

JPBM Meeting

Minutes of Meeting

April 28, 2014

Organizational Attendees: Linda Braddy, Robert Bryant, James Crowley, Robert Devaney, Barbara Faires, Irene Fonseca, David Levermore, David Manderscheid, Don McClure, Michael Pearson, Stephen Pierson, Miriam Quintal, Carla Savage, Nathaniel Schenker (chair), David Vogan, Ron Wasserstein

Guests: Ann Drobnis, Howard Gobstein, Michael Vogelius,

The meeting began at 9:00am.

Nat Schenker, ASA President and chair of JPBM, welcomed the members, who then introduced themselves.

Minutes from the October 28, 2013 JPBM Meeting held were approved (Pearson, Devaney).

NSF-DMS Director Michael Vogelius

Director Vogelius reported on the budget and activities of the Division of Mathematical Sciences, including:

- NSF is operating in a level budget situation at best.
- The MPS budget is currently at \$1.3B. DMS represents \$226M of that budget, only 92% of the 2010 level.
- The funding success rate (awards/proposals) was 26% during FY13. He hopes to maintain at least this level going forward.
- About 76% of the DMS funding goes to individual investigators, 12% goes to institutes, 9% goes to workforce development, and 3% to other costs (taxes, panels, IPA). Vogelius said this model of heavily weighting toward individual investigators is important and has proven to be successful for mathematics.
- Rationalizing DMS interdisciplinary investments: Taking a good look at the most effective ways to leverage resources. They have created the MSII (Mathematical Sciences Innovation Incubator), with the following goals: To facilitate DMS co-review and co-funding of multi-disciplinary research collaborations involving mathematical scientists; to provide leverage for investments of non-DMS NSF programs in projects that include mathematical scientists; and to provide a uniform mechanism through which collaborative research teams involving mathematical scientists can request DMS co-review. The expectation is that this will grow into a disciplinary/multi-disciplinary program. For this year, the program can be viewed as a vehicle for DMS participation in BIGDATA, with funds available from DMS and OMA for this purpose. Next year, the program will connect with DMREF, SaTC, and BIGDATA. By 2016, they hope it will be a budget driver. Criteria for MSII support include: likely impact of the involvement of mathematical scientists in the project; the extent to which the mathematical sciences play an essential role in the proposed research project; novelty of the proposed collaboration or research

topic; and potential for impact of the research project in furthering mathematical sciences research.

- Broadening participation in research: Goal is to increase participation by groups of representatives that are underrepresented in DMS. A small pool of money has been set aside to help in this regard.
- Workforce Program modernization: RTG, REUs, etc. These programs have taken some cuts, but he wants to prevent further ones. Vogelius says failure to support these programs would have long term negative consequences. Individual PI grants relatively rarely support graduate students, so RTGs remain the best way to gain this support. RTGs will continue, with a slightly sharpened focus on the “value of the added training components.” MCTP (Mentoring through Critical Transition Points) will be discontinued, and replaced by a program for “Enriched Graduate Research Training” (“EGRT” – this is not the official name at this point). This new program aims to provide: enhanced understanding of research area in broader context; preparation to take mathematical inspiration from problems in other disciplines; better preparation for and knowledge of a wide range of career paths in business, industry, and government (BIG). Proposals will be open to university departments and professional organizations. Collaboration with partners from BIG will be encouraged.
- Vogelius emphasized the important of white papers from societies, especially with regards to how mathematics can support other research. This is a means of building up the core budget. White papers putting meat on examples in the Mathematical Sciences 2025 report is an example of what could be done.
- The number of institutes will not be increased in the next few years, due to lack of funds. Current institutes will be continued if they continue to have good reviews. The institutes must be viewed as national resources, not just a university resource.

Washington overview (Pierson, Quintal, Rankin, Manderscheid)

House CJS Subcommittee may mark up the funding bill later this week. The leadership of the subcommittee are supportive of NSF but are pressured to fund other things as well. The Senate Appropriations Committee has indicated that budgets are austere. The advice is “to ask for what you want, but not to expect big increases.” A Dear Colleague letter for \$7.5B NSF in the House has 134 signees. A Senate version has 21 so far. The science community has embraced the \$7.5B figure in its advocacy efforts. We’ll have to be realistic about the likelihood of success, but the unity of groups asking for \$7.5B is cause for optimism.

