

Conference Board of the Mathematical Sciences
One Hundred and Twenty-fifth Meeting of the Council
Friday, May 7, 2021

Zoom meeting, ID 673-517-2130, password CBMS
All times are Eastern Daylight Savings

- 11:00–12:00 Meeting of Launch-Years Math Leadership Network – John Staley
- 12:30–1:15 **Business Meeting of the Council**
1. Introductions and Overview of Meeting – Dave Levermore
 2. Nominating committee report and vote on Chair-Elect and Member-at-Large – Dave Levermore
 3. Secretary-Treasurer's Report – Charles Steinhorn
 - a. Approval of Minutes of the Meeting of December 4, 2020 (appendix A, p. 4)
 - b. FY 2021 Half-Year Financial Report (appendix B, p. 7)
 - c. Approval of FY2022 budget (appendix B, p. 7)
 4. Director's Report – David Bressoud (appendix C, p. 9)
Responses to survey on platforms for online programming (Appendix D, p. 14)
 5. Announcements
- 1:15–2:00 Justice, Equity, Diversity, and Inclusion (JEDI)
1. Report of AMS Task force on Racial Discrimination — Francis Su
<https://www.ams.org/about-us/Towards-a-Fully-Inclusive-Mathematics-Profession.pdf>
 2. Report on CBMS JEDI statement (Appendix E, p. 17) – Tim Hendrix, Abbe Herzig, and Dave Kung
- 2:00–2:45 Breakout groups by grouping of societies to share responses to JEDI issues and reactions to the draft statement.
- 2:45–3:15 Break
- 3:15–4:00 Reporting from break-out groups and discussion
- 4:00–4:30 Report on SEA CHANGE for departments in the math sciences — Abbe Herzig
- 4:30–5:00 Discussion of possible issues for small group gatherings between Council meetings

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Appendix A

Minutes of the 124th Meeting of the Council of the Conference Board of the Mathematical Sciences Held via Zoom Friday, December 4, 2020

The following were present for all or part of the meeting:

Executive Committee: David Levermore, Chair; Diane Briars, Past-Chair; Charles Steinhorn, Secretary-Treasurer; Edray Goins, Member-at-Large; Michael Steele, Member-at-Large;

Council Members: Kathryn Kozak, AMATYC; Catherine Roberts, AMS; Michael Steele, AMTE; Donna Lalonde, ASA; Charles Steinhorn, ASL; Joleigh Honey, ASSM; Ruth Haas, AWM; Shelly Jones, BBA; Jessica Utts, IMS; Michael Dorff, MAA; Edray Goins, NAM; Paul Gray, NCSM; Trena Wilkerson, NCTM; Cindy Lawrence, MoMath; Lisa Fauci, SIAM; Roy Goldman, SOA; Linda Fulmore, TODOS; Lorraine Howard, WME.

Additional society representatives: Anne Dudley, AMATYC; Ray Levy, AMS; Megan Burton, AMTE; Shari Stockero, AMTE; Ron Wasserstein, ASA; Darla Kremer, AWM; Crystal Morton, BBA; Michael Pearson, MAA; Deidre Smeltzer, MAA; Ken Krehbiel, NCTM; Kathleen Kavanagh, SIAM; Nora Ramirez, TODOS

Invited Guests: Kathryn Leverenz, Mathematics Institute of Wisconsin; Kirsten Bohl, MSRI; Tyler Kloefkorn, NAS; Heidi Schweingruber, NAS; Michelle Schwalbe, NAS; Mark Green, NAS; Ana Ferreras, NAS; Juan Meza, NSF; Mike Ferrara, NSF; Sandra Richardson, NSF; Ted Coe, NWEA; Dave Kung, TPSE

Staff: David Bressoud, Javon Barnes

Reports from the presenters are available at <https://www.cbmsweb.org/council-meeting-materials/>

I. Business Meeting

Chair Dave Levermore welcomed those who were present and outlined the agenda.

