# Writing Your First NSF-Style Proposal


Tessa Hill, UC Davis
tmhill@ucdavis.edu

Sarah Penniston-Dorland, U Maryland
sarahpd@umd.edu

## Outline of topics

- Your Program Officer
  - Introducing yourself
- Grant writing and strategic planning
- Elements of successful proposals
- Common pitfalls
- NSF proposal components
- The review process
- Strategies for proposal writing

## Your Program Officer…

1. Is a scholar in your field (usually) who knows what everybody is doing & is formative in directing the scholarship of your field
2. Coordinates & runs the review process
3. Executes or makes funding decisions, depending upon agency policies
4. Advocates for your field in competition with other research areas and budget priorities.
5. Continues to work with you throughout your grant and is interested in your success!

## Ask your Program Officer…

(After doing your homework)

1. Does your program fund this type of research?
2. What is the average program budget and success rate; how many proposals in a competition?
3. What is the typical size of a successful "new investigator" project in this program?
4. What is the review and decision-making process in this program?
5. Are there special programs for which I qualify and how can I be considered for them?
6. Are you aware of other agencies or organizations that fund this kind of project?

## Exercise: Short Professional Introductions

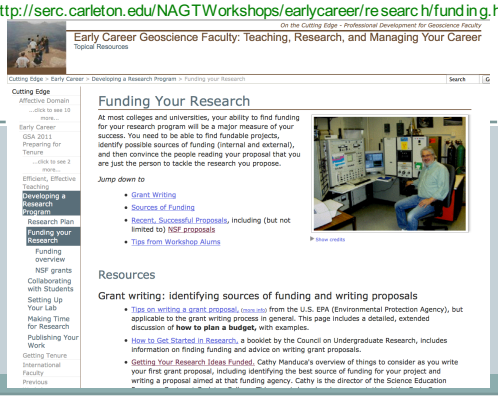
- Name
- Title
- Institution
- 1-2 sentences describing generally what you do.

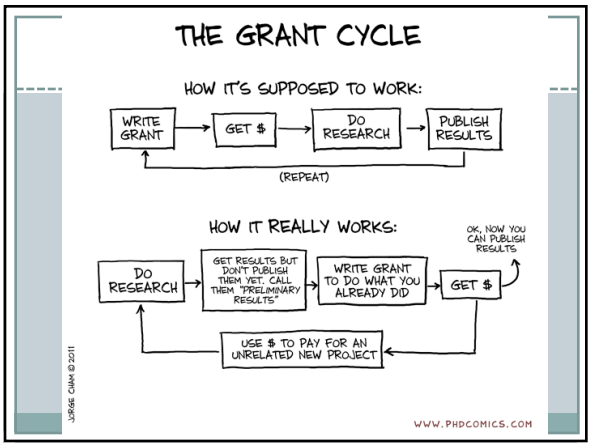
## Exercise: Longer Professional Introductions

- Name
- Title
- Institution
- Briefly describe a research project you are considering writing a proposal to fund

## A good source for information about Grant Writing:

http://serc.carleton.edu/NAGTWorkshops/earlycareer/research/funding.html




## Proposal strategic planning – Research significance

Pick a research topic you are considering writing a proposal to fund.

- Why is this topic important?
  - What is unique/transformative about the research?
  - What are the benefits of this research?
- How does this research fit with your overall career plan?

## Elements of Successful Proposals: Big Picture and Hypotheses

1. The relevance and importance of the proposed work should be clearly stated. Connect it to the 'big picture.'
2. Proposals should be **hypothesis or question driven**… objectives/hypotheses/questions appear on the first 1-2 pages
   - Hypotheses should relatable to big picture questions
   - Outline tests of hypotheses and expected outcomes
   - Outline possible alternatives

## Elements of Successful Proposals: Formatting and Writing Style

1. Use images – a picture is worth a thousand words.
2. Well organized, with underlining, **differences in type**, spacing, ***TITLES***, to call attention to main points and structure
3. Written in appropriate size font. Smaller is not better!
4. Use active writing style rather than passive. This is not a research paper.
5. Describe new and exciting aspects of proposed research. Do not cast it as an extension of previous research.

## Elements of Successful Proposals: Leave No Unanswered Questions!

1. Explain concepts clearly using concise language.
   - Don't use overly specialized terminology.
2. Provide preliminary data
   - Demonstrates ability to conduct proposed research
   - Makes expected outcomes clear
3. Demonstrate access to resources required for research
4. Address potential outcomes, possible pitfalls and alternative approaches
5. Demonstrate expertise
   - Use appropriate references (old and new)
   - Refer to your published work on similar topics
   - Consider potential reviewers when deciding upon references

## Components of an NSF proposal

- Intellectual Merit & Broader Impacts
  - *Intellectual Merit* should describe the potential of the proposed activity to advance knowledge.
  - *Broader Impacts* should describe the potential of the proposed activity to benefit society and contribute to the achievement of specific, desired societal outcomes.
- Project summary – 1 page
- Project description – 15 pages
- Biographical Sketch
- Data Management Plan
- Budget & Justification

## Broader Impacts

- ~1-2 pages of 15-page proposal
- Should be related to research
- Can include education of graduate students, incorporation of research materials into courses taught, development of new courses…
- ...but think creatively!
- Be prepared and specific – think through details, make contact with experts and document their involvement in the project
- Include an evaluation plan

## Data Management Plan

- Types of data
- Data storage and archiving
- Data availability and sharing
- IEDA (Interdisciplinary Earth Data Alliance) has a Data Management Plan Tool at iedadata.org

## The Review Process

- Who are/might be the reviewers?
  - You can suggest potential reviewers in your proposal.
- What are the review criteria?
- Become familiar with the review process
  - Offer to review grant proposals
  - Offer to serve on proposal review panel

## Complete your worksheet

- What resources do you need to be successful?
- What is the timeline for this research, from proposal writing to what you do if it is funded?

