Broader Impact Activities in CAREER Proposals

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Brief history of NSF broader impacts

NSF introduced broader impacts as a criterion into the peer review system in 1997.

In the beginning, it was basically ignored by scientists, but gradually (also because US congress got involved) all grants included a broader impacts section.

Nowadays, no or really poor broader impacts:

The grant will most likely not be funded, no matter its intellectual merit.

Nowadays, excellent broader impacts that get reviewers excited:

The grant may be funded over other proposals with similar intellectual merit.
How broader impacts are defined?

NSF does not provide a definition of broader impacts.

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to the project.
What activities are considered broader impacts?

NSF values the advancement of scientific knowledge and activities that contribute to the achievement of societally relevant outcomes:

- Full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM).
- Improved STEM education and 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, and others.
- Improved national security.
- Increased economic competitiveness of the United States.
- Enhanced infrastructure for research and education.
Broader impacts are here to stay…

In the past, there has been some controversy about the suitability of broader impacts in a research grant, and many scientists have advocated for its elimination.

However, the role of broader impacts in grants has not ceased to grow…

- In the America COMPETES Reauthorization Act of 2010, Congress included a requirement for NSF to attend broader impacts.
- December 2011: revision of the Merit Review Criteria by the National Science Board (NSB).
- October 2012: Release of the NSF’s new Proposal and Award Policies and Procedures Guide in October 2012,

These revisions raise the bar on how broader impacts are evaluated and apply the same five criteria used to evaluate the intellectual merit of the proposals.

Broader impacts are not going away, they are becoming more prominent!
Broader impacts are an opportunity

“Broader Impacts 2.0 should be viewed as an opportunity for us to apply the creativity that we exercise with intellectual merit to identifying and articulating how the results of our research have the potential to benefit society and to contribute to the achievement of a growing list of desired societal outcomes. Broader Impacts 2.0 exhorts us to go beyond our traditional notions of supporting graduate students or disseminating project results through publicly available Web pages to actively promoting the contributions of our scientific knowledge to policy, our economy, our culture, and pressing societal needs.”


They provide an opportunity to expand our research to other issues that we care… They provide an opportunity to showcase the value of our research to those that fund our projects: Taxpayers and Congress.

Scientists must take a leading role in making the benefits of research apparent to society!
How broader impacts are reviewed?

NSF states the following

http://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/gpg_3.jsp#IIIA1

The following elements should be considered in the review for both criteria:
1. What is the potential for the proposed activity to:
   a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
   b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. 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?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?
Who reviews broader impacts?

The reviewers for broader impacts are the same as for the intellectual merit.

Most often: researchers in your field, whom you know, either personally or through their papers. All NSF proposals are reviewed either by a panel or by mail in. In my experience, there are differences in the way broader impacts are evaluated.

- Panel: Broader impacts are analyzed extensively.
- Mail in Review: The evaluation tends to be less rigorous.

Either case, program directors (those who ultimately decide what projects get funded) take, for the most part, comments on broader impacts very seriously.
How to prepare a strong broader impacts section

Find an issue that you care about:
• Education at all levels.
• Under-represented minorities.
• Geographic dispersion.
• Public outreach for science
• Etc..

Do not wait till a few days before the deadline, prepare it with time. Get letters of support.

Do not reinvent the wheel, try to team up with other existing projects…

Include metrics, how the success of your activity will be measured.

Prepare a strong broader impact section once, then you can basically reuse it for all your NSF proposals with minor modifications!

Practical tip: Include a few references, just as for research articles, it will look more professional.

Practical tip: Broader impacts are typically at the end (the referee attention span is on the low end…) of the grant, it does not need to be long but it has to be clear.
What broader impact projects exist at ISU?

There are lots of ongoing projects. SP@ISU keeps an inventory of all the resources in campus that we are aware of…

Just visit our web page…
SP@ISU
Strengthening the Professorate

Iowa State’s Broader Impacts Resource

SP@ISU serves as a single point of contact on campus to gain knowledge in developing quality Broader Impact programs. SP@ISU helps make connections between researchers and resources on campus to develop and implement Broader Impact plans. The target audience is faculty, postdoctoral research associates, and advanced graduate students in science, technology, engineering, and mathematics (STEM).

