NSF Broader Impacts Workshop

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Office of Research Development

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MONTANA STATE UNIVERSITY

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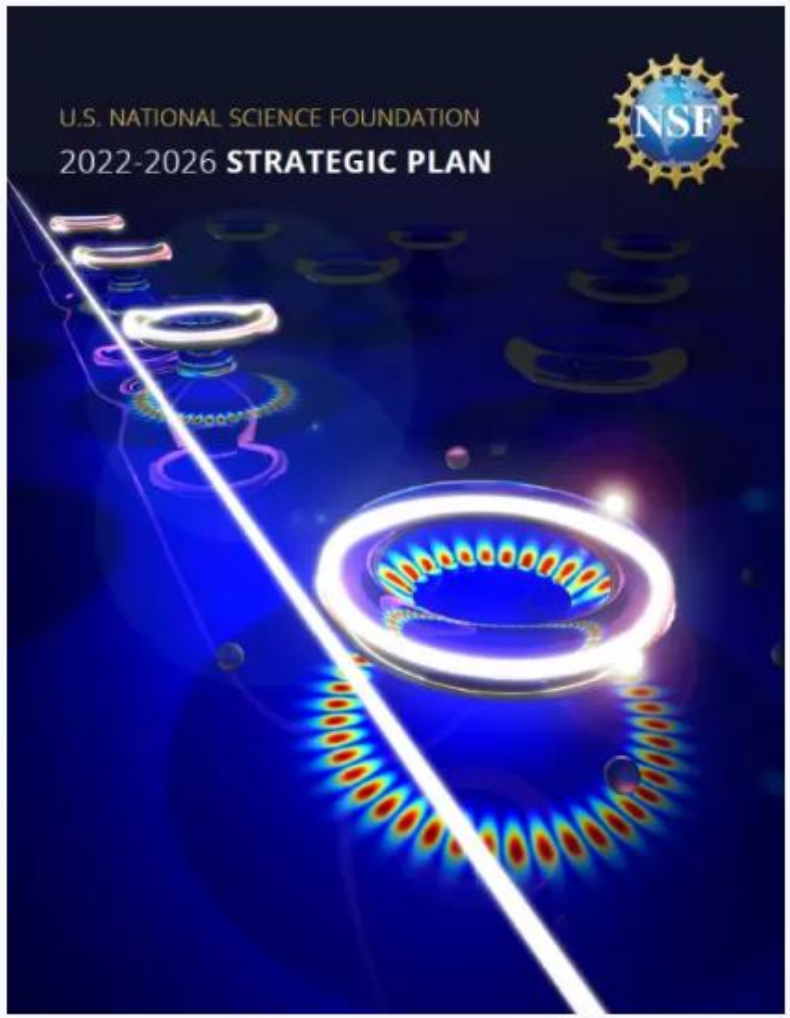
Office of Research Development

Workshop Agenda

- What is NSF Broader Impacts?
- Building a Broader Impacts Identity
- Broader Impacts in a proposal
  - Broader Impacts at MSU
- Tools for creating a successful Broader Impacts Plan

NSF Broader Impacts

National Science Foundation (NSF) Mission



The NSF vision: A nation that leads the world in science and engineering research and innovation, to the benefit of all, without barriers to participation.

The NSF mission: NSF promotes the progress of science by investing in research to expand knowledge in science, engineering and education. NSF also invests in actions that increase the capacity of the U.S. to conduct and exploit such research.

To promote the progress of science; to advance the national health, prosperity and welfare; and to secure the national defense.

NSF's core values: NSF's core values are essential and enduring tenets that guide everyone in the organization as we support the agency's mission. They have been developed with the active engagement of NSF staff. These values identify who we are and what is important to us. They guide how we make decisions, set priorities, address challenges, manage trade-offs, recruit and develop personnel and work together with our awardees.

- Scientific leadership.
- Diversity and inclusion.
- Integrity and excellence.
- Public service.
- Innovation and collaboration.

NSF Merit Review

Intellectual Merit

"The Intellectual Merit criterion encompasses the potential to advance knowledge; and…"

Broader Impacts

"The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes."

"…the best proposals feature an integration of the broader impacts and the intellectual merit"

Broader Impacts is congressionally mandated as part of the America COMPETES Reauthorization Act of 2010.

NSF PAPPG 24-1
America COMPETES Reauthorization Act of 2010; Title V, Section 526.

Renoe, S.D. 2025. An insider perspective on broader impacts. *BioScience*.

“The following elements should be considered in the review for both criteria:

