WHITE PAPER

MRI Grant Program:

Expert Tips & Tricks to Nab Expensive Instrumentation

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White Paper — "MRI Grant Program: Expert Tips & Tricks to Nab Expensive Instrumentation" is published by:

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Introduction

The Major Research Instrumentation (MRI) grant program is perhaps one of the most specific funding mechanisms at the National Science Foundation (NSF). The NSF awards MRI grants to only a very narrow slice of applicants, mostly due to its stringent eligibility requirements.

NSF's Office of Integrative Activities administers the MRI grant, which is an NSF-wide program. The NSF MRI grant program:

- Supports the acquisition and development of high-end scientific instrumentation for research and student training;
- Aims to improve research and research training; and
- Involves collaboration with other organizations.

MRI grants are specifically for instruments that are too expensive for support through other NSF programs. Such instruments must be shared – you must collaborate with other institutions, although the collaborating organization can be from the private sector.

The MRI program has become increasingly competitive. While proposal success rates in 2010 hovered around 30 percent, the rate for 2011 was just 21.8 percent. So of the 859 MRI proposals that NSF reviewed, only 187 actually received awards, according to a November 2011 presentation at the QEM Network Workshop in Las Vegas by **Dr. Randy L. Phelps,** Staff Associate at NSF's Office of Integrative Activities. Phelps is in charge of coordinating the MRI program.

Although the competition is fierce, the payoff is huge – the average MRI award in 2011 was more than $500,000, Phelps states. You can ask for $100,000 to $4 million, although there's no minimum for non-PhD-granting institutions or for proposals in mathematical, social, behavioral or economic fields.

REMEMBER:

NSF's MRI 2012 budget is $90 million – down from $100.2 million for 2011.

Based on the 2012 budget, Phelps expects that NSF will award around 150 – 175 MRI grants.

MRI proposals can ask for funding to support either the acquisition or the development of high-dollar instrumentation. Although there's no real distinction between how much you can ask for with either type of request, typically NSF awards three times as many acquisition MRI grants than development ones. Acquisition MRI grants are for three years, while development grants are for five years.

The big money isn't the only factor that makes MRI grants so competitive – the eligibility limitations and various sticking points in the review process also make the grant tough to get. But with some insider advice and expert guidelines, your chances of submitting a successful MRI proposal will skyrocket.

Eligibility: What Reviewers Want to See

The MRI program is specifically for integrating costly, hard-to-access instrumentation for research and research training. The program is unique in that it appears to focus on instrumentation, but actually has a dual purpose. This point is important to remember when you're composing the proposal.

The MRI program goals are rather specific. According to NSF, the program goals are to:

- *Support the **acquisition** of major state-of-the-art instrumentation, thereby improving access to, and increased use of, modern research and research training instrumentation by a diverse workforce of scientists, engineers, and graduate and undergraduate students;*

OR

- *Fostering the **development** of the next generation of instrumentation, resulting in new instruments that are more widely used, and/or open up new areas of research and research training;*

AND

- *Enabling academic departments, disciplinary and cross-disciplinary units, and multi-organization collaborations to create well-equipped research environments that integrate research with education;*

- *Supporting the acquisition and development of instrumentation that contributes to, or takes advantage of, existing investments in cyberinfrastructure, while avoiding duplication of services already provisioned by NSF investments;*

Here, the MRI program aims to "support the development of computational and data-intensive science and engineering programs, or provide pathways to regional and national infrastructure," Phelps explains.

- *Promoting substantive and meaningful partnerships for instrument development between the academic and private sectors. Such partnerships have the potential to build capacity for instrument development in academic settings and to create new products with wide scientific and commercial impact.*

Time Waster: Ensure Your Organization Meets Eligibility Requirements

TIP:

Eligibility parameters for MRI grants tend to focus on your institution. So before you spend hours, days or even weeks and months on crafting the perfect MRI grant proposal, you'd better check to make sure your organization is in fact eligible.

