Section One

Background for Making the Case

Why Partner? Institutional Outcomes and Impacts

Laying the groundwork for a successful partnership between a university and informal science education institution (ISE) is not
always easy. When both institutions bring their unique expertise and resources to the partnership, they can enable each other to
be efficient, innovative, and impactful. Successful partnerships can provide new opportunities and benefits to everyone involved.
Below are examples of possible outcomes of institutionalized partnerships:

Impacts and Outcomes for University Institution and Staff:

- Increased institutional capacity for high quality broader impact projects with ISEs and other community connections
- Grant Administrators and program leaders have clear avenues and networks in place for leveraging university values
- and strengths
- Public engagement and outreach efforts are aligned with current NSF broader impacts priorities and with engagement
- best practices.
- Universities and ISEs have new models to share related to successful broader programs, partnerships and proposals

Impacts and Outcomes for ISE Institution and Staff:

- Increased institutional capacity and comfort related to working with researchers and external partners
- Enhanced and strengthened strategic relationships with universities
- Customized templates and resources to quickly and easily respond to researchers
- New or strengthened community connections to improve access and impact of programs
- Increased ability to introduce their audiences to current research

Impacts and Outcomes for Principal Investigators:

- New or strengthened relationship with an ISE as a basis for future projects and collaborations
- Increased understanding of how to use university resources to support developing a broader impacts effort
- Shifted perspective on the role broader impacts can play across their career
- Increased familiarity with, understanding of, and respect for engagement expertise and scholarship

Section Two

Building a Foundation

Institutional Self Inventories: Introduction

When university and informal science education (ISE) staff come together to support the development of faculty-lead Broader Impacts (BI) projects, it is important that both parties first identify their organization's own unique values, capabilities, resources, and goals for the partnership. The self-inventory worksheets that follow should be completed separately by university and ISE staff. Once completed, the university and ISE staff share their findings with one another to guide the formation of a partnership that is mutually beneficial and draws on the strengths and interests of both organizations. University and ISE staff may also combine their findings into a single partnership self-inventory outlining where values, strength, resources, and aims align best.

Note that the ultimate goal of all broader impacts work is to positively impact our communities and the practice of science itself. That said, these questions are focused primarily on the benefits from the BID approach specifically. As you work through this process, please think carefully about the potential impacts of using this specific partnership approach.

Institutional Self Inventory: Worksheet for University Partners

This worksheet is intended to be used by research development officers, research administrators, and other university staff and faculty that support researchers in BI project development.

1. What are our core values?

The university self-inventory begins by identifying the core values of relevant BI stakeholders, including:

- Research sponsor/funding agencies
- Offices of Research Development, Engagement, Outreach and Extension
- Individual researchers or research groups/centers
- The researcher's college, department, field, directorate

Review vision and mission statements, strategic plans, and annual reports of institutional stakeholders to help clarify core values.

- What are the key values, motivations, and aspirations of each stakeholder?
- Where are investments in resources being made, and what initiatives do these investments aim to advance?

When working with individual researchers, provide them with opportunities to learn about and reflect on the core values of the stakeholders, and to consider where these values most clearly align and diverge.

2. What are our strengths?

Conduct an inventory of the BI-related strengths and expertise on your campus.

- Are there existing efforts on campus that connect to community organizations, or professional development opportunities for researchers to learn more about diversity, gender, science literacy and communications?
- Does your university have robust K-12 outreach programs, research experience for undergraduates, career development, or public service departments that researchers could connect to? What do faculty need to know to participate?
- Does your university have expertise in grant proposal development and broader impacts design? How do these activities support researcher projects?

Identify these assets and outline the pathways, resources, and supports required to connect faculty to them as they develop their broader impacts program ideas.

3. What are our internal resources?

Most universities have resources to support faculty in a wide range of activities that align with their key values and mission. The inventory activity above encourages you to develop a list of existing offices, programs and people that support researchers in the following areas:

- Research Development and Sponsored Programs*
- Community Engagement
- STEM Outreach
- Teaching and Learning
- Diversity
- Extension and Land Grant Affairs
- Communications
- Evaluation

- Industry
- Community Relations

Creating pathways for researchers involves building relationships with a variety of organizational leaders across your institution and understanding their capacity and interests to support researchers in Broader Impacts.

