

## Office of Sponsored Programs

### Grant Writing for Research Proposals

#### Before You Begin:

- . Know the field and its literature well.
- . Know what other projects in your field are being funded.
- . Check the literature to make sure the project you are considering has not been done before, or has been done and its methods judged inadequate.
- . Brainstorm ideas with colleagues and mentors.
- . Discuss your proposal with the Office of Sponsored Programs.
- . Check to see if your idea matches the sponsor's initiatives reflecting any high-priority areas.
- . Give yourself plenty of time to write the application, at least three to six months.
- . Considered asking a few of your senior colleagues to be on a mock review committee so that you can get ideas along with feedback on the concept, planning, and writing stages of your application.

#### Documentation:

- . Will you be doing human subjects research? Are you aware of IRB requirements?
- . Does the proposal require electronic application? Have you notified Sponsored Programs?
- . Are there any special requirements in the program announcement or request for proposals?

#### New Investigators:

- . Balance your lack of publications with more biographical information.
- . Outline modest, attainable goals that will match your level of experience.
- . Bring in (if possible, well-known) collaborators to fill gaps in your expertise and resources.
- . Show a solid understanding of the literature and recognition of the strengths and weakness
- . Attempt a modest amount of work and not too much for your first research grant.

#### Hypothesis:

- . Develop a strong hypothesis
- . Define specifically what you are setting out to prove/accomplish
- . State importance to the field?
- . Is the hypothesis testable/measurable by current methods?
- . State your hypothesis in the proposal abstract and the specific aims section
- . Focus your idea. Can it be accomplished with the time and resources you are requesting?
- . Does it fit with the sponsor's mission?

#### Research Plan - Planning – when you plan -

- . Address each of the sponsor's review criteria
- . Show central focus and coherent direction
- . Familiarize yourself with common review problems and solutions

### **Research Plan - Process – when you write -**

- . Start with an outline, and then worked on developing each section
- . Present information logically and clearly
- . Maintain balance between technical and non-technical language in your writing
- . Keep both audiences in mind (primary reader and other reviewers)
- . Highlight the importance and innovation of the project
- . Follow the exact format specified in the instructions
- . Explain which gaps in science/service project would fill
- . Refer to the literature thoroughly and thoughtfully
- . State hypothesis in the specific aims and the abstract, and provide a logical rationale
- . Prepare an appropriate budget, following both the sponsor's and CNU's guidelines
- . Provide all necessary information for human subjects review approval if applicable
- . Include a timetable for the proposed research
- . Keep in mind the page length, type size and margins required by the sponsor
- . Follow the instructions in the application guidelines to the letter

### **Research Plan -- Specific Aims**

- . Write this section in clear, non-technical terms
- . Begin this section by stating the general purpose or objectives of your research
- . Limit to three or four specific aims
- . Specify aims and objectives support and test your hypothesis
- . Present alternatives to hypothesis/problem and the reasons for your approach
- . List the experiments/processes to support each aim
- . Mention what staff you will need to accomplish aims
- . Organize and define aims to relate to methods

### **Research Plan – Background and Significance**

- . Write this section in clear, non-technical terms that all reviewers will understand
- . Show how your research is innovative, unique
- . Explain why project is worth funding
- . Convey the significance of research and how it will increase knowledge in the field
- . Include background information about the field
- . Does the literature section show reviewers your understanding of the field?
- . Show the gaps, discrepancies, or roadblocks in the field

### **Research Plan – Preliminary Data**

- . Show preliminary data to support the hypothesis/project
- . Show the feasibility of the project
- . Focus on your own preliminary data, or when using results from other sources, draw a clear distinction between yours and theirs
- . Explain how the results from preliminary studies are valid and how they will be expanded
- . Interpret results critically and provide alternative meanings for them
- . Explain how early work/experience prepares you for this new project

### **Design and Methods – General**

- . Does each experiment/method correspond to one of the specific aims, and state in the same order
- . Follow a logical sequence
- . Offer a timetable showing how and when,
- . Use flow charts and decision trees to show paths of design/methods and how they will progress
- . Estimate what you expect to accomplish each year and state foreseeable delays
- . Describe any hazardous procedures, situations, or materials, as well as appropriate precautions
- . Include supporting data
- . Include sufficient detail to show understanding and can handle the research
- . Cite references wherever possible