## Proposal-writing strategies

- Ask colleagues in the same field as you about expectations for proposals in your field
- Ask trusted colleagues to read through proposals
- Consider ideas on how you will deal with the revision (rejection) process

## Resubmissions

1. Specifically and directly addresses each review critique.
2. Substantially revise, rewrite, or remove sections that were critiqued in earlier reviews.
3. Update preliminary/pilot data and interpretations.
4. Incorporate new references that may have appeared since the previous submission (or were missed in the prior proposal).
5. Include a refined/revised list of potential reviewers based on reviews (some reading between the lines required).
6. Should appear noticeably stronger that the prior version.

## NSF proposals – Some Facts

- EOS article, 18 Dec 2012 (data are from Ocean Sciences Program, which is part of Geosciences Directorate)

  Junior investigators have just as good of a chance of getting funded as their senior colleagues

  For Broader Impacts, it is better to do one thing well than to propose a multi-faceted program for many different groups

  60-75% of proposals funded are first submissions (20-22% second submissions, 5-10% third submissions). Success rates of resubmissions were "generally close" to first submissions.

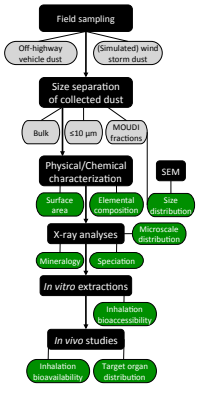
## Take advantage of special opportunities

- Packard Fellowship http://www.packard.org/what-we-fund/conservation-and-science/packard-fellowships-for-science-and-engineering/
- NSF CAREER/PECASE http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503214
- DOE Early Career Awards http://science.energy.gov/early-career/
- HHMI Professorships (for undergrad research) http://www.hhmi.org/programs/society-of-hhmi-professors
- Opportunities at your institution for early career faculty

## Get funding calls for proposals to come to you

- Your Sponsored Projects Office
  - Meet your SPO contact, make him/her familiar with your work
- Individual Agency email lists
  - E.g. NSF (http://nsf.gov/funding/)
- Community of Scholars – Pivot
  - http://pivot.cos.com (Free 30-day trial)
- Discipline-specific listservs
- Acknowledgements sections at conference presentations
- Meeting with your program officers

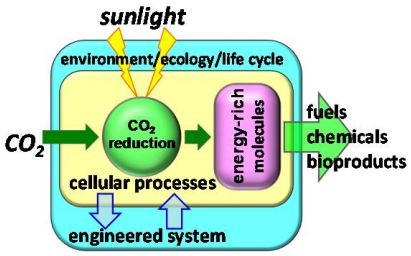
## Formatting Tip: The flowchart



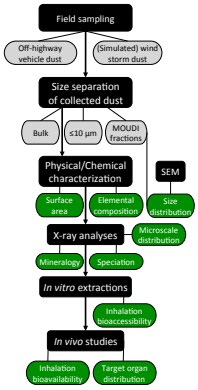
## Formatting Tip: The timeline

| Activity | Year 1 | | Year 2 | | Year 3 | |
|---|---|---|---|---|---|---|
| Field sampling of bulk, size-fractionated airborne dusts | | | | | | |
| Geochemical and physical characterization of collected dusts | | | | | | |
| Synchrotron X-ray analysis of bulk and size-fractionated dusts | | | | | | |
| *In vitro* PSF extraction experiments | | | | | | |
| *In vivo* short-term exposure inhalation experiments | | | | | | |
| *In vivo* long-term exposure inhalation experiments | | | | | | |
| Submission of characterization/synchrotron work for publication | | | | | | |
| Submission of *in vitro/in vivo* work for publication | | | | | | |

## Formatting Tip: The Conceptual Diagram



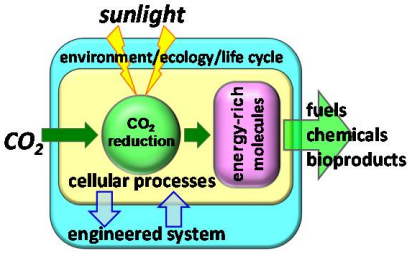

## Formatting Tip: The flowchart




## Formatting Tip: The timeline

| Activity | Year 1 | | Year 2 | | Year 3 | |
|---|---|---|---|---|---|---|
| Field sampling of bulk, size-fractionated airborne dusts | | | | | | |
| Geochemical and physical characterization of collected dusts | | | | | | |
| Synchrotron X-ray analysis of bulk and size-fractionated dusts | | | | | | |
| *In vitro* PSF extraction experiments | | | | | | |
| *In vivo* short-term exposure inhalation experiments | | | | | | |
| *In vivo* long-term exposure inhalation experiments | | | | | | |
| Submission of characterization/synchrotron work for publication | | | | | | |
| Submission of *in vitro/in vivo* work for publication | | | | | | |

## Formatting Tip: The Conceptual Diagram




## Common pitfalls

1. Too ambitious - for proposed budget, for personnel, for time
2. Results too specific and not generalizable
3. Importance of proposed work not fully explained