



Activity

Reflection

- What are the three most important pieces of advice for a colleague for dealing with broader impacts in an engineering education-focused proposal (i. e., a TUES proposal)?
- Write your ideas on your advice
 - No discussion
- Put aside and save



Preliminary Comments

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 Program Directors' responses



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

- ▶ GOAL: To increase the participants' ability to
 - Design projects that respond effectively to NSF's broader impacts criterion
 - Describe a projects' broader impacts in the proposal
- > OBJECTIVES: 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

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Preliminary Comments

Workshop Topics

- Broader impacts categories
- Reviewing a project's broader impacts
- Planning broader impacts



Broader Impacts Categories and Activities



Activity

Broader Impacts Categories

What does NSF mean by broader impacts?

- Individually identify an interpretation
- Report to the group



NSF Review Criteria

- Every NSF solicitation has a set of question that provide context for the broader impacts criteria
- Suggested questions are a guide for considering intellectual merit and broader impacts
- Suggested questions are NOT
 A complete list of "requirements"
- Applicable to every proposal
- An official checklist



NSF Suggested Questions for Broader Impacts

Will the project

- Advance discovery promote teaching & learning?
- ▶ Broaden participation of underrepresented groups?
- Enhance the infrastructure?
- Include broad dissemination?
- ▶ Benefit society?

NOTE: Broader impacts includes more than broadening participation



TUES Suggested Questions for Broader Impacts

Will the project

- Involve a significant effort to facilitate adaptation at other sites?
- Contribute to the understanding of STEM education?
- Help build and diversify the STEM education
- Have a broad impact on STEM education in an area of recognized need or opportunity?
- Have the potential to contribute to a paradigm shift in undergraduate STEM education?



Activity

Dissemination Activities

TASK:

- Identify activities that "broadly disseminate results to enhance scientific and technological understanding"
- Pay special attention to activities that will help transport the approach to other sites
- Individually identify several activities
- Share these with a neighbor or two
- Report to the group

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PD's Response: Two Types of Dissemination

- Dissemination to general public
 - Applies to research and education development proposals
 See handout
- Dissemination to peers (other instructors)
 - Education projects should include strategies for
 - · Making other instructors aware of material and methods
 - · Enabling other instructors to use material and methods



General Dissemination - NSF's Representative Activities I

- Partner with museums, nature centers, science center, 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

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General 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.

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PD's Response

Peer Dissemination Strategy

- Standard approaches
 - Post material on website
 - Present papers at conferences
 - Publish journal articles
- Consider other approaches
 - NSDL
 - Specialty websites and list servers (e. g. Connexions)
- Targeting and involving a specific sub-population
- Commercialization of products
- Beta test sites

Focus on active rather than passive approaches



Reviewing a Project's Broader Impacts

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Activity

Reviewing a Sample Proposal

- Review the Project Summary & the excerpts from the Project Description
- Assume the proposal is a TUES Type 1 with a \$200K budget and a 3-years duration and that the technical merit considered meritorious
- Write broader impacts section of a review
 - · Identify strengths and weaknesses
 - Use a bullet format
- Individually identify several strengths and weaknesses
- Share these with a neighbor or two
- Report to the group

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Program Officers' Views – Review Comments

- 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

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Program Officers' Views – Review Comments (cont)

- 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 (cont)

- 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

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Activity

Characteristics of Broader Impacts Plans

Identify desirable features of a broader impacts plan or strategy

- · General aspects or characteristics
- Individually identify several features
- Share these with a neighbor or two
- Report to the group

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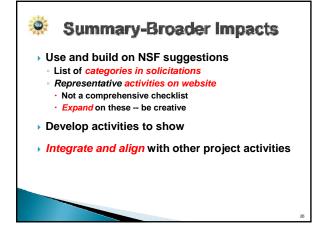
PD's Response

Characteristics of Broader Impacts Plan

- Include strategy to achieve impact
 - · Have a well-defined set of expected outcome
 - Make results meaningful and valuable
 - Make consistent with technical project tasks
 - Have detailed plan for activities
 - Provide rational to justify activities
- Include evaluation of impacts
- Have a well stated relationship to the audience or audiences

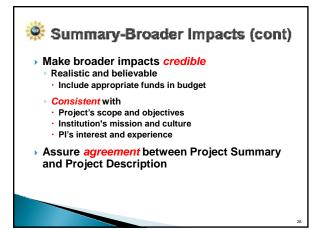
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Summary-Broader Impacts (cont)

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



REFERENCES

GPG
http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg

Broader Impacts Activities
http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf

