The meeting with Suresh and Marrett concluded with Suresh once again thanking the MPSAC for its work.

Other Business

Copies of the letter to the MPSAC members asking for names of candidates for the screening group or potential candidates for the position of AD/MPS were passed out. Berger asked that the names be submitted as indicated within ten days.

A discussion of the various working groups within the MPSAC followed. There will be a joint working group between MPS and EHR. Roberts and Reichmanis volunteered to be members. Aizenman will contact EHR and talk with them about how they want the group to function. An important first step will be to develop the charge so that the group knows what it needs to accomplish. Reichmanis suggested that it would be important to include the entrepreneurial aspects that Matt Platz talked about as part of the charge. DeSimone indicated he would also like to be included.

Berger asked if a working group on complex systems should be formed. Juan Meza supported this and volunteered to be a member. Sharon Glotzer also indicated an interest. Geoffrey West was volunteered *in absentia*.

DeSimone then brought up the topic of a potential change in the NSF Directorate structure. Platz commented that NSF was aware of this and that he thought it was a good idea. Every MPSAC meeting demonstrates that the present structure within MPS is very heterogeneous with different divisions having a different sense of direction and structure. He believes that the various divisions can function more effectively in a different structure. One should examine this to see if it would work and if it is in the realm of the possible. Berger asked if this would be easier or harder to do in the present structure. Seidel responded that a crisis can offer opportunities and admitted that the idea had not been followed up on because of the need to address the budget questions. But one should think deeply about how to organize NSF. Another possibility that has been put forth is to create virtual structures. A comment was made that one should make certain that reorganization does not just replace existing stovepipe structures with another set of stovepipe structures. Collaboration across all sectors is needed. Is the problem really structure or communication? DeSimone commented that the discussion mirrors the discussions that are taking place across university campuses. One would also need to talk with other Directorates. Robertson noted that the DMR Committee of Visitors had looked at the issue and made a recommendation to consider it, so DMR will have to respond to this. However, he would recommend that MPS should look at this first and take an internal look prior to reaching out to other Directorates.

Berger asked if there were any other working groups that needed to be formed. Seidel reminded everyone that a number of the white papers that had been developed by the working groups had already found their way into the budgets and that new ones could be useful. Midscale would be good, as would complexity. Orozco and Bortoletto offered to form a working group on midscale. Bruce Elmegreen, Juan de Pablo, and Frank Di Salvo also agreed. Chemistry volunteered George Crabtree.

Glotzer asked about reconstituting the group on matter by design and having it address the materials genome initiative. Robertson further added that bringing in ENG would be a good idea. The decision was made to reconstitute the group and make a joint group with the ENG MPSAC as was done with EHR. Aizenman noted that both Dr. Esther Takeuchi and Dr. Juan de Pablo had been on the original working. Glotzer commented that she would like to be a part of this working group.

Mike Norman then asked about data-enabled science and suggested that it might be a part of the current data activity.

Dr. Bruce Elmegreen commented that climate change needed to be looked at from a very broad point of view. He felt that NSF had a critical, leading role to play in this and that it should be put forward for FY 2014. Reichmanis indicated she would support this but in a way that dealt with data. Roberts indicated that he felt addressing climate change was already possible in SEES. He feels that it is important for NSF to emphasize this but did not think that it should be put forward as a budget driver at this point. It was noted that MPS already had a white paper on climate change. Seidel indicated that

this could be downloaded and possibly incorporated as part of SEES. Roberts suggested that one just revisit the white paper and maybe get other input.

Adjournment

The meeting was adjourned at 1:35 PM.

APPENDIX I

ATTENDEES

MPSAC Members Present at NSF

James Berger, Duke University
Daniela Bortoletto, Purdue University
Paul Butler, Carnegie Institution of Washington
Kevin Corlett, University of Chicago
Juan de Pablo, University of Wisconsin-Madison
Joseph DeSimone, University of North Carolina, Chapel Hill
Bruce Elmegreen, IBM
Barbara J. Finlayson-Pitts, University of California, Irvine
Sharon C. Glotzer, University of Michigan
Naomi Halas, Rice University
Elizabeth Lada, University of Florida (via teleconference)
Jerzy Leszczynski, Jackson State University
Dennis L. Matthews, University of California, Davis (via teleconference)
Juan Meza, Lawrence Berkeley National Laboratory
Michael Norman, University of California, San Diego
Eugenia Paulus, North Hennepin Community College
Luis Orozco, University of Maryland
Elsa Reichmanis, Georgia Institute of Technology
Fred S. Roberts, Rutgers University
Esther Takeuchi, SUNY, Buffalo

MPSAC Members Absent

Taft Armandroff, W. M. Keck Observatory
Emery Brown, Massachusetts Institute of Technology
Eric Cornell, JILA and the University of Colorado
George Crabtree, Argonne National Laboratory
Irene Fonseca, Carnegie Mellon University
Geoffrey West, Santa Fe Institute

