NSF Programs and Funding Opportunities

Joan Ferrini-Mundy, Introductory Remarks
To promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense...
Basic research ... results in general knowledge and an understanding of nature and its laws. This general knowledge provides the means of answering a large number of important practical problems....

- Vannevar Bush
What Makes NSF Unique

Funds broad fundamental research -- longer lead time for identifying results

Drives U.S. economy
Enhances American security
Advances knowledge
to sustain U.S. global leadership.

Distributes 93% of its budget through the merit review process
2,000
NSF-funded institutions

11,000
Awards funded

359,000
People NSF supported

49,000
Proposals evaluated

$7.5B
FY 2017 budget enacted

$1.2B
STEM education and workforce development

$100M
To seed public-private partnerships

93%
Funds research, education and related activities

231
NSF-funded Nobel Prize winners (since 1951)

Numbers shown are based on fiscal year 2017 activities.
NSF Funds All Fields of S&E

- Biological Sciences
- Computer & Information Science & Engineering
- Education & Human Resources
- Engineering
- Geosciences (including Polar Programs)
- Integrative Activities
- International Science and Engineering
- Social, Behavioral & Economic Sciences
- Mathematical & Physical Sciences
Partnerships are Critical

- Industry
- International
- Interagency
- National Labs
- States
- Scientific Societies
- Foundations
- Academia
The Brain is Wider Than the Sky

Credit: NSF Director France Córdova
NSF Breakthroughs Have Changed the World

3-D Printing Breakthrough

Gravitational Waves

Autonomous Car Software

HL TAU Discovery

Foundation for the Internet

Qualcomm SBIR

Barcodes Popularized

Early Web Browser

Credit: NSF slide
NSF Presence in the U.S.

NSF-FUNDED U.S. CENTERS, SITES, LABS & INFRASTRUCTURE

Credit: NSF slide
NSF’s 10 Big Ideas | Research Ideas

- The Future of Work at the Human-Technology Frontier
- Navigating the New Arctic
- Understanding the Rules of Life: Predicting Phenotype
- Windows on the Universe: The Era of Multi-messenger Astrophysics
- Harnessing Data for 21st Century Science and Engineering
- The Quantum Leap: Leading the Next Quantum Revolution

Credit: NSF slide
NSF’s 10 Big Ideas | Process Ideas

Growing Convergence Research at NSF

NSF 2026: Seeding Innovation

NSF INCLUDES: Enhancing STEM through Diversity and Inclusion

Mid-scale Research Infrastructure

Credit: NSF slide
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**Mission**

- To enhance grant seeking activities and facilitate grant collaborations across units and around the state in order to promote a culture of research excellence.

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**Services**

- Assist with proposal development
- Support interdisciplinary collaborations
- Identify funding opportunities
- Provide grantsmanship training
FY 2018

Awards by Funding Agency

- NSF: $13,601,418
- USDA: $10,429,880
- DOD: $7,643,000
- Commerce: $7,605,556
- Education: $3,987,539
- NIH: $3,245,403
- Energy: $2,614,947
- DHHS (Non NIH): $2,255,421
- NASA: $1,491,917
- Foundations: $1,310,824

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Getting Started
The Essentials

Source of slides: NSF
Navigating: Funding at www.NSF.gov
Navigating: Awards at www.NSF.gov
Additional Information on Resources

Join Directorate Specific Listserves!

Use Grants.gov’s search feature

Apply for a Grant Online Now
Apply for grants by creating a workspace. This feature enables you and your colleagues to work on the grant application online together.

Apply for a Grant with Workspace »
What is the Proposal & Award Policies & Procedures Guide?

The Proposal & Award Policies & Procedures Guide (PAPPG) contains documents relating to NSF's proposal and award process. It has been designed for use by both our customer community and NSF staff and consists of two parts.

Part I is NSF’s proposal preparation and submission guidelines

Part II is NSF’s award and administration guidelines
Types of Funding Opportunities

- **Program Descriptions**
  - Proposals for a **Program Description** must follow the instructions in the PAPPG.

- **Program Announcements**
  - Proposals for a **Program Announcement** must follow the instructions in the PAPPG.

- **Program Solicitations**
  - Proposals must follow the instructions in the **Program Solicitation**; the instructions in the PAPPG apply unless otherwise stated in the solicitation.