A Senate hearing tomorrow will involve the directors of NSF, OSTP, DARPA, NIH, and DOE. Testimony has been submitted in regard to this hearing. The AAU has provided significant testimony for the hearing, with many other organizations (including all the JPBM organizations) signing on.

NSF reauthorization bill concerns the community because it is flat (and has no vision), it cuts SBE funding, and it interviews with the review process. In 2007, NSF was reauthorized in the America COMPETES bill, championed by Senator Rockefeller. The bill included doubling over 7 years, but the 2010 reauthorization changed that to ten years. Now, the new bill is called FIRST, and has the three problems previously mentioned. The bill has not yet been marked up in the science committee, and may

not have enough votes to even get out of committee. The National Science Board took the extraordinary step of speaking publicly against the bill.

Open access: NSF is moving forward on open access issues, coordinated by the SBE directorate. The approach is incremental and allows flexibility for NSF divisions and directorates. They have decided not to build their own repository. The intention is not to make this onerous on the community, not negatively affecting the current publishing model.

STEM: Graduate education is still a focus of the Obama administration. The NSF re-training program is focused on STEM. Undergraduate education programs have been consolidated across the board at NSF. The Obama administration is concerned about challenges to getting STEM degrees, and math has been identified as a reason many students fall away from STEM programs (“math as a stumbling block”). The math community will need to engage on this issue to make sure people are aware of the community’s efforts in this regard.

Updates on undergraduate education issues

INGenIOuS

Linda Braddy reported on the INGenIOuS Workshop (Investing in the Next Generation through Innovative and Outstanding Strategies). The JPBM societies were all involved, and the workshop was funded by DMS.

The vision is: (1) Ensuring that the next generation of undergraduate and graduate students view the mathematical sciences as a vibrant choice ... and not just for academic jobs. (2) Positioning Mathematics and Statistics departments to create a workforce ready to meet 21st century challenges.

The workshop was conducted in July 2013, and the report was posted in January, 2014. Funding has been obtained to provide some printed copies. The [online report](#) is not in final format, though no further change to content is expected.

The report addresses six threads identified in the workshop:

- Thread 1: Bridge gaps between business, industry, & government (BIG) & academia
 - Acknowledge & address the interests & requirements of BIG employers in educational experiences in academia.
 - Forge new & strengthen existing relationships; promote collaborations among academia and BIG.
 - Connect students to BIG internship opportunities.
 - Develop opportunities for student research experiences onsite with BIG employers.
 - Disseminate information regarding the math/stats skills & competencies needed for BIG careers.
- Thread 2: Improve students’ preparation for non-academic careers
 - Provide math sciences students with career-appropriate preparation that emphasizes the centrality of math & stat to the STEM enterprise.

- Can increase in number of graduates who enter the workforce well equipped with math/stats skills & expertise.
 - Better inform students about career prospects in math/stats.
 - Can boost recruitment and retention.
 - Modernize curricula.
 - Begin WEU and WEG programs.
 - Like an REU in BIG environment/research; undergrads & grads.
 - Change (some) faculty members' perceptions & valuation of BIG careers for their students.
- Thread 3: Build public awareness of role of math/stats in STEM & non-STEM careers
 - Include focus on faculty, students (including K-12), pre-service teachers, AND the public at large.
 - Professional organizations: Undertake an expanded, cooperative, and coordinated effort (“collective action”).
 - Departments: Include speakers from BIG as part of regular colloquia/seminars.
- Thread 4: Diversify incentives, rewards, & methods of recognition in academia
 - Revise promotion & tenure criteria to include a broader set of professional activities.
 - Build a community that embraces diverse faculty roles.
 - BIG employers: Encourage, recognize, & reward math/stats scientists who engage in workforce preparation.
 - Professional organizations & funding agencies recognize exemplary programs & support replication.
- Thread 5: Develop new curricular pathways
 - Traditional curricula & programs
 - Dominated by upper level theory courses.
 - Need more focus on apps that reflect the complexity of BIG problems.
 - Need more focus on big data applications, modeling, data analysis, visualization, high performance computing, & standard BIG technology.
 - Need to **modernize** curricula & programs to better capitalize on the interplay of math/stats with a broad spectrum of career options & to better serve students.
 - Alternative entry points besides freshman algebra or beginning calculus.
 - Alternative options for major; interdisciplinary minors; professional master's degrees.
 - Alternate remedial and general education pathways.
 - Should College Algebra be a terminal, gen ed course?
- Thread 6: Build & sustain professional communities
 - A national community focused on workforce development to share information, resources, & best practices.
 - Current technology tools.
 - Assessment & evaluation.
 - Identify internships & improve job placement.
 - Implementation: Virtual and in-person communication tools.
 - Electronic listserv, discussion board, workshops.

