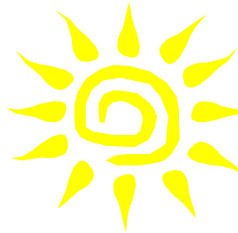


NSF-SPECIFIC GRANT WRITING WORKSHOP: Writing a Compelling Grant Proposal to NSF



Sunshine Consultants, International

... specializing in research competitiveness

Lynn W. Jelinski, Ph.D.

6406 Hopkins Drive

Austin, TX 78734

kc2kg@earthlink.net

843-412-4331

There are Lots of NSF-specific Resources Out There

http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg

2011 NSF Grant Proposal Guide

<http://www.clarku.edu/offices/research/pdfs/NSFProposalWritingTips.pdf>

How to Write NSF CAREER Proposals

http://sciencecareers.sciencemag.org/career_development/tools_resources/how_to_guides/how_to_get_funding

AAAS very useful site. Read: How Not to Kill a Grant Application.

<http://imechanica.org/node/588>

By George A. Hazelrigg, National Science Foundation program director for 18 years. 12 steps of writing a successful NSF application.

<http://www.cs.wustl.edu/~cmg/NSF/nsf.html>

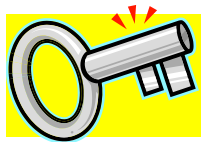
How to Write an NSF Proposal

<http://www.nsf.gov/bfa/dias/policy/outreach.jsp#present>

NSF Regional Grants Conferences

Positioning Yourself to be Even More Competitive, Especially for NSF Funding

1. Visit your NSF Program Manager
2. Review grants; get on review panels
3. Invite leaders in your field to present seminars at ISU
4. Participate in workshops where “the community” defines priorities and what will be done next



Do all of the above. Do #1 this week.



Outline

Resources and Positioning Yourself to be Even More Competitive

Identifying the Proper NSF Program for Your Application

Understanding the Inner Workings of NSF's Peer Review Process and what the Rating Scores Mean

Playing to Your Strengths

Generating Specific Aims with an Emphasis on Hypothesis-driven Research

Writing the First Two Sentences

Writing the First Two Pages (Significance, Innovation, Team)

Organizing and Writing the Approach Section

Conveying a Project Timeline

Data Management Plan, Postdoc Mentoring Plan

Writing the Project Summary

Fatal Flaws

Summary and Wrap-up

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Identifying the Proper NSF Program for your Application

<http://www.nsf.gov/mynsf/>

My NSF

http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg

2011 NSF Grant Proposal Guide

NSF Regional Grants Conferences
Hosted by the University of Texas at Austin
October 17, 2011 8:30 AM to
October 18, 2011 4:00 PM
Austin, TX

