NSF Merit Review Process
and
Research Proposal Preparation

Edward J. Hackett, Ph.D.
Former Division Director
Division of Social and Economic Sciences
Directorate for Social, Behavioral, and Economic Sciences
Outline

- Proposal review process
  - Submission
  - Administrative Review
  - Merit Review
  - Decisions
- Research proposal preparation
Proposal Submission

- **How?**

- **Who?**
  - Universities and colleges
  - Non-profit, non-academic organizations
  - For-profit organizations
  - State and local governments

- **To whom?**
  - Categories of Funding Opportunities

- **What?**
  - Basics of Proposal Types

- **When?**
  - Target date, deadline and window
Proposal Submission - To whom?
Categories of Funding Opportunities

- **Program Description**
  - broad, general descriptions of programs
  - usually the home for investigator-initiated unsolicited proposals

- **Program Announcement**
  - similar to Program Descriptions

- **Dear Colleague Letter**
  - provides general information to community, clarifies or amends existing policy or document, or informs community about upcoming opportunities or special competitions for supplements to existing awards

- **Program Solicitation**
  - encourage submission of proposals in specific program areas of interest to NSF
  - more focused; normally apply for limited period of time
  - may include additional review criteria and reporting requirements, budgetary and eligibility limits, require letters of intent or pre-proposals, etc.
Proposal Submission - What?

- **Letters of Intent**
  - *Only if needed by the program*
  - **Intent:** to help NSF program staff to gauge size and range of competition
  - **Contents:** PI's and co-PI's names, proposed title, list of possible participating organizations, and synopsis
  - *Not externally evaluated or used to decide on funding*

- **Preliminary Proposal**
  - *Only if needed by the program*
  - **Intent:** to reduce unnecessary effort in proposal preparation and to increase the overall quality of full submission
  - **Contents:** based on the program
  - **Review and decisions:** merit review to aid decisions
    - Invite or Not invite
    - Encourage or Not encourage

- **Full Proposal**
  - **Typical submission to NSF**
Proposal Submission - When?

Published in specific program descriptions, announcements, and solicitations

- **Target dates**
  - dates after which proposals still accepted, but may miss a particular panel

- **Deadline dates**
  - dates after which proposals will not be accepted for review

- **Submission Windows**
  - designated periods of time during which proposals accepted for review

- **Accepted any time - After speaking with a Program Director**
  - e.g. SGER (Small Grants for Exploratory Research), conference/workshop proposals, supplements
Submission and afterwards

- **Plan Ahead!!**
  - Don’t wait until the last minute.
  - Don’t count on getting a time extension

- **Submission**
  - Check before you submit
    - Print out from FastLane to ensure pdf conversion is correct
  - Work with your Sponsored Projects Office

- **After submission**
  - Acknowledgment and FastLane proposal status page
  - FastLane Proposal File Update module
    - Parts of a proposal *may* be replaced after submission
    - Don’t count on this, the word is *may*, not *can*. 
Proposal review process

- **Administrative Review**
  - Printed, checked for print problems, transferred to Division/Office
  - Assigned to program, cluster, section, etc.
  - Checked for compliance
    - Both review criteria
    - Format
    - Appropriateness

- **Merit Review**
  - *Ad Hoc* reviews
  - Panel review

- **Decisions**
  - Award or decline recommendation by Program Director
  - Concurrence by Division Director
  - Non-award notifications by Division/Office
  - Award notifications by Division of Grants and Agreements
Administrative Review

- **Compliance Check**
  - Print problems, format, page limits, etc.
  - Return without review
    - DOES NOT ADDRESS BOTH REVIEW CRITERIA IN PROJECT SUMMARY
    - inappropriate for funding by NSF
    - insufficient lead-time before the activity’s start
    - received after announced proposal deadline date
    - full proposal submitted when preliminary proposal "not invited"
    - duplicate of, or substantially similar to, proposal already under consideration by NSF from same submitter
    - does not meet NSF proposal preparation requirements
    - not responsive to GPG (Grant Proposal Guide) or program announcement/solicitation
    - previously reviewed and declined and has not been substantially revised
    - duplicates another proposal already funded
NSF invests in the best ideas from the most capable people, determined by competitive merit review.
Merit Review Criteria

- **The intellectual merit of the proposed activity**
  - Creativity and originality
  - Potential to advancing knowledge and understanding within and across fields
  - Conceptualization and organization
  - Qualifications of investigators
  - Access to resources

