

# National Science Foundation MAJOR RESEARCH INSTRUMENTATION (MRI)

QEM Network Workshop  
Las Vegas, NV

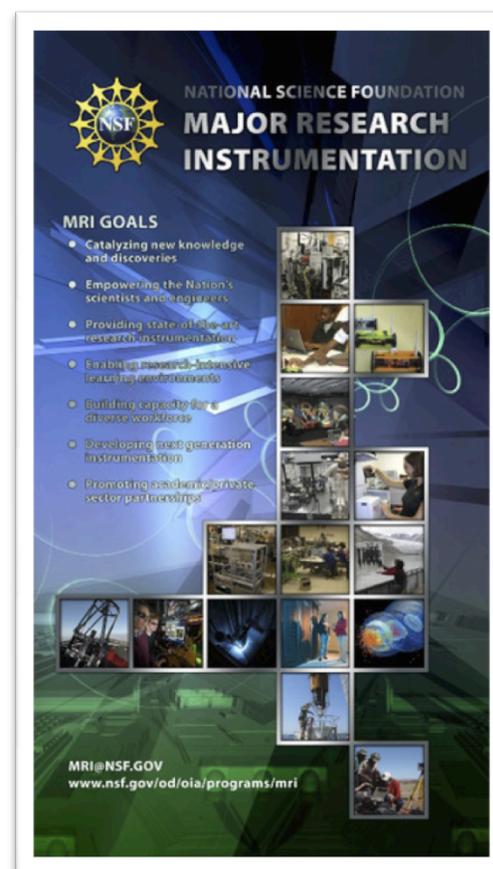
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**Dr. Randy L. Phelps**  
Staff Associate  
[mri@nsf.gov](mailto:mri@nsf.gov) 703-292-8040

<http://www.nsf.gov/od/oia/programs/mri>



**Office of Integrative Activities**



# NSF Overview



Physically located in Arlington, VA  
Virtually located at <http://www.nsf.gov/>



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# NSF Overview

- An independent Federal agency
- Created by Congress in 1950 with a mission *"to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes"*
- Annual budget of about \$7 billion  
(<http://www.nsf.gov/about/budget/fy2011/index.jsp>)
- Funding source for ~20% of all Federally supported basic research in America's colleges & universities.



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# NSF Overview

**VISION:** *NSF envisions a nation that capitalizes on new concepts in science and engineering and provides global leadership in advancing research and education.*

## STRATEGIC GOALS:

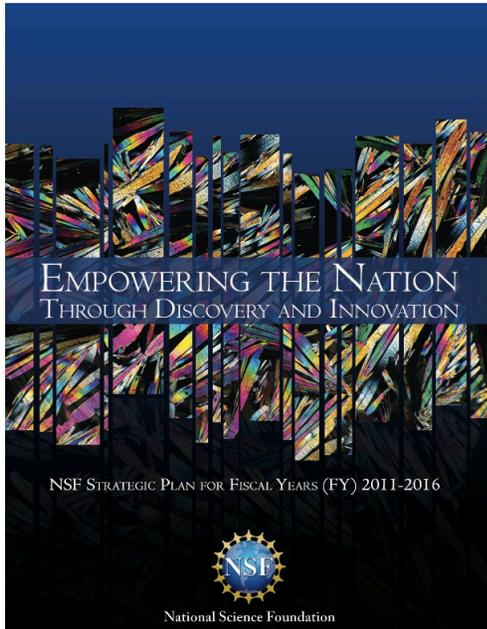
### Transform the Frontiers:

- ...investments that lead to emerging new fields...shifts in existing fields.
- Prepare and engage a diverse STEM workforce...
- ...US globally competitive...international partnerships/collaborations.
- **Enhance research infrastructure...data access...enable transformation...**

### Innovate for Society:

- ...investments that lead to results and resources that are useful to society
- Build...capacity of the nation's citizenry...addressing societal challenges...
- Support the development of innovative learning systems.

