Welcome to the ADVANCE Spring
Pre-Tenure Faculty Workshop

"NSF CAREER Grant Workshop"

April 25, 2012

NSF Career Grant Workshop
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General strategy:

- write a very good "standard grant" application
- supplement with a strong educational component

Integration: I did not really worry about it very much… which might be a bad example to follow.

Experience:

- prior standard grant applications (either successful or not)
- Have some educational/broad impact program going – will give your educational component an authentic feel

Specifics

- CAREER 5 years ➡ more "ambitious" than a standard grant application (usually 3 years, at least in Math)
- Get several **recent** samples: in your field but diverse subjects.
- Summary page and introductory/connecting paragraphs are important: the panel is not specific to your field
- Get several colleagues to read your application (they'll appreciate an advance notice and no overnight deadline☺)
- Consider hiring an editor
- Give yourself plenty of time!

Educational component: examples (just my own experience)

- Proposed to organize a [summer school](#) (had some documented experience organizing conferences)

- Proposed to significantly expand a math outreach program I was already running. The current Math Circle part of that was recently featured in the [A&S newsletter](#); the program involves grade school students, undergrads, and graduate students ("vertical integration"☺).

- Promised to keep being involved in other math outreach events around campus with a record of participation: Math Day, SIMUW (Summer Institute for Mathematics at the University of Washington), a summer residential camp for talented high school kids.

Intellectual merit

Of course, I cannot tell you how to do good research and how to write about it. So, just some obvious generalities:

- Be ambitious; set up long term career goals
- Have a proven track record
- Write coherently and convincingly
- Check for readability; appeal to a general audience

About Jim Pfaendtner

or... "why I love the NSF"

Career Trajectory:

PhD, Northwestern Univ. Chemical Engineering	2.5 year postdoc U of Utah / ETH Zurich Chemistry	Assistant Prof. UW Chemical Engineering
NSF IGERT trainee: 4 yrs	**NSF IRFP Postdoc award**	**1st grant: NSF BRIGE** **2nd grant: NSF CAREER**

Fun stuff along the way:

Year 1: initiate new collaboration with team from UMASS **NSF EAGER from CBET division**	Year 2: international workshop in area of expertise **NSF Pan American Advanced Studies Institute: PASI**

Year 3: start new collaboration with research group in Mainz, Germany
NSF Catalyzing New International Collaborations

NSF CAREER: Try 1

- First CAREER proposal was prepared at the end of my 1ˢᵗ year
- Finished it with about 7-10 days of lead time, enough time for feedback from a few people
  - Fatal mistake: Feedback was not great and I knew deep down there were flaws but I decided to submit anyway
  - If I had finished with a few more weeks lead time, I would have had the chance to fix it

Result: VG/G , VG/G , G
Placed in "recommend for funding" category

Feedback from program manager: 1) serve on a panel , 2) start doing some experiments because people in my field don't value work that is only simulations

NSF CAREER: Try 2

- Complete re-write of the proposal
  - The work had the same methods but different model systems
- I finished the proposal around 5 weeks ahead of time
  - I performed 3 rounds of reviews:
    - Sent to other early career folks, close friends, people outside of my field [~8 people]
    - Sent to some people a bit further along in their career then me after revising from round 1 [~5 people]
    - Sent to departmental mentor, PhD advisor, someone in my field [~3 people]
  - Some people thought this was overkill, but I learned a ton and people were happy to help. There were very few redundant comments and each person helped make my proposal better.
- All aspects of proposal were significantly stronger
  - I actually felt like this was the best proposal I had written
- Participated in a panel for my program
- I discussed Summary statement w/PM on the phone

Result: E , E/V , E/V , E/V , V   *[joint panel between CBET and CHEM]*
Placed in "highly recommend for funding" category

