New Faculty National Science Foundation (NSF) Broader Impacts (BI) Workshop Series:

History of and Why Faculty Have Still Been Confused on NSF BI - Part (ii).

MICHAEL THOMPSON, PHD “THE BROADER IMPACTS GUY”
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1. **Research performer competence** -- relates to the capability of the investigators, the technical soundness of the proposed approach, and the adequacy of the institutional resources available.

2. **Intrinsic merit of the research** -- the likelihood that the research will lead to new discoveries or fundamental advances within its field of science or engineering, or have substantial impact or have substantial impact on progress in that field or in other science and engineering fields.

3. **Utility or relevance of the research** -- the likelihood that the research can contribute to the achievement of a goal that is extrinsic or in addition to that of the research itself, and thereby serves as the basis for new or improved technology or assist in the solution of societal problems.

4. **Effect on the infrastructure of science and engineering** -- the potential of the proposed research to contribute to better understanding or improvement of the quality, distribution, or effectiveness of the nation’s scientific and engineering research, education, and manpower base.
National Science Board (NSB) and NSF Task Force on Merit Review Discussion Report:

I. Context of the Report

The merit review process is the nexus around which the evaluation of proposals at the National Science Foundation (NSF) revolves. Almost all of the 30,000 proposals submitted to NSF annually undergo external merit review. NSF has the resources to fund only about one-third of these. NSF receives over 170,000 reviews each year to help evaluate these proposals. Through the use of merit review, NSF seeks to maintain its high standards of excellence and accountability for which it is known around the world.

In 1981, the National Science Board (NSB) adopted four generic criteria for the selection of research projects, titled: (1) research performance competence, (2) intramural merit of the research, (3) utility or relevance of the research, and (4) effect of the research on the infrastructure of science and engineering. (A detailed description of these criteria may be found in Appendix A.) Because education programs had been eliminated from the budget at that time, the 1981 criteria addressed only research proposals. In the 1990s, they were adapted to our education programs as well...

Also, since 1981, the portfolio of projects solicited and supported by NSF has expanded to include, among other things, broad education initiatives and focused center-based activities. Further, the NSF Strategic Plan (NSF 95-54) emphasizes new long-range goals and core strategies, and the Government Performance and Results Act (GPRA) emphasizes the importance of linking NSF’s goals and strategies to the results of its portfolio of investments in science and engineering. In light of these changes, an assessment of the appropriateness of the NSF criteria seems warranted.

As its 1995 meeting, the NSB re-examined the criteria in light of the new Strategic Plan. A subcommittee of the Phase Review Process Task Force was charged with examining the Board’s generic review criteria and making recommendations on revising or changing them, along with providing guidance on their use. This paper presents the Task Force’s deliberations and findings. It is not intended as a final set of recommendations but as a means of stimulating discussion within and outside of the Foundation.
NSF Broader Impacts Criteria:

National Science Foundation (NSF) Merit Review Principles and Criteria

NSF uses two merit review criteria for evaluating research proposals for funding: Intellectual Merit and Broader Impacts. Both criteria are to be given full consideration during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria.

- The Intellectual Merit criterion encompasses the potential to advance knowledge.
- The Broader Impacts criterion encompasses the potential to benefit society and contribute to achievement of specific, desired societal outcomes.

Broader Impacts may be accomplished through the:

I. the research itself,
II. activities that are directly related to specific research projects
III. activities that are supported by, but are complementary to the project.

The following questions will be asked of BOTH CRITERIA when reviewing proposals:

1. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
2. 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?
3. How well qualified is the individual, team, or organization to conduct the proposed activities?
4. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes. Such outcomes include, but are not limited to:

1. Full participation of women, persons with disabilities, and underrepresented minorities in STEM (specifically African Americans, Hispanics, Native Americans, Alaska Natives, and Pacific Islanders)
2. Improved STEM education and educator development at any level
3. Increased public scientific literacy and public engagement with science and technology
4. Improved well-being of individuals in society
5. Development of a diverse, globally competitive STEM workforce
6. Increased partnerships between academia, industry, and others
7. Improved national security
8. Increased economic competitiveness of the United States
9. Enhanced infrastructure for research and education

Note: Plans for data management and sharing of the products of research, including preservation, documentation, and sharing of data, samples, physical collections, curriculum materials and other related research and education products should be described in the Special Information and Supplementary Documentation section of the proposal.
Utility or relevance of the research -- the likelihood that the research can contribute to the achievement of a goal that is extrinsic or in addition to that of the research itself, and thereby serves as the basis for new or improved technology or assist in the solution of societal problems.

Effect on the infrastructure of science and engineering -- the potential of the proposed research to contribute to better understanding or improvement of the quality, distribution, or effectiveness of the nation’s scientific and engineering research, education, and manpower base.

NSF BI 1-9 Areas
History of BI*, 1997 until now...

American Competes Act 2010
Congress mandates BI and encourages IHEs to assist PIs in achieving the BI criterion and requires PIs to provide evidence of institutional (BI) resources

2011
We are keeping BI and IHEs should provide support for PIs because there is confusion about it.

2012 & 2013
Three BI Offices Developed and National Alliance for Broader Impacts (NABI)

2014
Broader Impacts in Research (BIR)

See handout on NSF BI Criteria and NSF FAQs
Understanding NSF Broader Impacts - The Big Problems for Faculty:

Understanding Broader Impacts ≠ Understanding How to do NSF Broader Impacts

Nationally Information being provided and developed

*Lack of Conceptual/Theoretical Frameworks (thought experiment/exercise and 5 minute reading)
A broader impacts conceptual/theoretical framework allows us to effectively build and then advance on the national information being provided and developed in the NSF broader impacts domain:

Lack of Conceptual/Theoretical Frameworks

Better understanding of, more advancement, and increase in, transformative and creative NSF BI
The Broader Impacts Conceptual Framework (BICF):

- An explicitly societal centric framework that allows for engagement from society into the institution and engagement from the institution into society

- An engagement-outcome-impact model for creating sustainable societal beneficial impacts

- A framework that is relevant for an entire institution, provides insight into how the BI community and engagement community can explicitly interact

- Provides a way to institutionalize BI and engagement, and introduces and brings together fields of study and practice - Societal Benefit Theory & Practice (SBT&P)
Understanding NSF Broader Impacts - The Big Problems for Faculty:

- Understanding Broader Impacts
- Understanding How to do NSF Broader Impacts

Nationally Information being provided and developed

Conceptual/Theoretical Frameworks Allows This Transition
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