Writing Competitive Research Grant Proposals

Suggestions from Program Managers of the ACS Petroleum Research Fund

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Outline of Topics

- Proposal Writing Rules
- Funding Sources and Agency Information
- Selecting a Topic
- Writing the Proposal
- Proposal Evaluation

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Proposal Writing Rules

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#5: Know the agency's mission

- Every funding agency has ideas and rules about what it wants to fund.

- An agency usually does not fund re-written proposals previously sent to other agencies, because the overall goals are different.

- Don't attempt to contort the agency's mission to fit your research project.

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#4: Read all instructions **carefully**

Be sure to follow the instructions.

A common reviewer's view:

If the PI can't follow instructions for the proposal, then the PI probably can't follow instructions to do elaborate research.

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#3: Write with confidence, but don't disregard other ideas

Your proposal should convey the attitude that:

- You have identified an important problem, and you are the right person to do the work.

- You will get the job done and find answers to the problem discussed.

- You are aware of previous relevant studies.

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#2: Have a great scientific idea

One that can be investigated thoroughly, within the context of the institutional resources available to the PI, and within a reasonable time-frame.

Stable-isotopic research at a small liberal arts college without its own mass spectrometer: Is this competitive, or fundable?

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#1: If in doubt, contact the Program Officer

Preferably, <u>before</u> you spend the time writing an uncompetitive or non-compliant proposal.

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Funding Sources and Agency Information

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Funding Sources

State · Industry · Federal Agencies · Internal → Research Funding ← Private Foundations

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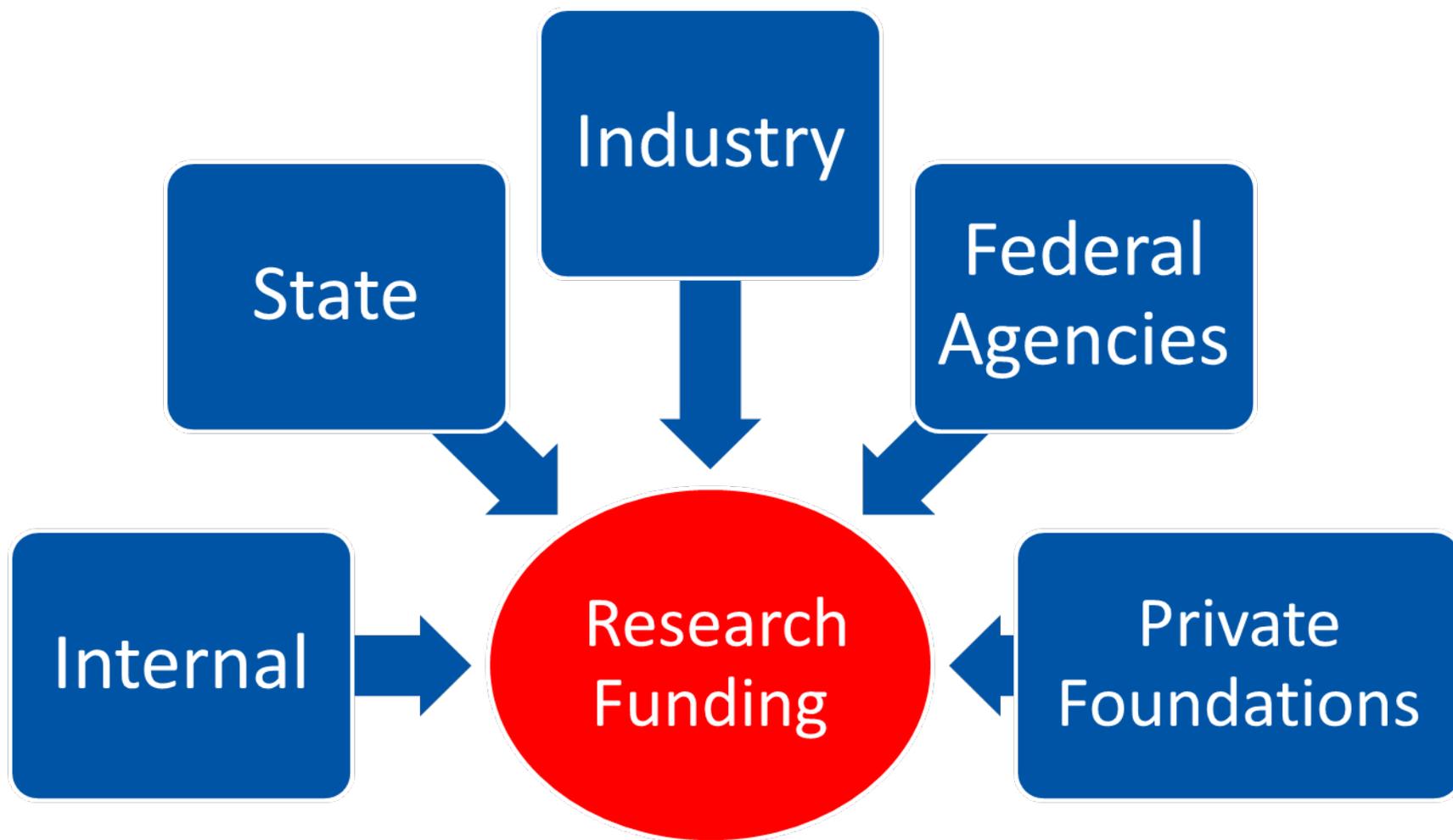
Finding the Right Agency

