New Faculty National Science Foundation (NSF) Broader Impacts (BI) Workshop Series:

Practical Applications for Developing, Choosing, Implementing, and Writing Your NSF Broader Impacts - Part iv.

MICHAEL THOMPSON, PHD “THE BROADER IMPACTS GUY”
DIRECTOR OF BROADER IMPACTS IN RESEARCH (BIR): HTTP://BIR.OU.EDU/
OFFICE OF THE VICE-PRESIDENT FOR RESEARCH (OVPR)
Process with stakeholders/people for **Achieving a specified goal that is societally beneficial** in a **finite** time that is measured.

**Aspects of Society**
- University Community
- Local Community
- State Community
- Regional Community
- National Community
- Global / International Community (*caveat here*)

**NSF Recommended areas of BI**

**Used to Help Achieve NSF BI Areas**
NSF Recommended areas of BI

1. Full participation of women, persons with disabilities, and underrepresented minorities in STEM (specifically African Americans, Hispanics, Native Americans, Alaska Natives, and Pacific Islanders)

2. Improved STEM education and educator development at any level

3. Increased public scientific literacy and public engagement with science and technology

4. Improved well-being of individuals in society

5. Development of a diverse, globally competitive STEM workforce

6. Increased partnerships between academia, industry, and others

7. Improved national security

8. Increased economic competitiveness of the United States

9. Enhanced infrastructure for research and education

NSF Broader Impacts Categories:
I. Broadening Participation
II. Education and Infrastructure
III. Industry and Competitiveness
IV. Everything Else
Developing and Knowing Where Your Broader Impacts (BI) and Broader Impacts Activities (BIA) Fit Into Proposals:

**Broader Impact/s (BI)** - A process with stakeholders/people to achieve a societal benefit in a finite amount of time that is measured. This can be with/through research, teaching, public/service, outreach, many other areas, and etc. This is a two way or multiple benefit in which faculty also benefit, (BICF Lexicon and SBT&P, 2014).
<table>
<thead>
<tr>
<th>Criterion Defined</th>
<th>Intellectual Merit</th>
<th>Broader Impacts</th>
<th>When proposals are reviewed, where are the gaps in understanding most visible?</th>
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<tr>
<td>To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?</td>
<td>PIs might remember to write about the innovation of their research and how it is potentially transformative</td>
<td>Most PIs do not think this way about broader impacts (but now they need to)</td>
<td>Project summary, project description</td>
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<td>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?</td>
<td>Most PIs see this as describing their methodology, giving details so that reviewers can see that PIs know how to perform their research. Most PIs assume that assessing success comes in publications (although planned dissemination should be described in the proposal)</td>
<td>Most PIs vaguely list that they want to work with particular groups (e.g., HS students, teachers, the public) but give no details as to how they will do this or evaluate its success (but they need to)</td>
<td>Project summary, project description, FEOR</td>
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<tr>
<td>How well qualified is the individual, team, or organization to conduct the proposed activities?</td>
<td>Most PIs think about this in the context of their research (biography, research expertise, facilities available to the research, etc.)</td>
<td>Most PIs don’t address in their proposals (but they need to) that they have the expertise and people power to carry out the activities or have support at their institution</td>
<td>Biosketches, FEOR, Letters of Commitment, space in the proposal</td>
</tr>
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<td>Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?</td>
<td>Most PIs understand that they should describe what is available to perform the research or other collaborators and the expertise they bring to the project</td>
<td>Some PIs will have found others to partner with to carry out broader impacts activities (e.g., K20 Center, Outreach, OK EPSCoR office, etc.); others will try to do everything on their own.</td>
<td>Project summary, project description, biosketch, FEOR, DMP, PMP, Letters of Commitment – almost everywhere</td>
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Reference: Alicia Knoedler, Associate VP of Research
Treat Your Broader Impacts (BI) Like You Would Treat Your Intellectual Merit (IM)!!!
Facilities, Equipment, and Other Resources (FEOR) is an excellent place to show your infrastructure for NSF Broader Impacts (BI)!!!