- **Dear Colleague Letters**
  - **Dear Colleague Letters** are notifications of opportunities or special competitions for supplements to existing NSF awards.
# Navigating a Program Solicitation

## Enhancing Access to the Radio Spectrum (EARS)

**PROGRAM SOLICITATION**

**NSF 15-550**

**REPLACES DOCUMENT(S):**

**NSF 14-529**

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### National Science Foundation

Directorate for Mathematical and Physical Sciences
Division of Astronomical Sciences

Directorate for Engineering
Division of Electrical, Communications and Cyber Systems

Directorate for Computer & Information Science & Engineering
Division of Computer and Network Systems

### Full Proposal Deadline(s) (due by 5 p.m. proposer’s local time):

- June 02, 2015

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### IMPORTANT INFORMATION AND REVISION NOTES

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised NSF Proposal & Award Policies & Procedures Guide (PAPPG) (NSF 15-1), which is effective for proposals submitted, or due, on or after December 22, 2014. The PAPPG is consistent with, and implements the new Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards (Uniform Guidance) (2 CFR § 200).

### SUMMARY OF PROGRAM REQUIREMENTS

**General Information**

- **Program Title:** Enhancing Access to the Radio Spectrum (EARS)
  - Opportunities for interdisciplinary research that increases the efficiency of the radio spectrum, expanding the access to wireless-enabled services for all Americans.

- **Synopsis of Program:**
  - The National Science Foundation’s Directorates for Mathematical and Physical Sciences (MPS), Engineering (ENG), and Computer and Information Science and Engineering (CISE) are coordinating efforts to identify bold new concepts with the potential to

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### Award Information

**Anticipated Type of Award:** Standard Grant

**Estimated Number of Awards:** 20 to 25

Each proposal may request up to $750,000 in total funding over a period of up to three years.

**Anticipated Funding Amount:** $15,000,000

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### Eligibility Information

**Who May Submit Proposals:**

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

**Who May Serve as PI:**

There are no restrictions or limits.

**Limit on Number of Proposals per Organization:**

There are no restrictions or limits.

**Limit on Number of Proposals per PI or Co-PI:**

A proposer may be a Principal Investigator (PI) or co-PI on up to two proposals.

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### Proposal Preparation and Submission Instructions

**Proposal Preparation Instructions**

- **Letters of Intent: Not required**

  - **Preliminary Proposal Submission:** Not required

  - **Full Proposals:**
    - Full Proposals submitted via FastLane. NSF Proposal and Award Policies and Procedures Guide (PAPPG) Guidance apply. The complete
Questions on Funding Opportunities?

Contact your NSF Program Officer

Work with your organization’s sponsored projects office

Ask Early, Ask Often
policy@nsf.gov
CAREER Awards

NSF 17-537

Future Due Dates:

Third Wed  BIO, CISE, EHR  July 17, 2019
Third Thursday  ENG  July 18, 2019
Third Friday  GEO, MPS, SBE  July 19, 2019

Future Years:  Third Wednesday, Thursday, Friday of July

www.nsf.gov/career
CAREER Awards

Foundation wide

Supports junior faculty/new investigators

Research and education integration

PECASE

*(Presidential Early Career Award for Scientists and Engineers)*

eligibility
CAREER Awards

Stable support for 5 years

Minimum award
$500K in BIO, ENG, Office of Polar Activities
$400K in other directorates

No official maximum, but subject to program’s resources (speak with your Program Officer)
Traits of a Successful CAREER Proposal

High quality -- This is a highly competitive program!

Matches disciplinary program expectations

Includes an appropriate scope of activities for a 5-year plan, not one’s whole life!

Goes outside the education box of regular research proposals in the field

Strikes a balance between doable research activities and more risky pursuits
Crosscutting & NSF-wide Opportunities
What Is meant by crosscutting?

Sponsored by >1 NSF unit....

Cuts across NSF in different ways...

Collaborative with other U.S. government agencies...
Types of Crosscutting Activities

- Cross-disciplinary (10 Big Ideas)
- Broadening participation or People-oriented
- Fellowships/Opportunities Education & Training
- Building Research Communities
- Infrastructure
- Data Sciences
- Translational
- International
Fellowships and Opportunities

GRFP
INTERN
PRFs
Graduate Research Fellowship Program

GRFP Goals

• To select, recognize, and financially support individuals who have demonstrated the potential to be high achieving scientists and engineers, early in their careers.