According to Phelps, the following types of organizations are eligible for the MRI program:

- **Institutions of Higher Education**
  - o PhD-granting institutions (awarded more than 20 PhDs or D.Sci.s during the combined previous two academic years)
  - o Non-PhD-granting institutions (awarded fewer than 20 PhDs or D.Sci.s during the previous two academic years)
  - o Non-degree-granting organizations (do not award Associate's, Bachelor's, Masters degrees or PhDs and D.Sci.s, or institutions that award all degrees outside of NSF-supported fields)

Not-for-Profit, Non-Degree-Granting Domestic U.S. Organizations

- o 501(c)(3) tax status
- o Must have an independent, permanent administrative organization (e.g., an office of sponsored research) in the United States
- o May include science centers, museums, research labs, observatories or similar organizations

- **Legally Incorporated, Not-for-Profit Consortia**
  - o Includes two or more eligible organizations
  - o 501(c)(3) tax status
  - o Must have an independent administrative structure (e.g., an office of sponsored research) in the United States

For MRI proposals, you may have a "collaboration" or a "consortium." A collaboration "represents a funding mechanism, used NSF-wide, by which investigators from two or more organizations who wish

to collaborate on a unified research project may submit proposals and share funding," Phelps states. A collaboration could involve a single proposal with sub-awards, or a "link collaborative" with simultaneous proposal submissions and separate awards to each organization.

A consortium "represents a submission mechanism for proposals that encourage greater collaboration and sharing of state-of-the-art instrumentation and are submitted by submission-eligible organizations to provide access to unique instrumentation for a broader user base of U.S. scientists and engineers," Phelps explains. This could be a legally incorporated consortium or one assembled specifically for the MRI grant program.

Don't Let Submission Limits Quash Your Proposal

Another crucial factor that you must check (and double-check) before you even think about writing an MRI proposal is the submission limits for organizations. Each organization or institution can submit only three applications – two for acquisition and one for development, according to **Karen Markin, PhD,** Director of Research Development at the University of Rhode Island. Markin is a former NSF and Department of Education reviewer, as well as a published expert on grant writing.

If your institution submits three proposals, at least one of the proposals must be for instrument development, Phelps notes. And if your organization submits more than three MRI proposals by mistake, the NSF can return all of them without review.

Because the submission limit is such a hard-and-fast rule, you must be absolutely certain that your own MRI proposal doesn't end up blowing the limit. Markin advises taking the following steps to ensure that your organization has not exceeded the limit:

- Contact your sponsored research office and ask about how your institution handles limited competitions, and then follow that procedure; OR

- Check the NSF award database:

1. Go to http://www.nsf.gov/awardsearch/;
2. Choose "Search All Free-Text" tab;

3. Type in **MRI** in the "Search Award For" box;
4. Check the box for "Active and Expired Awards"; and then
5. Sort the Organization tab to filter results from your institution.

What's NOT Appropriate for MRI Grants

Because the MRI program is so specific in what it will fund, you must understand exactly what kind of instrumentation is appropriate for the program and what is not. The MRI grant program will not support:

- **Construction, renovation or modernization** of rooms, buildings or research facilities, Phelps states. "Instruments must be able to decouple from their host environment."

- **General purpose and supporting equipment.** This might include general purpose computers and lab equipment like fume hoods or cryogen storage systems, Phelps explains.

- **Infrastructure maintenance,** such as electrical or plumbing, Markin says.

- **Large, specialized experimental facilities,** "constructed with significant amounts of common building material using standard building techniques," Phelps cautions.

- **Fixed or non-fixed structures,** manned vehicles, or other general-purpose platforms or environments, Phelps notes.

- Any instrumentation that you'll use primarily for science and engineering education courses. **Equipment for standard science courses** is not eligible for MRI funding, Markin explains.

- **Multiple instruments** to outfit your lab or facility.