Examples – Faculty Could Provide These in Their FEOR:
- The Broader Impacts in Research (BIR) organization
- Center for Research Program Development and Enrichment (CRPDE)
- Office of Undergraduate Research (OUR)

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Broader Impacts are Everywhere!!!
Including Other Agency and Foundation Solicitations

- a. Project Summary (required)
- b. Project Narrative/Description (required)
- c. Biosketch (publications, synergistic activities, collaborators, students)
- d. Current and Pending (pursuing funding related to broader impacts)
- e. Facilities, Equipment and Other Resources (FEOR)
- f. Letters of Commitment
- g. Data Management Plan
- h. Postdoc Mentoring Plan
- i. Suggested Reviewers
- j. BI language
- k. Ask for Help Early

Reference: Alicia Knoedler, Associate VP of Research - revised by Michael Thompson

NSF- National Science Foundation
NIH- National Institutes of Health
DOD- Department of Defense
NASA- National Aeronautics and Space Administration
ACS- American Chemical Society
UNESCO- United Nations Educational Scientific and Cultural Organization
Implementing, Writing, Implementing, and Choosing /Developing Your Broader Impacts (BI) and Broader Impacts Activities (BIA):

Broader Impacts Activity (BIA) - Is a planned pursuit, experience, type of engagement, action, function, work, specific deed/s used with stakeholders/people to achieve a societal benefit a finite period of time. BIA is part of one’s broader impacts program and fits in one’s broader impacts identity. This is what is done with the broader impacts inputs. BIA should be measured (BICF Lexicon and SBT&P, 2014).
The Five Structures of Broader Impacts (BI):

**BI IDENTITY:**
Is who you are, the way you think about yourself, the way you are viewed by the world, and the characteristics that define you based off of a process/es with stakeholders/people to achieve a societal benefit in a finite amount of time that is measured. Everyone has a BI identity.

The Broader Impacts Conceptual Framework (BICF):

**Inputs**
Resources dedicated to or consumed during the event

**Activities**
What is done with the inputs to accomplish the goal, purpose, and objectives of the event

**Outputs**
The direct products and services of the inputs and activities of the event

**Outcomes**
Benefits for participants and other beneficiaries as a result of the activities and outputs of the event

©Developed by the Midcontinent Comprehensive Center (MCC), The University of Oklahoma, College of Continuing Education, Division of Public and Community Services, 2017.
9 Practical Applications for Developing/Choosing, Implementing, and Writing Your BI Activities:

1. Talk to program officer and know how NSF will evaluate your proposal***

2. All reviewers in the directorates are different- i.e. traditional vs very innovative bia’s (try to hit a middle ground to cover all your bases unless you know what the reviewers in your directorate are partial to…)

3. In the BI statement don’t use complicated language and make it easy to find

4. When writing and choosing bia think and **include at what level, the particular population, how this ties in with your assessment, how reasonable it will be to accomplish bia (quality over quantity), include partnerships, will there be tiered impacts based off of your activity/ies. Be specific in your writing!**
About NABI

NABI has its roots in the Broader Impacts Infrastructure Summit of 2013, held at the University of Missouri. BIIS 2013 was the first meeting of the national BI community. It was followed by a second Summit in Arlington, Virginia. A result of those meetings was the formation of an engaged and active community that is ready to create its own national organization.

The goal of NABI is to create a community of practice that fosters the development of sustainable and scalable institutional capacity and engagement in broader impacts activity. This goal will be accomplished through the achievement of the following four objectives:

- Identify and curate promising models, practices, and evaluation methods for the BI community;
- Expand engagement in and support the development of high-quality BI activities by educating current and future faculty and researchers on effective BI practices;
- Develop the human resources necessary for sustained growth and increased diversity of the BI community; and
- Promote cross-institutional collaboration on and dissemination of BI programs, practices, models, materials, and resources.
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Too Many Broader Impact Activities (BIA’s) can ALARM Reviewers You Are Not Serious About What Your Really Going to Do !!!
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Too Many Broader Impact Activities (BIA’s) can ALARM Reviewers You Are Not Serious About What Your Really Going to Do.