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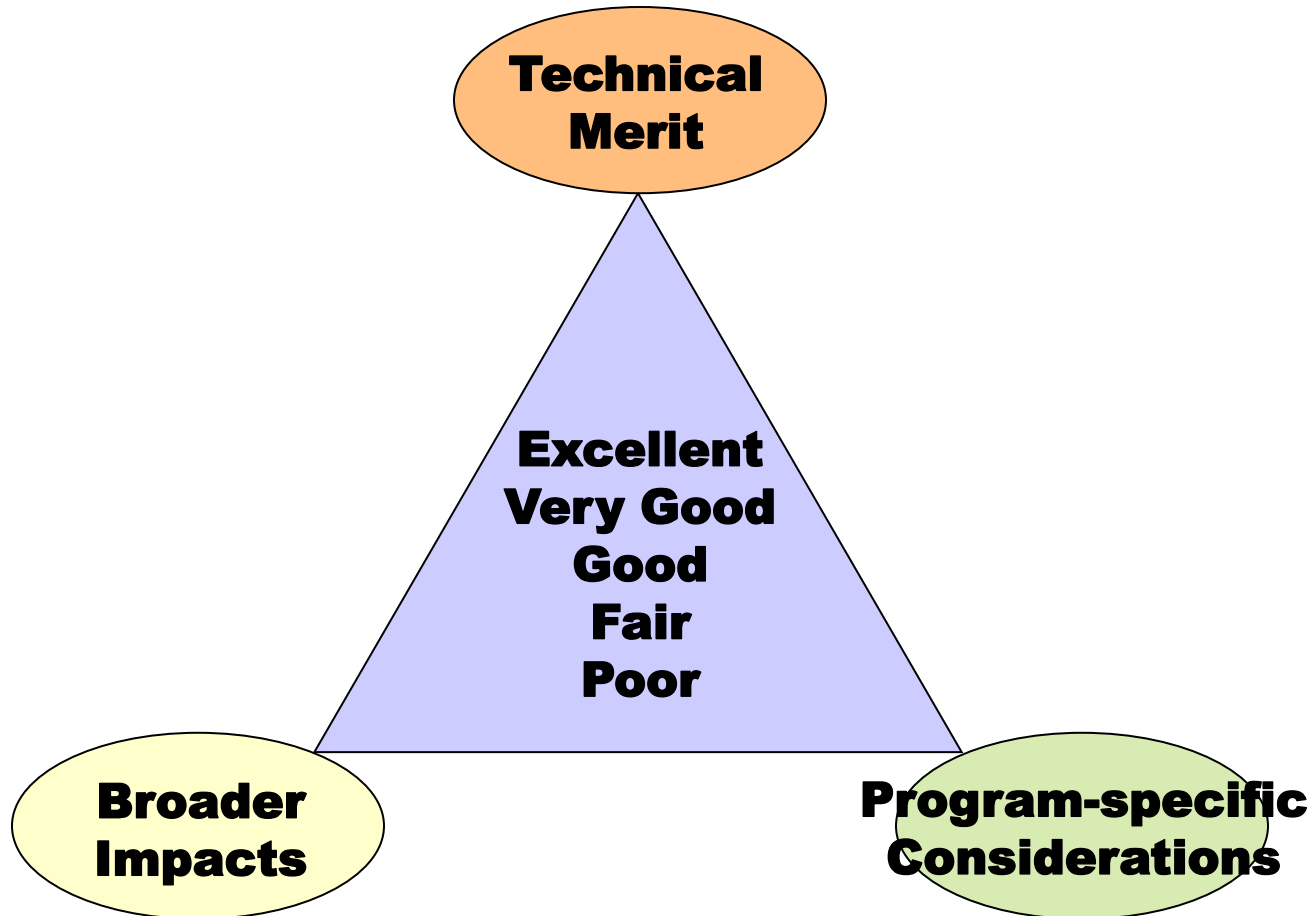
Summary and Wrap-up

Understanding the Inner Workings of NSF's Peer Review System and what the Rating Scores Mean



Program Director has a Lot of Latitude

Understanding the Inner Workings of NSF's Peer Review System and what the Rating Scores Mean



Understanding the Inner Workings of NSF's Peer Review System and what the Rating Scores Mean

Intellectual Merit Considerations

Significance

- How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields?

Investigators

- How well-qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of prior work.)

Innovation

- To what extent does the proposed activity suggest and explore creative, original or potentially transformative concepts?

Approach

- How well-conceived and organized is the proposed activity?

Environment

- Is there sufficient access to resources?

Understanding the Inner Workings of NSF's Peer Review System and what the Rating Scores Mean

Broader Impacts Considerations

Integration of Research and Learning

- How well does the activity advance discovery and understanding while promoting teaching, training, and learning?

Enhancing Diversity

- How well does the activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic)?

Building Infrastructure

- To what extent will the activity enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships?

Dissemination

- Will the results be disseminated broadly to enhance scientific and technological understanding?

Societal Impact

- What may be the benefits of the proposed activity to society?

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Create the Aims of your Proposal with an Emphasis on Hypothesis-driven Research

Before You Start: Answer the 3 Key Questions

What are you going to do?

