Research Development Quarterly Workshop Series

Spring 2014: NSF CAREER presentation and panel discussion

General Overview – 2:30 – 3:00 pm
Panel Discussion – 3:00 – 4:00 pm

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General Overview presented by: Marianne R. Smith, Ph.D.
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Overview of NSF

- The National Science Foundation (NSF) is an independent federal agency created by Congress in 1950, and with an annual budget of about $7.2 billion (FY 2014), funds approximately 24 percent of all federally supported basic research conducted by America's colleges and universities.

- NSF is the only federal agency whose mission includes support for all fields of fundamental science and engineering, except for medical sciences (but does fund faculty in Bio and Medicine).

- NSF has two review criteria: Intellectual Merit and Broader Impacts.
  - **Intellectual Merit**: The Intellectual Merit criterion encompasses the potential to advance knowledge
  - **Broader Impacts**: The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.
Goals of NSF CAREER Program

• Allow for the career development of outstanding new scientists
• Build a foundation for a lifetime of integrated contributions to research and education
• Provide incentives to Universities to value the integration of research and education
• Increase participation of those traditionally underrepresented in science and engineering
• Provide stable support for 5 years
Overview of NSF CAREER

• **5 years** of funding at minimum of $400K total ($500K for BIO and PLR)

• **Eligibility:**
  1) Assistant Prof. or equivalent,
  2) tenure track,
  3) untenured,
  4) Can only apply 3 times
  5) Propose to conduct research in an area that NSF funds

• **Integration of Research and Education -** All CAREER proposals must have an integrated research and education plan at their core.

• **Must include a Departmental Letter**

• **Include letter of collaboration (not endorsement), if applicable**

• **Have no co-PIs or senior personnel on cover page and budget**
Must apply to a particular program within a directorate:
- Biological Sciences (BIO)
- Computer and Information Science and Eng (CISE)
- Education and Human Resources (EHR)
- Engineering (ENG)
- Geosciences (GEO)
- Mathematical and Physical Sciences (MPS)
- Social, Behavioral and Economic Sciences (SBE)

Deadlines:
- July 21 (BIO, CISE, EHR)
- July 22 (ENG)
- July 23 (GEO, MPS, SBE)

Different NSF divisions and directorates use the CAREER program differently
- See [http://www.nsf.gov/staff/orglist.jsp](http://www.nsf.gov/staff/orglist.jsp) for description of programs
Proposal Elements

- **Title:** Must begin with “CAREER:”
- **Project Summary (1 page)**
  - Three sections: Overview, Intellectual Merit, and Broader Impacts
  - Plans for the integration of education and research activities included in all sections
- **Project Description (15 pages)**
- **References Cited**
  - Follow NSF guidelines
- **Supplementary Documents**
  - Chair Letter
  - Letter(s) of Collaboration (Do not include letters of endorsement or biosketches/C&P supports from collaborators)
- **Biographical Sketch (2 pages)**
  - Follow NSF guidelines
- **Current & Pending Support Form**
- **Budget** – talk to program officer about possible funding ranges
- **Budget Justification** (3 page limit)
- **Facilities and Equipment**
- **Data Management Plan** (2 page limit)
- **Postdoc Mentoring Plan** (if applicable-1 page limit)
• Font: 11pt (up to 12pt) - Times New Roman
• 1” Margins all around
• Page #s on center bottom
• Italicize key words within text for emphasis
• Grammar, spelling and punctuation correctness
• Effective use of graphics (referenced in text and captioned with figure/table numbers) and include some simple/non-complex graphics. If possible, not text wrapped
Project Summary (1 page)

• Three sections – **Overview, Intellectual Merit, and Broader Impacts** (typed directly into FASTLANE)

• **Overview**
  – State your goals/objectives/hypothesis
  – My long-term research goal is… In pursuit of this goal, the research objective of this CAREER proposal is… The research approach is…

• **Intellectual Merit:** Potential for your activities to advance knowledge. Include intellectual merit of both research activities and education plan.

• **Broader Impacts:** Potential of your activities to benefit society. Include broader impacts of both research activities and education plan.

• Written in 3rd person

• 4600 characters max
Directly answer their reviewer questions for both intellectual merit and broader impacts:

1. What is the potential for the proposed activity to: a. Advance knowledge and understanding within its own field or across different fields b. Benefit society or advance desired societal outcomes

2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?

3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?

4. How well qualified is the individual, team, or organization to conduct the proposed activities?

5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?
### Project Description

#### 1. Introduction or Project Overview
- 1.1. Background of the field and motivation for the project
- 1.2. Problem statement
- 1.3. Forecast intellectual merit and broader impact

#### 2. Preliminary Results
(This is not just a pie in the sky idea, but a sound foundation for future results.)
- 2.1. Past and current research in the field (the literature)
- 2.2. Past and current research by the PI

#### 3. Research Plan
(Intellectual merit is “shown” or proven throughout the document but emphasized in this section.)
- 3.1. Introduction
- 3.2. Goals (vision) and objectives (steps to attain goals)
- 3.3. Challenges/Limitations
- 3.4. Detailed plan (with detailed methods and procedures)
- 3.5. Timeline (year by year outline of activities)

#### 4. Broader Impacts and/or Education Integration
(As previously noted, these sections are often equated; however, as broader impacts may be generally outlined, educational activities are more explicitly outlined and tied into the research plan.)
- 4.1. Industry (impact on or collaboration with)
- 4.2. Academia and/or research field generally
- 4.3. Education
  - 4.3.1. Graduate, undergraduate, secondary
  - 4.3.2. Outreach
  - 4.3.3. Women/minorities/underrepresented groups
  - 4.3.4. Collaborations
  - 4.3.5. Interdisciplinarity
  - 4.3.6. Education assessment/evaluation plan
  - 4.3.7. Year by year outline of activities
  - 4.3.8. Dissemination (e.g., papers, conferences, websites)

#### 5. Results from Ongoing NSF Support (if applicable)

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**Structure Example**

- A description of the proposed research project, including **preliminary supporting** data where appropriate, specific objectives, methods and procedures to be used, and expected **significance** of the results
- A description of the proposed educational activities, including **plans to evaluate** their impact
- A description of how the **research and educational activities are integrated** with one another
- Results from prior NSF support, if applicable (must include a separate areas labeled “intellectual merit” and “broader impacts.”

