

To: Dan Finotello, NSF

Date: October 20, 2014

Re: MRSEC Director's Meeting Minutes (October 14, 2014)

The MRSEC Directors met on October 14, 2014 at the NSF (Arlington, VA). Meeting minutes were compiled by **Arjun Yodh** (who was co-chair of the meeting, along with **Melissa Hines**). The minutes per presentations are derived from notes taken by Yodh/Hines, and the minutes from each working group are derived from the notes of each working group chair.

NEXT YEAR'S ANNUAL MRSEC DIRECTOR'S MEETING: Tuesday October 13, 2015

NEXT YEAR'S CONFERENCE CHAIR WAS ELECTED: Vincent Crespi, Penn State

NSF Program Director Presentations (morning presentations)

After a short welcome from **Fleming Crim**, who heads the MPS directorate at NSF, we heard talks from **Mary Galvin** (Division Director, DMR), **Dan Finotello**, **Chuck Bouldin**, and **Daryl Hess**. These presentations described recent activity for DMR as a whole, for the MRSECs, for the PREMs, and for "Big Data" programs.

Since all of these presentations are posted on the MRSEC.org web site, only a few points from each presentation are described below, particularly if these points led to some discussion.

Mary Galvin

DMR is the directorate in NSF with the most patents.

Recently, strategic funding choices were made by the directorate, e.g., to cut back support of International programs and to increase MRSEC funding (by 3M in FY14).

Plans are well underway for support for mid-scale facilities (in 2015 and beyond). This idea was stimulated, in part, by a report from Murray/Crabtree-committee that pointed (among other things) to the abundance of CMP Nobel Prizes from industry (e.g., AT&T and IBM); a key for this success was that these industrial labs had in-house instrumentation needed for materials growth, instrumentation for characterization, as well as substantial theory/modeling efforts. The goal of the proposed program is to fund instrumentation in a certain price-range that is hard to support at Universities. Funds would be available primarily for equipment and for running facilities (e.g., staff). NSF is looking for unified proposals around particular materials themes (e.g., bulk and thin film crystal growth, etc.). Themes would change from year to year. Anticipate 1-2 funded in upcoming round at perhaps \$4-8 million/year. MRSECs can apply for these resources.

Other programs described/discussed in Galvin's talk included DMREF (which is very much like an IRG or SEED) and SusChEM (see presentation slides).

Dan Finotello

Finotello suggested we make the annual MRSEC Director's meeting on the second Tuesday in October every year (this 2nd Tuesday date is now "set" for next year (2015), but a decision for future years was left undecided between the 2nd and 3rd weeks in October.)

Finotello reviewed the details of the 2013-14 MRSEC competition, e.g., the breakdown of applications, topics, success rates in the early stages, issues with obtaining reviewers, etc. However, since the official budgets for the new awards had not been fully approved as of Oct. 14, Finotello was unable to provide as detailed information about the final stage of the competition. 81 pre-proposals w/246 IRGs were reviewed in 7 panels; 26 of the pre-proposals were invited full proposals (encompassing 65 IRGs). New awards are anticipated to be derived from a budget of \$56M/year.

Annual Reports / Site Visits: Annual reports cannot appear as collection of individual topics! They must convey synergy within the team. Mid-term MRSECs will have 4th-year review this year, and their Annual Reports must be in and approved ~4 weeks before the site visits. No changes in the guidelines for this year's Annual Report compared to last year. Finotello asked that if possible, please send all publications in the Annual Report separately on a flash drive. Per 4th year review, expect 2 days, 2 program officers, 4-8 panelists.

Last year's publications from Annual Reports revealed: 687 primary, 665 partial, 652 SEF, 79 patents, 33% publications with 2 or more PIs (with range from 14% to 55%)

The "Alexandria Effect": NSF moving to Alexandria Fall/Winter 2016. Not clear what the effect will be on MRSEC re-competition timing.

Chuck Bouldin

Bouldin discussed the PREM program. The solicitation is #14-606, and the deadline for submission is Jan 7, 2015. No significant changes with respect to previous solicitation. Expect flat funding relative to last competition, and because of termination of stimulus funds competition will be tough as dollars will be less.

Bouldin showed data looking at # of pubs in ISI journals and *h*-index after the award is made. Positive correlation exists between having a PREM and surviving as a MRSEC; about ½ or all MRSECs have PREMS. Want more MRSECs to participate. PREM proposals will be reviewed by at least one panel, but possibly two.

