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

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)
Blended Workshop Series Goals:

1. Thoroughly understand BI,
2. Have developed and begin to implement your BI plan,
3. Have written your NSF BI section in a correct format including the evaluation of your BI activities,
4. Learn how to sustain and grow your BI portfolio/program- with specific consideration to the NSF CAREER Integrated Research & Education Plan (IRP),
5. Be able to present your plan/portfolio that provides a competitive advantage when applying to NSF,
6. Be able to get help if you are currently writing or have written BI for a NSF proposal.
Workshop Series Packet:

1. Complete Overview of Workshop Series,
2. Broader Impacts in Research (BIR) Brochure,
3. National Alliance for Broader Impacts (NABI) Guiding Principles document,
4. NSF Merit Review Principles and Criteria
5. BIR Framework for Evaluating High Quality BI (plus two evaluation documents),
6. NSF BI Frequently Asked Questions (FAQs),
7. BI Criterion: How Intellectual Merit (IM) and Broader Impacts (BI) are reviewed,
8. Copy of the PowerPoint slides, (NSF BI 5 Step Development Plan)
9. Debunking the 20 Myths of BI draft document - upcoming

See Folder
**Criterion:**

*Criterion* - a principle or standard by which something may be judged or decided. A standard of judgment or criticism; a rule or principle for evaluating or testing something.
Part II:

1. **Research performer competence** -- relates to the capability of the investigators, the technical soundness of the proposed approach, and the adequacy of the institutional resources available.

2. **Intrinsic merit of the research** -- the likelihood that the research will lead to new discoveries or fundamental advances within its field of science or engineering, or have substantial impact or have substantial impact on progress in that field or in other science and engineering fields.

3. **Utility or relevance of the research** -- the likelihood that the research can contribute to the achievement of a goal that is extrinsic or in addition to that of the research itself, and thereby serves as the basis for new or improved technology or assist in the solution of societal problems.

4. **Effect on the infrastructure of science and engineering** -- the potential of the proposed research to contribute to better understanding or improvement of the quality, distribution, or effectiveness of the nation’s scientific and engineering research, education, and manpower base.
NSF uses two merit review criterion for evaluating research proposals for funding: Intellectual Merit and Broader Impacts. 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.

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

Broader Impacts may be accomplished through the:
I. the research itself,
II. activities that are directly related to specific research projects
III. activities that are supported by, but are complementary to the project.

The following questions will be asked of BOTH CRITERIA when reviewing proposals:
1. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
2. 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?
3. How well qualified is the individual, team, or organization to conduct the proposed activities?
4. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Current BI Criterion

Past BI-like Criterion

Utility or relevance of the research -- the likelihood that the research can contribute to the achievement of a goal that is extrinsic or in addition to that of the research itself, and thereby serves as the basis for new or improved technology or assist in the solution of societal problems.

Effect on the infrastructure of science and engineering -- the potential of the proposed research to contribute to better understanding or improvement of the quality, distribution, or effectiveness of the nation’s scientific and engineering research, education, and manpower base.

NSF BI 1-9 Areas
History of BI*, 1997 until now...

American Competes Act 2010

Congress mandates BI and encourages IHEs to assist PIs in achieving the BI criterion and requires PIs to provide evidence of institutional (BI) resources

2011

We are keeping BI and IHEs should provide support for PIs because there is confusion about it.

