NIH vs. NSF: Primary Differences and Proposal Development Strategies

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Overview

- Compare NIH and NSF from a biomedical/bioengineering perspective
  - Agency mission and organization
  - Approach to biomedical/bioengineering research
  - Proposal development, submission, and review
- Provide NSF proposal development strategies
- Highlight differences in electronic proposal submission systems

A Historical Perspective

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Who Funds What?

NIH Mission:

Seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce illness and disability.

NSF Mission:

Promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense.

Where does bioengineering/biomedicine fit in these agencies?

How NIH Funds Biomedicine

Generally funds **health-related exploration and applications** of:

- Devices and instruments
  - Determining the effectiveness of an imaging instrument on brain tissue
- Computation
  - Using bioinformatics to map the genes of complex diseases (e.g., Alzheimer's)
- Trials on animals or human subjects
  - Targeted drug release
  - Instrument techniques
  - Psychological/neurological experiments

How NSF Funds Biomedicine

Funds research on the **basic science** of:

- Devices and instruments
  - Applying specific imaging theories/techniques to improve performance of MRIs
- Computation
  - Developing computational modeling to design better prosthetics
  - Developing algorithms for natural language processing
- Trials on animals or human subjects
  - Targeted drug release
  - Instrument techniques
  - Psychological/neurological research

In Other Words . . .

- NSF supports fundamental biomedical research that adds to a body of knowledge
- NIH supports the health-related exploration and application of fundamental biomedical research
- BOTH expect research that:
  - Is highly innovative, cutting-edge
  - Is potentially transformative
  - Contributes to the body of knowledge
  - Can “move the needle”

Comparing The Basics

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Organizational

NATIONAL INSTITUTES OF HEALTH

Comprises 27 separate Institutes/Centers

Each Institute/Center has its own research agenda, priorities, and budget

FY 2016 NIH budget: $31.3 billion

FY 2015 Proposal success rate: 19%

NATIONAL SCIENCE FOUNDATION

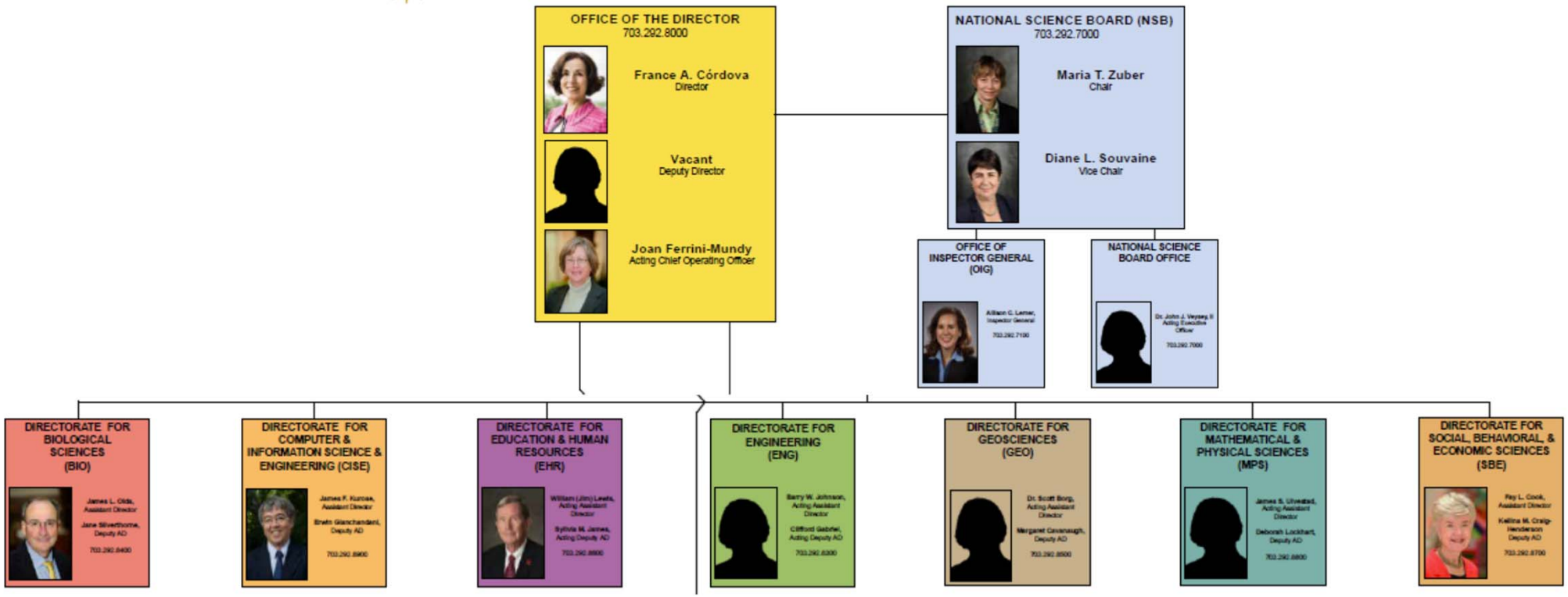
Comprises seven Directorates and about 30 disciplinary Divisions