*Offices of Research Development, Sponsored Programs and STEM outreach often assist researchers in developing BI. They may provide professional development around BI to faculty and grants administrators. They likely have resources and access to networks of grant panel reviewers, and successful grants recipients, and examples of successful proposals and program models that faculty can learn from. Nationally the NORDP National Organization of Research Development Professionals) group is supportive of research development professionals.

4. What are our external resources?

There are many external resources available to researchers both locally and nationally but knowing whom to connect to and how is a common barrier in engaging external resources. Additionally, many external BI programs seem to develop from individual relationships, a friend, neighbor or child's teacher, and without clear institutional relationships or plans for longevity. To create institutional relationships with external resources that withstand individual change, efforts to develop a common language around BI is important. Identifying share values for BI work is also important.

Where to begin:
- What ISEs exist in your community and what might they need to know in order to collaborate with researchers from your university on broader impacts?
- Based on the knowledge of the researchers you work with, what characteristics and knowledge should an ISE possess to work effectively in BI?
- Are there existing university initiatives that connect to local ISEs? How might you leverage those resources to support outreach to local ISEs to share opportunities and perhaps offer professional development or conversations around BI?
- If you have existing relationships with ISEs, what opportunities exist to improve relationships so that the values and needs of all the BI stakeholders are considered?

Reaching Out:
Many ISEs desire to work with STEM researchers and have existing programs and opportunities that well-matched researchers can collaborate on for BI. Yet not all ISEs and external resources understand BI from the point of view of university stakeholders.

- How might you begin to reach out to ISEs?
- How might you approach an ISEs with a sense of building common ground, reciprocity, and mutual benefit in mind. Envisioning and discussing what the benefits of long-term partnerships is key for everyone involved.

Other External Resources for Research Administrators to Support BI:
- External Program Evaluators
- ARIS: Center for Advancing Research Impact in Society
- AAAS: American Association for the Advancement of Science
- The Engagement Scholarship Consortium
- National Science Foundation Grants Conferences

5. What are the desired (audience) impacts of our project?

Think about the desired impacts you would like to have on the researchers you support and the ISEs you connect them too. Articulating the kinds of impact, you hope to have in working with faculty will allow you to work strategically. Some goals might be the following:

- Create processes and long-term relationships that facilitate researcher BI
- Ensure that the university make these available to all faculty
- Create a network of internal and external organizations that speak the same BI language
- Produce resources and systems that make BI less intimidating to researchers
- Enable faculty to enrich the communities they work in
- Support faculty and ISEs in utilizing existing resources to disseminate and celebrate their BI work

6. Where do we want to go?

Consider how successful BI programs can contribute to your long-term institutional goals. How can we align both researchers and ISE partners around the larger institutional stakeholder priorities, and lower barriers to collaboration through common BI language?

Institutional Self Inventory: Worksheet for Informal Science Education (ISE) Partner

1. What are our core values?

- What are the organization's mission, vision, and values?
- What initiatives are we working towards in the next five years?
- Who is our target audience? How do we serve them?

You may need to engage institutional leaders and multiple departments to capture a well-rounded picture of core values.

2. What are our strengths?

Define your strengths by considering both internal and external resources. Consider what resources you have now, but also long-term projections for projects and fundraising. Many federal projects take at least six months to be reviewed and possibly awarded, so it is critical to consider future internal resources (or lack thereof).

a. What are our internal resources?

- What are our most effective programs?
- How effective are our programs that connect scientists to public audiences?
- Do we have a program space or room? Is this a flexible space? Can people bring in materials and set up?
- Do we have staff trained in evaluation? Science communication? Workshop development? Program development?
- Does our education staff have the flexibility to try new things?
- Do we have tools or resources to support doing evaluation? Do we already have methods of measuring impact?
- Is our institution successful at writing grants and receiving funding? Do we have resources and/or staff to support grant writing at your institution?
- How are our programs funded? Is there capacity or the possibility to update or change programs, or are they dictated by funding sources?

b. What are our external resources?

- What connections do we have to funding sources?
- What are our active or potential partnerships with local research organizations or scientists? Consider: university faculty or researchers, university grants administrators, schoolteachers or administrators, after school programs, libraries, parks, youth and community centers, theaters, etc.
- What is the community perception of our organization? Are we recognized as a leader in current science content? A fun engaging place of children? An educational center?

