



Broader Impacts Design for NSF Proposals: New Resources for Cornell Researchers

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Cornell University, Office of Sponsored Programs

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Sciencenter
State, New York

Agenda

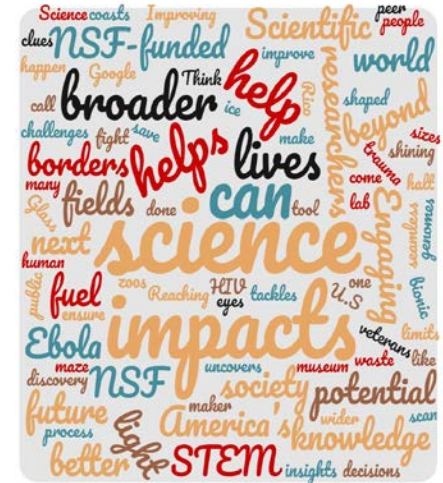
Overview: NSF and Broader Impacts (BI)

NSF at Cornell

History of BI: Challenges and Opportunities

BID Team Resources for [Researchers & Stakeholders](#)

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

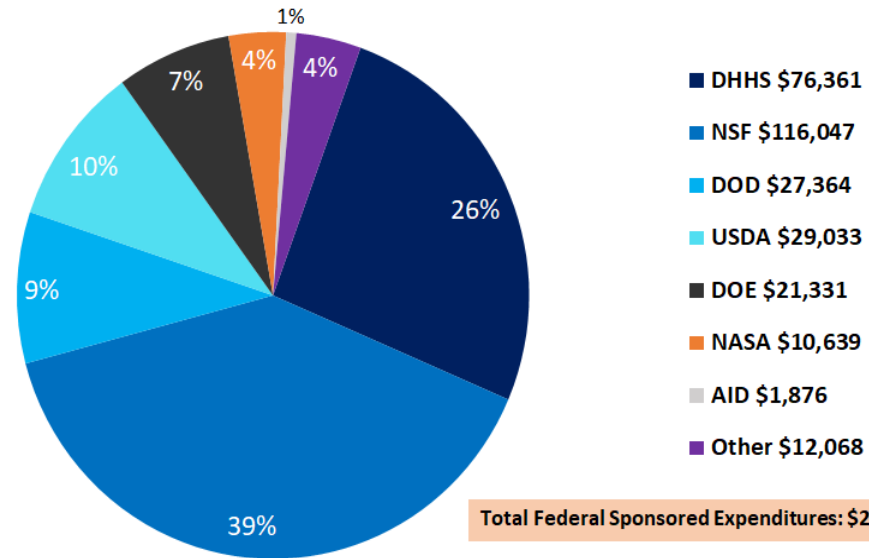
- NSF receives 50,000 proposals, funding +/- 12K new proposals (22% average annual funding rate)
- 2020 Federal Budget: \$8.3B
 - 7 STEM Directorates
 - 10%/\$823M to EHR Directorate/ STEM EDU
 - NSF = ¼ of all federally sponsored basic, non biomedical research at US universities.



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)





**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** (potential of research to benefit society)
- Check out: [nsf.gov/discoveries](https://www.nsf.gov/discoveries)



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)



