PORTAL
to the Public



THE PATH FORWARD

Lessons Learned and Recommendations from the
Portal to the Public Second Synthesis Meeting

September 2010
Pacific Science Center, Seattle, Washington

Dennis Schatz & Lauren Russell

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The Portal to the Public project and second Synthesis Meeting were led by Pacific Science Center (Seattle, WA). Collaborating partners include Explora (Albuquerque, NM), Institute for Learning Innovation (Edgewater, MD), and the North Museum of Natural History and Science (Lancaster, PA).

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May, 2011

Dear Colleagues,

The evaluation and research results are complete for the three-year Portal to the Public effort, which began in July 2007 with funding from the National Science Foundation. In every dimension the project has attained its goals:

1. Scientists responded in large numbers to participate in face-to-face interactions with public audiences and were eager to share their current scientific work with science center visitors.
2. Scientists embraced the need for and saw the advantages of receiving professional development to enhance their ability to engage with a wide variety of public audiences.
3. Public audiences reacted positively to the opportunity to engage with individual scientists who are neighbors in their communities. These interactions enhanced public engagement with science by increasing understanding of particular scientific studies, as well as the passion that drives individual scientists.
4. The Portal to the Public guiding framework was successfully embraced and implemented in eight science centers of varying sizes across the country, illustrating the framework's ultimate flexibility.
5. Informal science education professionals came to perceive the guiding framework as a significant way to enhance their ability to work with scientists and science-based organization in their communities.

As we reach the end of the grant period, it is time to look at "The Path Forward" to determine how best to disseminate and improve the Portal to the Public effort. It is also a perfect opportunity to examine how lessons learned can be helpful to the entire field of public engagement with scientists in Informal Science Education.

To help us determine The Path Forward, we convened a two-day Synthesis Meeting in late September 2010. It was attended by 64 experts, stakeholders, and members of the Portal to the Public project team. This report captures the substance and nature of the discussions that occurred during the meeting. While many of the findings and recommendations in this report are directed specifically to the Portal to the Public effort, there are implications that apply to the broader field of Public Engagement with Science (PES). We hope that this report is useful to a wide range of organizations and individuals. To date, several key recommendations from the Synthesis Meeting have already guided plans for the future of Portal to the Public. The Portal to the Public team has drafted criteria for minimum implementation standards, and has used findings in this report to plan the launch of a Portal to the Public National Network and major dissemination effort.

Meeting participants were not asked to reach consensus on the questions pondered during the meeting. In fact, it would not have been possible to do so. This report, therefore, represents a spectrum of diverse perspectives and ideas that will collectively inspire our future work.

Our thanks to all of the participants who took time from their busy schedules to be a part of this meeting and contribute their insights to the discussions. Our special thanks to Dana Vukajlovich and Lauren Burman (logistics coordinators), and our team of extraordinary discussion group facilitators, and talented scribes. Additional thanks to graphic designer, Clayton DeFrate, and to our report editor, Cameron Dokey.

Sincerely,

Dennis Schatz
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Pacific Science Center

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Lauren Russell
Portal to the Public Project Manager*
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*In January 2011 Lauren joined David Heil & Associates, Inc., and now works as a Project Coordinator for the firm based in Portland, OR.

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EXECUTIVE OVERVIEW

Project Background

Portal to the Public began in July, 2007, as a three-year project funded by the National Science Foundation. Over this period of time, the Portal to the Public collaborative developed a flexible guiding framework for informal science educators to use as they seek ways to engage scientists and public audiences in face-to-face interactions that promote appreciation and understanding of current scientific research and its application.

The collaborating team was led by Pacific Science Center (Seattle, WA), and included the North Museum of Natural History and Science (Lancaster, PA), Explora (Albuquerque, NM), and the Institute for Learning Innovation (Edgewater, MD). Tisdal Consulting (Saint Louis, MO) conducted the summative evaluation. Through a dissemination project midway through the grant period, the program was implemented at five additional sites—North Carolina Museum of Life and Science (Durham, NC), Explorit Science Center (Davis, CA), Adventure Science Center (Nashville, TN), Discovery Center (Springfield, MO), and Discovery Center Museum (Rockford, IL).

