



## Research Opportunities in the Biological Sciences at the National Science Foundation

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## Topics for the first half of this presentation

OVERVIEW OF ORGANIZATION OF THE NATIONAL SCIENCE FOUNDATION

PROPOSAL PREPARATION

THE REVIEW PROCESS

(FUNDING OPPORTUNITIES FOR THE BIOLOGICAL SCIENCES: IN YOUR HANDOUTS)

## Distinctive Features of NSF

Emphasis on integrating research and education

Close interaction with universities

Rotator system: many program directors are on loan from universities, labs or industry

Reviews are advisory; program directors make funding decisions

## Health-related Topics Appropriate for NSF Support

NSF does not normally support

- The development of products for commercial marketing
- Research with disease-related goals
- Animal models of disease conditions or the development or testing of drugs or other procedures for their treatment

NSF does support

- Research in bioengineering, with diagnosis- or treatment-related goals (applies engineering principles, advances engineering knowledge)
- Bioengineering research to aid persons with disabilities

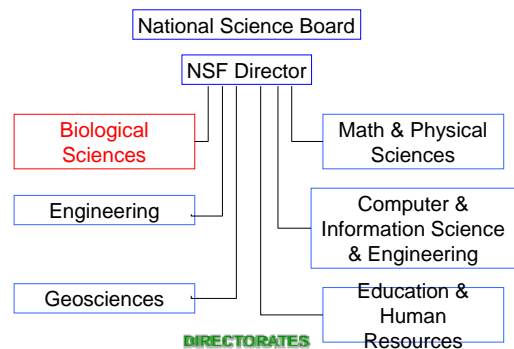
## Transformative research

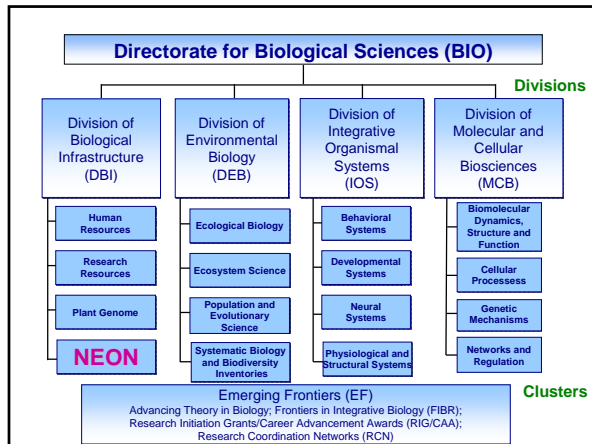
Research resulting in transformative advances within fields of science or engineering.

Investigators working at the frontier might need to take high risks in their research.

Proposals with great potential even though they may challenge current paradigms or otherwise be considered risky.

## Organization of the NSF





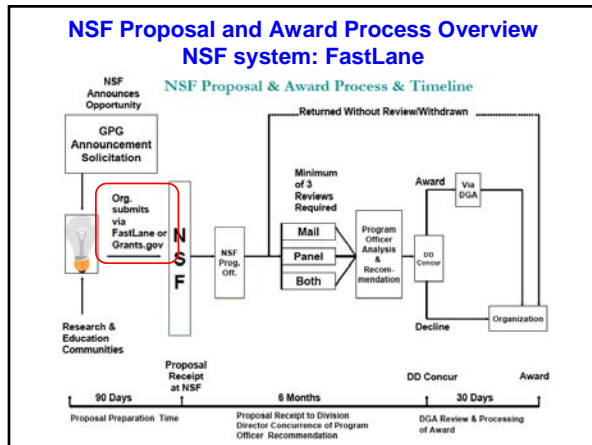
## Division of Molecular and Cellular Biosciences (MCB)

**Biomolecular Dynamics, Structure, and Function**  
 Structure and dynamics of biomolecules  
 Biomolecular interactions and mechanisms  
 Energy transduction: photosynthesis and biological electron transfer

**Cellular processes**  
 Membrane organization and function  
 Organelle biogenesis, maintenance, and trafficking  
 Cytoskeletal dynamics, cell division and motility

