

How to Become a Successful NSF Principal Investigator?

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- Any opinions, findings, and conclusions or recommendations expressed in these slides are those of the presenter and do not necessarily reflect the views of the National Science Foundation.
- Although the presenter used to work at NSF, he does not currently have any affiliation with NSF, and does not claim to represent NSF in any way.
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- How to become part of the NSF "system" and community?
- How best to interact with your NSF program director(s)?
- How to frame your research ideas into a winning NSF proposal?
- Understanding the NSF review and decision process
- How best to get feedback when your NSF proposal is declined?

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

- Division Director (DD)
- Program Director (PD)
- Peer Researchers

Program Directors make the funding recommendations (i.e., decisions)

Funding decisions are informed by peer reviews (panels or ad-hoc)



- Director
- Assistant Director (AD)



- Identify the program(s) that best align with your interests/expertise
- Identify the researchers who make up the program's community
- Identify recently funded proposals
- Volunteer to serve as a reviewer/panelist
- Get to know the program director



- "Core" Programs
 - Regular submission windows once or twice each year, sometimes open (no deadlines)
- Solicitations and Initiatives
 - One time opportunity with special emphasis, new emerging areas,...
- RAPID and EAGER
 - Rapid response data collection or experimentation that is time sensitive
 - Early, exploratory research —
 - Talk to program director first
- How best to learn about the details of these funding opportunities?
 - NSF web-site each program/solicitation/initiative has a page
 - https://www.nsf.gov/awardsearch/
 - NSF strategic vision https://www.nsf.gov/news/special_reports/big_ideas/





- Why is it important to interact with your PD?
 - Get valuable feedback e.g., feedback on 1-page project summary
 - Influence program's agenda
 - Increase your chances of getting funding
- How best to interact with your PD?
 - E-mail to introduce yourself and volunteer for review panel
 - Phone call OK, but only if scheduled via e-mail
 - Face-to-face visit at NSF not all PDs like this; some disallow it
 - Face-to-face meeting at conference, other networking event, review panel
- When you meet
 - Be prepared to listen (you don't learn by talking)
 - Be prepared with questions see next slide

PDs strive to maintain a vibrant research community... and they are nice people ③

...



- Start by setting the stage: give a 5-minute (max) elevator pitch
- Does my research objective fit well with your program?
- If not, could you point me to another program that fits better?
- How is the review process organized? (panel, ad-hoc, ...)
- Which communities are involved in the program? (submitting/reviewing)
- Can you help me understand/interpret the reviews on my declined proposal?
- Do you have any additional feedback that was not captured in the reviews?
- What is the typical award size? Are there (implicit) constraints on the budget?

Some PDs may offer constructive feedback that helps you improve your proposal ideas. Others don't... "It is not my job to write your proposal."



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Problem Solving ↔ Research





For a winning NSF proposal, you should make the new knowledge the primary focus





More actionable

More specific



Research Goal:

Direction of research you aim to pursue Advance knowledge of subject X

Research Objective:

Specific outcome you plan to achieve Test hypothesis H

Research Plan: Sequence of actions you will take Perform experiment E to collect data D





Typically, research objectives fit one of the following templates:

- The research objective of this proposal is to test hypothesis H.
- The research objective of this proposal is to measure parameter P with accuracy A.
- The research objective of this proposal is to prove conjecture C.
- The research objective of this proposal is to apply method M from field Q to solve problem X in field R.





- Results in new knowledge
 - Be clear, explicit and up-front about what the new knowledge will be
 - Suggestion: first sentence of summary = "The research objective of this proposal is..."
- Ideally: Novel, innovative, transformative with broad impact
- A proposal is a plan for what you will do provide sufficient detail
- The "project summary" (i.e., abstract) is crucial
- Convince the reviewers you are qualified and will deliver
 - Good literature review
 - Some initial results
- Keep your audience in mind the review panel





- Familiarize yourself with the GPG (Grant Proposal Guide) and stick to the rules
- Do preliminary research
- Write a proposal summary and use it to get feedback from colleagues and NSF PD
- Make sure to address both Intellectual Merit and Broader Impacts
- Write the full proposal and get feedback from colleagues
- Work with support staff to develop budget, submit everything to Fastlane, and officially submit <u>before the deadline</u>





Deadline or Target date for submission window Compliance check and assignment to program Program-to-program trades Set up panels or send out for ad hoc review Conduct panels Review panel results/ make recommendation decisions Document recommendations DD concur Award made 2 3 0 1 4 5 6 7 Time, months





Intellectual Merit

- New Knowledge? What is the potential for the proposed activity to advancing knowledge and understanding within its own field or across fields?
- Transformative? To what extent does the proposal suggest and explore creative, original, or potentially transformative concepts? How likely is it to revolutionize entire disciplines, create entirely new fields, or disrupt accepted theories and perspectives?
- Broader Impacts
 - Benefit to Society? What is the potential for the proposed activity to benefit society or advance desired societal outcomes?
 - Education? How well does the activity promote teaching and learning?
 - Broad Participation? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)?





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- Read the reviews
- Try to read in between the lines reflect on what the reviewers are trying to communicate?
- Two weeks later, read the reviews again reflect again
- Two weeks later, set up a phone call with the PD to get feedback and help you interpret

Wrong Interpretation:

"As long as fix the problems pointed out by the reviewers, my resubmission will get funded"





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Questions?