### **Design and Methods – Approach**

- . State the expected outcome of your research
- . List each step in the same order as specific aims, linking steps to the aims so reviewers can see how you will achieve them
- . Show why each experiment/step is important or how it is relevant to the hypothesis/project
- . Are the steps/experiments in a logical sequence, flowing from one to another with clear end points
- . Offer a timeline
- . Justify choice of methods in detail
- . Outline methods in detail
- . Support methods with data
- . Provide solutions for potential problems
- . Address difficulties you may encounter; show you can handle them, propose solutions and alternatives
- . Estimate how much you expect to accomplish each year of the grant and state any potential delays
- . Use enough detail (keep in mind page limitations)
- . Anticipate reviewers' questions about the feasibility of what you propose, e.g., how you will gain access to equipment or study populations

### **Design and Methods – Results**

- . Show you are aware of the limits to and value of the kinds of results you expect
- . Convince reviewers you will be able to interpret results
- . Define the criteria for evaluating the success or failure of a specific test
- . State the limits you will observe in interpreting results

### **Cited Literature**

- . List all publications supporting your hypothesis and methods
- . Format the citations correctly, i.e., the names of all authors (not et al.), name of the book or journal, volume number, page numbers (not first page only), and year of publication

### **Abstract**

- . Stay within the word/page limit
- . State your hypothesis/problem
- . Describe objectives and specific aims
- . State the importance of the research and how it is innovative
- . Outline the methods you will use to accomplish goals
- . Exclude all confidential or proprietary information from abstract
- . Keep the language of abstract simple and easy to understand for a broad audience

## **Performance Site**

- . List all the sites where work will take place
- . Match the information on the Resources page, if any
- . Include a Key Personnel header, listing all people involved and their roles? Does each have a biosketch?

## **Consultants**

- . Refer to/defer to consultants any experience you lack
- . Use consultants who are experts in their fields
- . Include a letter of support describing the willingness of an investigator to participate as a consultant
- . List consultants as key personnel and provide biosketches

## **Biosketches**

- . Include biosketches in the proper order: principal investigator, then all others in alphabetical order by last name
- . Include all required details: name, title, education, and employment history; note page limitations
- . Does employment history contain a chronological list of current, relevant publications with titles and complete references (including all authors)?
- . Are my roles in other relevant research included?

## **Other Support**

- . Indicate whether other organizations are currently supporting you in the research you've presented
- . Let the sponsor know of any other grant support or other projects you have
- . If applying to more than this source of support for this project indicate that there's no overlap between them, and made sure the aims differ
- . Make sure that you are not committed more than 100 percent effort on all your support/obligations

## **Budget**

- . Is the budget realistic and appropriate for the project's aims and methods?
- . Have you requested enough, but only enough, money to do the work?
- . Have you made sure none of your requests appear to be extravagant or include resources already available to me?
- . Have you followed the budget instructions in the sponsor guidelines?
- . Have you planned for the cost of the entire project, including costs not requested of the sponsor?
- . Have you figured all of my costs into your budget?
- . Did you specify costs for consortium arrangements through subcontracts?
- . Have you avoided asking for expensive equipment unless I really need it to conduct this research?

## **Resources**

- . Show resources on hand; adequate equipment, space, and support staff to conduct the research

## **Cover Letter (If Appropriate/Applicable)**

- . Include a cover letter with your application
- . Include your application's title
- . State the different disciplines involved, if multidisciplinary
- . State if application is in response to a specific RFA or PA or RFP
- . State, if applicable, that you have enclosed the required institutional approval documentation

## **Writing Checklists:**

### **Presentation of Information**

- . Pleasing presentation, e.g., well-organized and sufficient white space to prevent crowding of information
- . Label all materials clearly so that reviewers can easily find information
- . Type clean and legible
- . Begin with basic ideas and move towards more complex ideas
- . Include bullets and lists to draw attention to key facts and create visual breaks
- . Include graphics that can help reviewers grasp information quickly and easily
- . Include information that will photocopy well
- . Put any colored or glossy materials in the appendix
- . Put all other graphs and charts (not on glossy paper) in the research plan and not the appendix
- . Include the necessary number of copies of the proposal and sets of all appendix material packaged as required by the sponsor
- . Does the application require a cover letter?
- . Include a table of contents

