

Overview of the National Science Foundation

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Select Slides courtesy of Beth Tranter, Chief of Staff, Office of Research, Virginia Tech

Source Material:

NSF 16-01, 15-004, NSB2015, and NSF Strategic Plan



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Overview

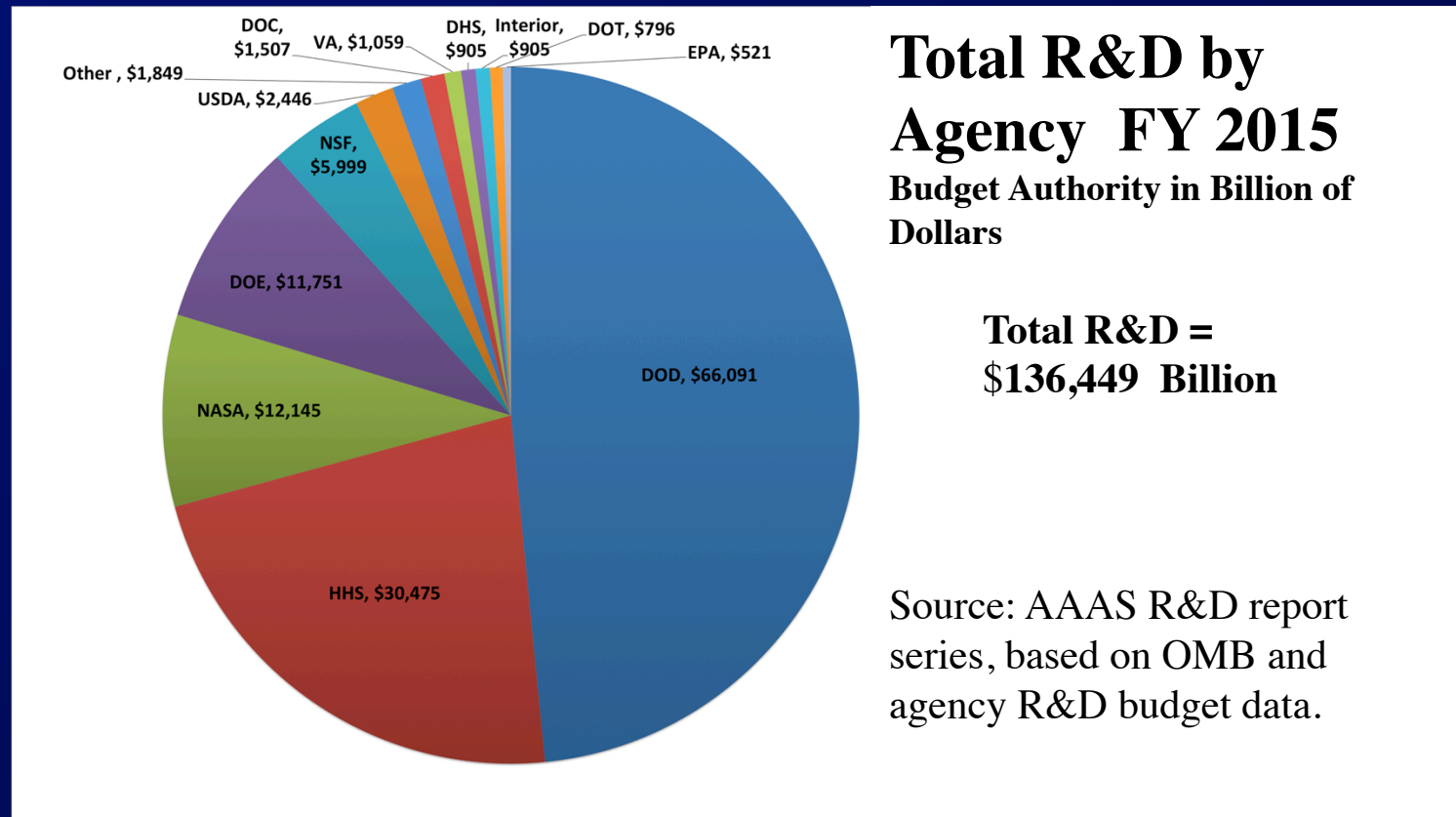
- **Overview of NSF Structure and Operation**
- **Types of NSF Awards**
- **The National Science Board Merit Review Criteria**
- **Preparing the Proposal**
- **The NSF Proposal--Award Timeline**



Overview of NSF Structure and Operation



The Federal Funding Landscape



Source: AAAS R&D report series, based on OMB and agency R&D budget data for 2015.