3. What are the desired audience impacts of our project?

Consider each of the audiences involved in the Broader Impact Design teams:

Audience: University grants administrators
Possible impacts: Administrators understand the mission, vision, needs, and challenges of the ISE and assist in connecting appropriate researchers to the ISE.

Audience: Principal investigators
Possible impacts: PIs recognize the value of ISE resources and designate appropriate funds to support ISE work. PIs develop a long-term partnership with the institution.

Audience: Community connections and learning scientists or specialists
Possible impacts: These partners help build leading practices in inclusivity into program design

Audience: Members of your institution
Possible impacts: Members experience new programs and content and increase their involvement with the organization.

4. Where do we want to go?

How will the Broader Impact Design teams contribute to fulfilling long-term institutional visions and development of internal capacity?

What do Partners Need to Know About Each Other?

Once the self-inventory process is complete, it is helpful for both organizations to take the time to learn about one another. This process can help expose differences in what each organization will need to build institutional support for the new partnership.

Listed below are things that partners should discuss directly. We recommend that each partner gather this information into a single document that is quick to read and distribute to stakeholders within the institutions. As in any personal or professional relationship, it is important not to make assumptions as this can lead to problems down the road. It is also important to revisit this document regularly since personnel, priorities, and systems can all change over time.

Note that some apply more to the ISE partner, some more to the university partner.

1. Name of organization and website
2. Mission or brief description of organization
3. Key contact person, title, and contact information
4. Facilities, Equipment and Other Resources
   A brief statement on the unique resources the organization can bring to the project, including facilities, equipment, existing relationships and partnerships, infrastructure/expertise for participant recruitment and marketing, program evaluation, communications and public relations, or large-scale distribution or dissemination of the project materials.
5. Example of current or past collaborations between individuals at the organizations, if applicable:
   If available, provide a link to press or content generated from a successful researcher/partnership project.

Questions for ISE partner:

6. Existing priorities and activities in engagement/education
   Summarize program opportunities that researchers can leverage, participate in, enhance, and/or engage in professional development with your organization. Examples include: public demonstrations, curriculum and professional development with science teachers, videos, blogs, social media, radio shows and other public media, citizen science projects, science communication training programs, STEM career days, summer camps, open houses, etc.
7. Audiences reached through exiting engagement/education programming
   Audiences served through current programming, including location and geographic range (rural, urban, counties, states etc.). Include the average number of people reached and impacted annually via your programs.
8. Typical project budget or project budget range
   This can be a high-level conversation initially, but will require substantially more detail down the road (see "Guide for Developing a Broader Impacts Menu" in the next section)
9. Timeline for contacting the organization to develop a new project
   Minimum time needed and process involved to initiate a new partnership project.
10. Projects that would benefit from researcher expertise
    What organizational interests or priorities could be better realized through collaboration with PI or other university personnel?
11. Other and Optional Information:
    Or other information you would like to share with researchers not mentioned above.

Questions for university partner:

12. What support is available to PIs on campus as they develop their grant proposals?
    Do PIs work on grants on their own or is there an institutional support structure for PIs to write and get feedback on their proposals. Does the help that is available differ from one department or faculty to another? How do PIs find out about possible BI partners?
13. Who supports early career PIs? Does this process include information about broader impacts or public engagement opportunities?
    Is support for proposal writing different for early career faculty? Are there workshops on grant writing? If so, who? Do these workshops offer support on conceiving BI projects and finding partners?
14. Who submits the grants?
    During the grant submission process, who helps PIs to be sure that their paperwork is in order? This person may help PIs get the right contracts, budget, and other documents from the ISE.
15. Who administers grants, once awarded?
    Is there a central office, or role that will execute any needed contracts or Memorandum of Understanding (MOU)? How will the ISE receive payment?

Section Three

Working within the Relationship

Guide for Developing a Broader Impacts Menu

Description

A Broader Impacts (BI) Menu is a tool that outlines baseline options for BI activities hosted by an ISE or other organization. The items listed within a BI Menu can vary, but at a minimum include program name, description, and approximate cost.

