

# NIH & NSF *Funding Advisor*

The monthly guide to preparing and submitting optimal grant applications

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### 7 Cost-Sharing Myths vs. Realities ..... 5

*Many PIs know they may share with their institution or another party that portion of research-project costs not covered in their grant, but the process seems beset with some widely held myths, experts say. They enumerate seven of the most common and provide the realities. Among them: Cost-sharing will help you win a grant. Actually, it won't; some agencies even prohibit reviewers from considering it. Others believe they needn't document cost-sharing if it's not in the budget, but the truth is they must document any resources they use.*

### Meeting NSF's Two Principal Criteria ..... 6

*What's the best thing you can do to excite NSF reviewers about your proposal? Write a strong summary page with sharp focus on Intellectual Merit and Broader Impact — the agency's two major criteria, a longtime reviewer says. The one-page summary, written in third person, should give an overview of your objectives and methods and include separate, brief statements on each of the two criteria. Our expert tells what they mean and then explains how to address them in ways that are most likely to get you noticed.*

## Initial Funding Attempt Failed? Here Are Tips on Resubmitting

Your first NIH grant application was kicked back unscored by peer reviewers or received a score just below funding eligibility parameters.

That doesn't mean you should give up. The agency rejects many initial applications (A0), but you might want to resubmit.

A 2009 policy change allows you one resubmission (A1) for all types of grants, including the basic R01 research grant. What factors should you consider when deciding?

First, determine if your proposal is worth resubmitting. If you think you'll be rewriting more than half of it, you might want to forgo resubmission and prepare a fresh application. If you're rewriting less than 50 percent, then resubmit with attention to these general tips:

- Carefully examine the reviewers' summary statement, which highlights their overall reactions and provides clues about what they would want

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### Study Section Insider

## Advice to Help You Gear Up For Web-Based Grant Reviews

by Christopher Francklyn, PhD

Most established professors built their careers on a research grant model they assumed would remain relatively unchanged. Its central features included the standard 25-page application and the face-to-face (FTF) study section for reviewing the proposals.

However, we are now seeing two major paradigm shifts in that model:

- The new, shorter R01 application (one-page abstract plus 12-page research plan).
- The rise of alternatives to the FTF study section, the most noteworthy of which is Asynchronous Electronic Discussion (AED) — a fancy way of describing a Web-based “chat room” version of the traditional FTF study section.

I recently served on an AED panel — an experience that motivates this column. While NIH has not yet announced plans to totally abandon the traditional study section meeting with 20 scientists clustered around a

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to see in your resubmission. Ask your program officer (PO) and experienced colleagues to help you interpret any comments not clear to you.

- If space permits, respond to *each* reviewer's comment in the text. Highlight your responses and changes [in brackets or **boldface**]. If you're making significant changes in text, say so in your introduction.
- Highlight compelling new data that you gathered while waiting for the initial response.
- Cite newly published research papers.
- Remember you are not allowed to change the title and abstract of an unfunded A1 application and submit it as a new one. The Center for Scientific Review (CSR) monitors this carefully.

Here are scenarios of three actual resubmissions that succeeded, with tips and comments from the PIs:

### Scenario 1: Reframing the Hypothesis

**Rachelle Gaudet**, PhD, associate professor of molecular and cellular biology at Harvard University, won her first R01 in 2008.

But her first submission was triaged without a score.

On her first resubmission (A1), Gaudet received what she calls a "poor score." But she was happy she received a score because that meant reviewers discussed her application. She was perplexed that they said it lacked organization.

"I always won praise for my published papers, but the PO said it was grantsmanship," she says. "I lacked a hypothesis based on the preliminary data."

Before submitting her A2 (second submission allowed under the pre-2009 NIH policy), Gaudet asked a senior colleague to help translate reviewers' comments. The colleague said criticisms were directed at her *Approach* and *Specific Aims*.

Therefore she placed greater emphasis on her hypothesis and the overall significance of her work.

By the time she resubmitted, she had more preliminary data that "excited" reviewers. "We then had a hypothesis-driven proposal" that was funded, she says.

### Scenario 2: Providing Additional Data

Gaudet is currently working on resubmitting a different proposal under the new policy. Her initial application, submitted in June 2010, was triaged. She isn't sure if she will be ready to resubmit for February 2011, the closest receipt date.

Reviewers' individual comments (made prior to the discussion phase) did not indicate major problems, Gaudet says. Reviewers found her Aim 1 to be "high-impact" or potentially resulting in a significant impact on public health. One reviewer also made positive comments on Aim 2, but other reviewers wanted more quantitative data in her approach.

