Handout #1

Broader Impacts

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Important Notes

- Most of the information presented in this workshop represents the presenters' opinions and not an official NSF position.
- Participants may ask questions using the *QUESTION BOX* on the meeting screen.
- Responses will be collected from a few sites at the end of each Activity. At the start of the Group Activity, we will identify these sites in the *CHAT BOX* and then call on them one at a time to provide their responses.

Preliminary Comments

- More than a set of guidelines on broader impacts
- Change the way you think about broader impacts.
  - Improve your understanding
  - Help you learn
- Engagement makes learning more effective
  - Good learners are not simply listeners.
- Active, collaborative process to improve learning

Active & Collaborative Learning

- Effective learning activities
  - Recall prior knowledge – actively, explicitly
  - Connect new concepts to existing ones
  - Challenge and alter misconceptions
  - Reflect on new knowledge
- Active & collaborative processes
  - *Think* individually
  - *Share* with partner
  - *Report* to local and virtual groups
  - *Learn* from presenter's response

Participant Activities

Two types of activities
- Group Activity   ~ 6 min
  - Think individually   ~ 2 min
  - Share with a partner   ~ 2 min
  - Report in local group   ~ 2 min
  - Report to virtual group
    - A few institutions selected
    - Check Chat Box for your Institution's name
- Individual Activity   ~ 2 min

Workshop Goals and Expected Outcomes

Goal: Enhance the participants' understanding of strategies for dealing with broader impacts in an NSF educational project so that they can more effectively address this issue in preparing proposals or in implementing funding projects.

<u>Expected Outcomes</u>: Participants will be able to:

- Describe NSF's Broader Impacts criterion.
- Recognize strengths and weaknesses of a Broader Impacts plan and suggest improvements.
- Discuss broadening participation in relation to the project's context (e.g., type of institution, discipline, etc.).
- Describe activities aimed at engaging specific audiences to broaden the impact of a project.

Broader Impacts

- See Handout from NSF Grant Proposal Guide Section III.A.1
- Intellectual Merit (IM)
  - Potential to advance knowledge
- Broader Impacts (BI)
  - Potential to benefit society
  - Contribute to the achievement of desired societal outcomes
- Elements to consider in the review of **both** criteria:
  - Potential to advance knowledge and benefit society and achieve desired specific societal benefits
  - Creative, original, or potentially transformative concepts
  - Strong project plan with sound rationale and assessment plan
  - Qualified project team for given plans
  - Adequate resources

Broader Impacts

<u>Categories of BI activities</u> outcomes include but are not limited to:

- Full participation of women, persons with disabilities, and underrepresented minorities in 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

Group Activity: Broader Impacts Criterion

- Identify several specific activities or strategies that you might incorporate into an educational project to address the BI Criterion.
  - Think individually ~ 2 min
  - Share with a partner ~ 2 min
  - Report in a local group ~ 2 min

Handout #2

Response: BI Activity Examples

- Integrate research activities into teaching STEM
- Establish mentoring programs for (some examples)
  – High school students
  – Engineers from underrepresented groups
  – Colleges for Women
- Encourage student participation at professional meetings
- Encourage student and faculty participation from underrepresented groups

Response: BI Activity Examples

- Partner with museums, nature centers, science centers, …
- Report analysis results in manners appropriate for general audiences
- Publish and present in diverse media and settings
- Present results appropriate for audiences such as congress
- Describe links between discovery and societal benefits

Broader Impacts Plan

- As of January 2013, proposals to the NSF are now required to include a "Broader Impacts Plan"
  - A separate section within the project description
  - A discussion of the broader impacts of the proposed activities
  - Should include the specific strategies to broaden the impact of the project

Chapter II.C.2.d.(i)- NSF Grant Proposal Guide

Developing Broader Impacts Plans

- Broader Impacts activities should be treated with same care as Intellectual Merit activities
- Integration of Intellectual Merit and Broader Impacts activities encouraged
- Need to address both NSF and *program specific issues*

Group Activity: Broader Impacts Plan

Read the Broader Impacts Plan provided

- What are the strengths and weaknesses of the plan?
- What are any suggestions for improvement?
  - Think individually ~ 2 min
  - Share with a partner ~ 2 min
  - Report in local group ~ 2 min

Handout #3

Response: Strengths of the Broader Impacts Plan

- Professional Development for STEM educators
  - Improved STEM education and educator development at any level
- Potential for improved STEM education
  - Improved STEM education and educator development at any level
- Potential for national impact
  - Increased public scientific literacy and public engagement with science and technology
- Will target projects that are focusing on underrepresented groups
  - Full participation of women, persons with disabilities, and underrepresented minorities in STEM
- Multiple strategies employed

Response: Weaknesses of the Broader Impacts Plan

- Dissemination of project results through routine unnamed publications
  - Specific conferences and/or journals should be given
- Does not mention the diversity of the PIs who will be selected
- No specifics for marketing plan
- No evaluation plan for Broader Impacts
- No workshop details
  - Number of participants, number of sessions, etc.