• To broaden participation in science and engineering of underrepresented groups, including women, minorities, persons with disabilities and veterans.
GRFP Unique Features

- **Fellowship**: Awarded to individual
- **Flexible**: Choice of project, advisor & graduate program
- **Unrestrictive**: No service requirement afterward
- **Portable**: Can be used at any accredited U.S. institution
  - MS, PhD, both degrees

- **2010 - 2018**: 2,000 Fellowships yearly
  - 2016: ~16,800 Applications - ~12 % success rate
  - 2017: ~13,200 Applications - ~15 % success rate
  - 2018: ~12,400 Applications - ~16 % success rate
GRFP Benefits

Five Year Award – $138,000
- Three years of support
  - $34,000 Stipend per year
  - $12,000 Educational allowance to institution
- Professional Development Opportunities:
  GRIP: Internships at federal agencies
  INTERN: other internships
- Supercomputer access: XSEDE
- Career Life Balance (family leave)

See GRFP Solicitation NSF 18-573
INTERN (Dear Colleague Letter 17-091)

Supplement to NSF GRFP award for Fellows to gain knowledge, skills and experiences through internships in non-academic settings:

- Industry laboratories or industry research and development groups
- Start-ups
- Government agencies and National Laboratories
- Policy think-tanks
- Non-profit organizations

Also available to graduate students (with advisors supported by NSF) in Engineering, Education and Human Resources, and in the Office of Advanced Cyberinfrastructure (OAC; CISE)
Postdoctoral Research Fellowships

• Allows Postdocs to serve as their own PI
• Directorate/Division-specific; not all Divisions award them
• Up to 2 or 3 years of funding (varies by division)
• Choice of institution and mentor
• Must be US Citizen or permanent resident
• Provides both a Stipend and an Allowance (amounts vary by division and directorate)

• Allowance used for:
  – Benefits
  – Travel
  – Publications
  – Research expenses

Integrating Research and Education Training

REU
RET
NRT
Goals:

– Initiate and conduct projects that engage a number of undergraduate students in research.

– Involve in research students who might not otherwise have the opportunity, particularly those from academic institutions where research programs are limited.

To search for an REU site, visit:  [www.nsf.gov/crssprgm/reu/reu_search.jsp](http://www.nsf.gov/crssprgm/reu/reu_search.jsp)
GOAL: Enable K-12 teachers and community college faculty to engage in STEM research and then adapt knowledge into their teaching.

- RET Sites and Supplements
- May be included in REU proposals
- Check Directorates for specific mechanism
The **NRT Program**, encourages the development of innovative models for STEM graduate training

- Supports training STEM graduate students in high priority interdisciplinary research areas
- Supports professional development to foster an inclusive workforce ready to enter diverse STEM career

**Letter of Intent Submission:** Nov. 26 to Dec. 6, 2018  
**Full grant proposal due date:** Feb. 6, 2019
Infrastructure

EPSCoR

MRI

ERC
Established Program to Stimulate Competitive Research (EPSCoR)

Enhances research capacity and competitiveness of targeted jurisdictions by strengthening STEM capability.
NSF EPSCoR FY18 Eligibility

States
AL Alabama          ND North Dakota
AK Alaska           NV Nevada
AR Arkansas         OK Oklahoma
DE Delaware         RI Rhode Island
HI Hawaii          SC South Carolina
ID Idaho          SD South Dakota
KS Kansas          VT Vermont
KY Kentucky        WV West Virginia
LA Louisiana       WY Wyoming
ME Maine           Other
MS Mississippi     GU Guam
MT Montana         PR Puerto Rico
NE Nebraska       VI U.S. Virgin Islands
NH New Hampshire

EPSCoR states and other U.S. jurisdictions eligible for EPSCoR during FY 2018
EPSCoR Investment Strategies

➢ Research Infrastructure Improvement (RII)
  Support physical, human, and cyber infrastructure

➢ Co-Funding with NSF Directorates and Offices
  Meritorious proposals reviewed in other NSF programs

➢ Outreach and Workshops
  EPSCoR Community-wide activities and NSF staff interaction
Major Research Instrumentation (MRI)

- Acquisition or development of research instrumentation (incl. cyber-infrastructure)
- Shared-use/multi-user instrumentation for research and training
- Academic and private sector partnerships

FY 2018 MRI Competition

- Solicitation NSF 18-513 (significant changes from prior years)
  Full proposal window: January 1, 2019 - January 22, 2019; January 1 - January 19, annually thereafter
Engineering Research Centers (ERCs)

Funded for 10 years at ~ $4M/year (a 5-year initial award / 5-year renewal)

Multi-university, cross-disciplinary academic collaboration

Driven by leading edge complex engineering challenge with significant potential societal impact

Additional support provided by industry, and other partners

Strong integration of research, education and workforce development, diversity and culture of inclusion and innovation ecosystem.
Engineering Research Centers (ERCs)

Notes: (1) Darker labels denote current ERCs. Lighter labels denote graduated centers. (2) Most centers are multi-university partnerships. University shown is lead institution.
Translational Research and Commercialization

Division of Industrial Innovation and Partnerships

Basic Research

$7.8B

$265M

Translational Research

Tech Translation Partnerships & Commercialization Driven Activities
Partnerships are Critical
Most academic spinouts fail because they develop something NO ONE CARES ABOUT

Do customers want something more efficient? or maybe just cheaper?

or just smaller?

