Developing an NSF CAREER Proposal

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March 15, 2013

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Outline

- Program orientation vs. research project
- Clear and cogent problem statement
- Prior work helps
- Be aware of the time schedule
- Talk to the program manager first
- Proposal structure and writing tips
- Finding help
- When are you ready to submit your proposal?

Program orientation

- Five-year program of research and education
- CAREER is an *integrated program of research and education*
- Different from the usual NSF solicitation
  - Not for a specific research project
- You will need to articulate a research and education agenda
  - Select an area of work in your field that needs work
  - Describe *several* interrelated research problems that need to be solved in the area
  - Describe some related education and training problems that need to be solved

Selecting a Research and Education Area

- Pick a compelling problem that has broad impacts and effects that are tangible
  - Integrated research AND EDUCATION program
  - Funds your activity in a research area, not to solve a specific research question as you did for your dissertation
  - Should build on your expertise and provide a research and education plan for the next five years.
- Think about developing a research agenda and program
  - More than a specific research problem

Education

- Integration of research and education is a critical aspect of the proposal
  - Plan your education component and how to integrate your research component with education
  - Integrate the results of your research into your courses
  - Research is not 100% of your job as a faculty member

- Think about what your job is as a faculty member
  - Discovery aspect which you are very familiar with from your dissertation
  - *Education aspect* should build on your education, AND bring in your discoveries from your research work

Education

- Think of education as another kind of discovery activity
  - Part of your job as a faculty member
  - Look at your education program as a deliberate discovery process
- Just as you pursue research, also pursue a coherent and cogent education program
  - How do your courses fit within the curriculum in your department?
  - Publish your education results in appropriate education venues such as ASEE
  - In your minibio explicitly list your research and education papers

Articulating the problem statement

- It is essential to express a *clear, cogent, and compelling* problem statement
- You should be able to describe the problem in one clear and compelling paragraph
  - Not easy to do well
  - Requires a lot of thinking about how to express your problem
  - Think of this as the 'elevator pitch' for your proposal
- *What is the problem, and why is it an important problem?*
- Ask colleagues with a CAREER award to review your program
- Develop a strategy on how to approach the writing
  - Robert Boice *Advice for New Faculty Members*
    - *"Write in Mindful Ways".* schedule time to write every day
- Develop your own "voice" within a clear structure and framework
- Use specific aims, objectives, and goals

Build on your foundation

- Build on your past experiences, skills, and strengths
- Education
- Work Experience

Prior Work

- Prior published work in the research area is helpful
- Journal articles are best
  - Refereed high impact conferences are also good
- Demonstrates to reviewers
  - Your work in the area is publication caliber
  - Demonstrated ability to conduct research in the area
- Leverage your established courses and labs
  - Demonstrates momentum in education and courses
  - Describe your lab facilities in proposal or as an supplemental document

Be aware of the time schedule

- Work backward from the RFP due date
  - Begin as soon as possible
  - Plan to submit *before* the due date
- You may need to stop and rethink your approach – don't be afraid to go back to the beginning and overhaul your framework if it doesn't seem to fit the CAREER program

- CAREER Proposal Development Schedule
  - Publish prior work
  - Develop research and education agenda
  - Talk to Dept. Head and colleagues
  - Pitch idea to NSF program manager
  - Develop budget
  - Write proposal
  - Submit proposal
- Quality work takes time
  - Don't waste one of your chances
    - ***Only submit your very best work***

Talk to the program manager early in the process

- Find the NSF directorate that is the closest match to your research area and interest
- You can visit in person, but phone call is OK
- Plan sufficient time to arrange schedules
  - Months not days

- Process
  - Email program manager to introduce yourself and request an appointment for a phone call or visit (at least 30 min) to discuss your CAREER proposal
  - Pitch your idea
  - **LISTEN** and take good notes

Finding a Mentor

- Experienced senior faculty who can give you feedback on the proposal
  - I had a member of my college who used to work as an NSF program manager
  - He is also a senior faculty member at Utah State with many years of experience running a research program
- Refine your "elevator pitch" and try it with your mentors and colleagues to polish it
  - You should be able to convey your idea in a couple of paragraphs

Proposal structure and writing tips

- Research and education agenda
    - A well-defined set of research and education problems you propose to address
    - Leads to a set of objectives
- Objectives
    - Numbered list of research and education activities
    - Each activity addresses problems posed in research and education agenda
- Specific Aims
    - Numbered list of specific aims <u>for each objective</u>
    - Provide very specific details on what you propose to do
    - If you have prior work in the specific aim (published or unpublished)
        - Describe your results and how you will apply and extend the work
- Expected outcomes for each specific aim
    - What will be the impact of the work for a specific aim on the problem?
- Timeline
    - Describe a timeline and milestone for each specific aim

Proposal structure and writing tips

- Budget
  - Be realistic
  - Minimum is $400K ($500K Bio)
- If you ask for $1M, be prepared for budget negotiation
  - Program Manager may ask what you can accomplish with < $1M
- If you budget for minimum + small delta
  - Less chance that you will need to reduce your budget

Proposal structure and writing tips

The first paragraph in your proposal is very important

- Captivate reviewers to read the rest of your proposal

– Reviewers read many proposals

- Make reading your proposal a valuable use of their time

- Helpful to learn about problem areas from reading proposals

Proposal structure and writing tips

- Summary page very important
  - Treat it as an executive summary
  - Describe the research problem, your objectives, and the expected outcomes of your proposed work

- Don't forget to leave room for intellectual merit and broader impacts
  - Mark them clearly in your project summary, e.g.:

  Intellectual Merit:

  Broader Impacts:

- Data management plan is required
  - E.g. Purdue PURR

- New NSF GPG requirements for Results from Prior Support
  - Jan 2013 – new GPG (GPG13001)
  - Address Intellectual Merit and Broader Impacts from prior support

Finding Help

- Google
  - "NSF CAREER" returns 9,230,000 results
- NSF CAREER Proposal Writing Tips
  - http://www.clarku.edu/offices/research/pdfs/NSFProposalWritingTips.pdf
- Ask a senior colleague to read your proposal and provide feedback
  - As them to read it as though they were a reviewer
  - Carefully address each comment

When are you ready to submit your proposal?

- Have you performed all of the steps?
  - Publish prior work
  - Develop research and education agenda
  - Talk to Dept. Head and colleagues
  - Develop budget
  - Pitch idea to NSF program manager
  - Write proposal
- Don't send in your proposal until you are 100% satisfied that it is your best effort
  - There is memory in review panels and reviewers
  - You will need to address comments from prior years' review
  - <u>Don't submit incomplete product</u>