Final Report of MRS/NSF Focus Groups

held at the 1997 MRS Spring Meeting • March 31–April 4 • San Francisco, California

Introduction

In 1997, Materials Research Society (MRS) offered to provide input from its membership to the Division of Materials Research Division (DMR) of the National Science Foundation (NSF) on certain aspects of DMR funding policy and process. To gather that input, MRS decided to hold focus groups at its Spring meeting held in San Francisco, CA, March 31–April 4. This report describes the approach used to set up and facilitate the meetings, presents results of the focus groups, and concludes with a commentary on those results and recommendations for further exploration of selected issues.

Approach

MRS decided that the type of information solicited at this stage would be better acquired through use of a qualitative data collection tool such as a focus group than it would through a quantitative instrument such as a survey.[1] MRS realized that this type of collection and analysis yields results that are *indicative* of the nature of the larger population, not *predictive*. However, appropriately designed and executed qualitative data collection exercises can give a clear picture of the tendencies of the larger population that can be explored later in greater depth if so desired, significantly contributing to the effectiveness of the quantitative data collection instruments. Furthermore, focus groups give the researcher the opportunity to pursue issues in depth, and allow the elicitation of what may be unexpected information.

MRS decided to run six focus groups. The number of groups was somewhat driven by the structure of the meeting itself: It was anticipated that recruitment would be easier and attendance higher (and attrition lower) if the groups were held during the lunch or dinner meal period. Meeting attendees would be less likely to have competing claims on these time slots than they would if the groups were held in a slot concurrent with technical sessions or other formally scheduled meeting events. Furthermore, the offer of a meal as incentive to attend (in lieu of the cash payment frequently offered by focus group sponsors) was seen as a real, positive inducement to MRS members.

Efforts were made to recruit 15 participants for each group. The participants were selected according to a nonprobability quota sampling strategy. That is, MRS determined that it wanted each group to be "representative" of its membership. It determined that there were four primary demographic characteristics of its membership that contributed to "typicality" employment (academia, industry, or national laboratories); whether the member was a "regular" or a student member; residence (U.S. or non-U.S.); and length of tenure in MRS (one year or more, or a new member as of this meeting). The distribution of these characteristics in MRS are shown in Figure 1.

The makeup of the set recruited for each focus group closely matched this distribution of demographics. (Note that this sample did not account for combinations of these demographic characteristics. There was no effort to account for the number of, for example, academics who are regular members, reside in the U.S., and have long tenure in MRS.)

All focus groups were run by the same facilitator to enhance continuity. The facilitator was Jessica Glicken, a consultant to MRS. Glicken is a cultural anthropologist professionally knowledgeable in the area of science policy (around which NSF interests focused, in this case), and experientially familiar with the U.S. research environment as she has worked at a Department of Energy national laboratory, has a Ph.D. degree, and has had contact with NSF in her own area. By design, there were no NSF personnel present at any of the sessions to minimize observer/sponsor bias on the part of the participants and to encourage them to speak freely. Three of the sessions were attended by an MRS member knowledgeable in the ways of NSF/DMR to answer specific questions of DMR process that the facilitator was unable to answer.

Participants were informed at the beginning of each session that the public output of the process would be a report which presented results only in aggregate. The report (or a summary thereof) would be distributed to the membership through *MRS Bulletin* or some other vehicle to which all members had access. There would be no attribution of comments to specific contributors in the report, nor would there be any information in the report that identified the session at which particular comments were made. These assurances, along with the