Proposal: How to Make Your Application Shine

In 2011, NSF brought forth a whole host of changes to MRI proposal requirements. In most cases, the requirements and limitations are tighter. Phelps states that for MRI proposals, NSF now:

- Prohibits inclusion of **voluntary committed cost sharing;**
- Requires that all proposals describe **plans for data management and sharing,** or state and explain the absence of a need for such plans;
- Provides **guidance** for proposals that locate instruments at an organization other than the submitting organization;
- Requires that you categorize the requested instrument using **NSF-provided codes.**
- Mandates that the **institutional commitment letter list previous MRI awards** to your organization from the past five years.
- Requires a **"project outcomes report,"** which you would need to make available to public 90 days following the award's expiration.

Pay Attention to Key Elements of Your MRI Application

Now more than ever, you have a lot of "moving parts" to nail down for your MRI proposal to survive the review process. In addition to the 2011 changes, experts have identified some hot areas to direct your attention to in particular.

Acquisition vs. Development: The MRI program makes a distinction between instrument acquisition and development, although both fall under the scope of the grant. The major difference between the two is that proposals for instrument acquisition can last for up to three years, while those for instrument development are

up to five years, Phelps notes.

Development and acquisition proposals are funded in the same range, but in starkly different quantities. For instance, among the 187 MRI awards in 2011, only 45 were for instrument development with 142 for acquisition, Phelps says.

Cost-Sharing: You must provide cost-sharing for 30 percent of the total project cost, Phelps states. This is required for PhD-granting institutions and non-degree-granting organizations, Phelps says. But if you're with a non-PhD-granting institution, cost-sharing is not required.

Your institution's cost-share must be exactly 30 percent, Markin stresses. You cannot offer any voluntary cost-sharing outside the 30 percent either.

Merit Review: When you submit your MRI proposal, you as PI must identify an NSF division to review the proposal, Phelps says. Although NSF will likely heed your suggestion for the appropriate division, the agency can place your proposal in any division it deems appropriate.

Shared Use: Shared use of the proposed instrumentation is a huge factor in NSF's review of your MRI grant application. Simply put, NSF wants the most bang for its buck, so you need to show that there will be many users of the instrumentation, Markin says.

First and foremost, you must show a need for the instrumentation at your institution, Markin instructs. But beyond that, you must demonstrate that investigators from many different disciplines (not just your own) can use the instrument. Talk to fellow faculty members at your institution, as well as scientists at neighboring institutions to find others who have a need for the instrument, she suggests. Also, try to recruit graduate and undergraduate students to further expand your shared-use community.

Management Plan: The MRI proposal requires that you formulate a management plan for the proposed instrumentation. The management plan should describe major points like allocation of time to users, operations and maintenance, and anticipated downtime, Phelps explains.

According to Markin, your management plan must explain in detail:

- Where you will house the instrumentation;
- Who will operate the equipment;
- Who will maintain the instrument and how;
- How much will maintaining the instrumentation cost;
- How much operating the equipment will cost;
- How often the instrumentation will be used (including downtime); and
- How you'll allocate instrument time.

Data Management: You must also include a data management plan "describing how NSF-funded research will be made available at incremental costs in a reasonable time," Phelps says. The data management plan is a rather new component (effective for proposals due on or after Jan. 18, 2011) that NSF is requiring in all proposals. In fact, Fastlane won't allow you to submit a proposal without a data management plan.

The plan is a supplementary document that should be no longer than two pages. Collaborative proposals need to submit only one data management plan. According to the NSF, you should include in your plan:

- The types of data, samples, physical collections, software, curriculum materials or other materials you'll produce via the proposed instrumentation;
- The standards you'll use for data and metadata format and content;
- Policies for accessing and sharing, including provisions for appropriate protections of privacy, confidentiality, security, intellectual property, etc.; and
- Your plans for archiving data, samples and other research products, as well as for preserving access to them.

REMEMBER:

You can find more information on data management plans, including requirements specific to the Directorate, Office, Division or Program, at http://www.nsf.gov/bfa/dias/policy/dmp.jsp.

Institutional Commitment: To show institutional commitment, you must provide a letter from your institution stating that it will operate and maintain the instrument during and after the grant period, Markin says. The letter should also list the MRI awards to your institution in the past five years, including a description of the status of instrumentation from each past award.