"In this case, they want a more integrated approach," Gaudet says. "We have a good idea, and we know what we want to do, but we don't know if we have a compelling case. If we have more data by February, we will resubmit. Otherwise, we will wait until June 2011."

This is where timing becomes a concern.

"If we are successful in February, we probably won't get funding until June 2012," Gaudet says, noting that resubmission for the June 2011 receipt date will push funding even further out. "But we aren't going to give up."

### Scenario 3: Emphasizing Feasibility

**Pampee Young**, MD, PhD, associate professor of pathology and medicine at Vanderbilt University Medical Center, received her first R01 in 2008.

Her initial application was deemed not fundable but her first resubmission (A1) scored highly and was funded.

She learned from reviewer comments that she needed greater focus on feasibility and significance.

Here are excerpts from the language changes (in boldface) in her resubmission that got reviewers excited about her proposal:

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- In the first paragraph, she conveyed confidence in her proposal's feasibility based upon a new concept of therapy: *"Until recently, myocardial loss and associated functional deterioration was regarded as irreversible. Yet, accumulating evidence suggests that injected stem cells can improve function of a failing heart, giving birth to a revolutionary concept of regenerative therapy for the heart... bone-marrow stem cells ... have shown in several preclinical models to result in improved myocardial function, leading to a current human clinical trial to provide these dramatic new cell-based therapies using human mesenchymal stem cells (MSC) for myocardial repair."*

- In the second paragraph, she highlights significance: *"Regulation of the Wnt signaling pathway is critical for MSC self-renewal and regenerative capacity"* and is *"an excellent future target for cell-based therapies for myocardial injuries and wound regeneration."*
- Finally, her third paragraph drives home impact on public health: *"to develop 'super' stem cells would expand their utility, especially in elderly patients with cardiac dysfunction and in the diabetic population."*

Young also brought on board experienced co-investigators, lending even greater credibility to her proposal. ■

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conference table, it is likely that the frequency of Internet review will increase and that of FTF meetings will decrease. This change will be driven by three main considerations:

1. NIH is under increased pressure to find ways to cut costs (to preserve as much money for grants as possible); thus reviewer travel will be deemed an unnecessary luxury.
2. Web-based review provides increased flexibility for reviewers, thereby facilitating the ability of the Scientific Review Officer (SRO) to recruit needed experts.
3. Web-based review offers the possibility that the review will be based more on the *science* in your application as opposed to group dynamics and the personalities of the reviewers.

We will explain the pros and cons of this for applicants and offer some tactical advice on how best to present a proposal for Web review.

### How it works

The mechanics of Web-based review are fairly straightforward. In advance of the meeting, the primary, secondary and reader download their applications electronically and then prepare reviews on new "bullet point" style forms.

The scores and text are uploaded to the Internet Assisted Review server, where they are accessible to the other reviewers prior to the electronic meeting.

The salient difference with the Web-review process is, of course, the format of the meeting. Rather than the entire panel proceeding through each application in turn, AED is better understood as a "parallel" process where each application is discussed in its own Internet-based "thread."

(The SRO still has discretion about which applications are submitted for discussion by the entire panel.)

The electronic discussion starts with some posted comments from the primary and secondary reviewers, setting the tone and providing the rationale for the opening scores. Other panelists are free to drop in and post comments.

The preliminary scores for the application are posted on the page for other panelists to review during the discussion. These can be changed dynamically during the review, based on whether reviewers alter their degree of enthusiasm.

### More thorough debate

Arguably the most important difference between a FTF review and the Web interview is that, in the former, the application typically receives no more than 15 minutes of discussion. This places pressure on the committee and the chair to drive to a relatively quick consensus; if the panel can't resolve debate around a critical issue, the range of scores might still be relatively wide. This does occur for contentious applications.

The relatively short period for discussion can also mean that the outcome of the review can be heavily influenced by the opinions of one or just a few dominant personalities. There usually isn't time to research the literature to address key issues of novelty and feasibility that may arise during the discussion.

With the Web-based review, each application is open for discussion during the entire review session (~25

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hours). Operationally, this means that each application can receive a truly exhaustive review, with the potential for protracted debate on critical issues. Reviewers can adjust their scores dynamically to reflect the tone of the discussion about an application.

Reviewers now also have time to consult outside sources, such as the applicant's prior publications, to settle technical questions.

### Pros, cons for applicants

For you the applicant, this extra time can be both a blessing and a curse.

On the positive side, there is more time for people to read and consider the comment thread and debate the points that are raised. The influence of the "strong voices" on the panel is somewhat diminished, and the individuals most interested (and probably with the most relevant expertise) are likely to be the most engaged with your application.