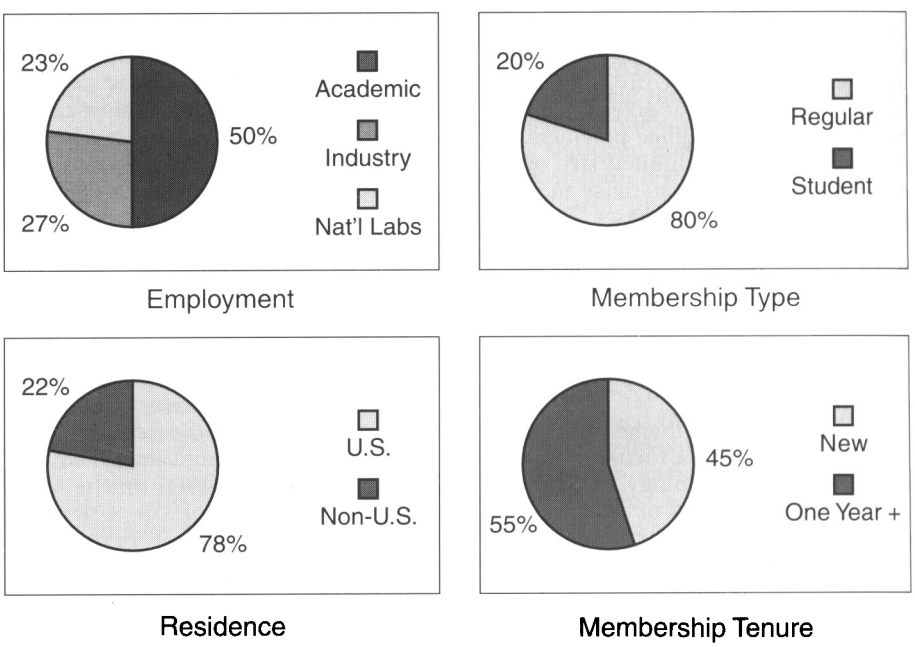

Figure 1. MRS demographics (selected).

[1] See H. Russell Bernard, *Research Methods in Cultural Anthropology* (Sage Publications, Newbury Park, CA, 1988) and Delbert C. Miller, *Handbook of Research Design and Social Measurement*, 5th ed. (Sage Publications, Newbury Park, CA 1991) for detail on qualitative and quantitative data collection methods and instruments.

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absence of any NSF personnel, were designed to encourage candor by participants and to reduce fears that current or anticipated funding or other means of participation in any NSF processes would be jeopardized by participation in the sessions. The sessions were video/audiotaped for internal use by MRS only[2]; participants were informed of this in invitational materials and asked again at the start of each session if there were any objections. They were further informed that if the tapes were to go outside of MRS, permission would be requested in writing.

Recruitment for the groups was done by MRS headquarters personnel via telephone, with mail/fax follow-up material. Participants were reminded of their session when they registered for the conference with a written memo. Attempts were made to contact by phone or in person those that did not pick up their memo.

Results

All six sessions were held as scheduled. Attendance at the groups averaged 14, with the lowest attendance at the groups held on the third day of the meetings. Participant demographics were close to those of the whole Society, as shown in Figure 2.

At the beginning of each session, the facilitator elicited from participants the nature and extent of their interaction with NSF. Responses were varied in each group. Some participants had never had contact with NSF. Others were currently or had been grant recipients, either as a principal investigator (PI) or as a masters student. Other participants either were currently or had been reviewers, and there were a few who had some other interaction with NSF. Although statistics were not collected, it is estimated that about 75% of the participants had some interaction with NSF in the course of their professional career.

The same topics were covered with all groups. These included a discussion of proposed merit review criteria, suggested changes to the review process, the merits of various strategies for choosing and balancing the elements of a research portfolio, and suggestions for new types of support.

