SEAS Center for Women in Engineering

Fall 2022 - Faculty Handouts

Responding to Broadening Participation

and

Broader Impact in Grant Proposals

SEAS Level

What is Broadening Participation?

- What does it mean to be high quality, how to be excellent and promote innovation that addresses the needs to all? Equity, diversity, inclusion is essential to quality. Diverse environments support innovation. So, achieving your mission requires broadening participation.

- Advancing discovery and understanding while promoting teaching, training, and learning, may be accomplished by training graduate students, mentoring postdoctoral researchers and junior faculty, involving undergraduates in research experiences, and participating in the recruitment, training, and professional development of K-12 mathematics and science teachers.

- Broaden participation of members from marginalized communities, for example, by establishing collaborations with students and faculty from institutions and organizations serving women, minorities, and other groups under-represented in the mathematical sciences.

- **It is important to know the difference between "broader impacts" and "broadening participation."** While they are related, they are not the same thing. Broadening participation is an important element which falls under broader impacts and aims to include scientists from underrepresented groups and institutions, thereby fostering collaboration among diverse social groups and leading to innovation.

SEAS Mission to Broaden Participation in Computing and Engineering Study and Careers

The current mission is quite light and does not actively address broadening participation. Without diversity and inclusion, the mission is ill-informed and might not really serve global communities without voices representing all of those communities. Here is the current mission:

Founded in 1884, the mission of the School of Engineering and Applied Science (SEAS) of The George Washington University is to serve the global community by:

- Providing high quality undergraduate, graduate and professional educational opportunities.

- Stimulating and promoting innovative fundamental and applied research activities.

Located in the nation's capital, SEAS strives to promote a multicultural technological community with an intentional focus to include those cultures that have traditionally not be part of SEAS and maintain and develop special integrated programs with industry and government.

SEAS' programs and degrees prepare professionals to be confident in their understanding of science and technology, capable of exercising constructive leadership, creative in the face of new environmental and societal challenges, and agile in the application of critical analytical skills during a life-long learning that will open new career horizons.

In all of its activities, the school strives to create a vibrant atmosphere, providing for interaction and joint ventures among faculty, students, and the abundant resources of scientists and facilities available in the Washington Metropolitan Area.

The following is the SEAS Mission on diversity, which is slightly different from broadening participation.

> *The mission of SEAS Diversity and Inclusion is based on our understanding that each person brings a distinct life experience to the table. SEAS is committed to a faculty, students and staff who represent diversity not only in gender, race, ethnicity, sexual orientation, disability, religion and age, but also in cultural and educational backgrounds, profession, life experiences, thoughts and ideas. SEAS believes embracing diversity and a culture of respect, not only enhances our educational mission, but is the bedrock of our efforts to foster leadership, innovation and vital community partnerships.*

While this is the DEIA statement, it needs to link to the overall goals statement. You cannot achieve your mission without including these aspects we need one more bridging sentence between our mission, the underlined above and the following. SEAS actively supports faculty efforts for outreach to broaden the understanding and participation of traditionally under-represented groups in their specific area of research. Faculty need to understand the opportunities that such broader participation gives them in enhancing excellence in research and widening the lenses for discovery.

SEAS dedication to Broadening Participation as demonstrated by the Broadening Participation Award

The SEAS BP award is designed to celebrate a faculty member who has made efforts to increase diversity and inclusion in SEAS. The purpose of the award is to communicate to the world SEAS's commitment to diversity and inclusion and indication that we are committed to incorporating the learning and contributions into one's work. The Award is presented annually at the inaugural faculty meeting each academic year. Our broadening participation programs and activities seek to inspire all voices, move from broadening participation programs to a broadening participation culture, and invest in the next generation of

computing and engineering leaders and professionals, including an assessment of faculty contribution to the field and department when considering P&T.

This Award is based on a demonstration of a thorough understanding and appreciation of diversity and inclusion issues. Example activities might include one or more of the following but not limited to:

- Actively include aspects within research projects to broaden the participation from among traditionally under-represented groups in the discipline and raise awareness of the research opportunities

- Conduct diversity research and scholarly activities that enhance the school's diversity and inclusion initiatives.

- Assist in the recruitment and retention of faculty, staff, students, and volunteers from groups traditionally underrepresented

- Provide or actively participate in opportunities to raise awareness of diversity and inclusion within the community in which they live, study, and championing the contributions of diversity to excellence in research.

Guidelines for Departmental Broadening Participation Statements

The following comments and advice are intended for department faculty to use as they craft their own department statement on broadening participation in their specific discipline. Having such a statement will help individual faculty include references to that statement in proposals.

Context: What is your context in terms of demographics (statewide, university, department, profession, intersectionality,).

BPC Mission: Articulate the BP mission. This is a big picture statement that describes the strategic vision for the fields within the department.