### Perform as a Model Organization:



## **Strategic Plan FY 2011-2016**



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# NSF Overview

- **Fulfills mission chiefly by issuing limited-term (3-5 year) grants, mostly to individual PIs**
- **Primarily community driven – “bottom up”**
- **Currently funds about 11,000 new awards per year, out of ~45,000 submitted**
- **Fund research proposals deemed most promising by a merit-review system**
- **Merit-review by panels and mail reviews**



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# NSF Funding Opportunities

- **Program Description**

Published only on the NSF website.

Proposals must follow GPG (Grant Proposal Guide) instructions.

- **Program Announcement**

Published NSF document describing the program.

Proposals must follow GPG instructions.

- **Program Solicitation**

Published\* document with additional restrictions and/or requirements.

Proposals must follow both the solicitation and the GPG instructions

- **Dear Colleague Letter**

Notifications of opportunities or special competitions for supplements to existing NSF awards.



\*Solicitations are also published at [www.grants.gov](http://www.grants.gov)

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# Major Research Instrumentation Strategic Goals

- Supporting the *acquisition* of major state-of-the-art instrumentation, thereby improving access to, and increased use of, modern research and research training instrumentation shared by the Nation's scientists, engineers, and graduate and undergraduate students;

**OR**

- Fostering the *development* of the next generation of major 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 & cross-disciplinary units, and multi-organization collaborations to integrate research with education;



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# Major Research Instrumentation: Additional Program Goals

- Supporting the acquisition and development of research instrumentation that makes use of, advances, and/or expands the Nation's cyber-infrastructure and/or high performance computing capability:
  - ❖ Support development of computational and data-intensive science and engineering programs, or
  - ❖ Provide pathways to regional and national infrastructure.
- Promoting substantive and meaningful partnerships for instrument development between the academic and private sectors:
  - ❖ Create innovative ideas or products with wide scientific or commercial impact.



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# The MRI Program Will **Not** Support:

- **Construction, renovation or modernization of rooms, buildings or research facilities** (instruments must be able to decouple from their host environment);
- **Large, specialized experimental facilities** (constructed with significant amounts of common building material using standard building techniques);
- **General purpose and supporting equipment** (e.g., general purpose computers/laboratory equipment, fume hoods, cryogen storage systems);
- **Sustaining infrastructure and/or building systems** (e.g., electrical, plumbing, HVAC, toxic waste disposal, telecommunications);
- **General purpose platforms or environments** (e.g., fixed, non-fixed structures, manned vehicles);
- **Instrumentation used primarily for science and engineering education courses.**



<http://www.nsf.gov/od/oia/programs/mri/>

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## **MRI-Eligible Expenses**

***MRI does not support requests for multiple instruments to outfit labs/facilities***



<http://www.nsf.gov/od/oia/programs/mri/>

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# MRI Proposals – The Basics

- **Restrictions on organization submission eligibility** - see solicitation NSF 11-503 and next slide
- **Submission limit** - Three (3) per organization: *If three proposals are submitted, at least one of the proposals must be for instrument development.*
- **Cost-sharing** at the level of 30% of the **total project cost** is required for Ph.D.-granting institutions and non-degree-granting organizations. **Cost-sharing is not required for non-Ph.D. granting institutions.**
- **Merit Review** - At the time of submission, PI's are asked to identify an NSF division(s) to review proposal. NSF reserves the right to place proposals in the appropriate division(s) for review.

**Note:** Proposals responding to a funding opportunity with a due date on or after January 18, 2011, must now comply with the guidelines in NSF 11-1.