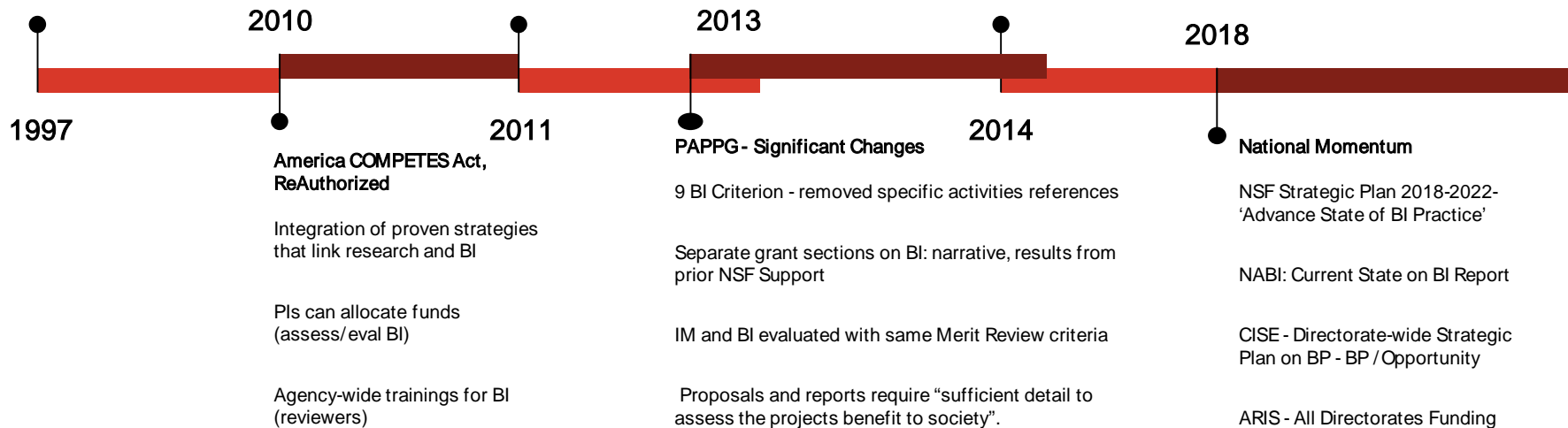


BI Timeline

Broader Impacts Criterion

5 Explicit Elements

Merit Review Process



NSF Strategic Plan 2011-2018

National Science Board, NSF governing body, task force on Merit Review for BI.

NAS, PCAST, Broadening Participation

NSF Continues Investment/Improvement

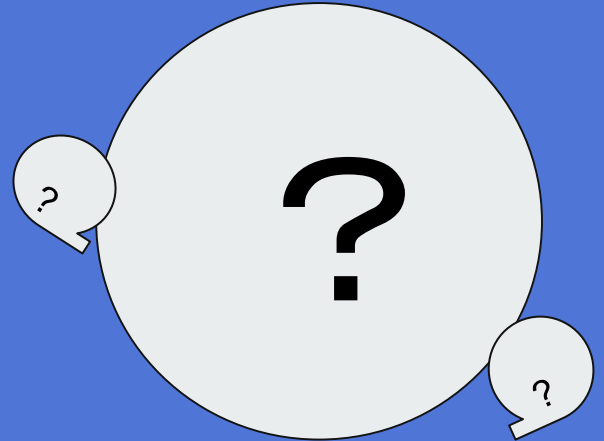
NABI (National Alliance for Broader Impacts) established; 3 directorates

NSF Summit and Publication





What are Broader Impacts?





Broader Impacts potential (of the proposed research) to “benefit society and contribute to the achievement of specific, desired societal outcomes.” -PAPPG 2019

- 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, 2018, B. Olbricht, NSF ENG Directorate, 2018)



BI Merit Review Criteria (PAPPG 2019)



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

**Trends in Grant Success across NSF Directorates:
Broadening Participation & Broad Dissemination of Outcomes**
Dr. Susi Iocono, NABI 2018, 2019, ARIS 2020



Other Considerations: 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).



Other Considerations: NSF's Strategic Plan 2018-2022

Future STEM Workforce

Diverse STEM Workforce

Convergence, Collaboration

NSF's 10 Big Ideas



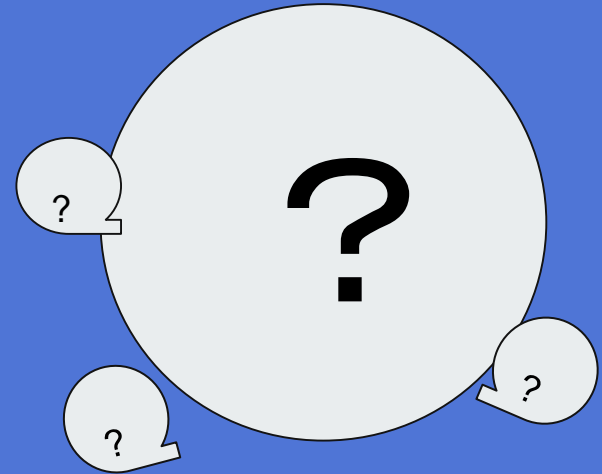
Broader Impacts are:

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.



