NSF Merit Review Process and Research Proposal Preparation

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Outline

- Background: About NSF & me
- Mechanics of proposal process
- Proposal review
  - Submission
  - Review
  - Decision
- Scholarly interlude on merit review
- Proposal preparation specifics & advice
National Science Foundation

- Not a foundation
- Established by Congress in 1950 “to promote the progress of science; to advance the national health, prosperity, and welfare...”
- Independent agency—outside Cabinet
- Guided by National Science Board
- Merit review (from ONR) & COV (since mid-1970s) to award grants & evaluate process
- Permeable—borrows university faculty
- Translator and transducer
NSF Proposal & Award Process & Timeline

- NSF Proposal Generating Document
  - NSF Organization submits via FastLane
- NSF Proposal Processing Unit
  - Minimum of 3 Reviews Required
  - Mail
  - Panel
  - Both
- Program Director Analysis & Recom.
- Division Director Concur
  - Award Via DGA
  - Decline
- Organization

Timeline:
- Proposal Receipt at NSF: 90 Days
- Proposal Review and Decisions: 6 Months
- DD Concur: 30 Days
- Award

Proposals are returned as inappropriate or withdrawn.

Research & Education Communities

NSF Director Analysis & Recom.
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 - Categories of Funding Opportunities

- **Program Description (or Announcement)**
  - broad, general descriptions of programs
  - accepts investigator-initiated proposals

- **Dear Colleague Letter**
  - general information; clarifies or amends existing policy or document; announces 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 limited-time request
  - 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 required by the program
  - **Intent**: to help NSF gauge size and range of competition
  - **Content**: 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 required by the program
  - **Intent**: reduce proposal preparation effort, increase quality of full proposals, inform review process
  - **Contents**: based on the program
  - **Review and decisions**: merit review to aid decisions
    - Invite or not; Encourage or not

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

Published in program descriptions 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
Words of Caution

- **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, transferred to Division/Office
  - Assigned to program, cluster, section, etc.
  - Checked for compliance
    - Both review criteria
    - Format
    - Appropriateness

- **Merit Review**
  - *Ad Hoc* (email) 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
    - FAILS TO ADDRESS BOTH 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 & declined; not substantially revised
    - duplicates another proposal already funded
NSF invests in the best ideas from the most capable people, as determined by competitive merit review.
Merit Review Criteria

- **Intellectual merit**
  - Creativity and originality and *transformative potential*
  - Potential to advance knowledge
  - Conceptualization and organization
  - Qualifications of investigators
  - Access to resources

- **Broader impacts**
  - Promotes teaching, training and learning
  - Participation of underrepresented groups
  - Enhancement of infrastructure
  - Dissemination of results
  - Benefits to society
A scholarly interlude on merit review

- Describe the context of merit review
- Provide an institutional analysis of merit review
  - What does it do?
    - Manifest and latent functions
  - What values or principles guide it?
    - Values compete: ambivalence
  - ... Let's set the stage with some alternatives to merit review....
Ways To Allocate Funds For Science

- Legislators may allocate funds
  - Earmarking and Pork Barrelling
  - + Democratic
  - + Legitimate
  - + Distributional fairness
  - - “Political”
  - - Inexpert
  - - Culturally corrosive
  - ... More than $4.5B (est.) spent by earmark
Another Way To Allocate

- **Strong Manager (DARPA)**
  - + Flexible and responsive
  - 0 Assumes clear objectives and standards
  - 0 Requires outcome accountability
  - 0 May not work for all aims or fields
  - - Projects have defined objectives, programs sustain fields
  - - Must seek out failure, cut losses, redirect effort
One Final Option...

- **Formula funding**
  - $$\alpha \xi + \beta \psi + \chi \zeta + \delta \iota \zeta \psi$$
  - Who writes the formula, in what terms?
  - $$\alpha \xi + \beta \psi + \chi \zeta + \delta \iota \zeta \psi$$ to states or institutions or departments?
    - Then merit review? Another formula?
  - 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.
- **NSF made its choice at “birth,” has adapted over the decades, and thrived through merit review**
- **Merit review informs and guides POs, who are active scientific decision makers—a mixed model**
- **And some purposes of merit review are subtle ...**
Merit review in principle…

- 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 NSF and to the proposal author

- Improves science through wise allocations of resources and identifying new opportunities

- Cumulatively, it shapes the research area and the agency research program
A Flywheel

- Lends stability
- Embodies the “essential tension” of science between tradition and originality
- Helps researchers “stay the course” through obstacles of research
Mode of Scholarly Communication

- Original ideas circulate among influential scientists, which helps prepare the field to accept them.