Suggestions and tips

Item	Importance
Carefully read the NSF CAREER solicitation and understand the difference between CAREER and other types of grants	Critical
Read as much material as you can that other people have written about preparing CAREER grants	High
Establish a meaningful plan to integrate research and education and provide at least one novel thing	Medium/High (depends totally on PM)
Finish your proposal with enough time to solicit multiple rounds of revisions from friends/colleagues (use different people each round) [*Remember: the reviewers for your panel will be outside your area*]	Critical
Establish your plan to become a leader in field X. Show that you are doing something new and exciting different from your PhD and postdoc work [*Don't overdo it here – will be partially obvious from your text and CV*]	High
If you don't get it the 1st or 2nd try make sure you understand why by talking to your PM	Critical
Understand the type of work that is funded by your program, the subject of recent CAREER grants funded, and the profiles of CAREER winners from the last 5 years (they may be your panelists)	Critical

Perspectives from an NSF review panelist

Mark Oskin
Dept. of Computer Science and Engineering
University of Washington

How proposals get reviewed (all proposals, not just CAREER)

- A panel is about 10-12 people, and they consider roughly 30-35 proposals.

  - Each panelist reviews ~ 10 proposals

- Panelists are a diverse group.

  - Panelists get to suggest what they want to review from title and PI only

  - If your proposal has 4 reviews, you can count on half of them coming from people who are not experts in the sub-area of your field.... so:

    - Don't use jargon without defining it, better yet, don't use it, or do so sparingly

    - Don't assume your reviewer has read a citation

      - If it's an important concept defined in a citation, define it in your proposal.

      - Proposals are explicitly reviewed *as if* the panelists have not read the citations and your existing work.

    - People in your area enjoy the technical meat.

    - People outside your area don't understand it but are sold on the vision.

...continued

- The "joke" is that traditionally a panelist reads their proposals before the meeting on the train ride down from Boston to DC.

  - But this really isn't a joke: your proposal is going to be read at a rate of about 2 mins/page *or less* (potentially as fast as 30 seconds a page for an "on the spot" read).

  - So make your proposal easy to read

    - Use proper spelling and grammar

      - Hire an editor if this is difficult for you. Don't be ashamed about it. The chair of our department hires editors all the time before submitting papers to a top conference!

    - Use formatting to your advantage

      - Call out key concepts

      - Make your proposal *skimmable* with good headings

      - Think a little about what happens if someone skips a paragraph or a page or two... can they jump back in and follow along?

How you are judged

- In practice, proposals are judged on the following criteria (*this is an ordered list*)
  - Vision and potential for transformative impact
    - is the problem important to solve
    - is it a new idea
    - ... but curb your enthusiasm. Don't breath your own tailpipe and over sell
  - Technical meat -- will it work?
  - Broader impact -- is it not just boilerplate? Do you really care?
  - Technical approach -- is it a viable methodology
  - ...and if these things fall outside the scope of the norm, they are grounds for grumbling or rejection
    - inappropriate budget
    - numerous spelling and grammatical mistakes
    - are all the necessary I's dotted and T's crossed according to the GPG

Some tips for success (all proposals, not just CAREER)

- NSF says they want to fund proposals that are "transformative".
  - *Rarely* can a reviewer really say "the work proposed by the PI would have a transformative effect on the field if it was successful"
    - Only about 2 of 30 proposals meet this bar.
    - So use this to your advantage. Propose something that actually *is* transformative.
- NSF says they want to fund high-risk / high-reward research
  - But panelists are conservative curmudgeons....
  - If you propose something high risk, be extra careful (see next point)
- Justify your ability to be successful with a little preliminary study
- Don't pay lip service, but actually care about outreach and broader impact

Special to CAREER

- There is an additional perhaps subtly (un)stated evaluation criteria for CAREER
  - "is this a CAREER size project?", which you can read as, if you are successful at this idea, will you get tenure. Is it that visionary and big?
  - This runs *directly counter* to the minuscule amount of funds you will get from the award.
  - Tough to balance too big vs. "CAREER size", good luck!
    - My advice: propose big vision, acknowledge this can only fund the start
- The educational component is taken *very seriously*. Do not ignore it. Embrace it and be passionate about it.
  - I've personally seen a proposal that everyone thought was excellent in every respect except the omission of an educational component be rejected.
  - I've also seen proposals with research ideas that everyone agreed weren't the best and most amazing / transformative / whatever, but had stellar educational sections be strongly recommended for funding.

