JPBM Meeting

Minutes of Meeting

October 28, 2013

Attendees: Gerald Blazey, Linda Braddy, James Crowley, Robert Devaney, Barbara Faires, Irene Fonseca, Eric Friedlander, David Levermore, Don McClure, Michael Pearson, Stephen Pierson, Miriam Quintal, Carla Savage, Peter Turner, David Vogan, Hank Warchall, Ron Wasserstein

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The meeting began at 8:30.

Minutes from the April 28, 2013 JPBM Meeting held were approved.

Washington Overview – Miriam Quintal, Sam Rankin

Quintal gave an overview of the **Washington picture**. We are still living with the sequester. It won't be across the board in 2014, even if it is not replaced. There is strong bi-partisan support in Congress for research but there are differences in the top line ($91 billion). Where will we be in January? Quintal showed the big spread between the House and Senate numbers; but the NSF is not likely to face a big cut. The DOE Office of Science, however, could be affected.

The Competes Re-authorization is taking place this year, under a new name, First and Einstein Acts. It is not likely we will have a bill passed this fall.

The DMS had a big cut in FY2013. NSF protected infrastructure and graduate fellowships. NSF is still all-in on the cross-cutting initiatives; the ability to play in these areas is driving budgets. The "One NSF" language is gone, but in practice remains the same. NSF wants to see proposal pressure; this is a factor in determining the distribution of funds. DMS leadership has new initiative ideas which play a big role too. Major facilities, which require Operations and Maintenance (O&M), will impact the MPS budget (and therefore math) as they require ongoing funds.

NSF has a new director, yet to be confirmed. Michael Vogelius will be going to head DMS in January.

Open access still an issue. Agencies will each release their plans for open access later this year. Warchall said there is a working group developing an action plan. The intent is not to cause extra bother for anyone, including researchers and NSF staff. They want to make use of existing mechanisms for data repositories and so forth. It shouldn't be that painful in the end. Rankin added that there is language in the draft Competes Act; publishers reacted with the Chorus proposal. PubMed Central is an alternative. University libraries are trying to put something together too. The Competes Act of 2010 defined a process which is moving forward.

There has been a poor relationship between NSF and the House Science Committee staff, starting with the battle last summer over SBE grants. AAU presidents met with Lamar Smith about a week ago, according to Rankin.

Emerging big focus areas - Neuroscience is a big focus area for 2014. The NSF is taking a leadership role and could have a role for math. MPS had a workshop this fall on the topic. In the DOD there is a big interest; DARPA is hiring people in this area. Graduate education is also a big focus area, e.g. modernizing graduate educate to educate students beyond academic work (entrepreneurial skills, etc.). NSF is still in the discussion phase on this.

The STEM consolidation proposal from the Administration, which proposed to move fellowships to NSF, caused the NSF to think about how they would cater to the needs of other agencies. The IGERT in computing from NSF is one example. Overall, the STEM consolidation probably won't go forward.

Fonseca asked Warchall what we as a community might do to get engaged in future initiatives. Warchall responded that the mathematical sciences are fundamental to the initiatives at NSF. Every part of the NSF wants to collaborate with DMS. And thus, there are many opportunities to participate in multidisciplinary activities; but these have not been effective in building/increasing the budget for DMS. There has been some thinking within DMS to get the community involved in a more direct way and/or by branding what we do in interdisciplinary activities to give mathematics more visibility. DMS has one of the highest success rates of all the divisions at NSF.

Rankin noted the CJS language which leaves an opening for pushing for the core funding. Warchall commented on core funding. DMS has not decreased funding for the "pure mathematics" programs. They all received at least the 2010 level of funding in subsequent years. There were no cuts in the base funding. So the cuts came out of other programs, like stochastic systems (a co-funding activity). Workforce programs, like RTGs, also took a cut.

According to Warchall, Fleming Crim, Acting Director for MPS, does appreciate the importance of core research. Other directorates are much happier with a more applied focus, making this a hard message to carry forward.