Broadening Participation in STEM

- Lack of diversity in STEM is viewed as a significant national problem
  - One area addressing NSF's Broader Impacts criterion is broadening participation in STEM

Federal Definitions of Minority Groups
(34 CFR 280.4)

- American Indian or Alaskan Native A person having origins in any of the original peoples of North America, and who maintains cultural identification through tribal affiliation or community recognition.

- Asian or Pacific Islander A person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands. This area includes, for example, China, India, Japan, Korea, the Philippine Islands, and Samoa.

- Black (Not of Hispanic Origin) A person having origins in any of the black racial groups of Africa.

- Hispanic A person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.

NSF Definition

- The following are groups identified by the NSF as underrepresented in science and engineering
  - Underrepresented minorities
    - Blacks
    - Hispanics
    - Native Americans
    - Alaskan Natives
    - Native Pacific Islanders
  - Women
  - Persons with disabilities
  - Veterans

Individual Activity: Broadening Participation

- How do the following factors play a role in the groups that will be targeted in a specific project?
  - Discipline or field of STEM
  - Location of project implementation
- Can you think of other factors that would influence targeted group identification?
  - Think individually ~ 2 min and write your reponses

Handout #4

Response: Broadening Participation Context

- Project strategies for broadening participation will vary according to the context for the project.
  - Women are not underrepresented in psychology, so projects in psychology that target women for participation would generally not be considered as broadening participation
    - Exception: universities with generally small female populations
      - It depends!

Broadening Participation Contexts

When defining targeted groups, consider:
- Discipline
  - Women in engineering versus women in biology
- Institution
  - Minority Serving Institution
    - For example, Hispanics or Whites might be underrepresented at an HBCU
  - Location
    - Rural or Urban populations are often underrepresented in STEM
  - Demographics
    - Some states (i.e., Maine) are predominantly white; however, there are still populations in the state underrepresented in STEM (women, rural, etc.)
  - Non-traditional backgrounds
    - Veterans, transfer students, adult learners
- Economic Status
  - Low Socio Economic Status

Important Question Concerning Broadening Participation

- What is the project doing to enhance the participation of the targeted population?
- What is the rationale for choosing that activity?
- How is progress being evaluated?

Group Activity: Broadening Participation Strategies

Your project has created a new pedagogy for teaching basic chemistry. This new pedagogy has the potential to benefit multiple groups, three of which are:

    1. college faculty
    2. college students
    3. high school teachers

- What are the factors that you would want to consider in designing activities for these different groups?
  - Think individually ~ 2 min
  - Share with a partner ~ 2 min
  - Report in a local group ~ 2 min

Handout #5

Response: College Faculty

- Points of contact
  - Professional meetings or through networks
  - Direct email contact
  - Mailings to deans or department chairs
  - News briefs in disciplinary publications
- Type of institution where they teach
- Need for strong, convincing evidence
- Courses to target
- Busy schedules
  - Strategies need to fit time constraints

Response: College Students

- Students' majors, e.g.
  - Science major
  - Liberal arts major
  - Pre-service teachers
- Student diversity
  - Campus student organizations

Response: High School Faculty

- Points of contact
  - First point of contact may be either:
    - The school principal or science coordinator
  - Possible contact at professional meeting
  - Colleagues in Education College may have contacts in the local districts
- Ties to national or state standards
- Partnerships require time and trust
  - True partnerships require give and take
- Timing is a factor
- Compensation for teachers

Thanks for your participation!

- This concludes the virtual session. Thanks for your participation.
- There will be a concluding local session where participants will reflect on their experiences in the virtual session
- All participants will receive an email message with a link to the post-workshop evaluation survey. Please go to the site and complete the survey so that we can identify areas for improvement and have information to report to NSF

Acknowledgement

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Grant Proposal Guide (GPG), NSF 13-1, January 2013

Printable Version Link: http://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/gpgprint.pdf

Online Version: http://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/gpg_index.jsp

III. NSF Proposal Processing and Review
   A. Merit Review Principles and Criteria
     2. Merit Review Criteria

All NSF proposals are evaluated through use of two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. Both criteria are to be given full consideration during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (GPG Chapter II.C.2.d.(i) contains additional information for use by proposers in development of the Project Description section of the proposal.) Reviewers are strongly encouraged to review the criteria, including GPG Chapter II.C.2.d.(i), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit**: The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts**: The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

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?

Broader Impacts Plan

Through this project, we will select existing NSF-funded efforts that are ready for national dissemination and assist PIs in creating web-based professional development workshops. The proposed project has the potential to have significant national impact. The project will be disseminated broadly in two ways. First, as we are advertising our professional opportunities to faculty across the nation, they will learn about this project through our marketing materials. They will also learn about the projects that are being featured in the workshops. In addition, we will prepare papers and presentations for national conferences regarding this project.

Through our workshop selection process, we will especially target projects that have a diversity component to them. (By "diversity component" we mean that the project has a special focus on broadening participation, on improving success and retention of students underrepresented in STEM, that developed materials for STEM education have a broad appeal, etc.). By further disseminating the results from these projects through our professional development workshops, we will extend these diversity components on a nationwide basis. Ultimately this will serve to broaden participation in STEM.