Top 10 Insider Tips to Win the MRI Grant

With a narrow window of MRI-proposal success, you have to make your application as competitive as possible. Reviewers will look for certain elements in your proposal when they make funding decisions. Here are the top 10 expert tips to get your MRI proposal to the top of the pile.

1. Focus on the merits. NSF reviewers are always scrutinizing the Merit Review criteria – Intellectual Merit and Broader Impacts. In your Broader Impacts, discuss the social/societal benefits of the instrumentation, Markin recommends. One way to boost your Broader Impacts is to collaborate with diversity-related programs at your institution, she adds.

TIP:

Broader Impacts shouldn't just be included in your narrative. Include them in your abstract as well.

Highlight broader impacts and intellectual merit using subheadings and bold text to make them easier to find.

You need to take your description of the instrumentation's benefit to a whole new level. Describe enthusiastically the compelling research or research training activities that you'll undertake with the proposed instrument, Phelps advises. "Demonstrate how your activities will make meaningful contributions within and across disciplines in both research and research training."

Example: *"The Nikon A1 confocal microscope system is to be housed in the Imaging Suite within the new Center for Sciences and Innovation at Trinity University. The Imaging Suite will bring together Trinity University faculty and student researchers as well as faculty and student researchers from local institutions, including the University of the Incarnate Word and St. Phillips Community College, to address the range of biological questions requiring confocal microscopy. The investigators have an established record for engaging undergraduate students in their research and using their research programs to develop innovative learning experiences for the classroom and teaching laboratory. Undergraduate science courses in Biology, Neuroscience, Mathematics and Physics will*

experience how confocal microscopy may be used in discovery and investigations. Trinity University will host a series of confocal microscopy workshops for the area that address both theoretical and practical considerations for this technology. The investigators are also partnering with local science educators and undergraduate students planning careers in science education." (MRI: Acquisition of confocal microscopy system for dynamic imaging and analysis in research and learning at Trinity University)

2. Touch on 'institutional capacity.' MRI grants are also aimed to build institutional capacity, Phelps says. So try to match up your proposed effort to your institution's mission. Also, explain how your project would support the integration of research and education, to reinforce the appropriateness of your proposal for the MRI program.

Aside from your institution's mission, expand your effort's alignment to how it matches up with societal goals, such as your region's goals and initiatives, the president's strategic plan, statewide Epscor goals or state economic development goals, Markin suggests.

Example: *"This proposal requests funds to purchase an inductively coupled plasma-mass spectrometer (ICPMS) system for trace element and speciation analysis. The proposed system offers five key improvements over current equipment at UNM: a) improved detection limits, b) speciation of metals by HPLC separation, c) spot analysis of solid samples through use of existing laser ablation equipment, d) analysis of biological thin sections using a CryoCell, and e) isotopic analysis. This instrument will be integral to the research and training missions at UNM in areas related to energy development, water resources, and protection of the environment, and human health. Knowledge gained from research conducted at UNM and students graduating from its academic programs will be key to permitting responsible development of energy resources as well as protection of human health and environment in the arid southwest."* (MRI: Acquisition of an Inductively Coupled Plasma-Mass Spectrometer (ICP-MS) System for Elemental Analysis and Speciation – University of New Mexico)

3. Show the impact on infrastructure. Inline with your Broader Impacts and Intellectual Merit, MRI reviewers are especially interested in what kind of impact the proposed instrumentation will have on infrastructure.

"Describe how the instrument will make a *substantial* improvement in the institution's ability to conduct leading-edge research," Markin advises. Explain impacts like development of new courses or outreach to secondary schools.