The two biggest drawbacks are consequences of the increased scrutiny. With the extra time and the close attention of the experts, this means that every small error and oversight will likely be dredged up and chewed over at length.

Whether reviewers will be able to accord those perceived flaws and mistakes their correct weight likely will depend on their experience levels.

The fact that all of the reviews are being conducted simultaneously has a further important consequence: It's much harder to evaluate each application in the context of the entire group. The aforementioned "strong voices" can dominate the review process, but can serve a useful function in preserving consistency across the scoring. This is also the chair's job, but the chair now has the nearly impossible task of monitoring and overseeing 20-plus application chat threads simultaneously.

### Suggested tactics for AED review

Does AED fundamentally change how you should prepare your application? In broad terms, probably not. Regardless of the review mechanism, you should still identify a highly significant research question, outline a series of feasible experiments that will inform that

question and provide a strong argument that you are the PI ideally suited to the problem. Don't alter the foundation of your scientific research plan.

What may change, however, are the *tactics* you use to communicate your plan.

Assuming that reviewers most likely to drop in on your chat room and comment are more likely to be true experts — rather than panel members captive in a room — it's useful to consider ways to specifically capture their interest. Here are some potential useful strategies:

- **Ensure that your application clearly addresses significant questions in your field** and presents clear evidence of fresh thinking and new hypotheses. Merely collecting additional data to add details to old problems is not going to excite reviewers.

- **Where possible, identify major questions where controversy exists**, thereby creating the expectation that your results will resolve the issues. Be provocative in your thinking, but not your tone.

**Example:** *There is much debate over which of two current approaches to XXX problem is more effective. However, many scientists agree that neither stands out as significantly better than the other. Our YYY approach goes in an entirely new direction; the evidence we've collected indicates it will produce superior results.*

- **Make your references work for you.** The shorter application form doesn't give you much room to describe how experiments are performed. Therefore, identify a subset of your key papers (or those of others in the field) that explain how the experiment is done and which demonstrate your qualifications. Write them **in bold** in your reference list to underscore their importance.

With the longer review period, reviewers may question your ability to perform a key experiment. Help them identify your key papers that address these issues. Instead of technical details, your **Approach** section should focus on strategy, building a rationale for the experiments and explaining how the data will be used. A well-crafted flow chart diagram can save precious lines of text.

- **Update and polish your credentials.** PIs should understand that the extra time AED reviewers will have to examine their applications will mean more time to pick apart the details of their Curriculum Vitae (CV).

When trying to gauge their enthusiasm for applications that fall outside their field, many reviewers look to an applicant's productivity in the previous funded period. If there are concerns that there is either insufficient output or the work was not responsive to the aims of the previous period, this can diminish enthusiasm. In some cases, this can push what is an otherwise excellent application out of the range where it would be considered a good candidate for funding.

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The NIH conducted a survey report on the AED program in 2009, and many aspects of the AED process were rated favorably by both SROs and reviewers.

While some respondents noted that the lack of an FTF meeting eliminated an important networking opportunity, the NIH is not likely to view that as a serious drawback, especially weighed against the substantially reduced costs and increased flexibility that AED offers.

Thus, for review panels where no more than 25 applications are under consideration, look for AED to become the new norm for NIH peer review. By anticipating this change and altering your presentation to accommodate the new review format, your applications should score better.

*Dr. Francklyn is a veteran reviewer for NSF and NIH and served as an NIH study section chair. He is a professor at the University of Vermont, where his scientific expertise is in protein synthesis and RNA-protein interactions. He is also assistant editor of the Journal of Biological Chemistry. ■*

## Cost-Sharing in Grant Proposals — 7 Common Myths and Realities

Coming up with ideas for cost-sharing — where to get additional resources outside the grant, who can add value to your proposal and how — often is a creative process. But the creativity ends there. When actually applying for grants using cost-sharing, you must be wary of what you promise and how you'll execute it after the award.

That advice comes from **Sandra Nordahl**, co-director, Authored Research Contracting and Compliance Department at San Diego State University.

“Any cost-sharing offered by faculty members needs to be in accordance with agency guidelines and fully documented,” Nordahl says. She and her colleague **Jennie Amison** discussed some cost-sharing do's and don'ts during a recent *Principal Investigators Association* audio conference.

What is cost-sharing? It's the portion of research-project costs that are not supported by a sponsor like NIH or NSF, but instead are borne by your institution or another third party.