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# MRI: Organizations Eligible to Submit Proposals

- 1. Institutions of higher education** acting on behalf of their faculty members, that are accredited in and have a campus in the United States, its territories or possessions.
- 2. Not-for-profit, non-degree granting domestic U.S. organizations** that include (but are not limited to) independent museums and science centers, observatories, research laboratories, professional societies, and similar organizations that are directly associated with the Nation's research or educational activities. These organizations must have an independent, permanent administrative organization (e.g. an office of sponsored research) located in the United States, its territories or possessions, and have 501 (c)(3) tax status.
- 3. Legally incorporated, not-for-profit consortia** including two or more submission eligible organizations as described in items (1) and (2) above. Such a consortium is one with an independent administrative structure (e.g. an office of sponsored research) located in the United States, its territories or possessions and 501 (c)(3) tax status.



<http://www.nsf.gov/od/oia/programs/mri/>

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# MRI Collaborations and MRI Consortia

- **“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:
  - Single proposal with sub-award(s)
  - Link Collaborative – simultaneous submission of proposals; separate awards to each organization
  - Unfunded collaborations
- **“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 broad user base of U.S. scientists and engineers:
  - Legally, incorporated consortia (3a)
  - MRI consortia (3b)



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# MRI: Classification of Organizations

- **Ph.D. granting institutions of higher education** are accredited colleges and universities that have awarded more than 20 Ph.D.s or D.Sci.s in all NSF-supported fields during the combined previous two academic years. Additionally, any organization that awards Ph.D. or D.Sci. in NSF-supported fields is considered to be a Ph.D.-granting institution if the only degrees it awards in NSF-supported fields are post-Bachelor's degrees.
- **Non-Ph.D. granting institutions of higher education** are accredited colleges and universities(including two-year community colleges) that award Associate's degrees, Bachelor's degrees, and/or Master's degrees in NSF-supported fields, but have awarded 20 or fewer Ph.D./D.Sci. degrees in all NSF-supported fields during the combined previous two academic years.
- **Non-degree granting organizations** are those that do not award Associate's degrees, Bachelor's degrees, Master's degrees, and/or Ph.D.s or D.Sci.s. Non-degree-granting organizations also include institutions of higher education that award all of their degrees outside of NSF-supported fields.



<http://www.nsf.gov/od/oia/programs/mri/>

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# MRI Program Solicitation NSF 11-503<sup>1</sup>

- Proposals considered for **Instrument Acquisition** (3 years) or **Instrument Development** (5 years)
- **Number of Anticipated Awards** based on anticipated FY12 budget of **\$90 million<sup>2</sup>**:
  - ~**150-175 awards** overall
  - (up to \$35 million for \$1-4 million awards<sup>2,3</sup> )
- **Anticipated Award Size:**  
**\$100,000 to \$4 million** for either acquisition or development proposals  
(no minimum for proposals from non-Ph.D. granting institutions or proposals for fields of mathematical and social, behavioral and economic sciences)



<sup>1</sup>To be used for the FY 2012 competition (Deadline: January 26, 2012)

<sup>2</sup>Subject to availability of funds

<sup>3</sup>Subject to proposal quality

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# MRI Program Solicitation NSF 11-503

## *Significant Changes Began in FY11*

- Inclusion of voluntary committed cost sharing is prohibited.
- All proposals must describe **plans for data management** and sharing of products of research, or assert the absence of need for such plans.
- Guidance for proposals that locate instruments at an organization other than the submitting organization.
- Categorization of the requested instrument using codes provided.
- Organization commitment letter must list previous MRI awards to organization from the past five years.
- Requirement for “project outcomes report” available to public 90 days following the expiration of the award.



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# MRI Program Solicitation: NSF 11-503

***A web broadcast on the FY12 MRI competition is planned for December 6, 2011. Save the Date! Please monitor the website below for further details.***

<http://www.nsf.gov/od/oia/programs/mri/>



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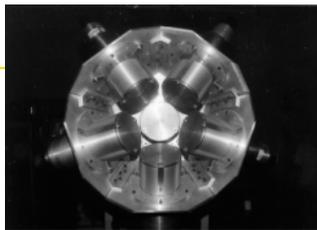
# MRI Highlights

## *Highlights from MRI FY09*

1) \$1,222,620 Award – MPS/PHY  
Hope College

Neutron Detector Array

Collaborative proposal among 9  
PUIs to develop the Large-area  
multi-Institutional Scintillator  
Array (LISA), to facilitate physics  
measurements with rare isotope  
beams at the National  
Superconducting Cyclotron  
Laboratory.