Example: *"Introduction of flow cytometry will impact undergraduate education at Birmingham-Southern College, a primarily undergraduate liberal arts college of approximately 1300 students with well-regarded programs in biology and chemistry. Typically, one-third of each incoming class expresses an interest in the sciences. Though primarily for undergraduate research, this instrument will have a significant impact on teaching, training, and learning due to (1) the research requirement for all natural science majors at BSC and (2) integration of research into the curriculum of BSC's teaching laboratories. Our intensive senior research programs are among the greatest strengths of the natural sciences at BSC. Every graduate of these majors must engage in a minimum of two terms of research. This instrument will provide senior research students with the opportunity to utilize an important technology not currently available at the College. Acquisition of this flow cytometer will also significantly impact students enrolled in biology and chemistry courses. Flow cytometry will be incorporated into research-based laboratories in Honors Cell and Molecular Biology, Genetics, Cell Biology, and Biochemistry, exposing students in these courses to flow cytometry data collection and analysis. Students will gain hands-on experience with flow cytometry, impacting the vast majority of science majors at BSC."* (MRI: Acquisition of a BD Accuri C6 Flow Cytometer for Multidisciplinary Undergraduate Research – Birmingham Southern College)

4. Tout your leadership. Being a stellar research scientist is one thing, but "being a good manager is quite another," Phelps says. You must show reviewers that you have the necessary leadership skills and commitment to bring the project to completion.

5. Ask for exactly what you need. A common mistake in grant proposals is to ask for more funding than needed just to see how much you can get. Conversely, asking for too little because you're afraid of requesting the big dollar amounts is an equally bad mistake, because it makes you look inexperienced or out of touch with the actual funding needed.

Crucial: You must ask for what you need – no more and no less, Phelps stresses. And most of all, you must justify everything you ask for, especially resources and personnel. When you're justifying personnel, describe and define:

- Each and every team member's specific role;
- How specific personnel's participation will contribute to the overall project goals and impact; and
- How specific personnel's participation will contribute to the nation's ability to develop the next generation of scientific instrumentation (if applicable).

Example: *"This Major Research Instrumentation award permits Principal Investigator Dr. Beverly Chiarulli* and *Co-Principal Investigators, Drs. Scott Moore, Benjamin Ford, Sarah Neusius and Phillip Neusius to purchase a 3D Scanner system for digital documentation of the built environment and a Multiple Array Ground Penetrating Radar for below ground surveys of archaeological features. Individually, these instruments create high quality high resolution images of structures and landscapes as well as below ground archaeological features. Used together, they can create a digital library of above ground structures to provide a comparative database for the identification of below ground archaeological features. Because of this joint usage, they form an integrated system. The instruments will be employed by IUP faculty and students and our collaborators and their students from Howard University, the University of Nevada at Las Vegas, and the University of North Dakota.*

Among the projects that will use the instruments are:

1. Dr. Chiarulli's project on historic cemeteries in western Pennsylvania will use 3D mapping of surface topography and standing gravestones in combination with the Multiple Array GPR to record forgotten grave sites;

2. Dr. Ford's investigation of shipwrecks in frozen lakes will use 3D imaging of surviving ships similar to wrecked vessels combined with winter surveys of Lake Ontario using the multiple antenna GPR to record otherwise potentially inaccessible shipwrecks for identification and protection;

3. Dr. Moore's survey of painted churches in the Troodos Mountains, Cyprus will aid in the preservation of the interior and exterior decoration of these churches by documenting the manner of construction of these buildings for an increased understanding of Byzantine Christianity and the development of rural religious practices;

4. Drs. Chiarulli and Neusius' investigation of Late Prehistoric Villages in western Pennsylvania will use the multiple array GPR for rapid below ground survey of large villages to discover faint prehistoric features and develop maps of village layouts without excavation;

5. Dr. Moore and his collaborators' will use 3D scanning to image above ground Roman ruins to understand

site formation in Cyprus combined with a Multiple Array GPR survey of the entire coastal settlement for to the definition of the city's physical layout and provide the data to understand the development of this midsized Roman settlement and its role in local and regional trade; and

6. Drs. Neusius and Ford's Survey of Smicksburg, a 19th Century Commercial and Industrial Center in Indiana County, Pennsylvania will use 3D scanning to create a digital library of houses from this period and the multiple array GPR to produce detailed comparative subsurface information and record otherwise inaccessible heritage resources." (MRI: Acquisition of Instruments for 3D Digital Mapping of Historic Structures and Archaeological Sites – Indiana University of Pennsylvania Research Institute).