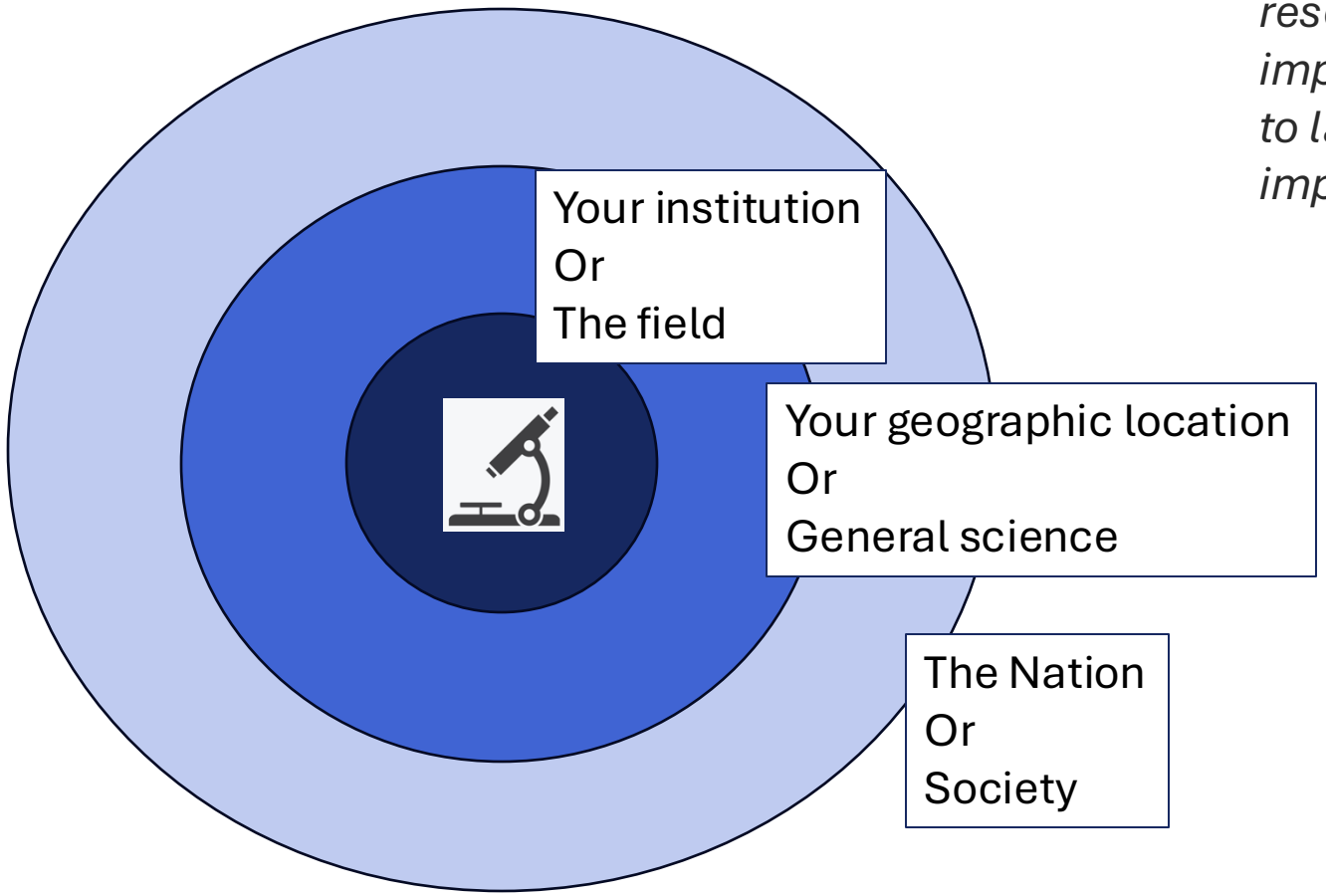
1. **What is the potential for the proposed activity to**:
   a) Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
   b) Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore **creative**, **original**, or **potentially transformative** concepts?
3. 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**?
4. How **well qualified** is the individual, team, or organization to conduct the proposed activities?
5. Are there **adequate resources** available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?”

NSF PAPPG 24-1

Your project's broader impact activities don't need to be a separate add-on to your research. Your project can have broader impacts through:

- Your research activities.
- Activities directly related to your research.
- Activities that are supported by, but complementary to, your research activities.

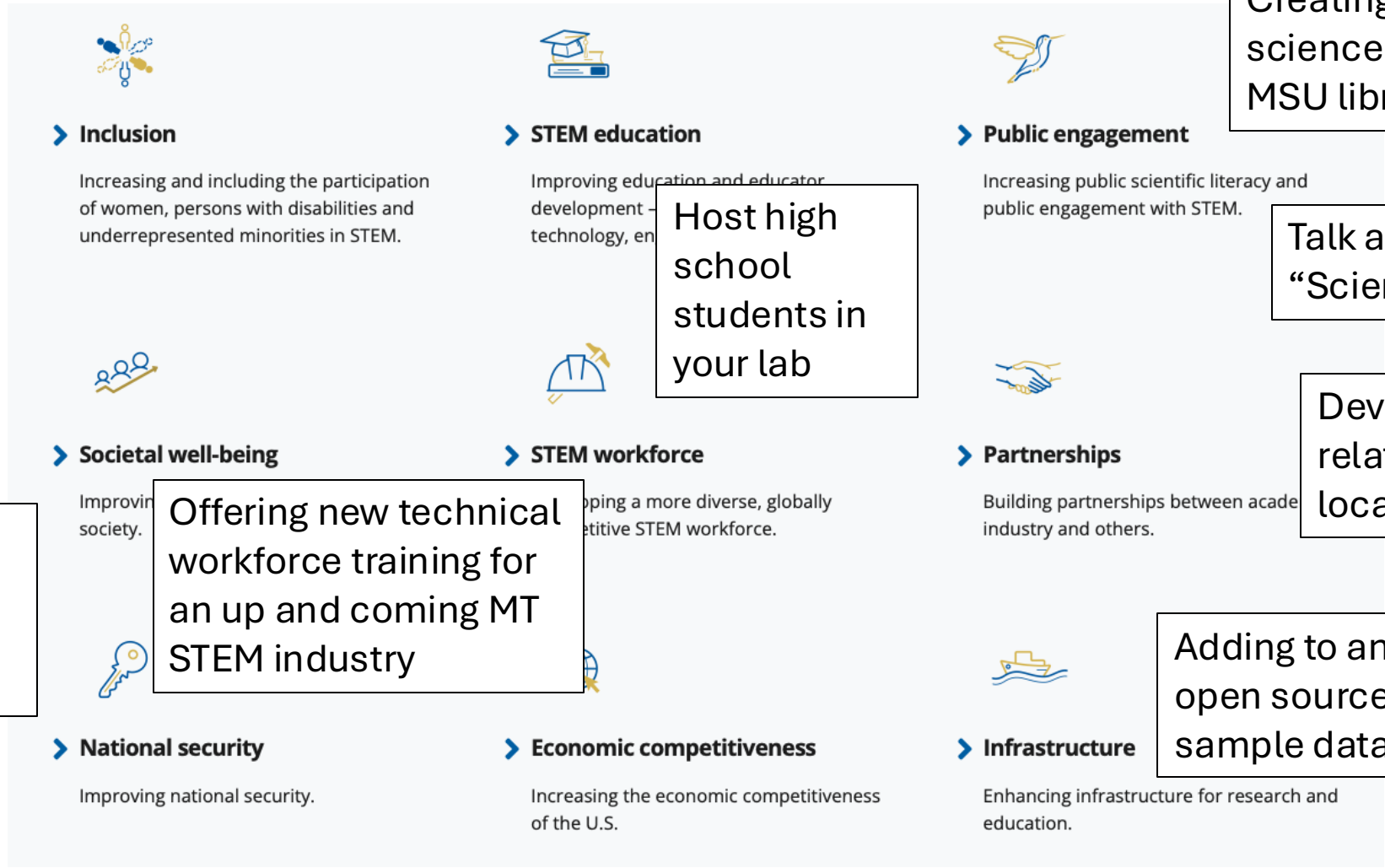
Broader Impacts at multiple levels



"Describing the direct societal impacts of the research is also an important part of a broader impacts statement; however, it is not enough to label that statement as your broader impacts and move on."

