Minutes

MPS Advisory Committee Meeting

August 16, 2012
National Science Foundation

Thursday, April 16, 2012

Welcome and Introductions

Dr. James Berger, Chair of the Mathematical and Physical Sciences Advisory Committee (MPSAC) opened the meeting at 2:00 p.m. He welcomed members to the meeting, and, a roll call of members present at NSF, MPSAC members participating in the meeting via WebEx, as well as members of the two MPSAC subcommittees (The Division of Materials Research Materials 2022 subcommittee and the Division of Astronomical Sciences Portfolio Review subcommittee) was held. Berger invited Dr. H. Edward Seidel, the Assistant Director of MPS to address the Advisory Committee. Seidel noted that this was his last meeting with the MPSAC as his term as Assistant Director of MPS ended on August 31, 2012. He then commented that Morris Aizenman would be retiring at the end of August 2012 after 36 years in the Federal service – all at NSF. Berger invited Aizenman to make a few remarks.

Berger then invited the Co-chair of the DMR Materials 2022 subcommittee, Matthew Tirrell, to present the Materials 2022 report.

Report of the Division of Materials Research Materials 2022 Subcommittee

The Materials 2022 subcommittee of the AC includes 14 external members of the community, with MPS-AC representation by George Crabtree. The group was led by Roger Falcone, UC Berkeley, and Matt Tirrell, University of Chicago. The report was the result of one year's work, including in-person meetings, teleconferences and a webinar with the community.

Tirrell began by discussing the charge that the subcommittee had received. Basically, it was how can DMR best utilize its resources to meet national needs in instrumentation, provide access to unique instrumentation capabilities through user programs at national facilities, enable of multi-user instrumentation for the materials community, including operations and maintenance, taking into account programs by other agencies, identify opportunities for development of new instrumentation and facilities, and meet needs for workforce development. There were, however, boundary conditions within the charge. The subcommittee was not to consider proposals for future, or individual project, it was not to consider how funds are to be distributed among individual ongoing efforts, and it was to get community input.

Membership of the subcommittee was finalized during September 2011, and teleconferences were held in November and December of 2011. There was an onsite

meeting in December 2011, and a webinar was conducted with the community in February 2012. Another onsite meeting was held in March 2012. A preliminary report to the MPSAC was presented in April 2012, and the report was finalized via two rounds of email discussions involving the entire subcommittee during June – July 2012. Nearly 160 written comments were received from participants in Webinar and in direct email communications.

Tirrell then provided the background from the COV 2011 report regarding DMR facilities and instrumentation as well as its recommendations. Among the recommendations was that DMR should balance instrumentation portfolio so that all scales of instruments are provided, including $30K to $10M+; it should develop a facilities stewardship strategy; and DMR should develop instrumentation networks, possibly a national network, along the lines of the Materials Research Facilities Network (MRFN) developed by the MRSECs.

Tirrell commented that the challenges to the subcommittee were to identify compelling scientific cases for instrumentation programs as well as stewardship/ partnership in national user facilities; to identify the compelling broader impacts for instrumentation programs as well as stewardship/ partnership in national user facilities; and to provide recommendations as to the nature of instrumentation and facility programs that should be supported within the division.

In addressing the charge, the Materials 2022 subcommittee adopted a structure for the task of developing a vision for the infrastructure and facility needs of the materials community. The goals for NSF support of materials research instrumentation and facilities were discussed and formulated. Effective support mechanisms to meet these goals were examined and proposed. An analysis of balance among alternatives, that is, different scales and balances among various components of the materials research infrastructure, as they pertain to instrumentation and facilities was made and is presented.