1. Secretary-Treasurer's Report – Charles Steinhorn

- a. The Minutes of the Meeting of May 1, 2020 were approved as corrected
- b. The FY 2020 Operating Budget Income/Expense Report and Unrestricted Net Assets History were presented
- c. The FY 2021 Dues Assessments was approved

1. Director's Report. David Bressoud reported on the ongoing work with the state task forces that initiated their work at the Pathways Forum in May. At the time this report was given it

was still hoped that the second Forum could be held in person October 4–6, 2020. There were six summer research conferences that had been funded for summer 2020. Three CBMS conference monographs had been published were in the production since the last report.

2. Announcements.

Kirsten Bohl announced the modified plans for the National Math Festival in 2021 which will be conducted online and continue with activities through 2022.

Shelly Jones reported on some of the ongoing discussions from the breakout group on Equity that continued to meet irregularly after last May's Council Meeting

II. Breakout Discussions

The participants went into breakout rooms for two rounds, each followed by time for reporting back. The break-out sessions focused on

Equity (first and second session)

Online instruction and the greatly increased visibility of the Black Lives Matter movement have accentuated the need to deal with issues of equity. How do we ensure that those from under-resourced or otherwise challenged communities continue to have access to quality education and the supports needed to realize their full potential? We may address both equity for students as well as equity for professionals (junior researchers, women, bipoc¹) who have been particularly impacted by the COVID crisis.

Running Online Conferences (second session)

In-person conferences have switched to online formats. What are the issues that member societies have encountered around different platforms? Which are the most reliable professional services? What problems arise when running these in-house, and what solutions have been found? What are the different revenue models that societies are using in connection with online conferences? What is happening to exhibitor revenue?

Membership Issues (first session)

The shift to a greater online presence creates both challenges and opportunities. For those societies for which membership is largely generated or motivated by in-person gatherings, are you seeing decreased membership numbers, and, if so, how are you dealing with them? As our societies increase their online offerings, there are opportunities to both increase member engagement and to create on-ramps, free services that entice potential members to get more involved. What is being done? What is being planned? What is known about how such offerings are working to increase member engagement?

Expanding Online Offerings (first session)

This overlaps with the previous topic, but the emphasis would be more on sharing the variety of new online offerings including online instructional resources, blogs, podcasts, webinars, and online platforms for member discussions. It could also embrace the technical issues that societies are dealing with, either in working with online service providers or building in-house capacity.

¹ Black, Indigenous, and People of Color

Classroom Issues (second session)

Many of our societies are directly involved with helping their members adjust to the realities of instruction and assessment in the age of COVID-19 and the inevitable changes that we face even after emerging from this time. What are the issues that your teachers and instructors are wrestling with? What resources and supports are being found to be most helpful?

The Future of Graduate Student Programs (first session)

Supporting recent PhDs through the difficult academic job market of the next few years. Should we be shrinking PhD programs? letting our students stay for $n > 7$ years? Running more math to industry programs to help them get jobs there? What are the societies' roles in shaping this discussion?

The Future of STEM Education (second session)

Building on the recent National Academies Symposium on the Future of STEM, which asked participants to envision what STEM education might look like in 2040 and how we might get there, what should mathematics education look like in 2040? What should the curriculum be - one that supports students in moving into industry as well as heading toward research/teaching careers? What are the implications for institutions? Professional organizations?

III. Report on Activities of the National Academies

Michelle Schwalbe, BMSA, Heidi Schweingruber, BOSE, and Ana Ferreras, BISO, reported on the activities of these boards as well as BHEW. Following the presentation there was a discussion of the creation of an Action Collaborative to spur and shape some of the work in mathematics education that is needed. In particular, the transition from high school to college mathematics and revisiting mathematics standards were mentioned.