Renoe, S.D. 2025. An insider perspective on broader impacts. *BioScience*.

How does your research benefit society?



Creating a citizen science kit with the MSU library

Host high school students in your lab

Talk at a local "Science Café"

Develop a relationship with local industry

Generating a research tool that can predict future natural disasters

Offering new technical workforce training for an up and coming MT STEM industry

Adding to an open source sample database

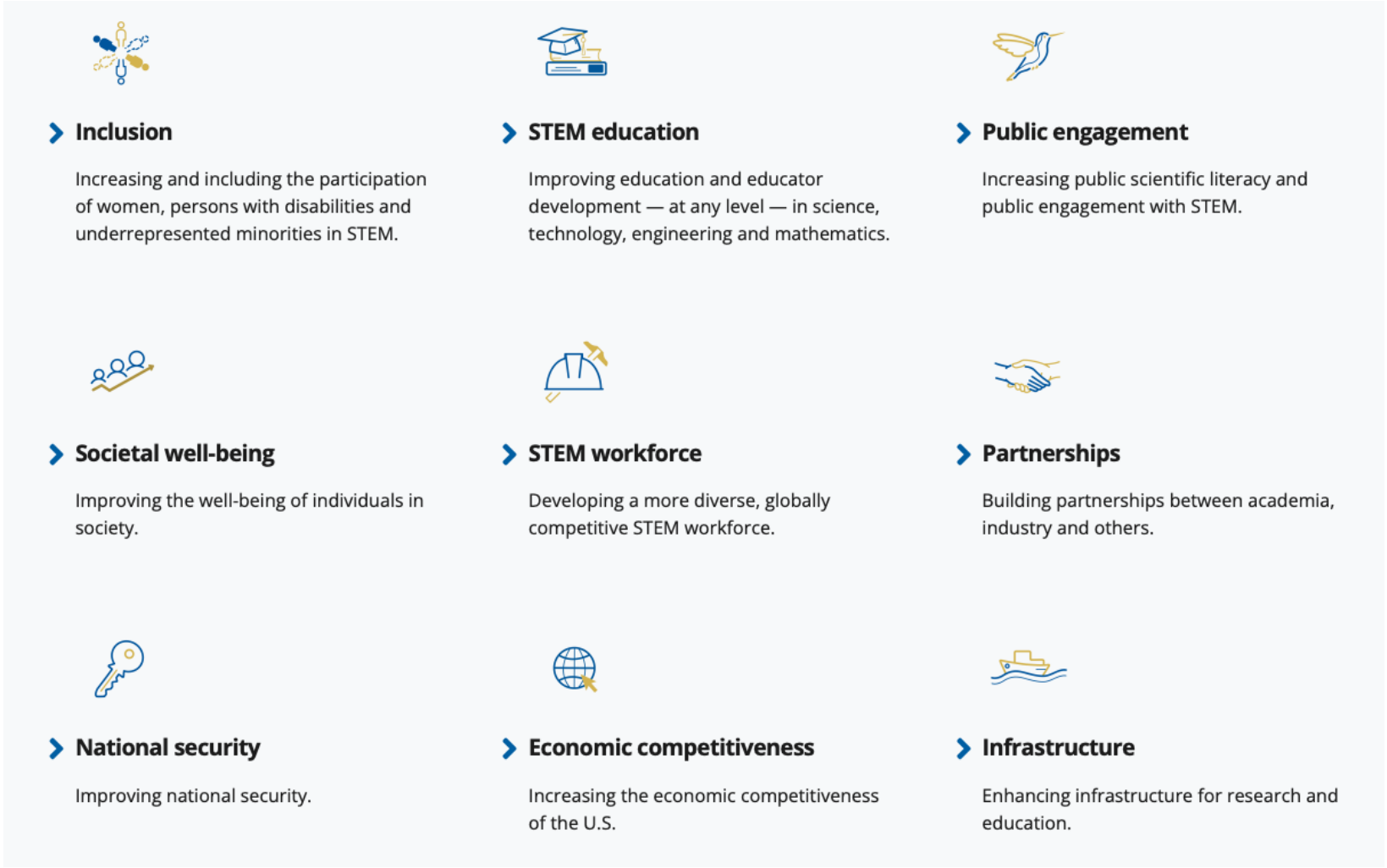
[NSF Broader Impacts]

Broader Impacts in the current federal climate

- Stay current with NSF guidance
  - Broader Impacts is still a merit review criteria (and congressionally mandated)
  - You must still follow active guidelines and requirements up to submission
  - Use the same language included in solicitations
- Focus on basic science vs. applications (when possible)
- Reframe, writing to the “new” audience
  - We do not recommend just removing words
- Broader Impacts is not the same as Broadening Participation
  - Outreach and education is not one of the investment areas that are being wholly cancelled – many are still open
  - Connect to economic and workforce interests or national security impacts
  - Reference "access and opportunity for all" rather than targeting specific groups
  - Lean into MSU's tripartite land-grant mission

Ask for advice!

What other Broader Impacts can your work have?



NSF Broader Impacts

NSF CAREER and Broader Impacts

- Great for building identity for early career researchers, as it shapes their view of science and education integration, as well as Broader Impacts (Bosley et al. 2024)
- *Although it begs the question*: How do you think about Broader Impacts when you already have education in your project?

