10-2009

Writing a Supercomputer Proposal for the National Science Foundation's Major Research Instrumentation Solicitation

Amy Apon
Clemson University, aapon@clemson.edu

WRITING A SUPERCOMPUTER PROPOSAL FOR THE NATIONAL SCIENCE FOUNDATION'S MAJOR RESEARCH INSTRUMENTATION PROGRAM

Amy Apon, Director
Arkansas High Performance Computing Center

Work supported in part by NSF
Grant #0722625 and Grant #0918070

NATIONAL SCIENCE FOUNDATION MAJOR RESEARCH INSTRUMENTATION (MRI)

- Equipment can be requested as a part of any research proposal, not just MRI
- MRI is designed for the acquisition or development of equipment that falls outside the scope of a typical research proposal, or that can be used by several research projects
- Acceptance rates of MRI as high as 40%
  - This higher than many research solicitations
- MRI-R^2 is currently being competed
- There has been an MRI competition every year for the last 22 years
  - There may not be a competition this January

MRI AND SUPERCOMPUTING

- This talk is based on the solicitation that was due on August 10, 2009
- The guidelines change a bit for each solicitation
  - **Read the solicitation carefully !**
- I'll try to point out some things that have varied in the last few years

MRI GUIDELINES

- Proposals can be for instrument acquisition or for instrument development
- Limit of three proposals per institution, but a maximum of two can be for instrument acquisition – check for your campus competition
- A cluster of commodity computer components is considered to be an instrument acquisition
- Cost sharing requirements have varied from year to year
  - Sometimes there is no requirement,
  - Sometimes it depends on the institution
  - Sometimes it is 30% (mol) of the total budget

READ THE SOLICITATION CAREFULLY!

THERE ARE MANY REASONS THE PROPOSAL MAY BE RETURNED WITHOUT REVIEW

- Proposals that do not contain, as a supplemental document, a signed statement from the sponsored research officeclassifying the performing organization as either non-Ph.D.-granting, Ph.D.-granting, or non-degree-granting (see SectionIV);
- Proposals that wholly or substantially duplicate those that were accepted for review under NSF 09-502;
- Applicable proposals that do not indicate appropriate levels of cost-sharing (Line M of the budget in Fastlane), *and that donot contain required documentation demonstrating organizational cost-sharing commitment (Sections V.A and V.B);*
- Proposals from institutions of higher education that are not ranked among the top 100 of those receiving Federal researchand development funding must include a signed letter from the institution's President or Provost to be eligible for the cost-sharing exemption. The letter must certify that the proposal will: 1) make a substantial improvement in the institution'scapabilities to conduct leading-edge research; 2) provide research experiences for undergraduate students using leading-edge facilities; and 3) broaden the participation in science and engineering research by women, underrepresented minoritiesand persons with disabilities (Sections V.A and V.B). Applicable proposals indicating exemption from cost-sharing that donot contain this explicit certification will be returned without review;
- Proposals that do not separately address the Intellectual Merit and Broader Impacts review criteria in the Project Summary;
- Proposals requesting funding to support postdoctoral researchers that do not include, as a supplementary document, adescription of the mentoring activities that will be provided for such individuals. The mentoring plan must not exceed onepage;
- Proposals describing activities that fall outside of the scope of those supported by the MRI-R2 program (Section II.A);
- Proposals describing activities that fall outside of the scope of those supported by NSF (Section II.B);
- Proposals that exceed an organization's submission limit (Section IV);
- Proposals that represent standard research projects that are appropriate for submission to regular grants programs at NSF(Section II.A);
- Proposals to place an instrument at a facility of another Federal agency or one of their FFRDCs that are not submitted byconsortia (Section IV);
- Proposals for instruments that augment the scope of a project currently receiving funding through the NSF Major ResearchEquipment and Facilities Construction (MREFC) account (Section IV);
- Proposals that do not contain required supplemental documentation, or that contain supplemental documentation other thanthose required and/or encouraged by the MRI program (as prescribed in Section V.A) and by the Grant Proposal Guide(GPG);
- Proposals that do not conform to font, margin and page limitations;
- Proposals that do not contain a Management Plan in the Project Description (Section V.A);
- Applicable proposals that do not contain Results from Prior MRI Support in the Project Description (Section V.A).