Appendix B

FY 2020 Actual and FY 2021 Budget Shown for Comparison				
see the director's report (Appendix C) for discussion of FY 2021 budget				
Income				
	FY 2020	FY 2021	FY 2021	FY 2022
	Actual	Budget	First half actual	Suggested Budget
Dues	\$68,200	\$65,000	\$31,844	\$65,000
Interest	\$106	\$100	\$9	\$100
Royalties	\$1,073	\$1,000	\$0	\$1,000
NSF Regional Research Conferences				
Salaries	\$30,500	\$30,000	\$7,678	\$30,000
Indirect Costs	\$3,886	\$6,000	\$768	\$6,000
Forum 6				
Salaries				
Indirect Costs				
Other				
Total Income	\$103,765	\$102,100	\$40,299	\$102,100
Expense				
	FY 2020	FY 2021	FY 2021	FY 2022
	Actual	Budget	First half actual	Suggested Budget
Compensation				
Director	\$45,000	\$45,000	\$22,500	\$45,000
Administrative Coordinator	\$7,029	\$16,500	\$6,886	\$16,500
Postage and Shipping	\$253	\$200	\$10	\$200
Supplies	\$546	\$3,000	\$231	\$3,000
Internet	\$1,000	\$1,200	\$1,162	\$1,200
QuickBooks license	\$755	\$800	\$755	\$800
Website	\$55	\$300	\$30	\$300
Council Meetings				
Travel	\$4,929	\$10,000	\$0	\$10,000
Food and Other Meeting Expenses	\$5,443	\$10,000	\$0	\$10,000
Staff Travel	\$100	\$7,000	\$325	\$7,000
Accounting Fees	\$1,525	\$3,500	\$3,625	\$3,500
Auditing Fees	\$7,500	\$2,500	\$0	\$2,500
Insurance	\$715	\$750	\$265	\$750
Unbudgeted Expenses				
Bank Service Charges	\$49			
Charitable contributions	\$1,000			
Total Expense	\$75,899	\$100,750	\$35,789	\$100,750
Operating Surplus or (Deficit)	\$27,866	\$1,350	\$4,510	\$1,350
Notes				
a - These are only paid every third year. This was in anticipation of auditing fees of approximately \$7500 in FY 2023.				

Unrestricted Net Assets as of March 31, 2021

unrestricted cash on hand	\$90,875
accounts receivable	
NSF	\$207
dues	\$400
other	
accounts payable	\$0
Net	\$91,482

Investments

Vanguard Balance Sept 30, 2019	\$146,272
Vanguard Balance Mar 31, 2020	\$164,576
Vanguard Balance Sept 30, 2020	\$172,424
Vanguard Balance Mar 31, 2021	\$180,666
Total Unrestricted Net Assets	\$272,148

Appendix C

Director's Report

The closures resulting from the Covid-19 pandemic continue to affect CBMS. For the budget, we have benefited from the fact that both The December 2020 and the May 2021 meetings are being run remotely. In addition, staff travel expenses have evaporated. On the other hand, we have given some relief on dues assessments, and the postponement of the NSF/CBMS Summer Research Conferences has reduced one significant source of revenue.

Platforms for online conferencing. In response to the request at the December Council meeting, I set up a questionnaire on the use of various platforms for online conferencing, which went out both to the member societies and to the math institutes, asking about the platforms they have used, strengths of weaknesses, warnings about potential problems, how they are handling the revenue side of online programming, and plans for what will happen after the pandemic lockdown. I heard back from all of the math institutes except for the Institute for Advanced Study as well as five of our member societies.

A summary of the responses is attached as Appendix D. The full set of responses, organized by platform, can be found at

<https://docs.google.com/document/d/1N5stw1CBgse00ju5qQZyBEIYvZMNjqiGTwpytbcAtuo>

Information gathering sessions. In February and March, we took advantage of the increased reliance on Zoom meetings to hold information-gathering sessions between the CBMS Executive Committee and the leadership of most of the member societies, collecting information on issues of interest to subsets of our members. Though often expressed differently, two issues arose in every one of our meetings: how the societies are dealing with Social Justice, Equity, Diversity, and Inclusion—for which we have started using the acronym JEDI that we picked up from ASA—and mathematical progressions, especially as they inform and prepare students at all levels for the variety of careers that build on the mathematical sciences.

There was widespread agreement that it would be very useful to have a joint CBMS statement addressing issues of social justice and the role of the mathematical sciences community. This would be along the lines of the joint statement on active learning that was endorsed by most of the society presidents in 2015. The CBMS Executive Committee has asked Tim Hendrix, Abbe Herzig, and Dave Kung to draft such a state, with a first draft ready for review and discussion at the May meeting.