6. Set yourself apart. What makes you unique? Why is your area of inquiry new and exciting? You must distinguish yourself to make your MRI proposal stand out, Markin says. Demonstrate the transformative impact of your proposed activities across and within disciplines.

Example: *"This proposed instrument will support the body of research at The University of Iowa on trace organic compounds and their metabolites in the environment and living organisms by increasing capacity and capabilities. This instrument will allow in-depth studies within our ongoing projects, including the transport and fate of hormones in plants (Zhai and Schnoor), hydroxylated metabolites of PCBs in poplars (Zhai and Schnoor), rats (Robertson) and human blood (Hornbuckle); organic pollutants by extreme flood events (Hornbuckle, Just, Schnoor); PCBs sulfate metabolites of PCBs in poplars (Zhai and Schnoor), rats (Robertson and Duffel); the enantioselective metabolism of chiral PCBs and their metabolites (Zhai, Schnoor, and Lehlmer); PCB-related compounds in the environment (Hornbuckle, Lehmler, Thorne) and others. All the organic compounds mentioned above have the potential of great harm to our health and environment. All the researchers in this team will use this LC-MS/MS to address many public concerns on the health of environment and human beings. All the findings of these researches will greatly advance our knowledge and understanding of the behavior, fate and toxicological mechanisms of organic pollutants in the environment and alert people to take suitable protective measures."* (MRI: Acquisition of Instrumentation (LC-MS/MS) for the Trace Analysis of Anthropogenic Organic Compounds and Their Metabolites in Various Complex Matrices – University of Iowa)

7. Be clear and specific. You must be very clear in your proposal about what instrumentation and resources you're requesting, as well as the justification for them, Phelps says.

8. Think like the reviewer. When you ponder your proposal, put yourself in the reviewer's shoes. What questions would you have about the proposal if you were the reviewer?

9. Make your proposal compelling. Don't simply aim to make your proposal error-free – strive to make it compelling, Phelps encourages. Compelling MRI proposals are what get the funding.

You need to describe the expected outcomes, in terms of the scientific outcomes, the broader impacts and those that are MRI-specific, Phelps explains. Clearly define the value of these outcomes to scientific disciplines and society as a whole. Explain how the outcomes align with the goals of the MRI program and NSF's strategic goals.

10. Get help. Don't go it alone – talk with other PIs who've composed successful MRI grant proposals. Talk to Program Officers (POs) in NSF Divisions where you think your proposed work "fits," Phelps says. Also, don't forget your sponsored research office, which will offer a wealth of valuable information as you're writing your MRI proposal.

Strategies: Avoid the Top MRI Blunders

When it comes to MRI grant proposals, you can make small mistakes – and you can make big mistakes. And ideally, **you** want to make no mistakes at all.

According to Phelps, if you make one of these mistakes, your MRI proposal will go directly into the trash – without review:

- The proposed activities are **outside the scope** of those the NSF and/or the MRI program supports.
- The proposal doesn't **adequately distinguish** development efforts from acquisition or basic research efforts.|
- The proposal exceeds your institution's MRI **submission limit.**

In fact, if your institution submits too many MRI proposals, the NSF could return all of the proposals without review, Markin warns.

- The proposed project is a **standard research project** appropriate for submission to regular NSF programs.
- You're proposing to place an instrument at a facility of **another Federal agency** or one of their FFRDCs, without submitting the proposal via a consortia.
- The proposal augments the scope of facilities receiving funding through the NSF **Major Research Equipment and Facilities Construction (MREFC)** account.
- The proposal fails to indicate the appropriate levels of **cost-sharing.**
- The proposal does not contain the required documentation demonstrating **institutional commitment** and information on MRI awards to the institution

REMEMBER:

Remember to only request funds that are needed for the specific instrument.

Make sure the cost doesn't include extra "bells and whistles" that are not needed for the described research.

in the past five years.