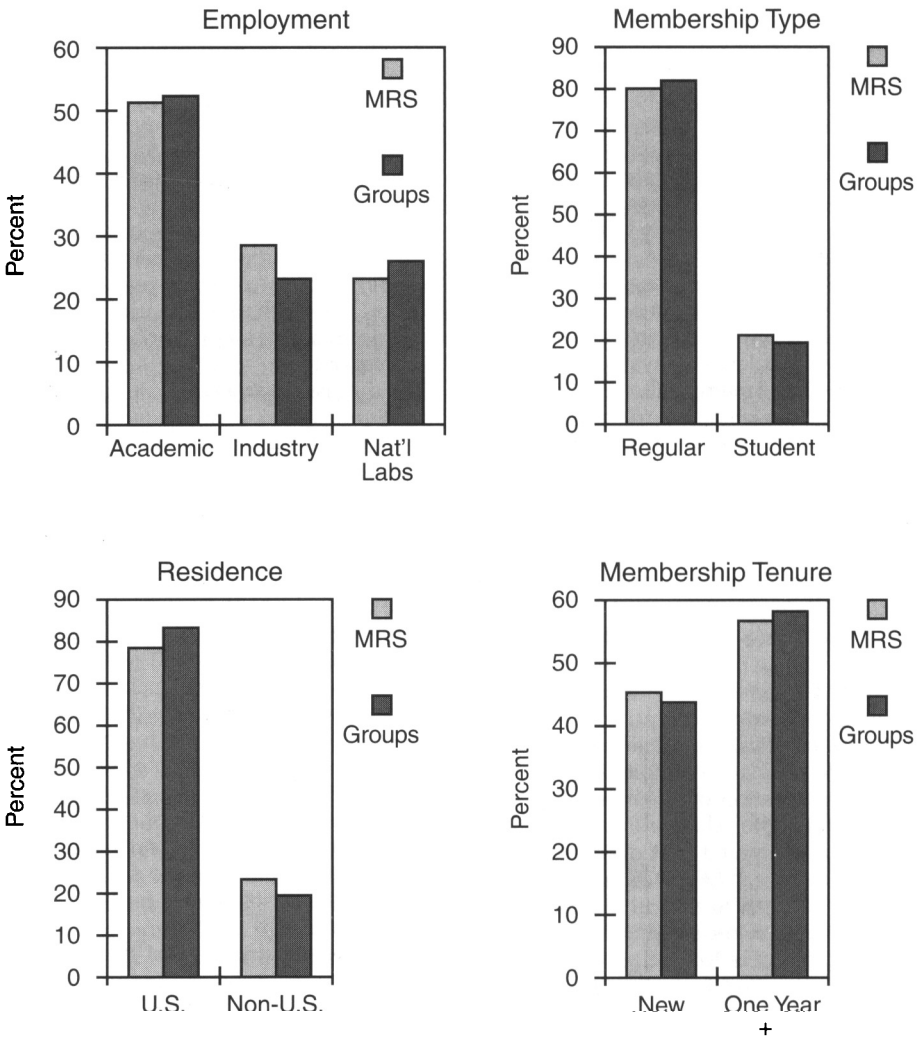

Figure 2. MRS and focus group demographics (selected).

The information that emerged from the groups in these specific topical areas is presented in this report, following the "general comments" section. Effort is made in the presentation to give an indication of the representativeness of the comments presented. Terms such as "some of the groups" or "most of the groups" are used to discourage readers from forming more quantitative and predictive conclusions regarding specific percentages of participants supporting or disapproving of an idea.

General Comments

There were three areas that emerged from all the groups that significantly colored the discussions. These were the lack of knowledge of NSF/DMR processes; of the social relevance and education/infrastructure components of the NSF mission (see sidebar on "NSF Mission and Goals"); and of the full range of programs and funding opportunities available through NSF and DMR, even of those specifically applicable to certain segments of the focus group populations.

The low level of knowledge of almost all focus group participants of the NSF/DMR process for accepting, reviewing, and awarding individual investigator awards had a significant impact on the nature of the discussion and on participant responses to questions in the topical areas. The facilitator kept the discussion as much as possible away from process details, although some had to be provided for participants to discuss some of the questions. This low level of knowledge was particularly interesting considering the relatively high number of participants who had some or significant contact with NSF.