An important development promoting equity and social justice is the extension of the work of the AAAS SEA CHANGE program (seachange.aaas.org) to departments in the mathematical sciences. SEA CHANGE offers recognition for efforts to effect sustainable change with regard to diversity, equity, and inclusion in STEMM² at U.S. institutions of higher education. A working group that includes Abbe Herzig and Dave Kung is currently developing a program connected to SEA CHANGE that would recognize such efforts by departments in the mathematical sciences. This will be discussed at the May meeting, and we are looking for ways that CBMS may be able to facilitate this work.

² Science, Technology, Engineering, Mathematics, and Medicine.

There are a number of issues wrapped up in mathematical progressions. These include the introduction of data science into the mathematics curriculum of both in K-12 and postsecondary instruction and informing students—especially those from underrepresented groups and in the first generation of their family to go to college—about opportunities for rewarding careers that build on the mathematical sciences. The latter also involves much greater attention to offering the courses that will best serve the future needs of our students and assisting them in their choices of courses. In addition, there is the ongoing effort to replace tracking with pathways that offer far greater flexibility for students.

Other topics that arose in our discussions:

- Dealing with the effects of the COVID-19 shutdowns, including strategies for dealing with lost learning and missed opportunities as well as ways to provide social and emotional support for a teaching profession that has been severely stretched this past year.
- Developing appropriate assessment tools. This past year has forced some very creative approaches to both formative and summative assessment. The challenge now is to determine what has been learned from these forced experiments that can be beneficial as we move forward.
- Collecting and making appropriate use of data on the racial and ethnic makeup of society membership and of society leadership.
- Managing the business of small societies with stretched resources, especially issues such as elections, member databases, and filing tax forms.
- Making our societies more effective vehicles for influencing policy decisions that affect teaching and research at the national state, and local levels.
- Creating guidelines for the review of graduate programs.
- Increasing the collaboration of CBMS and JPBM, possibly including CBMS members as observers at JPBM meetings.

CBMS Survey. This past fall the CBMS departmental survey conducted every five years was postponed, the first time this has happened in its 60-year history.³ It was decided that Fall 2020 would be far from representative and that responses were likely to be low given the enormous pressures on departmental chairs. In its place, a short survey was distributed to a stratified random sample of departments gathering information on the effects of the pandemic on departmental offerings.

We found that 53% of departments taught most of the classes in a purely online format, almost always offered synchronously. At an additional 30% of departments, most of the courses were taught with a combination of face-to-face and online interaction. This experience has increased departmental and faculty willingness to offer online learning. We found that 35% of departments intend to offer more online courses, 26% are considering offering a broader range of course in online formats, and 39% of departments reported that there is increased interest by their faculty to teach online courses.

The full results of the survey can be found at <http://www.ams.org/profession/data/cbms-survey/cbms2020>. My *Launchings* column for April 2021 compares responses by type of institution: large versus small, public versus private, and undergraduate only versus offering

³ The first survey was conducted by the US Department of Education in 1960.

graduate degrees, <https://mathvalues.squarespace.com/masterblog/cbms-survey-of-departmental-responses-to-covid>.

The full CBMS departmental survey will be sent out this coming fall. We just now beginning to review the questions to ensure that they take into account the changes that have come about because of the pandemic restrictions.

Regional Research Conferences. The oversight of the NSF/CBMS Regional Research Conferences has been a major source of revenue for CBMS, accounting for roughly one-third of our income. Six conferences were funded by NSF for the summer of 2020. All of them were postponed to 2021. NSF chose not to fund any of the new proposals for conferences to be run in 2021. Two of the six postponed conferences were scheduled to be held in June and have been postponed again, now to summer 2022. The remaining four conferences are still tentatively scheduled for this August. It is not clear at this time what will happen to them or what NSF will do about new proposals for summer conferences in 2022.

