NSF’s Broader Impacts Criteria

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Workshop Format

- “Working” format
  - ½ to ¾ of time in team activities
- Limited time to complete activities
  - Frequently feel you need more time
- Purpose: identify, consider & discuss ideas
  - Get you started
  - No “answers”
  - No “formulas”
Workshop Background

NSF Review Criteria

• NSF proposals evaluated using two review criteria
  – Intellectual merit
  – Broader impacts
• Most proposals
  – Intellectual merit done fairly well
  – Broader impacts done poorly

Workshop Goal

• To increase the community’s ability to design projects that respond effectively to NSF’s broader impacts criterion
Workshop Background

NSF Strategies

• NSF proposals also evaluated relative to two principal strategies
  – Integrating research and education
  – Integrating diversity into NSF programs, projects, and activities
• Both reflected in the broader impacts criterion

Workshop Objective

• At the end of the workshop, participants should be able to
  – List categories for broader impacts
  – List activities for each category
  – Evaluate a proposed broader impacts plan
  – Develop an effective broader impacts plan
Conceptual Framework for the Workshop – Constructivist Model

• Learning situations involve prior knowledge
  – Some knowledge correct
  – Some knowledge incorrect (i.e., misconceptions)

• Learning is
  – Connecting new knowledge to prior knowledge
  – Correcting misconception

• Learning requires
  – Recalling prior knowledge – actively
  – Altering prior knowledge

Constructivist Model and Active-Cooperative Learning

• Learning activities must encourage learners to:
  – Recall prior knowledge – actively, explicitly
  – Connect new concepts to existing ones
  – Challenge and alter misconceptions

• The think-share-report-learn (TSRL) process addresses these steps
Participation “Rules”

• In small group discussion
  – Be positive, supportive, and cooperative
    • Limit critical or negative comments
  – Be brief and concise in discussions
    • Avoid lengthy comments, stories or arguments
  – Stay focused
  – Get everyone involved
• In reporting to large group
  – Rotate reporters
  – Report group’s views not your own
  – Be brief and concise in discussions

Workshop Approach

Information in “Learn” Phase, represents:

✓ “official” NSF positions
✓ NSF suggestions
✓ program officers’ opinions
Broader Impacts Categories and Activities

Exercise -- Broader Impacts Categories

**TASK:**
- Identify the categories of activities responding to NSF broader impacts criterion
  - e.g., Increase participation of underrepresented groups

**PROCESS:**
- Think, share, report, learn
Statement of Broader Impacts Merit Review Criteria

- What are the broader impacts of the proposed activity?
  - How well does the activity advance discovery and understanding while promoting teaching, training, and learning?
  - How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)?
  - To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships?

Statement of Broader Impacts Merit Review Criteria (cont’d)

- Will the results be disseminated broadly to enhance scientific and technological understanding?
- What may be the benefits of the proposed activity to society?
“Relative Ease Quotient”

What, in your opinion, is the easiest activity to address in a typical proposal? What is the most difficult?

- Discovery and learning
- Broadening participation
- Infrastructure enhancement
- Dissemination
- Societal benefits

Exercise -- Dissemination Activities

**TASK:**

Identify activities that “broadly disseminate results to enhance scientific and technological understanding”

**PROCESS:**

- Think, share, report, learn
Dissemination -- NSF’s Representative Activities I

• Partner with museums, nature centers, science centers, and similar institutions to develop exhibits in science, math, and engineering.

• Involve the public or industry, where possible, in research and education activities.

• Give science and engineering presentations to the broader community (e.g., at museums and libraries, on radio shows, and in other such venues).

• Make data available in a timely manner by means of databases, digital libraries, or other venues such as CD-ROMs.

Dissemination -- NSF’s Representative Activities II

• Publish in diverse media (e.g., non-technical literature, and websites, CD-ROMs, press kits) to reach broad audiences.

• Present research and education results in formats useful to policy-makers, members of Congress, industry, and broad audiences.

• Participate in multi- and interdisciplinary conferences, workshops, and research activities.