[2] MRS members unfamiliar with qualitative data collection techniques would find it useful to review the segment of the tape of each of the six meetings which dealt with the same topic (the merit review criteria might be the most enlightening in this case) to gain an understanding of qualitative data collection techniques. The participants were presented with the same information in each case; the reviewer could observe differences and similarities in responses among the groups. That also might give the reviewer a better context within which to understand the analysis presented in this report.

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There clearly was a lack of knowledge of the broad mission and goals of NSF. As will be noted later in this report, most participants appeared to believe that NSF's primary and perhaps only purpose was to support basic research. The education, infrastructure development, and social relevance components of the mission and goals were clearly new information to many participants.

Finally, there was a lack of knowledge of the gamut of programs and awards available through NSF in general and DMR in particular. This was particularly surprising since many of those suggesting the institution of new programs when programs already existed were precisely those who would benefit from the existing programs.

Topical Areas

Comments on New Merit Review Criteria

The facilitator opened discussion on the topic of new merit review criteria (see sidebar on "NSF Merit Review Criteria") with a short description of the Government Performance and Results Act (GPRA) as a context-setting device and in anticipation of questions relating to the impetus for change. However, the facilitator also noted that even with the GPRA influence, NSF/DMR would need some mechanism to discriminate among the proposals it received, as it did not have the resources to fund all of them at the level of request. Participants were asked to assess the criteria from the standpoint of both proposal preparers and reviewers.

Two primary points were made in all the sessions. First, the new criteria simply represent a repackaging of the old. All the same areas are covered, simply in a different configuration. The second point related more specifically to the qualifications of both proposers and reviewers to speak to the criteria and the applicability of the criteria for materials science research.

The "broader impacts" criterion was seen as problematic by all groups, both from the standpoint of proposers and reviewers. Most participants felt that they were "not qualified" to address the criterion, that the criterion asked for "subjective" and qualitative rather than "objective" information, and that it was vague and poorly defined (what are social needs? infrastructure?). The term "diversity," which appears in some of the explanatory material related to this criterion, generated a fair amount of discussion in several groups, both in terms of what it meant (was it referring to the race and gender categories addressed by, for example, EEO/AA programs, or did it have a broader definition to include, for example, academic disciplines or experience levels?) and its appropriateness to evaluation of a research proposal. There also was concern that it might unfairly discriminate in favor of large institutions which had a larger pool from which to draw. Finally, there was a sense that the "broader impacts" criterion represented a political rather than a scientific agenda and was therefore inappropriate to ask of basic research.

The discussion around the impact criterion stimulated concern in several groups that it might move NSF too far toward the applied end of the spectrum. "NSF should not dismiss proposals because there is no obvious application for the research results," said one participant. "NSF is the last bastion of basic research—and needs to stay that way," said another. It should be noted, however, that while this sentiment represented the feelings of a significant majority of the participants, including some (but not all) of the participants from industry, it certainly was not universal. In a few cases, some participants were vocal with their comments about the value of considering the "use" end of research efforts. In a couple of the groups this led to suggestions for a separate set of criteria for basic and applied research.

In the same vein, most of the groups asked about the relative weight of the two, proposed criteria, as well as the subbullets presented as explanatory material. While opinions on specifics differed, most felt that the intellectual merit criterion ought to have more weight than the impact criterion for the types of projects funded by DMR.

Participants in several groups were concerned that the criteria collectively did not guard against the concentration of funding in large schools and with well-established PIs through the emphases on "established track record" and "access to adequate resources." There were some suggestions for programmatic means to ensure a more equitable distribution among large, well-known schools and established PIs, and smaller, less well-known schools and new researchers. These will be discussed in the section covering suggestions for new types of support.

There also was concern that the criteria did not adequately guard against the personal politics that play in a small professional community such as that to which materials scientists belong. Although most participants recognized that there are mechanisms that ask about formal conflict of interest, they were concerned that there was no assurance that personality and other informal conflicts would not be able to influence the review process. This concern came up in most of the groups.