- The proposal does not contain **Results from Prior MRI Support** in the Project Description.
- The proposal does not contain the required **supplemental documentation,** such as Post-Doc Mentoring Plan (if applicable) and Data Management Plan.
- The proposal contains supplemental documentation that the MRI program does not require and/or encourage.
- The proposal does not conform to font and margin requirements and/or page limitations.
- The proposal does not separately address the **Intellectual Merit and Broader Impacts** in the Project Summary.
- The proposal does not contain a **management plan** in the Project Description.

What Can Kill You on Review

So if you manage to avoid all these pitfalls and actually get your proposal into the review process, what are the next potential traps lurking in your path? Phelps cautions that your MRI proposal will fail during review if it:

- Does not demonstrate adequate institutional commitment.
- Does not adequately demonstrate how and by whom the instrument will be utilized, operated and maintained – in other words, your proposal doesn't have a strong management plan.

TIP:

Don't procrastinate on getting your institutional commitment letter.

You will need to get involved with the high level administrators for this so do it sooner rather than later.

Your management plan is one of the most crucial parts of your MRI proposal. You need to set forth all the details to assure reviewers that you have specific, concrete plans for the instrumentation. "NSF does not want to pay for an expensive doorstop," Markin quips.

- Does not demonstrate shared-use within the institution and/or among institutions.
- Requests instrumentation that is otherwise reasonably accessible.
- Does not adequately match the budget to the project's scope.
- Does not describe research training, particularly for groups underrepresented in science and engineering or persons with disabilities.

Comparison: NSF MRI vs. NIH's HEI Awards

If you're looking for funding to support high-cost instrumentation, keep in mind that the MRI award isn't the only grant available. The National Institutes of Health (NIH) has a somewhat similar program called the High-End Instrumentation (HEI) grant, which supports a single major piece of research instrumentation or equipment costing anywhere from $750,000 to $2 million dollars.

NIH developed the HEI award to complement the Shared Instrumentation Grant program. Since 2002, NIH has provided 140 HEI awards to biomedical research institutions in 27 states, with funding totaling more than $224 million. For FY 2012, the NIH National Center for Research Resources (NCRR) expects to spend $20 million on the HEI program, awarding about 10 to 15 grants.

Get the Skinny on the HEI

The HEI grant is:

- 12 months in duration;
- Up to $2 million;
- For a single major item of equipment per application;
- Nonrenewable;
- Offered biannually (every other year); and
- Announced via a Program Announcement published in a June issue of the NIH Guide for Grants and Contracts (http://grants1.nih.gov/grants/guide/index.html), with a typical application deadline in September.

The instrumentation that HEI covers may include, but is not limited to, label free interaction analysis, chromatography purification, high content cellular analysis, imagers, and calorimetry. But HEI grants will NOT support:

- Synchrotron equipment (except detectors);
- The development of new instrumentation;
- General purpose equipment or purely instructional equipment;
- Instruments used for clinical (billable) care;
- An instrument with a base cost of less than $750,000.

HEI vs. MRI: What's Similar?

When comparing the MRI and HEI grant mechanisms, the biggest difference comes from the diverging missions of the NSF and NIH. If you're considering the HEI program, you must be seeking instrumentation that directly benefits the medical/health science field. Your proposal must be in line with NIH's mission, which is to "support science in the pursuit of knowledge about the biology and behavior of living systems and to apply that knowledge to extend healthy life and reduce the burdens of illness and disability."

There are, however, numerous similarities between HEI and MRI. These include:

o **High-end instrumentation** – Both grants are for costly instruments that you wouldn't otherwise get via traditional research grants. The HEI supports instrumentation costing no less than $750,000, compared with the MRI starting at $100,000 (but HEI does not have the MRI's minimum for non-PhD-granting institutions or for proposals in mathematical, social, behavioral or economic fields).