Your Research Objective → ← Agency Mission
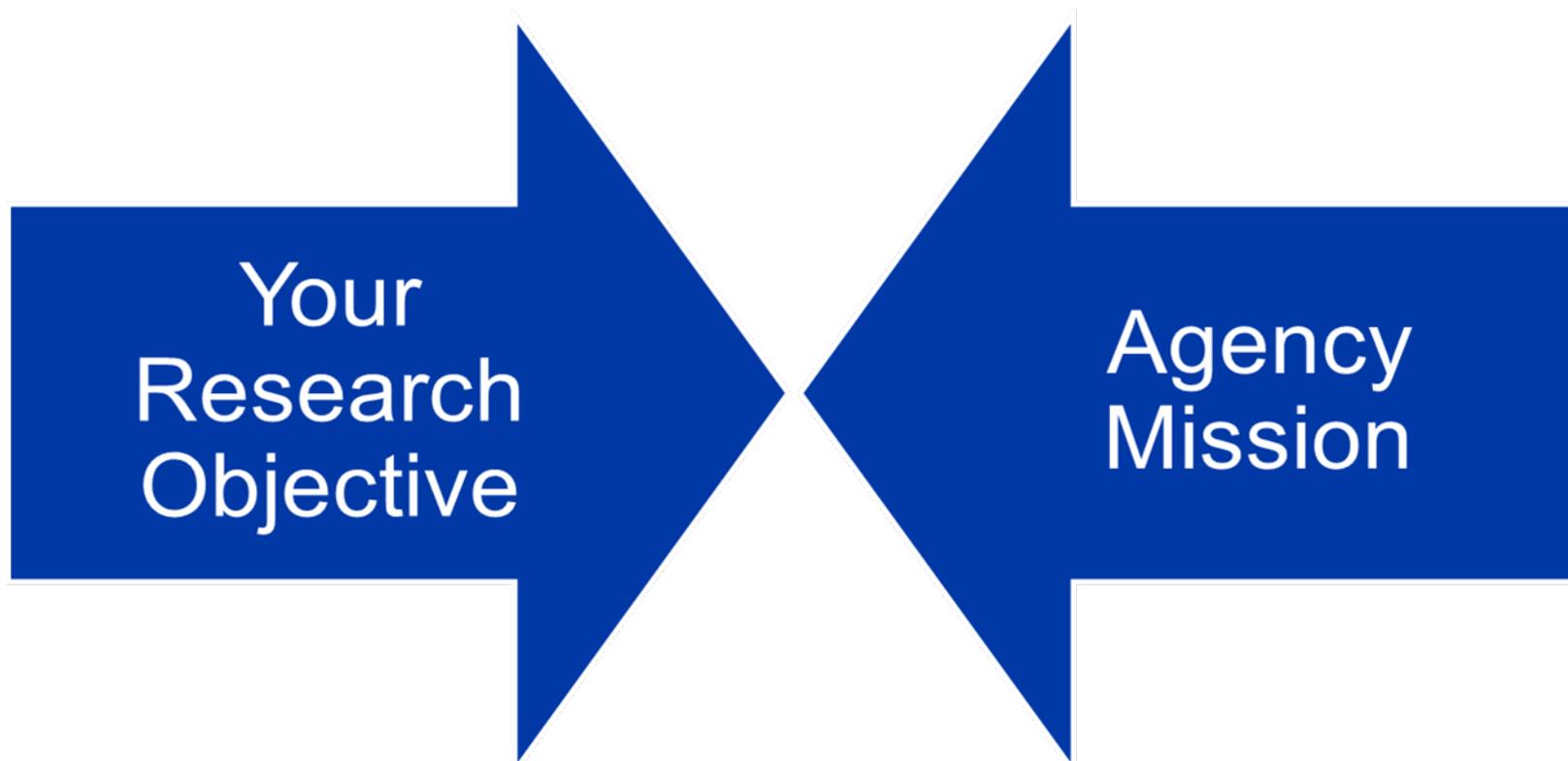
Make sure that your research fits the mission of the funding agency!