Some of the groups were asked for their own criteria for identifying proposals which would yield "good science." *Post facto* discriminators were immediately volunteered (i.e., publications and citations). When asked for *ex ante* discriminators, all the groups had difficulty. Most suggested criteria addressing the quality of the idea (which generally, but not always, was defined as its originality or its leveraging potential). One group noted that the strict application of a set of criteria was not the way in which they evaluated proposals, whether for NSF or in other contexts. They would look over the criteria, set them aside, and then consider the proposal as a whole, asking themselves if the research as described could be done, and "if I cared if it were done."[3] In another group, one of the participants noted that the current review forms do not encourage rigorous application of the criteria.

NSF Mission and Goals

Mission and Purpose

To promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense.

Long-Range Goals

- Enable the United States to uphold a position of world leadership in all aspects of science, mathematics, and engineering;
- Promote the discovery, integration, dissemination, and employment of new knowledge in service to society; and
- Achieve excellence in U.S. science, mathematics, engineering, and technology education at all levels.*

* From *NSF in a Changing World* strategic plan issued in 1995.

[3] From a decision theory standpoint, of course, this is the same process. The criteria simply make explicit what is implicitly considered by the reviewers as they ask "can it be accomplished" and "do I care." It was interesting, however, that this group saw those as two, distinctly different processes.

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Finally, almost all the groups suggested that education of both proposers and reviewers on the criteria would significantly enhance the likelihood that the criteria would be applied as NSF would like them applied. This was felt to be particularly true for the "broader impacts" criterion. The education could take the form of explanatory printed materials, or workshops or briefing sessions.

Changes to the Review Process

The discussions around the review process revealed how little even participants in the process knew about the movement of a proposal from conception to submission to funding or rejection. Of particular concern to participants was the location of the authority for the final decision. The question frequently arose about the mechanism for the reconciliation of diverse reviews (three "excellents" and a "very good," for example). Occasionally this led to a discussion of "grade inflation" (a proposal needs all "excellents" to be funded), but generally that was recognized as a function of the number of submissions versus available funds.

On a related topic, there also was significant concern about the "accountability" of the reviewers and of the funding process itself. Who picks the reviewers? Is there ever a check against the reviews at project completion, either by the reviewers themselves or by NSF personnel? In a couple of cases, this line of discussion led to some relatively heated interchanges about the need to incorporate project milestones in the funding process. In general, industry participants were in favor of them, others against. The "for" argument was based on a need for accountability; the "con" argument focused on the time burden this would impose on the researcher, and the attractiveness of the current NSF process with its relatively low level of reporting requirements when compared to other funding agencies.

Almost all of the groups raised the importance of allowing rebuttal to critiques or clarification of points of misunderstanding before the funding decision was made. The process of submitting an article to a peer-reviewed journal was frequently invoked as a positive model in this regard.

The response was generally positive to the question about the attractiveness of a significant process modification that involved initial submission of a short white paper, some sort of evaluative process at this stage, and then submission of a full proposal by a subset of those who submitted the white papers. Most felt this to be an excellent idea, as it would increase the efficiency of the process for the proposer: The significant time and effort required for the preparation of a full proposal would not be invested unless the likelihood of success were high. Consequently, the researcher would have more time to "do science." It was also seen as a potential equalizer. The institutional resources required to create flashy packages would not come into play in preparation of a white paper. Although most comments were positive, some were concerned that the ease of preparation of the white paper would encourage the submission of an excessive number of ill-conceived ideas.