**Genetic Mechanisms**  
 Gene expression and epigenetics  
 Chromosome dynamics, DNA replication, repair, recombination and inheritance  
 Evolution of genes and genomes

**Networks and Regulation**  
 Signaling and metabolic networks  
 The minimal cell, synthetic biology and the origins of life  
 Environmental interactions and microbial communities



## Sections of the Proposal

Cover Sheet  
 Project Summary  
 Table of Contents  
 Project Description  
 Biographical Sketch(es):  
 Brief CV, Publications (list up to 10)  
 Synergistic Activities (list up to 5)  
 Collaborators  
 Graduate Advisors and Postdoctoral Sponsors

Budget  
 Postdoctoral mentoring plan  
 Institutional plan for ethical training  
 Data management plan

## Project Description (15 pages)

Results from Prior NSF Support  
 Intellectual Merit  
 Goal and Objectives  
 Justification  
 Background  
 Preliminary Studies  
 Proposed Work  
 Timeline  
 Broader Impacts  
 References Cited (not counted in the 15 pages)

## What is included in "Intellectual Merit"

- Objectives for the period of the proposed work and expected significance
- Relation of the proposed project to
  - the longer-term goals of your research program
  - the present state of knowledge in the field
  - ongoing work in your lab under other support
  - work in progress elsewhere
- Outline the general plan of work
- Clear description of experimental methods and procedures

### Reviewers' Criteria for Intellectual Merit

- How important is the proposed activity to its own field or across different fields?
- How well qualified is the proposer to conduct the project?
- To what extent does the proposed activity suggest and explore creative, original, or potentially transformative concepts?
- How well conceived and organized is the proposed activity?
- Is there sufficient access to resources?

### What are "Broader Impacts"?

- 1. Integrate research and education**  
Students as participants in research; recruitment/training of K-12 teachers; student participation at meetings
- 2. Broaden the participation of underrepresented groups**  
Establish collaborations; include students from underrepresented groups in research/teaching, make presentations at institutions
- 3. Enhance the infrastructure**  
Collaborations between disciplines and institutions, shared research and education infrastructure
- 4. Results disseminated broadly**  
Science exhibits, presentations to the broader community, databases/digital libraries, multi- and interdisciplinary conferences
- 5. Benefits to society at large**  
Link discovery and societal benefit, interpret research results in formats understandable for non-scientists

### Resources for Broader Impacts

1. Social Epistemology Vol 23 (3 & 4) 2009.
2. Nature "Science for the masses" 465:416. 2010
3. NSF "Investing in America's Future" FY 2006-2011

### Reviewers' Criteria for Broader Impacts

- How the project will **integrate research and education** by advancing discovery and understanding while at the same time promoting teaching, training, and learning
- Ways in which the proposed activity will **broaden the participation** of underrepresented groups
- How the project will **enhance the infrastructure** for research and/or education
- How the results of the project will be **disseminated broadly** to enhance scientific and technological understanding
- Potential **benefits to society** at large of the proposed activity
- **Mentoring activities provided to postdoctoral researchers** supported on the project described in a one-page supplementary document.

### Data Management Plan

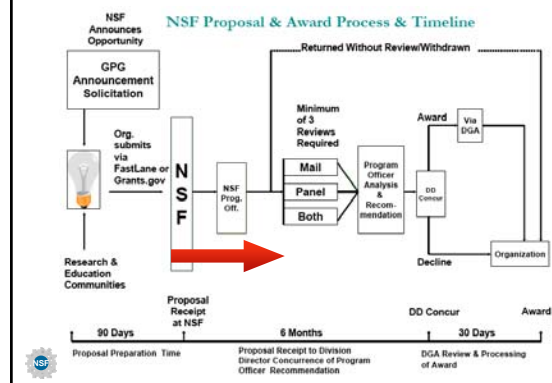
The data management plan is expected to describe "the data that will be authored as well as how the data will be managed and made accessible throughout its lifetime."