The Materials 2022 subcommittee felt that the goals for DMR should be to provide sustained financial investment that makes cutting edge instrumentation, especially essential, new and unique instrumentation, accessible to university-based research programs; to promote research on development of new instrumentation that advances experimental frontiers, maintains an inventive culture and enables new discoveries; to provide access to a full range of cutting edge commercial instrumentation; to provide geographically distributed access to a full range of equipment capabilities for materials synthesis, characterization and processing; to play a crucial role in the education of successive generations of instrument and facility users, developers and operators; and to enable access to unique experimental capabilities that are beyond the scale of individual investigator laboratories.

With respect to mechanisms to achieve these goals, a major investment in instrumentation for materials characterization is needed, with an initial significant investment for multiple years to catch up with deferred investments, and a continuing and sustained investment to build and make available to the community the next generation of world-leading instruments. An initial surge in funding is critical to

establish a vibrant program. Technical staff to upgrade and maintain the state of the art instruments and to train users is critical. This stewardship task cannot be left to students and postdocs. The instrumentation initiative should be linked to national strategies for science, technology, innovation and competitiveness where appropriate. Advanced and innovative instrumentation is a primary enabling capability, central for NSF to achieve its research and education missions.

In view of this the DMR Materials 2022 subcommittee recommended that DMR should increase funding for MRI proposals and develop a mechanism for the acquisition and stewardship of equipment in the $100,000-$500,000 range, allowing for the possibility of bundling smaller pieces of equipment together in a single proposal to fulfill a suite of related characterization problems; that DMR should recognize and facilitate the critical role of professional staffing in the successful operation of instrumentation and characterization tools; that it is crucial that small-scale funding be provided to instrument developers during a period of University-based research, to keep a pipeline of new instrumentation flowing; that DMR should act on the long-standing idea originally from other sources, advanced here again, to develop a network of centers, termed Materials Discovery Centers (MDC); and that investments in instrumentation and facilities should be aligned with national initiatives.

With respect to the balance among alternative components of instrumentation and facilities investments, the subcommittee discussed alternatives extensively. There was reasonable consensus on the policy side, that is, on the philosophy of how DMR equipment and facilities investments might best be made. This could be distilled into two statements: (1) More investment needs to be made to enable excellent access, utilization and development of instrumentation from the small to mid-size, as defined earlier; and (2) DMR has a special responsibility to foster the earliest stages of research into effects that are likely to lead to characterization tools based on entirely new principles; and large-scale facilities investment by NSF should occur if a convincing case is made that the facility provides unique capabilities, not available elsewhere.

In his concluding comments, Tirrell noted that there is a general feeling that the US is falling behind in its investment related to point (1) above and that it is vital that this trend be reversed. On point (2), the subcommittee heard from many users of large-scale facilities about the important role they, too, play in advancing materials research. There is no argument about that. The discussion should be more centered around the proper role of NSF, as compared to DOE, NIST and other agencies. The subcommittee opinion is that NSF should value uniqueness and novelty over capacity-building in large facilities as criteria for support. NSF should also emphasize the importance of education of the next generations of instrument scientists and expert users of materials research facilities in making decisions on where to invest its financial support.

Tirrell went on to comment that a major investment in instrumentation for materials characterization is needed, with an initial significant investment for multiple years

(say 5 at least) to catch up with deferred investments, and a continuing and sustained investment to build and make available to the community the next generation of world-leading instruments. An initial surge in funding is critical to establish a vibrant program. The technical staff to upgrade and maintain the state of the art instruments and to train users is critical. Finally, the instrumentation proposal should be linked to national strategies for science, technology, innovation and competitiveness where appropriate. Advanced and innovative instrumentation is a primary enabling capability, central for NSF to achieve its research and education missions