The concept of instituting an oral presentation as a significant part of the proposal process generally received poor reviews. Panelists felt that its clear positive aspect was the opportunity on the part of the proposer to clarify or expand upon key points of his proposal. However, this positive aspect could be managed in other ways (again the peer-reviewed journal article analogy was invoked), and was strongly outweighed by the negatives of oral presentations. The logistics would be very difficult, and resource-intensive. It also had the potential to cut down the pool of qualified reviewers. One of the attractions of the current system is the ability to fit a review into a time slot of one's own devising. Finally, almost all felt that it would favor those with excellent oral presentation skills over those with excellent scientific abilities.[4]

Panelists were asked their opinion of the value of hard deadlines for proposal submission. Almost all groups recognized that there currently is and always will be a *de facto* deadline driven by NSF (Congressional) funding cycles. Most felt that it would be beneficial to make that deadline *de jure,* that is, explicit. The question was then rephrased, and participants were asked if they would be able to do a better job as reviewers (i.e., recognize the "excellent" proposals) if they could review comparatively or relatively, rather than absolutely. (Under a "no deadline" system, each proposal can only be absolutely evaluated against some set of criteria. Under a "deadline" system, proposals in a set could be relatively ranked against those criteria.) Discussion suggested that the "deadline" system and comparative reviews would be more conducive to useful reviews. Finally, from a reviewer's perspective, it was suggested by a couple of groups that a deadline would allow reviewers to budget time in advance and so be able to do a better job.

One final area that received attention in a couple of groups, although it was not directly addressed by the facilitator, was that of cross-disciplinary or cross-area funding. Proposals that addressed a problem from a multidisciplinary perspective often had difficulty getting "excellent" marks from all reviewers because individual reviewers often did not understand all parts of the proposals. Another group raised concerns regarding what one participant called "cluster funding," which means getting support from more than one division of NSF. There did not appear to be a mechanism (or maybe the interest) on the NSF side to make this happen. The preferred funding path seems to be single-division.

Research Portfolio Questions

Questions under this topic generally fell into two areas: methods for choosing research portfolio elements (i.e., proposals to fund) and the distribution among funding modalities (i.e., Individual Investigator Awards [IIA], Centers, Facilities, and other areas).

To stimulate discussion on the issue of choosing research portfolio elements, participants were presented with three models. The first was peer review of a set of unsolicited proposals. The second was a formula funding model in which some portion of the funding budget is allocated to some subset of the recipient population according to a formula based on political requirements, performance history, or some other criterion. The third was a model in which "experts" choose areas of interest to fund and accept proposals only in those areas (the Advanced Research Projects Agency [ARPA] or MITI model).[5]

The sentiment of all groups in response to this question was clear. The peer review model was highly favored as being the most appropriate to basic research—which was, after all, said the participants, what NSF funded and

[4] It is interesting that not one participant recognized that the current process favors those with excellent writing skills over those with excellent scientific abilities. It is true, however, that our education system emphasizes written communication over oral.

[5] For a recent quantitative approach to an analysis of the return two of these portfolio management models provide (peer review and formula funding), see Ellis B. Cowling, John T. Sigmon, and Charles E. Putman, "Maximizing Benefits from Research: Lessons from Medicine and Agriculture" in *Issues in Science and Technology* (Spring 1996) p. 29. Robert Mullan Cook-Deegan compares "expert choice" models with peer review in a more qualitative approach in "Does NIH Need a DARPA?" in *Issues in Science and Technology* (Winter 1996–1997) p. 25.

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should continue to fund.[6] The participants felt that the mission agencies used the "expert choice" model, obviating the need for NSF to do so. The "expert choice" model also had inherent process problems that some participants recognized: Who would the experts be, particularly for basic research? Is this win all/loose all strategy an appropriate one for any field, let alone for basic research? Finally, the formula funding model received cautious endorsement for limited applications. It was noted that it might be appropriate to support fulfillment of certain parts of the NSF mission—such as the infrastructure development emphasis—but not for what was seen as the central part of that mission—the promotion and support of basic science.

Several participants in different groups did recognize that NSF and DMR currently exhibit some mixture of all three models. However, the message that emerged from this discussion was a resounding endorsement of peer reviews.

