NSF Overview

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

Office of Integrative Activities
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.
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:**
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
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
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;
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.
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.


Office of Integrative Activities
MRI-Eligible Expenses

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


Office of Integrative Activities
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.
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.

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:
  o Single proposal with sub-award(s)
  o Link Collaborative – simultaneous submission of proposals; separate awards to each organization
  o 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:
  o Legally, incorporated consortia (3a)
  o MRI consortia (3b)
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.

MRI Program Solicitation NSF 11-503

- Proposals considered for Instrument Acquisition (3 years) or Instrument Development (5 years)
- Number of Anticipated Awards based on anticipated FY12 budget of $90 million:
  ~150-175 awards overall
  (up to $35 million for $1-4 million awards)
- 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)

1To be used for the FY 2012 competition (Deadline: January 26, 2012)
2Subject to availability of funds
3Subject to proposal quality
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.
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.

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.
# 2011 MRI Award Snapshot - Overall

<table>
<thead>
<tr>
<th><strong>Number Reviewed</strong></th>
<th>859 (201 DEV, 658 ACQ)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dollars Requested</strong></td>
<td>$576.4 million</td>
</tr>
<tr>
<td><strong>Mean Dollars Requested</strong></td>
<td>$671,000</td>
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<tr>
<td><strong>Median Dollars Requested</strong></td>
<td>$477,000</td>
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<tr>
<td><strong>Number of Awards</strong></td>
<td>187 (45 DEV, 142 ACQ)</td>
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<tr>
<td><strong>MRI Amount Awarded</strong></td>
<td>$88.1 million</td>
</tr>
<tr>
<td><strong>NSF Amount Awarded</strong></td>
<td>$100.2 million</td>
</tr>
<tr>
<td><strong>Overall Success Rate</strong></td>
<td>21.8%</td>
</tr>
<tr>
<td><strong>Mean Award</strong></td>
<td>$536,000</td>
</tr>
<tr>
<td><strong>Median Award</strong></td>
<td>$433,000</td>
</tr>
<tr>
<td><strong>Number of Institutions that Participated</strong></td>
<td>462</td>
</tr>
<tr>
<td><strong>Number of Institutions Awarded</strong></td>
<td>169</td>
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</table>
# 2011 MRI Award Snapshot

By Institution Type

<table>
<thead>
<tr>
<th></th>
<th>Ph.D.</th>
<th>non-Ph.D.</th>
<th>Non-degree</th>
<th>MSI</th>
</tr>
</thead>
<tbody>
<tr>
<td># reviewed</td>
<td>506 (30% DEV)</td>
<td>312 (11% DEV)</td>
<td>41 (29% DEV)</td>
<td>75 (25% DEV)</td>
</tr>
<tr>
<td>Mean request</td>
<td>$784 K</td>
<td>$453 K</td>
<td>$934 K</td>
<td>$545 K</td>
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<tr>
<td>Median request</td>
<td>$590 K</td>
<td>$341 K</td>
<td>$761 K</td>
<td>$377 K</td>
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<tr>
<td># awards</td>
<td>104</td>
<td>74</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>NSF $ awarded</td>
<td>$70.5 M</td>
<td>$24.5 M</td>
<td>$5.2 M</td>
<td>$7.4 M</td>
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<tr>
<td>MRI $ awarded</td>
<td>$61.4 M</td>
<td>$21.7 M</td>
<td>$5.0 M</td>
<td>$6.0 M</td>
</tr>
<tr>
<td>Success rate</td>
<td>20.6%</td>
<td>23.7%</td>
<td>22.0%</td>
<td>24.0%</td>
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<tr>
<td>Mean award</td>
<td>$678 K</td>
<td>$331 K</td>
<td>$580 K</td>
<td>$411 K</td>
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<tr>
<td>Median award</td>
<td>$523K</td>
<td>$312 K</td>
<td>$472 K</td>
<td>$299 K</td>
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### 2011 MRI Award Snapshot - EPSCoR

<table>
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<tr>
<th><strong>Number of Proposals Reviewed:</strong></th>
<th>199</th>
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</thead>
<tbody>
<tr>
<td><strong>Dollars Requested:</strong></td>
<td>$124.8 M</td>
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<tr>
<td><strong>Number of EPSCoR-eligible Awards:</strong></td>
<td>50</td>
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<tr>
<td><strong>EPSCoR-eligible Success Rate:</strong></td>
<td>25.1%</td>
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<tr>
<td><strong>Amount Awarded to EPSCoR-eligible Awards:</strong></td>
<td>$25.8 M</td>
</tr>
<tr>
<td><strong>Eligible proposals co-funded by EPSCoR:</strong></td>
<td>18</td>
</tr>
<tr>
<td><strong>EPSCoR Awarded to EPSCoR-eligible Awards:</strong></td>
<td>$3.9 M</td>
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<tr>
<td><strong>Mean award:</strong></td>
<td>$515,000</td>
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<tr>
<td><strong>Median award:</strong></td>
<td>$390,000</td>
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### 1998 - 2011 MRI Award Snapshot

