

ALIGNING YOUR PROPOSAL: NATIONAL SCIENCE FOUNDATION FUNDING PRIORITIES¹

WHAT ARE BROADER IMPACTS?

NSF defines Broader Impacts (BI) as the potential of scientific research to benefit society and contribute to the achievement of specific, desired societal outcomes. BIs include, but are not limited to:

- Full participation of women, persons with disabilities, and historically marginalized and excluded demographics in STEM
- Improved STEM education/educator development at any level
- Increased public scientific literacy and public engagement with science and technology
- Improved well-being of individuals in society
- Development of a diverse, globally competitive STEM workforce
- Increased partnerships between academia, industry, etc.
- Improved national security
- Increased economic competitiveness of the United States
- Enhanced infrastructure for research and education

From 1992-2019, BIs were conceptualized in four categories:

- Human Capital
- Technological Capital
- Cultural Capital, and/or
- Benefits to Society.

But I'm not apply to NSF. Now what?

At WySCI, we use Broader Impacts as shorthand for all these approaches to sharing science and making science matter. If you're not applying for funding from NSF, you probably won't see a call/requirement for 'broader impacts' per se. Instead, you might see language like research impacts in society, career or military readiness, innovation, mentoring, etc. WySCI is available to consult on these efforts regardless of funding target.

WHAT DO WE KNOW ABOUT HOW NSF FUNDS² BROADER IMPACTS?

NUTSHELL

Bad: What PIs think is compelling often doesn't match reviewer priorities or award trends.

Good: The issue isn't entirely what a PI proposes; the crux is how you frame it. NSF historical priorities can inform how you frame your proposal and work plan, but you generally do not need to fully shift your conceptual frame.

Rates of funding for successful broader impacts is higher when impacts are situated closer to the project (Fig. 1).

Human Capital-related funding, across all NSF directorates, accounted for 47-56% (2014 & 2018), except for the Social, Behavioral, and Economic Sciences (~33% for both FYs).

These priorities are evident in decisions from *reviewers and program officers* but are not official NSF policy.

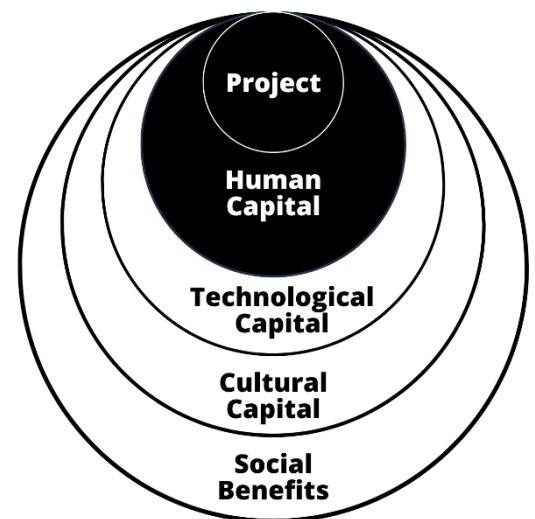


Figure 1. The closer your Broader Impacts are to the core of this figure, the easier it is to make a compelling pitch for funding.

FEASIBILITY & ALIGNMENT MATTER

The saying in the Broader Impacts field is that “**Broader Impacts won’t win you a grant, but they can lose you one.**”

Your proposed Broader Impacts should be:

- Integrated throughout your proposal, not siloed in an “outreach” project;
- Aligned with the capacity of your team;
- Plausible and feasible, which includes allocating adequate funding, evidence of necessary expertise and/or relevant partnerships, etc.

These factors help to explain why ‘Benefits to Society’ (that outermost ring of Fig. 1) are receiving less support from reviewers. Such impacts are frequently (a) taken for granted or (b) seem far-fetched.

ASSESSMENT IS A GROWING PRIORITY FOR FUNDERS

For just these reasons, assessment is increasingly expected. In 2014 & 2018, for example, student assessment was the major investment area for all types of student-related funding. If assessment of Broader Impacts is not clearly spelled out in your proposal, reviewers may not believe that:

- you’re actually going to do the work, and/or
- you/your team are equipped to assess the efficacy of your broader impacts efforts.

WHO SHOULD YOU TARGET WITH YOUR BROADER IMPACTS?

You are actually the best person to answer this question. Who do you think your science can or should matter to? What other types of benefit do you hope your work in science will have? (Yes, these are potentially complex and even existential questions!) Here are a couple of resources for thinking this through:

- Fasttrackimpact.com/i-want-to-plan-my-impact hosts a template for analyzing who you might want to focus on and work with. They also host a [high-level impact planning template](#) that you may find useful, along with several other relevant resources.
- This typology of public impact, coupled with this paper discussing scientists’ Impact Identities, can help you narrow in on those big questions we just posed you.

WHAT DO YOU DO WITH ALL THIS INFO?