These postponements are not just a hit to the CBMS budget. When I renegotiated the arrangement of CBMS with NSF for managing these conferences early in my term as Director, one of the major changes that was insisted upon was to stop paying for the writing of the CBMS monographs. Up to and including the summer of 2019, the principal lecturer was paid an honorarium of \$2000 for the delivery of the ten lectures during the conference, with the promise of an additional \$5000 for the creation of monograph based upon these lectures. The new arrangement, which was to begin in 2020, was to continue to pay \$2000 for the ten lectures⁴ and to offer an additional \$3000 for a substantial body of online materials. The monographs, published by AMS, SIAM, and IMS/ASA will continue, but authors will be paid royalties by the societies instead of honoraria.⁵ This, incidentally, will eliminate another small source of income for CBMS. Royalties from second and subsequent printings had been coming to CBMS.

I had hoped that with the new expectations in place in 2020, there would be plenty of time for me to assess the effectiveness of this approach, and especially whether it was still leading to the creation of CBMS monographs. I am pleased to announce that we have just had the first manuscript come in that is not eligible for the honorarium, *A Geometric View of Additive Combinatorics* by Jozsef Solymosi and Frank de Zeeuw. But it is not at clear how the new requirements will affect the creation of these monographs. The assessment of these changes will become the responsibility of my successor.

CBMS Forum. The first of the forum on High School to College Mathematics Pathways was held in May 2019. It brought together 23 teams of state leaders in K-12 and higher education mathematics education and began the work of helping them to address state issues of the transition from high school to college mathematics. These teams continued to work with facilitators from the Dana Center at UT-Austin over the following 18 months. The intention was to wrap up by bringing these teams back together in October 2020. While the money for this gathering had been obtained, it was impossible to bring the teams back together physically. The in-person gathering was replaced by online gathering held over three afternoons. It was decided to hold onto the money for an in-person forum until it would be possible to hold that meeting.

⁴ While the terminology of “lecture” remains, there is now a clear expectation that these will be interactive.

⁵ Those who were principal lecturers in 2019 or earlier were given until the end of 2019 to submit a manuscript for the full \$5000 honorarium. This did produce a flurry of monographs before the door closed.

I have recently contracted with the Hyatt Regency in Reston, VA to hold this second in-person gathering over Sunday-Tuesday, May 1–3, 2022. In the meantime, the Dana Center has agreed to continue meeting on a quarterly basis with the state teams.

The agenda for this next forum on High School to College Mathematics Pathways is still in flux. It will involve bringing the state leadership teams back to share successes and difficulties. It is also the intent to expand the circle of states that are involved in these issues. At the same time, the Dana Center's work on its Launch Years initiative has been progressing. Informing participants about this work which is now being undertaken most intensely in the states of Washington, Georgia, and Texas will certainly be on the agenda. The exact role for the CBMS member societies is still to be determined, but equity and progression issues will be a natural fit.

High School Initiatives. Related to the Forum, two states have recently encountered pushback from their middle to high school efforts: Oregon for its Math Equity Toolkit (<https://equitablemath.org/>) and Virginia for the Virginia Math Pathways Initiative (<https://www.doe.virginia.gov/instruction/mathematics/vmpi/index.shtml>). They are very different. In Oregon, the work is focused on developing culturally responsive pedagogy. For Virginia, it involves curricular redesign for integrated math in grades 8–10 followed by a variety of options that can be tailored to student's individual needs in grades 11 and 12. In both cases, concern for equity has engendered attacks from right-wing media.

Members of the CBMS Executive Committee met with Tina Mazzacane and Brian Nussbaum of the Virginia Dept of Ed on April 26. It is clear that they would appreciate support from the CBMS member societies. This could be an explicit statement of support pointing out the benefits of integrated math or a request to colleges, universities, and businesses in Virginia to recognize this effort as a means of improving the preparation of all students.

One of the elements of the Virginia initiative that is encountering resistance is the increased emphasis on modeling and data analysis. Dave Levermore and I have agreed that it would be helpful if a group of member societies could work on outreach to the general public on the changes that are occurring in the mathematical preparation that is needed for the careers of today and tomorrow.

Budget. Because of the pandemic, CBMS has seen significant drops in both income and expenses.

