Overview of the National Science Foundation

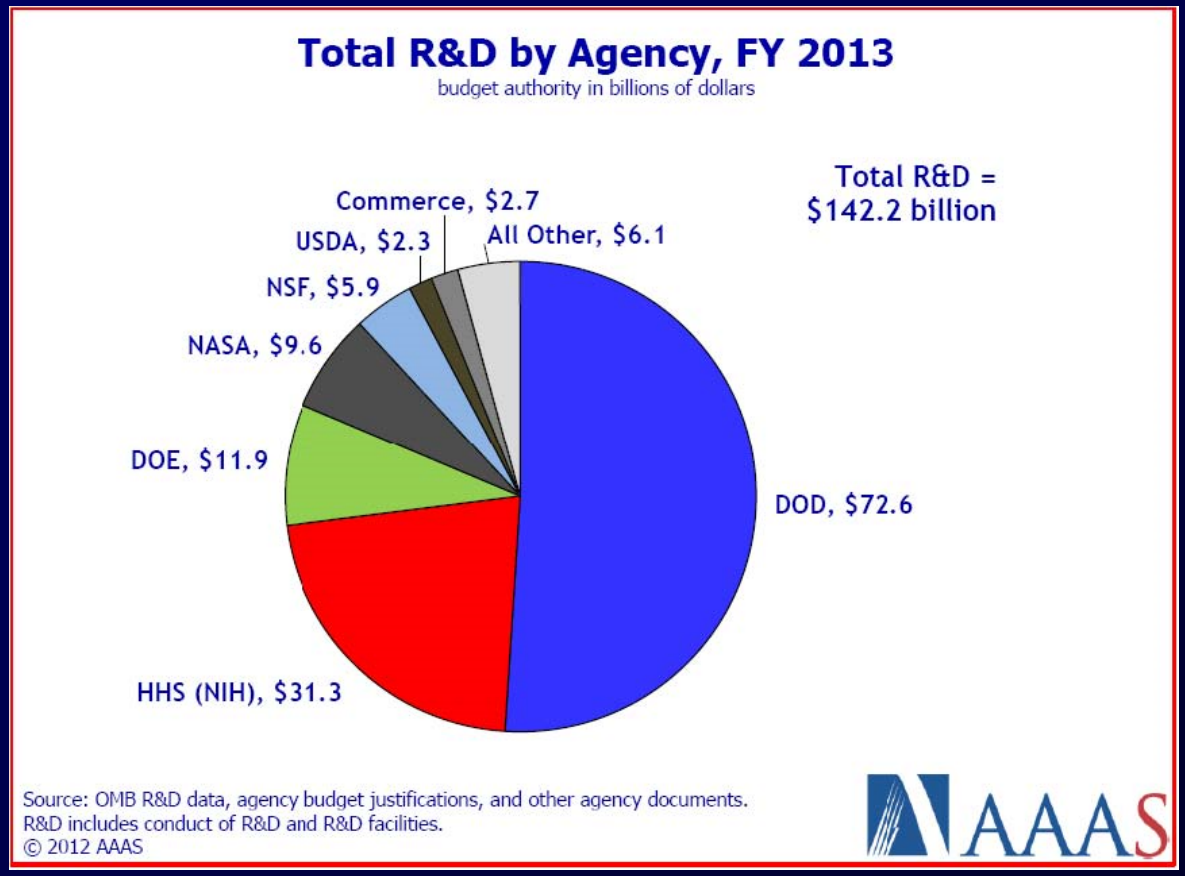
- **Mickey McLaurin**
  - **Research Administration Advisor—Pre-Award**
- **Ken Sleeper**
  - **Program Development Specialist/Research Advocate**

- **Slide content courtesy of Beth Tranter, Chief of Staff, Office of Research, Virginia Tech**

Overview

- Overview of NSF Structure and Operation
- Types of NSF Awards
- The National Science Board Merit Review Criteria
- Preparing the Proposal
- The NSF Review Timeline and Process

The Federal Funding Landscape



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Overview of NSF Structure and Operation

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The National Science Foundation (NSF)

- An independent Federal agency
- Funds research and education in most fields of science and engineering
- Annual budget: Generally ~ $6 billion
- Receives ~45,000 proposals each year; ~11,000 funded

Source: NSF Enterprise Information System 10/2/08
http://www.nsf.gov/nsb/publications/2009/nsb0943_merit_review_2008.pdf

Mission: **To promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense.**

From the National Science Foundation Act of 1950

Vision: **Advancing discovery, innovation, and education beyond the frontiers of current knowledge, and empowering future generations in science and engineering.**