Quality Not Quantity!!!!
Be strategic in what you say are your inputs, activities, and outputs that support each of your outcomes.

The Broader Impacts Conceptual Framework (BICF):

Resources dedicated to or consumed during the event
What is done with the inputs to accomplish the goal, purpose, and objectives of the event
The direct products and services of the inputs and activities of the event
Benefits for participants and other beneficiaries as a result of the activities and outputs of the event

Inputs → Activities → Outputs

Short-term Outcomes → Intermediate Outcomes → Long-term Outcomes

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4. When writing and choosing bia think and include at what level, the particular population, how this ties in with your assessment, how reasonable it will be to accomplish bia (quality over quantity), include partnerships, will there be tiered impacts based off of your activity/ies. Be specific in your writing!
9 Practical Applications for Writing, Developing, and Implementing Your BI Activities continued...

5. Have documented evidence of your BI identity - i.e. posters, Twitter, Facebook, your website, other peoples websites

6. Generate a timeline for the research and your BI

7. Talk about short, or mid, and/or long term outcomes of your bia with a guaranteed roadmap for success (always make sure you can accomplish what you say you will do!!!!!)

8. Write how your bia fits to help accomplish at least one of the nine NSF Recommended BI

9. You need to have BI pilot data like you need research pilot data!!!!
Have Documented Evidence of Your Broader Impacts!!!

Other Examples: Websites, Posters, Blogs, Articles, Local News, Get Featured on Facebook, and etc.,
5. Have documented evidence of your BI identity- i.e. posters, Twitter, Facebook, your website, other peoples websites

6. Generate a timeline for the research and your BI

7. Talk about short, or mid, and/or long term outcomes of your bia with a guaranteed roadmap for success (always make sure you can accomplish what you say you will do!!!!)

8. Write how your bia fits to help accomplish at least one of the nine NSF Recommended BI

9. You need to have BI pilot data like you need research pilot data!!!!
Getting All of This Condensed and Written Into My NSF Proposal in a Nice Succinct Way.

**Broader Impact Identity**
The Smith Collaboration (TSC™), using contemporary and co-creation methods to present geographic knowledge, seeks to benefit local, national, regional, and trans border research by investigating, understanding, and promoting the impact of social policies, political atmospheres, and environmental energy about, from, with, and among, to historically underrepresented perspectives – particularly those formulated and fostered within communities (urban, rural, and suburban). This is done in three main ways.

**Leveraging Outcomes to Impacts**
Translating the FII-SAP into the BI Identity/Professional Identity Canvas

**NSF BI 5-Step Plan Development Review Sheet:**

**Inputs**
- What does the project try to accomplish? What resources are dedicated to achieving the goal, purpose, and objects of the event?

**Activities**
- What are the direct products and services of the inputs and activities of the event?

**Outputs**
- The direct outcomes and activities of the event.

**Outcomes**
- Benefits for participants and other beneficiaries as a result of the activities and outputs of the event.

**Steps:**
1. Have you performed an inventory of your BI elements below? Yes or No
   - What are your strengths?
   - What are your passions about?
   - What does your research reveal itself to?
   - What is your time, effort, and logistical constraints?

2. Have you performed an inventory of the BI external factors below? Yes or No
   - Who is your audience?
   - What level?
   - What context?
   - What exists already?
   - What is missing?
   - Who are your potential partners?