Income:

- Dues. Several societies requested relief from their dues assessment because of severely strained finances. We were able to meet all of the request, which amounted to \$7524 for the year. This implies that instead of the budgeted \$65,000 in dues, we will only be receiving \$57,476.
- Royalties. These only come in when a CBMS monograph goes into a second or further printing. While historically about \$1000/year, there is no guarantee. As further monographs come in under the new arrangement (see section on Regional Research Conferences), this source of revenue will disappear.
- NSF Regional Research Conferences. There has still been some work on these, but most of that work has been put on hold.

Expenditures:

- Supplies. Now that this office is in its last year, and especially with COVID-19 shutdown of much of the work, needed office supplies are minimal.
- Website. In December we switched our website hosting service to the one used by Macalester College, which greatly reduced our costs.
- Council meetings. Holding them virtually eliminates the entire cost of \$20,000/year.
- Travel. This has been reduced to registration fees for a few online conferences.
- Auditing fees. The audit is conducted every three years and costs about \$7500 each time it is done. This is setting money aside against a future expense.

Appendix D

Platforms for Online Programming Summary of Responses to CBMS

Twelve organizations responded to the survey, seven of the math institutes⁶ and five of the CBMS member organizations.⁷ In three cases, two people with different responsibilities and viewpoints responded. Everyone uses Zoom, but most find that they need to supplement it in some way. I have broken these additional platforms into three groups: conference platforms (Conference Exchange, Hopin, and Event Platform), subgroup gatherings, usually with avatars (Gather.town, Sococo, Spatial.chat, Mozilla Hubs, Framevr.io), and vehicles for sharing information (Slack, Awwapp, Google Drive, Jamboard, Zulip).

This report summarizes respondent comments, organized by type of platform, as well as responses to questions about charging for access to the programming and expectations for what will happen once in-person meetings are again possible. The full set of responses, organized by platform, can be found at

<https://docs.google.com/document/d/1N5stw1CBgseO0ju5qQZyBEIYvZMNjqjGTwpytbcAtuo>

Zoom

Cindy Lawrence of MoMath summed it up well:

Strengths: easy, reliable, and familiar; works with most (all?) browsers, allows interaction using audio, video, text chat, or combinations thereof; ability to make breakout rooms; ability to annotate shared screens. Weaknesses: doesn't facilitate free movement in and out of small groups; doesn't do well with synchronization (such as for music); limitations on size of the group; sharing multiple screens using different apps is hard.

AMATYC used Zoom with a limit of 1000 for their conference this last October and found it worked satisfactorily. They appreciated the ability to register directly through Zoom. Several prefer not to use the webinar feature. Those that use it emphasized the importance of having one experienced person whose sole task is to monitor the chat. AMS used Zoom for the graduate school fair and exhibits at the Joint Math Meetings and were disappointed at how little user buy-in there was. IPAM noted that generally poster sessions do not work well on Zoom. Presenters got few questions, but this seems to be a problem with all online platforms for posters.

Conference Platforms

Conference Exchange (Confex). This was used by AMS to run four sectional meetings (300–900 registrants each) and the Joint Math Meeting (4200 registrants). This platform is still under development, so using it required a lot of time and effort fixing problems and appeasing exhibitors. It should work more smoothly next time. For JMM, they included ePosters, Exhibits, and a grad student fair where each university had a Zoom room where they could meet with prospective students. There were also three networking sessions from noon to 1 in Zoom rooms. AMS found that using Confex requires pushing a lot of details out to all participants as well as

⁶ AIM, ICERM, IMA, IMSI, IPAM, MSRI, SAMSI

⁷ AMATYC, AMS, AMTE, MoMath, NCSM

providing training for organizers, presenters, and exhibitors. Training needs to be recorded and accompanied by documentation. All presenters need to test their log-ins at least 7 days in advance. Also, Confex did not enable poster presenters or exhibitors to preview their spaces as they set them up, which was a problem. Confex enables placement of ads. AMS learned the importance of getting Google Analytics set up correctly at the beginning so that advertisers could get data on hits.

Hopin. MSRI is using this platform for the [National Math Festival](#) that will have interactive online events April 16–18. They'll let us know how it went after April.