From National Science Foundation *Investing In America's Future*, FY 2006-2011 Strategic Plan

NSF by the Numbers

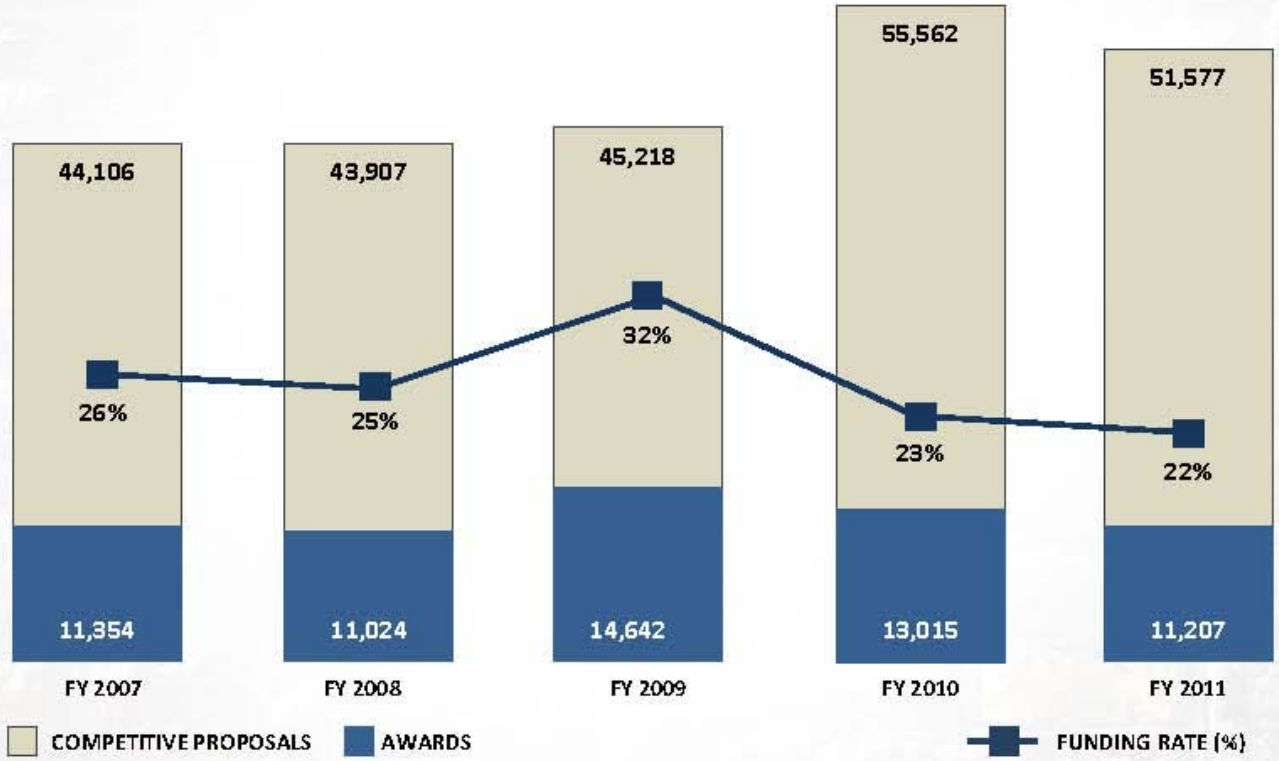
FY 2013

$6.9 billion	Appropriations (does not include mandatory accounts)
1,922	Colleges, universities, and other institutions receiving NSF funding
49,000	Proposals evaluated through a competitive merit review process
10,800	Competitive awards funded
233,000	Proposal reviews conducted
299,000	Estimated number of people NSF supports directly (researchers, postdoctoral fellows, trainees, teachers, and students)
47,800	Students supported by NSF Graduate Research Fellowships since 1952

Source: NSF FY2013 Performance and Financial Highlights
http://www.nsf.gov/pubs/2014/nsf14003/nsf14003.pdf?WT.mc_id=USNSF_124

