



Broader Impacts: How to Effectively Communicate the Societal Benefits of a Project

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Learning Objectives

- Participants will gain an understanding of the importance of Broader Impacts (BI) and how BI can be integrated into a proposal.
- Participants will learn how to assist their researchers to create an effective BI plan.



Overview of Presentation

- Background / History / Basics
- Broader Impacts and the Merit Review Process
- Creating a Broader Impacts Plan
- Broader Impacts Resources

Thank you to Liz Nysson, NABI Steering Committee Member for her contributions to this content



What are Broader Impacts?

All NSF Proposals are Evaluated on Two Criteria...

➤ **INTELLECTUAL MERIT**

- ✓ The potential of a project to advance knowledge and understanding within its own field or across different fields

➤ **BROADER IMPACTS**

- ✓ The potential of a project to benefit society or advance desired societal outcomes

BROADER IMPACTS = SOCIETAL IMPACTS



Pictures from: <http://scienceinsociety.northwestern.edu/initiatives/hst-broader-impacts-support>

Broader Impacts Myth

- ✓ It is just a box to check so that I can do my REAL work





History of Merit Review

- 1974 | 11 criteria for NSF review
- 1982 | 4 criteria: research competence, merit of the research, utility, and effect on infrastructure
- 1986 | NSF officially utilized “merit” review
- 1996 | Intellectual Merit and Broader Impacts
- 1998 | Accountability for BI established
- 2010 | America COMPETES Act Reauthorization: 8 BI categories
- 2016 | NSF Proposal and Award Policies and Procedures Guide (PAPPG): 9 BI Categories
- 2017 | American Innovation and Competitiveness Act (AICA): 7 BI categories

Source: Iacono, Suzi. NABI 2018 Summit. April 26, 2018.



AICA Broader Impact Categories

The Foundation shall apply a broader impacts review criterion to identify and demonstrate project support of the following goals:

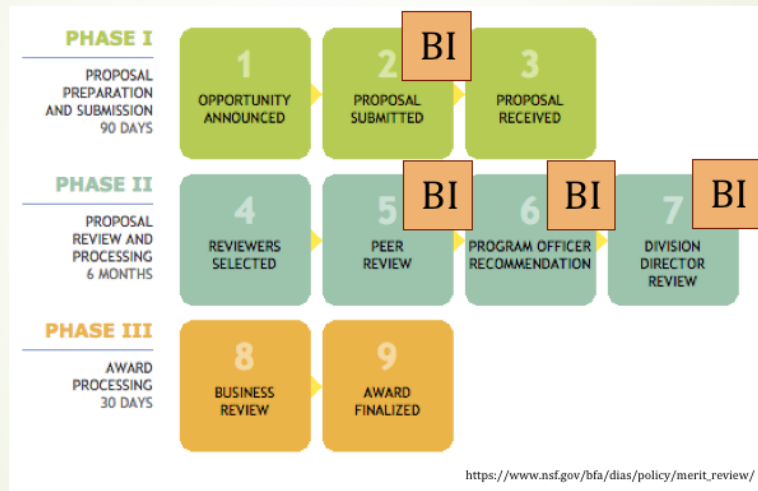
- **Increasing the economic competitiveness** of the United States.
- **Advancing of the health and welfare** of the American public.
- **Supporting the national defense** of the United States.
- **Enhancing partnerships between academia and industry** in the United States.
- **Developing an American STEM workforce** that is globally competitive through improved pre-kindergarten through grade 12 STEM education and teacher development, and improved undergraduate STEM education and instruction.
- **Improving public scientific literacy and engagement** with science and technology in the United States.
- **Expanding participation of women and individuals from underrepresented groups** in STEM



Broader Impacts and Your Proposal

- **Project Summary**
- **Project Narrative**
 - ✓ Separate section titled “Broader Impacts”
- **Budget and Budget Justification**
- **Supplementary Documentation**
 - ✓ Postdoc Mentoring Plan
 - ✓ Letters of Collaboration
 - ✓ Biosketch
- **Annual Report**

BIs and the Merit Review Process





Creating a Broader Impacts Plan



BI Basics - Nuts & Bolts

- BI activities should not be independent of the proposed research.
 - ✓ shouldn't feel "tagged on"
- A well-written BI section should include activities that are:
 - ✓ clearly described
 - ✓ have a well-justified rationale
 - ✓ demonstrate creativity or originality
 - ✓ have a basis in established approaches.



BI Basics - Nuts & Bolts (cont.)

- **The proposer should have a well-organized strategy for:**
 - ✓ accomplishment of clearly stated goals
 - ✓ establishing the qualifications of those responsible for the activities
 - ✓ demonstrating sufficient resources for support.
- **A plan should be in place to document/assess results.**
- **Discuss the other societal impacts of your project:**
 - ✓ Training undergraduate and graduate students
 - ✓ Informing best practices for industry
 - ✓ Write-ups on your blog
 - ✓ Etc.