STRONG research question



Why is it important to do this?

Who cares? So what? What happens if you do this?



Why is your approach innovative?

How is your approach creative? How are you going to do it?



Let's Create our Two or Three Aims

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Summary and Wrap-up

Let's Write the First Two Sentences

The objective of this proposal is ...

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Now Let's Work on the First Two Pages of Your Grant and then Organize the Rest of It

The Secret is to Organize and “Write to the Merit Review Criteria”

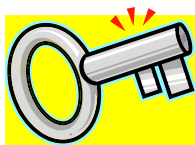
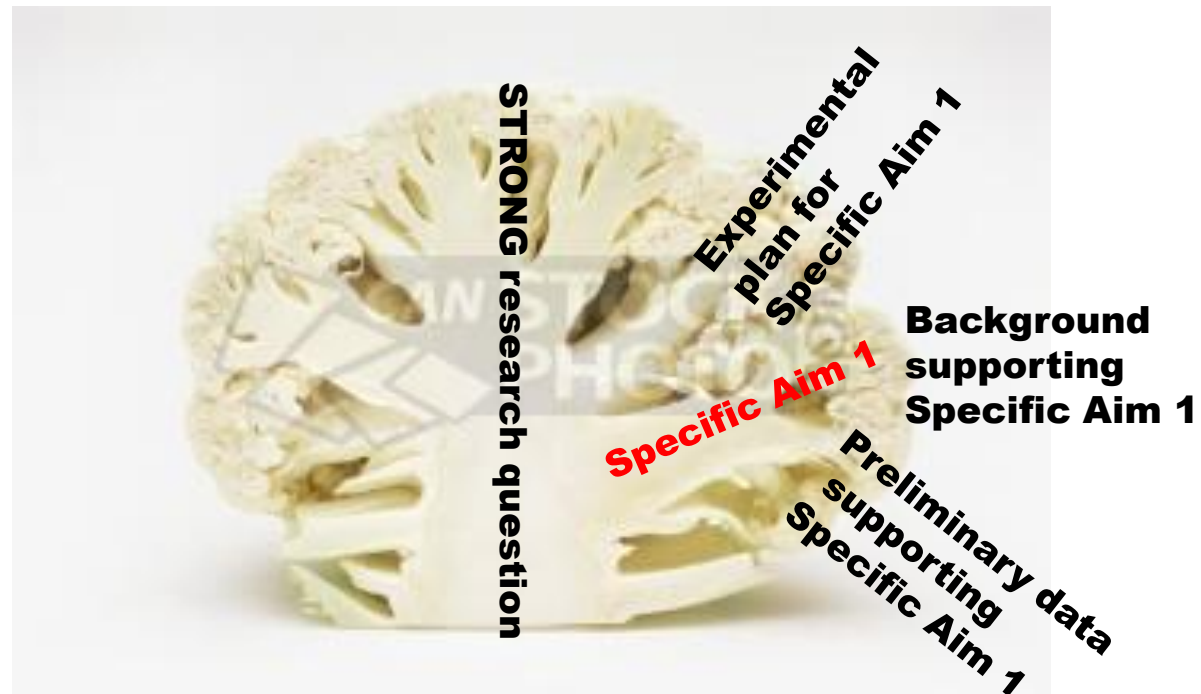
Project Summary– 1 page; write last
Background and Significance – 1 page or so
Investigators – 1 paragraph or so
Innovation – 1 paragraph or so
Approach (repeat for Aims 1, 2, and 3)

