Tips on Writing NSF Proposals

Jan Cuny, CISE Program Officer
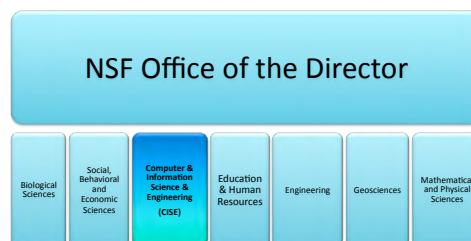

This talk is about NSF. All agencies are different.
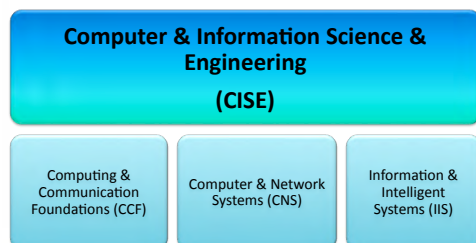

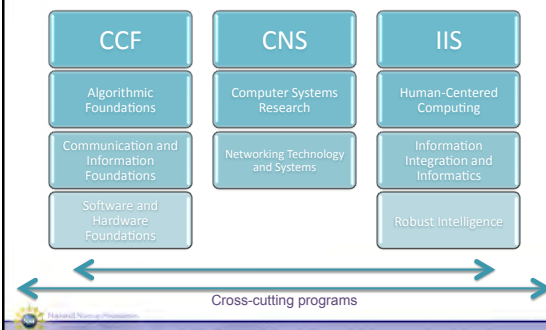There is no substitute for great ideas and strong research.

NSF is divided into disciplinary Directorates.

NSF Office of the Director

Biological Sciences | Social, Behavioral and Economic Sciences | Computer & Information Science & Engineering (CISE) | Education & Human Resources | Engineering | Geosciences | Mathematical and Physical Sciences

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The CISE Directorate will probably be your main point of contact.

Computer & Information Science & Engineering (CISE)

- Computing & Communication Foundations (CCF)
- Computer & Network Systems (CNS)
- Information & Intelligent Systems (IIS)

CISE has core programs in each division as well as cross-cutting programs across divisions and CISE participates in foundation wide programs.

| CCF	CNS	IIS
Algorithmic Foundations	Computer Systems Research	Human-Centered Computing
Communication and Information Foundations	Networking Technology and Systems	Information Integration and Informatics
Software and Hardware Foundations		Robust Intelligence

Cross-cutting programs

Slide 1:

There are many CISE Cross-Cutting Programs:
www.nsf.gov/funding/pgm_list.jsp?org=CISE

- Cross-Division Example
  - *Computing Research Infrastructure (CRI)*
    Creation, enhancement and operation of world-class computing research infrastructure.
- Cross-Directorate Example
  - *Cyber-Physical Systems (CPS)*
    Integration of computation, communication, and control into physical systems.
- Cross-Agency Example
  - *National Robotics Initiative (NRI)*
    Development and use of robots that work beside, or cooperatively with, people.

Slide 2:

Your first task is to find the right program for your project.

Slide 3:

Read Dear Colleague Letters and FAQs.

Slide 4:
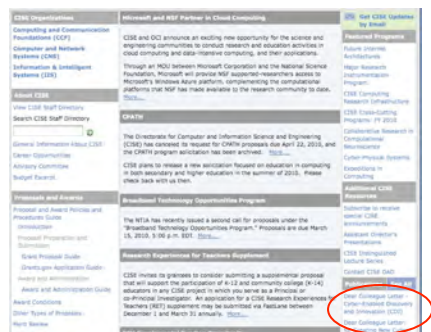
Beware of stale copies!

Slide 5:

Talk to your program officer (make an appointment, ask for advice, be prepared, don't call when you're upset).

Note: Funding decisions *are not* based on a personal relationship with your program officer.

Slide 6:

Understanding the review process can help.

12-20 panelists

25-30 proposals

A panelist reviews 10-15 proposals

Reviews are written before the panel

Additional panelists may read highly ranked or controversial proposals

Ad hoc or mail reviews may be used as well

Reviews are input to the Program Officer in making the funding recommendations.