- 1. Review your current ideas/proposal.** Do your Broader Impacts address the considerations detailed in this hand-out? If not, consider reviewing [this resource](#) from the Center for Advancing Research Impacts in Society (ARIS) as a starting point.
- 2. Scan the [resource options](#)** hosted by ARIS to see if any resonate with what you hope to do.
- 3. Explore** the [Broader Impacts planning rubric](#) or the [rubric tutorial](#) which walks you through a case study’s use of the rubric. These resources are part of a distilled [Broader Impacts Toolkit](#) provided by ARIS in partnership with Rutgers University.
- 4. Reach out to WySCI.** We are here to help! Come to our weekly support drop-in sessions to get the ball rolling. We can help you think big picture, connect to campus and community partners, and even sort out the specifics of your Broader Impacts efforts. [Details on our website.](#)
- 5. Remember to contact the UW Research and Economic Development office.** Their [Proposal Development clearing house](#) will orient you to compliance and submission processes, necessary contact people, etc., that you will need to coordinate with as you develop and submit your proposal. NOTE: You will have access to much more timely and thorough support if you notify Research Services weeks or months ahead of your submission deadline. They will not process proposals with less than 5 days’ notice, but your proposal (and your stress levels!) will be much better if you don’t cut it that close.

NOTES

1. These Broader Impacts insights are based on NSF reports from FY 2014 & FY 2018.
2. See page 3 for more detail on recent NSF funding patterns as they relate to Broader Impacts.

SOME NITTY GRITTY ON NSF'S FUNDING PATTERNS

Today, Broader Impacts are organized in five categories: (1) Advance Discovery; (2) Benefit to Society; (3) Broaden Participation; (4) Dissemination; and (5) Enhance Infrastructure (in alphabetical order).

While the categories have changed, the priority on human capital-related funding will likely persist. Indeed, federal policy and other significant national trends influence flux in funding priority for these categories from one funding cycle to the next.

According to 2014/2018 data, the majority of NSF funding is allocated to projects where BIs contribute to 'Advance Discovery' (~40-55%). In the other categories, the current trend appears to be greater emphasis placed on 'Broaden Participation,' although this varies by directorate. These trends align, of course, with the longer-term emphasis on funding that supports human capital in Broader Impacts. Within this context, *projects which involve undergraduates substantively in research (not just broader impacts), particularly in ways that 'Broaden Participation', received more funding compared to other types of Broader Impacts.* Projects which 'Enhance Infrastructure' account for ~25%, and 'Broaden Participation', 'Benefits to Society', and 'Dissemination' collectively account for the remainder (2014 & 2018). However, NSF data indicate that reviewers prioritize 'Dissemination' slightly more than funding rates reflect.

YOUR PROPOSAL MAY BE MISALIGNED FROM REVIEWER PRIORITIES AND NSF FUNDING MAY NOT FULLY ALIGN WITH REVIEWER PRIORITIES.

While successful FY 2018 proposals (e.g., project summaries) tended to emphasize 'Advancing Discovery' and 'Broadening Participation' with some attention to 'Enhancing Infrastructure,' reviewer emphasis varied by directorate. Most reviewers prioritized projects which 'Advance Discovery' through alignment of BIs with the overall research proposal. Meanwhile BIO, CSE, EHR, GEO, and MPS also prioritized 'Benefit to Society,' EHR emphasized 'Dissemination,' and SBE also emphasized 'Broaden Participation.'

Much of NSF's orientation and funding momentum in the past decade was informed by the American Innovation and Competitiveness Act (AICA). Within that context, there were 7 priorities. In 2018, reviewers emphasized advancing health and welfare, broadening participation, and industry participation. However, the projects that reviewers prioritized also tended to emphasize economic competitiveness, developing the workforce, national security, and public literacy. (Similar differences were evident in 2014, with the sole difference being reviewers prioritized developing the workforce, not industry participation). These priorities held true across major initiatives and more general funding pools. 'Advance Discovery' received 45%-50% of all funding in FY2018, followed by 'Broaden Participation' (15%-17%) and 'Enhance Infrastructure' (15%). Trends held true for multi-directorate funding, too.

As the next cycle of federal focus comes onboard (aka the CHIPS and Science Act; [overview here](#)), we can expect some fluctuation in these trends as reviewers and directorates account for current priorities. However, overarching principles will likely hold.

WHY ARE WE TALKING ABOUT BOTH WHAT WAS FUNDED AND REVIEWER PREFERENCES?

The NSF proposal review process involves multiple stages. At its simplest, proposals that meet the eligibility criteria are distributed to volunteer reviewers (your scientific peers, recruited via several NSF mechanisms). Individual reviewers typically review a subset of proposals which are being considered at a given time; usually each proposal is considered by two independent reviewers. The reviewers rate the proposals via two key criteria: Intellectual Merit and Broader Impacts. Although the two criteria are supposed to be equally weighted, to date the Intellectual Merit criterion tends to carry more weight. Eventually, the reviewers are convened in-person or virtually by an NSF Program Officer who facilitates a discussion of the proposals. At the end of this discussion, reviewers submit final scores for each proposal they reviewed. Program Officers and other NSF personnel then use the reviewers' scores, accompanying comments, and discussion from the panel to determine which proposals receive funding. Bottom line: reviewers play a crucial role, but they do not make the final funding decisions. Thus, it is worthwhile to consider what reviewers tend to prioritize/rank highly *and* what NSF ultimately funds.