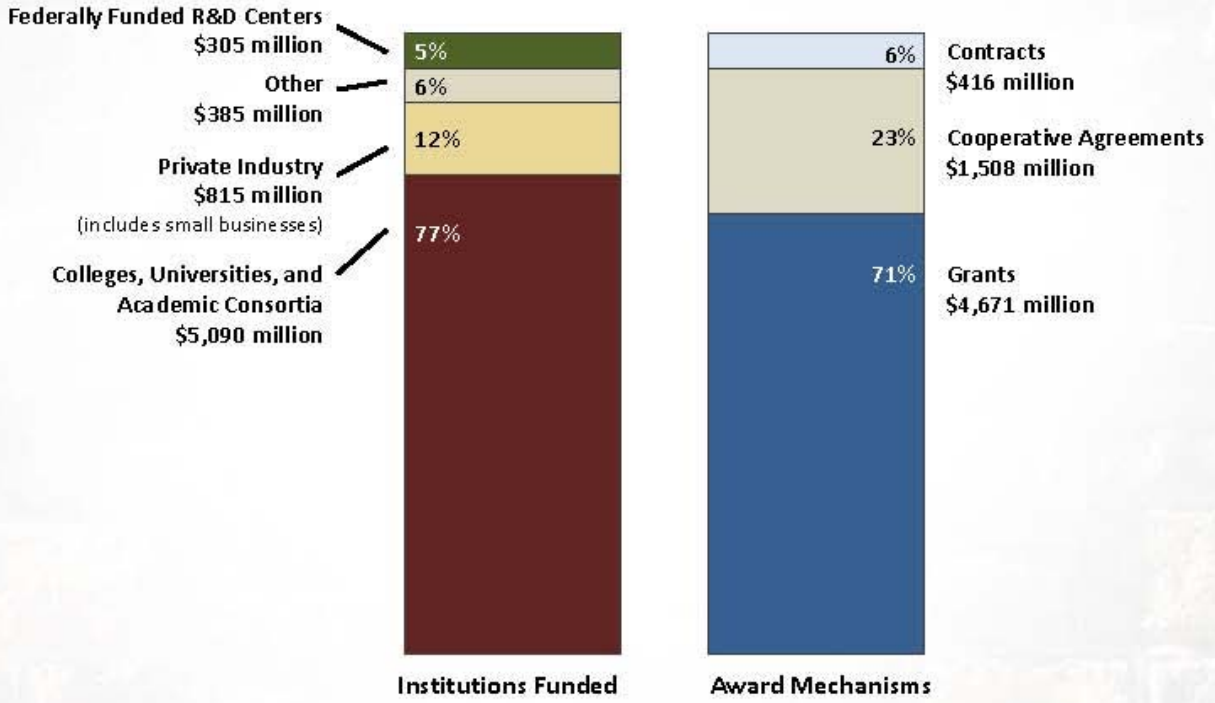
Proposals and Funding Rates

Number of NSF Competitive Proposals, Awards, and Funding Rates



NSF Obligations for Research and Education

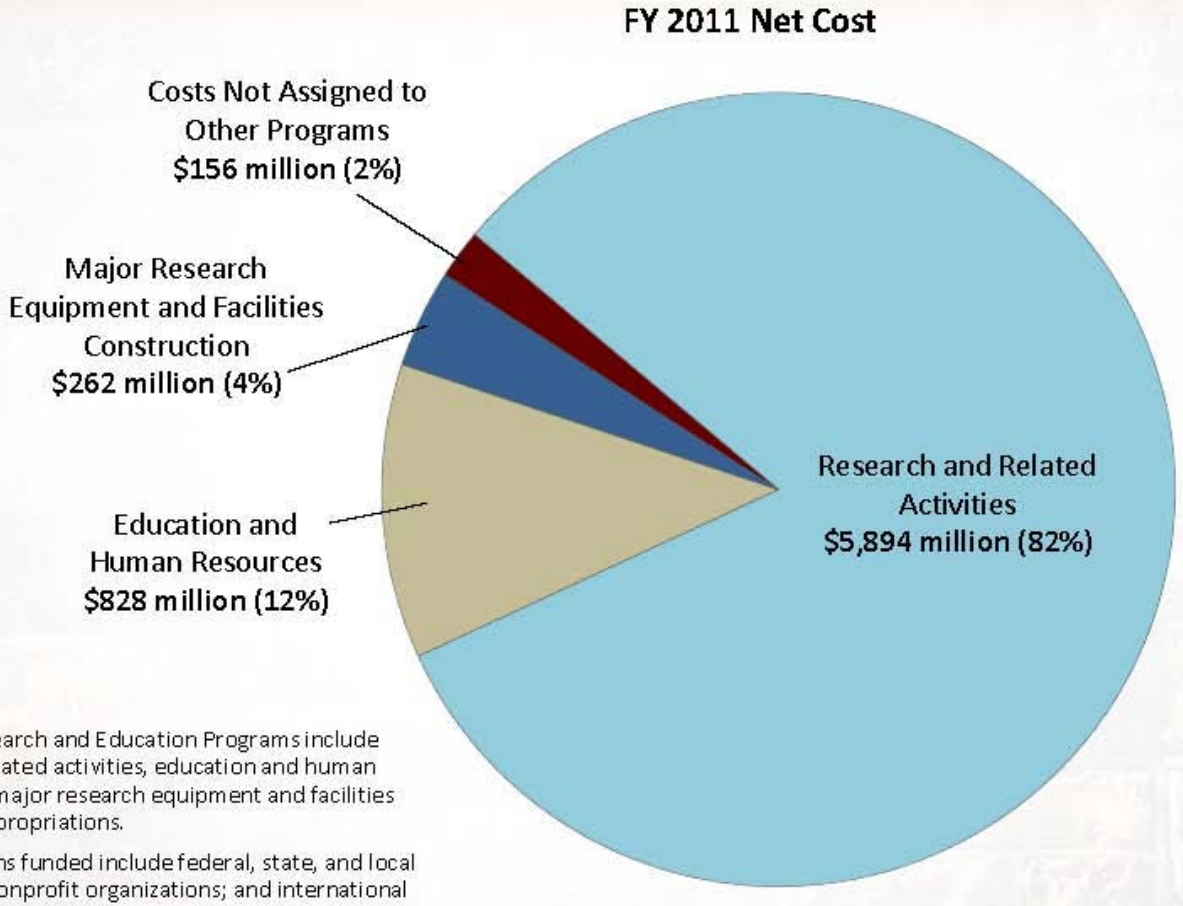
FY 2011 Obligations for Research and Education Programs ($6,595 million)