2012 & 2013

Three BI Offices Developed and National Alliance for Broader Impacts (NABI)

Broader Impacts in Research (BIR)

See handout on NSF BI Criteria and NSF FAQs
Understanding NSF Broader Impacts - The Big Problems for Faculty:

Lack of Conceptual/Theoretical Frameworks (thought experiment/exercise and 5 minute reading)
The Broader Impacts Conceptual Framework (BICF):

- An explicitly societal centric framework that allows for engagement from society into the institution and engagement from the institution into society

- An engagement-outcome-impact model for creating sustainable societal beneficial impacts

- A framework that is relevant for an entire institution, provides insight into how the BI community and engagement community can explicitly interact

- Provides a way to institutionalize BI and engagement, and introduces and brings together fields of study and practice - Societal Benefit Theory & Practice (SBT&P)

*Julie Risien coined this term*
Understanding NSF Broader Impacts - The **Big Problems** for Faculty:

Lack of Conceptual/Theoretical Frameworks (5 minute reading)
Part III:
Conceptually Understanding the Term Broader Impacts (BI):

Broader Impacts (BI) - is defined as encompassing the ability to benefit society and contribute to achievement of specific, desired societal outcomes (NSF-16-1).
Broader Impacts (BI) is an International Issue!!!
What Does Broader Impacts (BI) Really Mean?: A Cross Case Analysis

Broader Impacts (BI) is defined as encompassing the ability to benefit society and contribute to achievement of specific, desired societal outcomes.

**EU - Davis and Laas, 2014**

So read, we may identify three important similarities between RRI and the criterion of broader impacts:

1. **Societally desirable** NSF apparently has a conception of science, technology, engineering, and mathematics as working to achieve “societally relevant outcomes”—presumably outcomes “relevant” in a positive way, that is, outcomes society should desire (even if it does not). Both RRI and broader impacts seek science and innovation that serve society.

2. **Process** There is in both criteria the idea of a process by which researchers in academia (and other research institutions) might work with industry and others to achieve societally desirable outcomes. Admittedly, the part played by process in the NSF criterion (“partnerships” and “participation”) seems far less central than in RRI (more about that below).

3. **Specific goals** The list of societally desirable outcomes that the broader impacts criterion aims at is at least partially the same as that Europe has or might be expected to put together. For example, Europe wants its research and innovation to increase its economic competitiveness just as the US wants its research and innovation to do (see, for example, Directorate-General 2013).

**England, Scotland, Wales, and Northern Ireland, 2014**

**Impact: 20 per cent of the overall results**

**Definition for the REF**

‘Impact’ is any effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia.

**Information provided in submissions**

- Each submission included:
  - Impact case studies. These four-page documents described impacts that had occurred between January 2008 and July 2013. The submitting university must have produced high quality research since 1993 that contributed to the impacts. Each submission included one case study, plus an additional case study for every 10 staff.
  - An impact template. This document explained how the submitted unit had enabled impact from its research during the period from 2008 to 2013, and its future strategy for impact.

**Assessment criteria**

Impact case studies were assessed in terms of the ‘reach and significance’ of the impacts.

Impact templates were assessed in terms of how far the approach and strategy are conducive to achieving impacts.

**Netherlands, 2014**

**What is valorisation?**

Over the last decade there is an ongoing debate about the societal impact and utilisation of academic research. This is also called ‘valorisation of knowledge’ or ‘technology transfer’ and can be defined as:

The process of value-creation out of knowledge, by making this knowledge suitable and available for economic or societal utilisation and to translate this into high-potential products, services, processes and industrial activity.

Reference: Davis M. & Laas K., (2014), Sci Eng Ethics. A Comparison of Criteria...
**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.

Basic structure for thinking, writing, and evaluating your broader impacts*

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**BI Identity Non-Academic definition:** Is who you are and how you plan to engage and benefit others by leaving a legacy through your research, teaching, occupation, and/or service.

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*Developed by the Mid-Continent Comprehensive Center (MC3), The University of Oklahoma, College of Continuing Education, Division of Public and Community Services, 2007.
HOW DO I GET STARTED?

Understanding, Developing, Writing, and Implementing, Your Broader Impacts Identity (BII):

Broader Impacts Identity (BII) - 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. (BICF Lexicon and SBT&P, 2014).