The goal of SP@ISU is to strengthen the professoriate by enabling professional development in STEM, while promoting and enhancing a diverse community of scholars and learners.

More about SP@ISU

What are Broader Impacts and why are they important?

From the National Science Foundation

The project Summary will contain the following required separate statements: overview of the project, statement on Intellectual merit, and statement on broader Impacts. Annual and Final Reports must address activities related to the Broader Impacts criterion that are not intrinsic to the research. NSF New Merit Review Criteria, Requirements for Proposals

The Project Description must contain, as a separate section within the narrative, a discussion of the broader impacts of the proposed activities. Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to the project. NSF values the advancement of scientific knowledge and activities that contribute to the achievement of societal relevant outcomes:

- Full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM)
- Improved STEM education and 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, and others
- Improved national security
Information for Faculty

This is a compilation of resources to use as a starting point to learn about NSF's Broader Impacts criterion and to assist faculty in developing their own broader impacts initiatives.

- SP@ISU Brochure
- NSF Grant Proposal Guide
- NSF Broader Impacts Handout
- Presentation on SP@ISU Resources
  This is a short presentation that outlines the newest NSF broader Impacts areas and explains resources available through SP@ISU.
- Catalog of ISU Programs
  A comprehensive listing of programs on campus that work in areas of broader impacts and information on how faculty can effectively partner with them.
  http://apps.spisu.isastate.edu/programs
- Broader Impact Wizard
  The Centers for Ocean Sciences Education Excellence (COSEE) based at Rutgers University developed a Broader Impacts Wizard to help researchers develop a broader impact statement for NSF proposals and improve researchers' ability to communicate their science. The Broader Impact Wizard walks a researcher through five steps to come up with an engaging, interesting broader impact statement. The five steps include: audience, budget, activities, project description, and evaluation. While this wizard focuses on ocean sciences examples, the concepts are relevant to all NSF proposals. The broader Impacts programs that the wizard refers to are specific to Rutgers University. For ISU programs, refer to the SP@ISU website.
  http://cosseewizard.net/wizard/
- Evaluation Workshop Resources
  In the fall of 2012, SP@ISU hosted a day-long Broader Impacts Evaluation Workshop to provide opportunities for faculty, postdoctoral scholars, graduate students, and staff to learn more about broader impacts evaluation and resources on campus. The event consisted of a morning session, “Effective Broader Impacts Evaluation Practices for Grants,” and two concurrent afternoon sessions, “Assessing Undergraduate Research Experiences” and “Assessing K-12 Outreach Programs.” For presentations, video and information on each session please follow the links below.
  Effective Broader Impacts Evaluation Practices for Grants
  Assessing Undergraduate Research Experiences
  Assessing K-12 Outreach Programs
- SP@ISU statement for “Facilities, Equipment and Other Resources” section of NSF Proposal
- Iowa State Library tools for Data Management Plans
- For Youth Program Administrators
  In order to keep our promise of offering excellent youth activities and programs at ISU, this website contains information and resources to help Program Leaders plan and conduct activities, programs and camps for youth in a safe and effective manner.
Programs at ISU

The program catalog is a comprehensive listing of programs on campus that work with Broader impact initiatives and are willing to partner with faculty members. Programs are broken down into categories based on the audience each program serves. Once you have selected a category, all programs at Iowa State that work with that population will be listed. Following the Program name is a short description of how these programs work with Iowa State Faculty. Please select the individual program to get more information.

If you have a program that you would like to list, contact us at 515-294-8061 or spisu@iastate.edu.

- Benefits to Society
- Broadening Participation
- Community College
- Economic Competitiveness
- Enhanced Infrastructure
- Evaluation
- Faculty Development
- Globally Competitive STEM Workforce
- Graduate
- K-12
- K-12 Teachers
- Partners Outside of Iowa State University
- Partnerships Between Academia, Industry, and Others
- Postdoctoral Associates
- Public Engagement & Literacy
- STEM Education
- Undergraduate
- All Programs

Featured Programs

Iowa Space Grant Consortium (ISGC)

The mission of the Iowa Space Grant Consortium (ISCG) is to coordinate and improve Iowa’s future in aerospace science and technology and to stimulate aerospace research, education, and outreach activities throughout the state.

