



Special Article

Grantsmanship writing tips: significance, innovation and impact

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1. Introduction

In this fourth and last special article on grantsmanship [1–3], we discuss the strategies to write competitive “Significance,” “Innovation,” and “Impact” sections, when required. Several sponsors request these, and it is important that their elements are written strategically, as they often account for a large portion of the review criteria. We will also present specific components that are needed for applicants to the National Institute of Health (NIH) from Europe. The NIH is the leading funder of biomedical research in the United States; at present, 495 awards are given to “foreign” institutions, and even more funding is provided when the foreign institution is listed as a subaward, or an individual is listed as a consultant. European institutions can apply for funding; however, there are additional elements that need to be considered [4].

2. Significance

Funding agencies often require a “Background and Significance” section because background and significance are logically related. While the *Background* defines the “gap/need” [2], the *Significance* states the positive impacts the project will have, by “filling the gap or meeting the need.” “Significance” is a term used by sponsors to identify the “why” of the project (why is your study important?). A study is important, and thereby significant, because it will fill a gap or meet a need. Thus, it is imperative that this section “captures” the reviewer and clearly demonstrates both the *need for the project* and its *impact or*

contribution to health and science. Therefore we advise, as others have [5], to structure the section into two main parts. *First*, define once again the *need for the project*. You will be able to include more details on the feasibility and rationale in this section, but you will save the specific details and outcomes for the Approach or Experimental Design sections. Specifically, you should make a solid case for the need using peer-reviewed literature, preferably literature that includes the personnel on the grant application. One must be judicious with citations. It is better to cite the most relevant literature rather than list a large quantity. Be sure to use primary literature and not topical reviews when justifying your project rationale, your choice of model, or your methods. In addition, you do not simply state what the literature says. Any citation should be discussed and include both the strengths and weaknesses of the study. The identified weaknesses of the current literature will highlight the current gap in knowledge and therefore “need” of your project. Likewise, you will want to introduce your supportive preliminary data in this section; once again, highlight the strengths and acknowledge any weaknesses. Because these discussions take up space, it forces the writer to choose only the most relevant data and literature.

Second, after developing a strong argument for the need and feasibility of your project, you will want to acknowledge how your project will forward biomedical research progress. Clearly state the *impact or contribution to health and science* that your project will bring. Identify what technology, method or data will be produced and how specifically it will impact your field(s). Describing the contribution that your work will bring, allows the reviewer to understand what the expected outcomes are and why they are important. Use the terms “significance” and

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“contribution”. Using these key terms alerts the reviewer that the sentence is important and that will address the review criteria. At the same time, do not overstate the benefits of your project. Doing so will affect your credibility.

3. Innovation

For many funding agencies, the “Innovation” section is both a structural component of the proposal and a key review criterion, often accounting for about 20% of the overall score. This part is ½ page to 1 page on average, so it is vital that this section accomplishes its goal.

Before writing, be clear as to the difference between “New” and “Innovative”. Innovation is considered something novel that would bring progress, i.e., that would have a positive impact on patients' care. In an innovative perspective, it's not enough to propose a “new” diagnostic biomarker, but it is crucial to show how this biomarker will open new horizons and drive the progress with a positive impact in clinical practice.

As proposed by others [5–7], the advice is to structure this section into 3 components: *i.* Introduction with background and status-quo; *ii.* Statements of innovation and *iii.* The positive impact in terms of progress and new horizons. Begin by briefly framing what is the *status-quo* by citing relevant literature to create a clear picture of currently accepted knowledge. Discuss where the problem is and why in your opinion the progress is stalled and/or the research questions are still unanswered. Second and most importantly, highlight what is innovative in your project and what will be *changed* by your work. Do you have a new methodology? A new application of theoretical concepts? Does your team have a new combination of expertise? Are you proposing an innovative way to look at a problem? Will patient care guidelines be updated? Will a new procedure be validated? State if you are using any novel or original methodology or tools, and underscore if your team has a unique combination of expertise. Use italics or bolding to bring the reviewers attention to lines that clearly detail the innovative components of the project. Likewise, use the term “innovation”. Finally, close this section, with a short paragraph about how the project will broaden research horizons. Describe also how the research will assist the funding agency in reaching new heights and breaking down any barriers to research. Currently, “horizons” is a key term that should be incorporated.

One of the main problems raised by reviewers regarding the innovation section is the lack of credibility and feasibility, especially for junior investigators [6]. Thus, it's crucial to always support the innovation section with your objective and original preliminary data and/or with the novel expertise of your team.