Event Power. NCSM will be using this for their conference in April. They can report after that.

Subgroup gatherings

Gather.town. ICERM has found it be a bit quirky and some people cannot get it to work. They use it for coffee breaks and informal gatherings, but do not trust it for high-stakes professional communications. MSRI uses it for social events. IMSI complained that that neither Gather.town nor Sococo are really accessible on tablets and mobile devices.

Sococo. AIM, IPAM, and MSRI are using this platform and AMS plans to use it this summer for their Mathematics Research Communities. Both AIM and IPAM pointed out that participants need some training in its use. Because of the learning curve, it is only really appropriate for workshops that run over several days, and support needs to be available for trouble-shooting, especially early on. As AIM reported,

This [requires] a significant commitment of staff resources (both the senior staff who are mathematicians, and the support staff). But the impression of being in a dedicated space that feels like a real place (and feels more real the more you use it) is worth it. There are bugs, as well as "features" in Sococo which are not well suited to a math workshop. It is necessary to guide participants away from these, or help them deal with it.

Spacial.chat. ICERM is using this.

Mozilla Hubs and Framevr.io. IMSI is experimenting with these. One drawback is that only about 20 users at a time can be in any one space. Mozilla Hubs is easier to access on multiple devices than Gather.town. IMSI is thinking of using Framevr.io for a poster session in April.

Flipgrid. AMTE has used Flipgrid for asynchronous interaction with poster presenters. It appears to have increased contact with these presenters.

Information sharing

Slack. ICERM uses it as an avenue for staff support as well as communication among participants. MSRI uses it for student collaborative projects. It has the advantage of working well with a large group of people. IPAM has tried using it for posters but found that it led to few interactions.

Awwapp and Google Drive. Awwapp is an online whiteboard used by AIM. AIM also used Google Drive.

Zulip. Real-time chat with email threading. Used by ICERM.

Jamboard. Virtual whiteboard used by MSRI.

Swapcard. IMA has been pleased with this as a means of exchanging information about participants' backgrounds.

Pricing

The math institutes all had additional sources of funding that did not require them to charge for access to their programs, although several noted how expensive it is to run these online programs because of the demands on support personnel. At the Joint Math Meetings, AMS charged \$600 for each exhibitor space. Meeting registration was \$50 for students, \$100 for members, \$150 for non-members. Short course registration was \$20 for students, \$40 for members, \$60 for non-members. 400 participants registered for the short courses, far outstripping participation at in-person meetings.

NCSM tries to keep registration below \$150 for their 3-day events. This spring's conference will charge \$300. AMATYC had free registration for the conference this past fall, but recognize that they will not be able to sustain that in the future.

MoMath is estimating that 50% of the in-person fee is reasonable for an online program, but recognize that much of their online programming will need to be free or nearly free.

Looking ahead

Everyone speaks of allowing virtual attendance once we return to in-person meetings. How this will work, beyond opportunities for remote viewing of the presentations and perhaps an opportunity to pose questions, is not at all clear. Both AIM and MoMath believe that a truly hybrid program does not seem feasible, at least at this time. Programming will either be virtual or in-person. Both AMS and MSRI emphasized that they are making no judgements now, but will wait and see.

Appendix E

CBMS Statement on Justice, Equity, Diversity, and Inclusion (JEDI) in the Mathematical Sciences

The Conference Board of Mathematical Sciences (CBMS) is an umbrella organization composed of professional societies and organizations from all areas of the mathematical sciences. CBMS's stated purpose is to *"promote understanding and cooperation among these national organizations so that they work together and support each other in their efforts to promote research, improve education, and expand the uses of mathematics."* (cbmsweb.org)

We envision a mathematics community that values all our colleagues and students and in which we all work and learn together with respect and dignity.

We envision a mathematical world in which all individuals have equitable opportunities to learn, use, and contribute to mathematics, as well as to shape the future of the discipline. Our vision includes a mathematical landscape that reflects the diversity of our society – across racial, ethnic, gender, sexual orientation, and all other social identities – as learners, researchers, teachers, practitioners, and leaders.