Quintal noted that OMB and the Administration are driving the agenda, especially with NSF, and it is hard to imagine that their choice for the new NSF Director is probably willing to buy into their agenda, which includes an emphasis on cross-cutting initiatives.

NSF/DMS – Hank Warchall

DMS is back on track following the government shutdown. There are a few changed deadline dates; these can be found on the DMS home page.

Warchall gave a budget update, along with a view of what is on the horizon. He showed recent division budgets in MPS FY10-13 plus FY14 request. DMS was cut 7.8% in FY13 (this resulted in FY3013 funding being 89% of FY10). The graph of DMS funding rates showed the proposal success rate dropped from 30% to 28%, due in part to sequestration. Levermore noted the higher percentage of individual awards in DMS and the fact that large projects, like major equipment, tend to have smaller success rates. Warchall explained that the NSF has a module called the PI success ratio; DMS is still among the highest in the success rates. Forty percent of those who apply within a three-year window get a grant. Quintal noted that the number of proposals seems to be declining and asked why this is when other divisions are

increasing. There were 80 fewer awards in 2013, compared to 2012, and this could be attributed to the sequestration.

DMS has ten new people in the division. Half the staff scientists are rotators. DMS looks for people with tenure. Two rotator positions were converted to permanent slots (Victor Royford in applied math was one of these).

Travel cost restrictions was challenging for the division last year. It affected not only operations money, but also the IPAs who were not allowed to travel as much as they wanted. They have not heard of travel cost restrictions going forward and are hopeful that it will ease up a bit. Quintal noted that as we move away in time from the GSA scandal, the pressure is likely to decrease.

Informing DMS thinking - A number of reports have been influential in informing DMS thinking. These include the 2013 COV report; the two publications from the BMSA on Math 2025; the July 2013 INGenIOus workshop (convened by DMS to talk about the state of the workforce in the mathematical sciences); *Engage to Excel* (a somewhat worrisome report from PCAST); and finally the OMB/OSTP budget guidance.

Coming up are three things:

1. Rationalizing the DMS Interdisciplinary investments

Everyone wants to partner with DMS and invest money in their programs. SEES has about a dozen components, all of which could involve math scientists. DMREF was another cross-cutting program with a DMS component. All sorts of activities have a role for mathematics. DMS has had a small investment in a number of these programs. The DMS commits funds to these activities. The array of investments has been good, but it has not been effective in enhancing the DMS budget because it is not so visible. DMS is thinking about a mechanism to make a splashy DMS program that provides more flexibility in spending the funds.

Warchall reminded the group of the math sciences priority area of a few years ago; it can't be repeated. But something along these lines could be done. In the earlier initiative, other divisions committed to investing in math sciences.

2. Broadening participation

The COV pointed out that the division has been doing good things to support the participation of women and minorities, but felt that something more should be tried. Funds cannot be targeted for specific gender or ethnic groups. However, one can create programs whose goal it is broaden participation, provided that anyone can make such a proposal. DMS wants to try something new in the research area. There is also a risk of creating the appearance of "second class" awards.

3. Workforce Program Modernization

CAUSE (Catalyzing Advances in Undergraduate STEM Education) in FY14 would consolidate undergraduate education activities. The DMS wants to stay ahead of this, even if it might not be approved by Congress.

Much of DMS graduate education is aimed at people ideally suited to become faculty at research I universities. But the positions available are far fewer than the number of new doctorates. We need to think about how to prepare Ph.D graduates for careers in other fields outside of academia. There is thinking in DMS about tuning up the workforce program portfolio to emphasize other desiderata. There are a few such existing programs. Research Training Grants (RTGs) are a localized version of VIGRE. RTGs involve faculty members, researchers, and postdocs to serve training the next generation of researchers. This model will likely survive. But there are other models; some have industry internships built in, for example. No one model is perfect for all institutions.

