Funding Opportunities for Acquiring Major Equipment from Federal Granting Agencies

M&M 2004 Core Facility Management – Part II: NSF

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D. Sherman: The January issue of Microscopy Today contained Part I of this series, which focused on obtaining funding from the NIH. This second article will focus on funding opportunities for major equipment acquisition through the NSF.

Dr. Angela Klaus is a Program Director in NSF's Division of Biological Infrastructure. Dr. Klaus' formal training was in biology. She started out as a high school science teacher and then worked for several years as an analytical electron microscopist for Exxon-Mobil. She has that analytical experience that many biologists lack. Angela took a leave from her position as Director of the Microscopy and Imaging Facility at the American Museum of Natural History in New York to spend two years at NSF. Her responsibilities at NSF involved instrument related programs. Now there is a bit of a difference between NIH and NSF in that at the NIH the administrators sign on for a long period of time and there is a lot of continuity in that respect. At NSF, many of the program directors rotate in for a period of 1-3 years from their regular positions. Thus, they often take leaves from their regular positions to work at NSF and then return to those positions at the end of their NSF tour. Angela is in the process of rotating out after a 2-year commitment at NSF.

Dr. Angela Klaus:

As Debby mentioned I am a rotator at the National Science Foundation. It's been a privilege and an honor to serve science as a Program Director, and I feel it is an honor to be invited here to tell you about NSF funding opportunities.

I geared this talk towards primarily undergraduate institutions – mainly 2- and 4-year colleges that do not award graduate degrees. I do most of my outreach at this type of institution. I decided to keep most of the talk intact for this audience just in case there are people who are unfamiliar with the NSF system. I would like to start with a little background.

The National Science Foundation was established with the NSF Act of 1950. The Act established the Foundation's mission, which is "to promote the progress of science, to advance the national health, prosperity, and to secure the national defense." That was the mission statement in 1950 and that remains the mission of the NSF today. Those words have been interpreted differently as the years passed by, as the focus of NSF tends to change as its administration changes.

NSF is a small agency compared to NIH, and it funds all areas of science, mathematics, and engineering. The Director of the National Science Foundation is a Presidential appointment and he or she reports directly to the President of the United States. Dr. Arden Bement is the current Director of NSF (as of 11/04).

I would like to give you a brief overview of the administrative structure of the NSF, as this could be important in navigating the system so that you become a successful grantee. The Director of the NSF reports to the President of the U.S., but is guided by a body called the National Science Board made up of prominent members of the scientific community. The National Science Board sets NSF policy. Under the office of the Director, the Foundation is divided into Directorates. Today, I will be speaking mainly about the Directorate for the Biological Sciences (BIO). Dr. Charles Bouldin will be speaking about opportunities in the Directorate for Mathematics and Physical Sciences (MPS).

The NSF Directorates are divided into Divisions. The current head of the BIO Directorate is Dr. Mary Clutter. I work in the Division of Biological Infrastructure (DBI), headed by Dr. Machi Dilworth. Within the Biology Directorate there are four Divisions: (1) Biological Infrastructure, (2) Environmental Biology, (3) Division of Integrative Organismal Biology (IOB). (formally Integrative Biology and Neuroscience), and (4) Molecular and Cellular Biosciences. There is also a Virtual Division called "Emerging Frontiers." All the programs for biological instrumentation are administered through DBI. This Division also administers Biological Research Collections, Field Stations and Marine Labs, training programs such as Research Experiences for Undergraduates (REU), and the Plant Genome Research Program. Most Divisions are organized into individual clusters.

Roughly 40% of the Program Directors at NSF are rotators, and serve for 1-3 years. So if you are going to be successful at NSF it is really a good idea to stay in touch with the permanent Program Directors in your particular program area. It's also very helpful to stay in contact with the permanent staff at NSF because so many Program Directors rotate in and out so often.