Making progress toward this vision is a matter of justice. A basic premise of life in a democratic society is that all of its members have equitable opportunities. Increasingly, mathematics helps us model complicated situations, understand options, and make informed decisions. Quantitative literacy is imperative to civic engagement. Mathematics is also a valuable tool to investigate, document, and communicate injustice, and serves as a gateway to many opportunities. We envision that all people will have equitable access to those opportunities.

Equitable education in mathematics enhances the learning experience of all students. Participating in a diverse classroom exposes students to others with perspectives, skills, and experiences that may be different from their own, which is vital to developing the problem-solving and critical thinking skills needed to learn and apply mathematics. This rich type of educational experience also provides fertile ground for the development of a deeper appreciation and understanding of mathematics that will inspire and prepare students to become our future users of mathematical tools and concepts.

Equitable opportunities and an inclusive environment increase the diversity of ideas within our discipline, enriching the mathematics we create, know, and use. Mathematicians, statisticians, and those in related areas view and explore ideas and concepts from new perspectives, make connections never before realized, harness mathematics to address the problems of tomorrow, and advance knowledge in important ways. By broadening the diversity of those who participate in the enterprise of mathematical thought, we increase the potential for richer understandings and further developments in mathematics.

The power, beauty, and opportunity inherent in engaging with mathematics is a distant goal for some; we envision a world in which individuals of all identities believe there is a place for them in mathematics, and can see themselves in those mathematical spaces.

We acknowledge our responsibility and culpability.

The mathematics community currently falls far short of this equitable vision, for a complex assortment of reasons, both historical and ongoing. Some of CBMS's member organizations have actively participated in the exclusion of some groups – including women and Black mathematicians – and are currently grappling with those past actions. Some have participated in this injustice in more subtle ways through inequitable opportunities, including biased policies and processes for making awards and filling leadership positions, inadequate support for parents (especially mothers) of young children, and otherwise tolerating or even enabling bias, disrespect, macro- and micro-aggressions, and inequity. In stark contrast, some of CBMS's member organizations were created specifically to support mathematicians who are the objects of these injustices.

We collectively acknowledge the need to examine past and present practices to identify injustices, and implement policies and practices that redress these injustices, support equitable educational and professional opportunities, and create an inclusive and welcoming profession.

We acknowledge that the systemic nature of racism, misogyny, and other forms of discrimination require each of our organizations to make significant investments in time, energy, and other resources to identify problematic policies and procedures and to implement changes.

We commit to action and accountability.

As an organization, CBMS will build and employ policies and practices that model justice and equitable opportunities for all mathematical scientists. In turn, CBMS will support its member organizations in their work to create spaces that are just, equitable, diverse, and inclusive. Engaging in self-reflection and articulating our goals are essential first steps in making meaningful progress, but those steps must lead to action in order to be meaningful.

We will make justice, equity, diversity, and inclusion fundamental to our mission of service to the mathematical sciences community, and to create safe, humanizing, and fertile spaces for all mathematicians to flourish.

We will work together, as mathematicians of different races, genders, and other social identities, to analyze and document practices and policies that disparately affect minoritized mathematicians' abilities to participate fully in and benefit from the professional life of the associations.

We will create measurable action plans and commit resources in our work to address what we learned in those analyses.

We pledge to work together across organizations, both within and beyond the mathematical sciences, to put in place policies and practices that lead to equity, justice, and inclusion for all members of our community.

To hold ourselves accountable, we will report publicly about our progress on those plans, to CBMS, to each other, and to the broader mathematics community, at least annually. These reports will hold us accountable for action, and will identify and highlight actions that member organizations have taken to address JEDI issues within their policies, practices and procedures, to serve as models for future progress.

We recognize that this work is not a singular effort, but requires ongoing partnership as we iterate toward a just, equitable, diverse, and inclusive mathematical community. We pledge, as member organizations of CBMS, to continue to engage in dialogue with one another about systemic inequities and to collaborate on solutions.

Through this statement, we embrace our vision for a just, equitable, diverse, and inclusive mathematics profession; acknowledge our culpability in racism, sexism, and other forms of unjust policies and behavior; and commit ourselves to action and accountability in service of that vision.