BI Identity Non-Academic definition: Is who you are and how you plan to engage and benefit others by leaving a legacy through your research, teaching, occupation, and/or service.
The Components that Make up Your BI Identity

1. Research and/or Teaching and/or Service

2. Societally Centric Beneficial Engaged Outcomes (SCBEO)

3. Legacy in Addition to Your Field
Broader Impact Identity

The Smith Collaboratory (TSC)*, using participatory and co-communal methods to produce geographic knowledge, seeks to benefit local, university, regional, and trans-border communities by investigating, understanding, and portraying the impacts of cultural policies, political atmospheres, and environmental imagery about, from, with, and in response to historically underrepresented perspectives – particularly those formulated and fostered in terms of Indigeneity, gender and nation. This is done in three main ways.

Creative Scholarship & Research

Interpretive study of the organizational geographies and exhibition circuits of Indigenous media, as well as collaborative visualizations of Indigenous geographies.

Recently Completed Projects:
- Organizational ethnography of Indigenous video production and circulation in Oaxaca, Mexico and related publication of articles and book chapters
- Production of two Indigenous videos: Listening for the Rain and Revisiting Tar Creek Superfund Site

Future Works:
- Video portraits of Tribal Environmental Professionals
- Examination of Indigenous video production in Peru
- More media art projects created with geospatial and fieldwork informed data

Teaching & Mentorship

Post-colonial pedagogies for exploring the cultural and technological geographies of authoritative knowledge production and encouraging inquiry into how scientific diplomacy and performance changes over time and space.

Undergraduate Courses:
- Introduction to Human Geography
- What is Science?
- American Landscape
- Research Methods and Professional Development

Undergraduate/Graduate Course:
- Interpreting Society & Environment: Qualitative Research Methods

Graduate Courses:
- Introducing Critical Theory
- Contemporary Geographic Thought
- Geographies of Development
- Critical Geopolitics

Community Engagement

Catalyzing, promoting, and participating in events that showcase Indigenous media and facilitate helpful conversations about social and environmental justice.

University of Oklahoma Screening Partners:
- Native Crossroads Film Festival & Symposium
- Department of Anthropology and Department of Geography & Environmental Sustainability
- College of International Studies
- College of Atmospheric & Geographic Sciences

Other Recent Screening Partners:
- South Central Climate Science Center
- Oklahoma City Public Schools, Metro-tech, and Oklahoma City Community College

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* THE SMITH COLLABORATORY (TSC): The integration of multi-disciplinary national/international partnerships to provide culturally supportive scholarship, teaching, and mentorship.
Part IV:
Practical Applications of BI Using the National Science Foundation (NSF) as an Example:

**Broader Impacts (BI)** - is defined as encompassing the ability to benefit society and contribute to achievement of specific, desired societal outcomes (NSF-16-1).
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**

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**NSF**
- Science (S)
- Technology (T)
- Engineering (E)
- Mathematics (M)

**SCIENTIFIC LITERACY**

**UNITED STATES OF AMERICA**

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**NATIONAL SECURITY AGENCY**

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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).
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

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

Reference: Alicia Knodler, Associate VP of Research- revised by Michael Thompson
BI Criterion: How NSF Proposals are Reviewed

<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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</thead>
<tbody>
<tr>
<td>To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?</td>
<td>The Intellectual Merit criterion encompasses the potential to advance knowledge</td>
<td>The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes</td>
<td>Project summary, project description, biosketch, FEOR, DMP, PMP – almost everywhere</td>
</tr>
<tr>
<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>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>
</tr>
<tr>
<td>How well qualified is the individual, team, or organization to conduct the proposed activities?</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>
</tr>
<tr>
<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 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 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>
</tbody>
</table>

Reference: Alicia Knoedler, Associate VP of Research
Broader Impacts are Everywhere!!!

Including Other Agency and Foundation Solicitations

- a. Project Summary (required)
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Reference: Alicia Knoedler, Associate VP of Research, revised by Michael Thompson
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).
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!
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!!!!
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 bip / 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.