Daryl Hess

Hess talked about "Big Data" programs or, alternatively, *Cyberinfrastructure for Materials Discovery and Innovation*. \$200M from 6 agencies are dedicated to big data initiatives. They are always looking for input for how these funds are best spent. A "big data" request for input closes on November 14.

OTHER Presentations (including Working Group Summaries)

MRSEC POWER-POINT HIGHLIGHTS

We had a lengthy discussion about best practices for MRSEC highlights centered on **Nick Abbott's** presentation on the topic. NSF program managers emphasized that they need better highlights that reach out to public, to policy makers, to congress, etc., i.e., better than the ones they currently receive (on average). Too many highlights are too technical. Abbott suggested a highlight format following the DMR abstract format, i.e., a very non-technical highlight and a technical highlight. He gave examples of poor highlights and good highlights from the Wisconsin MRSEC. The non-technical form seems to be hard for many folks. The text must be in non-technical language (e.g., nothing more technical than the words “quantum” or “polymer”), understandable by an average 8th grade student, and it must describe what has been done (in very simple language), and it absolutely must describe why it is significant (for society whenever possible).

Materials Research Facilities Network (MRFN)

Ram Seshadri gave a short report on the Materials Research Facilities Network (MRFN). The idea of MRFN is to pool MRSEC resources into one (or one more) data base that can reach out to researchers at smaller institutions (and others) and can offer equipment for use. Seshadri emphasized that although successful, we still need to increase awareness and access, and we still need more synergy between MRFN and MRSEC websites. Irina has developed a Drupal-based system that automatically pulls information from center sites that have the same structure as the UCSB site. These sites must be Drupal based, and there are also other requirements. She will share APIs with interested centers upon request. In closing, Seshadri noted that if a user wants to access the facilities, they can apply for costs to travel and use it; however if the MRSEC does not have funds, the request is denied and the system should automatically email whoever is set as responder via MRFN and MRSEC.org websites. There was some discussion about “who” at the various other MRSECs (besides UCSB) is notified, and whether this could be standardized/clarified.

BROADENING PARTICIPATION WORKING GROUP (Michael Rubner)

(Group members at meeting: Michael Rubner, Tim Lodge, Melissa Hines, Seth Fraden, Dennis Hess, Ajay Nahata)

Two items were discussed in this working group.

1) Future Faculty Workshops – a discussion was held about the pros and cons of having MRSECs organize and run Future Faculty Workshops. These workshops, initiated by Professors Swager (MIT) and McCullough (now at Harvard), have the goal of partnering up faculty mentors with senior graduate students and post-docs interested in pursuing an academic career. With a focus on engaging minority and women participants, the workshops have been highly successful, covering topics such as how to prepare for an academic career, how to do successful faculty interviews and what to expect as a junior faculty member. To date, seven of these workshops

have been run with the last one (2014) being sponsored by the MIT and Harvard MRSEC programs. Professor Swager has indicated that he would like to transition this workshop to other organizations in order to create a bigger impact and engage a larger pool of participants. A possible way of doing this would be to have multiple MRSECs collaborate to run regional Future Faculty Workshops. In doing so, the faculty workload and cost could be better managed. It was noted that the main obstacle to doing this is faculty bandwidth and over-commitment. The working group agreed that MRSECs should be encouraged to pursue this as a possible option since the experience accumulated by Swager and colleagues could be leveraged to great advantage. This suggestion was made to all directors in the wrap-up session with the note that those interested should contact Professor Rubner at MIT.

2) Issues associated with the new NSF rules on reporting of participants – The working group discussed recent guidelines from NSF that require that all participants in MRSEC programs (faculty, post-docs, graduate students, staff, REUs etc.) go to a designated website and declare their ethnicity, gender and disability status (if relevant). MRSEC programs can only report details about the number of participants in these categories if they have completed this on-line form. Currently, this process is not working well, as MRSEC programs have no idea who has completed the form. In addition, participant numbers could be significantly underreported, since many participants will choose not to make the effort to do this, or do not want to be identified as belonging to any particular group. Concerns were raised by all working group members about these new guidelines and this issue was reported to the directors during the wrap-up session.

INDUSTRY WORKING GROUP (Jessica Winter, Mike Ward)

(Group members at meeting: Jessica Winter, Michael Ward, Gabriel Lopez, Ted Norris, Evgeny Tsymbal, Nick Abbott)

There was a short review of all topics discussed at the group meeting. Below are the main issues discussed in the Director's working group summary session.