4. Impact

Numerous European funding agencies, including the EU program Horizon 2020, require an “Impact” section in the proposal that usually corresponds to an evaluation criterion. Specifically, Horizon 2020 grant applications are generally composed of two parts: *i.* an administrative form with all the details on the partners involved in the consortium and *ii.* the research proposal that is structured and evaluated based on “Excellence”, “Impact” and “Implementation” [8]. Horizon 2020 and other funding agencies [9] consider *Impact* as all the demonstrable positive effects that the research project will have on science and on the scientific world, on society and industry, or even on researchers' career development for fellowships grants. In this view, we advise to carefully read the Horizon 2020 work programme for the action of interest or the call for application/mission from the funding agency where the sponsor clearly states the expected impact that a funded proposal should have. Thus, you should tailor your consortium and/or design your project in order to best fulfill the impact requirements.

General principles of grantsmanship to use when writing the impact section of proposals are similar to those of the other two grant sections

described above. First, introduce the topic by presenting both what is known and what is not known; comprise a critical discussion of the consequences (including lack of advancement) that the current gap of knowledge has on the scientific and medical field. Then briefly describe the outcomes that the project is expected to bring and finally present all the demonstrable positive impacts and contributions that the project will have on science/medicine by enlightening what now is unknown (for instance significant advances in methodologies, theories and applications). It is important to support all the statements with objective and project-specific data based on preliminary results and peer-reviewed literature.

When required, the *Societal Impact* is considered as all the demonstrable positive effects that a research project has beyond the academic and scientific world (for instance the enhancement of quality of life and health). An additional way to build and support societal impact in a proposal is to present an accurate plan of public engagement activities [10] and therefore show how each activity will impact citizens, patients or society in general (for instance by informing citizens or even inspiring the next generations of scientist).

Some funding agencies require an *Impact on Industry and Economy*. In this case, the strategy is to have a clear plan of utilization of the research results [11] such as the filing of patents, the creation of spin-offs business or research, or the direct involvement industrial partners in the team/consortium when allowed. In this case, when writing the impact, it is important is to give both qualitative and quantitative details on the expected positive effects (revenue, returns on investments, savings). Regarding the specific economic impact of medical research, in cases where a patenting/industrial plan is not feasible, the key is to focus on savings for the healthcare system by reducing things like hospitalization rates, missed diagnoses, and emergency room visits. As before, your text must be objective and give project-specific data in support of the impact.

Finally, sponsors supporting fellowships grants often require the applicant to state the *Impact on the career development* of the fellow. The keyword to use in this case is “employability.” It is vital to show how all the planned research and training activities during the fellowship will strengthen the scientific profile of the fellow making him/her competitive in the science market, once completed the program.

5. Writing tips for European investigators applying to NIH

The section called “*Justification of Foreign Institution*” is required only for NIH applications that involve an institution outside of the USA. It will be reviewed, and it will contribute to the scoring categories of Investigator, Approach, and Environment. It is extremely important that in this page of text, the authors detail why the project requires a collaborator or institution outside of the USA and further that that resources used will enhance the research and public health of the USA. Once again, as you write, you must think of the audience, the reviewer. How will this work benefit American public health? The easiest solution is to identify what you are able to offer that is not available in the USA. Are you the leading expert on a technique or process? Do you have a dataset or animal model that is not currently available to the US? The justification should list the scientific advantages of the foreign component and also assuage any concerns about data and patient security. Be clear as to what weaknesses are addressed by the inclusion of foreign investigators, sites or technology. It is critical to include talent, resources, population or technology that is not readily available in the USA.

Finally, remember that the NIH provides funds to an institution and not an individual, so be sure that your institution has properly registered with the appropriate sites (Table 1) prior to submission.

6. Conclusions

Grant writing is becoming an important task for practicing

Table 1
Required registrations for foreign organizations.

Required registration	Purpose	Website/Contact
Dun & Bradstreet DUNS number	An organization needs a unique nine digit identification number that is associated with the physical location of the organization	https://fedgov.dnb.com/webform International Email: SAMhelp@dnb.com
System for Award Management (SAM) Registration	Database used for US federal government; stores information that is needed for any financial award.	https://www.sam.gov/SAM/ International Phone: 334-206-7828
Grants.gov	Needed to submit application (must have attained a DUNS Number and completed SAM registration); identifies the authorized organizational representative/signing official and provides organizational information	www.grants.gov Email: grantsinfo@nih.gov
eRA Commons	Allows for the organization and individual to complete their profiles which are needed prior to application (only signing official from organization can approve for an individual profile to be affiliated with the organization); tracks application status; enables access to ASSIST, the submission system	https://era.nih.gov/ Phone: 1-866-504-9552
North Atlantic Treaty Organization (NATO) Commercial and Governmental Entity (CAGE) – NCAGE code	Required for receipt of funding	https://eportal.nspa.nato.int International Phone: 269-961-7766

physician-scientists all around the world. The key for a successful grant is to start from a clinically relevant scientific hypothesis and translate it into a sound, well-written research proposal, presented by a competitive and skilled team. This is the last special article on grantsmanship [1–3] that we wish will support the audience of the European Journal of Internal Medicine, in reaching their scientific and funding goals.

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