Reviews are wrt solicitation

Proposals are ranked
- High Competitive
- Competitive
- Low Competitive
- Non Competitive

PIs get individual reviews, panel summary and perhaps PO comments

POs get input from all panels and build a portfolio

Lots of good proposals are not funded

Lots happens in processing a set of proposals, and it generally takes 6 months (and it doesn't help to pester).

- Fastlane submissions
- Compliance checks
- Paneling
- Panel meeting
- Portfolio building
- Possible PI negotiations
- Review Analyses written
- Decisions concurred & announced

14

Overwhelmingly, NSF panelists do a great job and our programs are much more successful because of their contributions.

They are smart, knowledgeable, and diligent. They take their responsibility seriously.

15

The very worst outcome from everyone's point of view is a Return without Review. Thee are lots of potential pitfalls.

- Late
- Unresponsive to the solicitation
- Duplicate or resubmission w/o change
- Missing pieces to a collaborative
- Non Compliant
  - Violates GPG guidelines
  - Criteria I & II missing from the Program Summary
  - Post doc but no post doc plan
  - No Data Management Plan
  - No Reference, C&P, or Facilities, etc. section
- For CAREER: Co-PI listed, Not submitted to the current CAREER solicitation, Department Letter missing

16

The PAPPG is your friend. It covers everything.

PROPOSAL AND AWARD
POLICIES
AND
PROCEDURES GUIDE

There implications of the review process.

- Make it accessible to your audience (Note there are different audiences.)
- Address *every* criteria in the solicitation (Watch for the word "must")
- Set the context (briefly)
- Make it easy to read (Correct spelling & grammar, Use reasonable font & white space, Avoid URLs)
- Organize it & include obvious section headers
- Write clearly and concisely

One way to distinguish your proposal is with the 5C's.

C LEAR

C ONCISE

C ORRECT

C OMPELLNG

C OMPLETE

Adapted from *NSF CAREER Proposal Writing Tips*, edited by ZJ Pei

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Make sure that your proposal answers all the right questions.

- What is the problem being addressed? What is the goal of the research? What hypothesis is being tested?)

- Why is this problem important and interesting? What's the big picture?

- What will you do? What strategies will you use? How will they bring us closer to a solution in the larger context?

- Do you have the necessary resources?

- How will you demonstrate that you have been successful?

Set the context for your work.

"Past research has demonstrated that trichromatic color vision depends upon three unique cone photoreceptors in the retina, and specific retinal circuitry that allows for the comparison of population activity of the cone types (refs)."

Garth A. Fowler, PhD, ScienceCareers.org

Position your work. Highlight controversies or 'missing links' in the field, include key references to the questions or motivation at hand, and *lead your reader to the aim of your proposal*.

Many propose that most early mammals had only two cone types (refs), and through evolution higher-order primates developed a third cone type and the needed retinal circuitry to integrate it into the retina (refs). **It is not known, however, in what order the third cone and the needed retinal circuitry developed.** The retinal circuitry of the two cone species could have been well able to integrate a subsequently developed third cone; the cone type may have appeared first; the two could have developed simultaneously.

Our results will provide an answer to **whether existing retinal circuitry can integrate a third cone signal**.

Garth A. Fowler, PhD, ScienceCareers.org

Explain why your work is significant. Explain how the results will integrate into the existing field, *and* how they meet the goals of the program.

"Our experiments help promote the use of **transgenetic techniques with traditional neuroscience procedures**, an aim of the RFP.

The grant will meet the requirement of **training future visual scientists** since the experiments comprise the thesis of...."

Garth A. Fowler, PhD, ScienceCareers.org

What makes a proposal competitive?

- Original ideas
- Strong rationale or evidence of potential effectiveness, Basis in the literature
- Knowledge and experience in the discipline and methodology
- Proposed work distinguished from previous work
- Succinct, focused plan
- Realistic amount of work & budget

Adapted from Gisele-Muller-Parker, *How to get NSF funding: A view from the "Inside"*

Sample reasons for high ratings.