Now, to get started on the road to getting funding at NSF, you will need to access the website at www.nsf.gov. You need to pay attention to the Guide to Programs and the Grant Proposal Guide. The Guide to Programs is published every fiscal year and provides a complete listing of all the available NSF programs. The Grant Proposal Guide is a document that your Office of Sponsored Research should memorize. This guide contains the rules for the administration of an NSF award.

Another part of the website that you should become familiar with is the green box on the left-hand side of the homepage. This box contains links to all the NSF program areas. The instrumentation programs are scattered throughout the Foundation according to relevant Directorate. For the BIO Directorate, instrumentation programs are administered through the Division of Biological Infrastructure. Another section of the NSF website you must become very familiar with is Fastlane. All NSF proposals must be submitted electronically through Fastlane. The link to the Awards Abstracts Search page is now on the navigation bar found across the top of the homepage. It is the third link from the left called "AWARDS". I've found this to be one of the most useful sections of the website for Principal Investigators. There is a similar page at NIH for searching for award information. You can search by specific time frames, by PI, institution, program officer, keyword, etc. to find grants that have been funded. It is an excellent way to find information on successful proposals. The award abstract will also include contact information for the PI and the name of the responsible Program Director for the award. It is possible to obtain copies of funded proposals through the Freedom of Information Act, however all declined proposals remain confidential.

The submission and review process for the NSF is quite different from NIH. The NSF doesn't have a Center for Scientific Review. All proposals are submitted electronically through Fastlane, and

the Program Director is the person responsible for management of the peer-review process and program budget. Based mainly on the advice of panel and adhoc reviewers, the Program Director makes funding recommendations to the Division Director.

NSF has a number of different types of submission deadlines. For some types of proposals, there are no deadlines. Examples are proposals submitted for workshop or conference support, and proposals submitted under the "small grants for exploratory research" or SGER mechanism. When submitting for workshop or SGER support, it is recommended that you contact the Program Director in advance to discuss interest and availability of funds. Regular research programs have either deadlines or target dates. For the most part, a deadline is a deadline – if you miss it, then that's it. There is a little bit of flexibility in a target date. If you anticipate missing a target date, it is possible to call the Program Director and ask for some additional time to submit your proposal. For example, the Major Research Instrumentation (MRI) program has a hard deadline after which proposals will not be accepted. The Multiuser Equipment for Biological Research (MUE) program, however, has a target date – if you anticipate a problem with meeting the target date for MUE, you can call Dr. Gerald Selzer, the responsible Program Director for MUE, and ask for a short extension.

Proposals can be submitted to NSF in response to a specific research program, or they are submitted in response to a Program Announcement. If submitting in response to a Program Announcement, it is important that you read the program announcement carefully. It's surprising how many people don't do this. Become familiar with eligibility requirements, goal of the program, and any special requirements, such as facilities for an instrumentation program. Once you've done your homework, I recommend you call the Program Director with specific questions. The Program Director can offer insight into writing a successful proposal that often cannot be gleaned from just reading the announcement.

A good proposal is a good idea that is well expressed, with a clear indication of methods for pursuing the idea, evaluating the findings and making them known to all who need to know. That is sort of a standard description of a good proposal - but a competitive proposal is all the above, plus appropriate for the program, and responsive to the program announcement. People sometimes don't think about these last two items and submit to the wrong program or do not respond to the program announcement and, generally, are not successful.

As I mentioned, the merit review process at NSF is quite different from NIH. The National Science Foundation has two review criteria. They are (1) intellectual merit, and (2) broader impacts. Most proposals stress the intellectual merit, but you must also address the broader impacts of the proposed activity in an NSF application. This could be an education plan, outreach to members of groups traditionally underrepresented in science, etc. The more sincerely you address the broader impacts, the more competitive you will be for funding success at NSF. The broader impacts review criterion is becoming more and more important as reviewers are becoming more aware of it, and outspoken on how broader impacts should be addressed.

The NSF merit review process differs in some ways from NIH in how review panels are constructed and what happens in them. As I mentioned earlier, at NSF the Program Director puts together the review panel. A proposal can be reviewed by a panel of peers or by 'ad hoc' review. Or it can be reviewed by both types of mechanisms. The only strict requirement is that a proposal must receive at least three reviews. The MUE program is run almost entirely through panel review.