- **The broader impacts of the proposed activity**
  - Discovery while promoting teaching, training and learning
  - Participation of underrepresented groups
  - Enhancement of infrastructure for research and education
  - Dissemination of results to enhance scientific and technological understanding
  - Benefits to society
Objectives of this segment:

- Describe the context of merit review
- Provide an institutional analysis of merit review
  - What does it do?
    - Intended and unintended consequences
  - What values or principles guide it?
    - Values compete: ambivalence
Ways To Allocate Funds For Science

- Legislators may allocate funds
  - Earmarking and Pork Barrelling
  - Democratic
  - Legitimate
  - Distributional fairness
  - Political
  - Inexpert
  - Culturally corrosive
  - More than $2.0B in FY05
Another Way To Allocate

- **Strong Manager (DARPA)**
  - Flexible and responsive
  - Assumes clear objectives and standards
  - Requires outcome accountability
  - May not work for all aims or fields
  - Projects end, programs sustain fields
  - May not scale up (DARPA $3B NIH $28B)
  - Must accept failure and cut losses
One Final Option...

- **Formula funding**
  - Based on population or performance or ... ?
  - To states or institutions or departments?
    - Then merit review? Another formula?
  - Who writes the formula, and how?
  - Will it encourage creativity and responsiveness?
  - How will it start young careers and finish “old” careers?
  - Gaming and unintended outcomes
So…

- Merit review is a choice…
  - There are alternatives.
- Each alternative has distinctive strengths and weaknesses…
  - As does merit review.
- But some of the strengths of merit review are subtle and important, as I hope to show.
What is merit review?

- A process for “grading the grain” and allocating scarce resources, of course.
  - NIH: reviewers are asked to evaluate the science, the whole science, and nothing but the science of a proposal
- But it is also much more...
A Source of Expert Advice

- To the author and to the agency or journal
- Aims to improve science by advice and by wise allocations of resources
- Cumulatively, it shapes the research area and the agency research program
A Flywheel

- Lends stability
- Embodies the “essential tension” between tradition and originality
- Challenges new ideas to be truly new
  - Yet insists on connection to tradition
- Helps researchers “stay the course” through obstacles of research
Mode of Scholarly Communication

- Ideas circulate among influentials in various forms, benefiting from expert advice while preparing the field to accept them.
- May ease acceptance of original ideas and results.
  - Compare with findings springing from formula-funded research groups.
Enactment of Professional Authority

- A buffer or border that separates science from other spheres (we don’t use merit review to fund highways!)
- Symbolic importance as an emblem of autonomy
- Practical benefit of creating a context for decision making relatively free of other considerations (e.g., politics, fads).
Entry Point for Social Considerations

- Currently formalized in the broader impacts criteria at NIH and NSF—which may be given differential weight in different decisions
- Program officer balancing portfolio (gender, ethnicity, geography, undergrad institutions)
- NIH Advisory Councils and “specials”
- Lay participation as a rising trend?
Competing Values

- Social values were thought to be unequivocal, the standards of goodness, truth, beauty and such that a society shared.
- Robert Merton (again) offered the notion of "sociological ambivalence" to capture idea of values in tension.
- Erikson pursued it further with cultural axes
- Often criticisms of peer review do not recognize the variety and inconsistency of these values
Competing Values

- Openness - Secrecy
- Effectiveness - Efficiency
- Sensitivity - Selectivity
- Innovative (transformative) - Inertial
- Meritocratic - Fair
- Rigorous - Responsive
- Reliable - Valid
Merit Review

- **Mail Reviews**
  - **Identifying reviewers:**
    - Reviewer suggestions by the PI
    - Program Director’s knowledge of what is being done and who’s doing what in the research area
    - References listed in proposal
    - Recent technical programs from professional societies
    - Recent authors in Scientific and Engineering journals
    - Reviewer recommendations

- **Panel Reviews**
  - At least two panelists provide written reviews
  - All are expected to contribute to the discussion of the proposal and its panel rating
Reviewer Conflicts of Interest

- Remove or limit influence of ties to an applicant institution or investigator that could affect reviewer advice
- Preserve trust of scientific community, Congress, and general public in integrity, effectiveness, and evenhandedness of NSF’s merit review process
- Types of COIs:
  - Affiliations with applicant institutions
  - Relationships with investigator or project director (personal and/or professional)
Basis for decisions: Reviews