A BI menu can be created by ISE staff within BID Teams. It can build from the material that comes out of the ISE Self-Inventory Worksheet. A BI Menu may be especially useful for large ISEs with a large number of programs/activities overseen by multiple staff members.

Benefits

A BI menu can be an effective communication tool for use within a BID team. It allows for the ISE staff member to clearly outline details of BI activities that other BID Team Members should know when considering including them in proposals. It can also highlight information that PIs may need to include in their proposals, such as target audience and number of participants reached. The process of developing a BI Menu is also useful for the ISE member of a BID team to check their understanding of BI activity options within their institution.

Limitations

Using a BI Menu comes with the risk of being too prescriptive with BI options. A BI Menu should not substitute for an individualized approach to each PI's BI activity development when possible. If used inappropriately or without clear expectations set in advance, BI Menus can result in BI activities that are 1) ineffective or not a good fit for the PI, 2) not a good fit for the ISE at a given point in time, or 3) written into proposals without the necessary communication or coordination with the ISE.

Steps for Developing a Menu (to be led by the ISE member of a BID team)

Step 1: Take an inventory of programs and opportunities

Make a list of all opportunities at your institution that might be a good fit for partner participation. You may want to include programs/events that occur infrequently but could be offered more frequently with the participation of a partner and their resources.

This process may build on the work done in the Self-Inventory Worksheet, in which ISE staff identify their core values, desired audience impacts, strengths, and resources. The Self-Inventory should help guide the selection of programs that might be included in the menu.

Step 2: Draft an early version of the Menu

Create a table that lists the different programs and other opportunities the ISE partner has identified.

Criteria might include:

- Program name
- Program description
- Target audience
- Number served
- Whether the program requires direct interaction with the audience
- Time commitment required from PI or participants

- Approximate cost
- Point person within ISE
- Priority for participation (e.g., on a spectrum of "partner participation is essential for program" to "including a partner would be inconvenient but possible")
- Keywords (to match opportunities with BI identity/legacy work)
- For ease of use, you may want to use one of the criteria to group BI activity options into larger categories. For example, Pacific Science Center lumped opportunities into five general categories: "On the Museum Floor," "K-12 Focus," "Special Programming," "Professional Development," and "Exhibits and Curriculum."

Step 3: Solicit stakeholder input

Share the draft menu with stakeholders (e.g., program owners internally, other BID team members). Ask them to review menu options for factors such as accuracy, variety, feasibility, appeal, etc. Add, edit, and remove items as needed to create a working Menu.

An abridged example from Pacific Science Center can be found at the end of this guide.

Step 4: Ensure ongoing maintenance and communication

In many ISEs, programs and their specific details can change frequently. Decide with ISE internal stakeholders how and how frequently the menu should be examined and updated as needed, to change the details of program opportunities, add new opportunities, or remove opportunities that no longer exist. For example, some ISE staff may choose to review the menu quarterly as a part of formal recurring meetings. Other ISE staff might choose to encourage individual program managers to check up on Menu options virtually on their own time.

In addition, make sure that other program managers know how their programs have been written into proposals, and that they will be notified if the grant is awarded.

Using BI Menus within BID Teams

Step 1: Gather background information on the PI

Note: This step will vary depending on the number of PIs with whom the BID team works. This guide was developed based on use at Pacific Science Center, a relatively large ISE, and the University of Washington-Bothell, a relatively small HEI. For larger HEIs who consult with a large number of PIs, this process might have to be adapted or omitted.

Collecting background information can be done through an initial conversation or informal interview with the PI, a review of any BI Identity/Legacy work they have completed, or a combination of the two.

Questions might include:
- What outreach experiences have you enjoyed the most?
- What audiences have you enjoyed working with the most?
- Are there other audiences that you haven't worked with yet, but would like to?
- Are there outreach experiences that you would like to build on?
- How comfortable are you in front of an audience?
- How comfortable are you in small-scale, mentoring-type conversations?
- Are there skills (e.g., in teaching) you're hoping to continue to develop through your outreach?
- Do you have undergraduates, graduate students, or postdocs you would like to involve in your outreach?
- What part of your research and scholarly work do you enjoy the most?
- Why is outreach important to you? What are you hoping that public audiences or students will gain from

interacting with you?
- What is your budget for your BI activities?