Think about those additional Broader Impacts categories as well!

Bosley, J. et al. 2024. Leveraging the ARIS BI Toolkit to Equip Faculty for Career – and CAREER – Success. *Journal of Community Engagement and Scholarship*.

Broader Impacts Identity

Why create a Broader Impacts Identity?

"By integrating these various aspects of a scientist's skills, interests, and opportunities, we expect that a well-developed impact identity can foster approaches to broader impacts that result in better outcomes for the scientist and for society. For scientists, this manifests as more rewarding experiences conducting public engagement in a way that represents them as a whole person."

- Creating a Broader Impacts Identity is the pathway to make Broader Impacts less burdensome!
- This is the place to consider your unique personal experience and what you love about what you do
  - This alignment will ensure your Broader Impacts is not an "add on"
- It allows you to place your work in a larger context, which can be very fulfilling!
- Broader Impacts identity is a way to justify your Broader Impacts
  - Why are you the best person for this plan/project?

Risien, J. and Storksdieck, M. 2018. Unveiling Impact Identities: A Path for Connecting Science and Society. *Integrative and Comparative Biology*.

What is Broader Impacts identity?

What do you want to be known for?

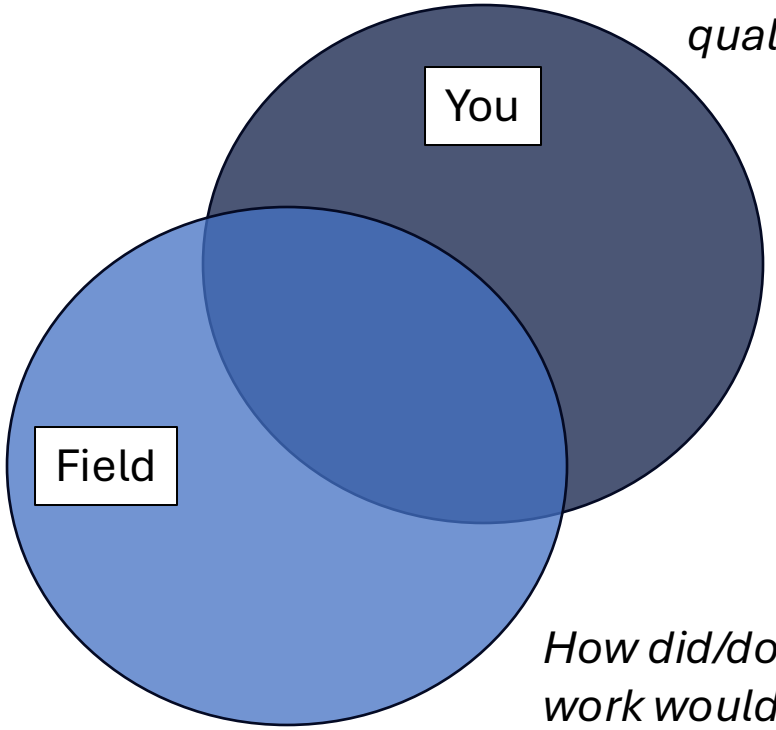
Research identity + Impact (or Broader Impacts) identity

*Both should shape the choices you make – grants, publications, etc.

What do I love to do?

Consider who you are as a scientist and a person, and how you got to where you are

What unique experiences and challenges have you encountered? What makes you qualified to undertake the project?



How did/do you imagine your work would change the world?

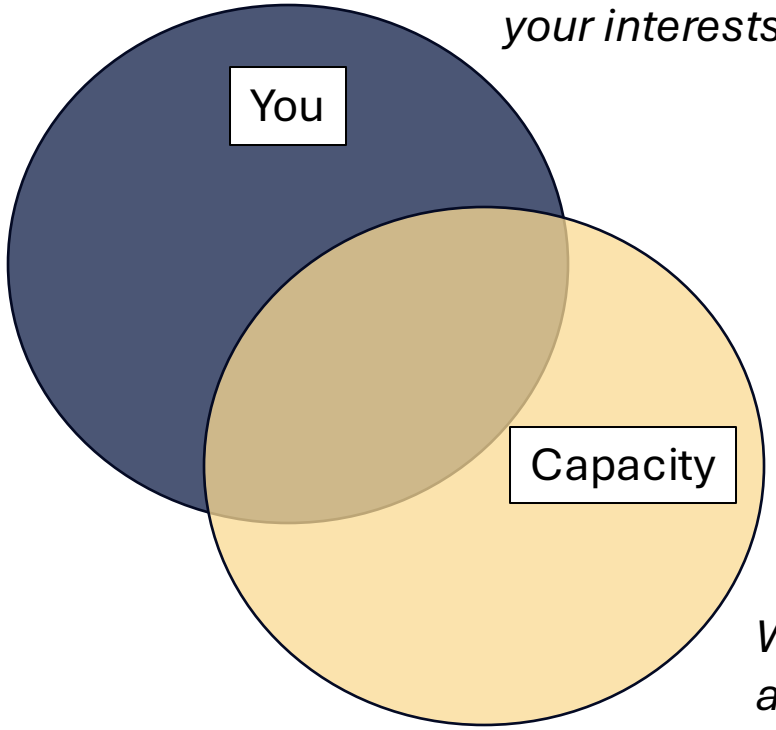
When did you "fall in love" with science? Why, and what inspires you?

Adapted from ARIS Training Team, January 2022

What can I do?

What you do for fun and your access

Besides your research, what are your interests and passions?