GOAL OF MRI

- Increase access to shared scientific and engineering instruments for research and research training
  - Foster the integration of research and education in research-intensive learning environments
  - A single instrument or system of related instruments that share a common or specific research focus

- Don't make the mistake of writing a proposal for what you want to do
- Write a proposal for what they want to fund!

SOME CHARACTERISTICS OF SUCCESSFUL MRI PROPOSALS

#1) Describes good science – this 60% of the proposal

- Science description must be written for an interdisciplinary panel
  - Strong list of supporting references and cited publications – your own plus others
  - Strong current funding for the research
  - No current funding sets a bad starting point for the panel reviewers
- Describe the "hero" users first (2 to 4)
- Follow with a set of other users that will benefit from the system

SOME CHARACTERISTICS OF SUCCESSFUL MRI PROPOSALS

#2) Makes the case that the research needs the instrument – match the request with the need

- This is critical

- Can use various metrics to make this justification
  - Your usage on currently available resources
  - Comparison to typical usage for research of this type
  - The smaller the request the easier this justification is
- A large request (>$1M has been the threshold) falls into a more competitive category. Avoid this for first time submissions.

SOME CHARACTERISTICS OF SUCCESSFUL MRI PROPOSALS

#3) Justifies the technology you want to acquire

- Include at least one specific vendor quote
  - Allow several weeks to work with the vendor on the quote
  - Select the technologies, justify them. Can't just say you want a GPGPU cluster without knowing what that means
  - Balance the system with needs. Can't just ask for 500TB of storage for no reason.
  - Get a reasonable academic price, which may not include all possible discounts
  - Say you will rebid this at time of purchase
  - Get a technology expert to review your description

SOME CHARACTERISTICS OF SUCCESSFUL MRI PROPOSALS

#4) Makes plans for housing the instrument

- Say where the cluster will be located (this was required in the most recent solicitation)
  - Describe this in terms of floor space, A/C, power, and UPS
  - If you don't have the facility now, explain how you will prepare it.
- Get a letter of support from your institution that says this
- A large cluster request must have a careful description and consideration of physical needs and target location

SOME CHARACTERISTICS OF SUCCESSFUL MRI PROPOSALS

#5) Makes plans for administrating the instrument

- Describe the qualifications of who will administrate the cluster
  - Some years these costs could be included in the proposal, and some years these are excluded
- Make sure the quote includes warranty and maintenance for three years
- Include scheduling software (e.g., Maui, Torque)
- Describe your scheduling and allocation policy
  - Fair share among all users is OK

SOME CHARACTERISTICS OF SUCCESSFUL MRI PROPOSALS

#6) A good management plan

- Best if the PI is a tenured faculty member
- Have a Faculty/Research Advisory Committee. Say who will be on this, and how long they will serve if not for the duration of the project
- Inclusion of External Advisers (especially for large requests) is well received
- Provide a deployment schedule
- Describe how this instrument fits into the university's overall plan for research infrastructure
- Describe the networking connectivity and access to this instrument
- Describe what will happen to the instrument after the grant ends

SOME CHARACTERISTICS OF SUCCESSFUL MRI PROPOSALS

#7) Strong broader impact, including impact to training and education infrastructure

- Describe how this instrument can be leveraged to provide training and access to national or larger scale resources
- How will the instrument attract researchers and students and contribute to broader participation by underrepresented minorities – use best practice and describe how you will measure this
- How will the instrument improve the quality of research and research training
- Show strong evidence of student research – cite articles that include student authors
- Be careful about how much the instrument is used for teaching – this solicitation is for research training

LAST POINTS

- Proposals for smaller clusters at undergraduate-serving institutions are well-received
  - Fall into a different category of competition
  - It's OK for the faculty members to administrate these themselves
  - Still, focus on research training, research experiences for undergraduates, training that complements national resources
- Be careful about letters of support – in at least one solicitation the inclusion of these was a reason for return without review
- <u>Read the solicitation carefully!</u>

QUESTIONS?

Amy Apon, aapon@uark.edu
David Chaffin, dchafffin@uark.edu
Jeff Pummill, jpummil@uark.edu

Arkansas High Performance Computing Center
http://hpc.uark.edu