If you're requesting HEI funds that don't cover the entire cost of the instrument, you must provide in your application documentation of from where you're going to get the remainder of the funding. You must have this documentation signed by an appropriate institutional official.

o **Final reports** – Both programs require a final report within 90 days of project end. MRI's is a "Project Outcomes Report," and HEI's is a "Final Progress Report," which must include:

- the instrument purchased,
- a list of all users, and
- the value of the instrument to the investigators and to the institution as a whole.

o **Shared use and instrumentation management plans** – Both require that you include these plans in your application, but MRI requires a data management plan, while HEI does not specifically ask for one.

o **Institutional commitment** – Both applications require documentation of institutional commitment. For HEI, institutional commitment is one of the five scored review criteria. To score high, you must show:

- Evidence of institutional commitment to support the instrument;
- The institutional infrastructure (technical support, space, environment and utilities) is available to support the instrument;

- An institutional track record for making technology available;
- A financial plan for fully funding the purchase and long-term operation and maintenance of the instrument; and
- Appropriate documentation (letters from institutional officials).

HEI vs. MRI: What's Different?

Ultimately, HEI and MRI have perhaps more differences than similarities. Here are the key differences:

o **Acquisition vs. development** – MRI supports acquisition and development of instrumentation, while HEI supports acquisition only.

o **'Dual purpose'** – HEI has no "dual purpose" requirements like in MRI grants for improving research & research training and collaboration among institutions/organizations in addition to acquiring valuable, costly instrumentation. Also, there's no collaboration or consortium required for HEI.

o **Submission limits** – The HEI has no institutional submission limits (MRI is no more than three proposals), but applications cannot be for similar instrumentation at the same institution.

o **Cost sharing** – HEI requires no cost sharing, as opposed to the MRI's mandatory 30%. Also, HEI grants support the direct cost of the instrument only.

Although HEI awards don't require matching funds, NIH expects you to provide an "appropriate level" of support for associated infrastructure, such as building alterations or renovations, technical personnel, and post-award service contracts for instrument maintenance and operation.

o **Instrumentation sharing** – Although both grants require that you share the instrument, with HEI you must share the instrumentation among other researchers inside your institution. This is different from MRI, where you need to share among other institutions or private-sector organizations.

For HEI, "major users can be individual researchers, or a group of investigators within the same department or from several departments at the applicant institution," according to NIH. You can include NIH extramural

awardees from other nearby institutions as well.

o **Eligibility** – Institutional and PI eligibility is different for HEI than for MRI. The HEI program is for domestic public and nonprofit institutions only, including:

- Health professional schools;
- Graduate institutions;
- Hospitals;
- Health departments; and
- Research organizations.

HEI also has different eligibility requirements for the PI and for the users. Your application must identify three or more NIH-funded investigators (PIs of active P01, R01, U01, R35, R37, DP1 and DP2 research grants) who will use the instrument. Although the PI for the HEI grant does not have to be NIH funded, you must show that at least 75% of the total usage time will be for projects supported by NIH research grants.

Bottom line: Despite both the MRI and HEI grants supporting expensive scientific instrumentation, your best choice between the two programs will likely depend on the type of research you're doing. If your work directly relates to medical, health or life sciences – where you can point to a tangible benefit to the medical field – your best bet is the NIH's HEI program. Otherwise, you should stick with the MRI.

CONCLUSION

To get off on the right foot, make sure you keep in mind the MRI program's key limitations and eligibility requirements. And remember that just because you carefully avoid all the most common pitfalls doesn't mean you'll get your MRI proposal funded.

"Good proposals may not get funded," Phelps says. You need to make your MRI proposal as competitive as possible, but remember that you're still up against a 20- to 25-percent success rate and a limited budget to go around.

To get more information on the MRI program and creating proposals, check out these resources:

- **MRI Program Solicitation**
  http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5260
- **MRI Program FAQs**
  http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf11011
- **Proposals and Award Policies and Procedures Guide**
  http://www.nsf.gov/publications/pub_summ.jsp?ods_key=papp
- **MRI Homepage**
  http://www.nsf.gov/od/oia/programs/mri/
- **Examples of Broader Impacts**
  http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf
- **Award Search**
  http://www.nsf.gov/awardsearch

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