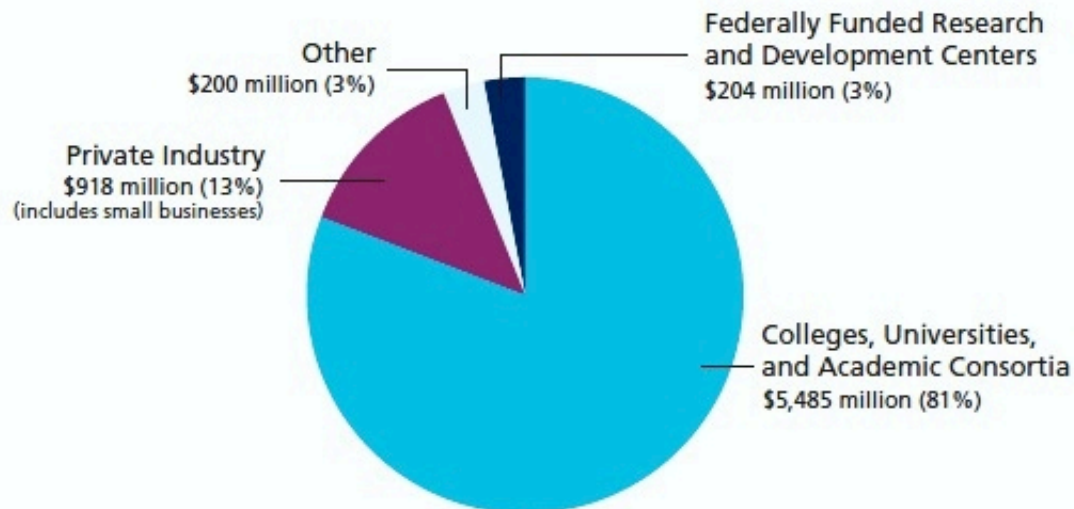


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INSTITUTIONS FUNDED BY NSF

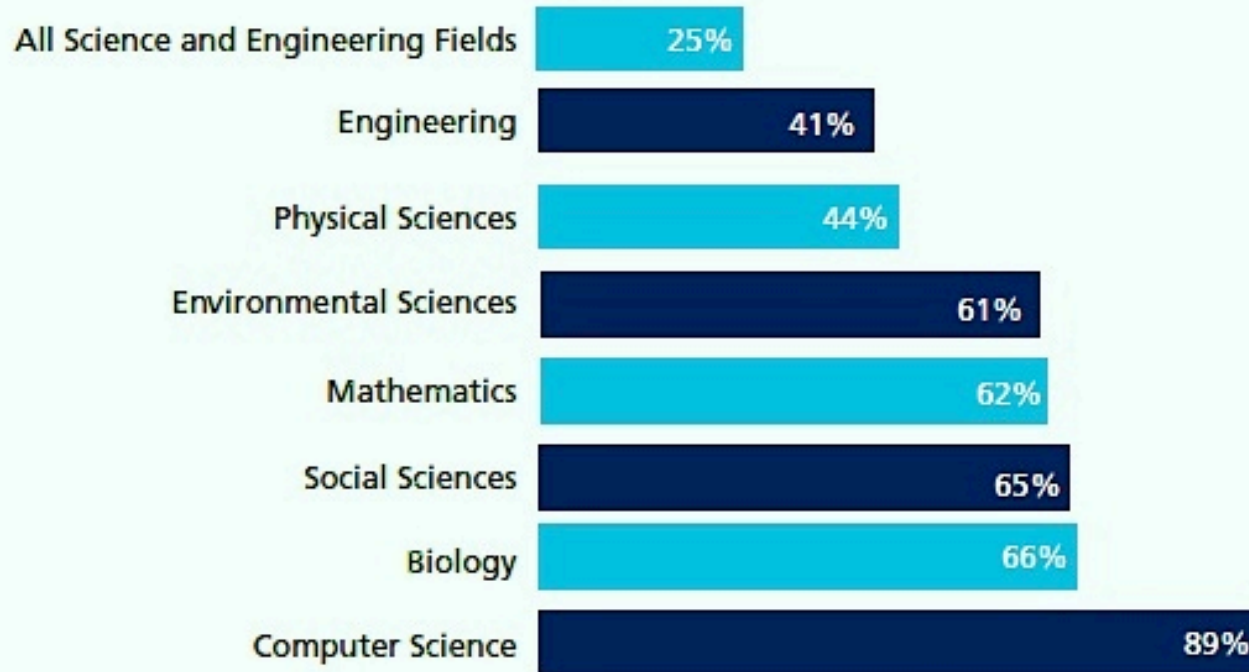
FY 2014 Obligations for Research and Education Programs (\$6,807 million)