Step 2: Develop an individualized BI menu for each PI

Based on the responses elicited during the background information gathering phase, review your institution's full BI Menu for options that might be a good fit for each PI's interests and abilities. If necessary, check with individual program owners to ensure availability of program options.
Ideally, individual activities or options will be starting points for a BID team discussion.

Step 3: Review proposed options with the BID team

Get feedback on the proposed options from the rest of the BID team. Depending on the structure and predetermined workflow of your BID team, the individuals involved in this process will vary. Questions for different BID team members might include:
- PI: Which of these opportunities best fit your interests and most aligns with your BI Identity work? Are there any options that are definitely not feasible within your budget?
- Research supports professional (e.g., staff member in the office of sponsored projects): Which of these options most align with the HEI's community engagement goals and strategies?
- (Optional) Learning sciences researcher: What learning outcomes do you see in the proposed options? Are there specific options that will be of highest impact for the target audience? What recommendations do you have for optimizing the approach of any of these options?
- Community connection: Are the proposed options appropriate for your community? Will they add value to your community?

Step 4: Finalize options for inclusion in the PI's personal BI menu and for the specific proposal being developed

Based on the feedback gathered in Step 3, revise the PI's individualized BI menu. Include additional information as needed to make sure that all members of the team clearly understand the goals and commitments of each option.

Step 5: Ensure ongoing maintenance and communication

Establish a process to make sure that BID team members are notified of proposal progress. For example:
- Which options were ultimately included in the proposal?
- When the proposal was submitted
- When the PI is notified

This step may involve other BID tools (e.g., a MOU).

Make sure to communicate to other members of the BID team about how the individualized menu should and should not be used following the submission of each specific proposal. For example, if the ISE wants the PI to go through the process described above for each new proposal, make sure that both the PI and the Research Support Professional know this. If the PI can use the same options but should check with the ISE member of the BID team to confirm continued availability of each option, make that clear.

Determining Fit: Is this PI a good candidate for collaboration?

The approach laid out in this project asks a PI to commit time and other resources to creating a strong BI effort. This is not appealing to some PIs who may be looking for the easiest way of fulfilling their BI obligations. In order for the partnership to thrive, all parties need to be able to advocate for their own capacity and priorities, and - critically - be able to say "no" if an opportunity isn't a good fit. In some cases, university staff may choose to steer a PI away from reaching out to an ISE partner if they can sense the fit is poor. In other cases, the ISE itself may need to decide they cannot sign on to a proposed collaboration.

When considering whether an opportunity is a good fit for collaboration, ask the following questions (some are more appropriate for an ISE partner, some for a university partner, some for both):

Interests

- What is the primary goal of the proposed BI project?
    - For this PI?
    - For the ISE?
- Would this potential collaboration advance institutional mission, vision, values, strategic plan, or initiatives?
    - This may include considering how it will impact the university or ISE's reputation, or impact on community outcomes.
- Will it enhance the experience of our audience? How?
    - What audience does the PI say they want to work with?
- Is this PI open to input from both ISE experts and from community members who may be invited to contribute to the design process?
    - Does the proposed project fit with the needs of underserved audiences?
    - Does the proposed project expand opportunities for community connections and underserved audiences?
- Is there a strategic advantage to nurturing a relationship around this particular PIs work?

Partnership logistics

- How soon is the grant due?
    - Is there enough time to collaborate with this PI and create a strong project proposal?
- Does the PI show genuine interest in collaboration?
    - Have they made time for conversations?
    - Have they visited the ISE institution or do they plan to visit soon?
- Reach out to your community connections - what do they think of the project?
- Who should be involved in making the decision at each institution (and how)?
- What department(s) is directly involved? What department(s) will be impacted?
- How will the decision be made to participate in this BI project - by command, consult, consensus, or vote?

Capacity

- Are there sufficient staff, space, budget & time to implement this project properly?
    - Is this a new program or project?
    - Does this project fit into an existing program?
    - What does the timeline look like? How does it compare to pre-existing projects?
- How does it fit in with the other priorities and is this the best time to do it?

Projections

- Do the potential rewards outweigh the risks?

    - What are the rewards?
    - What are the risks?
- Is it sustainable or does it advance sustainability?
    - Will this relationship outlast the grant?
    - What could this program look like after the grant?