How do they adopt new technologies?

Who make a purchase decision?

How do I reach new customers?

What problem does this solve for my customers?

Is that a big problem? or maybe just inconvenient?

The answers are not in the lab and not even on campus
Ten Big Ideas for Future NSF Investments

**RESEARCH IDEAS**

- Harnessing Data for 21st Century Science and Engineering
- Work at the Human-Technology Frontier: Shaping the Future
- Navigating the New Arctic
- Windows on the Universe: The Era of Multi-messenger Astrophysics
- The Quantum Leap: Leading the Next Quantum Revolution
- Understanding the Rules of Life: Predicting Phenotype

**PROCESS IDEAS**

- Mid-scale Research Infrastructure
- Growing Convergent Research at NSF
- NSF 2026
- NSF INCLUDES: Enhancing STEM through Diversity and Inclusion
NSF 2026 IDEA MACHINE

The Application Process

DUE 10/26/2018
How to enter: Register your Idea

Step 1
• Register at the Idea Machine website and prepare your Idea.

Step 2
• Fill out application including 10,000 character narrative questions.

Step 3
• Review your complete application and submit by 10/26/18.
Application Components

1. **Title** of your Big Idea;
2. Each author’s name, occupation, affiliation / place of employment (if applicable), city, state, and country of residence, and email address.
3. Scientific, engineering, or STEM education research interests or areas of expertise of the author(s);
4. **Narrative** that addresses the five questions listed on the next slide.
5. Up to **three key words** describing the Big Idea;
6. Up to three publication/citation references (optional);
7. Consent to NSF's use and display of the submitted information and contestants’ names and likenesses;
8. Confirmation that all individual and team entrants meet the age, and citizenship / residence requirements as described in the eligibility criteria.
1. What is the compelling question or challenge? (200 characters)

2. What do we know now about this Big Idea and what are the key research questions we need to address? (4000 characters)

3. Why does it matter? What scientific discoveries, innovations, and desired societal outcomes might result from investment in this area? (3000 characters)

4. If we invest in this area, what would success look like? (1800 characters)

5. Why is this the right time to invest in this area? (1000 characters)
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**Proposal Development Associate for Special Projects**
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**Mission**
- To enhance grant seeking activities and facilitate grant collaborations across units and around the state in order to promote a culture of research excellence.

**Services**
- **Assist** with proposal development
- **Support** interdisciplinary collaborations
- **Identify** funding opportunities
- **Provide** grantsmanship training
ADDITIONAL NSF SLIDES NOT COVERED IN THE 10/11/2018 WORKSHOP
NSF Directorates and Offices
Biological Sciences (BIO)
Biological Sciences (BIO)

Understanding the Rules of Life

NEON / NEON Science

Understanding the Brain

Fundamental Research and Workforce Development
NSF Directorates and Offices
Computer & Information Science & Engineering (CISE)
Computer & Information Science & Engineering (CISE)

James Kurose, AD
Erwin Gianchandani, DAD

Office of Advanced Cyberinfrastructure (OAC)
Manish Parashar, Head
Amy Friedlander, Deputy

Division of Computing and Communication Foundations (CCF)
W. Rance Cleaveland (DD)
Thyaga Nandagopal (DDD)

Division of Computer and Networked Systems (CNS)
Ken Calvert (DD)
Jeremy Epstein (DDD)

Division of Information and Intelligent Systems (IIS)
Henry Kautz (DD)
Joydip Kundu (DDD)
PRIORITIES

• **Core** research programs across all of computer science

• **Cross-cutting** programs that cross NSF directorates and programs:

  BIG DATA, Collaborative Research in Computational Neuroscience, Cyber-Physical Systems, Enabling Quantum Leap, Future of Work at the Human-Technology Frontier, National Robotics Initiative, Secure and Trustworthy Cyberspace, Software Infrastructure for Sustained Innovation, Smart & Connected Health/Communities

• **Education & Diversity**: CSforAll, Broadening Participation in Computing

• **Early Career Support**: CISE Research Initiation Initiative

• **Other**: Research infrastructure, Technology transition & industry collaboration (e.g., I-Corps, I/UCRC)
NSF Directorates and Offices
Education & Human Resources (EHR)
EHR Investment Priorities

STEM Learning and Learning Environments

- Build on cognitive and “non-cognitive” foundations in STEM
- Support research and the development of innovative tools, approaches and practices in formal and informal STEM learning contexts