- **Merit Review**
  - Content of the review is more important than the rating.
  - Program Director analyzes reviews.
    - Fairness
    - Substance in the reviews
    - Technical problems raised in the reviews
      - major vs. minor
    - Reasons for the reviewer concerns or enthusiasm
    - Impact of information not available to the reviewer (e.g. updates)
  - Program Director sometimes obtains additional reviews or comments from the PI

- **Panel Recommendations**
Basis for Decisions: A Balanced Portfolio

- Innovation and Creativity
  - High risk - high reward projects
- Breadth of research areas
- Priority areas and systems
- Demographics and Diversity
- Broadening participation
- Institutional impact - PUI, EPSCOR, etc.
- Integration of research & education
- International collaborations
Outline

- Proposal review process
- Research proposal preparation
  - Getting started
  - The proposal
  - Proposal writing tips
A good proposal is a good idea, well expressed, with a clear indication of methods for pursuing the idea, evaluating the findings, making them known to all who need to know, and indicating the broader impacts of the activity.
Step 1: Getting started

- There is no substitute for a cutting-edge idea!
- Find the right program early!
  - It’s better to do this well before you write, than after you get your reviews back.
Develop your brilliant idea

- **Key Questions**
  - What do you intend to do?
  - Why is the work important?
  - What does the literature provide?
  - How are you going to do the work?

- **Make sure it is innovative and exciting**
  - Survey the literature
  - Talk with others in the field

- **Can you convince people that you can do it?**
  - Obtain preliminary data
  - Develop arguments to support feasibility
  - Determine available facilities and resources
    - What you have
    - What collaborators can help with
Finding the right program

- **What to look for:**
  - Goal of program or announcement
  - Eligibility
  - Special requirements
  - Deadlines or target dates

- **Where:**
  - www.nsf.gov
  - Program Directors (phone, email)
  - MyNSF

Read the program description or solicitation carefully.
MyNSF
http://www.nsf.gov/mynsf/

MyNSF, formerly the Custom News Service, allows you to receive notifications about new content posted on the NSF website. Notification can be received via email or RSS.

Current Subscribers:

If you are already subscribed, please enter your email address in the box below and select the MyNSF button. This will take you directly to your personal MyNSF Page. You may bookmark that web page.

Email address:  MyNSF

New Users:

To subscribe, type your email address in the text box below and select the Subscribe button.

Email address:  MyNSF
Step 2: The Proposal

The Grant Proposal Guide

- Get it - Read it - Follow it
- Proposal preparation and submission
- Submission of collaborative proposals via
  - Subaward
  - Separate, yet linked, proposals
- Review criteria and process
- Return without review criteria
- Withdrawal, declination, and award processes
- Significant award administration procedures
Parts of a Proposal

- **Cover sheet and certifications**
- **Project summary**
  - Both intellectual merit and broader impacts described
- **Table of contents**
- **Project description**
- **References cited**
- **Biographical sketches**
- **Budgets and justification**
- **Current and pending support**
- **Facilities, equipment and other resources**
- **Special information/documentation**
  - NO reprints, preprints, letters of endorsement
- **Single Copy Documents**
  - Reviewer suggestions, deviation authority, confidential information, etc.
Project Summary

This one page is critical because it:

• It may affect which program or panel will review your proposal.
• It must include a statement addressing both review criteria
  • And proposals that do not separately address both criteria within the one-page Project Summary will be returned without review.

Intellectual Merit

• Describe the scientific/engineering problem and why it is important
• State the overall objective of the project
• State the specific aims
• Describe how the aims will be achieved

Broader Impacts

• Educational & outreach activities; infrastructure; dissemination of results; underrepresented groups; benefit to society
Project Description

- The key to a strong proposal
- Overall concept / rationale
- Hypothesis-driven or Data-driven or Innovation-driven

Execution
- Careful
- Thorough
- Appropriate
Project Description

15 pages where you will need to cover

- Objectives and expected significance
- Relation to present state of knowledge
- Experimental methods and procedures
- Results from prior NSF support (required if applicable)
- Relation to the PI's longer term goals

Sections optional:

- preface, background, preliminary studies, specific objectives, significance, experimental plan
Project Description

- **Know your audience - the reviewers!**
- **Think about the reviewers**
  - Write accurately, concisely, and clearly
  - **Make it easy for reviewers** to like your proposal
  - You never get a second chance to make a first impression
  - **First page tells it all**
  - Figures and tables get your point across clearly
  - **Some reviewers** (particularly on inter-/multi-disciplinary proposals) may not be an expert in your specific field
Biographical Sketch

