Grant applications: the Art of Science

Many articles have been written by people skilled in writing grant applications and keen to show off their successful tips. However, fewer articles have been written from the other side of the fence, so to speak: that is, by the grant administrator. This article hopes to provide some insight into the review process and how applicants can fine-tune their submissions for maximum effect.

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Think of writing a grant as a process similar to redecorating the spare room. You do not lay the carpet before you have finished the painting, or start wallpapering knowing you have only one roll of paper. Assembling the equipment and tools required, although time-consuming, is an essential prerequisite. Likewise, writing a grant application requires you to be familiar with the ground rules for that grant. Read the guidelines and the supplementary materials thoroughly.

Each application should be tailor-made. Too often, the applicant simply cuts and pastes text from previous applications or other documents they have to hand, with scant regard to its relevance to the current application. This leads to frustration on the part of the applicant when the application is either rejected outright or returned with a host of questions that could have been avoided if they had simply read the supplementary materials fully. The ambit of each research fund is different and it should be no surprise that different rules and guidelines exist.

Another important element is to assemble the project team. During review, many applications are turned down because it is clear the research team is not fully qualified to answer the question they have posed. They need additional input, be it from a statistician, epidemiologist, clinical microbiologist, or whatever. Do not be afraid to ask for help and do not jealously guard your own 'turf' from outsiders to the detriment of your application. Wherever possible, document proposed collaborations and offers of materials or reagents of restricted availability with letters from the individuals involved.

Common clerical errors include not providing sufficient paper copies of the completed application, not providing a soft copy, failing to obtain ethical clearance or an exemption for the research study, not including applicant's CVs or signatures, and so on. Each omission delays the processing of your application.

Writing

Presenting a complex research question coherently and then cogently justifying its support in a few thousand words is definitely an art. The perfectionist would argue that a badly spelt and grammatically weak application would have no chance of success. Whilst it is generally wise to have your application looked at by someone else before submission, or at least spell-checked by the computer, it does not follow that the typo discovered two weeks after submission is the death knell for the application. Most review boards make suitable allowance for poor spelling and grammar. After all, the applicants are scientists, not English teachers. Of course, there is a limit to the extent of the language deficiencies that will be acceptable, but at the end of the day, it is not bad spelling that kills a grant application; usually the clincher is the fact that the highly intelligent individuals comprising the grant review panel cannot make head or tail of it!

Getting the length of the application right is one of the biggest challenges facing the grant applicant. The temptation is to adopt an 'everything but the kitchen sink' attitude, in which every conceivable piece of background information is included in the hope that any query raised in the subsequent review will be addressed. The more

'The buck stops with the guy who signs the cheques'
Rupert Murdoch

The number of applications that arrive on the closing day is staggering

parsimonious approach holds that that which is not essential to the application must be ruthlessly expunged. Generally, the best course of action is to try to fill the space available. This at least gives the impression that you have more information to hand if necessary, but have chosen not to include it due to space limitations. If you have a five-page allowance for methods and you can only manage to write one page, your application will immediately be viewed with suspicion. Your problem should be how to cut the information you have to fill the space available.

The major elements of any grant application comprise the Abstract, the Research Plan and the Methods.

Abstract

The abstract should include:

- a brief background of the project
- specific aims or hypotheses
- the unique features of the project
- the methodology to be used
- expected results
- evaluation methods
- the significance of the proposed research

The abstract should be seen as a one-page advertisement for your research proposal. Write the abstract last so that it reflects the entire proposal. The abstract has a longer shelf life than the rest of the proposal and may be used for purposes other than the review, such as providing a brief description of the grant in annual reports, presentations, or responding to requests from senior management at the funding body.

Research plan

The research plan should describe the *what*, *why*, and *how* of the proposal. It should address a number of issues.

- What do you intend to do?
- Why is this worth doing? How is it innovative? Make a compelling case for your proposed research project.
- What has already been done in general and what have other researchers done in this field? Use appropriate references. Avoid outdated research. Show knowledge of recent literature and explain how the proposed research will further what is already known. Use citations not only as support for specific statements but also to establish familiarity with all of the relevant publications and points of view.
- What have you done to establish the feasibility of what you are proposing to do? Emphasise how some combination of a novel hypothesis, important preliminary data, a new experimental system and/or a new experimental approach will enable important progress to be made.
- How will the research be accomplished? Who? What? When? Where? Why? Establish the credibility of the proposed principal investigator and the collaborating researchers. Do you have the facilities (physical space, equipment, manpower) or are they available readily within your institution? Provide evidence of collaboration if you intend to use other resources or techniques outside your sphere of knowledge.