During the discussion that followed Tirrell's presentation Elsa Reichmanis asked if any thought was given to the coordination with other agencies to more broadly fund more Materials Discovery Centers. Tirrell answered that Materials 2022 heard from several agencies including the Department of Energy (DOE) and the Department of Defense (DoD). He felt this was good, as this is a national problem and it is not owned by one agency. Taft Armandroff asked if Materials 2022 had considered the midscale instrumentation efforts of the MPSAC and Tirrell responded that the recommendations made by the Materials 2022 subcommittee are certainly aligned with that report. Barbara Finlayson-Pitts said that the Environmental Molecular Sciences Lab at PNNL has just had a $60M recapitalization and they are looking for users. It is worth looking at before embarking on something new. Tirrell responded that collaboration with DOE labs was discussed during the visit with Harriet Kung and that this can be further explored by DMR. Finlayson-Pitts then asked about the effect of this effort on individual investigator funding. Tirrell responded that Materials 2022 had focused on the balance of funding between facilities and instrumentation, not between individual investigators and instrumentation. Seidel reminded everyone that it is not a zero sum game. Finlayson-Pitts then asked how to influence universities on the technical staff support issue – universities like to get support for staff but when the money ends, the positions disappear. Tirrell responded that this recommendation was as much for universities as for NSF – and he suggested 3-5 year rolling contracts as a model to consider.

Mark Coles of NSF's Large Facility Office (LFO) asked about the international context. Tirrell replied that the subcommittee tended to focus on international competition as a driver. There was no explicit recommendation for cooperation, although this is a good idea. Randy Phelps of NSF's Office of International Activities (OIA) pointed out that divisions can supplement the Major Research Instrumentation (MRI) competition by adding funds and, for example, the Division of Chemistry had done that. Because MRI has a cost-sharing component, a Division can get more "bang" for the buck. Tirrell replied that supplementing MRI was one of the recommendations of Materials 2022. Phelps commented that many other divisions fund materials research and Tirrell responded that the Materials 2022 subcommittee recognizes that other NSF Divisions are important and should be included in discussions.

Seidel thanked Tirrell, Falcone, and the subcommittee for a very helpful report. Many parts of the report resonate with what is going on internally at NSF. It aligns well with the national Materials Genome Initiative (MGI) and the midscale instrumentation

effort. NSF's Cyberinfrastructure for the 21st Century (CIF21) is being conceived to include instrumentation, not just data and computations. The effort here is a good exemplar for grand challenge communities being discussed at NSF.

The MPSAC unanimously accepted the Materials 2022 Subcommittee Report.

Report of the Division of Astronomical Sciences (AST) Portfolio Review Subcommittee

Berger asked Jim Ulvestad, the Division of Astronomical Sciences to make some preliminary remarks concerning the Portfolio Review (PR). Ulvestad emphasized that the PR was a direct consequence of a recommendation from the New Worlds, New Horizons Decadal Survey in light of current budget realities. He described the charge to the subcommittee and subcommittee procedures. He then introduced Daniel Eisenstein, chair of the PR Committee.

Eisenstein began by noting that we are in a golden age of Astronomy, and that there has been enormous progress on many fronts, ranging from cosmology to exo-planets to the formation of stars, galaxies, and black holes. The U.S. has a vigorous and effective leadership position in the field.

Astronomy sets priorities for major new initiatives via National Academy of Sciences decadal surveys, the most recent of which was *New Worlds, New Horizons (NWNH)* and *Visions & Voyages (V&V)*. However, NSF must set priorities between these new initiatives and its current programs and facilities. This was the purpose of the PR subcommittee. He noted that Portfolio Reviews are essential for proper stewardship even in strong budget climates. Astronomy is driven by state-of-the-art technology and new ideas. To maintain U.S. leadership in the field, one has to balance existing projects and facilities relative to what is possible in the future. This task is made more important by the fact that budget forecasts are now more pessimistic than assumed by *NWNH*.

Eisenstein then gave an overview of the AST portfolio. AST supports a wide variety of activities, including state-of-the-art facilities in optical, radio, and solar astronomy; small-grants programs to support individual researchers; mid-scale projects, e.g., surveys & instrumentation; and support of instrumentation and operations at non-NSF facilities. The PR report adopts the average of FY10, FY11, and FY12 as today's baseline.