<table>
<thead>
<tr>
<th>FY</th>
<th># Proposals</th>
<th>$ Requested</th>
<th># Awards</th>
<th>MRI Funding</th>
<th>Total NSF Funding</th>
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<tbody>
<tr>
<td>1998</td>
<td>479</td>
<td>$248.5</td>
<td>165</td>
<td>$49.5</td>
<td>$56.4</td>
</tr>
<tr>
<td>1999</td>
<td>472</td>
<td>$261.5</td>
<td>166</td>
<td>$49.5</td>
<td>$56.8</td>
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<tr>
<td>2000</td>
<td>475</td>
<td>$252.0</td>
<td>163</td>
<td>$49.5</td>
<td>$54.7</td>
</tr>
<tr>
<td>2001</td>
<td>741</td>
<td>$305.5</td>
<td>311</td>
<td>$74.6</td>
<td>$78.7</td>
</tr>
<tr>
<td>2002</td>
<td>691</td>
<td>$296.3</td>
<td>279</td>
<td>$75.7</td>
<td>$81.3</td>
</tr>
<tr>
<td>2003</td>
<td>757</td>
<td>$351.2</td>
<td>280</td>
<td>$83.2</td>
<td>$91.0</td>
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<tr>
<td>2004</td>
<td>838</td>
<td>$421.4</td>
<td>327</td>
<td>$109.1</td>
<td>$112.9</td>
</tr>
<tr>
<td>2005</td>
<td>784</td>
<td>$473.0</td>
<td>256</td>
<td>$88.8</td>
<td>$95.6</td>
</tr>
<tr>
<td>2006</td>
<td>759</td>
<td>$427.4</td>
<td>233</td>
<td>$88.2</td>
<td>$97.0</td>
</tr>
<tr>
<td>2007</td>
<td>774</td>
<td>$478.3</td>
<td>222</td>
<td>$89.7</td>
<td>$96.9</td>
</tr>
<tr>
<td>2008</td>
<td>810</td>
<td>$515.8</td>
<td>224</td>
<td>$93.2</td>
<td>$101.0</td>
</tr>
<tr>
<td>2009</td>
<td>2,020</td>
<td>$1,715.9</td>
<td>651</td>
<td>$398.9</td>
<td>$405.6</td>
</tr>
<tr>
<td>2010</td>
<td>939 (41)</td>
<td>$626 ($6.3)</td>
<td>171 (29)</td>
<td>$86.8 ($4.1)</td>
<td>$94.8 ($4.1)</td>
</tr>
<tr>
<td>2011</td>
<td>859</td>
<td>$404.3</td>
<td>187</td>
<td>$88.1</td>
<td>$100.2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>11,449</td>
<td>$6,783.4</td>
<td>3,664</td>
<td>$1,428.9</td>
<td>$1,527.0</td>
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</tbody>
</table>

1. Includes only awards submitted directly to MRI program.
2. Includes MRI funds and contributions from Directorates and Offices.
3. Includes one-time appropriation under ARRA.
4. Includes 29 awards and $4.1M awarded to MRI RAPID Proposals.
5. Includes $1.4M in FY11 MRI Funds and $300K in other FY11 NSF Funds.

Office of Integrative Activities
Finding a Home at NSF

Office of the Director and Staff Offices

Director

Deputy Director

National Science Board

Office of Inspector General

Directorate for Biological Sciences

Directorate for Computer and Information Science & Engineering

Directorate for Education and Human Resources

Directorate for Engineering

Directorate for Geosciences

Directorate for Mathematical and Physical Sciences

Directorate for Social, Behavioral and Economic Sciences

Office of Cyberinfrastructure

Office of Integrative Activities

Office of International Science and Engineering

Office of Polar Programs

Office of Budget, Finance and Award Management

Office of Information and Resource Management

Office of Integrative Activities
INTERMISSION

Office of Integrative Activities
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

Office of Integrative Activities
Understand NSF before considering a proposal!

- Know the NSF Website (www.nsf.gov)
- Search Recent Awards (www.nsf.gov/awardsearch)
- Identify appropriate funding opportunities (www.nsf.gov/funding)
- Talk to Program Officers in Divisions where you fit
- Know program purpose, goals, and requirements
- Serve as a panelist!
- Talk to successful PIs
- Know NSF’s role compared to other Federal agencies
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!

Office of Integrative Activities
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!

Office of Integrative Activities
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.

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!
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
MRI Proposals

So what makes an MRI proposal competitive?

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

**Office of Integrative Activities**
MRI Proposals

Some Final Thoughts

• Questions
Backup Slides

Office of Integrative Activities
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

Office of Integrative Activities
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.


*Programs solicitations may have additional merit review requirements.
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
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