"This proposal suggests a clear, elegant, well-documented approach to a problem that has plagued this field for decades."

"This PI has a beautiful plan. Undergraduates or new graduate students can step right into this work, yet could solve a major problem and be publishable in a first rate journal."

"This is certainly adventurous, and I frankly would have doubted it could be done. Yet the PI has proven the method in preliminary work AND had it accepted by a peer-reviewed journal!"

Adapted from Gisele-Muller-Parker, *How to get NSF funding: A view from the "Inside"*

Sample reasons for low ratings.

"Why all the rambling, this seems like a fishing expedition. There's no hypothesis or focus."

"What does this component/co-PI have to do with the central focus of the proposal?"

"I really can't tell what is going to be done and how."

"I would probably not read a paper describing the results."

"The scope of the work is out of proportion to the budget and the amount of time proposed."

Adapted from Gisele-Muller-Parker, *How to get NSF funding: A view from the "Inside"*

And once you have it written, you still have to get it into FastLane. Use the Demo Site. Call the FastLane help desk.

FastLane

Form	Saved	Form	Saved
Cover Sheet	04/09/05	Project Summary	
Table of Contents	N/A	Project Description	
References Cited		Biographical Sketches	
Budgets (Including Justification)		Current and Pending Support	
Facilities, Equipment, and Other Resources		Supplementary Docs	

Single Copy Documents

Form		Form	
PI/Co-PI Information	N/A	Add/Delete Non Co-PI Senior Personnel	N/A
Deviation Authorization(if applicable)		Change PI	
List of Suggested Reviewers (optional)		Link Collaborative Proposals	
Additional Single Copy Documents			

Go Back

Project Summaries are just one page.

- Suitable for publication, Written in third person
- Not an abstract … a self-contained description of the activity
- Include objectives and methods to be employed
- MUST clearly address in separate statements:
  - Intellectual Merit
  - Broader Impacts

Criteria I is Intellectual Merit.

- Does it advance knowledge and understanding?
- How well qualified is the proposer?
- Does it suggest and explore creative and original concepts?
- Is it well-conceived and organized?
- Is there sufficient access to resources?

Criteria II is Broader Impacts.

- Does it advance discovery and understanding while promoting teaching, training, and learning?
- Does it broaden the participation of underrepresented groups?
- Does it enhance the infrastructure for research and education, such as ... partnerships?
- What are the benefits to society?

Project Descriptions are just 15 pages.

- Problem statement
- Significance
- Related work
- Feasibility
- Strategy for accomplishing project
- Assessment/Evaluation plan
- Future plans
- Qualifications of the PIs
- Prior results

Supplementary Docs may have specific requirements

- Data management Plan
- Post Doc Mentoring Plan
- Letters of Support (Beware)
- Should not be used to get around the 15 page limit on Project Descriptions

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Budgets should be reasonable/realistic.

- Provide complete justification for expenses.
- Remain within guidelines.

- Excessive budgets irritate reviewers
- Expect budget negotiations with NSF

Tips for successful proposal writing.

- Signup for NSF & CISE Updates
- Read current versions of the entire solicitation carefully
- Beware the word "must"
- Make your organization apparent
- Use plain, simple English
- Do not include extra stuff but use your 15 pages
- Be specific about what you're going to do
- Use tables, figures, and flow charts to save words
- Make it visually appealing

Additional tips for successful proposal writing.

- Don't cheat on the 15 page limit (e.g. tiny font size, small margins, URLs or extra supplementary docs)
- Before you submit, Print out the entire proposal from FastLane & check section lengths in the TOC
- Talk to your program officers early and often
- Participate on a panel
- Get copies of previous proposals from your colleagues

More additional tips for successful proposal writing.

- Ask for feedback from experienced researchers.
- Ask friends and mentors to read and edit your proposal.
- Do your own peer review.
- Take advantage of your institution's help.
- Don't wait til the last minute.
- Use all of your "building a research career" and "networking skills"

What should you do if you are declined?