2) \$3,948,000 Award  
– BIO/DBI Vanderbilt

900 MHz NMR Spectrometer

NMRs are frequent requests to MRI  
because they enable leading-edge  
scientific research spanning a wide  
range of disciplines. Most proposals  
request 400-600 MHz instruments,  
and request < \$1 million. The  
availability of ARRA funding made  
possible the support of this  
meritorious \$4 million proposal.



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# 2011 MRI Award Snapshot - Overall

<b>Number Reviewed:</b> 859 (201 DEV, 658 ACQ)
<b>Dollars Requested:</b> \$576.4 million
<b>Mean Dollars Requested:</b> \$671,000
<b>Median Dollars Requested:</b> \$477,000
<b>Number of Awards:</b> 187 (45 DEV, 142 ACQ)
<b>MRI Amount Awarded:</b> \$88.1 million
<b>NSF Amount Awarded:</b> \$100.2 million
<b>Overall Success Rate:</b> 21.8%
<b>Mean Award:</b> \$536,000
<b>Median Award:</b> \$433,000
<b>Number of Institutions that Participated:</b> 462
<b>Number of Institutions Awarded:</b> 169



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# 2011 MRI Award Snapshot

## By Institution Type

	Ph.D.	non-Ph.D.	Non-degree	MSI
# reviewed	506 (30% DEV)	312 (11% DEV)	41 (29% DEV)	75 (25% DEV)
Mean request	\$784 K	\$453 K	\$934 K	\$545 K
Median request	\$590 K	\$341 K	\$761 K	\$377 K
# awards	104	74	9	18
NSF \$ awarded	\$70.5 M	\$24.5M	\$5.2 M	\$7.4 M
MRI \$ awarded	\$61.4 M	\$21.7 M	\$5.0 M	\$6.0 M
Success rate	20.6%	23.7%	22.0%	24.0%
Mean award	\$678 K	\$331 K	\$580 K	\$411 K
Median award	\$523K	\$312 K	\$472 K	\$299 K



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# 2011 MRI Award Snapshot - EPSCoR

<b>Number of Proposals Reviewed: 199</b>
<b>Dollars Requested : \$124.8 M</b>
<b>Number of EPSCoR-eligible Awards: 50</b>
<b>EPSCoR-eligible Success Rate: 25.1%</b>
<b>Amount Awarded to EPSCoR-eligible Awards: \$25.8 M</b>
<b>Eligible proposals co-funded by EPSCoR: 18</b>
<b>EPSCoR Awarded to EPSCoR-eligible Awards: \$3.9 M</b>
<b>Mean award: \$515,000</b>
<b>Median award: \$390,000</b>



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# 1998 - 2011 MRI Award Snapshot<sup>1</sup>

FY	# Proposals	\$ Requested	# Awards	MRI Funding	Total NSF Funding <sup>2</sup>
1998	479	\$248.5	165	\$49.5	\$56.4
1999	472	\$261.5	166	\$49.5	\$56.8
2000	475	\$252.0	163	\$49.5	\$54.7
2001	741	\$305.5	311	\$74.6	\$78.7
2002	691	\$296.3	279	\$75.7	\$81.3
2003	757	\$351.2	280	\$83.2	\$91.0
2004	838	\$421.4	327	\$109.1	\$112.9
2005	784	\$473.0	256	\$88.8	\$95.6
2006	769	\$427.4	233	\$88.2	\$97.0
2007	774	\$478.3	222	\$89.7	\$96.9
2008	810	\$515.8	224	\$93.2	\$101.0
2009 <sup>3</sup>	2,020	\$1,715.9	651	\$398.9	\$405.6
2010 <sup>4,5</sup>	939 <sup>5</sup> (41) <sup>4</sup>	\$626 <sup>5</sup> (\$6.3) <sup>4</sup>	171 <sup>5</sup> (29) <sup>4</sup>	\$86.8 <sup>5</sup> (\$4.1) <sup>4</sup>	\$94.8 <sup>5</sup> (\$4.1) <sup>4</sup>
2011	859	\$404.3	187	\$88.1	\$100.2
<b>TOTAL:</b>	<b>11,449</b>	<b>\$6,783.4</b>	<b>3,664</b>	<b>\$1,428.9</b>	<b>\$1,527.0</b>