Broadening Participation and Institutional Capacity in STEM

- Promote accessibility, supports and success for underrepresented groups through high-quality STEM education

STEM Workforce

- Build capacity and prepare a diverse STEM workforce
- Capitalize on novel advances in science and technology
- Address emerging global, social, and economic challenges and opportunities
NSF Directorates and Offices
Engineering (ENG)
ENG Initiatives and Priorities Address National Interests

- INFEWS: Innovations at the Nexus of Food, Energy, and Water Systems
- Risk and Resilience – Resilient Infrastructure Systems
- Clean Energy Technology
- Cyber-Enabled Materials, Manufacturing, and Smart Systems
  - Advanced Manufacturing
- National Nanotechnology Initiative
- Communications & Cyberinfrastructure
- Understanding the Brain
- Education and Broadening Participation
  - NSF INCLUDES
  - IUSE:RED

- GOALI: Grant Opportunities for Academic Liaison with Industry
- INTERN: non-academic grad student internships towards professional development
- Engineering Research Centers
- IUCRC: Industry University Cooperative Research Centers
- PFI: Partnerships for Innovation
- iCorps: Innovation Corps
- SBIR/STTR Small Business Innovation Research
NSF Directorates and Offices
Geosciences (GEO)
Support basic research in the Earth, ocean, atmospheric and space sciences, from pole to equator, core to surface of the sun.

Support research facilities & infrastructure--instrument pools, research vessels, NCAR, US Antarctic Program, and more)

Promote education and diversity in the geosciences. NSF INCLUDES.

PREEVENTS--Prediction of and Resilience against Extreme EVENTS.
INFEWS--Innovations at the Nexus of Food, Energy, and Water Systems

Leads NNA--Navigating the New Arctic

Cross-directorate initiative: CoPe
NSF Directorates and Offices
Mathematical & Physical Sciences (MPS)
Mathematical & Physical Sciences (MPS)

Directorate for Mathematical and Physical Sciences (MPS)  AD Anne Kinney

- Division of Astronomical Sciences (AST)  Richard Green
- Division of Chemistry (CHE)  Sean L. Jones
- Division of Materials Research (DMR)  Linda Sapochak
- Division of Mathematical Sciences (DMS)  Juan Meza
- Division of Physics (PHY)  Denise Caldwell

Office of Multidisciplinary Activities (OMA)  Clark V. Cooper
Mathematical & Physical Sciences (MPS)

Science at the Scales of the Universe

Images from Wikipedia Commons
NSF Directorates and Offices
Social, Behavioral, & Economic Science (SBE)
Social, Behavioral, & Economic Science (SBE)

Fay Lomax Cook
Assistant Director

Kellina Craig-Henderson
Deputy Asst. Director

Behavioral and Cognitive Sciences
Marc Sebrechts
Division Director
Tamera Schneider
Deputy Division Director

Social and Economic Sciences
Dan Sui
Division Director
Alan Tomkins
Deputy Division Director

National Center for Science and Engineering Statistics
Emilda Rivers

Office of Multidisciplinary Activities
Samson Adeshiyan
Acting Deputy Division Director

Deborah Olster
Science Advisor
John Garneski
Budget Analyst
Madeline Beal
Communications Specialist
Social, Behavioral, & Economic Science (SBE)

Cross Directorate Research Priorities

Understanding the Brain (UtB)
Risk and Resilience: Critical Resilient Interdependent Infrastructure Systems and Processes (CRISP)
Innovations at the Nexus of Food, Energy, and Water Systems (INFEWS)
Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (INCLUDES)
Secure and Trustworthy Cyberspace (SATC)
Smart and Connected Communities (S&CC)
NSF’s Big Ideas  (especially: Work at the Human-Technology Frontier; Harnessing the Data Revolution; Navigating the New Arctic; and Understanding the Rules of Life)
NSF Directorates and Offices
Office of Integrative Activities (OD/OIA)
Timothy M. VanReken
Established Program to Stimulate Competitive Research (EPSCoR)
tvanreke@nsf.gov

Coordinate RII (Research Infrastructure Improvement)
Track-4: EPSCoR Research Fellows

Support EPSCoR Co-Funding and Outreach

Member, INFEWS and INTERN working groups

Former Assoc Prof, Environmental Engineering, Washington State University (Pullman)

Expertise in atmospheric particles, air quality, and climate
Established Program to Stimulate Competitive Research (EPSCoR)
Loretta Moore, Section Head

Evaluation and Assessment Capability (EAC)
Anand Desai, Section Head

Established Program to Stimulate Competitive Research (EPSCoR)
Loretta Moore, Section Head