Currently, the budget challenges have to deal with the major new facilities are under construction. The Atacama Large Millimeter Array (ALMA) operations are ramping up to a U.S. share of about $40M/year (up from $23M in this chart). The Advanced Technology Solar Telescope (ATST) operations later in the decade will ramp up to nearly $20M/year, and the added cost of these activities adds an additional cost of 15% to the present budget. Unless the overall budget increases, this must displace something else.

Eisenstein noted that after correcting for inflation, the AST budget has dropped by 5% in each of FY11 and FY12. Looking to the future, it seems unlikely that the AST budget will grow significantly in the next few years. This is starkly different than the 4% annual growth (post-inflation) assumed in *NWNH*. In fact, the FY 2012 budget is already $45M behind NWNH scenario.

The Portfolio Review used two budget scenarios supplied by AST. Scenario A was the more optimistic of the two: After adjusting for inflation, AST purchasing power drops over the next few years to 90% of FY10-12 level, and then grows to 106% by FY 2022. However, Scenario B is more pessimistic. In this scenario, AST purchasing power drops by FY 2015 to 80% of FY 2010 - 2012 level, then stays constant to FY 2022. In fact, by FY 2022, these scenarios are only 50-65% of the *NWNH* scenario.

In either case, if one extrapolates from the *status quo b*oth scenarios require significant changes within the AST portfolio. Extrapolating the current set of facilities forward, plus the ramp-up for ALMA and ATST operations would sharply reduce all grants programs (small and mid-scale) by a factor of 1.5 in Scenario A and by a factor of 4 in Scenario B. In scenario A such reductions in grant funding would be severe, and in the case of Scenario B, they would be crippling. This is before consideration of any NWNH new initiatives. It is important to note that this collision is not at the end of the decade. It is upon AST even in FY 2012, and the pressure will amplify in the next few years.

Eisenstein described the community Input that had been received in preparing the report. They subcommittee had solicited community input in various forms. They had made use of updated program long-range plans (5 year) and vision statements (10-15 year) from the Arecibo Observatory, Gemini Observatory, NOAO, NRAO, and NSO. They had put out an open call for written input from community, with 3 month response window. AST used AAS town hall and a web document to orient people about the severity of the context and to advertise the call for input. They had received 131 responses, and they had been generally very thoughtful. The subcommittee had put out a more focused solicitation to Directors and the principal investigators (PIs) of major OIR and RMS facilities, posing questions about future directions for their facilities and their relation to the OIR and RMS systems.

The subcommittee had been charged to recommend a set of critical capabilities required to achieve decadal survey science priorities and these capabilities are a key metric for our prioritization.

In terms of technical capabilities, *e.g*., facilities, instruments, computers, these were derived by studying each of the 20 questions and 6 discovery areas from NWNH (plus the associated mapping from V&V). They itemized critical and supporting capabilities for each question and ranked the critical capabilities within 4 broad themes (cosmology and fundamental physics, galaxies, stars and stellar evolution, planetary systems and star formation) based on the *NWNH* science theme panels. The subcommittee looked at the health of the profession capabilities, and itemized critical capabilities required for stewardship of the field and continued U.S. leadership in astronomy.

The subcommittee then focused on FY 2017 and FY 2022 to determine portfolios. FY 2017 includes the full ALMA ramp-up and the bulk of the ATST ramp-up. Given that FY 2014 budgets are already being designed, FY 2017 is a plausible time frame for AST to implement major recommendations on facilities. FY2022 would be the time of the next decadal survey and could include operations of two top-ranked NWNH priorities: the Large Synoptic Survey Telescope (LSST) and the Cerro Chajnantor Atacama Telescope (CCAT).

In determining the facility portfolios for FY 2017, it takes longer to adjust than the grants portfolio and responsible divestment takes years. In order to have a major change at a facility by FY 2017 requires a decision soon, long before one know whether the FY 2017 AST budget will be more like Scenario A or B.