<sup>1</sup>includes only awards submitted directly to MRI program.

<sup>2</sup>includes MRI funds and contributions from Directorates and Offices.

<sup>3</sup>includes one-time appropriation under ARRA.

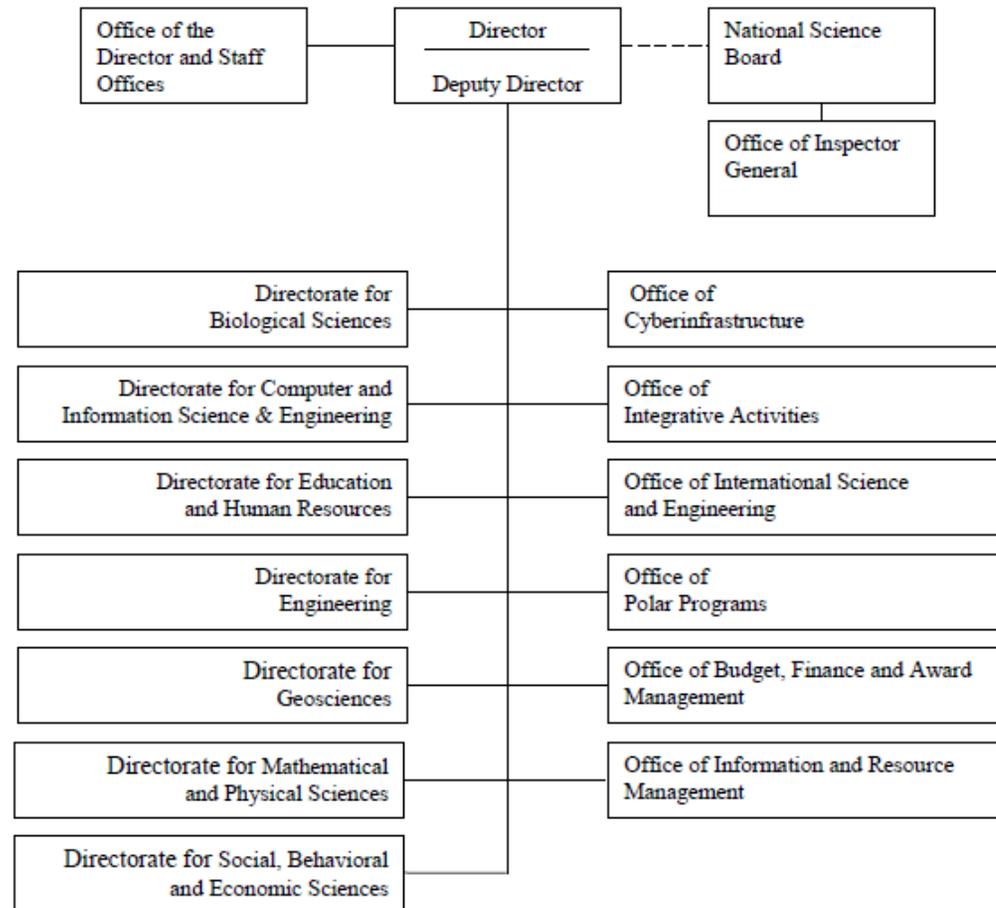
<sup>4</sup>includes 29 awards and \$4.1M awarded to MRI RAPID Proposals.