Aim 1

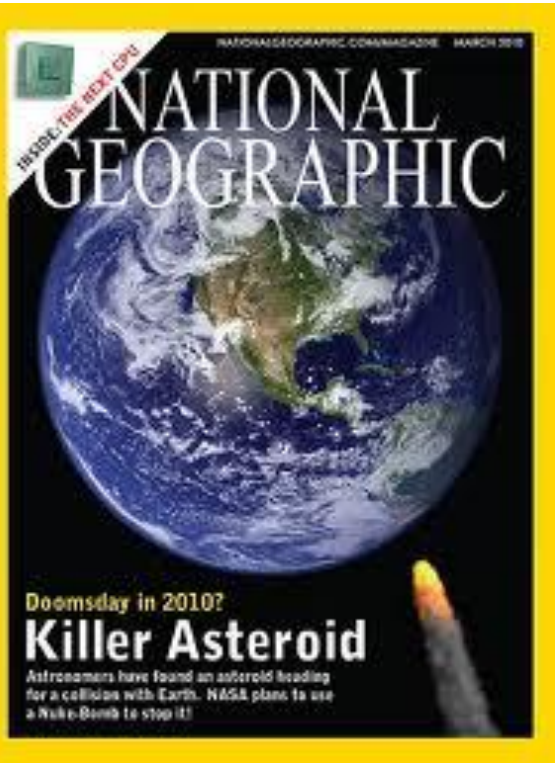
Hypothesis
Background and Preliminary Data Supporting
Specific Aim 1
Approach to Specific Aim 1, Including
Experiments and Interpretations
Potential Pitfalls and Alternative Approaches

Environment – 1 paragraph or so
Integration of Research and Learning – 2 paragraphs at least
Enhancing Diversity – 2 paragraphs at least
Building Infrastructure – 1 paragraph or so
Dissemination – short paragraph
Societal Impact – 1 paragraph or so
Timetable – 1/3 page

The Cauliflower Method for Developing a Grant



EVERYTHING should relate to the central question: What are you going to do? Pare away anything else.



Take it from the Experts Who Know how Science is Read

“I learned from a *National Geographic* photographer that their articles are structured to tell a compelling story when read in any of several different ways:” – Dr. Kiane McKnight

Pictures only

Pictures and captions only

Pictures and captions and some of the adjacent text

All material from beginning to end, at a leisurely pace

Adapted from Florida CRC Grants Workshop presentation by Bill Landing

**Organizing and Writing the Approach Section –
Figure Captions are Very Important**



Fig 1. Prothonotary warbler.



Fig 1. Increase in the number of prothonotary warblers in Austin correlates with drought conditions (2000-2011)(reference).

Organizing and Writing the Approach Section – Declarative Headers are Very Important

Preliminary Data

or

Preliminary Data Demonstrating Feasibility of Aim 1

Experiments on Biosensors

or

Biosensor Using “Diving Board” Tip Demonstrates Unusual Specificity

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Don't Forget Your Project Timeline – Here's a Template

[illegible]

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Data Management and Postdoc Mentoring Plans

Template for NSF Data Management Plan. In general, the data management plan should answer these two questions: 1) *What data is generated by your project?* 2) *What is your plan for managing the data?*

Expected Data

Data Formats

Access to Data and Data Sharing

Practices and Policies

Policies for Re-use, Re-distribution of Data

Archiving of Data

Template for NSF Postdoctoral Fellow Mentoring Plan

[www.nsf.gov/eng/iip/sbir/Sample Postdoc Mentoring Plan.doc](http://www.nsf.gov/eng/iip/sbir/Sample_Postdoc_Mentoring_Plan.doc)

<http://psd.uchicago.edu/NSF%20Data%20Management%20Plan%20Template.pdf>

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Summary and Wrap-up

A Winning Formula for Writing the Project Summary

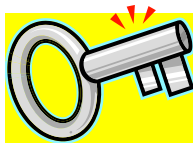
The first 4 sentences:

Sentence 1: What will you do?

Sentence 2: Why is it important?

Sentence 3: What has already been done?

Sentence 4: How are you going to do it and how is your approach special?



Don't forget that the abstract is hugely important for review panels where members who haven't reviewed the proposal "vote". Don't simply copy-and-paste the first few sentences from your proposal.