Notes: NSF Research and Education Programs include research and related activities, education and human resources, and major research equipment and facilities construction appropriations.

Other institutions funded include federal, state, and local governments; nonprofit organizations; and international organizations.

Program Funding Profile

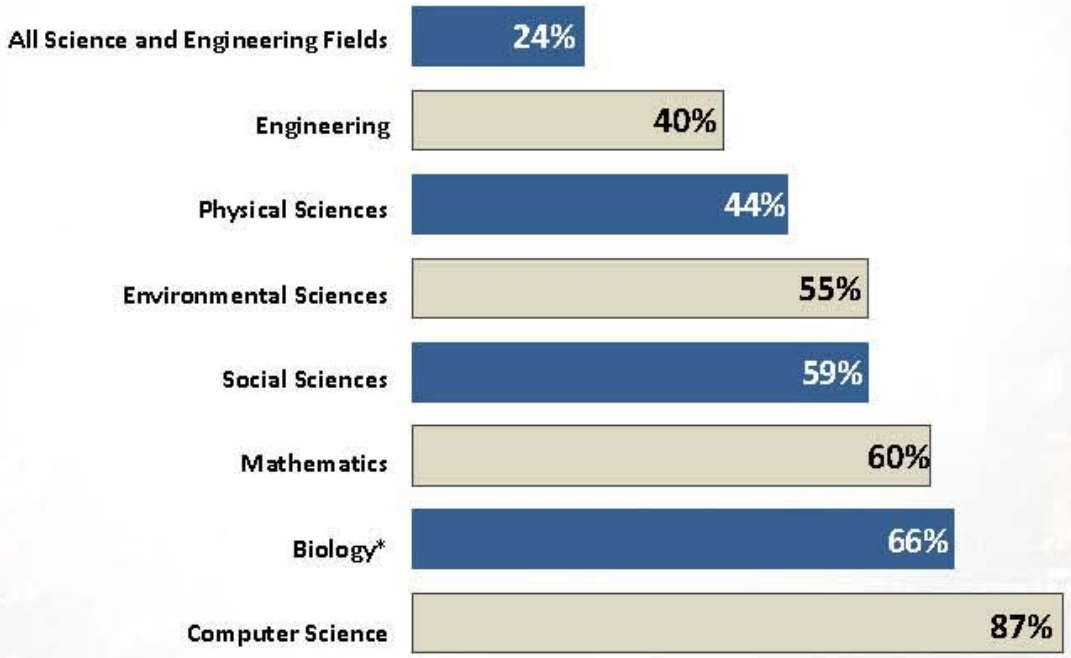


Notes: NSF Research and Education Programs include research and related activities, education and human resources, and major research equipment and facilities construction appropriations.

Other institutions funded include federal, state, and local governments; nonprofit organizations; and international organizations.