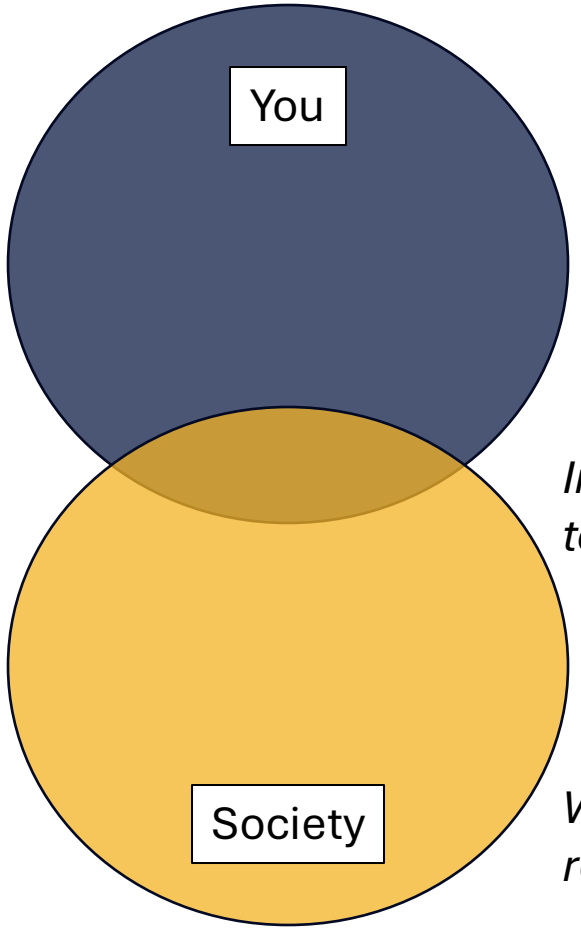
What skills, partnerships, tools, and resources do you have?

Adapted from ARIS Training Team, January 2022

What should I do?

What impact **could** you have on the world

Where can you have an impact?



In your field, what are some connections to societal issues and needs?

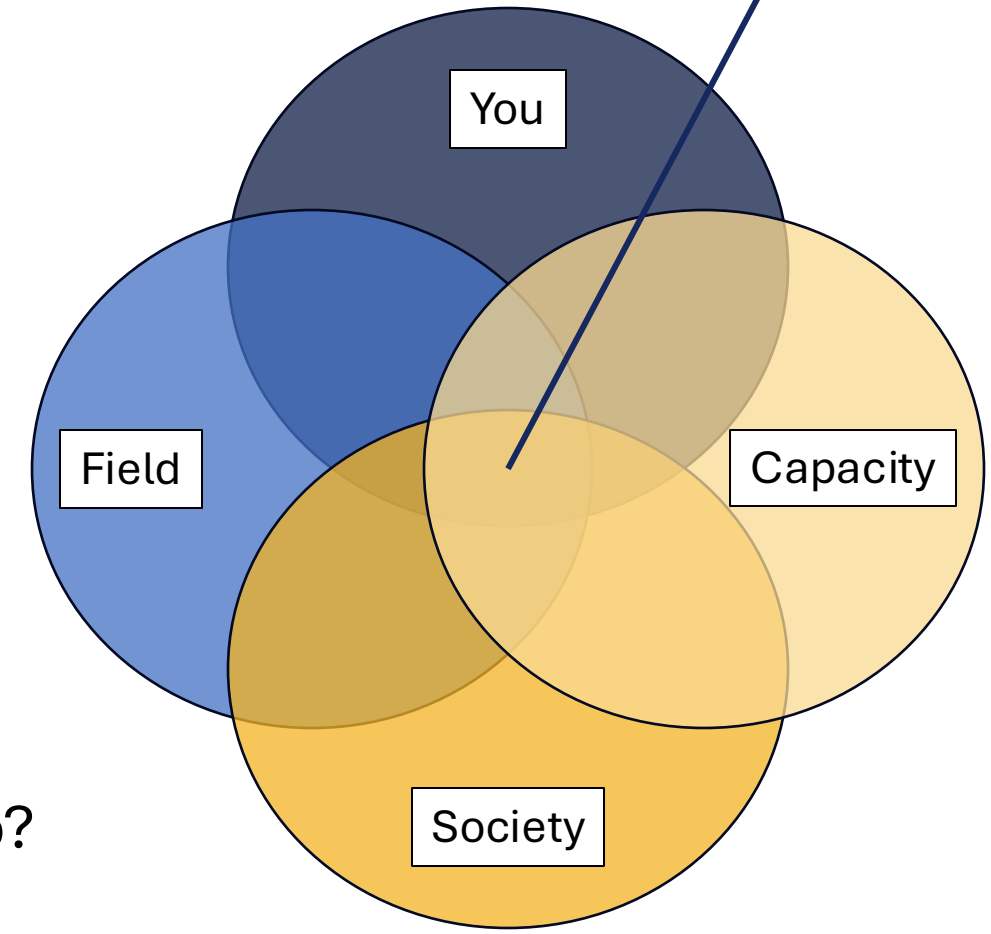
What change do you want to see as a result of your work and why?

Adapted from ARIS Training Team, January 2022

Your Broader Impacts Identity

What do I love to do?

What can I do?



What should I do?

Adapted from ARIS Training Team, January 2022

Broader Impacts Identity Activity

Broader Impacts in a proposal


THE WIZARD

SIX ELEMENTS

of a Comprehensive BI Plan

1 Statement

- A statement of the societal benefits of the research, and include them in your Intellectual Merit (IM).

2 Goals

- Review the 10 suggested BI areas in the NSF PAPPG and incorporate them into your BI goals.
- What do you hope to accomplish?

3 Evidence

- Provide relevant literature to justify the need for your proposed BI plan, addressing why you chose this audience, this activity, and how it aligns with your project and personal interests.

4 Partners and Activities

- Include details such as target audience and recruitment strategy, and descriptions of the activity.
- Identify potential partners and their role in the proposal.

5 Evaluation

- A strong proposal includes an evaluation plan, a named partner, and a supporting budget.
- How will you measure impact?
- Who will conduct evaluation activities?