You may share costs because:

- It's a condition of the award (mandatory cost-sharing). Some grants require the institution to pick up certain costs. Federal regulations and grant-sponsoring agencies require cost-sharing, and these regulations should jibe with your institutional policies.
- You agreed to share costs as part of your proposal (voluntary cost-sharing). **Note:** Once you've agreed to it, you are committed once the agency awards the grant. For example, Professor X agrees to *donate* 5 percent of his time to the project; now it's required under the grant that Professor X will *not* receive compensation under the grant award for his time.
- After you've received your grant, you decide to spend above and beyond what you stated in the proposal (voluntary, uncommitted cost-sharing). Unlike the first two categories, this cost-sharing does *not* become part of the award.

In a quick poll of audio conference attendees, half knew their institution had a cost-sharing policy, one-quarter said their institution didn't have one, and one-quarter weren't sure.

### Cost-sharing myths

According to Amison, director of Sponsored Research Development at San Diego State, PIs may hold to several myths about cost-sharing. Here are seven of the most common and the realities:

**1. Myth:** It (cost-sharing) will help you get the award. **Reality:** You don't get direct review credit for cost-sharing. Many agencies prohibit considering cost-sharing as a review criterion.

However, if cost-sharing ultimately leads to a better proposal because you have access to more resources, then indirectly — and only indirectly — does cost-sharing play a role.

*Example:* An expert in another department on photonics will donate a certain percentage of his time to the project. As a result, you can include photonic applications in your proposal. The reviewers are impressed with this addition and move your proposal to the top of the pile.

**2. Myth:** If it's not in the budget, but in the narrative, you don't have to document it. This often happens when you include a section on “resources available to the project” in the narrative, but don't include those items in the budget. **Reality:** If you use those resources, you must document them.

*Example:* A faculty expert is available for consultation on data management. You end up needing her expertise,

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and she troubleshoots a problem that takes her three days to solve. You must keep track of that time and report it in your cost-sharing documentation to the sponsoring agency.

**3. Myth:** If it's not required, you don't have to document cost-sharing. **Reality:** Anything that can be quantified or valued needs to be documented once the award is granted, regardless of the voluntary status of the cost-sharing.

"If you do get an award where cost-sharing was in the narrative and the award comes in, and you then realize it needs to be documented, you can contact the sponsor and try to negotiate the requirement for cost-sharing to be documented out," says Amison. "Approach it with the sponsor agency, and receive the approval in writing."

*Example:* You voluntarily agree to share lab space and equipment costs on a project. Once it is funded, you'll have to talk to your program officer and your institution's finance people to come up with an approved way to divide the facilities and administration costs.

**4. Myth:** To document sufficiently, it's enough to have a letter from a third party saying it will commit the resources. **Reality:** You need complete cost documentation from third parties.

*Example:* You are awarded funds for a larger project to study blood samples, but another institution agrees to do complex analyses of samples and pay for those costs. You might assume this institution just needs to tell you they're paying for it and pass this information on to the sponsoring agency. Understandable, but not allowed.

"Documentation is not merely a letter committing resources; it's actually the receipts, the payroll records, the general ledger records and other distinct financial records," says Amison.

**Bottom line:** You need cost documentation from

the other institution and must pass that on to your sponsoring agency.

**5. Myth:** If you're submitting several proposals simultaneously, you can show the same cost-sharing on all of them and then actually use the resources on the winning proposal. For example, you get a commitment of the same faculty member's time for different proposals and assume that you'll use it only on the funded project. **Reality:** That's not allowed.

"Once you commit cost-sharing to one project, it can't be used on any other project proposal," says Amison. "You're telling the agency that these cost-sharing elements, whether in-kind or cash, are specifically for the leveraging on this particular program and that they are directly related to it."

**6. Myth:** You don't have to provide documentation until you finish the project. For example, you assume you can simply run down to the finance office after the project is over and get documentation for all the supplies and materials the institution provided and paid for. **Reality:** It won't have as much credibility, and you probably won't be able to completely backtrack the entire financial history of your project's cost-sharing portion.

"If you wait until the end, it's very difficult to obtain the cost-sharing documentation, whether it's receipts or payroll records," says Amison. "It's more accurate to do it continuously."

**7. Myth:** Teaching your courses counts as an in-kind contribution. **Reality:** That's not allowed in most cases.

"The only way it would be allowed is if the course were developed specifically for the grant or contract," Amison explains.

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## Meeting NSF's 2 Key Criteria: Intellectual Merit, Broader Impact

What's the one thing you can do to hook the reviewer of your NSF proposal and get them thinking, "This proposal is a winner!"?

Write a one-page summary with a sharp focus on what NSF calls **Intellectual Merit** and **Broader Impact**. That's according to **Dr. Michael Lesiecki**, a former PI in chemical physics and an NIH/NSF reviewer for 20 years. Lesiecki, executive director of Maricopa Advanced Technology Education Center in Phoenix, spoke on NSF grant proposals at a recent *Principal Investigators Association* audio conference.

