EVALUATION STRATEGIES FOR MEASURING THE BROADER IMPACTS (BI) IN NSF INCLUDES PROJECTS
MEET YOUR MODERATOR

LOUIS J. GROSS, PHD

Founding Director, NIMBioS

Professor of Ecology and Evolutionary Biology and Mathematics, University of Tennessee, Knoxville
WHO IS THIS PRESENTATION FOR?

PRINCIPAL INVESTIGATORS OF NSF INCLUDES PROJECTS

STEM EDUCATORS PLANNING TO SUBMIT BROADENING PARTICIPATION PROPOSALS

STEM EDUCATORS INTERESTED IN LEARNING MORE ABOUT EVALUATING PROGRAM SUCCESS
HOW TO INTERACT TODAY

Messages appear here

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MEET YOUR PRESENTERS

PAM BISHOP, PHD

Director, National Institute for STEM Evaluation and Research (NISER)

Associate Director for STEM Evaluation, National Institute for Mathematical and Biological Synthesis (NIMBioS)

SONDRA LORE, EDS

Evaluation Manager, National Institute for STEM Evaluation and Research (NISER)
What is NSF INCLUDES?
What are broader impacts?
Examples of broader impacts
Evaluating broader impacts
Evaluating BI and sustainability
Questions and comments
How to learn more
WHAT IS NSF INCLUDES?

❖ Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science

❖ Three essential components:
  ❖ Design and Development Launch Pilots (DDLPs)
  ❖ National Network Coordination Hub
  ❖ Alliances
WHAT ARE BROADER IMPACTS?

BRIEF HISTORY OF BROADER IMPACTS

Between 1981 and 1997 National Science Board had four “generic” criteria for agencies to use in reviewing proposals:

1. Research performer competence
2. Intrinsic merit of research
3. Utility or relevance of the research
4. Effect on the infrastructure of science and engineering
WHAT ARE BROADER IMPACTS?

BRIEF HISTORY OF BROADER IMPACTS

1. Research performer competence
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3. Utility or relevance of the research
4. Effect on the infrastructure of science and engineering

1. Intellectual merit
2. Broader Impacts

Image credit: Nick Youngson CC BY-SA 3.0 Alpha Stock Images
What are Broader Impacts?

**NSF Broader Impacts Criterion**

“**Broader Impacts**: The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes” (PAPPG III.A.2)

“Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to the project. NSF values the advancement of scientific knowledge and activities that contribute to the achievement of societally relevant outcomes.” (PAPPG Part II.2.d.(i))

Source: NSF 18-1: Proposal & Award Policies & Procedures Guide, January 2018
WHAT ARE BROADER IMPACTS?

NATIONAL ALLIANCE FOR BROADER IMPACTS (NABI)

Broader Impacts criterion is unclear

Source: The Current State of Broader Impacts: Advancing Science and Benefitting Society, NABI, January 2018
WHAT ARE BROADER IMPACTS?

TYPES OF BROADER IMPACTS

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

More at: https://broaderimpacts.net/
BROADENING PARTICIPATION IN STEM AND BROADER IMPACTS

NSF INCLUDES

Societal impacts

Diversity
Educational development
Workforce
Partnerships
Competitiveness
Infrastructure
Sustainability
WHY IS EVALUATION OF BI IMPORTANT?

PROGRAM EVALUATION

✓ Real-time information about your progress toward achieving your broader impacts

✓ Make data-based decisions about continuing, stopping, or modifying project activities to make progress towards your broader impacts

✓ Measure the reach of your broader impacts

✓ Supports plans for sustainability

✓ Provides evidence to support future funding
**Goals**

*Inputs*
- Faculty time
- Staff time
- Industry partner time
- Student time
- Grant $

*Activities:*
- Training faculty students, and staff on implicit bias
- Summer programs on leadership and teamwork
- Industry internships
- Role modeling
- Support groups
- Mentored research
- Learning strategies

*Outputs*
- Intermediate:
  - Raise awareness/intervention in implicit bias
  - Give students skills to create community
  - Students understand that women are successful engineers

*Participants:*
- Faculty
- Staff
- Industry partners
- Engineering students
- Students of other disciplines
- Engineering community

*Outcomes*
- Intermediate-term:
  - Overall decrease in implicit bias
  - Females see themselves as belonging in engineering
  - Increase academic preparedness

- Long-term:
  - Institutionalization of internship program with industry partners
  - Implicit bias educational modules widely available for use
  - Increase recruitment/retention of women in engineering