Integrative Activities (IA)
Steve Meacham Section Head
Office of Integrative Activities (OD/OIA)

IA: Science and Technology Centers - **STC**

IA: Major Research Instrumentation - **MRI**

IA: Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science **INCLUDES** - 17-522

EPSCoR: Research Infrastructure Improvement - **RII**

EPSCoR: Co-Funding; Outreach, Workshops

EAC: Evaluation and Assessment of Crosscutting programs
NSF Directorates and Offices
Office of International Science & Engineering
Office of International Science and Engineering

Office Head
Rebecca Keiser

Deputy Office Head
Sam Howerton

Budget Analyst
Simona Gilbert

Overseas Offices

Countries & Regions
Joe Miller (Acting)

Programs & Analysis
Anne Emig (Acting)

Administration
Jackie Moore
Office of International Science & Engineering

PRIORITIES

Advance the FRONTIERS of S&E via international collaboration

Prepare a GLOBALLY-ENGAGED U.S. S&E workforce

Develop GLOBAL KNOWLEDGE NETWORKS that link U.S. faculty and students to the world

Leverage RESOURCES, EXPERTISE, FACILITIES around the globe
Things to Consider Before Writing a Proposal...
Five Key Elements

1. Great idea
2. Fit with current research expertise and career development plans
3. Ability to devise a strategy including benchmarks, timelines, and metrics
4. Adequate resources to accomplish your project
5. Assessment Plan
Developing your Proposal

Key Questions for Prospective Investigators

• What has already been done?
• Develop hunch or hypotheses for forward progress
• Obtain preliminary data
• What do you intend to do?
• Why is the work important or unique?
Proposal Development Strategies:

What Do You Need Besides $ ???

• Prepare to do the project
  – How are you going to do the work?
  – Realistically assess needs
  – Do you have the right team?
  – Determine available resources
  – Present to colleagues/mentors/students

• Determine possible funding sources
  (NSF may not be the right or the only one)
Proposal Development Strategies:
What details should you glean from the solicitation?

- Overall scope and mission
- Instructions (deviations from the PAPPG)
- How your proposed project fits with the solicitation
- Review procedures and criteria
- Deadlines
The Merit Review Process
NSF’s Proposal & Award Process Timeline

PHASE I

1. OPPORTUNITY ANNOUNCED
2. PROPOSAL SUBMITTED
3. PROPOSAL RECEIVED

PHASE II

4. REVIEWERS SELECTED
5. PEER REVIEW
6. PROGRAM OFFICER RECOMMENDATION
7. DIVISION DIRECTOR REVIEW

PHASE III

8. BUSINESS REVIEW
9. AWARD FINALIZED

https://www.nsf.gov/bfa/dias/policy/merit_review/
When Preparing Proposals

- Read the funding opportunity; ask a Program Officer for clarifications if needed
- Address all the proposal review criteria
- Understand the NSF merit review process
- Avoid omissions and mistakes
- Check your proposal to verify that it is complete!
- Double Check that the proposal NSF receives is the one you intended to send
Proposal & Award Policies and Procedures
Guide (PAPPG)
NSF Merit Review Criteria:

1. Intellectual Merit –
The potential to advance knowledge

2. Broader Impact –
The potential to benefit society and contribute to the achievement of specific, desired societal outcomes
NSF Review Criteria: Review Elements

• The following elements should be considered in the review for both criteria:
• What is the potential for the proposed activity to:
  – *advance knowledge* and understanding within its own field or across different fields (*Intellectual Merit*); and
  – *benefit society* or advance desired societal outcomes (*Broader Impacts*)?
• To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
• 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?
• How well qualified is the individual, team, or institution to conduct the proposed activities?
• Are there adequate resources available to the PI (either at the home institution or through collaborations) to carry out the proposed activities?
NSF’s Proposal & Award Process Timeline

PHASE I

1. Opportunity Announced
2. Proposal Submitted
3. Proposal Received

PHASE II

4. Reviewers Selected
5. Peer Review
6. Program Officer Recommendation
7. Division Director Review

PHASE III

8. Business Review
9. Award Finalized

https://www.nsf.gov/bfa/dias/policy/merit_review/
Types of Reviews

• Ad Hoc (individual reviewer)

• Panel (gathered reviewers)

• Combination

• Internal
  – Reviewed by NSF Program Officers (special cases)
How are Reviewers Selected?