- On-site, multi-day sessions for academics at BIG entities during which they join a team working on existing problems.

ISSUES (Integration of Strategies that Support Undergraduate Education in STEM)

Linda Braddy also reported on this workshop, held at the end of January with 27 participants. The goals were:

- To find areas in which STEM professional societies can
 - Learn from each other's educational activities.
 - Coordinate efforts and policy statements to increase their collective effectiveness ("collective action").
 - Leverage their influence to improve undergraduate education within individual colleges and universities.

The report of the workshop can be found at <http://serc.carleton.edu/issues>. The report identifies "areas for collective action," as follows:

- Encourage and coordinate professional development for early career faculty.
- Provide resources for chairs for self-assessment of teaching effectiveness.
- Encourage broader participation in STEM programs through active recruitment, communication of possible pathways, and connections to potential employers.
- Find common language for policy statements on educational issues; look for opportunities to reinforce the message across disciplinary boundaries.
- Develop common rubrics (across fields) for assessing the effectiveness of discipline-specific programs.

Among the follow up plans is another workshop, to be organized by the MAA and the ASA, entitled "A Common Vision for the Undergraduate Math Program in 2025." The purpose would be to develop a shared vision of the need to modernize the undergraduate mathematics curriculum, especially the first two years. This would be a vision that a core group of professional societies can endorse and promulgate, and about which the societies have some degree of confidence that a broad cross-section of the community will embrace. NSF-DUE funding will be sought.

Joint MAA/ASA statement on teaching the introductory statistics course

Ron Wasserstein reported that the MAA and ASA have collaborated on a joint statement about the qualifications for teaching undergraduate statistics. He said the statement is intended to be helpful to advance the quality of teaching without trying to be prescriptive. While an expected educational level is presented in the statement, it is recognized that it is not realistic everywhere, so the statement includes information about resources available to help people assigned to teach these courses who may not be well prepared.

StatsNSF

Irene Fonseca briefly updated us on the status of the StatsNSF subcommittee of the MPS Advisory Committee (MPSAC). Co-chairs of StatsNSF are Iain Johnstone and Fred Roberts. The report is in draft form. Input has been received from MPSAC. Input is expected from other advisory committees. The draft report will be updated based on the input received. Final version will go to MPSAC for acceptance in July.

CATS big data training workshop

Dave Levermore reported. The workshop brought together people from the statistics community and the computer science community to discuss training needs for undergraduate and graduate students in “the age of big data.” Many major companies were represented. These companies have better access to OSTP than our communities do. Discussions like this should be enlarged and continued, because big data is influencing everything. Many other areas in the mathematical sciences (and other sciences) were not represented in this discussion. Participants in this workshop seemed unaware of important activities in some of these other areas, including some major educational reforms in undergraduate mathematics. The mathematics community needs to be at the table.

JPBM Communications award changes

At our Fall 2013 JPBM meeting, a group (consisting of Bob Devaney, David Levermore, Carla Savage, and Ron Wasserstein) was asked to consider whether to broaden the award by presenting it to multiple winners each year. The issue arose because two things were noted by our most recent award selection committee: there are many of good candidates for the award, and it is quite difficult at times to compare candidates who work in vastly different media.

The group recommended addressing both the quantity of high quality candidates and the variety of media in which they work by giving, when appropriate, two or more awards, but to add a category to the name of the award. For example, if we had wanted to honor George Csicsery and Dana Mackenzie in the same year, we might have awarded Csicsery the “JPBM Communications Award - Excellence in Visual Media” and Mackenzie the “JPBM Communications Award - Excellence in Print Media”.

There are several components to this approach:

- We would never give multiple awards if we didn't feel we had multiple top candidates in any given year
- Adding the category name clarifies that there wasn't a tie, but two separate winners
- We can change the category names whenever we need to, because new categories of communication are being invented all the time
- Just because we gave an award for “excellence in visual media” in year N would not require us to give an award in that category in any subsequent year
- We can be as specific as we want with the category name. For instance, the categories in the examples above are very broad. We could zero in: Csicsery could have earned it for “Excellence in Filmmaking” and Mackenzie for “Excellence in Science Writing”
- Bottom line: The JPBM would have wide latitude to recognize more worthy winners while leaving flexibility for future awards.