Each Directorate has its own research agenda, priorities, and budget

FY 2016 NSF budget: $7.4 billion

FY 2015 Proposal success rate: 25%

NATIONAL SCIENCE FOUNDATION



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Program Mechanisms

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Parent Announcements (PAR)

Standard Research Grants: R01

Exploratory: R21

Small Grants: R03

Large Project/Centers: P01

Training Awards: K01

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Unsolicited Proposals

- Standard programs with submission windows

Solicited Proposals

- Specific programs with specific due dates

EAGER and RAPID

Early Faculty CAREER program

Proposal Review Process

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First-Level Review

- By a Scientific Review Group (SRG)

Second-Level Review

- By Institute/Center National Advisory Councils or Boards.

Proposals must be recommended for approval by **BOTH** the SRG and Advisory Council

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Program Officer identifies experts and forms a review panel

Review panel makes recommendations for funding

Program Officer makes final recommendation

Proposal Ratings/Scores

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Overall Impact Score: 1-9

- 1=exceptional; 9=poor

Considers the following and gives a separate score for each:

- Significance
- Investigator
- Innovation
- Approach
- Environment

Bottom-half of scored applications are not discussed

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Ranks proposals by these categories:

- Excellent (outstanding quality)
- Very Good (high quality)
- Good (quality, worthy of support)
- Fair (lacking in critical aspects)
- Poor (has serious deficiencies)

Merit Review Criteria for ALL proposals:

- Intellectual Merit
- Broader Impact

Proposal Development: Primary Differences

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Nomenclature

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Specific Aims

Research Strategy

Principal Investigator/Principal Director (PI/PD)

Co-Investigator

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Objectives

Project Description

Principal Investigator (PI)

Co-Principal Investigator (Co-PI)

NSF doesn't like to see NIH nomenclature in proposals!

Requests for Proposals

NATIONAL INSTITUTES OF HEALTH

Clearly provides deadlines and other critical information

Content requirements for Research Strategy is usually clear and specific

Easy to read

NATIONAL SCIENCE FOUNDATION

Clearly provides deadlines and other critical information

Content requirements for proposal narrative is often vague

Small font size makes it hard (and tiring) to read

Detailed RFPs usually provided for solicited proposals

Proposal Format

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Margins
- At least a half-inch on all sides
- No information in headers/footers, no page numbers

Minimum 11pt font
- Arial
- Helvetica
- Palatino Linotype
- Georgia

NATIONAL SCIENCE FOUNDATION

Margins
- One inch on all sides, page numbers

Minimum 10pt font
- Arial*
- Courier New
- Palatino Linotype

Minimum 11pt font
- Times New Roman
- Computer Modern

Line spacing
- No more than six lines per vertical inch*

Budgets

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Modular Budget
- For projects $250,000 or less in direct costs

Detailed Budget
- For projects $250,001 or more in direct costs

Budget limits usually EXCLUDE indirect costs (F&A) unless specified otherwise

No limit on the number of person months

Cost-sharing usually allowed

Salary cap: $185,100 per year

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Same budget format for all NSF programs unless specified otherwise

Budget limits usually include F&A costs

Allows Senior Personnel salary for up to two months (summer or academic)

Cost-sharing rarely allowed (program-specific)

No salary cap

Research Strategy vs. Project Descriptions

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Format

NIH RESEARCH STRATEGY

Page limits based on project type

- R03, R21 = 6 pages
- R01 = 12 pages

Organization/framework provided through required sections in narrative:

- Significance
- Investigator
- Innovation
- Approach
- Environment

NSF PROJECT NARRATIVE

Page limit is 15 pages for all program types unless otherwise specified

Organization/framework rarely provided; content requirements explained in RFP

Required sections in narrative:

- Intellectual Merit Statement
- Broader Impact of the Proposed Work
- Results of Prior NSF Support

Student Involvement

NIH RESEARCH STRATEGY

NIH does not expect discussion of student involvement in proposed project

NSF PROJECT NARRATIVE

NSF expects students underrepresented in STEM fields to be involved in project:

- African American
- Hispanic
- Native American
- Eskimo
- Pacific Islander
- Women

How will you do this?