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How Do You Find Out?

<u>Agency Web Site</u>

Grant Proposal Guide

Topics Supported

New Initiatives

Announcements

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Agency Information

- Read the Request For Proposals (RFP) or the agency's "Grant Proposal Guide."

- Believe and follow the instructions.

- Read them for what they say, not what you want them to say.

- Your chosen agency should not be the sole source of funding.

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An Agency Wants to Know:

- What is your approach?
- Why is this important to your research community?
- If successful, what will be the benefit to society?

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Still Have Questions?

- Contact the Program Officer – by email or phone.
- Be ready to answer:
  - What is your research objective?
  - How does this meet the agency's mission?

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If You Contact a Program Officer:

- Be prepared with focused questions:
  - *e.g,* "I have a new idea about sequestration of atmospheric CO_2. Is this within the scope of your program? If not, could you suggest where I might submit this?"

- Listen (you don't learn by talking).

- Remember that the Program Officer is <u>not</u> the panel (or reviewer).

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Questions <u>Not</u> to Ask a Program Officer:

- Will you fund my research?

- Is this a good research topic?

- What research topic do you think I should work on?

- What are my odds of being funded?

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More Questions Not to Ask:

- If I send a copy of my proposal to you, will you tell me what you think of it?

- My proposal wasn't funded; if I resubmit it, what are the chances of success?

- Who are the reviewers?

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Selecting a Topic

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Deciding a Research Topic

Your research must be:

• Methodical, repeatable, and verifiable.

• Not done before.

• Significant.

• Reasonable probability of success.

• Lends itself to a viable research plan.

You must have facilities to accomplish the research.

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Know Your Field

- What is the current state-of-the-art?
- What are the top ten researchers in the field doing now?
- What are the sources for funding?
- What are the key research issues?
- Who would likely review your proposal?

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Build on Your Strengths

- Differentiate this proposal from your Ph.D. dissertation, and any other sponsored work.

- Perform thorough up-to-date literature search and exploratory research before writing the proposal.

- Establish and keep your contacts.

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Writing the Proposal

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Now that you have an idea, how do you go about writing the proposal?

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Keep in Mind While Writing

- **<u>Carefully</u>** follow all instructions provided by the funding agency.

- Don't run the risk of having your science "down-graded" or your proposal rejected, because you didn't follow instructions.

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Basic Concepts

- Write to be readable.

- Make the level of detail appropriate.

- Find out how much money is available, and follow the budget guidelines.

- Have clearly defined hypotheses, goals, and approaches.

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Proposal Guidelines

- Page Limit
- Word Limit
- Budget Limit
- Abstract Format
- Reference Format
- PI and Co-PI Eligibility
- Submission Method (file types, size, etc.)

- Font Size
- Minimum Resolution
- Table of Contents
- Research Objectives
- Tables/Figures

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General Outline of a Proposal

I.   Abstract: Written in slightly more general terms, readable by non-experts.

II. Background and Significance: Demonstrate that you know the field thoroughly.

III. Specific Aims: 1-2 sentences on each point that you intend to investigate.

IV. Experimental Plan.

V.   Resources available and resources required to complete your research.

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State Your Research Objective

- Make clear in the first paragraph exactly what your proposal is about.
- The statement of your research objective should lead you directly to your methodology.