Methods

The research methods section should include the following:

- An overview of the experimental design. Give sufficient detail. Do not assume that the reviewers will know how you intend to proceed.
- A detailed description of specific methods to be employed to accomplish the stated aims. Provide detailed protocols, questionnaires (for surveys), etc. Is progress dependent upon the stepwise completion of successive stages? If so, what are the contingency plans if any of the stages cannot be completed?
- A detailed discussion of the way in which the results will be collected, analysed, and interpreted. How was the sample size calculated? What effect size will be measured? What is the statistical power of the study? What statistical tests will be used and why?
- A projected sequence or timetable. Is the sequence logical? Is it overly ambitious? Are the aims feasible given the time, budget and manpower requested?
- A description of any new methodology used and why it represents an improvement over the existing ones. This establishes that alternative approaches were not simply overlooked.
- A discussion of potential difficulties and limitations and how these will be overcome or mitigated. If employing a complex technology for the first time, take care to demonstrate familiarity with the experimental details and potential pitfalls. If necessary, add a co-investigator or consultant experienced with the technology to the project team.
- Expected results and alternative approaches that will be used if unexpected results are found.

Box 1. A quick guide to getting it right

1. Read all the guidelines and supplementary materials thoroughly before filling in the application form.
2. Abide strictly by the guidelines. If it says supplementary material will not be considered, then do not provide any. If it says ethical approval is mandatory – obtain it.
3. Sign the form. You may need the signatures of other departmental officers, e.g. head of department, finance officer, *etc*.
4. Apply in good time; do not leave it until the last minute.
5. Declare conflicts of interest, simultaneous funding or whether the same application was rejected by other bodies.
6. Be patient.

- Precautions to be exercised with respect to any procedures, situations, or materials that may be hazardous to personnel or human subjects.

The applicants may believe that the answer to many of these questions will be self-evident to the reviewers from the application. Conversely, if they are absent, the reviewer may believe that the applicant does not know what he or she is doing.

Supporting material

Another element that is often overlooked is the space provided for additional comments or supporting materials. This is an opportunity for applicants to mention the test questionnaires, diagrams, flowcharts, reprints of related articles or manuscripts in press, media articles, etc, that they may not have had space to mention previously. This is an enormously important element of the application. Any information that will help the reviewers look favourably on the application should be included. It is also important to declare any actual or potential conflicts of interest, simultaneous funding pending or received, and whether the same – or a substantially similar – application has been rejected previously by other funding bodies.

It is essential to justify all requests for consumables, equipment, manpower and other costs. Why are Brand X consumables preferred over cheaper alternatives? Why is that expensive piece of equipment required? Note that 'to speed up the analysis' is not really a justification in such cases. The reviewer will tell you to use standard methods, take a bit more time, and save the thousands the equipment costs. Is a Post-Doc or Masters student really required? Can a research assistant or even a technician do the work?

Finally, before submission, have the entire application read by a colleague from whom you are not afraid to receive criticism. Maybe the entire proposal is conceptually wrong and a waste of time. They will almost certainly have some comments on how to improve the application.

Submission

By far the greatest problem with applications is leaving it until the last minute. An open call for applications often lasts three months. It is not uncommon for grant administrators to receive no applications at all for the first two months – obviously time is needed to write the application – but the number of applications that arrive on the closing day is staggering. Timely submission is strongly encouraged. Applications will be opened and read and processed by the fund secretariat before the closing date. The more they can get through before the deadline the more time they have to deal with the inevitable onslaught of late submissions.

Review

The actual review process varies greatly between countries and often between funds administered by the same funding body. In Hong Kong, it is usual for applications to the Research Fund for the Control of Infectious Diseases to be sent to a local as well as one or two overseas experts. About 4-6 weeks is allowed for these independent reviews, following which a Grant Review Board is convened and the applications discussed in the light of the independent expert opinion.

The old chestnut that it is better to have your application reviewed at the beginning of the day, when the review panel is fresh and enthusiastic, rather than at the end of the day, when they are bored, irritable and ill-disposed to acceptance is a fallacy. One could equally argue that it is better to be reviewed at the end of the day when the review panel is keen to go home and will overlook serious flaws in the application that they would have picked up earlier. In reality, the time of day, or the sequence in which a grant is reviewed (the beginning, middle or end of a session) is essentially immaterial.

Read the guidelines and abide by them

The time between the closing date and actually receiving a funding decision can be considerable. Presumably, the applicants have been working on the problem in the meantime in some capacity and so will be able to provide updated progress, additional data or feedback to the review panel if necessary. If the investigator has submitted the same application to another fund and has received a decision, inform the other fund secretariat as soon as possible.

Response

Eventually, the review board will send you their decision. Statistically, it is more likely to be negative than positive. In Hong Kong, a 10-25% success rate across a range of funds is not unusual. If your application is approved – congratulations! You may need to provide the secretariat with start and end dates for your study or sign a contract spelling out terms and conditions before you can receive the grant. Do so promptly – simply releasing funds can take several weeks.

More likely, a funding decision will be deferred pending clarification of questions raised by the reviewers. In these circumstances be polite and humble. Do not bite the hand that feeds (or may be about to feed). Answer all the questions fully and completely. Regardless of how you feel, do not insult the reviewers or the secretariat staff. If you differ in your opinion try to courteously convince the reviewers of your point of view. In addition to responding to specific reviewer concerns, review the rest of the application to determine whether updating or improvement is possible. Just because it was not criticised before is no guarantee it will not be criticised in the review of the revised application.

Research grant applications can be fraught with pitfalls. Fortunately, many of these can be prevented with adequate attention to the format and content of the application form, timely observance of deadlines and a rapid and full response to requests for further information.

Good luck!

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