- People may become aware of or involved in activities (workshops, meetings, panels, publications) that are in formation.

- Stream of proposals represents new intellectual growth of a field, shaped through merit review.
Enactment of Professional Authority

- Distinguishes science from other endeavors (we don't use merit review to make most allocation decisions!)
  - Symbolic importance as a badge of cultural distinctiveness and professional autonomy

- Creates a “preserve” for evaluation and decision making that is 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 have different weight in different decisions

- Program officer balancing portfolio (gender, ethnicity, geography, undergrad institutions)

- NIH Advisory Councils and “specials”

- Is greater citizen participation possible?
Competing Values

- Social values are the standards of goodness, truth, beauty and such that a society shares—the principles of evaluation.

- Values may be unitary or coherent, or they may be organized in pairs that are in tension with one another—“ambivalence”.

- Criticisms of merit review often overlook the variety and inconsistency of the values it is asked to serve.
Competing Values

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

### Mail Reviews

- **Identifying reviewers:**
  - Reviewer suggestions by the PI
  - Program Director’s knowledge of the research area
  - References listed in proposal
  - Recent meeting programs of professional societies
  - Recent authors in scientific and engineering journals
  - Reviewer recommendations
  - Google and the web

### 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 fairness of review
- Types of COIs:
  - Affiliations with applicant institutions
  - Relationships with investigator or project director (personal and/or professional)
Basis for decisions: Reviews

- **Written Reviews**
  - Substance of the review is more important than the rating.
  - Program Director analyzes reviews.
    - Fairness
    - Substance of the reviews
    - Technical problems raised in the reviews
    - Reasons for the reviewer concerns or enthusiasm
    - Information not available to the reviewer (e.g. updates)
  - Program Director sometimes obtains additional reviews or comments from the PI

- **Panel Advice—substance and priority**
Basis for Decisions: A Balanced Portfolio

- Innovation and Creativity
  - Potentially transformative proposals
- Breadth of research areas
- Priority areas and systems
- Demographics and Diversity
- Broadening participation
- Institutional impact- RUI, EPSCOR, etc.
- Integration of research & education
- International collaborations
You now have an expert's understanding of the proposal review and decision processes

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 good 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 original and exciting**
- Survey the literature
- Talk with others in the field

**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

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: [Input Field] MyNSF

New Users:

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

Email address: [Input Field] 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 page is critical:**
  - It influences which program or panel will review your proposal.
  - It must address both review criteria
    - If not, then returned without review.

- **Intellectual Merit**
  - Describe the research problem & its importance
  - State the overall goal and specific aims
  - Describe how the aims will be achieved

- **Broader Impacts**
  - Educational & outreach activities; infrastructure; dissemination of results; underrepresented groups; benefit to society
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 to cover:

- Objectives and expected significance
- Relation to present state of knowledge
- Methods and procedures
- Results from prior NSF support (required if applicable)
- Relation to your longer term goals
- Optional sections:
  - preface, background, preliminary studies, specific objectives
A proposal is not a linear document

Original, subtle, complicated ideas demand clear, careful, lucid explanation

Writing = thinking; rewrite for clarity and impact

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

Sweat the small stuff:
  • Spell check and proof-read
  • Prepare clear photos, graphs, etc.
  • Readable font and font-size
Advice: The reader over your shoulder

The reviewer may not be an expert in your specific field

Make it easy for reviewers to like your proposal—show you're committed, engaged

Lost on page one is lost forever

Figures and tables get your point across clearly

You cannot predict what a reviewer will notice
Advice: Be reasonable

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

- **Be honest and up-front:**
  - Address issues, don’t try to hide them
  - Acknowledge possible research complications problems and have alternatives

- **Explain what the literature provides and why research is needed**
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
Budget

- **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**
  - Only when they are allowed
Why do some proposals fail?

- Absence of original ideas or hypotheses
  - Incremental
  - Not exciting or original
- 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 evaluate the proposal and the project
Funding and afterwards

- **Funding**
  - Budget and scope may be negotiated before award
  - Funding may be as a standard grant (all $ at once) or continuing grant ($ released annually).

- **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