Such a plan should cover:

- the types of data to be authored
- the standards that would be applied for format, metadata content, etc.
- provisions for archiving and preservation
- access policies and provisions
- plans for eventual transition or termination of the data collection in the long-term future

See NSF website or Google "Data management plan examples"  
Talk to your institutional sponsored programs office

### The Review and Award Process



## What Makes a Proposal Competitive?

1. Project is likely of **high impact**
2. Contains **new and original ideas**
3. A **critical approach** is taken to interpreting the data
4. Project is based on a **sound scientific rationale**
5. Project plan is **logical, succinct and focused** and is described in sufficient detail to allow evaluation
6. Proposer demonstrates a **knowledge of subject area** and published/relevant work
7. Proposer is **experienced** in essential methodology
8. Proposes a **realistic amount of work**



## Your review comes back



When a decision has been made (whether an award or a declination), you typically get an email informing you of the decision. Through FastLane you can get:

- a description of the context in which the proposal was reviewed
- a copy of panel summary
- copies of all reviews used in the decision



## Grant Proposal FAQs

**NSF Program Officers make recommendations to fund or decline a proposal, not the panel.**

Reviewers and review panels do not make funding decisions. NSF Program Officers use their comments to make their recommendations to award or decline a proposal.

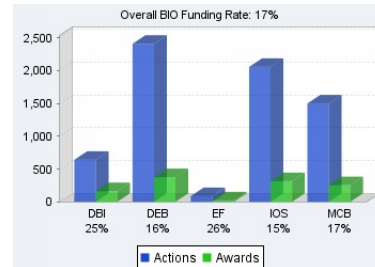
**Most proposals that are awarded do not receive all "Excellents."**

Most proposals that are awarded do not receive all "Excellents." Even if you get all "Excellents," you may not be funded.

**Principal Investigators submit on average about 2.1 proposals for every award they receive.**

Many Principal Investigators who receive awards also have been declined. NSF statistics show that, in 2006, 45% of new PIs received their first award on their first attempt.

## 2010 Funding rates



**Funding Rate** (success rate) is calculated by dividing the number of new awards made in a fiscal year by the number of new awards and declines made in that fiscal year.

## National Science Foundation Funding Opportunities



You are here

## Types of Proposal Submission

### Solicited vs. Unsolicited

Unsolicited proposals are associated with regular Divisions (MCB, DEB, etc.)

Solicited proposals have a published Program Solicitation (Program Announcement)

- Target dates (submission windows) are the norm
- Some specialized programs have no deadlines
- Letters of Intent required by some (preliminary proposals)

## Approximate Target Dates for Unsolicited Proposals

July 9 or 12, 2011

January 9 or 12,

2012

Environmental Biology (DEB)  
Integrative Organismal Systems (IOS)

September 6, 2011

May 21, 2012

January 28, 2013

Molecular and Cellular Biosciences (MCB)

only one proposal as PI or coPI per cycle

## Selected examples of early career opportunities

(check the deadlines!)

### Doctoral Dissertation Improvement Grants (DDIG)

After candidacy exam, 100-120 awards, up to \$15,000 for 24 months

### Postdoctoral Research Fellowships in Biology

In FY 2011, BIO programs were (1) Broadening Participation in Biology and (2) Intersections of Biology and Mathematical and Physical Sciences; address important scientific questions; graduate students apply; **The topics change each fiscal year!**

### Faculty Early Career Development Program (CAREER)

Integrate research and education; minimum of \$500,000 for 5 years

### Early-concept Grants for Exploratory Research (EAGER)

Supports exploratory work in its early stages on untested, but potentially transformative, research ideas or approaches ("high risk-high payoff"); must contact the NSF program officer(s)

### Research Initiation Grants to Broaden Participation in Biology (RIG BP)

Use innovative ways to attract and retain members of under-represented groups

### Ecology of Infectious Diseases (EID)

Joint NSF and NIH initiative; focus on the ecological dynamics, evolution, and transmission of pathogens (terrestrial, freshwater, or marine); diseases of humans, non-human animals, or plants