Current 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

Large campus, small community, and challenging finding the right people and supports

Not part of tenure package/Land-Grant University

Important to early career faculty success

Pockets of knowledge, resources, access to BI

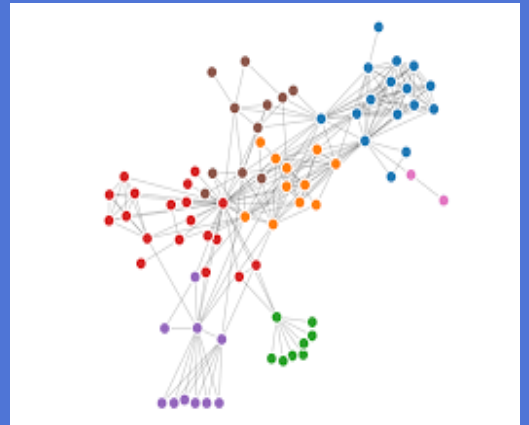
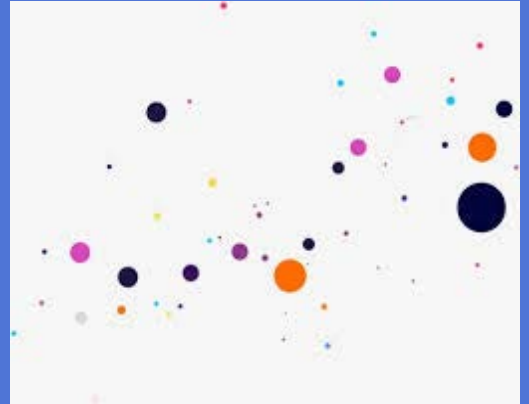


Resources

Can we lower the barriers?

Can we make better connections,
share knowledge, develop lasting

BI partnerships?





BID

Partnerships for
Broader Impacts Design



Cornell University



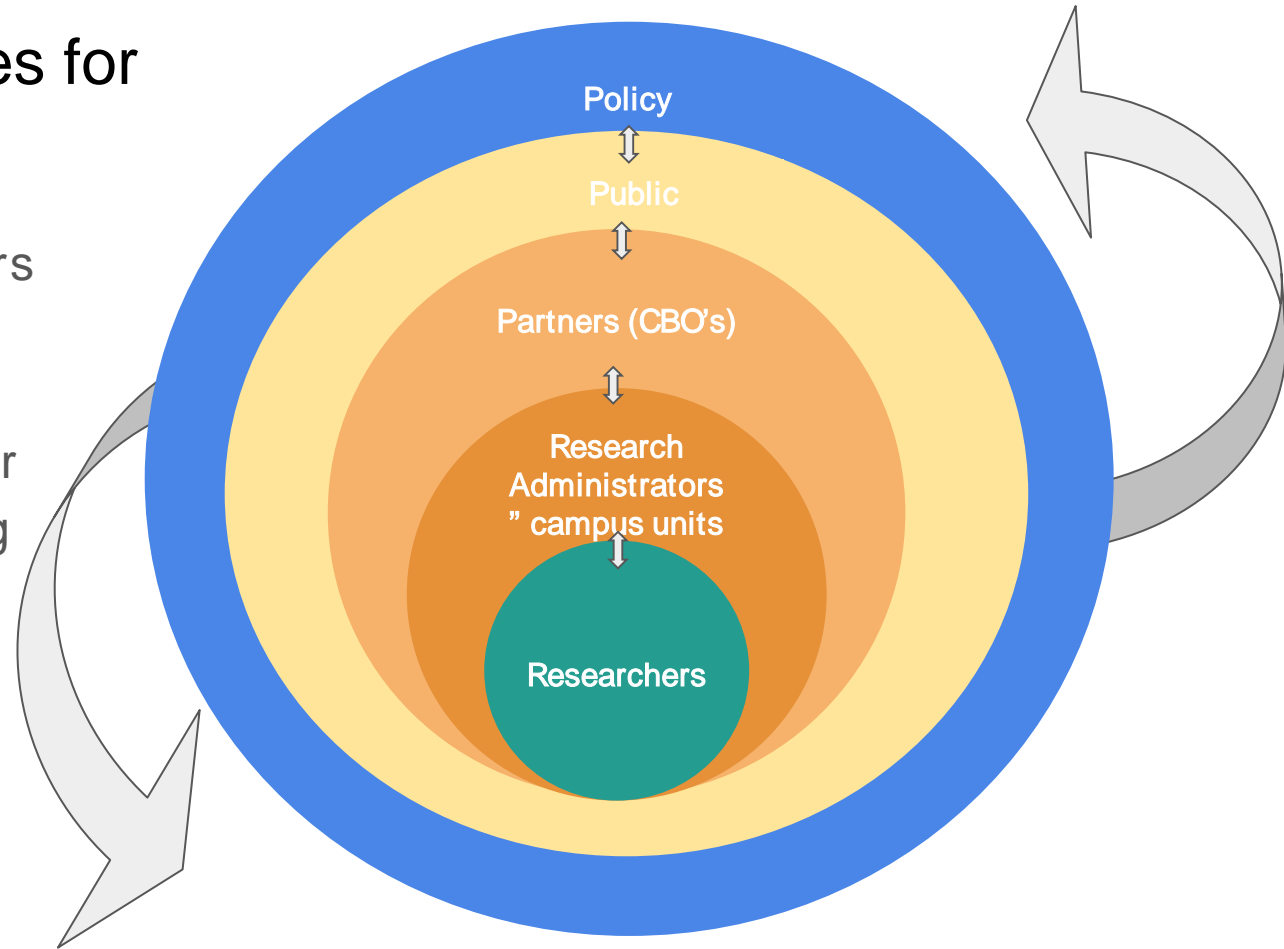
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Common resources for BI Stakeholders?