Pgs 106-108. D. Christensen, 2011
Intellectual Merit

- Know the expectations of your scientific community
- Be sufficiently “risky” (transformative, high potential for payoff) or at least adequately creative
- Have outlined goals and objectives
- Have a problem statement in the Introduction
- Have sufficient detail and a work plan
- Show novelty and creativity
- Have preliminary data (less risky)
- Have a timeline
- Have evaluation or assessment of methods
- Give sufficient background of the field (don’t overly cite yourself)
1. Broader impacts to the scientific field and society as a whole:
   • How did/does your research advance the field?
   • How did/does your research impact society or industry?
   • How did/does your research promote international or interdisciplinary collaborations?
   • Will the results be disseminated broadly to enhance scientific and technological understanding?

2. Integration of Education and Research & Integration of Diversity (e.g. outreach, mentoring):
   • How well does the proposed outreach activity broaden the participation of underrepresented groups (e.g. ethnicity, gender, disability)?
   • How well does the activity advance discovery and understanding while promoting teaching, training and learning?
   • To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks and partnerships?

* Have multiple detailed integration strategies
Integration of Education and Research - Suggestions

- Participate in the recruitment, training, and/or professional development of K-12 science and math teachers.
- Develop research-based educational materials or contribute to databases useful in teaching (e.g., K-16 digital library).
- Establish research and education collaborations with students and/or faculty who are members of underrepresented groups. Include students from underrepresented groups as participants in the proposed research and education activities.
- Make campus visits and presentations at institutions that serve underrepresented groups.
- Stimulate and support the development and dissemination of next-generation instrumentation, multi-user facilities, and other shared research and education materials through the integration of open-source platforms and social media.
- Partner with nature centers, science centers, or after school programs.
- Involve the public or industry, where possible, in research and education activities (volunteer work, service learning, internships, citizen science).
- Give science and engineering presentations to the broader community (e.g., at museums and libraries, on radio shows, and in other such venues.).
- Participate in multi- and interdisciplinary conferences, workshops, and research activities.
- Analyze, interpret, and synthesize research and education results in formats understandable and useful for non-scientists.
- Provide information for policy formulation by Federal, State or local agencies.
- Increase science literacy for the general public through “awareness campaigns” that promote behavioral changes (i.e. recycling, water and energy conservation).
• Support the PIs 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
DO’s

• DO start early
• DO ask for help (have others read it!). Have a reader or mentor
• DO read the solicitation very carefully and follow directions
• DO represent the literature in the field and frame the project within the field
• DO propose novel work. Differentiate your work from that done by others
• DO have a clear plan with adequate details and stated objectives
• DO have a clear objective statement in the beginning (not buried in the text)
• DO include a clear management plan
• DO include an evaluation plan for the project
• DO match the budget with objectives
• DO have a five-year project scope
• DO show where the research might lead
• DO use graphical help to help the understanding of complex concepts
• DO describe applications that could result from the research
DON’Ts

• DON’T have too many directions, experiments, aims or methods. DO have a unifying theme
• DON’T have an unbalanced proposal and use excessive technical writing – Too much text devoted to complex details
• DON’T fail to establish significance or excitement about your work
• DON’T have misspellings and bad grammar
• DON’T be disorganized. DO have effective and consistent headings
• DON’T bury goals in the proposal
• DON’T be too ambitious for time/money
• DON’T propose tasks in which you have inadequate skills or credentials
• DON’T have collaboration letters written in the same wording
• DON’T forget to include minorities/underrepresented groups
Action Items for Proposal Preparation

  - Best to contact by email to set up a phone call
  - Ask the PO if your project fits within their program (and funding direction).
  - Discuss your readiness to submit
  - Find out if your review will be ad hoc or panel. A panel is likely to have non-experts in specific research areas.

- Volunteer to serve on an NSF review panel
- Review funded proposals
- Seek mentors on campus
- Talk to departmental administrators and the Sponsored Research Office
- Start a “Broader Impacts” Activity
Review Process Overview

Four possible layers of review

Two distinct audiences – technical and general

You

Program Director

Panel

Program Director

reviewer
reviewer
reviewer
reviewer
reviewer
reviewer
reviewer

$ or $
Who Gets Funded

Number of proposals

Typically funded
Almost Always funded
Almost Never funded

Outstanding
Excellent
Very Good
Good
Fair
Poor

“Gray” Zone
Important Resources

• Postdocs: Writing assistance at the UCI Graduate Resource Center - http://www.grad.uci.edu/services/grc/index.html
• Faculty: Research Development Professionals in your School http://www.research.uci.edu/research-development/contact-us/index.html
• Past awardees in your School or Department (searchable in NSF): http://www.nsf.gov/awardsearch/advancedSearch.jsp
  – Organization: university of california-irvine
  – Keyword: CAREER (search award title only)
  – Can search current and expired.