MPS Staff

Morris Aizenman, Office of the Assistant Director, MPS
David Branch, Division of Materials Research
Denise Caldwell, Deputy Division Director, Division of Physics
Kevin Clancy, Division of Mathematical Sciences
Kelsey Cook, Division of Chemistry
Joseph Dehmer, Division of Physics
Janice Hicks, Division of Materials Research
Zakya Kafafi, Division of Chemistry
Dana Lehr, Division of Astronomical Sciences
Vernon Pankonin, Division of Astronomical Sciences
Sastry Pantula, Division of Mathematical Sciences
Tanja Pietrass, Division of Chemistry
Matthew Platz, Division of Chemistry
Ian Robertson, Division of Materials Research
Thomas Russell, Division of Mathematical Sciences
Edward Seidel, Assistant Director, MPS
Don Terndrup, Division of Astronomical Sciences
James Ulvestad, Division of Astronomical Sciences
Henry Warchall, Division of Mathematical Sciences
Maria Womack, Division of Astronomical Sciences

Visitors

Altaf Carim, OSTP

Keith Crank, American Statistical Association

Sandra Dawson, TMT

Miriam Heller, Mhitech Systems

Naomi Webber, Lewis-Burke Associates

Brittany Westlake, American Chemical Society

**APPENDIX II
BREAKOUT SESSION ROOMS
MPS Advisory Committee Meeting
Thursday Afternoon, November 3, 2011**

		DIVISIONAL ASSIGNMENTS FOR MPSAC MEMBERS						
		AST	PHY	CHE	DMR	DMS		
		Room	Room	Room	Room	Room		
		320	330	1020	1060	370		
Term Ends 09/30/12								
A	ARMANDROFF	A						
	CORLETTE					R		
	DE PABLO				R			
A	DESIMONE			A				
	GLOTZER				X			
	LESZCZYNSKI			R				
	OROZCO		R					
	ROBERTS					X		
Term Ends 09/30/13								
	BUTLER	R						
A	CORNELL		A					
A	CRABTREE				A			
	HALAS				X			
A	MATTHEWS		A					
	MEZA					X		
	NORMAN	X						
	PAULUS			X				
	TAKEUCHI			X				
Term Ends 09/30/14								
	BERGER					X		
	BORTOLETTO		X					
A	BROWN					A		
	DISALVO			X				
	ELMEGREEN	X						
	FINLAYSON-PITTS			X				
A	FONSECA					A		
A	LADA	A						
	REICHMANIS				X			
A	WEST		A					
A	Absent							
R	Breakout CHAIR, MPSAC member who will summarize Divisional meetings activities to MPSAC							

APPENDIX III

MPSAC Working Group Membership FY 2012

Computation - DES	Climate	Energy	SEBML	Life Sciences	Broadening Participation
Glotzer - Berger	Finlayson-Pitts	Takeuchi	Orozco	Matthews	TBD
de Pablo Fonseca Leszczynski Meza Norman	Armandroff Berger Butler Norman Reichmanis Roberts	Bartoletto Crabtree Fonseca West	Cornell Corlette DeSimone	Berger Butler de Pablo	de Pablo DeSimone Leszczynski Matthews Paulus
Lee Jameson (DMS) 703-292-4833 lameson@nsf.gov	Zeev Rosenzweig (CHE) 703-292-7719 zrosenzw@nsf.gov	Linda Sapochak (DMR) 703-292-4945 lsapocha@nsf.gov	Charles Bouldin (DMR) 703-292-4920 cbouldin@nsf.gov	Mary Ann Horn (DMS) 703-292-4879 mhorn@nsf.gov	Charles Pibel (PHY) 703-292-4971 cpibel@nsf.gov

MPSAC Working Group Membership FY 2012

Matter by Design	Basic Research	Facilities	Inter-Disciplinary	Mid-Scale	Education
De Pablo	Cornell	Armandroff	Halas	DiSalvo	Reichmanis
Glotzer Halas Leszczynski Reichmanis	Bartoletto Corlette DeSimone Fonseca Reichmanis	DeSimone Fonseca Matthews Orozco	Glotzer Orozco Reichmanis Takeuchi West	Bortoletto Crabtree De Pablo Di Salvo Elmegreen Orozco	DeSimone Paulus Reichmanis Roberts
Andy Lovinger (DMR) 703-292-4933 alovinge@nsf.gov	Morris Aizenman (OAD) 703-292-8807 maizenman@nsf.gov	Wayne van Citters (OAD) 703-292- gvancitt@nsf.gov	Morris L. Aizenman (OAD) 703-292-8807 maizenman@nsf.gov	Jospeh Dehmer (PHY) 703-292-7370 jdehmer@nsf.gov	Morris L. Aizenman (OAD) 703-292-8807 maizenman@nsf.gov

APPENDIX IV

February 9, 2012

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 November 3-4, 2012 (attached), and am pleased to certify the accuracy of these minutes.

Sincerely,

Signed

Jim Berger
Chair, Mathematical and Physical Sciences Advisory Committee