Ratings and Rejection

- NSF now uses 4 ratings, this is what the panel is saying with them:
    - HC: the panel wants to tie NSF hands and say fund this work
    - C: the panel is saying fund these if there is money, but within C is a hidden grouping of High/Mid/Low. You won't know where you really ended up.
    - LC: The idea is possibly fundable but the proposal is too flawed to consider. Fix it and resubmit.
    - NC: Do not submit this idea again to NSF.
- For CAREER, the ratings are slightly inflated as a way to be encouraging to you.
- Also for CAREER, extra care is taken in the panel summaries to be helpful and provide positive sounding constructive advice.
- If you did not get funded the panel genuinely believes they have your best interests at heart. The advice they put in the summary is not flippant!
    - ...but there is little to no history in the process and a fair degree of randomness. You could follow all their advice for improvement and get a worse score next time! (been there, we all have!)

Advice on Writing Grant Proposals

Mark Oskin

Understand the time constraints of the reviewer.   Traditionally, prior to all electronic reviewing, proposals were read "on the plane/train ride to D.C.". A panelist (reviewer) will receive about ten proposals to review, which means your proposal is going to receive about thirty minutes of this persons time. The reviewer will not be able to read everything in detail, and thus will skim portions of the proposal. You should take this into account when you write it, and so the better structured you can make the document, the more easily the reviewers can skip over components they are already familiar with. Clear labeling of sections, even paragraphs is helpful so that the reviewers can zero in on things they do not currently know about, or are otherwise dubious of. This goes for all aspects of the proposal, including introducing your new idea and reviewing related work. The easier you can make it to skip sections the better.

Proof-read the proposal carefully.   About a third of proposals are so poorly written that the spelling and grammatical errors make it clear the PI does not care about the grant. At the very least, ensure your first sentence isn't a garbled mess; I can't tell you how many proposals contain run on and have otherwise bizarre grammatical errors in the very first sentence.

Don't be repetitive.   There is no need to fill the entire 15 pages with 9 point font. If you don't have anything to say, don't waste the reviewers time by repeating yourself. Nothing annoys a reviewer more than reading the same bland content three or four times in a proposal.

Don't be vacuous.   Usually repetition and vacuousness go hand in hand. It seems that the strategy taken most often by proposals with no real ideas behind them is to continue repeating high-level and vacuous spin about how wonderful the idea is. The reviewers are not going to buy this, so you better have some real content.

Curb your enthusiasm.   Not every idea is going to rescue the environment, bring world peace, and put a human on MARS. I know you may be infatuated by your idea, but the reviewer just isn't going to have the same gusto. Don't get too caught up in your own Quixote spin, it is just going to make the reviewers skeptical.

Cover a subject well.   Don't spend a paragraph on a subject and then say the remainder is beyond the scope of the proposal. Remember, the reviewers are skimming through your proposal, and this may be the paragraph they read closely. Too many "this is beyond the scope of this proposal", and you start to sound like you haven't thought this through. In

a similar vain, don't provide a very high level description of one subject, and then a very detailed description of a completely unrelated one. There should be some logical consistency to the depth of your presentation.

Know the expertise of your reviewers. You may have a keen idea to integrate some new theory developed in another discpline to solve something. Thats great, but, don't try and impress the reviewer by sticking strange equations in the middle of your project description. There will be two types of reviewers: First, those who don't really know, and more importantly care, what the equations are saying. They will just skip over them and read the text to see what you are trying to talk about. The second will be those who do know something about this other area, and they are going to make sure you don't make a typo in them. Eitherway, no one is going to be impressed that you can copy some equations and theoroms from elsewhere and retype them precisely. You are better off providing some high level insight to the average reviewer about this new theory than trying to explain it to them in depth (remember the reviewer is reading your proposal at faster than 2 minutes a page).

Know your related work. It is appropriate that your idea builds on prior work. The worst thing you can do is propose something that has been done before. Remember, you could be forgetting to understand and cite the work of one of the reviewers. At the very least, reviewers like to see that you have done your homework and know how your ideas fit into the larger context.

Don't forget the program you are apply for. It is not just about having an interesting idea. Sometimes a less developed idea but a more well rounded proposal is more easily justified as fundable.