NSF Support of Academic Basic Research in Selected Fields

(as a percentage of total federal support)



*Excludes the National Institutes of Health

Source: NSF Survey of Federal Funds for Research and Development

NSF Organization

- Discipline-based Directorates (7)
  - Biological Sciences
  - Computer & Info Sciences & Engineering (CISE)
  - Education & Human Resources (EHR)
  - Engineering (ENG)
  - Geosciences (GEO)
  - Mathematical & Physical Sciences (MPS)
  - Social, Behavioral & Economic Sciences (SBE)
- Divisions within each Directorate
- Sections within each Division
- Programs within Sections
- Program Directors (permanent & IPAs, aka "rotators")

Types of NSF Awards

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What does NSF Fund?

- **Research Proposals**
- **Capacity building proposals**
- **Equipment proposals (Major Research Instrumentation, etc.)**
- **Major Research Equipment and Facilities Construction (rarely)**
- **Collections Development**
- **Conferences, symposia and workshops**
- **International travel proposals**
- **Facilitation proposals for Scientists and Engineers with Disabilities (FASED)**
- **Antarctic Artists and Writers' Program**
- **Joint solicitations with other agencies**
- ***and more!!!!!***
- ***Did you know? NSF accounts for about 24 percent of federal support to academic institutions for basic research.***

Types of Announcements

- **Program Descriptions (PDs)**
  - **"Investigator initiated research"**
- **Program Solicitations/Announcements (PAs)**
- **Supplements (including REU, RET, International)**
- **Dear Colleague Letters (DCLs)**
- **Crosscutting Program Solicitations:**
  - **Cross-Directorate Programs (CAREER, MRI, IGERT, PIRE, etc.)**
  - **Centers (ERCs, STCs, NSECs, SLCs, MRSECs, etc.)**

Types of Awards

- **Standard grants**
- **Supplements to standard grants**
- **Cooperative agreements**
- **Contracts**
- **Graduate Research Fellowship Program (GRFP) - Individual awards, but funding flows through the institution.**
- **RAPID and EAGER Projects**

The National Science Board Merit Review Criteria

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Merit Review Criteria

- What is the **intellectual merit** of the proposed activity?
- What are the **broader impacts** of the proposed activity?
- **Program-specific criteria** may be listed in the program announcement
-

Intellectual Merit

- How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields?
- How well qualified is the proposer to conduct the project?
- To what extent does the proposed activity explore creative, original, or POTENTIALLY TRANSFORMATIVE CONCEPTS*?
- How well conceived and organized is the proposed activity?
- Is there sufficient access to necessary resources?

Transformative Research

- Involves ideas, discoveries, or tools that radically change our understanding of an important existing scientific or engineering concept or educational practice or leads to the creation of a new paradigm or field of science, engineering, or education. Such research challenges current understanding or provides pathways to new frontiers.
- Characteristics of transformative research are that it:
  - Challenges conventional wisdom
  - Leads to unexpected insights that enable new techniques or methodologies, and/or
  - Redefines the boundaries of science, engineering, or education

Broader Impacts

- How well does the activity advance discovery and understanding while promoting teaching, training, and learning?
- How well does the proposed activity broaden the participation of women and underrepresented groups? (“Diversity”)
- To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships?
- Will the results be disseminated broadly to enhance scientific and technological understanding?
- What may be the benefits of the proposed activity to society?

NSF Merit Review Criteria

- **Implications for broader impacts, and the emergence of national goals …**
  - **Increased economic competitiveness of the United States**
  - **Development of a globally competitive STEM workforce**
  - **Increased participation of women, persons with disabilities, and underrepresented minorities in STEM**
  - **Increased partnerships between academia and industry**
  - **Improved pre K-12 STEM education and teacher development**
  - **Improved undergraduate STEM education**
  - **Increased public scientific literacy and public engagement with science and technology**
  - **Increased national security**
  - **Enhanced infrastructure for research and education, including facilities, instrumentation, networks and partnerships**

Five Review Elements

THIS SLIDE IS THE **OFFICIAL WORDING REVIEWERS GO BY**

The following elements should be considered in the review for BOTH criteria:

1. What is the potential for the proposed activity to
   a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
   b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

The Importance of Merit Review Criteria

"(PIs) must address both merit review criteria in separate statements within the one-page Project Summary. This chapter also reiterates that broader impacts resulting from the proposed project must be addressed in the Project Description and described as an integral part of the narrative."