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Clear Presentation

- State the problem or hypothesis.
- State why the issue is significant.
- State what you are going to do.
- Explain how you will carry out the proposed work.

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Competitive Proposals

- Keep the narrative focused on the project.

- Use tables, charts, and figures effectively.

- Mention role students will play in research.

- Present preliminary results if you have them.

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Common Errors in Proposals

- Does not fit agency's mission.

- Violates one or more agency guidelines.

- Beyond capabilities of PI, students, or institution (don't propose too much).

- Lack of proofing: Grammar, spelling, formulas, numbering, math errors.

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More Common Errors

- Missing pages, figures, tables, or signatures.
- Unfocused, poorly organized.
- Low personnel budget – Not enough people.
- Low impact – no publishable results even if funding is obtained.

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Do's and Don'ts
Don't:

Rush	Cram too much in project description
Wait until the last minute to contact P.O.	Use tiny fonts or narrowed margins
Ask for too much or too little money	Make figures/tables small or low resolution
Ignore instructions or proposal guidelines	Cite papers "in prep" or "submitted"

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Do's and Don'ts
DO:

Download completed proposal.	Proof read before submission.
Use correct format, and format correctly.	Make sure everything is legible.

Follow all instructions and submission procedures carefully!

Same Idea in Different Proposals?

- A PI <u>may</u> submit multiple proposals, to different agencies, for the same research topic, or for similar research topics.

- You must show how each proposal is different, and indicate that you will only accept one grant, and withdraw the other proposal if one is funded.

- Keep each Program Officer informed of the status of the proposal to the "other" agency.

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Multiple Proposal Submissions

- It is likely that the same person may be asked to review proposals which were submitted to different agencies.

- Agencies generally do not fund research already supported by another agency.

- It may not be legal to accept more than one grant for the same topic, even if the grants are from different agencies.

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Proposal Evaluation

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Proposal May Be Returned Without Review, If You:

- Ignore "Do's and Don'ts" of previous slides.
- Have unauthorized attachments (*i.e.,* "the university reserves the right to negotiate terms and conditions if a grant is awarded.")
- Don't follow <u>all</u> the instructions in the RFP.

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Reviewers Want to Know

1) What is it about (research objective)?

2) How will you do it (technical approach and methodology)?

3) Can you do it (you and your facilities), and is it worth doing?

4) Are there any secondary objectives that are relevant to the agency (*e.g.,* education of students, broader impacts of research)?

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Proposal Review Criteria

1) Significance:

 – Does this study address an important problem?

 – If aims of application are achieved, how will scientific knowledge be advanced?

 – What will be the effect of these studies on concepts or methods that drive this field?

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Proposal Review Criteria

2) Approach:

- – Are the conceptual framework, design, methods, and analyses adequately developed, well-integrated, and appropriate to the aims of the project?

- – Does the applicant acknowledge potential problem areas and consider alternative tactics?

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Proposal Review Criteria

3) Innovation:

– Does the project employ novel concepts, approaches, or methods?

– Are the aims original and innovative?

– Does the project challenge existing paradigms, develop new methodologies, or technologies?

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Proposal Review Criteria

4) Investigator:

  – Is the investigator appropriately trained and well-suited to carry out this work?

  – Is the work proposed appropriate to the experience level of the PI (and other researchers, if any)?

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Proposal Review Criteria

5) Environment:

– Does the scientific environment in which work will be done contribute to the probability of success?

– Do proposed experiments take advantage of unique features of the environment, or employ useful collaborative arrangements?

– Is there evidence of institutional support?

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Reviews of Uncompetitive Proposals

"This proposal is a simple extension of the PI's Ph.D. dissertation."

"The PI has failed to refer to important studies published in the past 2-3 years."

"Much important information on experimental procedures, and equipment for measurements is omitted. I can't really tell what is going to be done and how."

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Reviews of Uncompetitive Proposals

"The PI seems to feel only one outcome of these studies is possible and fails to consider others. If that were true, the studies would be unnecessary."

"This work can certainly be carried out, but it does not address any topic of broad current interest. I would probably not read a paper describing the results."

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Any other questions?

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