6 Timeline

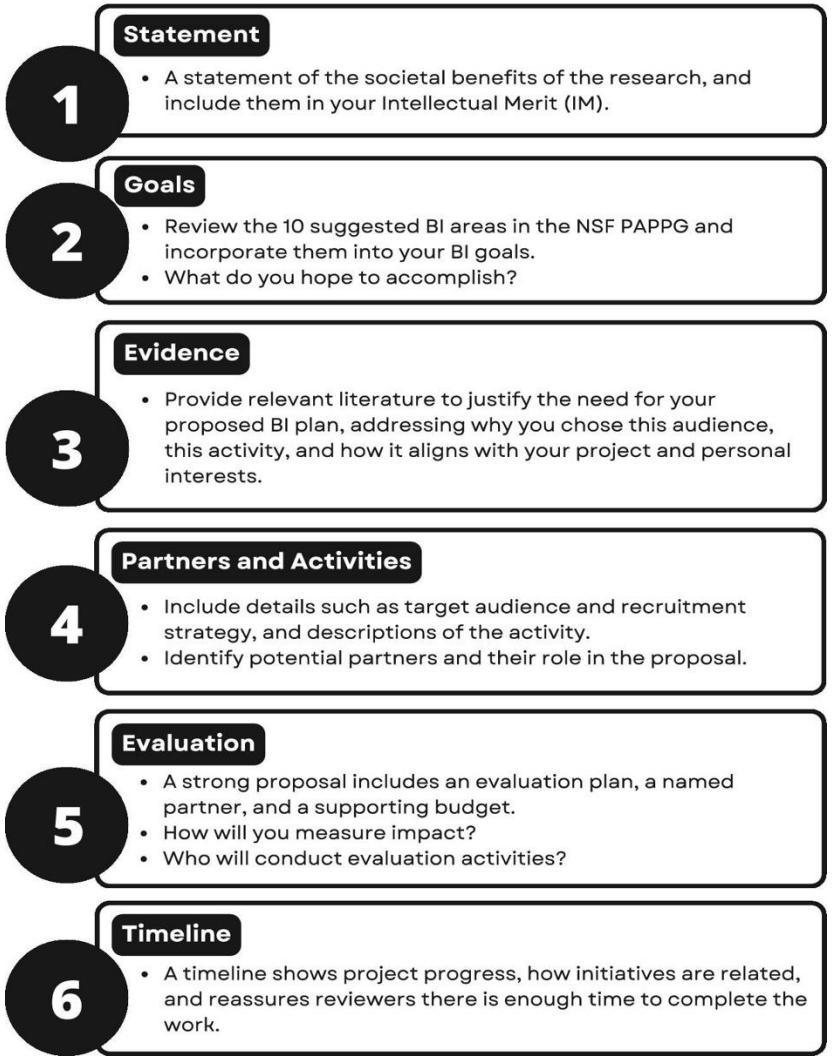
- A timeline shows project progress, how initiatives are related, and reassures reviewers there is enough time to complete the work.

- Incorporate multiple levels of Broader Impacts

Renoe, S.D. 2025. An insider perspective on broader impacts. *BioScience*.

SIX ELEMENTS

of a Comprehensive BI Plan



- Justify the need of your Broader Impacts plan, including why it is needed at your institution, region, and/or for your specific audience

Renoe, S.D. 2025. An insider perspective on broader impacts. *BioScience*.

SIX ELEMENTS

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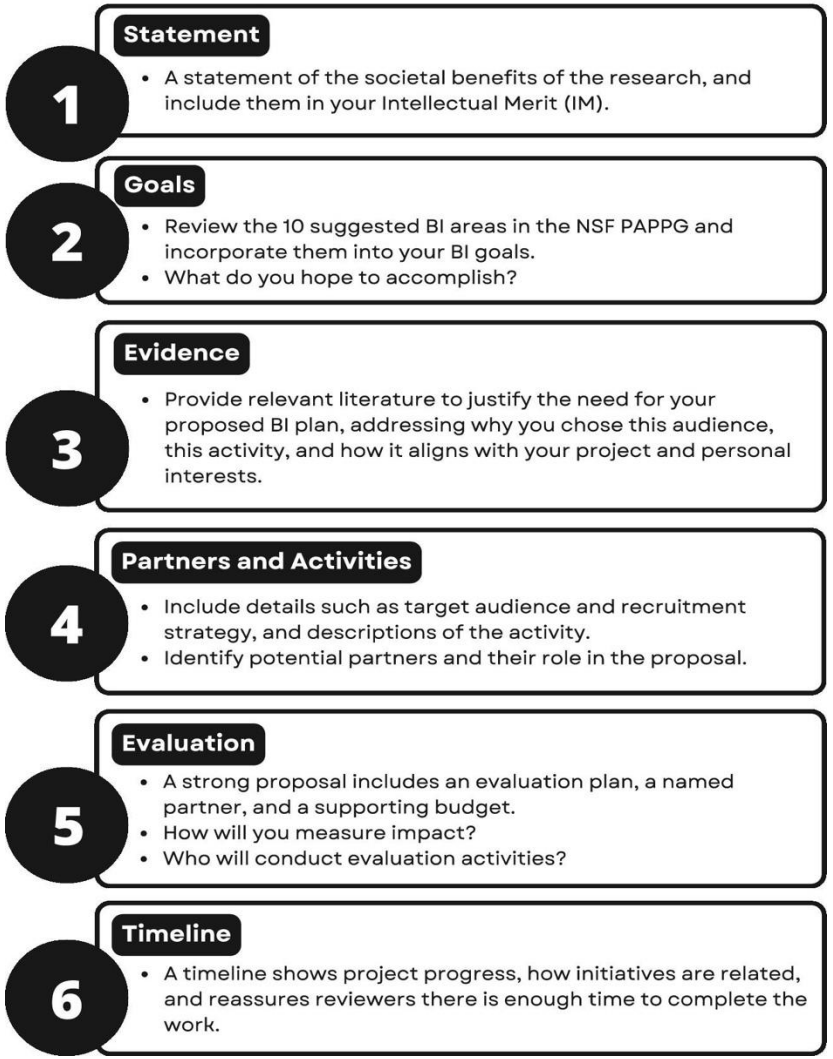

- Broader Impacts should incorporate both practices (what you do) and communication/dissemination (how you talk about what you do)

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6 Timeline

- A timeline shows project progress, how initiatives are related, and reassures reviewers there is enough time to complete the work.

