

Dos and don'ts of developing an NIH grant application

Insight from the Office of Research Infrastructure Programs.

INTRODUCTION

The National Institutes of Health (NIH) has 27 Institutes plus the Office of the Director (OD) as its 28th component unit (nih.gov/icd/). Since December 2011, the newly established Office of Research Infrastructure Programs (ORIP), which funds extramural research programs, is located within the NIH OD's Division of Program Coordination, Planning, and Strategic Initiatives (dpcpsi.nih.gov/). ORIP's mission is to advance research infrastructure and research-related resources and to coordinate NIH's science education efforts, thus supporting the NIH mission by enhancing the efficacy of biomedical research (dpcpsi.nih.gov/orip/index). ORIP works across NIH Institutes to create and support a variety of research programs that advance

biomedical studies (Figure 1).

Although ORIP is almost four years old, some of its programs have existed much longer as researchers have utilized these programs for their research for many decades. ORIP programs support other NIH activities, but also lead efforts to promote new research endeavors and directions. Organizationally, ORIP has two scientific divisions, the Division of Comparative Medicine (DCM) and the Division of Construction and Instruments (DCI), as well as the Office of Science Education (OSE) (Figure 2). OSE provides funding for the Science Education Partnership Awards (dpcpsi.nih.gov/orip/ose/sepa/science_education_partnership_awards_index), while DCI supports the shared instrumentation and physical infrastructure programs, the latter in the form of renovation and construction grants (dpcpsi.nih.gov/orip/diic/index). DCM's mission is to support biomedical research in the form of diverse models of human disease using vertebrate and non-vertebrate animals or cultured cells (dpcpsi.nih.gov/orip/CM/index). This support is not just for new or expanded models, it also promotes the preservation or characterization of models that have utility for NIH-sponsored research. Additionally, DCM funds programs that enhance the biomedical workforce supporting and contributing to animal-based research and resources.

NIH supports a wide variety of grants in the form of different grant mechanisms. More information on specific types of grant programs can be found at grants.nih.gov/grants/funding/funding_program.htm. A

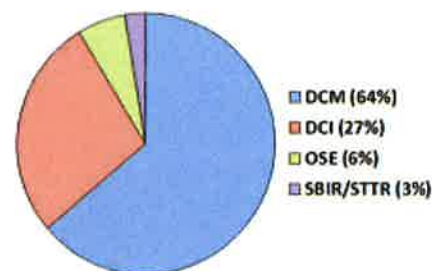


Figure 2: Grant portfolio for fiscal year 2014 for the Office of Research Infrastructure Programs. Percentage (%) reflects the part of the ORIP extramural funding budget. Abbreviations: DCI, Division of Construction and Instruments; DCM, Division of Comparative Medicine; OSE, Office of Science Education; SBIR/STTR, Small Business Innovation Research and Small Business Technology Transfer programs.

scientist who wants to apply for funding needs to understand the different NIH funding mechanisms before writing an application and the steps for applying for any given mechanism (e.g., a letter of intent or an approval letter may be required). How to collaborate with a team of investigators when assembling an application will also be critical in achieving success. ORIP supports, among other mechanisms, investigator-initiated awards that aim at testing a hypothesis (in the form of R21 and R01 mechanisms), resource center grants, small business program awards, institutional and individual training grants and other educational awards, grants for high-end shared instruments, and conference awards (dpcpsi.nih.gov/orip/rf/f_opps). The following paragraphs will provide helpful guidelines put together by ORIP staff for both novice and seasoned grant writers. However, getting an early start, good ideas, and perseverance will still be an essential part of the course.

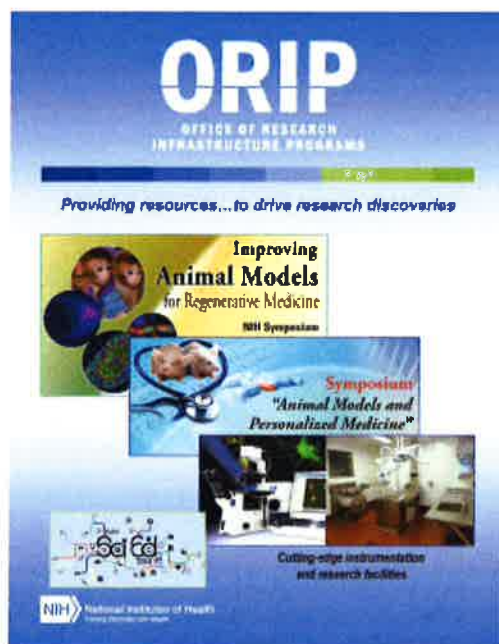


Figure 1: The Office of Research Infrastructure Programs (ORIP) works across NIH Institutes by providing resources to drive research discoveries.

COMMUNICATION

When applying for research support through a grant application, applicants need to consider two major aspects of this task: the scientific idea, approach, or question which will be pursued and the knowledge of how to package this idea for submission to the appropriate funding agency. This communication does not address the science, but it is important to keep in mind that it is a very crucial aspect of any application. This communication will focus on providing guidance on the packaging of a research idea or question.