Merit Review Considerations for BIs

- What is the potential for the proposed activity to:
 - ✓ Advance knowledge and understanding within its own field or across different fields (Intellectual Merit)?
 - ✓ **Benefit society or advance desired societal outcomes (Broader Impacts)?**
- To what extent do the proposed activities suggest and **explore creative, original, or potentially transformative concepts?**
- 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?**
- **How well qualified is the individual, team, or organization** to conduct the proposed activities?
- Are there **adequate resources available** to the PI (either at the home organization or through collaborations) to carry out the proposed activities?



Crucial Questions to Address

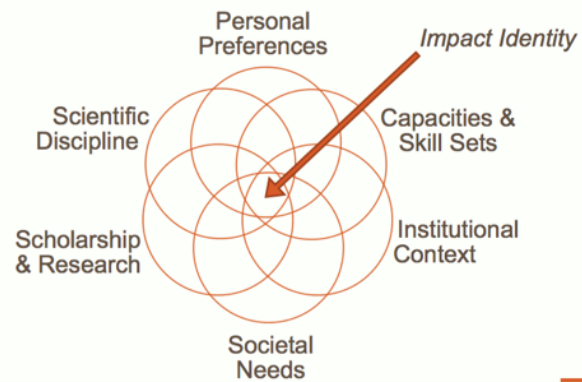
- What do you want to do?
- Why do you want to do it?
- How will you do it?
- What resources will you need to do it?
- Who will do it? Who will help?
- How will you know you've done it?



How do you get started?

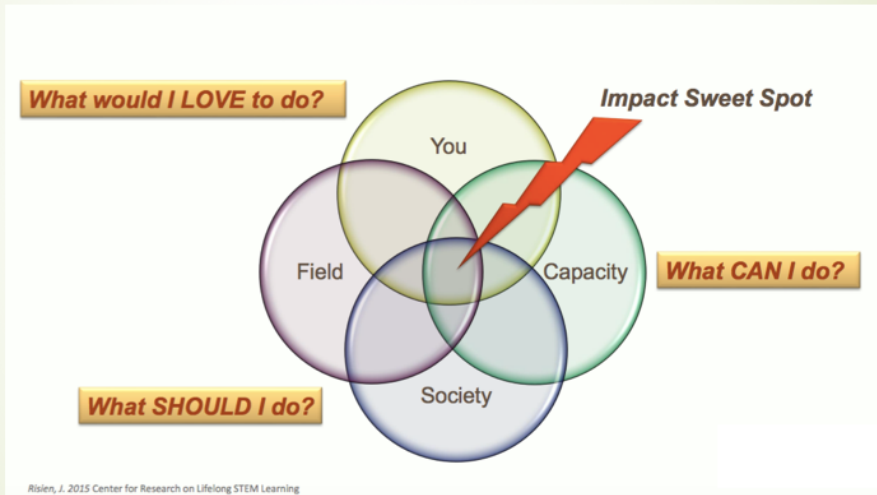
Develop your Broader Impacts Identity

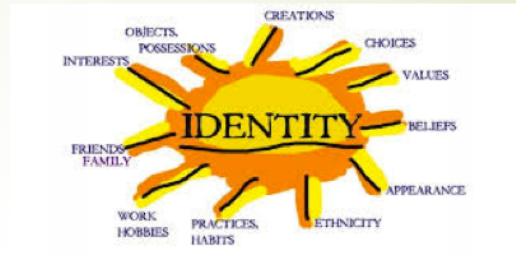
Multidimensionality of Research Impact Identity



Source: Risien, Julie. Storskieleck, Martin. Unveiling Impact Identities: A Path for Connecting Science and Society

Broader Impacts “Sweet Spot”





Activity: **Broader Impacts Identity**



Activity: BI Identity Worksheet

What did you notice?

- Are many of your activities social or solitary?
- Are you drawn to a creative field or activity?
- Do you favor research or teaching?
- Do you like working with kids?
- Are you comfortable in front of large groups?

Let your **Interests** and **Comfort**
Guide your Broader Impacts Plan



The BI Planning Process

➤ Generate Ideas

- ✓ See what's been done before
- ✓ Assess your goals and capabilities
- ✓ Take stock of existing programs, partners, and resources
- ✓ Generate a list of feasible ideas

➤ Prioritize and Choose

- ✓ Define criteria
- ✓ Use criteria to prioritize list of ideas

➤ Articulate a Plan

- ✓ The What, Why and How

Generate Ideas:

* Goals and Capabilities

- social outcomes you are especially passionate about
- Is there a particular audience, or a particular format of activity or communication you prefer
- how much time do you have to devote to BI activities
- unique skills or access to any unique resources

Prioritize and Choose:

What matters most to you (from BI Identity worksheet)

Example Criteria:

- Your level of interest in the idea (you'll be doing this for a few years)
- How much the idea aligns with mutual goals between you and priority partners
- How much the idea aligns with priorities of your department and/or the College of Science
- The level of effort the idea will require to execute
- Ability of the idea to further your brand/reputation in your field
- Strength of the idea's connection to your research
- How measurable or significant of an impact the idea could produce

- How unique or creative the idea is
- How sustainable the idea is

Articulate a Plan:

*** WHAT You Are Doing**

- Goals of your activity
- What discrete activities will you be executing?
- What past work or established approaches are these activities based off of?