- Provide details to show that your plan is well thought out
- Show reviewers that you have a way to measure success

Renoe, S.D. 2025. An insider perspective on broader impacts. *BioScience*.

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Overall Tips:

- Be **creative** with your plan, and utilize **already existing** resources
  - Avoid "default" Broader Impacts
- Avoid appearing like the Broader Impacts is just an "add on"
  - **Justify** the need of your Broader Impacts Plan
  - **Integrate** your Broader Impacts themes throughout the whole proposal
  - **Don't introduce new topics** in the Broader Impacts section: You should aim to introduce your Broader Impacts topics in your introduction, and the themes should be incorporated throughout the Project Description.

Renoe, S.D. 2025. An insider perspective on broader impacts. *BioScience*.

“If you should do it for your intellectual merit, then you should probably do it for your broader impacts as well.”

Renoe, S.D. 2025. An insider perspective on broader impacts. *BioScience*.

What can it look like?

Chris Schaffer – taken from “Nanoparticle Transport in the Brain” (awarded):

“Schaffer has served as a faculty project advisor for the Cornell College of Engineering’s Curie Program. This weeklong event brings to campus 30 high-school girls who are interested in engineering to learn more about engineering applications. For example, students use optical techniques to characterize blood flow and oxygenation in tissue, which provides them with an introduction to optics-based measurements, medically relevant physiology, and medical diagnostics. Schaffer and Olbricht both participate in the biomedical engineering department’s NSF-sponsored GK-program called Cornell’s Learning Initiative in Medicine and Bioengineering (CLIMB) that teams graduate students and faculty members with science teachers in middle and high schools in the Ithaca area. Both PIs will use the activities proposed here as a basis for developing additional modules for Curie and related programs as well as new graduate student/teacher curriculum projects for CLIMB”.

Cornell University. Broader Impacts Resources 2016.

Georgia Tech – “Polymer Nanostructures as Thermal Interface Materials”:

“The success of this project could enable cost-effective materials for thermal management of advanced electronic systems and devices leading to new technologies and applications in the computing, communications, electronics, aerospace and defense industries. New discoveries will be disseminated through patents, technical publications and potential technology transfer to a start-up company through Georgia Tech’s Advanced Technology Development Center (ATDC). ADTC is located in close proximity to the PIs labs and provides seed funding and technology incubation space to member companies. Integration of research, teaching, and outreach programs across multiple disciplines, including polymer science and nanotechnology, will impact the education and training of a diverse student body covering the undergraduate, graduate and post-graduate level at Georgia Tech. Finally, the PIs will engage high school teachers and students from Dekalb County in outreach activities involving hands-on exposure to advanced materials and thermal technologies.”

Georgia Tech. Sample Broader Impacts Statements.

Georgia Tech – “CAREER: 3D Heterogeneous Integration for Power Reduction in Embedded Systems: Application to Wireless Image Sensing and Transport”:

“The educational plan of the project includes creating a new undergraduate course, "Physics of Computation", a visual VLSI learning tool, and a "toy-sensor" chip design project for undergraduate courses; and fostering undergraduate research. This plan develops the pedagogical methods and tools for delivering an integrative learning of VLSI, instead of isolated skills in device, circuits, and systems, to next generation students. The outreach activities include engagement with the Summer Undergraduate Research in Engineering/Science program at Georgia Tech; recruiting under-represented students through the Facilitating Academic Careers in Engineering and Science for African-American students program; and participation in the First Lego League for the middle school students in the State of Georgia, hosted by ECE, Georgia Tech.”

Georgia Tech. Sample Broader Impacts Statements.

A note on Broader Impacts and Budget

- Broader Impacts should be incorporated into the project budget
- Broader Impacts partners should be incorporated in the project budget (and on project team)

Program Officers have mentioned in the past that there is sometimes money set aside for Broader Impacts activities – ask for what you need to perform the work!

Partners & Collaborations

Tips and considerations

Questions to ask yourself:

1. Who needs a seat at the table? What expertise do you need to make your argument compelling?
2. Who is already working in your field?

Timeline:

1. Engage partners early in the project development phase
2. Include partners in proposal development

Where to find collaborators:

1. MSU Expertise Search
2. GrantForward "Researchers" tab
3. MSU Partnerships Collection

Broader Impacts at MSU

Who can you work with?

- INBRE Community Engagement Core
- Center for Faculty Excellence
- Science Math Resource Center
- Academic Technology & Outreach
- Technology Transfer Office
- Economic Development
- Organizations in your college or department
- And many others!

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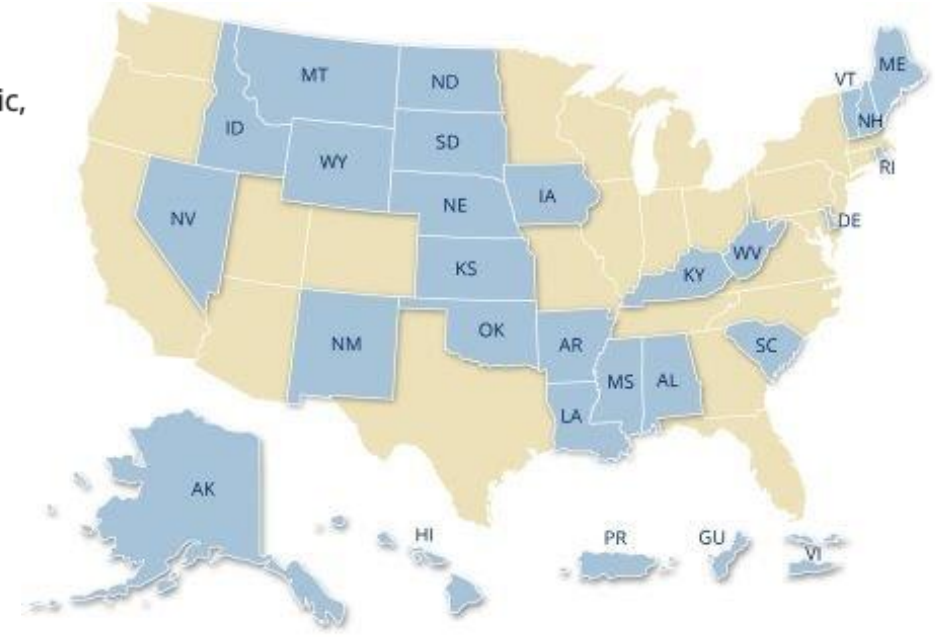
[MSU Broader Impacts Resources from ORD]

