

## Essential Elements of a Good Grant Proposal

- You have identified an important question
- You have shown that you can answer that question
- Answering the question matches the funding agencies goals

- Learn by doing:
  - Writing your own grants
  - Reading other grants
  - Discussing another's grant in candid manner
    - Don't be defensive or offended

## What are the goals?

- A critique that says:
 

“This well-written proposal presents clever approaches to a timely and important topic and is likely to yield new insights and have a significant impact on the field”

  - Well-written:
  - Clever approaches:
  - Topic:
  - Likely to be successful:

## NIH Extramural Grants

- Many types of NIH grants
  - Career development
  - Training grants
  - Program project and collaborative grants
  - **Transition awards (K99, K22)**
  - Research grants
    - Investigator-initiated (R01, R21, R15)
    - Response to targeted requests (RFP, RFA)

The screenshot shows the homepage of the NIH Office of Extramural Research. The navigation bar includes links for Home, About Grants, Funding, Forms & Deadlines, Grants Policy, News & Events, About OER, and NIH Home. The main content area is divided into several sections:
 

- About Grants:** Includes Grant Application Basics, Grants Process Overview, Types of Grant Programs, How to Apply, Peer Review Process, Award Management, Foreign Grants Information, and Non-Financial Operations.
- Funding:** Features Funding Opportunities, Search Funding Opportunities, NIH Guide for Grants and Contracts, and various NIH-wide initiatives like Career Development Podcast, New CDA, and NIH Common Fund.
- Grants Policy:** Covers Policy & Guidance, Compliance & Oversight, Research Involving Human Subjects, Office of Laboratory Animal Welfare (OLAW), Peer Review Policies & Practices, Intellectual Property, and Invention Reporting.
- Forms & Deadlines:** Lists Forms & Applications, Submission Dates / Deadlines, and Submitting Your Application.
- News & Events:** Contains News Flashes, News Board, News Links, and a Get Connected section.

The screenshot shows the homepage of the National Institute of Allergy and Infectious Diseases (NIAID). The navigation bar includes links for NIAID Home, Health & Research A to Z, Labs & Scientific Resources, Funding, About NIAID, and News & Events. The main content area is divided into several sections:
 

- NIAID Funding News:** Includes a Subscribe to Alerts section, Back Issues, Editorial Board, and News Links.
- How to Subscribe:** Provides a 5-step process for receiving instant emails for NIAID Funding News, including finding the Research Funding header, picking topics of interest, signing up for NIAID topics, and unsubscribing.
- Research Funding Topics:** Lists various funding opportunities such as Concepts, Potential Funding Opportunities, Fiscal Year Paylines, NIAID and the Economic Recovery Act (ARRA), and Newsletter: NIAID Funding News.
- Highlights:** Lists recent NIAID Funding News, All About Grants, and various funding opportunities like Postdocs, Training Opportunities List, and Special Announcements.

## New NIH RO1 Grant Review Criteria

- Know the criteria
- Make it easy for the reviewer to recognize and reward your fulfillment of each criterion

## NIH RO1 Grant Review Criteria

Five criteria

- Significance
- Investigator(s)
- Innovation
- Approach
- Environment:
  - Overall/Impact Score
- Evaluation: reviewers will score each review criterion separately (as they feel is appropriate)
- Emphasize substance and impact, de-emphasize methods

## NIH Scoring: 1-9 scale

Impact	Score	Descriptor	Additional Guidance on Strengths/Weaknesses
High	1	Exceptional	Exceptionally strong with essentially no weaknesses
	2	Outstanding	Extremely strong with negligible weaknesses
	3	Excellent	Very strong with only some minor weaknesses
Medium	4	Very Good	Strong but with numerous minor weaknesses
	5	Good	Strong but with at least one moderate weakness
	6	Satisfactory	Some strengths but also some moderate weaknesses
Low	7	Fair	Some strengths but with at least one major weakness
	8	Marginal	A few strengths and a few major weaknesses
	9	Poor	Very few strengths and numerous major weaknesses

### Additional Information for Scoring Guidance Table

**Non-numeric score options:** NR = Not Recommended for Further Consideration, DF = Deferred, AB = Abstinence, CF = Conflict, NP = Not Present, ND = Not Discussed

**Minor Weakness:** An easily addressable weakness that does not substantially lessen impact

**Moderate Weakness:** A weakness that lessens impact

**Major Weakness:** A weakness that severely limits impact

## Parts of the Proposal: **Specific Aims**

- Enough to be substantial and significant; not so many to be overly ambitious or unfocused.
  - Not the long-range goals, but clearly a part of them.
  - What can be accomplished in the time requested
  - Not every experiment, but the general approaches
- Connected but independent.
  - Danger in having all aims dependent on a result in the first aim
- Some aims should be “almost done”; some should be clever and novel.