PCAST Discussion/Education Issues

Modeling Across the Curriculum workshop, the *INGenIOuS* workshop, and the next *CBMS Forum* – Peter Turner

Modeling Across the Curriculum. The objective of the workshop was to develop new models for STEM education. This was an opportunity to provide a coordinated approach to STEM. It begins to address the alternative pathways for education as well. [Levermore noted that computer science has used this terminology to replace a year of K-12 math with a CS course.] The workshop had fifty attendees covering the spectrum of undergraduate education. A modeling course in the K-12 discipline was also discussed. Turner noted that a STEM course is being considered by the NY Board of Regents; it would not replace a math course. The workshop included discussions of possible materials and repositories for such materials, developing a high school modeling course, And developing undergraduate courses.. Next steps include exploiting synergies with related efforts.

Turner described the second workshop to be held in 2014.

INGenIOuS workshop - This workshop targeted workforce development, and not just for academic careers. Work experience for undergraduates was one idea explored. Six themes, each with a discussion group, led to white papers going into the workshop. These are available on the *INGenIOuS* web site. Know Innovation moderated the workshop. Paul Zorn was the director of the workshop and is leading the writing team. The initial themes became six threads, which were quite different from the original themes. The report should be completed by the end of this year.

CBMS Forum - There is a planning committee for the next CBMS Forum which will take place in about a year from now. Focus will be on preparation for the first two years of college, or the transition. Bob Devaney (MAA President) is taking the lead on this effort. There are three main themes: STEM; math and life/social sciences; and transition.

Pearson noted that the NSF has funded a proposal that includes the MAA and SIAM to develop some model projects; this work is led by Michael Dorff and Suzanne Weekes.

Levermore noted that the modeling curriculum is a way to reach out to other disciplines. This can be a useful approach to develop more allies.

Transforming Post-Secondary Mathematics Education – Eric Friedlander

Friedlander said there will be a panel discussion at JMM on this topic. Mark Green, Phillip Griffiths, and Friedlander are involved with Tara Holm and Uri Treisman. They have funding from Sloan Foundation and Carnegie Corporation. A tsunami will wash over us and the group wanted to address the impending crisis. Curriculum, modeling and computational skills are part of the concern. The focus is on undergraduate education, especially the first two years. The financial pressures on students and universities is also a big concern. We need to seize the opportunity presented by online education, but also need to be concerned about the effect on the academic workforce. We need to eliminate complacency among math departments and our community. There is an AAU program going out to eight universities with a focus on methods of learning – active learning. But also the *content* needs to be changed. Topics of discussion include a more useful undergraduate environment (this includes more modeling); and financial issues.

The next phase will be a multi-phase meeting involving government and academic leaders. This should lead to an action plan and RFPs. There is a need to inform the math community that changes are coming.

This is not an AMS activity, per se; it involves SIAM and MAA as well.

Calculus may not be the right entry level for many students coming into the university. Linear algebra or statistics may be more suitable for some. Retention is also part of this issue.

Levermore raised a point about diverse paths or entryways into the discipline. He noted that Bressoud talked about how calculus is growing because life sciences is growing. The growth in life sciences at universities has a major impact.

Friedlander invited societies to encourage attendance at the workshop at JMM.

Michael Pearson noted that CUPM is trying to lay the foundations for coming changes as well. He suggested involving Project Next fellows.

Friedlander noted that it is challenging to engage the math education community. Several JPBM members noted the importance of content over teaching methods. We (those represented by JPBM societies) are mathematicians interested in education rather than math educators. Friedlander noted that changes and forces for change are somewhat beyond our control. We must address the real issues.

ISSUES Workshop - Integration of Strategies for Undergraduate Education -. Linda Braddy for David Bressoud

Change and effective strategies - Change is difficult. There are major obstacles to change in undergraduate STEM education. To be effective, efforts must be sustained. Efforts should recognize faculty beliefs and should recognize and understand institutional barriers.

Braddy noted the AAU initiative funded projects began this fall. Half of the 60 research I universities are participating. David Bressoud is on the board for this program.

Vision and change in undergraduate biology education cuts across the many biology societies to produce a common vision for change. The PULSE project was the model for INGenIOuS.

AAPT had a workshop in the spring on STEM societies which have projects for new faculty. It was an effort to learn what other disciplines are doing.