Goals and Activities: Details departmental goals and activities. Goals should be specific and measurable, including from the demographics above. Goals should be "SMART": specific, measurable, achievable, relevant and time oriented. Activities should build on evidence-based approaches for BP, leverage existing resources, and build on or result in partnerships with organizations.

Metrics for Success: Details departmental commitment to reviewing progress towards goals and fulfillment of mission. The departmental plan should identify an appropriate approach to evaluation and identify metrics and instruments that will be applied to measure how well the proposed activities advance the department toward an identified goal. Include some actions for department to raise awareness of their own numbers. Most don't know the state of underrepresentation in their departments and further, they have no clue about

intersectionality. Having an action that seeks to capture data about intersectionality and compare their department enrollment and graduation with intersectional groups at the college, campus, region, and profession might help them identify gaps that need to be addressed.

Department Goal: Eventually these need to be embedded into the policies, processes, programs, culture, etc. It must not be seen as a task assigned to women and faculty of color. ALL need to be engaged, thus making these elements "normative."

Sample Computer Science

Our Broadening Participation in Computing (BPC) mission statement is:

1) To sustain our bridge program to computer science master's degrees for students coming from liberal arts programs and other non-computer science backgrounds

2) To provide exceptional support and retention services to traditionally under-represented groups in the computing field, and to increase enrollment, and improve graduation rates. The department's efforts in both BA and BS academic programs in CS as well as the design of CS For All support these goals.

3) To consider how the issues related to these communities affect what CS studies and includes in its instruction (what is the knowledge and how does it connect). How is DEI baked into what is developed and designed? Use case studies to show how insensitive work has negatively (or positively) impacted different populations. To provide leadership in collaboration with the School of Engineering and Applied Science in developing, implementing, and operating events and activities that are designed to recruit and assist the personal development, academic achievement, and graduation of traditionally under-represented groups in the computing field.

4) To support faculty and student activities that focus on increasing the participation of underrepresented groups in the computing field. These include but are not limited to outreach to local pre-college programs/teachers and community colleges to engage in mentoring, provide expertise on careers and educational pathways, GenCyber Camps, Scout Groups or develop REU experiences for undergraduates

NSF Broader Impact (BI) Criterion

Broader impacts have been considered as part of the NSF merit review of proposals since the 1960s. The criterion became a separate and distinct part of NSF proposals in 1997. (See https://stem.colostate.edu/a-history-of-the-broader-impacts-criterion-within-nsf/ for a history of NSF BI criterion.)

The purpose of the broader impact review criterion is to show that a proposed project has the potential to benefit society and contribute to the achievement of specific, desired societal outcomes. Assessment of broader impacts must be described in grant proposals. (See https://researchinsociety.org/wp-content/uploads/2021/02/GuidingPrinciplesDoc2020.pdf for a good guide in developing an overall BI plan.)

Faculty are encouraged to think creatively about activities and projects related to their specific proposals that might fit into one or more of the areas noted below. Remember, we are engineers, so please include how you might measure your impact in any activities you suggest.

Broader impacts may be accomplished

- through the research itself

- through activities directly related to specific research projects

- through activities directly supported by, but complementary to, the project

- *socially* relevant outcomes

  Participation
    - ▶ Increased participation of women, URM, persons with disabilities in STEM
    - ▶ Development of globally competitive, diverse STEM workforce
  Education
    - ▶ Improved STEM education; develop STEM educators
    - ▶ Engaging a wider audience outside the classroom; improved science literacy
    - ▶ Enhanced infrastructure for research and education
  Society
    - ▶ Improving society & well-being of people
  Economic
    - ▶ Increased partnerships w/industry
    - ▶ Improved national security, economic competitiveness

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While broadening participation might be a key component of your BI statement, is not necessarily a required component. Also, it is likely not the only societal impact of your project.

Incorporating Broadening Participation (BP) into Broader Impact (BI)

The following is provided for individual faculty as they craft funding proposals and respond to 'broadening participation' challenges.

While broadening participation might be a key component of your BI statement, is not necessarily a required component. Also, it is likely not the only societal impact of your project.

Be aware of current school and department statements on commitment to broadening participation and mention them in your proposal. You are welcome to ask for a letter of support from The SEAS Center for Women in Engineering. Make yourself knowledgeable of

intersectional issues—for example, women of color often face additional barriers. Recognize and document that as you describe efforts to support broadening participation.

Begin now to familiarize yourself with the various resources at GW that might bring you into contact with underrepresented communities in engineering. Find a group and begin to participate with them. For example, join SWE and attend some of their functions and offer them support. Help out NSBE and learn about the issues students face as they navigate the different programs and how these might be addressed. Bottom line, get involved with the local GW community. And take a few photos as every NSF reader loves a photo or two. We have clubs for Girls Gotta Code on campus. Check out NAE Engineering Girls or other such groups. (A list of offices at GW, organizations and clubs are at the end of the document.)