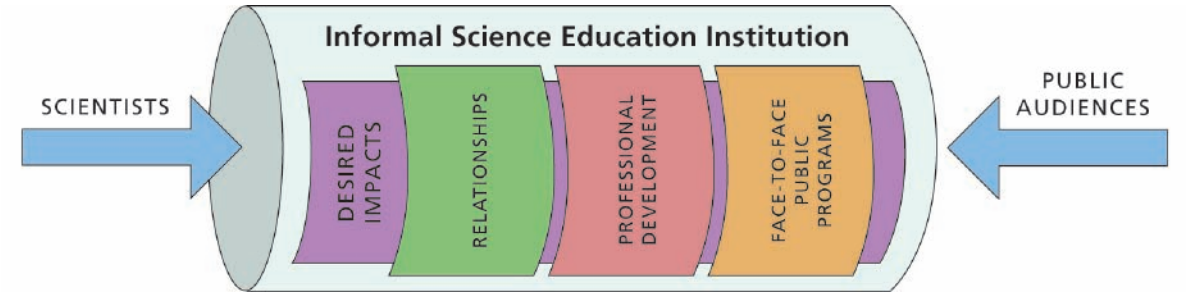
This diverse set of partners created a guiding framework that's hallmark is its flexibility, thereby rendering it an effective model for a wide variety of informal science education institutions to adopt. For a general overview of the Portal to the Public project, see a short video found at http://www.pacificsciencecenter.org/portal/video/.

Portal to the Public has made significant contributions to the informal science education (ISE) field's understanding of how scientists and ISE institutions can collaborate to achieve common goals related to public engagement with science, with special emphasis on facilitating face-to-face interactions between scientists and science center visitors. Leveraging this knowledge, the project has developed a guiding framework that will be of great value to numerous, diverse ISE institutions who are interested in developing Portal to the Public programs in their communities.

There are three major components to the Portal to the Public guiding framework.

- **Relationships** between science center staff and scientists from organizations such as universities, businesses, and government agencies
- **Professional development** that prepares scientists to share their work with public audiences
- **Face-to-face public programs** where scientists and public audiences interact, leading to increased appreciation and understanding of current science research and its application

Individual Portal to the Public program models are guided and framed by the **desired impacts** an ISE institution wishes to make on public audiences, participating scientists, and their own organization.



Portal to the Public Guiding Framework

In the guiding framework schematic above, the ISE institution is represented as a tube, or open "portal." It is within this context, inside the tube, that scientists and public audiences interact. There is no directionality to this flow—both scientists and public audiences are actively involved and affected by the exchanges. This guiding framework is designed to be flexible, allowing ISE institutions the ability to design and scale specific approaches and strategies to fit their communities and visions.

Context for the Second Synthesis Meeting

At the onset of this project, Portal to the Public collaborative members convened a group of experts, project staff, and advisors for a first Synthesis Meeting, held in January, 2008. The purpose of this meeting was to "take stock" of work being done in the informal science education (ISE) field to bring scientists and public audiences together in face-to-face interactions. The first Synthesis Meeting generated many recommendations for the direction of Portal to the Public efforts. See http://www.pacificsciencecenter.org/portal/synthesis for reports and presentations resulting from this meeting.

A second Synthesis Meeting was held in September 2010 at the end of the NSF grant period. The meeting's overarching goal was to identify and discuss key learnings resulting from the Portal to the Public effort, and to leverage these understandings to inspire insights and recommendations that will advance the field of informal science education as a whole. The two-day meeting was held at Pacific Science Center in Seattle, WA, and included 64 experts, stakeholders, and members of the Portal to the Public project team. This report, generated as a result of this meeting, captures the meeting's conversations and major findings. Detailed meeting goals, an agenda, and a participant list can be found in Appendix 2.

The Portal to the Public guiding framework is one of many models within the informal science education field that aims to engage public audiences with current scientific research. Several of these other initiatives also support face-to-face interactions, and representatives from a selection of these initiatives participated in the second Portal to the Public Synthesis Meeting. All meeting participants were charged with considering how Portal to the Public could complement, collaborate with, and learn from other existing public engagement efforts.

The second Synthesis Meeting was held at Pacific Science Center in Seattle, WA, in September 2010.

Throughout day one of the Second Synthesis Meeting, participants learned about the Portal to the Public guiding framework from theoretical, concrete, and analytical perspectives. Meeting attendees experienced an introductory video and presentation, live public programs, a professional development workshop activity showcase, a panel discussion with scientist volunteers, and presentations on the research and evaluation findings. At the end of the first day, participants were asked to reflect, and to provide their perspectives on the most important learnings and insights coming from the Portal to the Public effort.

The second day of the meeting was largely spent in structured small group discussions. Over the course of the day, each attendee participated in six of eleven discussion topics. A trained facilitator guided each discussion, while a scribe recorded comments and insights. Discussion Guides can be found in Appendix 2.