The ISSUES project has two pieces. The first is collecting information on what STEM societies are doing to improve undergraduate education (Science Education Resource Center collects some of these materials). The second is a workshop at the MAA in January to begin to craft a vision [the vision change document from biology is one motivation for this]. This is a multidisciplinary forum. Fonseca noted that there are lots of amazing initiatives in this area and asked whether there can be more coordination to multiply the effect.

Pearson took note of the criticism that mathematics curriculum and pedagogy issues tend not to be published in journals. Where the math sciences publishes this kind of work (related to education) is different from physics and other fields – we did not create a peer-reviewed journal for this. It comes out in MAA reports and similar vehicles. Now it is coming back to haunt us.

Friedlander noted that we need to simply get behind change. We need to make a strong statement and say it is time to do something. Perhaps we should say something about online education as well.

Fonseca said that the next time JPBM meets we should have something on the agenda to coordinate and consider making a statement. Friedlander suggested developing a model curriculum. Vogan urged caution about making a grand statement and cited demands on current faculty, but suggested a repository of things that teachers could use might serve our cause. Levermore supported the idea of a repository.

OSTP - Gerald Blazey, Assistant Director for Physical Sciences

Math doesn't have a ready conduit into OSTP. Blazey expressed interest in hearing our issues. Stays at OSTP are typically 1 to 2 years. He described the process for getting issues on the table:

- Understand the budget process. Every year a guidance memo is put out at year end for year end n+2. There are now deep discussions about what 2015 will contain. Now is the moment for talking to the agencies. These should continue up to year n+1.
- S&T priorities for 2015. The memo starts with statements that agencies need to take care of their mission but also emphasizes cross-agency priorities. Below the multi-agency emphases are specific initiatives (open data, materials genome, brain, graduate education). Each discipline must make a case for itself. Take the long view. Place fellows at OSTP and on the Hill; place people at the staff level at OSTP.
- NSF understands its role and fundamental research.
- Timely position papers. You can leverage investments by participating in initiatives like the brain initiative. White papers on the topic would help make the case. Get these in the right hands (Blazey now) in the Administration. DMS had set some money aside for the Materials Genome initiative. The same is true with Open Data and with Graduate Education. A discipline-wide view that can be handed to OSTP would be useful.

- Personal advice: pick a few topics. Show how your discipline can make a difference. Show what resources are needed. [As opposed to spreading out over many small topics.]
- Graduate Education. Considered the fifth priority; it has not been started yet. An informal group (GEM): NSF, DOE, NIH. NSF realizes it is not meeting the needs of the non-academic sector. Graduates need broader skills. The group is discussing how to move forward on workforce issues. About 50% of Ph.Ds eventually end up in non-academic careers. OSTP seeks inputs from each discipline on what best serves their needs. Internships can be important. Project management experience is also useful. We need education modules for faculty to pass on information to students. Those are the kinds of things the GEM group is thinking about.

Business Meeting

JPBM Communications Award

The award went to Danica McKellar, an actress who has written four books that encourage young women to pursue mathematics. She has also co-authored a math paper with Jennifer Chayes. She connects with an audience that we are not connecting with.

We invited last year's award recipient to the MAA dinner. We could offer McKellar a book signing in the exhibit hall or highlight her book. Keith Devlin is a good connection to McKellar, as is Jennifer Chayes. If McKellar cannot attend JMM, a recorded acknowledgement would work.

There could be a Q&A or book signing on Thursday evening. Or the AMS or MAA awards dinner. Invite her to the "Who Wants to be a Mathematician?" event.

Proposal to extend the JPBM Communications Award

Levermore. The JPBM Communications Award selection committee had many suggested nominees. There were 10-12 names suggested, and many of these would have been good choices. If we have so many potential winners, should we not recognize more people? Perhaps there should be a differentiation – one for more general people and one by professional mathematicians, for example. Comparing a movie maker to a blog writer can be challenging, according to Wasserstein. Should a working group be put together to come back with ideas?

Also Levermore suggested that we raise the profile of the award by listing the people and linking to their products that they received the award for. The AMS web site lists all previous winners. MathAware is where the web site is located.