- Diverse Stakeholders
- Unique resources
- Shared resources ?
- Stakeholders may or may not be speaking the same “BI language”
- Resources and structures need to improve this.





Resources at a Glance

INTERNAL

[OSP web: BI Resources](#)

CAREER Workshops

Research Development Team

Office of Faculty Development & Diversity

[Office of Engagement Initiatives](#)

[Public Service Center](#)

Center for Teaching Innovation

[The Graduate School](#)

McCormick Center for Teaching Excellence

K-12 Outreach Centers

Sci. Comm. Trainings

BI Identity

Writing/Design

Partners & Resources

Curriculum Grants

NY State Partnerships Liaison

Community Partners

Diversity & Inclusion

Careers Beyond Academia

Existing campus BI programs



BI Resources at a Glance

EXTERNAL

NSF Strategic Plan 2018-2022

NSF Science & ENG Indicators 2020

NSF – Portal to the Public

NABI – ARIS

CAISE

CBO's

National and International Collaborators

Professional Societies

Professional Evaluators

Sciencenter

TC3 Comm. Colleges

WSKG Public Media

Community Science Institute

CCE

RD list



Case Studies

Community Org. Researchers, Research Administrators, partnering in BI Design





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

Table of Contents

Section 1: Setting the Scene

| | |
|--|---|
| What is the BID Approach?..... | 7 |
| History of Broader Impacts..... | 8 |
| Why Partner? Institutional Outcomes and Impacts..... | 9 |

Section 2: Building a Partnership

| | |
|---|----|
| Self Inventory Introduction Worksheet..... | 12 |
| Institutional Self Inventory: Annotated University Guide..... | 13 |
| Institutional Self Inventory: Annotated ISE Guide..... | 16 |
| What do Partners Need to Know about Each Other?..... | 18 |

Section 3: Working Within the Partnership

| | |
|---|----|
| Putting Community First | |
| Guide for Developing a BI Menu..... | 23 |
| Is BID the Right Support System for this PI?..... | 27 |
| Broader Impact Identity..... | 29 |
| Broader Impact Design Match Cards..... | 32 |
| RFP Analysis Tool..... | 34 |
| Post-Submission Checklist..... | 36 |



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



Opportunities for Researchers

- Collaborate with Sciencenter educators to design and deliver hands-on programming for audiences at the Sciencenter and within the broader upstate NY community
- Professional development in informal science communication for your class, lab group, or other network
- Be a part of one of our special programs:
 - *Future Science Leaders* (middle school leadership program)
 - *Sciencenter After Dark* (informal adult-only events)

Who we are:

The Sciencenter is a non-profit hands-on science museum in Ithaca that hosts more than 110,000 guests annually and reaches many more through workshops and partnerships with museums around the world.