3. In your BI plan specifically:
   - Is your BI plan measurable?
   - Is your BI plan realistic?

4. Have you obtained BI implementation details? Yes or No
   - What is your BI timeline (in months)?
   - What is your BI budget?
5. Have documented evidence of your BI identity- i.e. posters, Twitter, Facebook, your website, other peoples websites

6. Generate a timeline for the research and your BI

7. Talk about short, or mid, and/or long term outcomes of your bia with a guaranteed roadmap for success (always make sure you can accomplish what you say you will do!!!!!

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9. You need to have BI pilot data like you need research pilot data!!!!
NABI Guiding Principles

Documents

Broader Impacts Guiding Principles and Questions for National Science Foundation Proposals

The National Association for Broader Impacts (NABI) Broader Impacts Working Group has developed a guiding document for the National Science Foundation’s (NSF) broader impacts (BI) criteria. The purpose of this document is to assist NSF program managers, proposal reviewers, and review panels in evaluating the BI component of NSF proposals and to assist proposers with developing their broader impact plans. This document is intended to provide a resource for consistency in the way reviewers evaluate and rate proposed BI plans.

Types of Broader Impacts: According to the current NSF Merit Review Criteria published in the Grant Proposal Guidelines (See page III.2 HERE), the following BI goals may be considered:

- 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 academics, industry, and others
- Increased national security
- Improved economic competitiveness of the United States
- Enhanced infrastructure for national research

The list above is not exhaustive, and it is not necessary to address more than one goal in a proposal, as long as the broader impact goal is likely to have a desired societal outcome and is well planned. However, the following two elements should be considered in the review process for broader impact activities. Each element has recommended Guiding Principles and Guiding Questions for proposers and reviewers.

TERMS/KEY WORDS

- Broader Impact (BI) Activity: A BI activity is a planned experience, engagement, action, function, etc. that is conducted over a finite period of time for a specific purpose and with a target audience. If the target audience is undergraduate or graduate students, the activity should be in addition to traditional undergraduate coursework or graduate student involvement. If a proposal mentions that this will reach an undergraduate class/course or mentor graduate students, this, in itself, would not be considered a broader impact activity. Broader Impacts refers to activities that go beyond traditional faculty responsibilities.
- Empowerment: The PI and/or project team mutually and actively involves target audience participants in the proposed BI activity.
- Evidence-based practices: Refers to any concept, model, or strategy that is based on or informed by evidence—such as some type of research, metrics, performance, educational research, and already established best practices.
- Goals: Goals are the purposes toward which the activity(ies) is directed.
- Impact: Beneficial or to or the target audience(s)/society due to the BI activity(ies) as evidenced by measurable or anticipated outcomes.
- Models: How the identified strategies or interventions will be implemented.
- Outcomes: Outcomes are the result of goals being successfully achieved. They should be measurable and measured. Outcomes demonstrate changes in awareness, knowledge, skills, attitudes, behavior, motivations, beliefs, values, capacities, or conditions of individuals, groups, organizations, systems, or communities. There can be short-term, intermediate, and/or long-term outcomes.
- Practice: The strategies selected to achieve stated goals.
- Scalability: Scalability defines the potential of a broader impact activity to be useful in other locations, with diverse audiences, or achieve a wide spectrum of outcomes.

This work is supported by the National Science Foundation under grants 1458781, 1308193, and 1425955. © Copyright 2016. National Alliance for Broader Impacts. All Rights Reserved.
An Example: There are Multiple ways to write a BI Project Summary. However you write them make it clear!!!