"Effective October 1, 2002, NSF will return without review proposals that do not separately address both merit review criteria within the Project Summary." *- Grant Proposal Guide, Ch. III*

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PREPARING the Proposal

- The proposal is more than just the "narrative"
- FOLLOW the NSF Guidelines for each section
  - Compliance Review

Major Proposal Components

- Cover Page
- Project Summary (1 page)
- Project Description (15 pages)
- References Cited
- Biographical Sketches
- Budget
  - Budget Justification (3 pages)
- Current and Pending Support
- Facilities, Equipment, and Other Resources
- Special Information and Supplementary Documentation
- DATA MANAGEMENT PLAN
- POST DOC MENTORING PLAN
- Appendix (only if authorized!)

Cover Page

- **Identify the Funding Opportunity**
- **Proposal Title**
- **Start Date and Duration**
- **Co-PIs**
- **Compliance issues (human subjects, animal subjects, etc.)**
- **Other details of the proposal**

Project Summary

- Three required sections
  - Overview
  - Intellectual Merit
  - Broader Impacts
- Maximum 4600 characters combined; Cannot exceed 1 page
- Generally written in the third person
- NOT an abstract of the project
- Should stress significance and innovation
- Summarize project overall goal(s) objectives
- List methods to be employed
- Identify expected outcomes
- The Entire structure of the Summary is a **Compliance Review Item

Project Description (15 pages)

- Detailed description of the project's overall purpose, specific objectives and expected significance
- Relation to longer-term goals of researcher(s)
- Contribution to present state of knowledge
- Results from prior NSF support, if any (5 pp. max.)
  - **Compliance Review Item
- Clear description of experimental methods and procedures
- Detailed work plan, with major tasks and timelines
- Address broader impacts of project
  - **Compliance Review Item
- Plans for dissemination of outcomes

References

- This section is required
- Include: Author(s), article and journal title, vol. #, page numbers, year of publication
- If available electronically, include url
- Follow an accepted scholarly format
- Do NOT include commentary parenthetical to narrative!
- No page limit

Biographical Sketches

- Required for Senior Personnel (PI's, co-PI's and Faculty Associates)
- Two-page limit, NSF format required ****Compliance Review Item**:
  - Professional preparation
  - Appointments
  - Publications (5 directly related and 5 other)
  - Synergistic activities (up to 5)
  - Collaborators and other affiliations
- Optional: Other personnel w/exceptional qualifications may be listed (Postdocs, GRA's, etc.)

Budget

- **Must be supplied for each year of project duration**
- **Justification required for all major items (3-page limit)**
- **Must match project design and work plan EXACTLY!**
- **Details on budget structure, allowable costs, etc., may be found in the GPG, Sections II-10 thru II-17.**
- ***Remember: The budget should be exactly what the project requires; no more, no less. Deliberate padding or "lowballing" is quickly spotted.***

Current And Pending Support

- Required for Senior Personnel (PI's, co-PI's and Faculty Associates)
- Status of the support (Current, Pending, or Submission Planned in Near Future)
- Title of project
- Source of Funding
- Project Period
- Place of Performance
- Effort committed

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Facilities, Equipment and Other Resources

- Used to assess the adequacy of the organizational resources available to complete the project successfully
- Must describe only those resources that are directly applicable to the project
- DO NOT include a laundry list of all equipment in your lab

Data Management Plan

- **All proposals must describe plans for data management and sharing of the products of research, or assert the absence of the need for such plans.**

1. **the types of data, samples, physical collections, software, curriculum materials, and other materials to be produced;**
2. **the standards to be used for data and metadata format and content**
3. **policies for access and sharing including provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements;**
4. **policies and provisions for re-use, re-distribution, and the production of derivatives; and**
5. **plans for archiving data, samples, and other research products, and for preservation of access to them.**

Post Doc Mentoring Plan

- Each proposal that requests funding to support postdoctoral researchers **must** include, as a separate section within the 15-page Project Description, a description of the mentoring activities that will be provided for such individuals.
- Examples of mentoring activities include, but are not limited to: career counseling; training in preparation of grant proposals, publications and presentations; guidance on ways to improve teaching and mentoring skills; guidance on how to effectively collaborate with researchers from diverse backgrounds and disciplinary areas; and training in responsible professional practices.
- The proposed mentoring activities will be evaluated as part of the merit review process under the Foundation's broader impacts merit review criterion. Proposals that do not include a separate section on mentoring activities within the Project Description will be returned without review.
  - ****Compliance Review Item**

PROPOSAL SUBMISSION

- **Proposals are generally submitted via the NSF FASTLANE system**
- **PI prepares the proposal in FASTLANE with assistance/input from ORSP**
- **ORSP (the Authorized Institutional Representative) submits the proposal**
- **NSF allows optional use of Grants.gov for proposal submission, but ORSP currently discourages this practice**