• Integrate research with education activities in order to communicate in a broader context.
Converting Activity to Impact I

• Don’t just list activities
  – More is not better
  – Describe the *impact* of activities
• Develop a *strategy* (a plan)
• Approach with same *detail* as intellectual content

Converting Activity to Impact II

• Develop a strategy (a plan)
  – Make *coherent* and consistent with
    • Institution’s mission and culture
    • PI’s interest and experience
  – *Integrate* with
    • Project activities
    • Intellectual merit
  – Include metrics and *evaluation*
Reviewing and Enhancing a Project’s Broader Impacts

Exercise – Review Proposal's Broader Impacts

**TASK:**
- Write broader impacts section of a review
  - Outline format

**PROCESS:**
- Think, share, report, learn
Sample Proposal

• Real proposal
  – Project Summary
  – Excerpts from Project Description

• Assume
  – CCLI/Phase 1
  – $150k (total) for 2 years
  – Technical merit considered meritorious

Program Officers’ Views – Review Comments I

• Scope of activities
  – Overall-very inclusive and good
  – Well done but “standard things"
  – Did not address the issue of quality
  – No clear-cut plan
  – Activities not justified by research base

• Dissemination
  – Limited to standard channels
  – Perfunctory
Program Officers’ Views – Review Comments II

• Industrial advisory committee a strength
• Collaboration with other higher ed institutions
  – Institutions appear to be quite diverse but use of diversity not explicit
  – Interactions not clearly explained
  – Sends mixed message – raises questions about partnership effectiveness
• High school outreach
  – Real commitment not evident
  – Passive – not proactive
  – High school counselors and teachers not involved

Program Officers’ Views – Review Comments III

• Modules are versatile
• Broader (societal) benefits
  – Need for materials not well described
  – Value of the product not explained
  – Not clear who will benefit and how much
• Assessment of broader impacts not addressed
How would you rate this proposal?

- Excellent - 2 hands up
- Very Good - 1 hand up
- Good - 2 hands on head
- Fair - 1 hand on head
- Poor - forearms crossed

Exercise -- Enhancing Broader Impacts Effort

**TASK:**

Identify additional or enhanced broader impacts activities that will strengthen the project

**PROCESS:**

- Think, share, report, learn
NSF Program Officer’s Suggestions -- Enhancing Broader Impacts Effort I

- Make activities appropriate to project
  - Establish a mentoring program for high school students
  - Use undergraduate students to interact with high school students
  - Connect to other projects if appropriate

NSF Program Officer’s Suggestions -- Enhancing Broader Impacts Effort II

- Utilize entire PI team in development process
- Take better advantage of institutional diversity (e.g., assessment of impacts of materials on diversity)
- Improve Dissemination
  - Add faculty workshops
  - Prepare exhibit for local museum
Exercise -- Characteristics of Broader Impacts Plans

**TASK:**
- Identify desirable features of a broader impacts plan or strategy
  - General aspects or characteristics

**PROCESS:**
- Think, share, report, learn
NSF Program Officer’s Suggestions -- Characteristics of Broader Impacts Plan I

• Include strategy to achieve impact
  – Have a well-defined set of outcome objectives
  – Make results meaningful and valuable
  – Make consistent with technical project tasks
  – Have detailed tasks for implementation and evaluation (did it work & why?)
  – Have a well stated relationship to the audience or audiences

NSF Program Officer’s Suggestions -- Characteristics of Broader Impacts Plan II

• Don’t use “tack on” evaluation and dissemination plans
• Investigate and discuss other broader impacts plans
• Include target group(s) in development
• Be creative!
Exercise -- Reflection on Broader Impacts

TASK:
- Identify the most interesting, important, or surprising idea you encountered in the workshop

PROCESS:
- Think, share, report, learn
Summary-Broader Impacts I

• Use and build on NSF suggestions
  – List of categories in solicitations
  – Representative activities on website
    • Not a comprehensive checklist
    • Expand on these -- be creative
• Develop activities to show impact
• Integrate and align with other project activities

Summary-Broader Impacts II

• Help reviewers (and NSF program officers)
  – Provide sufficient detail
    • Include objectives, strategy, evaluation
  – Make broader impacts obvious
    • Easy to find
    • Easy to relate to NSF criterion
Summary-Broader Impacts

III

• Make broader impacts **credible**
  – Realistic and believable
    • Include appropriate funds in budget
  – **Consistent with**
    • Project’s scope and objectives
    • Institution’s mission and culture
    • PI’s interest and experience
• **Assure agreement between Project Summary and Project Description**

REFERENCES

Grant Proposal Guide

Broader Impacts Activities
Thanks for your active participation!

Questions?