Note: 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. Totals may not add due to rounding.



NSF SUPPORT OF ACADEMIC BASIC RESEARCH IN SELECTED FIELDS (as a percentage of total federal support)

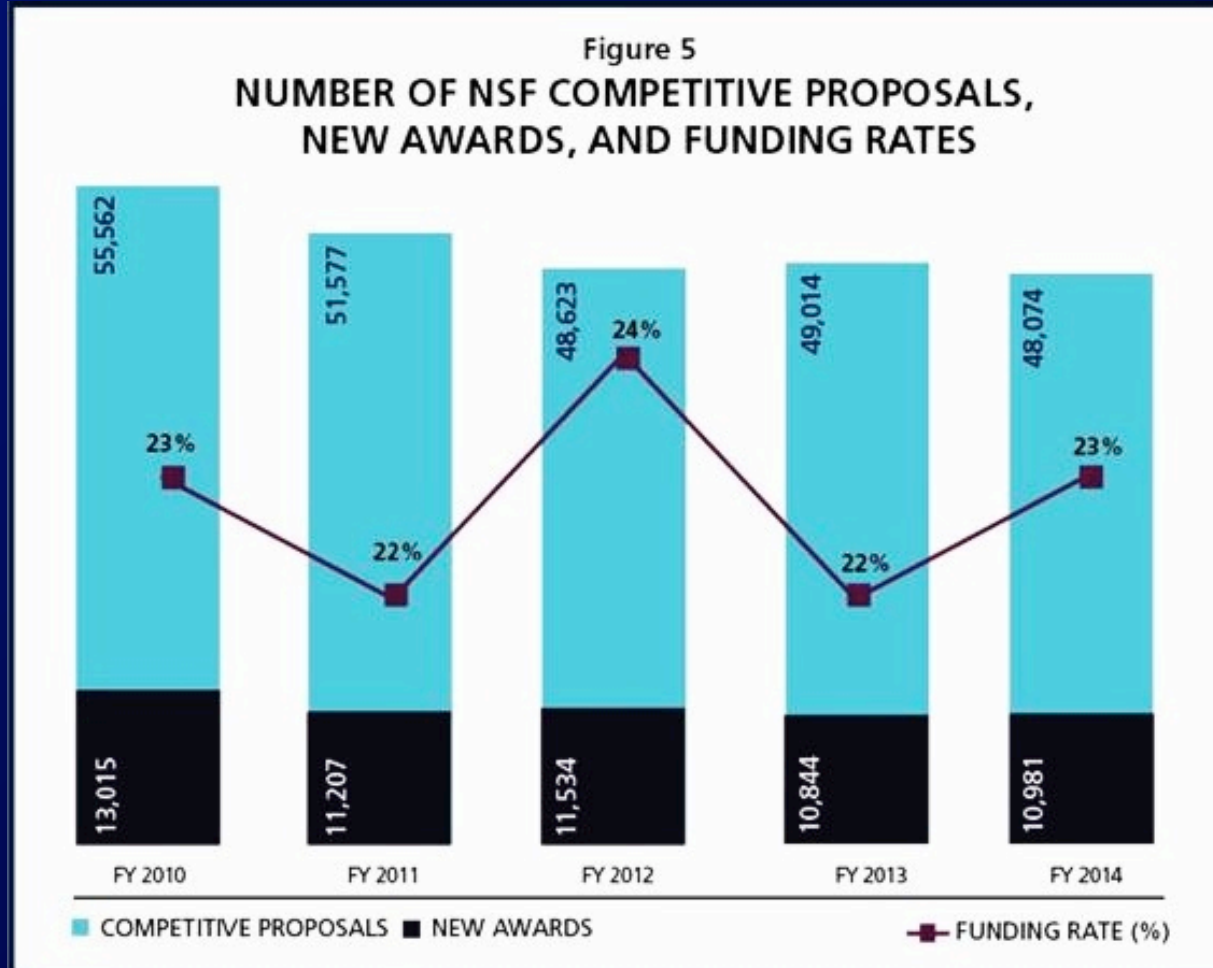


Note: Biology includes Biological Sciences and Environmental Biology; excludes National Institutes of Health.

Source: NSF/National Center for Science and Engineering Statistics, Survey of Federal Funds for Research & Development, FY 2013.



NSF Proposals and Funding Rate



NSF Organization Chart

http://www.nsf.gov/staff/organizational_chart.pdf

<http://www.nsf.gov/staff/orglist.jsp>

NATIONAL SCIENCE BOARD (NSB)

Dan E. Arvizu
Chair

Kelvin K. Droegemeier
Vice Chair
703.292.7000

NATIONAL SCIENCE BOARD OFFICE

Michael Van Woert
Executive Officer
703.292.7000

OFFICE OF INSPECTOR GENERAL (OIG)

Allison C. Lerner, Inspector General
703.292.7100

Richard Buckius
Chief Operating Officer

OFFICE OF THE DIRECTOR
703.292.8000

France A. Córdova
Director

Vacant
Deputy Director

OFFICE OF THE GENERAL COUNSEL (OGC)

Lawrence Rudolph, General Counsel
Peggy Hoyle, Deputy GC
703.292.8080

OFFICE OF INTEGRATIVE ACTIVITIES (OIA)

Suzanne Iacono, Acting Head
703.292.8040