The importance of photoperiod-dependent flowering relates to both natural ecology (e.g., timing flowering to seasons when seeds have the best chance for survival) and human-manipulated agricultural processes (e.g., suppressing early flowering in biofuels related crops). Understanding this process can expand our basic knowledge of plant physiology and direct our future ability to fine tune crops for increased biomass production. The proposed research focuses on the specific functions of NF-Y transcription factors in photoperiod-dependent flowering, but NF-Ys also have roles in other agriculturally-important plant processes, including drought resistance, nitrogen fixing root nodulation, and embryogenesis. Thus, mechanistically dissecting the roles of NF-Y transcription factors in flowering will provide essential information for scientists broadly studying plant development and stress response programs. Additionally, students at the University of Oklahoma currently have limited access to research opportunities in plant molecular biology. Inquiry-based research will provide undergraduate students with opportunities to perform cutting-edge plant physiology and molecular biology. To achieve this goal, many of the proposed experiments will be integrated into a newly developed Plant Physiology course. Additionally, the development of “Oklahoma Plant Molecular Biology Forums” is proposed. During each forum, select labs (principal investigators and their students) from regional research institutes (OU, OSU, Noble Foundation, etc.) will meet to present their ongoing research activities and future plans. The goals of these workshops will be to 1) improve student and PI familiarity with the regional research community, 2) improve opportunities to receive professional feedback and find local collaborators, and 3) provide additional opportunities for graduate and undergraduate students to speak in small groups and interact with PIs.

State the essence of your research.
Who will benefit in your community?

Who is the audience that will benefit beyond your community?
Why will they benefit?
How will they benefit?

What do you plan to do / what are your goals to this aim?

*ANOTHER IDEA*

Use at least one of the nine (9) NSF recommended broader impacts and say how what you are doing fits to support at least one of these areas.
An Example: There are Multiple ways to write a BI Project Summary and Narrative- However you write them make it clear !!!

The importance of photoperiod-dependent flowering relates to both natural ecology (e.g., timing flowering to seasons when seeds have the best chance for survival) and human-manipulated agricultural processes (e.g., suppressing early flowering in biofuels related crops). Understanding this process can expand our basic knowledge of plant physiology and direct our future ability to fine tune crops for increased biomass production. The proposed research focuses on the specific functions of NF-Y transcription factors in photoperiod-dependent flowering, but NF-Ys also have roles in other agriculturally-important plant processes, including drought resistance, nitrogen fixing root nodulation, and embryogenesis. Thus, mechanistically dissecting the roles of NF-Y transcription factors in flowering will provide essential information for scientists broadly studying plant development and stress response programs. Additionally, students at the University of Oklahoma currently have limited access to research opportunities in plant molecular biology. Inquiry-based research will provide undergraduate students with opportunities to perform cutting-edge plant physiology and molecular biology. To achieve this goal, many of the proposed experiments will be integrated into a newly developed Plant Physiology course. Additionally, the development of "Oklahoma Plant Molecular Biology Forums" is proposed. During each forum, select labs (principal investigators and their students) from regional research institutes (OU, OSU, Noble Foundation, etc.) will meet to present their ongoing research activities and future plans. The goals of these workshops will be to 1) improve student and PI familiarity with the regional research community, 2) improve opportunities to receive professional feedback and find local collaborators, and 3) provide additional opportunities for graduate and undergraduate students to speak in small groups and interact with PIs.

The BI Narrative

State the essence of your research. Who will benefit in your community?

Who is the audience that will benefit beyond your community?

Why will they benefit?

How will they benefit?

What do you plan to do / what are your goals to this aim?

Include your BI statement
Include your previous NSF supported bia and how it fits into your bpi / portfolio
Include any bia you have done before and/or results that is being expanded on because NSF funding
Include your specific bia that will or are being used to achieve your goals to benefit all stakeholders
Include how you specifically will assess/evaluate your success

*ANOTHER IDEA*

Use at least one of the nine (9) NSF recommended broader impacts and say how what you are doing fits to support at least one of these areas.
Putting Things in Context in Response to Faculty Questions Concerning Stakeholders:
1. Know why you care and what you love to talk about concerning your research, scholarship, creative activity

2. Develop sustainable long-term relationships and partnerships
   • communicate, cooperate, collaborate

3. Know your audience, figure out how to communicate, continue communicating, and always let the audience communicate back to you (bip & bia)...

Note: this slide was discussed but not shown in the video.
Special Thankyou To:

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