## Parts of the Proposal: **Research Strategy**

Sub-divided into three parts:

- Significance
- Innovation
- Approach

➡ Set the reviewer excited about the topic.

## Research Strategy

For multiple specific aims:

- Address Significance, Innovation and Approach for each Specific Aim *individually* or
- Address Significance, Innovation and Approach for *all* of the Specific Aims collectively.

### Research Strategy: **Significance**

- Explain the importance of the problem or critical barrier to progress in the field that you will address
- Describe how the proposed project will improve scientific knowledge, technical capability or clinical practice in one or more broad fields.
- Describe how the concepts, methods, treatments etc. that drive this field will be changed if the proposed aims are achieved.

### Research Strategy: **Innovation**

- Explain how the application challenges and seeks to shift current paradigms.
- Describe any novel theoretical concepts, approaches or methodologies, instrumentation or interventions to be developed or used, and their advantages
- Explain any refinements, improvements, or new applications of theoretical concepts, approaches or methodologies, instrumentation, or interventions.

### Research Strategy: **Research design and methods**

- Describe the
  - overall strategy
  - methodology
  - analyses to be used to accomplish the specific aims of the project.

### Research design and methods

- Same order as Aims
- General introduction of standard methods
- Rationale
- Methods: some old, some new

### Research Strategy: **Research design and methods**

- How will the data will be collected, analyzed, and interpreted
- Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims.

### Research design and methods

- Expected and unexpected results
- Data analysis
- Interpretation relative to Aims
- Why are you doing it that way
- Pitfalls, problems, alternatives

### Preliminary Data

- Include information on preliminary studies, data, and or experience pertinent to this application
- For early stage projects, describe any strategy to establish feasibility
- Address the management of any high risk aspects of the proposed work

### Progress Report / Preliminary Data

- Convince reviewer
  - Feasibility
  - Expertise with key methodologies
  - Excellent data
  - Productivity
    - Have some manuscripts in the review pipeline
    - Show timely publication record
  - Rigorous and multiple approaches
  - Critical interpretation

### Parts of the Proposal

- **Abstract**
  - Summary of the state of the field and the questions to be asked.
  - Specific aims, rationale and basic methods.
  - Significance and impact

*Write this last; make it match the proposal.*  
Determines the review panel and Institute  
Informs the study section

### Other Parts of the Proposal

- **Budget**
  - Modular budget (modules of \$25K, up to \$250K)
    - Personnel
    - Equipment
    - Supplies
    - Travel
    - Collaborations
    - Other
  - Justify fully

*Be realistic and in range*  
Comfort zone for each panel based on type of work and level of experience and productivity

### Biosketch Each Key Investigator

- **Personal Statement** – why are you the person to do this project
- **Positions and Honors**
- **Peer-reviewed publications**
  - 15 most relevant
  - Only published or accepted
- **Research Support**
  - highlights your accomplishments, and those of your colleagues, as scientists.

*Show how your training and productivity is needed for this project.*

### Resources & Environment

“Show how the scientific environment will contribute to the probability of success of the project”

For Early Stage Investigators, show institutional investment in the success of the investigator

- Independent space
- Adequate institutional support
- Equipment, facilities, unique features of the environment
- Collaborators

*Show you have or can get all needed resources*

### Parts of the Proposal: Other stuff

- Human subjects; vertebrate animals
  - Follow all current procedures
- Letters of collaboration
- Literature cited
- Appendix - only include allowed items

### Additional Tips

- Use a summary figure
- Write a review article before application
- Know your audience
  - Aim for a knowledgeable scientist, not an expert.
  - One reviewer may know the field better than you do; don't write for her
- Be realistic about significance
  - You will not cure cancer or design a new antibiotic

### Writing the grant

- Start early, ask for advice
- Write, re-write, re-write again
- Wait a week, re-read and re-write
- Read critically; proofread carefully

### Updates (if allowed)

- Status of manuscripts
- New results

### Technical details

- Electronic submission for most grants.
- Check for latest rules and requirements
- FAQ presents the allowed fonts, sizes, etc.
- Have figures, but make them readable and self-explanatory, and tied to the text.
  - Color is good.
  - Don't wait until the last minute to upload.

### Common errors

#### Too much

- Repetition
- Detail in methods
- Methods and aims
- Attention to narrow questions, minutia
- Reliance on collaborators

## Common errors

### Too little

- Repetition
- Proofreading
- Chance of broad insight
- Explanation of rationale, problems, and alternatives
- Expansion of technology

## Rewriting the A1

- Happens to everybody
  - Pay lines as low as 10% (higher for new investigators)
- The reviewer is always right
- It was your fault for not making it clear
- Interview SRA and Program Officer
- Rewrite extensively
- Comment on all previous criticisms
- Be nice

## New Investigators

- Typical grant issues
  - Over-ambitious
  - Incomplete knowledge of the field
  - Independence
- Higher payline