<sup>5</sup>includes \$1.4M in FY11 MRI Funds and \$300K in other FY11 NSF Funds.



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# Finding a Home at NSF



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# INTERMISSION



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# National Science Foundation

## What Makes an MRI Proposal Fail, What Makes an MRI Proposal Competitive?

### QEM Network Workshop

Las Vegas, NV

November 4-5, 2011

**Dr. Randy L. Phelps**

**Staff Associate**

**mri@nsf.gov 703-292-8040**

**<http://www.nsf.gov/od/oia/programs/mri>**



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# Understand NSF before considering a proposal!

- Know the NSF Website ([www.nsf.gov](http://www.nsf.gov))
- Search Recent Awards ([www.nsf.gov/awardsearch](http://www.nsf.gov/awardsearch))
- Identify appropriate funding opportunities ([www.nsf.gov/funding](http://www.nsf.gov/funding))
- Talk to Program Officers in Divisions where you fit
- Know the “Proposal and Award Policies and Procedures Guide” ([http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=papp](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=papp))
- Know program purpose, goals, and requirements
- Serve as a panelist!
- Talk to successful PIs
- Know NSF’s role compared to other Federal agencies



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# MRI Proposals

## ***What makes an MRI proposal fail before it is reviewed?***

- Proposals describing activities that fall outside of the scope of those supported by the MRI program;
- Proposals describing activities that fall outside of the scope of those supported by NSF;
- Proposals that do not adequately distinguish development efforts from acquisition or basic research efforts;
- Proposals that exceed an organization's submission limit;
- Proposals that represent standard research projects appropriate for submission to regular NSF programs;
- Proposals to place an instrument at a facility of another Federal agency or one of their FFRDCs that are not submitted by consortia (rare);
- Proposals that augment the scope of facilities receiving funding through the NSF Major Research Equipment and Facilities Construction (MREFC) account (rare);



**These proposals are subject to Return Without Review!**

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# MRI Proposals

## ***What makes an MRI proposal fail before it is reviewed?***

- Proposals that do not indicate appropriate levels of cost-sharing;
- Proposals that do not contain required documentation demonstrating organizational commitment and information on MRI awards to the organization in the past five years or that do not contain Results from Prior MRI Support in the Project Description;
- Proposals that do not contain required supplemental documentation (**e.g Data Management Plan** and, if applicable, a **Post-Doc Mentoring Plan**)
- Proposals that contain supplemental documentation not required and/or encouraged by the MRI program;
- Proposals that do not conform to font, margin & page limitations;
- Proposals that do not separately address the Intellectual Merit and Broader Impacts in the Project Summary;
- Proposals that do not contain a Management Plan in the Project Description.



**These proposals are subject to Return Without Review!**

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# MRI Proposals

- *A management plan is required and should describe allocation of time to users, anticipated downtime, operations and maintenance, etc.*
- *All NSF proposals now must include (or not?) a data management plan describing how NSF-funded research will be made available at incremental cost in a reasonable time.*

<http://www.nsf.gov/od/oia/programs/mri/>



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# MRI Proposals

## *What makes an MRI proposal fail during the review?*

- Proposals that do not demonstrate adequate institutional commitment;
- Proposals that do not adequately demonstrate how and by whom the instrument will be utilized, operated and maintained – i.e., proposals without a strong management plan;
- Proposals that do not demonstrate shared-use within the institution, and/or among institutions;
- Proposals that request instrumentation that is otherwise reasonably accessible;
- Proposals that do not adequately match the budget to the scope of the project;
- Proposals that do not describe research training, particularly for groups underrepresented in science & engineering or persons with disabilities.