Our Mission:

Cultivate a broad community of curious, confident, critical thinkers

You might be surprised to know:

- The Sciencenter has been awarded numerous NSF grants to further science education opportunities
- We have an established partnership with Cornell to aid researchers in developing their broader impacts
- We design and build new exhibits that are displayed in museums across the country and reach more than one million guests each year



Have your own idea?
Contact us!

Elizabeth McDonald
Education Program Coordinator
emcdonald@sciencenter.org

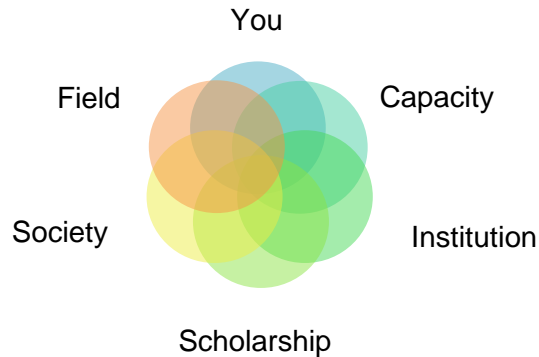
Sciencenter
601 1st Street, Ithaca, NY 14850
607-272-0600 x148





Faculty Services– BI Workshops & Consults

Broader Impacts Identity



(Risien, J. et al. 2018)

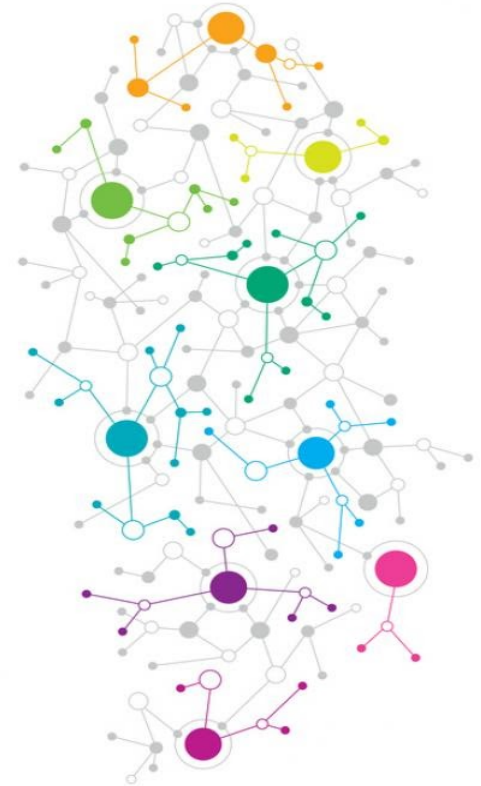
Broader Impacts Strategy

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

Community Based Organizations – BI Workshops, NSF-ready ?

1. Cornell Botanic Gardens
2. Cornell Cooperative Extension – Tompkins County Youth Programs
3. Cornell Graduate School - Careers Beyond Academia
4. Cornell Tech – K-12 Initiatives, Broadening Participation
5. Cornell Public Service Center
6. Cornell Diversity in Engineering Programs, CURIE and CATALYST
7. Cornell Expanding Your Horizons
8. Discover Cayuga Lake
9. New Visions Engineering, TST BOCES
10. NY State Master Teacher Program, SUNY Cortland Center
11. NY State 4H Youth STEM Programs
12. Office of Engagement Initiatives (OEI)
13. PRI – Museum of the Earth and Cayuga Nature Center
14. Public Service Center
15. Sciencenter
16. Tompkins Cortland Community College (TC3) College Now
17. WSKG Public Media





New NSF BI Resources via OSP

[NSF Broader Impacts Resources](#)

[Broader Impacts Development Services](#)

[Getting Started with Broader Impacts Design](#)

Community Orgs. List (old and new) and Partner Overviews

Ongoing Network Building

Contact: Tiffany Fleming, tcf7@cornell.edu



Questions Discussion

Thank you