NSF Program Directors operate under a goal of processing 70% of the proposals submitted to any program within 6 months of the submission date. In fiscal year 2004, we had 192 proposals submitted to Biology for the MRI program. By July 22, we were supposed to have 70% of awards and declinations processed. For the MRI program in Biology, two panels are usually run: one for instrumentation that is mainly related to molecular work (sequencers, mass spec's, etc.) and another for mainly microscopy equipment. Most of BIO's proposals this last year were requests for confocal microscopes and DNA sequencers.

An NSF review panel is an advisory committee only. The Program Director is not required to strictly follow the advice of the panel. Usually, however, the advice of the panel is followed fairly closely, with the Program Director making funding recommendations to the Division Director. A review panel usually consists of 10-20 people, depending on proposal pressure. Each proposal is usually assigned a primary reviewer and two secondary reviewers. The primary reviewer describes the proposal to the entire panel, gives his or her views on the proposal, and assigns a rating. NSF ratings include Excellent, Very Good, Good, Fair, and Poor. The secondary reviewers then give their reviews and ratings of the proposal. Finally, the panel as a whole discusses the proposal and then places it in a funding category (e.g. Fund, Fund if Possible, or Do Not Fund). The Program Director makes the final funding recommendations to the Division Director based primarily on the advice of the panel, budgetary constraints, and other programmatic considerations. Other programmatic considerations may include geographic distribution of funding or distribution across different types of institutions in order to create a well-rounded portfolio.

Another great way to learn how to write a good instrumentation proposal is to get on a review panel. A good strategy for getting invited onto a review panel is to contact the Program Director and express your interest in serving. Ask if you can email your CV, and make sure you include a description of the types of instrumentation you are familiar with. I recommend that you follow up by phone, and be persistent and polite. Many of the NSF rotators travel extensively, so you must be persistent and patient when trying to get in touch.

There are three programs for instrumentation in the BIO Directorate at NSF. You are probably most familiar with the Major Research Instrumentation program (MRI). The other programs are (1) Multiuser Equipment (MUE) which I spoke about earlier, and (2) Instrument Development for Biological Research (IDBR). MRI is a Foundation-wide activity administered by the Office of Integrated Activities (OIA). All MRI proposals are submitted to OIA, and then are distributed to individual directorates based on discipline. Setting up review panels and proposal processing is handled by Program Directors in the individual directorates. The funding for MRI comes from a special Congressional appropriation each year; it is not a regular standing program. In fiscal year 2003, the overall budget for the MRI program was approximately 86 million dollars. In fiscal year 2004, the MRI budget increased to

about 109 million dollars. The MRI budget for the BIO Directorate increased from approximately 13 million in FY03 to 23M in FY04. The website for the MRI program can be found by clicking the "Crosscutting" link on the NSF homepage. The deadline for submission to MRI is January.

The success rate for most programs at NSF is less than 30%. The success rate in the BIO Directorate in FY 2004 for MRI was over 30%, which is fairly typical for the MRI program Foundation-wide. Reviewers put a lot of work into their written critiques of proposals. You should read your reviews and the panel summary carefully, and then call the Program Director for advice on how to craft your proposal so that it will be successful upon resubmission. Success rates for resubmissions are fairly high. In the event of an award, whether it is an instrumentation or regular research award, you should be aware of supplemental funding. Supplements to existing awards can support undergraduate researchers, high school teachers, and in some cases, even a visiting scientist for the summer. In some instances, it may be possible to get a small amount of supplemental funding for equipment if prices or options have changed since the original quote was issued. You must contact your Program Director before submitting any request for supplemental funding.

If you plan to be in the D.C. area, it is worthwhile to schedule appointments to visit with NSF Program Directors in person. Such visits by PIs are not uncommon. Additionally, it may be useful to have administrators and sponsored projects personnel visit NSF in person. This is a terrific way to get information about programs, and to become more familiar with the NSF system. ■