Broader Impacts Design for National Science Foundation Proposals

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OSP Roundtable, February 21, 2019
Aims and Agenda

Clarify the broader impacts concept

Share a structure and resources to improve BI effectiveness across orgs.

Lower Barriers in BI Design and (Impact) for ALL involved

Invitation to work together

NSF Overview

What are Broader Impacts? And why are they so challenging?

Broader Impacts Design (BID project) NEW Resources for Faculty, Research Admins, and Partners, Community-Based Orgs (CBOs)

Case Studies (PIs and Partners)

Upcoming Opportunities

Questions and Discussion
National Science Foundation - Overview

1950: Created by Congress “to promote the progress of science; to advance the national health, prosperity and welfare; to secure the national defense”...

Today
- NSF receives 50,000 proposals and funds 12,000 new projects annually
- 2018 Federal Budget: $7.8B
  - 7 Directorates
  - 12%/$902M to EHR Directorate/ STEM EDU all levels
- NSF = ¼ of all federally sponsored basic research at US universities
NSF - Cornell’s Largest Federal Research Sponsor

- 2017: Cornell ranked #3 in NSF
- 2018: $116M Ithaca campus
- Most awards go to individual and small groups of researchers
- -15.3% decline over last 5 years
- + in 2018

Sponsored Research Expenditures FY 2018
Federal Agencies - Ithaca Campus (in thousands)

- DHHS $76,361
- NSF $116,047
- DOD $27,364
- USDA $29,033
- DOE $21,331
- NASA $10,639
- AID $1,876
- Other $12,068

Total Federal Sponsored Expenditures: $294,720,844
NSF has a long history of advancing science and society interests

1981-1997: 4 criteria (suggested societal impact)

1993 Government Performance and Results Act
Improve performance and public accountability at Federal Agencies

Since 1997 NSF Merit Review has included 2 criteria:

- **Intellectual Merit** (research potential to advance scientific knowledge)
- **Broader Impacts** (benefits to society)
Researcher Reservations 
Early on (1997-2011)

Diverse reservations about BI criteria:

'Don’t understand it’

'Not very important’

'Irrelevant’

'Impossible to address’

(J. B. Holbrook. 2005, 2012)
**BI Timeline**

**Broader Impacts Criterion**
- 5 Explicit Elements

**Merit Review Process**
- Proposals and reports require "sufficient detail to assess the projects benefit to society".

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**1997**
- Broader Impacts Criterion

**2010**
- America COMPETES Act, ReAuthorized
- Integration of proven strategies that link research and BI
- PIs can allocate funds (assess/eval BI)
- Agency-wide trainings for BI (reviewers)

**2011**
- NSF Strategic Plan 2011-2018
- PAPPG - Significant Changes

**2013**
- 9 BI Criterion - removed specific activities references
- Separate grant sections on BI: narrative, results from prior NSF Support
- IM and BI evaluated with same Merit Review criteria

**2014**
- NSF Continues Investment/Improvement
- NABI established; 3 directorates
- NSF Summit and Publication

**2018**
- National Momentum
- NABI: Current State on BI Report
- CISE - Directorate-wide Strategic Plan on BP - BP /Opportunity
- ARIS - All Directorates Funding
What are Broader Impacts?
Broader Impacts potential (of the proposed research) to benefit society and contribute to the achievement of specific, desired societal outcomes.”

- Research itself CAN BE the broader impact
- BI activities can be directly related to the research project
- BI activities can be supported by or complementary to the project

“If the research itself is transformational, that is enough; but most researchers can't make that case at the proposal stage; so they need to do something else” (Susan Renoe NABI, ARIS, B. Olbricht, NSF ENG panel reviews).
BI Merit Review Criteria (PAPPG 2019)

9 Broad BI areas for BI (specific, desired societal outcomes)

- 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

Important for Success at all NSF Directorates: Broadening Participation & Broad Dissemination of Outcomes
Integration

“NSF’s mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities” (Merit Review from PAPPG 2018).
Broader Impacts are:

Specific

Strategic

Flexible

Non-prescriptive

Reviewed in diverse directorates/fields, with their own cultural values, beliefs, needs, and agendas. Implemented in diverse cultures, environments and communities.
Challenges and Barriers

A lot to keep up with

Policy continues to be refined, expectations continue to grow, bar is higher

NSF is not a monolith, nor are fields, directorates

BI is not a last-minute ‘activity’ or ‘statement’

Many, diverse stakeholders (not always talking to one another)**

Cornell Specific

Confusion, frustration and excellence around BI

Not part of tenure package/Land-Grant University

Important to early career faculty success

Pockets of knowledge, resources, access to BI
Resources

What’s out there now?