Therefore, the subcommittee's recommendations for both scenarios have the same suite of current facilities for FY 2017 and it is inevitable that the grants programs will have the bulk of the variation between the two Scenarios.

Eisenstein noted that In terms of portfolio balance, astronomy needs both robust grants funding and state-of-the-art facilities. The two work together. Scenario B will require substantial cuts in both facilities and grants. However, for the subcommittee to be more optimistic in planning for facilities would place the grants program at risk for even more drastic cuts if the hoped-for budget does not materialize. This would be catastrophic: crippling loss of support of science analyses, development of new instruments and technologies, training of next generation of astronomers.

The subcommittee therefore recommended that AST plan its portfolio of current facilities assuming the more pessimistic range of forecasts (e.g., Scenario B), with the result that more optimistic budgets (e.g., Scenario A) can have heavier investment in the field through the small-grants and mid-scale programs and through *NWNH*-recommended new facilities.

Eisenstein then discussed the subcommittee's recommendations for small grants. Small research (AAG) and instrumentation (ATI) grants should remain top priorities within the AST portfolio. These individual investigator grants are crucial for the scientific output of all of the critical technical capabilities and are central to many of the health of the profession capabilities and their importance was stressed by *NWNH*. Additional recommendations for small grants programs are contained in the subcommittee's report.

With respect to recommendations for mid-scale projects, many of astronomy's critical capabilities could be advanced by surveys, experiments, and instruments at mid-scale project level ($3-50M). *NWNH* strongly recommended increased investment at this scale via a formally competed line. The subcommittee recommends that the Mid-Scale Innovations Program (MSIP) unify all fixed-term mid-scale projects, including the Telescope System Instrumentation Program, the University Radio Observatories, and major instrumentation projects at national observatories.

Eisenstein then discussed the subcommittee's recommendations for facilities. The subcommittee ranks ALMA, ATST, VLA, Gemini-South, Blanco, and Dunn Solar Telescope as essential facilities. ALMA, the expanded VLA, and ATST are all new and world leading. The Blanco 4-m is commissioning the Dark Energy Camera (DEC), and will be the best in class until LSST. The Gemini-South 8-m will have compelling instruments and strong synergy with ALMA, Blanco/DEC, and LSST. Also, it is important to note that the U.S. has comparatively few southern hemisphere large telescopes. With respect to solar science, the Dunn is crucial for a smooth build-up to ATST's science capabilities and the subcommittee recommends that the Dunn be operated until two years before ATST first light, similar to NSO plan.

The subcommittee recommends continuation of operations at Gemini-North, Arecibo, SOAR, and the NSO Integrated Solar Program (NISP). Gemini-North is the subcommittee's highest ranked optical –infrared (OIR) facility in the northern hemisphere. Arecibo is the world's largest single-dish radio telescope and radar source; it is under a cost-sharing agreement at least through FY16. The SOAR 4-m telescope was built under a partnership agreement that lasts until 2018 and the subcommittee recommends that AST not renege on that agreement. The subcommittee also recommends that recommend that NISP be required to find cost sharing to reduce AST costs to $2M/yr. The subcommittee also recommends that later in the decade AST reevaluate its participation in Arecibo and SOAR in light of science opportunities and updated budget forecasts.

Eisenstein then turned to facilities that that subcommittee recommended for divestiture. The subcommittee recommends that AST divest from the Mayall 4-m, the WIYN 3.5-m, the 2.1-m, and the McMath-Pierce telescopes at Kitt Peak, the Green Bank Telescope, and the Very Long Baseline Array. In making these recommendations the subcommittee understands that these facilities still have considerable science merit and that divestment from them will have significant impact on many people. However, within realistic budgets, the subcommittee felt that these facilities clearly rank below FY 2017 opportunities elsewhere in the portfolio, particularly in the grants program.