OFFICE OF INTERNATIONAL SCIENCE & ENGINEERING (OISE)

Rebecca Keiser, Head
703.292.8710

OFFICE OF LEGISLATIVE & PUBLIC AFFAIRS (OLPA)

Amanda Greenwell, Head
703.292.8070

DIRECTORATE FOR BIOLOGICAL SCIENCES (BIO)

James L. Oids, Assistant Director
Jane Silverthorne, Deputy AD
703.292.8400

DIRECTORATE FOR COMPUTER & INFORMATION SCIENCE & ENGINEERING (CISE)

James F. Kurnee, Assistant Director
Erwin Gianchandani, Acting Deputy AD
703.292.8900

DIRECTORATE FOR EDUCATION & HUMAN RESOURCES (EHR)

Joan Ferris-Mundy, Assistant Director
William (Jim) Lewis, Deputy AD
703.292.8600

DIRECTORATE FOR ENGINEERING (ENG)

Pramod P. Khargonekar, Assistant Director
Grace Wang, Deputy AD
703.292.8300

DIRECTORATE FOR GEOSCIENCES (GEO)

Roger Wakimoto, Assistant Director
Margaret Cavanaugh, Deputy AD
703.292.8500

DIRECTORATE FOR MATHEMATICAL & PHYSICAL SCIENCES (MPS)

Fleming Crim, Assistant Director
Clifford Gabriel, Acting Deputy AD
703.292.8800

DIRECTORATE FOR SOCIAL, BEHAVIORAL, & ECONOMIC SCIENCES (SBE)

Fay L. Cook, Assistant Director
Kellina M. Craig-Henderson, Deputy AD
703.292.8700

OFFICE OF BUDGET, FINANCE, & AWARD MANAGEMENT (BFA)

Martha A. Rubenstein, Head / Chief Financial Officer
Karen Tiplady, Acting Deputy Head
703.292.8200