• Three or more external reviewers per proposal
• No conflicts of interest
• Types of reviewers recruited: depth and breadth

• Sources of reviewers
  – Former reviewers
  – Program Officer’s knowledge of the research area
  – References listed in proposal
  – Recent professional society programs
  – S&E journal articles related to the proposal
  – Reviewer recommendations included in proposal
How Do I Become a Reviewer?

Contact the NSF Program Officer(s) of the program(s) that fit your expertise

- Introduce yourself as a strong potential reviewer based on your research experience
- Offer to send a 2-page CV with current contact information
What is the Role of the Reviewer?

Review all proposal material and consider

- The two NSF merit review criteria and any program specific criteria
- Adequacy of the proposed project plan- including the budget, resources, and timeline
- Priorities of the scientific field and of the NSF program
- Potential risks and benefits of the project

Make independent written comments on the quality of the proposal content
What is the Role of the Review Panel?

- Discuss the merits of the proposal with the other panelists
- Write a summary based on that discussion
- Discern relative merit of all proposals considered by panel
Managing Conflicts of Interest in the Review Process

- The primary purpose is to remove or limit the influence of ties to an applicant institution or investigator that could affect reviewer advice.

- The secondary purpose is to preserve the trust of the scientific community, Congress, and the general public in the integrity, effectiveness, and evenhandedness of NSF’s merit review process.
NSF’s Proposal & Award Process Timeline

PHASE I
- PROPOSAL PREPARATION AND SUBMISSION 90 DAYS
- OPPORTUNITY ANNOUNCED
- PROPOSAL SUBMITTED
- PROPOSAL RECEIVED

PHASE II
- PROPOSAL REVIEW AND PROCESSING 6 MONTHS
- REVIEWERS SELECTED
- PEER REVIEW
- PROGRAM OFFICER RECOMMENDATION
- DIVISION DIRECTOR REVIEW

PHASE III
- AWARD PROCESSING 30 DAYS
- BUSINESS REVIEW
- AWARD FINALIZED

https://www.nsf.gov/bfa/dias/policy/merit_review/
The merit review process provides:

- Review of the proposal and a recommendation on funding
- Feedback (strengths and weaknesses) to the proposers

NSF Program Officers make funding recommendations guided by program goals and portfolio considerations.

NSF Division Directors either concur or reject the Program Officers’ funding recommendations.
Feedback from Merit Review

- Reviewer ratings (such as: E, V, G, F, P)
- Analysis of how well proposal addresses both review criteria: Intellectual Merit and Broader Impacts
- Proposal strengths and weaknesses
- Reasons for decline (if applicable)

If you have any questions, contact the cognizant Program Officer
Documentation from Merit Review

• Verbatim copies of individual reviews, excluding reviewer identities

• If panel reviewed:
  ▪ Panel summary
  ▪ Context statement

• Program Officer comments, as necessary, to explain a decision
Examples of Reasons for Declines

• The proposal was not considered to be competitive based on the merit review criteria and the program office concurred.

• The proposal had flaws or issues identified by the program officer.

• The program funds were not adequate to fund all competitive proposals.
Revisions and Resubmissions

Points to consider:

• Do the reviewers and the NSF Program Officer identify significant strengths in your proposal?

• Can you address the weaknesses that reviewers and the Program Officer identified?

• Are there other ways you or your colleagues think you can strengthen a resubmission?

Again, if you have questions, contact the cognizant Program Officer.
NSF’s Proposal & Award Process Timeline

PHASE I
1. OPPORTUNITY ANNOUNCED
2. PROPOSAL SUBMITTED
3. PROPOSAL RECEIVED

PHASE II
4. REVIEWERS SELECTED
5. PEER REVIEW
6. PROGRAM OFFICER RECOMMENDATION
7. DIVISION DIRECTOR REVIEW

PHASE III
8. BUSINESS REVIEW
9. AWARD FINALIZED

For more info:
https://www.nsf.gov/bfa/dias/policy/merit_review/
Data and Cyber Sciences

Big Data

NRI

SaTC
BIGDATA

Goals: Identify novel computation, statistical or mathematical techniques and technologies or novel analyses or experimental evaluation

Two categories for submission:

**Foundations**: Encourages fundamental techniques, theories, methodologies and technologies of broad applicability.

**Innovative Applications**: Encourages novel techniques, methodologies, and technologies of interest to at least one specific application (special requirements).
National Robotics Initiative 2.0: Ubiquitous Collaborative Robots (NRI-2.0)

Expands the scale and variety of collaborative interactions.