**These proposals will be *not* review well!**

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# MRI Proposals

*So what makes an MRI proposal competitive?*

*Note the term “competitive”, rather than “successful”!*

*Due (in part) to budget limitations, 20-25% of submitted proposals are funded*

***Good proposals may not get funded***



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# MRI Proposals

*So what makes an MRI proposal competitive?*

***An obvious first step is to avoid the pitfalls already mentioned!***



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# MRI Proposals

## *So what makes an MRI proposal competitive?*

### Build your case on its merits

What is the intellectual merit of the proposed activity?

What are the broader impacts of the proposed activity?

- Describe (enthusiastically) compelling research / research training activities to be undertaken with the instrument. *Buy/Build it and they will come is not a good reason...*
- Demonstrate how your activities will make meaningful contributions within and across disciplines in both research and research training. *We are the ones best able/positioned to do this work!*
- Establishing a *need* is usually not enough. *What makes you unique?*
- Match your proposed effort to the mission of your institution and describe it in that context. *MRI awards build institutional capacity...*



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# MRI Proposals

## *Some Additional Thoughts...*

- Demonstrate appropriate leadership and commitment to bring the project to completion. *Being a good research scientist is one thing, being a good manager is quite another...*
- How would the project enable the integration of research and education? *MRI is a Research and Research Training program.*
- How would the project enable integrating diversity into NSF programs, projects, and activities? *Saying it will is not enough!*
- Ask for what you need, no more no less. *Bells and whistles are nice..*
- If you ask the question so will reviewers! *Think not as a PI, but as a reviewer...*
- Avoiding pitfalls (*i.e.*, “Don’t Do This”) will not guarantee a competitive proposal. *So your proposal is technically flawless but is it compelling?*

*The “opposite” of “Don’t Do This” is a vast range of possible approaches, strategies, and designs for your proposal.*



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# MRI Proposals

*Some Final Thoughts.....*

- Questions



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# Backup Slides



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# NSF-Wide Programs

Programs that are for a specific purpose and/or targeted to a specific group are generally administered as “NSF-wide” programs, e.g.:

**ADVANCE** – Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers

**CDI** – Cyber-Enabled Discovery and Innovation

**MRI** – Major Research Instrumentation

**EPSCoR** – Experimental Program to Stimulate Competitive Research

**REU** – Research Experiences for Undergraduates



[http://www.nsf.gov/funding/pgm\\_list.jsp?type=xcut](http://www.nsf.gov/funding/pgm_list.jsp?type=xcut)

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# NSF Merit Review Facts

## *So what makes an MRI proposal competitive?*

### ***Some background on Merit Review:***

- All proposals submitted to NSF are reviewed according to the two merit review criteria: Intellectual Merit and Broader Impacts.\*
- NSF Program Officers make recommendations to fund or decline a proposal.
- Most proposals that are awarded do not receive all “Excellent” ratings.
- NSF Program Officers are encouraged to recommend “risky” science and engineering for funding and/or invest in “transformative research.”
- Principal Investigators submit on average about 2.1 proposals for every award they receive.
- NSF promotes broadening participation in science and engineering.
- NSF annually has active awards at over 2000 awardee organizations.

See <http://www.nsf.gov/bfa/dias/policy/meritreview/facts.jsp>

\*Programs solicitations may have additional merit review requirements.



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# MRI Proposals

*But what can make an MRI proposal actually succeed?*

Justify the need for personnel and clearly define the role of each member of the team

- Ask for what is needed, no more, no less – justify the request;
- If appropriate, describe how participation by specific personnel will contribute to the Nation's ability to develop the next generation of scientific instrumentation



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# MRI Proposals

## *Some Final Thoughts.....*

Be clear.....

- About what instrumentation and resources are being requested
- About the justification for all resources being requested
- About the outcomes (scientific, broader impacts, and MRI-specific) that are expected
- About the value of these outcomes/contributions to a scientific discipline(s), MRI program goals, NSF strategic goals, and/or societal goal



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