The proposal passed unanimously on a Faires, Levermore motion. It was clarified that the prize amount would not be split, but that the same amount (currently \$1000) would be given to each awardee, and that the JPBM still makes the final decision (the award committee provides a recommendation to JPBM).

The award committee for the upcoming (2015) award will be Barbara Faires, David Levermore, Don McClure, and Ron Wasserstein (chair).

The committee was asked to prompt the societies to send out calls for nominations.

Mathematics Awareness Month (MAM)

Michael Pearson provided the following report to the JPBM (in advance of the meeting) on the 2014 MAM:

Some highlights:

- In addition to regular distribution of posters, a \$5000 contribution from Nancy Blachman enabled us to distribute an additional 1000 posters to HS teachers. Availability was announced through an NCTM email distribution and to teachers who normally participate in MAA AMC.
- MAA had two lectures in April (Colm Mulcahey on April 1, and Peter Winkler on April 23), both focused on the MAM theme. See www.maa.org/meetings/calendar-events/maa-distinguished-lecture-series for details.
- MAA partnered with Google to offer four "connected classroom" events; see www.maa.org/news/maa-and-google-present-connected-classrooms-to-celebrate-math-awareness-month for details.

Some notes from Colm Mulcahy:

- At the start of JMM the Twitter account @MathAware had about 340 followers, it now has 1600.
- CA state Assembly member Bob Wieckowski successfully introduced Assembly Concurrent Resolution 124 (ACR 124) to proclaim April Math Awareness Month. <https://www.govbuddy.com/directory/press/CA/wieckowski-resolution-proclaims-april-mathematics-awareness-month-former-president-of-the-american-mathematical-society-donald-graham-is-one-of-the-guests-to-be-introduced-on-assembly-floor/33360/> It happened Monday 21st, with former AMS & MAA President Ron Graham present.
- On Sat 12th, NPR's weekend edition mentioned MAM thanks to Keith Devlin <http://www.npr.org/2014/04/12/302166509/martin-gardner-a-genius-of-recreational-mathematics>
- Both Scientific American and Huffington Post have had blogs about MAM. A week ago I was told this was the 2nd most popular blog at the Sci AM site, with 3500 unique hits. <http://blogs.scientificamerican.com/guest-blog/2014/04/16/a-month-of-math-magic-and-mystery/> Tim's did well too http://www.huffingtonpost.com/tim-chartier/dont-beware-of-math-be-aware-of-it_b_5183219.html

He also provided a copy of a draft article for MAA Focus.

All agreed this MAM set a new bar for excellence, and that special recognition be given to the organizers (Colm Mulcahy, Eve Torrence, and Bruce Torrence). **Each JPBM society is to appoint one person to a subcommittee to determine an appropriate recognition.**

Jim Crowley reported on the 2015 MAM. He noted that the success of 2014 raises the issue of what we are trying to accomplish with MAM. Unlike the 2014 theme, previous themes have connected math to areas of application.

A topic needs to be chosen. Several potential topics were discussed, including Math and Imaging; Math Drives Industry (or Math Drives Careers); Math and Models; Math and Optics. The meeting participants agreed to leave the final decision to SIAM, the organizing society for MAM 2015.

Computing Community Consortium (CCC)

Ann Drobnis, Director of CCC, made a presentation to JPBM about the CCC, entitled “Catalyzing and Enabling Computing Research.”

CCC is a standing committee of the Computing Research Association that was founded in 2006. It is funded by NSF under a cooperative agreement. It is led by a broad-based council, staffed by CRA. Facilitate the development of a bold, multi-themed vision for computing research, and communicates this vision to stakeholders.

The mission is to catalyze the computing research community and enable the pursuit of innovative, high-impact research. CCC conducts activities that strengthen the community, articulating compelling research visions, and aligning those visions with pressing national and global challenges. They communicate those visions with a wide variety of stakeholders.

What distinguishes CCC?

- Proactive, rapid response – identify, plan, and execute in a matter of weeks to months
- Community-based – find and foster ideas from germination to fruition and beyond
- Leadership incubator – everyone is expected to do something

CCC conducts a multitude of activities:

- Community-initiated visioning – workshops to discuss out of the box ideas, blue sky idea tracks at conferences
- Outreach to White House, funding agencies – outputs of visioning activities, short reports to inform policy makers, task forces (health, IT, data analytics, education)
- Public relations efforts – Library of Congress symposia, research highlight of the week, CCC Blog, Computing Research News
- Nurturing the next generation of leaders – Computing Innovation Fellows Project, “Landmark Contributions by Students,” Leadership in Science Policy Institute, Computing Research in Action videos

Drobnis presented examples of “home runs hit by CCC.” White papers on big data, health IT, computer, architecture, and robotics were certainly highly successful.