OFFICE OF INFORMATION & RESOURCE MANAGEMENT (OIRM)

Joanne S. Torrow, Head / Chief Human Capital Officer
Donna Butler, Deputy Chief Officer
703.292.8100

DIVISION OF BIOLOGICAL INFRASTRUCTURE (DBI)
James Deshler, Acting Division Director
703.292.8470

DIVISION OF COMPUTER & NETWORK SYSTEMS (CNS)
Peter Auerbach, Acting Division Director
703.292.8950

DIVISION OF GRADUATE EDUCATION (DGE)
Dean Ewais, Division Director
703.292.8630

DIVISION OF CHEMICAL, BIOENGINEERING, ENVIRONMENTAL & TRANSPORT SYSTEMS (CBET)
JoAnn Lighty, Division Director
703.292.8320

DIVISION OF ATMOSPHERIC & GEOSPHERE SCIENCES (AGS)
Paul Shepson, Division Director
703.292.8520

DIVISION OF ASTRONOMICAL SCIENCES (AST)
James Unwin, Acting Division Director
703.292.8820

DIVISION OF BEHAVIORAL & COGNITIVE SCIENCES (BCS)
Amber Story, Acting Division Director
703.292.8740

BUDGET DIVISION (BUD)
Michael Stevens, Division Director
703.292.8260

DIVISION OF ADMINISTRATIVE SERVICES (DAS)
Wanda Gardner, Acting Division Director
703.292.8190

DIVISION OF ENVIRONMENTAL BIOLOGY (DEB)
Paula M. Mabee, Division Director
703.292.8480

DIVISION OF COMPUTING & COMMUNICATION FOUNDATIONS (CCF)
Rao Kosaraju, Division Director
703.292.8910

DIVISION OF HUMAN RESOURCE DEVELOPMENT (HRD)
Sylvia James, Division Director
703.292.8640

DIVISION OF CIVIL, MECHANICAL, & MANUFACTURING INNOVATION (CMMI)
Deborah Goodings, Division Director
703.292.8360

DIVISION OF EARTH SCIENCES (EAR)
Carol Frost, Division Director
703.292.8550

DIVISION OF CHEMISTRY (CHE)
Carol Bressi, Acting Division Director
703.292.8840

DIVISION OF SOCIAL & ECONOMIC SCIENCES (SES)
Alan Tomkins, Acting Division Director
703.292.8790

DIVISION OF ACQUISITION AND COOPERATIVE SUPPORT (DACS)
Jeffery Lupis, Division Director
703.292.8240

DIVISION OF INFORMATION SYSTEMS (DIS)
Dorothy Aronson, Division Director
703.292.8150

DIVISION OF INTEGRATIVE ORGANISMAL SYSTEMS (IOS)
Robert D. Miller, Acting Division Director
703.292.8420

DIVISION OF ADVANCED CYBERINFRASTRUCTURE (ACI)
Pete Quitters, Division Director
703.292.8970

DIVISION OF RESEARCH ON LEARNING IN FORMAL & INFORMAL SETTINGS (ORL)
Evan Heit, Division Director
703.292.8620

DIVISION OF ELECTRICAL, COMMUNICATIONS & CYBER SYSTEMS (ECCS)
Samir El-Ghazaly, Division Director
703.292.8330

DIVISION OF OCEAN SCIENCES (OCE)
Richard Murray, Division Director
703.292.8580

DIVISION OF MATERIALS RESEARCH (DMR)
Linda S. Sapich, Acting Division Director
703.292.8810

NATIONAL CENTER FOR SCIENCE AND ENGINEERING STATISTICS (NCSES)
John Gwalt, Division Director
703.292.8780

DIVISION OF FINANCIAL MANAGEMENT (DFM)
John Lynskey, Acting Division Director
703.292.8280

DIVISION OF HUMAN RESOURCE MANAGEMENT (HRM)
Jamie French, Acting Division Director
703.292.8180

DIVISION OF MOLECULAR & CELLULAR BIOSCIENCES (MCS)
Linda E. Hyman, Division Director
703.292.8440