Eisenstein emphasized that divestment does not necessarily mean closure. The subcommittee expects that AST will explore many different options, including finding new organizations, agencies, or NSF divisions to fund and operate the facilities. However, the subcommittee believes that the end of AST funding will likely mean an end to open-access time on these facilities.

With respect to recommendations for NWNH New facilities, the subcommittee recommends that LSST construction begin with an MREFC start in FY 2014. The LSST is the top-ranked large project in *NWNH* and the subcommittee similarly judges it to be of very high value. It is important to note that LSST construction funds come from MREFC and hence do not worsen the AST budget crunch that is expected over the next 5 years. The subcommittee recommends that AST provide partial funding to the Cornell Caltech Atacama Telescope (CCAT) later in the decade, if funding for other mid-scale projects exceeds $30M/year (about halfway between Scenario A and B). Also, in Scenario A, the subcommittee recommends that AST contribute

$20M/year to Giant Segmented Mirror Telescope (GSMT) late in the decade. Support for the Atmospheric Cerenkov Telescope Array (ACTA) be considered at lower priority than the above and support would require budgets at least as strong as Scenario A.

For Scenario B in FY 2017, the subcommittee notes that the funding level is only 78% of the purchasing power of FY 2010 – FY 2012 baseline, and there will be significant increases in ALMA and ATST operations funding. The result will be severe pressure on all portions of the budget. The small-grants funding would drop to 78% of FY 2010 - 2012 baseline; the mid-scale grant funding would drop to 72% of baseline, and observatory funding would drop to 79% of baseline. There would be no funding for CCAT or GSMT, so LSST would be the only NWNH major recommendation pursued. The subcommittee regards this level of small-grants and mid-scale funding as highly stressed and this despite the difficult facility divestments already described. The subcommittee feels it is essential for AST to hedge against deeper cuts in the grants program.

Scenario A in FY 2017 was then described. Scenario A in FY 2017 has a 7% drop in purchasing power compared to FY 2010 - 2012. Scenario A achieves a stronger grants program (but still well short of the augmentations recommended in *NWNH*). Small grants would be funded at 94% of the FY 2010 – 2012 baseline. Mid-scale grants funding would be increased to 128% of baseline, nearly double that of Scenario B. Overall, grants funding would be at 103% of baseline, while observatories would be at 86% of the FY 2010 – 2012baseline. Instrumentation and other mid-scale projects would be much better supported, leading to better use of the continuing AST and non-AST facilities.

Eisenstein then turned to the FY 2022 recommended portfolio. In Scenario A, by FY 2022, AST budget will have recovered to 106% of the FY 2010 - 2012 purchasing power. This will allow substantial investment in the field, achieving more of the *NWNH* recommendations. In Scenario B, in FY22 AST budget remains at only 80% of FY10-12 purchasing power.

In summary, the combination of increasing operations costs for ALMA and ATST with the expectations of a flat or contracting budget forces a major redistribution of the AST budget in the next few years. The Scenario B portfolio contains significant reductions in current facilities, small grants, and mid-scale projects; LSST would be the only major *NWNH* initiative pursued. These facility divestments must occur promptly or AST risks even larger cuts to the grants program and a severe imbalance in the field. The Scenario A portfolio invests more heavily in grants, particularly mid-scale projects, as well as in CCAT and eventually GSMT. By investing more in instrumentation and mid-scale collaborations, AST can keep the remaining facilities (both AST and non-AST) more competitive and return some time to open-access use.

Eisenstein concluded his presentation by noting that while the economic climate is a severe challenge, the subcommittee remains optimistic that the AST portfolio will remain a vibrant force in astronomical research. There will be new world-leading

facilities in ALMA, the ATST, the Expanded VLA, and LSST. In stronger budget scenarios, AST can collaborate in CCAT and GSMT. The MSIP and small-grants programs will allow AST to foster the best peer-reviewed ideas, to develop new technologies and instruments, maintain the health of the profession, and leverage the opportunities at non-AST facilities.

