

# NSF Funding: How to...

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# What is NSF?

- The National Science Foundation
  - Funds research and education in most fields of science and engineering
  - \$9.49B in FY2009 (\$3B from ARRA)
  - Funded roughly 14,641 out of 45,228 proposals reviewed in FY2009 (32%)
  - <http://www.nsf.gov>
    - Everything goes through Fastlane



# How is NSF organized?

- Several different **directorates** cover different disciplines
  - e.g., Directorate for Computer & Information Science & Engineering (CISE)
- Within directorates, there are **divisions**
  - e.g., Division of Computing and Communication Foundations (CCF) within CISE
- Each division is further subdivided into different areas with **program directors**

# NSF Directorates

- BIO: Biological Sciences
- GEO: Geosciences
- CISE: Computer and Information Science & Engineering
- MPS: Mathematical & Physical Sciences
- EHR: Education & Human Resources
- SBE: Social, Behavioral, & Economic Sciences
- ENG: Engineering

# Some suggestions

- Get to know *your* program director
  - Contact him/her via email, phone, and **in person** if possible—i.e., wander the halls of NSF
- Volunteer to be on a review panel
  - Get first-hand experience of the review process to see/understand what reviewers look for
  - See examples of ‘good’ vs. ‘not-so-good’ proposals

# The Proposal

- Identify a funding opportunity
  - Look through the NSF website
  - Directorate/division in your area typically has regular, annual funding opportunities
  - Recent/new opportunities often announced by the Office of Sponsored Research (OSR) at your school/department
- Besides the CAREER award, most proposals are collaborations
  - Assemble a good team that you feel comfortable working with

# Before you write...

- Develop a clear vision of what you want to propose
- Do some preliminary work that demonstrates the feasibility of your ideas
- Read through the Grant Proposal Guide and the funding announcement
  - May have specific requirements
- Get hold of and read *funded* proposals, preferably in your area



# What goes into a NSF proposal?

- Project Summary (1 page)
- Project Description (15 pages)
  - Plan out how many pages you will dedicate to each of the required pieces
- Budget, budget justification
- Bio sketch and other miscellaneous documents

# Project Summary

- 1-page summary that is public
- Should (must?) include:
  - Intellectual merit
  - Broader impacts

# Project Description (1)

- 15 pages is not a lot of space
  - Must adhere to rules for font size, line spacing, margins, etc.
- Provide clear and concise explanation of what you propose to do
  - Intellectual merit: What new contributions you would be making to the field
  - Broader impacts: How your contributions will affect both your immediate area and the general public

# Project Description (2)

- Background/motivation section often useful to
  - Set the context of your work and the current state of the art
  - Reiterate key research challenges
  - Provide some preliminary results to demonstrate that you can do the work
- Description of proposed work
  - Remember the adage: *A picture is worth a thousand words...* pretty pictures are worth even more!
  - Emphasize important concepts and research components using bulleted lists

# Project Description (3)

- Research plan and milestones
  - Reviewers like to see what you plan to do and when
  - Use graphical illustrations such as timelines to show major components of work and dependencies

# Project Description (4)

- Outreach (educational and under-represented minorities)
  - Proposals often get dinged for having a weak educational component (especially CAREER proposals)
  - Should not be boiler plate fluff, but have a concrete plan in place
  - Talk to your colleagues about what is available at your institution
    - e.g., SEAS has an office dedicated to outreach

# Project Description (5)

- Prior NSF funding
  - Keep this concise
  - Intention is to show that you have a good track record of delivering on your promises

# Other stuff

- Get an early start on the easy, misc documents
- Work with your finance rep to get the budget in place early
  - It doesn't have to be perfect since you will most likely get less than what you ask for
  - You can anticipate and factor in the reduction, but don't over do it
- Know your OSR deadline!



# Example: RoboBees

- NSF Expeditions in Computing
- \$10M over 5 years
- Proposed to built 'body', 'brain', and 'colony' with collaboration and integration across many disciplines
- Showed Rob Wood's flapping wing robot can take off
- 12-person team all in the Boston area (except for 1)
- Exciting education plan in collaboration with Museum of Science Boston



# Closing Thoughts

- NSF is a great source of funding for scientific and engineering research
  - Relatively low oversight and reporting
  - You can take your research into different directions if needed (within reason) as long as you generate good/interesting results
- Rejection is common (usually ~25% funding rate)
  - Read the comments/feedback and see how to improve the proposal, but remember reviewers are different each time
  - Try try again