Collaborative Proposals

- **Proposals from 2+ institutions linked together in FastLane with one lead organization**
  - **Each institution is awarded funds separately by NSF, but work together as a common unit on research**
  - **Lead organization will link proposals from collaborative institutions by using a temporary proposal # and PIN**
  - **Lead organization officially submits proposal first, then collaborators submit online**
  - ***IMPORTANT: All collaborators must submit to NSF in a reasonable timeframe, usually same day. Failure to do so may cause the proposal to be rejected.***
- **Alternative: Lead institution subcontracts to collaborators**

NSF Proposal and Award Process

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NSF Proposal and Award Process

PHASE I – PROPOSAL PREPARATION AND SUBMISSION – 90 DAYS

1 - Opportunity Announced. All funding opportunities are announced on the NSF website and Grants.gov. Program Descriptions, Program Announcements and Program Solicitations are mechanisms used by NSF to generate proposals. Unsolicited proposals to specific NSF programs may be submitted at any time.

2 - Proposal Submitted. The Grant Proposal Guide (GPG) is the source for guidance on preparing and submitting a proposal to NSF. The GPG details formatting and submission requirements. The proposing organization submits the proposal to NSF via the NSF FastLane System.

3 - Proposal Received. Proposals are received by the NSF Proposal Processing Unit and are assigned to the appropriate program for acknowledgement and, if they meet NSF requirements, for review. A proposal may be returned without review if it does not meet NSF proposal preparation requirements, such as page limitations, formatting instructions, and electronic submission, as specified in the GPG or program solicitation. The GPG identifies all of the reasons for which a proposal may be returned without review.

http://www.nsf.gov/bfa/dias/policy/merit_review/illustration.pdf

NSF Proposal and Award Process

PHASE II – PROPOSAL REVIEW AND PROCESSING – 6 MONTHS

4 - Reviewers Selected. Reviewers are selected based on their specific and/or broad knowledge of the science and engineering fields; their broad knowledge of the infrastructure of the science and engineering enterprise, and its educational activities; and to the extent possible, diverse representation within the review group. Sources of reviewers can come from the program officer's knowledge of the research area; references listed in the proposal; recent professional society programs; computer searches of science and engineering journal articles related to the proposal; reviewer recommendations included in proposal or sent by email. Proposers are invited to suggest persons they believe are especially well qualified to review the proposal, as well as identify persons they would prefer not review the proposal.

5 - Peer Review. All NSF proposals are reviewed through use of the two NSB-approved merit review criteria: Intellectual Merit and Broader Impacts. Some solicitations may have additional review criteria. External reviewers' analyses and evaluation of the proposal provide information to the NSF Program Officer in making a recommendation regarding the proposal.

6 - Program Officer Recommendation. After scientific, technical and programmatic review, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be recommended for an award or declined for funding. Due to the large number of proposals received, the review and consideration process can take up to six months. Large or particularly complex proposals may require additional review and processing time.

7 - Division Director Review. If the decision is made to decline the award, the organization is notified and review information is available in the FastLane System. If the decision is to award, the recommendation is submitted to a Grants & Agreements Officer in the Division of Grants and Agreements (DGA).

NSF Proposal and Award Process

PHASE III – AWARD PROCESSING – 30 DAYS

8 - Business Review. The Grants and Agreements Officer in the Division of Grants and Agreements (DGA) conducts a review of business, financial, and policy implications. Generally, DGA makes awards within 30 days after the program office makes its recommendation. Additional processing time may be required if: the organization has not received prior funding: if the award is a cooperative agreement; or it involves special situations (such as coordination with another Federal agency or a private funding source).

9 - Award Finalized. The award itself is comprised of an award notice, budget, proposal, applicable NSF conditions, and any other documents or requirements incorporated by reference into the agreement. Each NSF award notice specifically identifies certain conditions that are applicable to, and become part of, that award.

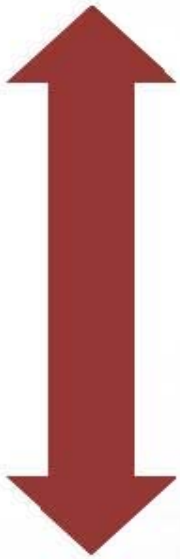
Note: This time frame typically does not apply to large-scale awards (~$20-$40M) such as Centers. Centers often take 2 years to complete the cycle from proposal announcement to award.