When questioned on the appropriateness of the distribution of funds among different funding modalities (IIA, Centers, Facilities), most participants had little comment. Comments that arose in other parts of the session revealed that most participants—although not all—had significant reservations as to the value of Centers as catalysts for effective research teams. The "natural" team, participants felt, consisted of three to five PIs. Such teams had a problem- or project-specific life. The Center structure, on the other hand, encouraged the formation of "unnatural" teams for the purpose of acquiring money. These unnatural teams then became reified into an administrative unit which took on a life of its own. There was some discussion around the perceived need to add a new funding category to address these natural teams. That discussion is reported in the next section.

Finally, participants found it difficult to comment on IIA award size. In a couple of sessions it was noted that the larger the awards, the fewer types of things can be funded (programmatic diversity would be reduced) and the more vulnerable institutions or departments become to fluctuations in revenue (if a department looses one $80,000 grant that is one thing; if it loses one $500,000 grant, that has a very different kind of impact).

New Types of Support

This section is prefaced with a reminder that the discussions made it clear that there were several programs offered by NSF/DMR of which participants were unaware although some of those participants were the targeted recipients of those programs. The lack of knowledge of current NSF processes (as distinct from programs) also contributed to the comments.

A program to fund terminal masters students met with virtually no support. Most felt that masters students do not have enough research experience to devise or carry out a sound research proposal. Also, there did not appear to be much interest in terminal masters programs *per se*. Comments reflected a sense that there was no job market for graduates from such a program, and that it was not a segment worth encouraging.

The proposal that received the most vocal support and which was suggested by someone in every group was for a separate pot of money or different evaluative criteria for new researchers. Again, there was lack of awareness of existing programs that address this segment.

The concept of funding for individuals as distinct from funding for projects was raised in several groups. It met with an ambivalent reception almost every time. The concern seemed to revolve around the development of an appropriate evaluative mechanism.

A separate category for the funding for the "natural" research teams discussed earlier did not appear particularly necessary to participants. They felt that these sorts of teams were well-covered in the IIA category.

In almost every session, one of the non-U.S. resident participants raised the question of funding for international programs. What was meant by this was not explored further (e.g., funding for non-

[6] The assumed model of the evolution of critical scientific thought that underlay the discussion surrounding the value of peer review in this context was particularly interesting. That model closely resembled that of a laissez faire capitalist system: that from the apparent randomness of individual activity, system order would emerge and all needs would be served.

NSF Merit Review Criteria

Current Criteria

- Research Performer Competence
  - capability of investigators
  - technical soundness of approach
  - adequacy of available institutional resources
- Intrinsic Merit of Research
  - likelihood that the research will lead to new discoveries of fundamental advances in its field OR
  - will have substantial impact OR
  - will have a substantial impact on progress in its or a related field
- Utility or Relevance of the Research
  - the likelihood that the research can contribute to the achievement of a goal that is extrinsic to the research itself
  - basis for new or improved technology
  - assists in the solution of societal problems
- Effect on the Infrastructure of Science and Engineering
  - potential to contribute to better understanding or improvement of the quality, distribution, or effectiveness of the nation's scientific and engineering research, education, and work force base

Proposed Criteria

- What is the intellectual merit and quality of the proposed activity?
  - will it significantly advance the knowledge base within and/or across fields?
  - does it suggest and explore new lines of inquiry?
  - to what degree does the proposer's documented expertise and achievement record increase the probability of success?
  - is the project conceptually well-designed?
  - is the plan for managing the project credible?
  - is there sufficient access to resources?
- What are the broader impacts of the proposed activity?
  - how well does it advance discovery and understanding while concurrently promoting teaching, training, and learning?
  - will it create/enhance facilities, instrumentation, information bases, networks, partnerships, or other infrastructure?
  - how well does it broaden the diversity of participants?
  - does it enhance scientific and technological literacy?
  - what is the potential impact on meeting societal needs?

U.S. citizens, funding for collaborative programs), but it was not generally known that there was an "international" program that addressed some aspects of this type of funding.