**Situation:**
Women are underrepresented in engineering
**Goals**

- Faculty time
- Staff time
- Industry partner time
- Student time
- Grant $

**Inputs**

**Activities:**
- Training faculty students, and staff on implicit bias
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- Industry internships
- Role modeling
- Support groups
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- Learning strategies

**Outputs**

**Participants:**
- Faculty
- Staff
- Industry partners
- Engineering students
- Students of other disciplines
- Engineering community

**Outcomes**

**Intermediate:**
- Raise awareness/intervention in implicit bias
- Give students skills to create community
- Students understand that women are successful engineers

**Long-Term:**
- Ability to change social patterns of bias
- Students see the connections and sense of belonging in engineering
- Students are better prepared for academic challenges in engineering

**Situation:**

Women are underrepresented in engineering

**Participants:**
- Faculty
- Staff
- Industry partners
- Engineering students
- Students of other disciplines
- Engineering community

**Intermediate:**
- Overall decrease in implicit bias
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**Long-term:**
- Institutionalization of internship program with industry partners
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Participants:

- Faculty
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Institutionalization of internship program with industry partners
### DEVELOP EVALUATION QUESTIONS FOR BI

#### BI: INSTITUTIONALIZATION OF INTERNSHIP PROGRAM WITH INDUSTRY PARTNERS

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Evaluation Questions</th>
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| Industry internship liaisons (Group: Industry partners) | To what extent is their company participating?  
If they are not participating at the expected level, how could they be incentivized?  
What changes need to be made so that the industry partner finds the internship program useful?  
Does the partnering company feel there is a shared vision and purpose between themselves and the project?  
Does the partnering company feel the project has defined clear roles and responsibilities for the program?  
What supports does the partner require to continue the program? |
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<td>Industry internship liaisons</td>
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<td>Liaison pre/post survey (before and after orientation, before/after semester of internship)</td>
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<tr>
<td>(Group: Industry partners)</td>
<td>How could they be incentivized to be more invested?</td>
<td>Industry liaison interviews (end of each semester)</td>
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<td>What changes need to be made so that the industry partner finds the internship program</td>
<td>Industry mentor focus groups (annual)</td>
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<td>useful?</td>
<td>Partnership meeting minutes (annual)</td>
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<td>Does the partnering company feel there is a shared vision and purpose between themselves and the project?</td>
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**STAKEHOLDERS**

**Students participating in internships (Group: Engineering students)**

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<td>What is the quality of interaction with industry mentors and how does it relate to the students’ sense of belonging in engineering?</td>
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## DATA COLLECTION PLAN

### STUDENTS INVOLVING IN INTERNSHIPS (GROUP: ENGINEERING STUDENTS)

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<td>Student Interviews (one month into the internship, end of internship)</td>
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<td>Do students feel their participation is valued by the company?</td>
<td>Student focus groups (bi-annual)</td>
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<td>To what extent did the student feel they gained technical skills in the internship?</td>
<td>Student surveys (before and after internship, one year follow-up)</td>
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<td>How satisfied are students overall with their experience with the internship program?</td>
<td>Review of student internship reports (end of internship)</td>
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<td>What were the most useful/effective experiences with the internship?</td>
<td>Case studies of student experiences</td>
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BI EVALUATION AND SUSTAINABILITY

**Scalability:** The potential of a broader impact activity to be useful in other locations, with diverse audiences, or across a wide spectrum of contexts.
BI EVALUATION AND SUSTAINABILITY

General Information
National Alliance for Broader Impacts: https://broaderimpacts.net/
COSEE Broader Impacts Wizard: http://www.cosee.net/about/highlights/broaderimpacts/biwizard/

Evaluation Resources
Betterevaluation.org
Informalscience.org
STEM Learning and Research Center: stellar.edc.org

Other Broader Impacts Offices & Centers
The Connector – University of Missouri: http://theconnector.missouri.edu/
Broader Impacts in Research – University of Oklahoma: http://bir.ou.edu/
The Science Center – Brown University: https://www.brown.edu/academics/science-center/outreach/support-faculty/broader-impacts/broader-impacts
Broader Impacts Resource Center – Penn State University: http://broaderimpacts.psu.edu/
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VISIT OUR INCLUDES CONFERENCE WEBSITE:
WWW.NIMBIOS.ORG/INCLUDESCONF

NISER RESOURCES

stemeval.org

Facebook.com/NISERevaluation

twitter.com/NISERevaluation
#NISEReval

CONTACT US!

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Thank you!

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