Writing Strategies for NSF Proposals

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Write to Your Audience

- Review panel may or may not include M.D.s or others with a clinical background
  - Ask the program officer how the proposal will be reviewed (panel, ad hoc, or both)
  - NSF allows you to recommend reviewers for your proposal – take advantage of this!
- Focus on the basic science angle
  - Don't wander too far into the medical/clinical focus
- Think like an NSF reviewer
  - Review your narrative from that perspective
  - Do you understand the terminology?
  - How would you would rate your proposal?

Limit Medical/Clinical Jargon

INSTEAD OF THIS	USE THIS
Myocardial infarction	Heart attack
Cardiomyocytes	Heart muscle cells
Sequela	After effect; complication
Oxidative phosphorylation	(i.e., the metabolic pathway in which cells use enzymes to oxidize nutrients . . .)

Place the Research Problem in Context

- Introduce the current situation from a broad perspective
  - The use of stents in angioplasty has saved countless deaths from heart attacks, but many more lives could be saved with stents that deliver therapeutic doses of medicine directly into the artery.
- What is the problem?
  - Current stents are made from inflexible metal composites that prevent drugs from being released easily into the blood stream.
- Why is this a problem?
  - Previous works have shown that the metal composites react with various cardiac drugs and may release too much or too little of a drug into the bloodstream. This places patients at serious risk of overdose or underdose and thus at increased risk of death.
- What is your idea to address this problem? What do you propose to do?
  - This proposal explores the use of X metal, a new lightweight compound, for cardiac stents. X metal does not interfere with drug delivery, and shows great promise for long-term use in arteries. Thus, thousands of lives could be saved by the development of a new type of stent.

Refrain from Using NIH Format & Style

- NSF reviewers bristle at obvious NIH proposals
- Do not use the phrase “Specific Aims” anywhere – use “Objectives”
- Do not organize your Project Narrative with these headings:
  - Significance
  - Investigator
  - Innovation
  - Approach
  - Environment
- Arial 11pt font is not recommended – Times New Roman 11pt is best

Learn the NSF Merit Review Criteria

- Study good examples of Intellectual Merit and Broader Impact Statements
- Practice developing these statements
- Think of ways to engage with students underrepresented in STEM in your project
  - Don’t wait until you’re writing the application
  - Make connections now with UWM student groups, resources, partners
  - Make connections now with community partners, Milwaukee Public Schools district

Contact Proposal Development Services

- Help you understand NSF perspective
- Provide proposal templates for both NSF and NIH proposals
- Review drafts from an agency/reviewer perspective
- Format and edit drafts, help smooth out rough spots
- Help craft strong Intellectual Merit and Broader Impact statements
- Interpret reviewer comments

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Electronic Submission Systems

GRANTS.GOV VS. NSF FASTLANE

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Proposal Submission

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Proposals submitted via Grants.gov

- Adobe package (To be retired 12/31/2017)
  - PI downloads and completes package, forwards to OSP for submission
- Workspace (Required beginning 1/1/2018)
  - PI uploads individual documents and completes forms online for submission by OSP

NIH ASSIST: Required for multi-project proposals

- PI uploads individual documents and completes forms for submission by OSP

Administered via eRA Commons

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Proposals submitted via NSF FastLane

- Online portal
- PI uploads individual documents and completes forms online for submission by OSP

Administered via FastLane

Account Creation by OSP Pre-Award Staff

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https://public.era.nih.gov/commons

National Institutes of Health eRA Commons Registration Form

- If you have an existing Commons Account with another institution, OSP staff must affiliate that account with UWM
- After OSP staff create the account, you will be mailed a temporary password by eRA Commons
- You must complete the Personal Profile Information in Commons; employment information is required

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https://www.fastlane.nsf.gov

National Science Foundation FastLane Registration Form

- If you have an existing FastLane account with another institution, you must update your PI Information to UWM
  - NSF Organization ID: **0038968000**
- OSP staff will assign a temporary password. At first login you will change your password
- You must update your PI Information in FastLane

Proposal Preparation

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Sample SF424 forms are available on the OSP website for completing the Grants.gov package:

http://uwm.edu/officeofresearch/forms-and-downloads/

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Institutional and PI information are automatically completed once a new proposal is created in FastLane

Thanks

QUESTIONS?

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