Upcoming workshops: visioning workshops (in human computation roadmap, uncertainty in computation), BRAIN, Aging in Place, Computing Visions 2025.

CCC has a strong interest in the future of the field, particularly from a workforce standpoint. They were involved in increasing the number of post docs (through NSF). They are developing a set of best practices for post docs in computer science.

APLU stem programs

Howard Gobstein, Executive Vice President, Research, Innovation, and STEM Education, Association of Public and Land-Grant Universities (APLU), and Co-Coordinator of the Science and Mathematics Teacher Imperative (SMTI), provided an overview of APLU's efforts to transform secondary mathematics teacher preparation.

He said successful mathematics education is central to addressing two critical constraints of the U.S. workforce:

- Overall college degree completion – math is perhaps the most challenging gateway courses
- Need more STEM majors and literacy – for which math is foundational.

There are two major means to address these issues:

- Greater success in introductory courses
- Preparation of secondary mathematics teachers - We need to prepare teachers differently in light of the Common Core State Standards, the Mathematical Education of Teachers II, and other documents. And we need more teachers!

Gobstein described the “Mathematics Teacher Education (MTE) Partnership.” It is organized by the Association of Public and Land-grant Universities (APLU) as a part of its Science and Mathematics Teacher Imperative (SMTI). The ambitious goal is to transform the preparation of secondary mathematics teachers to ensure they can promote mathematical excellence in their future students, leading to college and career readiness as described in the Common Core State Standards for Mathematics (CCSS-M). In short, “To set the bar for the nation in secondary mathematics teacher preparation.”

MTE-Partnership membership consists of 38 partnership teams that include an APLU/SMTI institution as the lead, at least one K-12 district, and at least one other organization (e.g., collaborating university, college, or community college; regional inservice center; state department of education). Teams must demonstrate continuing involvement of mathematics educators, mathematicians, and K-12 educators.

The partnership functions via “Networked Improvement Community (NIC) Design,” which marries precepts of improvement science (problem analysis, plan-do-study-act cycles, etc.) with precepts of networked design (so that common activities and measure can be carried out across a range of contexts). The projected outcomes include a variety of validated products, programs and approaches addressing important issues in secondary mathematics teacher preparation that incorporate sensitivity to the conditions affecting their success throughout the developmental process.

The intent is to avoid education ‘change’ as usual, but rather to building real, wide-scale, and sustained change. This intent is integrated into improvement design and approach. It builds on the capacity of the network, mobilizing teams to do work that matters to them, then building across teams to build scalable solutions. They hope to create a “gold standard” – programs that can document that their graduates are capable of providing the ambitious instruction and deep learning compelled by CCSSM, based on benchmarks to be developed by the MTE-Partnership.

Guiding principles have been created, and “research action clusters” (collaborations of partnership teams to address specific challenges facing secondary mathematics teacher preparation) are under way.

Gobstein listed the clusters, and provided an example of the work of one of them.

Gobstein left us with questions for discussion:

- What are your interests in the MTE-Partnership? Do we have mutual objectives to align our work? Collaborate?
- Who else is undertaking such work? What other knowledge, improvements, ought we to build on?
- How might we work closer to engage university leadership of APLU members in addressing challenges in university mathematics education and teacher preparation?

Brief reports from the societies

SIAM reported that their Fellows program is in its second year and is going well. A canvassing committee has been created.

A job fair is in the planning stages.

On the science policy front, they are working with DMS to run a mini-symposia during a SIAM meeting. They are also working on a “mini-version of the CCC” to enable discussions in the community. A sample topic is the relationship of computational science to data science.

The number of activity groups continues to grow.

ASA reported on its work to build connections with the data science community. A series of meetings with leaders in big data industries is underway. Groups are looking at both the undergraduate and graduate curricula in the “age of big data.” Continuing professional development programs are being created to help statisticians gain the new skills needed.

MAA noted the many on-going, simultaneous efforts related to undergraduate education. The good news is that all seem to have the same trajectory, but MAA wants to make sure these efforts do not happen in a vacuum by trying to make cross-connections.

The meeting adjourned at 3:51pm.