It was suggested that the NSF MRSEC program collect information on Patent Applications as well as patents issued. Patent applications are a more current index of activity (related to industrial impact) because some patents may not issue for years after first filing. Also, patent applications often are licensed, which NSF is not capturing now in their annual reports.

The group considered other mechanisms to illustrate the impact of the MRSEC program on the industrial sector. For example, some years back, an article from the MRSEC Bulletin authored by Clyde Briant (who was the director of the Brown MRSEC at that time) touched on all aspects of the MRSEC, but it contained a lengthy section on Industry Interactions. The industry working group at the Oct. 14 meeting pondered whether an MRS Bulletin article devoted to industry interactions and MRSECs, but now expanded to include startups and entrepreneurial ventures, would be good for the program. In 2004, the industry working group (chaired by Mike Ward) decided to collect information on industrial outreach activities in every Center, for the purposes to evaluate where the program stood with respect to industry, and also to collect data for an MRS Bulletin article about MRSEC impact on Industry, and vice-versa. Such an information gathering could be used to for an article like the one proposed above.

There was short discussion about how “best practices” to benefit large companies, e.g., via consortia, library access, access to students. There was short discussion about start-ups, and ICorps was noted to be of value. There was a short discussion about the importance of getting the message right per expectations for MRSEC-Industry interactions compared to the (often) more explicit coupling between industry and academics/centers in other NSF programs.

EDUCATION WORKING GROUP (Ka Yee Lee)

(Group members at meeting: Ka Yee Lee, Arjun Yodh, Wesley Francillon; member not at Oct. 14 meeting, Noel Clark; Melissa Hines, Dave Weitz will join this group next time)

The group is interested in identifying best practices in the area of Education and Outreach. Most of the small-group discussion centered on possible “best practices” along these lines.

We see a great opportunity for MRSECs to utilize their center websites, as well as the collective MRSEC.org site, as vehicles to reach and educate the public. While all MRSEC websites list the various education outreach activities carried out by the respective centers, in a quick survey it appears that only a subset of centers (roughly 1/3) provide useful, downloadable educational contents from activities that the centers already engage in. This downloadable content can come in the form of lesson plans and teaching modules for teachers, exciting videos from science demonstrations and research activities, or archived tutorials on specific topics given by experts that can be of interest to students and postdocs. This enables MRSEC to extend its reach and impact far beyond those who can physically participate in the activities offered by the centers.

Another topic discussed is connected with metrics for evaluating the success of our programs. Currently, a common platform to survey the experience of all MRSEC REU students is in place, which has allowed us to have a sizable pool and thus obtain statistically meaningful data for the program. To track the career paths of these students in the long term, as well as those of undergraduates, graduate students and postdocs from MRSEC labs, we discussed whether it might be possible to use social media (some sort of network like Linked-in, etc.) as a viable method. It is not clear if any of the centers have implemented this approach, but certainly we are aware of some departments within our Universities that are trying the network approach to stay connected to their students. The conversation also showed that we are all continuing to grapple with how best to evaluate our education and outreach activities.

FACILITIES WORKING GROUP (Ram Seshadri)

(Group members at meeting: Ram Seshadri, Charles Ahn, Mark Hersam, Phuan Ong; members who were unable to attend meeting, Vincent Crespi)

Points of discussion during the breakout session focused on the very positive role that the Shared Experimental Facilities (SEFs) play in education and training of students at all levels, and the great impact they have on all scaled of industry. In education, one of the innovations that is playing a positive role is remote use of SEF instrumentation. MRSEC SEFs are used by researchers from all sizes of industry, from start-ups to large corporations. Large corporations appear to increasingly prefer not to maintain certain sophisticated instrumentation in-house, and instead to rely on University facilities. In addition, across the country, the existence of MRSEC

SEFs is resulting in lowered barriers for start-up companies to get off the ground without investing in expensive instrumentation. Examples from the interaction of Northwestern MRSEC with the Art Institute of Chicago, and the Fields Museum, and examples from the Princeton MRSEC in their use of sophisticated microscopy techniques for building preservation are examples of accessible real-world impacts that the SEFs have. The group was very pleased that the NSF is paying such close attention to question of helium availability. Apropos sustainable models for the MRFN Program, modalities for paying for users from less research-intensive institutions such as PUIs were discussed. Potentially, some of the NSF mid-scale instrumentation funds, or other sources could be found for this purpose.