DIVISION OF INFORMATION & INTELLIGENT SYSTEMS (IIS)
Lynne E. Parker, Division Director
703.292.8930

DIVISION OF UNDERGRADUATE EDUCATION (DUE)
Susan Singer, Division Director
703.292.8670

DIVISION OF ENGINEERING EDUCATION & CENTERS (EEC)
Mario Rube, Division Director
703.292.8380

DIVISION OF POLAR PROGRAMS (PLR)
Kelly Falkner, Division Director
703.292.8030

DIVISION OF MATHEMATICAL SCIENCES (DMS)
Michael Vogelius, Division Director
703.292.8870

DIVISION OF PHYSICS (PHY)
Denise Caldwell, Division Director
703.292.8890

DIVISION OF GRANTS & AGREEMENTS (DGA)
Jamie French, Acting Division Director
703.292.8210

DIVISION OF INSTITUTION & AWARD SUPPORT (DIAS)
Dele Bell, Division Director
703.292.8230

OFFICE OF EMERGING FRONTIERS (EF)
Charles Liberato, Acting Division Director
703.292.8508

DIVISION OF INDUSTRIAL INNOVATION & PARTNERSHIPS (IIP)
Barry Johnson, Division Director
703.292.8050

OFFICE OF MULTIDISCIPLINARY ACTIVITIES (OMA)
Clark Cooper, Office Head
703.292.8800

LARGE FACILITIES OFFICE
Matthew J. Hawkins, Deputy Director
703.292.4416



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NSF Award Types



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What does NSF Fund?

- **Research Proposals**
- **Graduate Research Fellowships**
- **Equipment proposals (Major Research Instrumentation, etc.)**
- **Conferences, symposia and workshops**
- **International travel proposals**
- **Collections Development**
- **Major Research Equipment and Facilities Construction (rarely)**
- **Facilitation proposals for Scientists and Engineers with Disabilities (FASSED)**
- **Antarctic Artists and Writers' Program**
- **Joint solicitations with other agencies**
- ***and more!!!!***



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, GOALI, SusChEM, etc.)**
 - **Centers (I/U-CRC, ERCs, STCs, NSECs, SLCs, MRSECs, etc.)**



Types of Awards

- **Standard grants**
- **Supplements to standard grants (REU, RET, International etc)**
- **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



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



Merit Review Criteria

- **Intellectual Merit:** The Intellectual Merit criterion encompasses **the potential to advance knowledge**;
- **Broader Impacts:** The Broader Impacts criterion encompasses the **potential to benefit society** and contribute to the achievement of specific, desired societal outcomes.



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?



Intellectual Merit

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

* Note: these bullets are to stimulate ideas on achieving desirable societal outcomes; Broader Impact review criteria are nearly the same as they are for Intellectual Merit.



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**



The Importance of Merit Review Criteria

“NSF will return without review proposals that do not separately address both merit review criteria within the Project Summary.” - *Grant Proposal Guide, Ch. III*

The Project Description must contain, as a separate section within the narrative, a section labeled “ **Broader Impacts**” (*GPG Ch, II*)



Proposal Preparation



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PREPARING the Proposal

- The proposal is more than just the “narrative”
- FOLLOW the NSF Guidelines for each section (NSF 16-1)
 - 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**
- **DATA MANAGEMENT PLAN**
- **POST DOC MENTORING PLAN**
- **Other Special Information and Supplementary Documentation (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** (*specified section with title)
****Compliance Review Item**
- Plans for dissemination of outcomes

* “Broader Impacts”



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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**



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**



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



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



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 NSF-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.

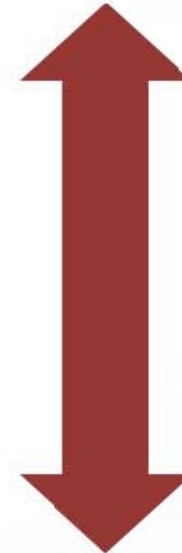


The Proposal Review Process

Individual rankings:

- “Excellent”
- “Very Good”
- “Good” (not good!)
- “Fair”
- “Poor”

Panel recommendations:



Remember: Program Directors have some flexibility



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???