- Professional Preparation
- Appointments
- Publications
  - 5 closely related
  - 5 other significant publications
- Synergistic activities
- Collaborators & other affiliations
  - Collaborators (last 4 yrs) & co-editors (last 2 yrs)
  - Graduate and Postdoctoral Advisors
  - Thesis Advisor and Postgraduate-Scholar Sponsor
Budgets should be
- reasonable, but ask for what you need
- for personnel, equipment, travel, participant support, & other direct costs (subaward, consultant, computer services, publication costs)
- for cost of educational activities associated with research, where appropriate

Unless solicitation specifies otherwise, do not:
- include cost-sharing on Line M in budget
- exceed cost-sharing level or amount specified in solicitation

Justification
Current and Pending Support

- List everything
  - current, pending and anticipated
- Be careful of overlap
  - Perception of overlap could be detrimental in the review.
- Dual submissions
  - when they are allowed
Proposal Writing Tips
1. Get help with proposal writing

- **Read:**
  - NSF publications
  - Successful proposals

- **Look before you leap:**
  - Serve as a reviewer or panelist

- **Talk with people:**
  - Program officers
  - Current or former “rotators”
  - Successful colleagues
  - Sponsored projects office
2. Start early and don’t be shy

- **Write:**
  - Rewrite and rewrite again

- **Get critiques from:**
  - Mentors and colleagues
  - Previous members of review panels
3. Be reasonable

- Be aware of the scope:
  - “Too ambitious” vs. “Too narrow”

- Be honest and up-front:
  - Address issues instead of trying to hide them
  - Acknowledge possible experimental problems and have alternatives
4. Make it easy for the reviewers

- **Know your audience:**
  - The reviewer may not be an expert in your specific field

- **Simplify and streamline:**
  - Make sure you get your overall idea across!

- **Pay attention to details:**
  - Run the spell checker and proof-read
  - Prepare clear photos, graphs, etc.
  - Make the font size as big as you can
Why do some proposals fail?

- **Absence of innovative ideas or hypothesis**
  - Will provide only an incremental advance
  - Not exciting or cutting edge

- **Errors**
  - Unclear or incomplete expression of aims
  - Faulty logic or experimental design
  - Less than rigorous presentation

- **Unrealistic, sloppy or incomplete**

- **Resources and facilities not in place**
  - PI qualifications/expertise not evident
  - Necessary collaborations not documented
If you have to resubmit...

- **Stay calm!**
  - Take ten... breaths, hours, days
  - Examine the criticisms carefully

- **Get in touch:**
  - Call, email or visit your program director

- **Think carefully about rapid resubmission:**
  - Take time to self-evaluate the proposal and the project
Funding and afterwards

**Funding**
- Budget and scope may be part of negotiations prior to making an award.
- Funding mechanisms may be as a standard (all $s at once) or continuing ($s released annually) grant.

**Afterwards**
- Do what you promised *(pretty much)*
- Notifications & Requests via FastLane
- Supplement opportunities
  - REU - Research Experience for Undergraduates
  - ROA - Research Opportunity Awards
  - RET - Research Experience for Teachers
- Submit annual and final reports
Getting Support in Proposal Writing

- NSF Publications
  - Program Solicitations
  - Grant Proposal Guide
  - Web Pages
  - Funded Project Abstracts
  - Reports, Special Publications

- Program Directors
  - Incumbent
  - Former “Rotators”

- Mentors on Campus
- Previous Panelists
- Serving As A Reviewer
- Sponsored Research Office
- Successful Proposals
Some Recent Changes to the Grant Proposal Guide

- **New NSF ID**: NSF is issuing new NSF ID to replace the use of Social Security numbers. The new ID will be automatically assigned to you through FastLane.

- **Postdoctoral Mentoring**: A new section in the Project Description that describes mentoring activities to be provided to postdoctoral researchers will be required for any proposal that requests support for postdocs.

- **Salaries and Wages**: The Foundation will now limit salary compensation for senior project personnel to no more than two months of their regular salary in any one year. This change was made to remove the concept of “summer salary.”

- **SGERs**: Two new programs will replace the Small Grants for Exploratory Research program, Grants for Rapid Response Research (RAPID) and Grants for Exploratory Research (EAGER).