*Living Document

Established Program to Stimulate Competitive Research (EPSCoR) as a Broader Impact

- Catalyze the development of research capabilities and the creation of new knowledge that expands jurisdictions' contributions to scientific discovery, innovation, learning and knowledge-based prosperity.
- Establish sustainable STEM education, training and professional development pathways that advance jurisdiction-identified research areas and workforce development.
- Broaden direct participation of diverse individuals, institutions and organizations in the project's science and engineering research and education initiatives.
- Effect sustainable engagement of project participants and partners, the jurisdiction, the national research community and the general public through data-sharing, communication, outreach and dissemination.
- Impact research, education and economic development beyond the project at academic, government and private sector levels.

Leverage Montana's status and indicate how your research helps to build infrastructure for *enhanced competitiveness for the state*.



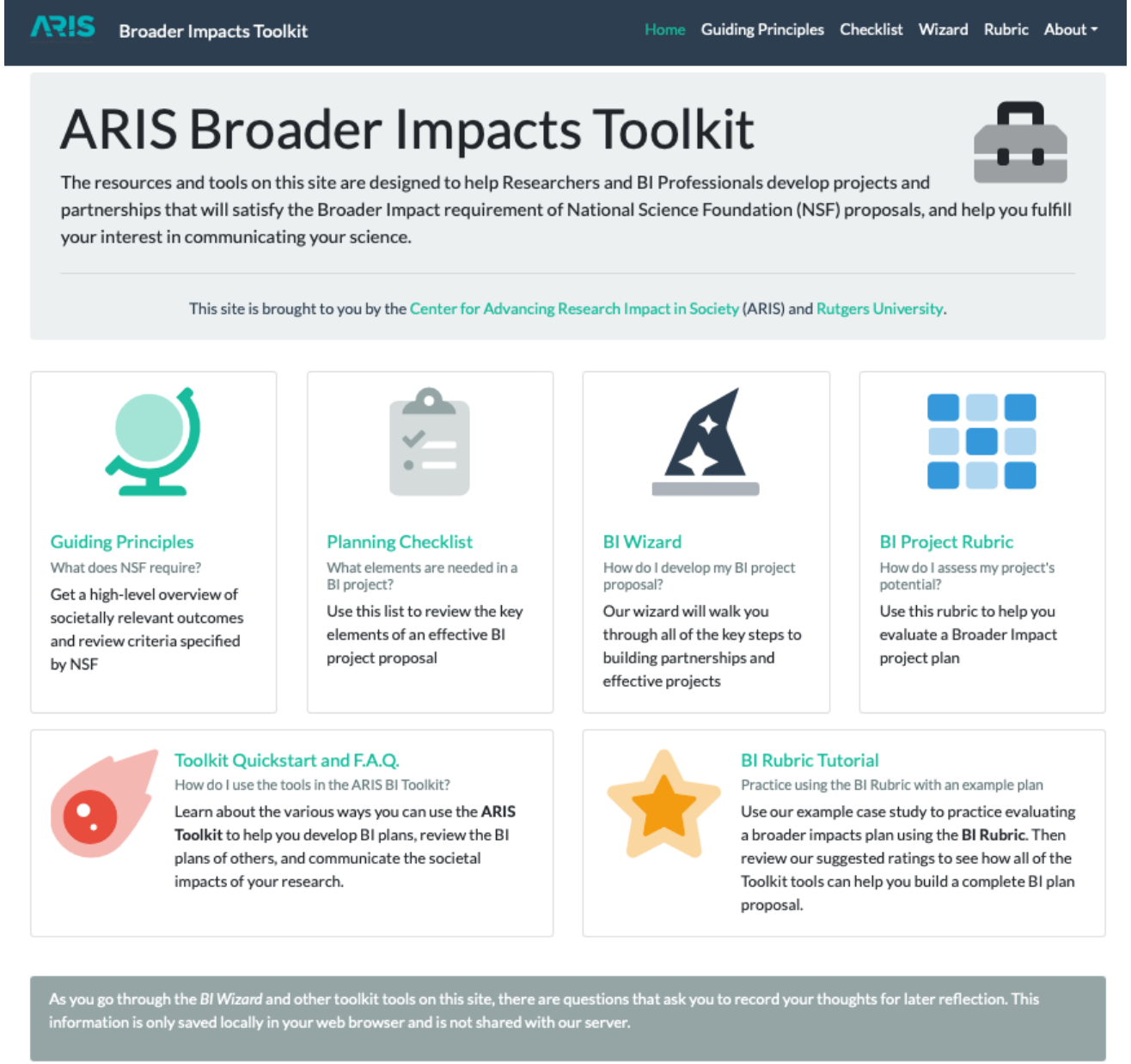
AL	Alabama
AK	Alaska
AR	Arkansas
DE	Delaware
GU	Guam
HI	Hawaii
IA	Iowa
ID	Idaho
KS	Kansas
KY	Kentucky
LA	Louisiana
ME	Maine
MS	Mississippi
MT	Montana
NE	Nebraska
NH	New Hampshire
NM	New Mexico
ND	North Dakota
NV	Nevada
OK	Oklahoma
PR	Puerto Rico
RI	Rhode Island
SC	South Carolina
SD	South Dakota
VI	U.S. Virgin Islands
VT	Vermont
WV	West Virginia
WY	Wyoming

Note: MSU's Land Grant Status can be leveraged in the same way

NSF EPSCoR

Tools for creating your broader impacts plan

[ARIS Broader Impacts Toolkit]



Please reach out!

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