FY 17 Participants
CISE, ENG, SBE, EHR, USDA/NIFA
DOE/EM, DOD

Open to US universities and colleges, as well as non-profit, non-academic organizations
SaTC
Secure and Trustworthy Cyberspace

- NSF’s flagship program for research in cybersecurity

- Multiple NSF directorates: CISE, EHR, ENG, MPS, SBE

- U.S. colleges & universities, also open to US non-profits, and sometimes for-profits

- Proposal designations:
  - Core
  - Education
  - Secure, Trustworthy, Assured and Resilient Semiconductors and Systems (STARSS)
  - Transition to Practice (TTP)
Translational Research and Commercialization

Basic Research

$7.8B

Division of Industrial Innovation and Partnerships

$265M
Translational Research

Tech Translation Partnerships & Commercialization Driven Activities
Partnerships are Critical

- Industry
- International
- States
- Academia
- National labs
- Foundations
- Interagency
- Scientific societies
Division of Industrial Innovation and Partnerships (IIP)
Driving basic research towards societal application

All IIP Programs are NSF wide bridges to societal impact

Private funds

GOALI – Grant Opportunities for Academic Liaison with Industry
INTERN – Grad Student non-academic internships
IUCRC – Industry University Cooperative Research Center
PFI – Partnerships for Innovation
I-Corps – Innovation Corps
SBIR/STTR – Small Business Innovation Research/Small Business Technology Transfer
Division of Industrial Innovation and Partnerships

A key NSF portal driving technological translation and innovation activities

- **Build strong industry/University collaborations**
  - Industry-University Cooperative Research Centers (IUCRC)
  - Grant Opportunities for Academic Liaison with Industry (GOALI)

- **Prepare your graduate students for non-academic careers**
  - Internships via INTERN supplements

- **Build innovative technology from your research**
  - through the Partnerships for Innovation (PFI) Program

- **Plan your high-tech startup venture**
  - via the Innovation Corps Program: I-Corps

- **Commercialize technology via small business**
  - Small Business Innovation Research (SBIR/STTR) Program
GOALI Proposals – Key dimensions

• Available NSF-wide as a specialized type of proposal that can be submitted to most programs

• Typical grant is 3-5 years and $100-150K per year.

• Basic research with strong academic-industry collaboration

• Requires an industrial partner (industry co-PI).

• Requires intellectual property agreement completed in advance of funding.

Faculty & Students: Industrial collaboration, education and training

Industry: Access top university research capacity and talent

NSF: Catalyze transformative research & collaborations

Universities: Build pathways to new/stronger links with industry

https://www.nsf.gov/pubs/policydocs/pappg18_1/pappg_2.jsp#IIE4
INTERN – Non Academic Internships for Grad Students

Host organizations may include:
- Industry laboratories or research and development groups.
- Start-ups or small businesses.
- Government agencies and National Laboratories.
- Policy think-tanks.
- Non-profit organizations.

$55K for up to 6 months of internship

Need an Intellectual Property agreement between university and Host


Due dates: May 1, 2019 (FY2019 funds) and May 1, 2020 (FY2020 funds).
Industry-University Cooperative Research Centers (IUCRC)

Collaborate strongly with industry
Leverage Industry funding
Industrial exposure to students/faculty

NSF provides $ for administrative and management costs

Members provide $ for research (only 10% overhead)

Increased $ for university Research

70+ Centers

100+ U.S. Universities

400+ Large Companies

300+ Small Companies

Federal & State Government Agencies

Broad areas of coverage
Advanced Electronics & Photonics
Advanced Manufacturing
Advanced Materials
Biotechnology
Civil Infrastructure Systems
Energy and Environment
Health and Safety
Information Communication & Computing
System Design and Simulation

Industry-inspired Centers

PRE-COMPETITIVE RESEARCH!
Partnerships for Innovation (PFI)

www.nsf.gov/PFI

• Primary source of technology development funding at NSF for researchers in academia and non-profits
  • projects with potential for accelerated commercialization
  • proof-of-concept work
  • prototype development

• Support partnerships and multi-disciplinary innovation ecosystems

• Broadening participation, Professional development, mentoring on entrepreneurship and technology translation

• Drive basic research into a technology innovation phase!
I-Corps™ - Entrepreneurial training towards effective business model creation

Most academic spinouts fail because they develop something NO ONE CARES ABOUT

Do customers want something more efficient? or maybe just cheaper?

What problem does this solve for my customers?

Is that a big problem?
or maybe just inconvenient?

How do they adopt new technologies?
Who make a purchase decision?

How do I reach new customers?

The answers are not in the lab and not even on campus
• Awards $200 million per year to roughly 400 small businesses/startups

• Supports research and development of groundbreaking, high-impact, high-risk technology

• Since 2014 NSF funded startups have raised $3.5B in private follow-on investment!

https://seedfund.nsf.gov