### **Writing -- Mechanics**

- . Paragraphs contain only one major point each
- . Use short, basic sentences that average 20 words or less
- . Include transitions to show the relationship between your ideas, using words such as: furthermore, additionally, in other words, in another area, in contrast, following the same path, and moving to the next stage (but not in excess)
- . Keep related ideas and information together, e.g., put clauses and phrases as close as possible to (preferably right after) the words they modify
- . Use strong, active verbs; avoid passive verbs (i.e. "We will develop a cell line," not "A cell line will be developed.")
- . Use verbs instead of abstract nouns ending in "ion" and "ment" (i.e. say "creating the assay leads to..." rather than "the creation of the assay leads to...")

### **Writing – Editing and Proofreading**

- . Edit and proofread the application thoroughly several times after giving yourself a few days away from it to gain perspective
- . Eliminate redundant words and phrases
- . Check all your information and data for consistency
- . Review conclusions to see if supporting facts might lead a reader to different conclusions
- . Have several colleagues critique the application on the writing and presentation
- . Get editorial help from a nonscientist with a strong writing background
- . Support all facts with citations
- . Avoid using URLs for source material in your application
- . Check your table of contents to make sure that all the items and page numbers correspond to those in the body of your application?
- . Have a clear, concise, but interesting title that describes your project and will get the attention of the readers

## Revising and Resubmitting

- . Read the summary statement and identify the problems
- . Address reviewers' comments point by point, identifying changes clearly
- . Summarize substantial additions, deletions, and changes
- . Clearly distinguish sections that are the same in the previous application and those that are different, showing precisely where you added new information with a method that will show up on a photocopy (not changing the color of the text)
- . If you disagreed with the reviewers, explain why and provide additional information
- . Follow the sponsor's instructions
- . Keep the title the same as it was the first time
- . If applicable, include an introduction to the research plan as part of the application
- . Does the introduction respond to the reviewers' comments by describing how you have substantially changed the application and addressed the criticisms outlined in the summary statement?
- . Does it include any new findings since the initial application?

## Common Proposal/Research Problems

Below we list the most common reasons cited by reviewers of research proposals for an application's failure to gain an award. Review this list and make sure none of these items apply to your idea.

- . Problem not important enough.
- . Study not likely to produce useful information.
- . Studies based on a shaky hypothesis or data.
- . Alternative hypotheses not considered.
- . Methods unsuited to the objective.
- . Problem more complex than investigator appears to realize.
- . Too little detail in the research plan to convince reviewers the investigator knows what he or she is doing, i.e., no recognition of potential problems and pitfalls.
- . Over-ambitious research plan with an unrealistically large amount of work.
- . Direction or sense of priority not clearly defined, i.e., processes/experiments do not follow from one another and lack a clear starting or finishing point.
- . Lack of focus in hypotheses, aims, and or research plan.
- . Lack of original or new ideas.
- . Investigator too inexperienced with the proposed techniques.
- . Proposed project a fishing expedition lacking solid scientific basis, i.e., no basic scientific question being addressed.
- . Proposal driven by technology, i.e., a method in search of a problem.
- . Rationale for project not provided, i.e., why they are important or how they are relevant.
- . Experiments too dependent on success of an initial proposed experiment. Lack of alternative methods in case the primary approach does not work out.
- . Proposed model system not appropriate to address the proposed questions.
- . Relevant controls not included.
- . Proposal lacking enough preliminary data or preliminary data do not support project's feasibility.
- . Insufficient consideration of statistical needs.
- . Not clear which data were obtained by the investigator and which reported by others.
- . Avoid the main traps applicants fall into. Reviewers are knowledgeable, experienced scientists, but they can't know everything.

## Common Reviewer Problems

Problem: They may not get the significance of your proposed search.

Solution: Write a compelling argument.

Problem: They may not be familiar with all your methods.

Solution: Write to the non-expert in the field.

Problem: They may not be familiar with your facilities.

Solution: Show them you can do the job.

Problem: They may get worn out by having to read 10 to 15 applications in detail.

Solution: Make sure your application is clear and concise, neat, well organized, and visually appealing.