- Read your reviews carefully and make appropriate changes.
- Talk to your program officer again.
- *EVERYBODY* has lots of NSF declines: Be persistent.
- Once you are funded, don't be a stranger.

CAREER awards build a foundation for a lifetime of integrated contributions to research and education.

- Supports your career as an academic: integrates research and education in the context of your institution
- Intended as a springboard, not an end in itself
  - What do you want to do as an academic over the next 5 years that will set you up for your career beyond that?
  - What are you passionate about?
- Make sure the research component is research
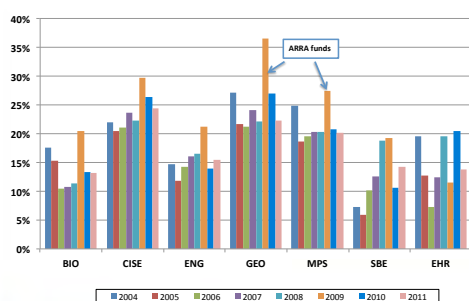- Make sure your educational plan is not an afterthought

CAREER Proposals are accepted across Directorates.
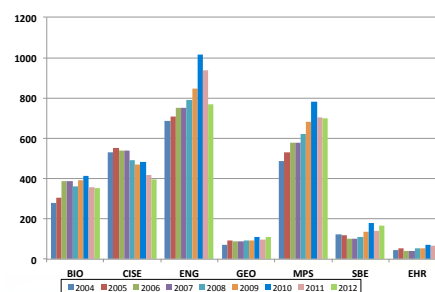
CAREER success rates vary across Directorates.

CAREER proposals must integrate education and research. There are lots of possible things to do.

- Involving others in your research using new tools, laboratory methods, field components, web outreach, cyber networks, etc...
- Partnering with other communities, especially those traditionally underrepresented
- Bringing the excitement of your research to education
- Developing new methods to disseminate your results beyond the immediate research community
- Engaging the broader community in your scientific pursuits ("citizen science")

CAREER proposals must include a well thought-out education plan.

- Activities should go beyond what is expected from any Assistant Professor in your field
- Workload should not be unreasonable
- Should be informed by what has been successful in the past - intellectual merit of the education component
- Should have a plan for assessing the success of the education program

CAREER proposals must include a departmental letter.

- Support for the proposed research and education activities
- Description of how the PIs career goals and responsibilities mesh with that of the organization and department
- Commitment to the professional development of the PI with mentoring and whatever else is needed to forward the PIs efforts to integrate research and education
- Verification that the PI is eligible for the CAREER program

Successful CAREER proposals have common traits.

- Match the expectations in the disciplinary programs in terms of research
- Go beyond the education box of regular research proposals in your field
- Written with peer reviewers in mind
- Have an appropriate scope of education and research activities (It's a 5-year plan, not life time plan.)
- Strike a balance between doable research activities and more risky pursuits

Tips for CAREER proposals.

- Have your budget come in $400-500K
- Talk to your program officer
- Read the solicitation really carefully, there are lots of special requirements
- Read the FAQs!
- Talk about your ideas with mentors and friends
- Read successful proposals in your area

BEST TIP EVER for CAREER proposals!

Attend one of the CAREER workshops

- Workshop 1: March 30, 2012 Drexel University
- Workshop 2: May 18, 2012 Arizona State University

See the CCC Blog:
http://www.cccblog.org/2012/02/18/nsfcise-holding-career-proposal-writing-workshops/#more-6543
or
http://www.nsf.gov/cise/workshops/career/

Link for CAREER information: www.nsf.gov/career

- Latest Program Solicitation - NSF 11-690
- Frequently Asked Questions - NSF 11-038
- CAREER Directorate/Division Contacts
- Link to recent awards
- Link to PECASE awards
- Next Deadline: July 23, 2012 - BIO, CISE, EHR, OCI

PECASE: Presidential Early-Career Awards for Science and Engineers (Dec. 2010)

Good luck with your proposals!

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