Participants' own written insights from day one, and the scribed discussion notes from day two make up the raw material for this report. Key findings have been summarized in the Executive Overview, while more detailed summaries of the major discussion topics can be found in Appendix 1. Additional insights and learnings from the Portal to the Public effort are contained in final research and evaluation reports, available at http://informalscience.org. The findings in this report summarize the discussions and major points made by the Second Synthesis Meeting participants collectively over the course of the two-day meeting.

Key Observations and Insights

The Value of Portal to the Public

- **Portal to the Public is an ambitious and successful initiative.** Meeting participants were generally impressed with how effectively the program could be implemented at science centers of various sizes. Favorable impressions also included the program's ability to develop dynamic face-to-face interactions between scientists and public audiences, as well as its ability to create innovative professional development for scientists, its focus on rigorous research and evaluation, and its ability to positively impact all stakeholders.

- **The Portal to the Public guiding framework is flexible, enabling it to be adopted by a wide variety of ISE institutions and lead to positive outcomes.** The framework is specifically designed to allow informal science education institutions to develop their own program goals, and recognizes that "one size does not fit all." This flexibility has provided the impetus for the generation of unique program structures and outcomes at a diverse set of ISE institutions. References to the value of the guiding framework's flexibility can be found throughout Appendix 1.

Portal to the Public is an ambitious and successful initiative.

- **Scientists do benefit from engaging in informal science education.** Through engaging in informal science education efforts, Portal to the Public scientists learn new ideas about how to communicate their work to the public. In addition, they develop positive attitudes towards informal science education, and the value of working with public audiences.

- **Face-to-face interactions between scientists and public audiences lead to positive impacts on both parties, and are thus a valuable program platform for ISE institutions.** Learning is personal and grounded in relationships. Everyone enjoys a memorable discussion. Dynamic exchanges between scientists and public audiences can allow for personally relevant content, highlight career paths, and humanize science by reinforcing the reality that science is performed by individuals. Face-to-face interactions give scientists opportunities to gain new perspectives on their own work through increased understanding of the public's knowledge and interests. For further discussion of this topic see pages 21–24.

Characteristics of Successful Implementation

- **Portal to the Public demonstrates that effective professional development experiences for scientists are critical to program success.** These experiences are imperative in creating value for scientist participants, and emphasize that the investment of their time is worth the benefits gained. Effective professional development must have clearly identified goals and provide scientists with opportunities for practice and self-reflection. Both outcomes can be achieved through the Portal to the Public model. Confident ISE staff members who have specialized expertise in informal science learning facilitate the most effective professional development. This topic is explored further in pages 19–20.

- **Portal to the Public ISE sites must define and communicate clear goals and desired impacts.** Within each institution, there is a tremendous amount of value in articulating, communicating, and then re-visiting the institution's own, unique, Portal to the Public goals and desired impacts. Institutions must identify what balance of the specific components within the framework will enable them to meet their stated goals, working always within the contexts of their own communities and capacities. The guiding framework's flexibility facilitates institutions as they move through this process.

- **Relationships between ISE institutions and science organizations, and ISE staff and scientists, need to be maintained and nurtured.** These relationships will ensure quality programming, scientist retention, and sustainability of Portal to the Public and similar programs. Developing and maintaining relationships is hard work. Thorough and well-planned communication channels support strong relationship building between ISE institutions and scientists. See pages 15–18 for further discussion on this topic.

Sustainable initiatives require significant strategic planning and thoughtful program development.

A Discovery Center Museum staff member using the guiding framework schematic to outline an institutional plan.

- **It is important to tailor programs to accommodate the needs and interests of individual scientists.** Scientists enter Portal to the Public and other outreach programs with prior knowledge and skills. In addition, they may have an interest in reaching specific audiences. These differences between scientists must be considered and accommodated through the professional development and public program formats. This insight is explored further on pages 15–24.

- **Sustainable initiatives require significant strategic planning and thoughtful program development.** In order to achieve sustainability, Portal to the Public must become part of an institution's core activities and long-term mission. Developing sustainability by building leadership commitment and awareness is vital to a successful effort. See pages 25–27 for additional details regarding the three key dimensions of overall program sustainability—attitudinal, programmatic, and financial.

Recommendations and Implications for Future Work

Scientist Involvement

- **Professional development designed to enhance scientists' abilities to share their current work with public audiences must include opportunities for ongoing practice, feedback from peers and experts, and support of participants' self-reflection and individual growth.** These characteristics, applicable to Portal to the Public programs and beyond, contribute to building a comfortable and productive learning environment. See pages 19–20 for more detail.

- **Sustaining scientists' involvement in Portal to the Public will require providing them with ongoing opportunities for new or deeper engagement.** This may include opportunities to participate in new public program formats, advanced professional development, and/or participate in training and mentoring new scientist recruits. Evidence that existing Portal to the Public scientists are interested in these opportunities is promising for long-term sustainability. This recommendation is explored further on pages 15–24.