This packaging requires that applicants use the best communication skills and methods available. This includes communication with the funding agency or organization before writing a grant application. Always contact the program administrator or official in charge of the type of application of interest. All

applications submitted to NIH are in response to a Funding Opportunity Announcement (FOA), a publicly available document by which a Federal Agency like NIH makes known its intentions to award discretionary grants or cooperative agreements, usually as a result of competition for funds. FOAs may be known as program announcements, requests for applications, notices of funding availability, solicitations, or other names depending on the Agency (i.e., NIH) and type of program. More details on how to search for the right funding opportunity can be found at grants.nih.gov/grants/planning_application.htm#search. Applicants can find the individual who will be the program contact listed towards the end of the FOA.

When communicating with the program contact, applicants should listen carefully to any advice provided. The best approach is to start with a brief e-mail

message that describes the proposed idea and lists a question or two. If an applicant has not received a response within 2 or 3 days, he or she should follow up with a phone call. Having sent a brief written document will make it easier for the program contact to review the applicant's situation and decide on the most appropriate response.

An alternative approach to identifying program contacts is through the funding organization's website. At the NIH, Institutes have organizational charts listing appropriate individuals serving as program contacts responsible for specific research topics. This is the case for all programs funded by ORIP. When viewing the ORIP website at dpcpsi.nih.gov/orip/index, select the tab labeled 'About ORIP'; for other NIH Institute websites, similar descriptors are used. There, applicants will find a 'Contact Us' link with e-mails and phone numbers. Applicants may

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also prefer to look at the different scientific units described at a funding site and search there for names of program contacts who would most appropriately oversee the type of research topics and programs of interest relevant to their research proposals. Lastly, applicants can seek advice regarding NIH contacts from more experienced colleagues and senior investigators.

INSTRUCTIONS AND DEADLINES

When preparing a research grant application, it is critical that applicants follow the instructions and meet the deadlines provided by the FOA and the program contact for the grant mechanism of interest as requirements may vary between the different grant mechanisms and NIH Institutes. Applicants should read the FOA multiple times to make sure all requirements of a particular grant mechanism are met. Failure to pay attention to specific details and additional instructions provided in the FOA or by the program contact in addition to the general NIH guidelines may result in delayed processing, reassignment to another NIH Institute or FOA, or withdrawal of the application.

FORMAT AND CONTENT

The presentation of a grant application is almost as important as the scientific content. Applications with sloppy formatting or crammed looking pages can be visually unappealing and thus make a bad first impression before the application is even read and reviewed. In addition to adhering to NIH formatting requirements regarding font, font size, margins, and spacing, using a clear and concise writing style can help maximize the “curb appeal” of applications. Great science can be lost or underrated when applications have errors in spelling, grammar, or numbering of figures and tables. Figures and tables should also be easy to read and understand. Otherwise, critical supporting concepts and preliminary data could be missed. One strategy to avoid these types of issues is to have someone proofread applications just for spelling, grammar, formatting, and overall visual appeal.

In preparing a grant application, it is important to engage the reader right from the start by conveying the confidence and enthusiasm of the applicant for the proposed project. Key literature, issues, questions, and controversies relevant to the proposed work should also be presented to provide context and perspective for the proposed studies. Always discuss potential problems, pitfalls, and alternative strategies as this is one of the most common omissions from grant applications. Failure to include these types of considerations can lead to concerns regarding the experimental approach and the applicant's ability to lead the proposed research. It is also recommended that a timeline be given to show that the proposed experiments can be reasonably completed within the specified project period. Benchmarks such as presentations at national meetings and submission of manuscripts could also be included within the timeline to provide work product and project outcomes.

PRE-REVIEW AND DISCUSSION

In preparing a grant application for the first time or for an unfamiliar grant mechanism, it is helpful to look at examples of successful grant applications. Such examples can be identified through requests to an applicant's colleagues and collaborators, the applicant's institutional Office of Sponsored Research, NIH (see Other Resources), or the NIH Research Portfolio Online Reporting Tools (report.nih.gov/), a searchable database of federally funded biomedical research projects. It is also recommended that applicants allow enough time to have scientists within and outside of the proposed field of study and nonscientists critically pre-review final drafts for scientific merit and clarity. Applicants should also critique their proposals. In reviewing their grant applications, applicants should be familiar with the review criteria that will be used to evaluate their proposals so as to ensure all criteria are clearly addressed within their applications. Details on review criteria for the different grant

mechanisms can be found at grants.nih.gov/grants/peer/guidelines_general/Review_Criteria_at_a_glance.pdf. Applicants should also go through their applications from the perspective that reviewers may not read the proposal from start to finish in one sitting. It may therefore be useful to restate certain key concepts and assertions throughout the research plan to ensure continuity between each time period a prospective reviewer might spend on an application.

OTHER RESOURCES

In addition to the insights provided by ORIP in this article, many NIH Institutes provide guides and tip sheets (grants.nih.gov/grants/grant_tips.htm). For example, the National Institute of Allergy and Infectious Diseases (NIAID) offers online tutorials on topics such as writing applications involving animals; resources for different career stages ranging from training and career development to new and early stage investigators; and applications tools which include examples of applications from NIAID and NIH (niaid.nih.gov/researchfunding/grant/pages/aag.aspx). The NIH Office of Extramural Research within OD also offers useful information about grants at grants.nih.gov/grants/oer.htm.

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