During the discussion following Eisenstein's presentation Berger asked in which year the effect of LSST operations on the AST budget starts Ulvestad responded that if LSST has an FY 2014 start, then full operations would begin in FY 2022 but the ramp-up would start in FY 2019 - 2020. Coles asked if there a consideration of closure liability if divestment of telescopes turns out to be impossible. Eisenstein responded that the subcommittee did not explicitly consider divestment costs, but understands that they can be significant. The uncertainties in these costs are so large, however, that the subcommittee felt it had to be left to AST as an implementation issue. Ulvestad added that AST told the subcommittee not to worry about divestment costs because it is not their area of expertise. AST gave them a rough rule that if you want to close a telescope and restore a site it will probably take a couple of years or more of operations funding to carry it out – that is, to achieve savings in 2017 you have to take steps in 2014. Eisenstein amplified that the last point is important: divestments take time. Berger commented that if divestment funds come from AST is that not another hit? Ulvestad responded that it means you have to stop science operations sooner and use what you would have spent on science to divest. In this manner one does not need new money but you have to do it earlier by 2 years or so. Seidel commented that the report is "very important to NSF," and expressed appreciation for the subcommittee's effort in producing a very thoughtful and highly quantitative report.

The Chair called for negative votes or abstentions. Armandroff abstained because of his membership on the AURA Observatories Council. There were no other abstentions or negative votes.

The MPSAC Portfolio Subcommittee Report was accepted.

Update on Actions Resulting from MPSAC Subcommittee Report on Name of Division of Mathematical Sciences

Seidel began this session by reviewing the history concerning this topic. There had been a suggestion made by the Director of the Division of Mathematical Sciences, Sastry Pantula, to change the name of the Division to the "Division of Mathematical and Statistical Sciences." This had resulted in considerable comment by the community, and a subcommittee of the MPSAC had been created to examine this question. The subcommittee had asked the public for input, and there had been diverse responses, with over 300 pages of input. This subcommittee had provided its report at the April 2012 meeting of the MPSAC.

After discussion with the other NSF Assistant Directors, he has decided not to change the name of the Division of Mathematical Sciences. However, he has noted

that the statistical sciences community feels separate from the other areas of mathematics and so future solicitation will call out “statistics” explicitly. He is asking the Chair of MPSAC to create a subcommittee to look at NSF support of statistics. The cochairs of this subcommittee will be Fred Roberts of Rutgers University and Iain Johnstone of Stanford University. The subcommittee will look at support of statistical sciences across NSF, particularly with respect to Big Data. The subcommittee will be made up of members from each of the NSF Directorate advisory committees as well as members of the community. There will be a working group within NSF chaired by Sastry Pantula, and the subcommittee will report out during the Spring 2013 advisory committee season. Roberts thanked Seidel for his support and he looks forward to working with Berger and others on this activity. Pantula thanked Seidel, Roberts, and Berger. He said that he had originally proposed the name change to recognize the distinct discipline of statistics, and he was looking forward to working with the subcommittee.

The MPSAC approved formation of the subcommittee.

Adjournment

There being no other business, the meeting was adjourned at 4:00 PM.

APPENDIX I

ATTENDEES

MPSAC Members Present at NSF
James Berger, Duke University
Juan Meza, Lawrence Berkeley National Laboratory

MPSAC Members Present via WebEx
Taft Armandroff, W. M. Keck Observatory
Daniela Bortoletto, Purdue University
Emery Brown, Massachusetts Institute of Technology
Kevin Corlett, University of Chicago
Eric Cornell, JILA and the University of Colorado
Juan de Pablo, University of Wisconsin-Madison
Francis DiSalvo, Jr., Cornell University
Bruce Elmegreen, IBM
Barbara J. Finlayson-Pitts, University of California, Irvine
Jerzy Leszczynski, Jackson State University
Luis Orozco, University of Maryland
Elsa Reichmanis, Georgia Institute of Technology
Fred S. Roberts, Rutgers University