Remember, BP activities and BI activities do not have to be "unique" (like the research plan). It is totally (probably preferred) to share in activities to minimize the overhead of planning activities and maximize impact.

- Full participation of women, persons with disabilities, and underrepresented minorities in STEM (specifically African Americans, Hispanics, Native Americans, Alaska Natives, and Pacific Islanders)

- Create a website for your proposal. Include faces and short bios of all that work on the project.

Proposals could address how the researcher might address these specific groups. Presentations to student groups in specific societies such as Society of Black Engineers or American Indian Science and Engineering Society (SACNAS) and also consider listening sessions and opportunities for collaboration, internships, research. Blogs or videos on project websites featuring individuals from under-represented groups can be a tool for broadening participation. Consider co-creating these with members of the target community

Education and Infrastructure

- Improved STEM education and educator development at any level

- Increased public scientific literacy and public engagement with science and technology

- Enhanced infrastructure for research and education

Proposals might include offers to speak at local civic groups, senior citizen groups as well as local K-12 schools. Don't forget any groups that are important to your young members of your family such as Girl scouts. We are fortunate to have the School Without Walls and a Foggy Bottom Citizens group almost on campus.

The following are examples of mentoring that your project could support. Consider bringing along an undergraduate student doing research with you to a national conference. Plans to offer opportunities to local schools for shadowing an engineer or including high school students as summer intern can broaden participation. Bringing a high school teacher on board for summer work and adding a bit of budget for that is a possibility as well. Create a relationship with a community college faculty in your

area and consider bringing a community college faculty member to your project meetings and follow-up.

Remember to make use of social media – both the SEAS media as well as a social media account from your project – to link to topics related to your work. Ask for help with social media from SEAS communication.

Consider indicating you will create and apply for an REU experience related to your topic.

Industry and Competitiveness

- 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

- Seek out industry partners, host alumni chats to spread the word about your project.

Everything Else

- Improved well-being of individuals in society

Assessment – Metrics more than Numbers

Any Broadening Participation plan should include a description of the ways in which effectiveness of the efforts will be assessed.

▶ Remember, the number of students participating in your project IS NOT a measure of effectiveness in increasing participation in STEM

▶ Instead, measures of effectiveness might include:

  ▶ Changes in knowledge, behavior, skills, abilities, and conditions

  ▶ Increased participation indicator = % of women & URM students from your BI project who sign up for STEM classes or clubs after the project (behavior change) compared to % who signed up prior and who sign up and did not attend

See https://fapesp.br/avaliacao/manuais/nsf_framework.pdf for a very complete description of frameworks for evaluating impact of Broadening Participation programs.

Resources

- ▶ **GW Resources**

  - ▶ SEAS & GW Resources | SEAS Center for Women in Engineering | The George Washington University (gwu.edu)

- ▶ • **NSF Materials:**

  - o **https://beta.nsf.gov/science-matters/nsf-101-five-tips-your-broader-impacts-statement**

  - o https://beta.nsf.gov/funding/opportunities/broadening-participation-engineering-bpe-1

  - o https://fapesp.br/avaliacao/manuais/nsf_framework.pdf

- • **Specific College and University site materials**

  - o **https://stem.colostate.edu/broadening-participation-best-practices/**

  - o **https://osp.gatech.edu/sample-broader-impact-statements**

  - o **https://www.cs.washington.edu/research/bpc**

  - o **https://www.umass.edu/research/services-training-resources/proposal-resources/sample-language-nsf-broader-impacts-statements-and**

  - o **https://www.usf.edu/engineering/cse/broadening-participation/bpc-award.aspx**

- - https://tickle.utk.edu/student-success/broadening-participation/

  - https://engage.msu.edu/ways-to-engage/broader-impacts-resources/view-examples-of-broader-impacts-activities

  - https://www.purdue.edu/research/oevprp/funding-and-grant-writing/grant-writing-support/broader-impacts.php

  - http://blogs.lawrence.edu/careercenter/tag/personal_statements

  - https://engineering.tufts.edu/studentlife/diversity-equity-and-inclusion

  - https://stem.northeastern.edu/resources/faculty/bi/

  - https://stem.colostate.edu/incorporating-broadening-participation-into-broader-impacts/

  - https://stem.colostate.edu/evaluating-broadening-participation-in-broader-impacts-activities/

- Outside and generic Resources

  - https://bpcnet.org (excellent resources for BP in computing)

  - https://seachange.aaas.org/

  - https://researchinsociety.org/

  - https://www.informalscience.org/sites/default/files/BP-Report.pdf

  - https://cadrek12.org/broadening-participation