The one-page summary, written in third person, gives an overview of the project — the activity that

would result if it were funded. It must include your objectives and methods and contain separate, brief statements on how the project meets the Intellectual Merit and Broader Impact criteria.

If you exceed the single-page length, NSF will return your proposal "without review," says Lesiecki.

Here's how NSF defines the two principal criteria:

- Intellectual Merit is what your proposal will do "to advance knowledge and understanding of undergraduate science, mathematics, engineering and technology education."
- Broader Impact means how your proposed activity "will advance discovery and understanding while

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promoting teaching and learning” — and that includes activities such as broadening participation of under-represented groups, enhancing education infrastructure and disseminating scientific understanding.

### How the process works

Your first step in writing the all-important summary page, he says, should be to keep NSF's review process in mind, specifically these points:

- An expert in your discipline will review your proposal. It will be in a stack of other applications, and reviewers typically can budget about 90 minutes for each one.

- Use language that the reviewer can “lift” in filling out his evaluation form. This can be as simple as saying, “This proposal is potentially transformative and moves the field in a new direction by ...”

- The reviewers must specifically rate the Intellectual Merit and Broader Impact of your proposal, and the NSF program officers (POs) who read the reviewers' evaluations will zero in on those answers when ranking your proposal. If they like what they read, your proposal will head to the top of the pile.

- Speak from a scientific point of view: “If the proposer makes a scientist-to-scientist connection using the language of the discipline, the proposal's credibility goes right up,” says Lesiecki.

### Intellectual Merit

In reviewing this aspect of your application, reviewers typically ask themselves questions like the following (in each case, you should anticipate such questions and make sure you address them within the application in ways suggested here):

- How important is the work? “An urgent need or a timely issue can capture a reviewer's attention,” says Lesiecki. *Example of what you might write in application:* “This work is important because this invention could solve a longstanding problem with ...”

- How well qualified are you to achieve your goal? *Your response in the application could be:* “Our institution's investigators have experience in similar projects, having found similar breakthroughs in ...”

- How creative, original or potentially transformative is this project? *You should write something like:* “The most creative aspect of this proposed work is ...”

- How well-conceived and well-organized is the project? You can't answer this directly, says Lesiecki. Rather, show it through rigorous organization and clear explanation throughout the proposal. *Suggestion:* Use

bold headings and subheads to emphasize any key points that support Intellectual Merit and Broader Impact.

- Does the applicant have the resources? If you have them already in place at your institution, make that clear, Lesiecki says. You'll win rating points for it.

**Bottom line:** Address questions like these first as you construct the Intellectual Merit paragraphs of your summary page.

### Broader Impact

Lesiecki says a proposal that fails in Broader Impact often will have a review that sounds like this: “*There is no doubt this program will offer a useful service and help build the strength of the XYU academic program. However, it has a limited potential to become a model or to catalyze information in any broad sense beyond the confines of the project.*”

To avoid that kind of project-specific, damn-with-faint-praise review, answer the following questions:

- How am I advancing discovery and understanding while promoting teaching and learning? For example, include in your proposal that you will develop research-based education materials or will contribute to databases useful in teaching (e.g., K-16 digital library).

- How am I addressing under-represented groups? Lesiecki suggests offering to make campus visits and presentations at institutions that serve under-represented groups, such as women and minorities. Or establish collaborations with faculty and students at community colleges, colleges for women and EPSCoR institutions (NSF's Experimental Program to Stimulate Competitive Research, which aims to improve the competitiveness of

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some institutions). Another option: Mentor early-career scientists and engineers from under-represented groups and include their participation as part of the proposal. (You can find a list of these colleges at [www.atecenters.org](http://www.atecenters.org).)

• How am I disseminating this research broadly? “Professional societies can offer great dissemination and impact opportunities,” says Lesiecki. For example, you might partner with your local chapter of IEEE (Institute of Electrical and Electronics Engineers) to offer presentations or opportunities to apply your discoveries in industry. Or present research and education results in formats useful to policy makers.

• Are there societal benefits? “Demonstrate the linkage between discovery and societal benefit,” says Lesiecki. “Partner with academic scientists, staff at federal agencies and with the private sector to integrate research into broader programs and activities of national interest.”

To craft the Broader Impact portion of your summary statement, think about the reach of your research and who might want to collaborate with and learn from you. Like many PIs, you may have to brainstorm to determine those entities and decide how you can disseminate information to them short of transferring intellectual property.

**Bottom line:** The broader you cast your net, the farther you’ll move up in the funding line.

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