MPSAC Members Absent
Paul Butler, Carnegie Institution of Washington
George Crabtree, Argonne National Laboratory
Joseph DeSimone, University of North Carolina, Chapel Hill
Irene Fonseca, Carnegie Mellon University
Sharon C. Glotzer, University of Michigan
Naomi Halas, Rice University
Elizabeth Lada, University of Florida (via teleconference)
Dennis L. Matthews, University of California, Davis (via teleconference)
Michael Norman, University of California, San Diego
Eugenia Paulus, North Hennepin Community College
Esther Takeuchi, SUNY, Buffalo
Geoffrey West, Santa Fe Institute

MPS Staff
Morris Aizenman, Office of the Assistant Director, MPS
Joesph Akkara, Division of Materials Research
James Alexander, Division of Mathematical Sciences
Beth Blue, Budget Office
David Brant, Division of Mathematical Sciences
Kevin Clancy, Division of Mathematical Sciences
Andrew Clegg, Division of Astronomical Sciences
Mark Coles, Large Facility Office
Pedro Embid, Division of Physics
Craig Foltz, Division of Astronomical Sciences

Tom Gergely, Division of Astronomical Sciences
Susan Hamm, Office of Assistant Director, MPS
Janice Hicks, Division of Materials Research
Scott Horner, Large Facility Office
Dana Lehr, Division of Astronomical Sciences
Bruce Palka, Division of Mathematical Sciences
Vernon Pankonin, Division of Astronomical Sciences
Sastry Pantula, Division of Mathematical Sciences (via WebEx)
Elizabeth Pentecost, Division of Astronomical Sciences
Randy Phelps, Office of Integrated Activities
Matthew Platz, Division of Chemistry
Bob Robinson, Division of Atmospheric and Geospace Sciences
Ian Robertson, Division of Materials Research
Celeste Rohlfing, Office of Assistant Director, MPS
Linda Sapochak, Division of Materials Research
Philip Schwarz, Large Facilities Office, NSF
Edward Seidel, Assistant Director, MPS
Tara Smith, Division of Mathematical Sciences
Linda Sparke, National Aeronautics and Space Administration
Paul G. Spyropoulos, Office of Assistant Director, MPS
Tom Stafford, Division of Astronomical Sciences
Donald Terndrup, Division of Astronomical Sciences
James Ulvestad, Division of Astronomical Sciences
Kathleen Turner, Department of Energy
G. Wayne Van Citters, Office of Assistant Director, MPS (via WebEx)
Lisa Van Pay, Office of Legislative Affairs
Henry Warchall, Division of Mathematical Sciences
Christer Watson, Division of Astronomical Sciences
Ashley White, Division of Materials Research
Maria Womack, Division of Astronomical Sciences

Visitors
Tom Bagrtan, National Radio Astronomy Observatory
Tony Beasley, National Radio Astronomy Observatory
Gary Bernstein, University of Pennsylvania (via WebEx)
Yudhijit Bhattachardee, Science
Geoffrey Blake, California Institute of Technology (via WebEx)
Debra Fisher, Yale University (via WebEx)
Daniel Eisenstein, Harvard University (via WebEx)
Yves Idzerda, Montana State University
Hans Kaper, Argonne National Laboratory
Cornelia Lang, University of Iowa (via WebEx)
John Mester, Associated Universities, Inc.
Angela Olinto, University of Chicago
Miriam Quintal, Lewis-Burke Associates
Sam Rankin, American Mathematical Society
Matthew Tirrell, University of Chicago (via WebEx)
Rene Walterbos, New Mexico State University (via WebEx)

Ronald Wasserstein, American Statistical Association

APPENDIX II

August 31, 2012

Dr. H. Edward Seidel,
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 August 16, 2012 (attached), and am pleased to certify the accuracy of these minutes.

Sincerely,

Signed

Jim Berger
Chair, Mathematical and Physical Sciences Advisory Committee