STEM Student Enrollment and Engagement through Connections (SEEC)

The STEM Student Enrollment and Engagement through Connections (SEEC) project seeks to increase the number of engineering graduates at Iowa State University by approximately 100 per year.
All Programs of K-12 Teachers

Category List > K-12 Teachers

Ames Laboratory
Ames Laboratory has a number of education programs that involve elementary school students through graduate students.

Biotechnology Outreach Education Center (BOEC)
The Biotechnology Outreach Education Center offers hands-on laboratory experiences for students from elementary through college age and adults.

Center for Excellence in Science, Mathematics, and Engineering Education (CESMEE)
CESMEE offers STEM education expertise to researchers with the educational and broader impact components of their grant proposals. CESMEE faculty can: 1. Offer an evaluation component that is external to the project and supports the STEM perspective 2. Provide post-award support functions 3. Review proposals prior to submission and offer feedback 4. Convene advisory groups 5. Help develop a research base for proposals and other endeavors 6. Create a literature review or identify appropriate sources.

Molecular Biology, Biotechnology and Genomics
The MBBG faculty, staff, and students at Iowa State University are committed to fundamental discovery and dissemination of scientific resources and information. They actively strive to provide opportunities for education and outreach to the community at large with a special emphasis on K-12 teachers and students as well as undergraduate students.

NSF Engineering Research Center for Biorenewable Chemicals (CBiRC)
CBiRC Education Programs provide extensive outreach from K-12 education (teachers and students) to graduate level. Through CBiRC education programs, Broader Impact plans are easily incorporated without the administrative overhead of maintaining individual outreach programs. CBiRC is interdisciplinary across the sciences and engineering and believes a collaborative partnership allows for stronger proposals and greater impact. Please contact us if you are interested in discussing our program offerings.

Project Lead the Way
Project Lead The Way is the leading provider of STEM education curricular programs used in schools. The program helps prepare students for the global economy through its curriculum, professional development, and network of educators, students, universities, and professionals.

Research Institute for Studies in Education (RISE)
RISE collaborates with faculty in conducting externally funded projects, providing expertise in program and project evaluation, survey research, and statistical analysis.

The Psychology in Education Research Lab (PERL)
PERL is a Research and Development (R&D) lab that is committed to the development of effective educational practices and policies that promote growth in student classroom learning and achievement.

Toying with TechnologySM
This program partners with other faculty in helping them develop and implement an educational component for research grants. Engineering research can be turned into K-12 lessons in science and mathematics that use engineering as the context for the problems. The lessons can be piloted, assessed, and disseminated through the TWT Program.
My experience: DMR-Award CAREER 0748475

How I developed the concept?

I decided to focus my efforts on high schools because:

- High school system needs “more help”, generally, deficit in science is more apparent.
- High school students may get interested in research.
- Lack of resources to implement the Iowa core curriculum and teaching by inquiry.
- Greatest impact in terms of possible STEM recruitment for ISU.

What I learned?

- I thought it would be easy to get high school teachers involved.. it took a lot of work!
- I started from scratch and I had very little experience in major outreach activities, better start with existing organizations.
What I accomplished?

Presidents Day

The idea was to provide resources to teachers to keep up with recent advances in science so that they are able to tell their students and get them excited about science.

An event would take place on Presidents day as this was professional development day in the Des Moines district.

We have developed a connection with more than 40 high schools in central IA.

We know the teachers and we get feedback from them.

At the initiative of some of the teachers we put together a larger event, to take place in summer 2011.

A proposal to the Carver Trust was submitted and subsequently funded (2011).
Metrics

Teachers and students that have participated in our events.

Growth with the Carver trust grant on modeling.

Increase in the number of students (not only due to this initiative).

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Other experiences...

Mayly Sanchez:
Women in Physics

Aditya Ramamoorthy:
Training Incoming URM students