If you decide not to partner with a PI, the university partner can help them find a different partner or spend additional time with the PI reflecting upon their understanding of broader impacts and larger broader impact goals.

Broader Impacts Identity

[This tool will need a robust intro paragraph]

The guide and activities that follow are meant to help you develop a self-directed clarification of your unique Broader Impacts niche. We hope that by having a core focus of your Broader Impacts Identity, similar to having a core focus in your research field, will help you to develop proposals and implement Broader Impacts activities that lead to successful grant awards.

The outcome of this WORKSHOP will be for you to develop/confirm some level of clarity and direction to identify your Broader Impacts audience, available assets, and potential partners. All of this information will be an essential component to shape the Broader Impacts section of any NSF proposal.

Exercise 1: Multidimensionality of Broader Impact Identity

Name your research field and its connections to societal needs and issues.

Which of the societal needs and issues most connect to your work?

Exercise 2: Research & Career focus statement

Describe your current research focus in a 1-3 sentence statement: a written version of an 'elevator pitch'.

In small groups of 2 or 3 individuals reflect on your field's natural connections to societal issues (from Exercise 1).

Exercise 3: Free phasing: your pathway(s) & motivation(s) to being a researcher

Quick list - short phrases that help to answer the questions that are posed:

What were your early motivators for going into your field, being a research/teacher; how did you feel about the path ahead?	In what ways were/are you hoping to change the world and why did you choose this professional pathway? What about it did you find exciting or important?

How are things different now?	Have your passions changed or evolved?	Do you believe something more or different is possible?

Think about the present and future:

How might your work actually change the world and for whom?	What is the (your) hidden potential?

Exercise 4: Craft a vision or impact goal statement

Work to craft a 1-3 sentence Broader Impacts Identity and goals statement. Focus on growth and long-term commitment(s). Use the ideas that are fresh in your mind from the previous exercises – help each other!

- Who are you, what impact can your work have?
- What change do you want to see as a result of your work and why?
- Who is (are) your audience(s) or beneficiaries?
- What are your preferred mechanisms/processes to realize desired impacts?

Impact Identity statement:

Exercise 5: Identifying your impact capacity & assets

The workshop facilitators can help serve as an asset connector to potential partners. You have identified your audience and a frame of the impact you would like to achieve. Now let's see if there is a match to these attributes in the community.

Explore, discuss and record:

- What people, programs, expertise, partners, institutions, tools do you already have access to that can help you reach your impact goal?

- What other people, programs, institutions, partnerships, etc. do you need?

How will you continue down the path of developing and defining your BI identity?

- One thing to do:

- One person to contact (or get connected to via BI partners workshop or email connection):

Post Submission To-Dos for ISE Partner

After a proposal is submitted:

After the grant is submitted, the ISE partner may feel somewhat in the dark as they wait to hear from the PI (or the PI's home institution). It is important to track and record broader impacts projects collaborations along with PI contact information. Since significant time can pass between a proposal's submission and an award being made, make sure key details about the project are recorded in a clear and consistent way to ensure a consistent thread if there is staff turnover in the meantime (see below for a suggested information template).

Ideally the PI will reach out when the grant is awarded, but this does not always happen. It may be worth following up with the PI a few months after, submission or checking the website of the funding institution.

After an award is made:

If the grant was awarded, meet with the PI to establish a plan for implementing the proposed broader impacts project.

In this meeting make sure to discuss the following items:

- Learn more about their intellectual merit
- Discuss ideas about implementing broader impacts project
  - Revisit goals
  - Be clear about who will be doing what: are graduate students, lab members, undergraduates involved?
- What are the next steps? What does the larger timeline look like?
- Consider who else might be an essential part of a BID support team. In addition to the PI, university and ISE, how will other partners be involved (e.g., a community partner or learning sciences specialist). How will these partners fit into the timeline?
- Discuss review panel feedback, particularly on broader impacts.

BI Collaboration Tracking Template:

Date:
Name of contact at ISE:
Name and contact information for collaborating PI:
Name and contact information for other points of contact at university who are connected to this project:
Solicitation details (agency, number/code, name):
Title of proposal:
Submission date:
Proposed project start date, if funded:
Budget allocated for BI collaboration:
Brief description of proposed BI efforts (2-3 sentences):