Broadening Participation in Computing

NSF and CISE are committed to Broadening Participation (BP)

“CISE will address BP programmatically both through focused activities and through the inclusion of BP efforts as an accepted and expected part of its research and education award portfolios.”

CISE BP Strategic Plan
https://www.nsf.gov/cise/oad/cise_bp.jsp
BPC is a community-wide effort

“It will take more than good intentions or business as usual, however, to reverse longstanding underrepresentation. It will take committed, focused, and sustained efforts on the part of many in the computing community.” Really, it should say: efforts of almost all are required for change.

CISE BP Strategic Plan

https://www.nsf.gov/cise/oad/cise_bp.jsp
Rationale

• This is an important time in computing education -- interest is skyrocketing but limited by disproportionate representation of all segments of society.

• There is longstanding underrepresentation of various populations -- including women, African Americans, Hispanics, American Indians, Alaska Natives, Native Hawaiians, Native Pacific Islanders, and persons with disabilities -- in the computing field.
Guiding Principles

• BPC requires **culture change** in colleges/universities, departments, classes, research groups, professional organizations & K-12.

• Culture change begins with **enhanced exposure** to BPC throughout the CISE community.

• PI engagement must be **tailored to individuals and organizations** as appropriate.
Introduction

• **CISE Pilot Goal:** Incorporate meaningful BPC actions in CISE-funded research

• **Fiscal Year (FY) 2017:** NSF 17-110, Dear Colleague Letter: Pursuing Meaningful Actions in Support of Broadening Participation in Computing (BPC), announces a new BPC pilot effort that builds on NSF/CISE’s past BPC activities

• **FY 2018:** BPC plans encouraged for Expeditions in Computing and Cyber-Physical Systems (CPS) and Secure and Trustworthy Cyberspace (SaTC) Frontier submissions

• **FY 2019:** BPC plans required by the time of award in Medium & Large proposals submitted to core programs, CPS, and SaTC
BPC Plan Scope

• BPC plans may range from a couple paragraphs up to three pages.
• Regardless of the length, **a BPC plan should include the following components:**
  • A well-reasoned and sound rationale for choosing the proposed activities;
  • The anticipated impacts of the proposed activities;
  • Demonstration that the PI, relevant team members and/or organization have necessary resources and qualifications to implement the plan; and
  • A well-defined mechanism for assessing and evaluating the impact of the proposed activities.
Multiple Approaches to BPC

In additional to addressing the components previously mentioned, a BPC plan should include meaningful activities in which a PI can engage. Efforts can be aligned with research, faculty, institutional, and/or outreach activities.
Examples of Research Activities

• Recruit students in groups typically underrepresented in computing to participate in NSF-supported conferences/workshops/summer schools
• Become a faculty mentor at an NSF-funded Research Experiences for Undergraduates (REU) site and support participation of groups underrepresented in computing
• Advocate for increased diversity in technical conferences through organizing committee participation and shepherd students at the conference
• Sponsor students from groups underrepresented in computing to attend conferences such as the Grace Hopper Celebration of Women in Computing or Tapia Conference
Examples of Faculty Activities

• Participate in professional development on diversity awareness and inclusive teaching
• Sponsor prominent speakers from groups typically underrepresented in computing to address faculty and students
• Provide training, mentoring, networking, and leadership opportunities for students and peers in groups typically underrepresented in computing
• Develop and disseminate pedagogy tools focused on unique social/cultural experiences of students in groups typically underrepresented in computing
• Encourage entrepreneurial efforts of students from underrepresented groups in classes/research groups in classes/research groups, e.g., by connecting them to on-campus resources/mentors
Examples of Institutional Activities

• Work with your department to develop/implement a BPC plan
• Plan a faculty workshop to focus on equity and inclusivity
• Sponsor a department journal club on diversity and inclusion
• Build a support community and organized activities for students in groups typically underrepresented in computing in your local universities and community colleges
• Support Research Experience for Teachers (RET) opportunities for teachers serving populations of predominantly underrepresented groups in local community colleges/high schools
Examples of Outreach Activities

• Lead and encourage outreach activities that involve students in groups typically underrepresented in computing

• Organize undergraduate and graduate students, including those in underrepresented groups, to visit K-12 classrooms

• Offer training opportunities for teachers who serve predominantly underrepresented groups in local community colleges/high schools

• Become a mentor/trainer in a national coding project; host a summer coding camp with the goal of attracting students in groups typically underrepresented in computing

• Participate in a project run by one of the CISE-funded BPC Alliances working with individuals in groups typically underrepresented in computing
Note: the following are intended to be illustrative of the elements that should be in a BPC plan (as opposed to exemplars of plans), and are brief due to space considerations.

Example of Abridged BPC Plan

[Who is being targeted and why] Currently, only 13% of those employed in machine learning and artificial intelligence (AI) activities are women. Further, in the next two years, there is a predicted 10% decrease in female student enrollment in undergraduate AI programs.