Commentary and Recommendations

The materials science community as represented by the participants in these focus groups has a very poor understanding of the overall mission of NSF and of DMR in particular. It also knows little about available programs or about the review and funding process. Education on programs would increase applicant pools, and could lead to increased levels of quality of submissions. It also would help fulfill some NSF goals of supporting the equitable development of a high quality science, engineering, and mathematics infrastructure.

Education on the review and funding process also appears to be important. This will be particularly important if NSF/DMR chooses to launch new review criteria. The rationale and context for the criteria will need to be made clear, both to the proposing and reviewing communities. Furthermore, if DMR wishes to have substantive reviews of the "broader impact" criterion or one similar to it, it will have to invest significantly in education of reviewers and of proposers.

There also may need to be additional training, monitoring, or some other addition of rigor into the proposal and review process if NSF/DMR wishes to be accountable to its published criteria. Although these focus groups were not the appropriate forum in which to pursue discussions about how reviews are actually done, it sounded like there was a great deal of variability in the application of the criteria. A set of focus groups populated by experienced reviewers might yield some insight into preferred and most useful processes, and methods for enhancing the rigor of the processes.

NSF may consider instituting some practice allowing interaction among proposers and reviewers before final funding decisions are made. This would give proposers an opportunity to rebut criticisms or clarify misunderstandings, and was felt by participants in these sessions to be a critical missing element of the current process.

NSF/DMR might consider a process modification that involves a short white paper submission followed by a longer proposal on a subset of that pool. Again, targeted focus groups on preferred processes would yield useful information.

The institution of a formal deadline and modification of the review process to allow or encourage comparative reviews would be seen as positive changes by materials scientists.

Finally, NSF/DMR might consider it useful to collaborate with a group such as MRS to explore in depth the actual activities that take place during the review process. How do reviewers use the criteria (some comments received here indicated that they are not used at all)? What additional information does a reviewer find useful to the review process to augment that which is presented in the written proposal (the reviewer's peers' knowledge of the proposer, for example)? Is there some format other than the current one that would be more helpful to the reviewer? The answers to these and other questions might help DMR design a review process that is not only more efficient but more effective in achieving its goals.

As a closing note, although MRS chose the demographic criteria it did to be "most representative" of MRS, it might have been able to address specific issues better if it had discriminated by some measure of experience with NSF. However, many of the questions could be answered by any member of the materials science research community, and NSF did get feedback on the visibility of and knowledge of the community about its programs and processes.

JESSICA GLICKEN
ECOLOGICAL PLANNING AND TOXICOLOGY, INC.

MRS Seeks Graduate Student Award Applications for 1997 Fall Meeting

The Materials Research Society Graduate Student Awards are intended to honor and encourage graduate students whose academic achievements and current materials research display a high order of excellence and distinction. Awards are presented to students who demonstrate excellence in their materials research projects and show promise for future substantial achievement in the field.

To be eligible for the award, applicants must have good standing in a recognized academic graduate degree program or have received their final research degree within the four months prior to the meeting. They must participate in the 1997 MRS Fall Meeting in Boston as the author or co-author of a paper and be prepared to participate in the finalists' student presentation judging session, which is held during the meeting.

The selection of the recipients is completed in two steps. First, a group of finalists is identified on the basis of information provided in the award applications. Second, each finalist presents a 10-minute talk in a special student presentation judging session at the meeting.

The recipients of the award will be announced at an Awards Ceremony during the meeting and announced in *MRS Bulletin*. Each award consists of a $250 cash prize, payment of the registration fee for the meeting, and a presentation plaque.

The application deadline is August 29, 1997. For information and an application form, contact John B. Ballance, Executive Director, Materials Research Society, 9800 McKnight Road, Pittsburgh, PA 15237-6006; 412-367-3003; fax 412-367-4373; or http://www.mrs.org/awards/Gradstud.html/. MRS

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