Integrating Broader Impacts into your Research Proposal

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Defining ‘Broader Impact’

How well does the proposed activity:

- Advance discovery and understanding while promoting teaching, training, and learning?
- Broaden the participation of underrepresented groups (e.g. gender, ethnicity, disability, etc.)?
- Enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships?
- What are the benefits of the proposed activity to society in general?

from NSF Review Criteria, 2011
Examples of BI Activities

Leadership or teamwork in STEM Education

Cross cultural experiences in US or abroad

Initiatives to benefit society or environment

Efforts to improve public scientific literacy

Engage with diverse audiences

Educating policy makers

Teach Mentor Outreach

Teach Mentor Outreach
Broader Impacts Planning Sheet:

<table>
<thead>
<tr>
<th>Past Audiences &amp; Activities</th>
<th>Number Reached &amp; Results</th>
<th>Proposed Audiences &amp; Venues</th>
<th>Proposed Aims &amp; Intended Outcomes</th>
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<td>NOTE: Your BI plan will be stronger if you show reviewers that you already engage in BI activities!</td>
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<td>Also you should not propose to do all things with everyone.</td>
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<td>Focus!</td>
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Elements of your broader impact plan

A good broader impact plan will have:

- Explicit objectives
- Stated relationship to scientific research
- Understanding of intended audience
- Specific and feasible implementation plans
- Connectivity to existing networks
- Evaluation plan - did you accomplish objectives?
The following elements should be considered in the review for both criteria:

- What is the potential for the proposed activity to:
  - Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
  - Benefit society or advance desired societal outcomes (Broader Impacts)?
- To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
- Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
- How well qualified is the individual, team, or organization to conduct the proposed activities?
- Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?
Example activities

- Participate in the recruitment, training, and/or professional development of K-12 science and math teachers

- Participate in developing new approaches (e.g., use of information technology and connectivity) to engage underserved individuals, groups, and communities in science and engineering

- Partner with museums, nature centers, science centers, and similar institutions to develop exhibits in science, math, and engineering

- ..... More examples in BOX folder
Example activity

- Wisconsin Idea STEM Fellows program

- It is an NSF-funded initiative for the Portal to the Public Network (PoPNet) and with an Advancing Informal STEM Learning (AISL) grant

- PoPNet is a collaborative of some 60 informal science education institutions (science centers, museums, zoos, etc.) of which UW-Madison is one member. (see popnet.pacificsciencecenter.org)

- UW-Madison and its Science Alliance recruits and trains cohorts of scientists (graduate students, postdocs, faculty, staff) in outreach and upon completion of 3 public events, awards the Wisconsin Idea STEM Fellow title to the individual

- The AISL grant will research the partnership between UW-Madison scientists and the WID team
• Professional development workshop: build skills to engage public
• Refine key messages about your research
• Practice simple techniques for talking science with non-scientists: focusing on small group communication and interaction
• Develop a hands-on educational activity directly related to research
• Participate in at least 3 public events over a 1-year period
Broader Impact of Your Research

While it is important to describe the significance and impact of your research...

- talking about the impact of your research alone is NOT sufficient to satisfy NSF’s broader impact criteria

- “...both criteria are important and should be given full consideration during the review and decision-making processes, each criterion is necessary but neither is sufficient.” NSF’s Merit Review Criteria, Review and Revisions, December 2011, National Science Board
Insights from Review Panels

- Applicants reviewed in blocks based upon stage in education
  - expectation of research experience and accomplishments is commensurate with stage of education
    - all senior undergraduates reviewed first
    - first-year graduate students
    - second-year graduate students
Insights from Review Panels

- General review guidelines:
  - Intellectual Merit (not really the focus of this workshop!)
    - high standards for academic performance
    - research expectations dependent upon both education stage and availability of research opportunities
    - you MUST be able to clearly communicate the motivation, purpose, and general plan for your research
    - do NOT assume that the reviewer has any background knowledge in your specific research area
    - make sure you do not have any conspicuously absent reference letters (i.e., from your past or present research advisors)
    - for later-stage applicants, evidence of research productivity is crucial
Insights from Review Panels

- General review guidelines:
  - Broader Impact
    - integration of broader impacts throughout?
    - demonstration of knowledge of what constitutes broader impact activities?
    - evidence that you will follow through with your proposed activities?
    - past participation in broader impact activities? leadership or initiative in these activities?
    - does not need to be astonishingly novel – but should be meaningful, feasible, and have the potential to impact broad and/or diverse audiences
  - Overall: How well has the applicant done given the hand they have been dealt?
    - not everyone has the same opportunities – has the applicant taken advantage of the opportunities available to them?
Merit Review Criteria and GRFP

For example, reviewers evaluating applications submitted to the Graduate Research Fellowship Program may consider the following with respect to the Intellectual Merit Criterion: the potential of the applicant to advance knowledge based on a holistic analysis of the complete application, including the Personal, Relevant Background, and Future Goals Statement, Graduate Research Plan Statement, strength of the academic record, description of previous research experience or publication/presentations, and references. Holistic review is a flexible, individualized way of assessing an applicant's interests and competencies by which balanced consideration is given to experiences, attributes, and academic achievements and, when considered in combination, how the applicant has demonstrated potential for significant research achievements in STEM and STEM education.

Reviewers may consider the following with respect to the Broader Impacts Criterion: the potential of the applicant to benefit society and contribute to the achievement of specific, desired societal outcomes based on a holistic analysis of the complete application, including by personal experiences, professional experiences, educational experiences and future plans.
What do YOU get out of this?

- If you receive the funding:
  - a pretty nice stipend
  - prestigious award
  - ability to choose amongst a greater number of labs/advisors
  - advisor happiness
  - supported plan for engaging in broader impact activities

- Even if you do not receive the funding:
  - experience in grant-writing and forming a research plan
  - generation of broader impact ideas that perhaps you and your advisor can still explore
A few additional resources

- UW-Madison Writing Center (http://writing.wisc.edu)
  - Will review early drafts for you (but contact them ASAP!)

- UW-Madison Graduate School Resources
  - http://grad.wisc.edu/studentfunding/fellows
  - https://uwmadison.box.com/GradSchool_NSFRresoures

- UW-Madison WISCIENCE and Science Alliance Fellows programs
  - http://wiscience.wisc.edu
  - http://www.science.wisc.edu

- National Association for Broader Impacts (NABI)
  - An NSF award to develop a BI community of practice
  - http://broaderimpacts.net

- University of Missouri list of resources (Broader Impact Network)
  - http://broaderimpacts.missouri.edu/

Of course also see the workshop packet PDF and our BOX folder for many more resources
Science Alliance Updater, a weekly email of campus events in science outreach. Send your name and email to kjniemi@wisc.edu and I will add you to the list.

OR

Send a blank email to join-allianceall@lists.wisc.edu