For whom?
Resources at a Glance

INTERNAL
- OSP – Research Development Team
- BID project team and tools
- Office of Faculty Development and Diversity
- Engaged Cornell - Opportunity Grants
- Public Service Center – Faculty Grants
- McCormick Center for Teaching Excellence in Engineering
- K-12 Outreach Centers

EXTERNAL
- NSF Strategic plan 2018-2022
- NABI – listserv, summit
- ARIS – fellowships, PD, assessment
- Portal to the Public
- Community Based Organizations

OSP website: BI resources and list of CBO contacts
Resources for all Stakeholders?

- Diverse Stakeholders
- Unique resources
- Shared resources
- Stakeholders may or may not be speaking the same “BI language”
- Resources and structures need to improve this.
Our Model (Researcher, Research Administrators Community Organization, other experts)
BID Toolkit
Sample tools

- New BI design tools and Resources have been developed from the 3 partner sites are being tested with 6 new teams at universities and museums across the country.
- See table for Toolkit

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Researchers, Research Administrators, and Community Partners in BI Design
Beginning Work with Faculty - My role in OSP

Broader Impacts Identity

You
Field
Society
Scholarship
Capacity
Institution

Broader Impacts Strategy

Alignment with NSF's Strategic Outcomes:

- NSF Strategic Plan 2018-2022
- Directorates - Program Officers
- PAPPG/RFP
- Merit Review Criteria
- Reviewers Insights
- Assessing networks and resources

(Risien, J. et al. 2018)
Community Based Organizations

What does it mean to be “NSF Ready?”

- Better Understanding of BI, RFPs, Researcher Questions
- Communications Template
- Pilot Experiences
- Project Narratives with PIs
- Budgets and Contracts
- Scopes of Work
- Biosketch
- PD for all on project
Case Studies
What can we learn from researchers and their partners?

Steven Adie, PhD

Work with the Sciencenter:

- Has collaborated with us to provide Portal to the Public to graduate students in his graduate course at Cornell
- Students engaged guests at the Sciencenter through hands-on activities highlighting current research in optics and biomedical engineering

Sciencenter BID Partner since 2016
- NSF CAREER grant submitted 2017
- Partnership funding for 5 years of collaboration

Assistant Professor, Meinig School of Biomedical Engineering
Michael Sheehan, PhD

Work with the Sciencenter:
- Portal to the Public science communication training for lab members
- Working with Future Science Leaders to communicate research in behavioral ecology through interactive displays at New York State Parks

Sciencenter BID Partner since 2017
- NSF CAREER grant submitted 2017
- Partnership funding for 5 years of collaboration with Future Science Leaders (middle school leadership) program

Associate Professor in Neurobiology and Behavior
Nancy and Peter Meinig Family Investigator in the Life Sciences
Tips for PIs Designing Broader Impacts

**Develop a BI Identity**
- Interests, abilities, aims, and resources align
- Gain experience in BI areas that are of true interest to you:
  - Test things out: ISE, outreach, mentoring, communications and media, community arts and theater, diversity, inclusion,
  - Learn/document new skills and expertise - Sciencenter, CTEI, Grad School PD, Professional Societies,
- Build plan over time and alongside research and education career aims

**Approach BI like you do your Research**
- Address a challenge, societal issue or need
- Use data (theory/scholarship) to justify the need and the approach for the project
- What’s being done now? What’s the best approach and why?
- Foundation of best methods
- Track results
- Share your outcomes

**Integrate Student Development in IM and BI Plans**

**Partnerships with Community Based Organizations**
- Assemble the right team/resources - partners, advisors
- Pilot and grow over time
- Be clear about your objectives and design a plan that allows you to measure progress/impact
Opportunities

Writing Broader Impacts Statements: Engaged Cornell, March 4th

NSF Career Workshop, March 27

Standard NSF Proposals Workshop, May 11

RA and CBO workshops coming too – interested, let us know.

Contact me for more information at tfleming@cornell.edu
Questions
Discussion
Thank you