[PI or Team qualifications] To help address this disparity, the PI has been actively mentoring both undergraduate and graduate students from underrepresented groups for the last five years. Four of her 11 doctoral students have been women. The PI also initiated and has since maintained a research collaborative in 2013 named ALICE with a private artificial intelligence business leader to focus on introducing AI research to women and minorities through collaborative undergraduate research projects.

[Specifics of the plan] The ALICE program will be involved in broadening participation in the current project by jointly recruiting 10 female undergraduate research interns who will work with the PI and ALICE program staff for 15 weeks on research projects. This will provide an opportunity for undergraduate student participants to learn and be introduced to AI in both a research and business setting. The setting provides a way to teach them about the exciting field of AI and support diversity within the growing AI field.

[Evaluate impact of the plan] During the program, the PI will work closely with ALICE’s team to assess program impact through descriptive information on the interns, their time spent participating in assigned projects, participant self-reported knowledge and attitudes about AI work, and information from the projects. The knowledge gained will allow the PI to investigate future projects to attract a broader undergraduate research applicant pool.
Example of Abridged BPC Plan

[Who is being targeted and why] Unfortunately, the percentage of women in the computer science (CS) field has been declining since the 1980s (35% of declared CS majors being women in 1985, as compared to on 18% in 2014).

[PI or Team qualifications] Understanding the importance of women in the CS field, the PI is actively involved with various local and national research opportunity programs, such as the National Research Opportunity for Women in Science Program (NROWS), and Undergraduate Research Opportunity for All (UROA) (See NROWS support letter).

[Specifics of the plan] The PI will participate in an extensive 1-year NROWS professional development program on diversity-awareness and inclusive teaching that will take place over a 2-day time period, recurring monthly, at the NROWS headquarters in Washington D.C. (See suppl. document 1). Twelve topics will be covered ranging from “effective intercultural communication” to “countering stereotype threat and imposter syndrome.” Funds have been set aside within the budget (See budget justification) for the PI to travel and participate in the program. After completion of the NROWS program the PI will develop and offer a free faculty/student diversity-awareness seminar series on a monthly basis for the course of 6 months (See college support letter).

[Evaluate impact of the plan] To assess impact of the PI’s seminar series, the PI will monitor series attendance (demographics of the students and faculty present, student-faculty participant ratio) and collect feedback from the participants after each seminar. The feedback will be compiled and used for future diversity-awareness seminar series the following year. The knowledge gained will allow the PI to tailor projects to the desires of the research community and attract new participants to the field.
Example of Abridged BPC Plan

[Who is being targeted and why] Currently, only 24% of our undergraduate student population in our computer science program is from underrepresented groups. These numbers drop dismally when looking at graduate enrollees (11%) and faculty (two women of 36 faculty members).

[PI or Team qualifications] To address these disparities, the PI will participate in the development a departmental plan at broadening participation in computing. This idea has already received support from the departmental chair and dean (see letters of support). The PI was recently hired in part of an effort to grow the department in both size and diversity. The PI has spent her time in graduate school building her research portfolio, but also learning how to effectively teach and mentors students from underrepresented groups.

[Specifics of the plan] The departmental plan will be developed over an 18 month period in conjunction with departmental and university leadership, faculty and experts in STEM education. The plan will target effectively growing the diversity of both the students and the faculty. The plan will include the development of supportive networks for students.

[Evaluate impact of the plan] The PI will work with colleagues in the school of education to develop an evaluation plan to assess the impact of the plan on recruitment of students and faculty and interviews with potential and current members of the department.
Example of Abridged BPC Plan

[Who is being targeted and why] Given the underrepresentation of women and minorities entering the computer science workforce, the PIs will use this project will improve research training and advance the careers of members of underrepresented groups by focusing on outreach in robotic technology.

[PI or Team qualifications] The investigators will contribute to their longstanding outreach program (2015 to present); which offers day-long tutorials on haptic and robotic technology for high school, community college and non-computer science major undergraduate students. This program has been developed by the PIs, who have had a successful history advising minority student organizations and organizing events to support women in the sciences. The tutorials were also developed with the support of their department and involves participation from a range of faculty members.

[Specifics of the plan] This monthly program provides a fun and educational activity in developing a robot for a specific task. Students will develop prototypes of the robot and create code to support the chosen task. In addition, the team will create a website to facilitate additional pre- and post outreach activities.

[Evaluate impact of the plan] The PIs will assess the impact of the program and amend their projects to the interests of the participants while contributing to the overall goal of the project. The PIs will also track the demographics of the students, attitudes towards computing and feedback on the tutorial.
Common Principles for BPC

• BPC activities should be **intentional**.
• BPC activities should be **ongoing** and integral parts of research projects.
• BPC activities should include **evaluation**.