*** WHY You Chose Your Proposed Activities**

- connection to your research and
- qualifications: resources and/or skills
- socially relevant outcomes

*** HOW You Will EXECUTE These Activities**

- timeline and milestones
- funding/resources needed – means to acquire these
- others involved (support staff)

*** HOW You Will ASSESS Your Success**

- method of assessment / who will conduct assessment
- When/how frequently will data be captured for the assessment?
- How will assessment data be captured, conducted, and analyzed?



Points to Remember

- Start your BI plan early (don't wait until the last minute)
- Research and Broader Impacts can be integrated
- Your research outcomes can be a broader impact
- BI activities can be directly related to your project
- BI activities can be supported by or complementary to the project
- You can partner with other groups, organizations, schools, etc. (but talk to them early)



Examples of Broader Impacts Activities



Leveraging Existing Partnerships

➤ **Northwestern Science in Society**

[partners with Chicago-area schools and community groups]

- ✓ Silverstein Genetics for High School
 - students undertake a genetics case study
 - use DNA-based laboratory diagnostics to find mutations
 - Explore legal ramifications of genetics testing
- ✓ Afterschool Science at Y.O.U. (Youth & Opportunity United)
 - Program for underserved youth in grades 3-12
 - Led by mentor scientists and their students
 - Students gain skills / explore science by engaging in projects tied to researcher's work

What partnerships already exist at your institution?

- With local school districts
- With local businesses
- Alumni connections



Leverage your Interests

➤ Sustainability in Prisons Project

- ✓ A partnership between The Evergreen State College and the Washington State Department of Corrections
 - Prison had an interest in sustainable operations and a need to cut water use
 - Professor had infectious optimism and a great passion for introducing new audiences to the wonders of science
- ✓ Started with an Ecology Professor who received NSF funding to initiate the *Research Ambassador Program*
- ✓ Benefits of Project
 - Prison implemented 0 waste policy (composts or recycles everything)
 - Education and Rehabilitation of Inmates

Ecology Prof. Nalini Nadkarni

- Came to prison to engage prisoners in greening their facility
- Initiated monthly talks on topics of sustainability by prominent researchers
- Saw great opportunity to engage prisoners to solve environmental problems

Cedar Creek Prison

- Set up like a “wilderness retreat”
- Rehabilitation process requires every inmate to have a job—lots outside
- Inmates began collecting data
- Mentorship relationships developed between inmates and University professors and graduate students

Benefits of Partnership

- Prison administrators quick to implement ideas and anxious to push forward with sustainability improvements
- Education and Rehabilitation of Inmates
- * one inmate got accepted in Biochemistry PhD program w/full scholarship upon his release



Leverage your Interests (cont.)

➤ Girl Scout Coding Camp

- ✓ Merged passion for coding with daughter's involvement in Girl Scouts
 - daughter's desire to learn how to code
 - Working to earn 1 of 30 new badges in the field of computer science, robots, etc.
 - Aiming to win the Girl Scout Silver Award for completing a project that makes the world a better place
 - PIs need to find an innovative way to incorporate Broader Impacts into a research proposal



Leverage your Interests (cont.)

➤ SciToons

- ✓ An innovative approach to explain complex scientific concepts and to communicate the research behind it to a broad audience
- ✓ Designed to engage students in teaching and learning
 - Students and faculty meet weekly to select topics, and design the video (story development, storyboard, narration, recording, multimedia, animation, video production)
- ✓ Impact
 - Connect STEM students with science faculty mentoring relationships
 - Sustainable working relationships with local elementary, middle and high school teachers
 - Ability of elementary – high school students to understand complex scientific concepts



Broader Impacts Resources



BI Resources

- **COSEE BI Wizard** (<http://coseenow.net/wizard/>)
 - ✓ A web-based tool that helps researchers identify their target audience, plan appropriate BI activities, create a budget, define learning objectives, and outline an evaluation plan
- **National Alliance for Broader Impacts - NABI** (<https://broaderimpacts.net>)
 - ✓ The Current State of BI (<https://broaderimpacts.net/wp-content/uploads/2018/01/nabi-current-state-of-bi-011118.pdf>)
 - ✓ Guiding Principles (https://broaderimpacts.net/wp-content/uploads/2016/05/nabi_guiding_principles.pdf)
- **Northwestern Science in Society** (<http://scienceinsociety.northwestern.edu/>)
 - ✓ Research Center dedicated to science education and public engagement
 - ✓ Lots of examples of BI activities



BI Resources (cont.)

- **NSF Office of Integrative Activities**
(<https://www.nsf.gov/od/oia/special/broaderimpacts/>)
- **American Association for the Advancement of Science – AAAS**
 - ✓ Center for Public Engagement with Science & Technology
(<https://www.aaas.org/resources/communication-toolkit/many-approaches-public-engagement>)
- **PennState Broader Impacts Resource Center**
(<https://broaderimpacts.psu.edu/>)