

Leverage What You Already Do to Address Broader Impacts

The purpose of this document is to assist UCSD Principal Investigators in collecting information relevant to the Broader Impacts (BI) component of NSF proposals. Leveraging existing strengths is an excellent way to address BI. The prompts that follow ask about ongoing and/or planned activities that may:

- promote teaching, training and learning
- broaden participation of underrepresented groups
- enhance infrastructure for research and/or education
- broadly disseminate results to enhance scientific and technological understanding
- benefit society

AND are relevant to the proposed research. Relevant here means: could reasonably be linked to the research or to the more fundamental scientific, engineering, or technological principles underpinning the research.

The contributions of all members of a research team to the BI plan may strengthen a proposal. So although the questions are phrased in terms of *your* activities, please regard *you* to mean all those who will be involved in the proposed research, including senior personnel, post-doctoral scholars, students and staff.

In distributing this document to members of a research team, it may be helpful to encourage respondents to copy and paste relevant information from other documents, e.g. recent performance review documents, annual reports, proposals, and websites.

Please direct questions or comments about this document to Sharon Franks, sfranks@ucsd.edu, 858-822-3452.

1. Teaching (and Broadening Participation)

If you teach, co-teach or contribute to courses – or plan to propose new courses – in which aspects of the proposed work such as methods, tools and results will or could be incorporated, please provide the following information. In responding, please consider instruction at all levels – graduate, undergraduate, community college and pre-college (K-12).

- a. Course title:
- b. Institution, Department and/or Program in which the course is taught:
- c. How often is the course taught (e.g. annually)?
- d. If you are not the sole instructor, for what percentage of the total instruction are you responsible?
- e. Typical enrollment, i.e. approx. number of students:
- f. If known, characteristics of students who take the course – e.g. estimated percentage from underrepresented groups, e.g. Black/African American, Latino/a, American Indian; Does the course attract students from multiple academic disciplines? (specify which ones)
- g. Briefly describe the connection or potential links between the course and the proposed research. For example, will you engage students in collaborative, hands-on learning projects related to proposed research? Will you incorporate discussion of this research in your lectures, or draw on the proposed research in formulating real-world problem sets or exams?
- h. Is there anything else reviewers should know about the course or your teaching, e.g. innovative teaching methods used, teaching awards received, pedagogical models developed and disseminated.

2. Training (and Broadening Participation)

If you are involved in mentoring or the training of students, post-doctoral scholars¹, junior faculty, and/or staff, and you expect your efforts in this regard to continue under the aegis of the proposed research please respond to the following.

- a. Please indicate the number of trainees at each level that you anticipate will be supported by this award or otherwise involved in the proposed research?
 - Undergraduates_
 - Graduate students _
 - Post-docs _
 - Junior faculty _
 - Staff _

¹ If funding for post-docs is requested, NSF requires explicitly describing post-doctoral mentoring plans in the proposal.

- b. Provide, if known, additional details about the mentees/trainees. How many, if any, are members of groups underrepresented in STEM (sciences, technology, engineering and mathematics) fields? If it's possible to make a case that women are underrepresented in particular fields, and you mentor women, please include pertinent information.
- c. If applicable, please give highlights of any other continuing or planned mentorship or training you do outside of your own research group. For example, you may be an ongoing supporter of a minority-recruitment program or summer research experience program at your university. If so, please give the name of the program, how long you've been involved in the program, and the nature of your involvement. Examples:
 1. *Through the UCSD STARS Program, I host 2 undergraduate interns in my lab every summer.*
 2. *To help recruit underrepresented students to UCSD, postdoctoral scholar Smart T. Pants and I make presentations annually at Ed U. Kate High School and in conjunction with the Robots R. Cool competition for undergraduates.*
 3. *My lab actively participates in our department's annual open house that attracts approximately 150 students from the community colleges in Southern California.*
 4. *Graduate students Q. Werty and U. Iop are active in campus diversity enhancement initiatives, including... (give details).*
- d. If you serve on committees – university level, professional society, community advisory bodies – that focus on curriculum development and/or promotion of diversity through strategic faculty or student recruitment, please give details:
 1. *Name of committee*
 2. *Charge of committee*
 3. *Your leadership role (e.g. Chair), if applicable*
 4. *Term /years of service*
 5. *Noteworthy accomplishments*

3. Infrastructure Enhancement

If there are aspects of the proposed research that may enhance the infrastructure for research and/or education, please note them.

- a. Explain how the instruments, tools or methods you will develop or improve will enable others – i.e. those not directly involved in the proposed research – to better conduct their research.
- b. Explain how you will establish or expand collaborations between disciplines and institutions, among U.S. academic institutions, industry and government and with international partners.
- c. Explain if and how you will upgrade the computation and computing infrastructure.
- d. Describe how any proposed activities with regard to teaching and training will contribute to ongoing educational opportunities for large numbers of students.
- e. Describe any current/future activities in which you may contribute to the formation or growth of research networks. Examples may include service on organizational committees, chairing special sessions at conferences, and editing special issues of journals.

- f. If the proposed work will contribute to the operation of shared research facilities, e.g. science and technology centers, please explain how.

4. Broad Dissemination (and Broadening Participation)

Describe any plans to disseminate your findings broadly within and beyond the scientific and engineering academic communities. The following prompts may be useful.

- a. Describe plans to publish and present. If possible, name some of the journals – print or electronic – in which you plan to submit manuscripts. If you can, cite the journals' circulation/readership, and describe the readership, e.g.:

- What academic disciplines do the readers represent?
- Does the publication reach an international audience?

Please provide analogous details for anticipated conference presentations:

- Name of conference (professional society sponsor)
- Month/year of anticipated presentation
- Approx. conference attendance, if known
- Attendee demographics, if known

- b. Will you reach out to other audiences, beyond academia?

Examples:

Describe how you will engage colleagues in industry. In addition to involving them in an advisory capacity, will you give invited presentations at their headquarters? Invite them to be short-term collaborators-in-residence? Place your students in internships in their laboratories?

Describe anticipated communications with research colleagues in government, if applicable.

- c. If you have or wish to develop plans to communicate with non-technical audiences, for example the science- and technology-interested public, please describe them. Give details about what you anticipate doing; When? How often? How long? Who will benefit (target audience, including underrepresented groups)? How will they benefit?

Examples:

Consult on the development of technology exhibits at a science center.

Give public talks about your work.

Publish in general-audience print or electronic publications.

Communicating with the media perhaps in conjunction with your institution's public affairs office.

Consulting on filmmaking projects.

Presenting at career fairs

Judge science & engineering fairs

Interact with community groups (e.g. scouts, Boys & Girls Clubs).

Interact with policymakers.

5. Societal Benefit

Describe how the proposed activities (research, infrastructure-building, education, outreach & dissemination) may benefit society. How may the eventual – not only direct – outcomes of this work contribute to the technological capacity to improve the human condition, the environment, the US or global economy? Give examples. In the shorter term, how might the proposed activities contribute to workforce preparedness, improved

healthcare delivery, disaster preparedness, environmental protection/remediation, or other pressing needs of our time?