The Proposal Review Process

Individual rankings:

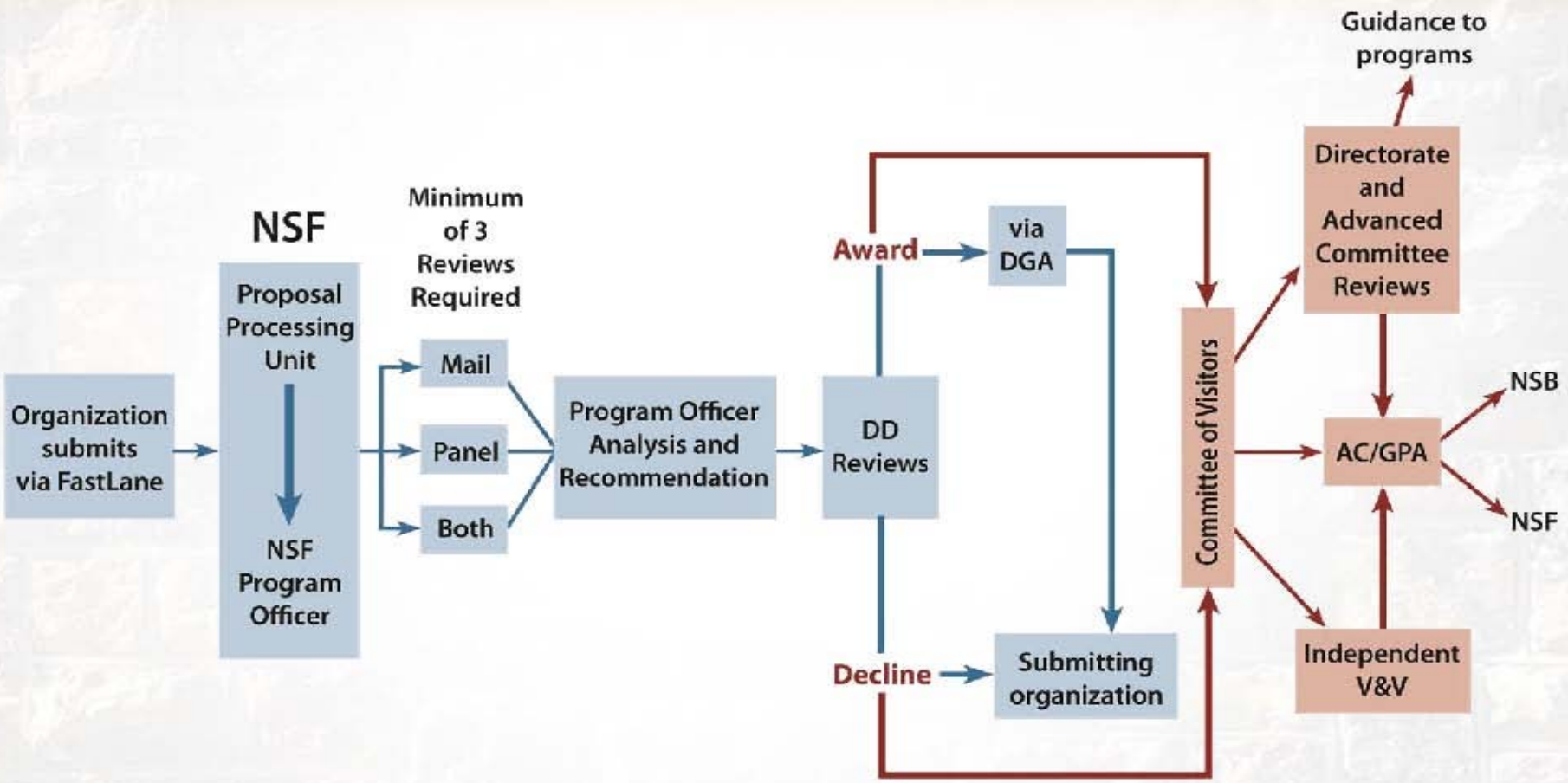
- "Excellent"
- "Very Good"
- "Good" (not good!)
- "Fair"
- "Poor"

Panel recommendations:



Remember: Program Directors have some flexibility

NSF Merit Review Process



Takeaways

- Follow the guidelines
  - NSF is diligent about proposal compliance
- Contact ORSP early and often for assistance
- Think about all elements (narrative, personnel/collaborators, budget, resource needs) as a cohesive whole

- QUESTIONS???

Most Recent Primary Source Data (FY14)

- **NSF Performance and Financial Highlights: http://www.nsf.gov/pubs/2015/nsf15004/nsf15004.pdf**

- **National Science Foundation's Merit Review Process: http://www.nsf.gov/nsb/publications/2015/nsb201514.pdf**