A Winning Formula for Writing the Project Summary, Continued

The Second Paragraph

Technical Merit

The Third Paragraph

Broader Impacts

- a) Integration of Research and Learning
- b) Enhancing Diversity
- c) Building Infrastructure
- d) Dissemination
- e) Societal Impact of the Technology or Science

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Summary and Wrap-up

Fatal Flaws

Problems with significance:

- Not significant nor exciting nor new research
- Lack of compelling rationale
- Incremental and low impact research

Problems with specific aims:

- Too ambitious, too much work proposed
- Unfocused aims, unclear goals
- Limited aims and uncertain future directions

Problems with experimental approach:

- Too much unnecessary experimental detail
- Not enough detail on approaches, especially untested ones
- Not enough preliminary data to establish feasibility
- Feasibility of each aim not shown
- Little or no expertise with approach
- Lack of appropriate controls
- Not directly testing hypothesis
- Correlative or descriptive data
- Experiments not directed towards mechanisms
- No discussion of alternative models or hypotheses
- No discussion of potential pitfalls
- No discussion of interpretation of data

Problems with investigator:

- No demonstration of expertise or publications in approaches
- Low productivity, few recent papers
- No collaborators recruited or no letters from collaborators

Problems with environment:

- Little demonstration of institutional support
- Little or no start up package or necessary equipment

Fatal Flaws, Continued

Insufficient innovativeness, creativity, originality

Failure to cite important literature

Problems with protections for human subjects:

- Inadequate protection of identity
- Unacceptable risks

Problems with use of vertebrate animals

Annoying the reviewer

Make Sure All Players Are in Your Reference List

**Advice from a Member of the
National Academy of Science**

**Q: “Dr. Stern, how did you do it. What
is your secret?”**

A: “I referenced everybody!”



Melvin Stern, Department of
Oceanography, Florida State
University

Adapted from Florida CRC Grants Workshop presentation by Bill Landing

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Summary: How to Write a Winning Grant

STRONG research
question



Who cares? So what?
What happens if
you do this?



How is your approach
creative? How are
you going to do it?



1. Answer the 3 Key Questions

- ❖ Answers generate hypothesis
- ❖ Answers generate specific aims
- ❖ Answers generate broader impacts

2. Write Elevator Conversation

3. Write first 2 sentences

4. Write first 2 pages

5. Use the “Cauliflower Method” to develop the full proposal

6. Use 4-sentence formula to write the abstract

7. Ask a colleague to read it before submission

Sentence 1: What will you do?

Sentence 2: Why is it important?

Sentence 3: What has already been done?

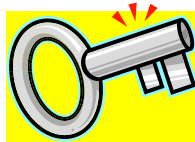
Sentence 4: How are you going to do it and how is your approach special?



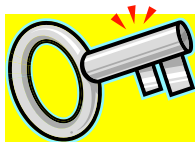
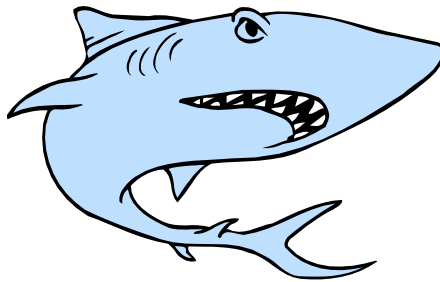
STRONG research question

Experimental
plan for
Specific Aim 1
Specific Aim 1
Background
supporting
Specific Aim 1
Preliminary data
supporting
Specific Aim 1

Summary: How to Write a Winning Grant



EVERYTHING should derive from a **STRONG** research question.



Put yourself in the reviewer's frame of mind and don't expose your soft underbelly.

A serene seascape at sunset. The sky is a mix of soft pinks, oranges, and blues, with scattered clouds. The ocean is a deep blue with gentle ripples. In the distance, a small sailboat with a single white sail is visible on the horizon. To the left of the sailboat is a small, dark, rocky island. To the right is a larger, dark mountain range. The overall mood is peaceful and contemplative.

**Smooth Sailing
for Writing a
Winning NSF
Grant**