2014 JPBM Communications Award Selection Committee members were: Levermore (chair), Devaney, Savage, Wasserstein.

Math Awareness Month 2014- Colm Mulcahy

MAA is responsible for the 2014 Mathematics Awareness Month (MAM) poster. 2014 is the centenary of Martin Gardener's birth, and that suggested the theme for 2014. *Mathematics, Magic, and Mystery* is the theme. This is an opportunity to turn people on to mathematics, as Martin Gardener did for many people. Colm Mulcahy,a professor at Spellman University, agreed to help out with this year's MAM. There is something new for every day of the month. Each new piece goes live one day at a time, in order to hook people to look for the next day's entry. Each page will have a book. There will be details associated with each hook, including resources for further reading.

McClure asked about rights for the images. He noted that we have a permission form for rights and wanted to make sure we avoid problems with this.

Persi Diaconis and Ron Graham offered to contribute, using something from their book.

Math Awareness Month 2015

The topic on the table last time was related to math and imaging.

We were asked to review Math Awareness Month. Should we publicize this better? Devaney noted that undergraduate math clubs do use the theme. We need to get a committee to look at this.

MAA - Iranian Mathematicians

The National Academy is coordinating a visit of Iranian mathematicians sponsored by the Department of State. Don Saari (BMSA) is involved. Michael Pearson was asked to coordinate a session among scientific societies. Pearson will need someone from each society. It will be the Tuesday before the Joint Meetings. Bressoud will take the lead for the MAA. The mathematicians will then go to the JMM. The Iranians then will go around the country making visits (UC Irvine, e.g.). It is a networking visit. They want to learn things such as what are the formal structures to support the math sciences in the U.S. Levermore volunteered to participate on behalf of SIAM. We should get the list of visitors from Pearson in a few weeks.

Further discussions:

AMS

- The AMS launched two new open access journals for 2014. The AMS hopes to publish 10% of the Transactions of the AMS in the open access version of the journal.
- Launching activity groups. These are electronic communities using Higher Logic. They are starting first with MRC summer program groups.
- There are two panels at JMM of interest. The Committee on the Profession has one on MOOCs. It is a 90-minute session. There is also one on the public face of science – how mathematicians can be more proactive in writing about their profession. This takes place Friday afternoon 2:30-4:00 (just before the panel on transforming education).
- MathJAX. Please participate.

ASA

- The ASA is experimenting with an open access journal: Statistics and Public Policy. The ASA will pay Taylor & Francis $500 per article. The ASA can then decide what they need to charge authors, based on the T&F fee and ASA expenses.
- The 175th anniversary of the ASA is 2014. This will culminate with a meeting in Boston.
- The international year in statistics is drawing to a close.

MAA

- MAA launched a new membership structure along with a new web site. They eliminated tiered pricing for income. They no longer include print products with the membership. A member may add a print product for a price. This has been a huge project. "We went from hundreds of codes in Personify to six." Your member profile now has links to the products. As a result they also eliminated the "perpetual lapsing membership" whereby someone could be a lapsed member for a brief period and return as a deeply discount member -- essentially as a $44 membership in the past.
- MAA is developing their own member database. They hope the Combined Membership List will simply be a federated search of each society's list in the future.

SIAM

- SIAM is revisiting the SIAM Fellows program. We are appointing a canvassing committee to broaden diversity in the pool of fellows. We are also giving the Major Awards Committee oversight over the fellows program; they will re-write and streamline guidelines, answer queries and interpret the rules.
- We are developing processes for nominations for external awards and for major national committees. We will try to have some commonality and coordination of databases.
- Math Congress of the Americas. The Math Council of the Americas has been created to oversee the MCA. Fonseca raised the question about how/whether to involve undergraduate education (and the MAA). Friedlander reported that there are now two proposals for the next meeting (one of these is Montreal).
- Math in Industry Meeting in Europe - This will take place in November and will be reported on at the next JPBM meeting.
- Open Option for SIAM journals - This is SIAM's response to the call for open access.
- SIAM News Online - To be completed by early 2014.