Dennis Schatz and Lauren Russell lead a large group discussion.

- **ISE institutions should market Portal to the Public (and other public engagement opportunities) to scientists as serious opportunities to improve their skills and make meaningful impacts on public audiences.** This strategy will attract the most motivated participants and produce the most effective science communicators. Scientists avoid programs that appear to be "watered down" or that may waste their time. See page 19 for further exploration of this notion.

- **It is important to strategically broaden scientist involvement by increasing the number of participants and adding diversity to the types of scientists involved (considering career stage, research topic, type of work, ethnicity, background, etc.).** Portal to the Public appears to be most effective at attracting early-career scientists, underscoring the need to develop specific strategies that will engage these scientists with informal science education institutions throughout their careers, as well as the need to attract senior scientist participants. See page 16 for a deeper discussion of this theme.

- **Science organizations (universities, corporations, national laboratories, for example) must embrace and incentivize outreach and education at the institutional level via cultural and policy change.** Changes could include adding outreach to tenure criteria for university faculty, and considering time spent participating in outreach as paid work hours. Ultimately, these changes will sustain scientists' involvement in Portal to the Public and other similar initiatives, leading to widespread, positive impacts on public audiences. Pages 17–18 note specific recommendations and ideas to achieve this goal.

Face-to-face interactions allow for less scripted, more realistic conversations between public audiences and scientists.

Innovations in Programming

- **Portal to the Public should help scientists reflect on how conversations with public audiences may impact the scientists' own thinking about their work.** One scientist at the Synthesis Meeting made a striking comment that, during a Portal to the Public program, a question from a four-year-old visitor helped her realize she didn't understand parts of her own research well enough. Face-to-face interactions allow for less scripted, more realistic conversations between public audiences and scientists. This style of mutual engagement and learning reveals the humanity of scientist and visitor alike by highlighting shared interests and perspectives. See page 21 for elaboration on this opportunity and need.

- **Portal to the Public programs should highlight the intersection of science with societal, ethical, and controversial themes.** Professional development should be created to help scientists assess the needs of their audiences, handle "sticky" questions, and facilitate conversations on these topics. See pages 20 and 22 for further discussion of this recommendation.

- **Portal to the Public programs should emphasize the nature and process of science, specifically illustrating the non-linear, creative, and fun aspects of current scientific research and applied work.** Scientists should share stories of their career paths, unanswered questions, failures, and methods to show science as a dynamic human endeavor. See pages 21–24 for more about this recommendation.

- **There is a great opportunity for Portal to the Public to reach and impact underserved audiences, and this work should be a top priority.** Underserved populations should be defined within the contexts of their communities. Contexts to consider may include income level, education level, or cultural background. Scientists should participate in professional development that helps them to examine their own assumptions about these populations, while it also builds awareness of different perspectives and cultures scientists may encounter. See pages 12–14 for further discussion, as well as suggestions for strategies to serve priority audiences for Portal to the Public.

Sustainability and Field-Wide Impact

- **Portal to the Public is one model for engaging scientists with the public, but it fits within a wider field of work, and should be part of a holistic strategy for informal science education.** It is important to view Portal to the Public within its ISE context, not simply on its own. For an excellent overview of Public Engagement with Science initiatives, see, "Many Experts, Many Audiences: Public Engagement with Science" an Inquiry Report released by the Center for Advancement of Informal Science Education. http://caise.insci.org/uploads/docs/public_engagement_with_science.pdf.

- **ISE institutions should advocate for public policy that supports more funding for outreach and includes broader impact requirements within research grants.** Many federally funded research projects already require outreach, such as the broader impact criterion for NSF grants. Clear opportunity exists to fund local Portal to the Public efforts with grants written as collaborations between informal science education and scientific institutions. Successful collaborations involve committed relationship building and early planning on all sides. See pages 17–18 and 34–35 for a deeper discussion of this recommendation.

- **It is both feasible and desirable to implement Portal to the Public in diverse communities and institutions nationwide.** The outcomes of Portal to the Public are closely aligned with the visions of many ISE institutions, and the flexibility of the guiding framework supports the sustainable adoption of the program as a whole. Portal to the Public has already developed key resources for dissemination. These include:
  - ❍ Introductory Video
  - ❍ 3-Day Dissemination Workshop for other ISE Organizations
  - ❍ Implementation Manual
  - ❍ Catalog of Professional Development Elements

  For a full description of these key resources, along with potential new dissemination resources, see pages 30–33. See more details regarding the advantages and challenges of broad implementation on pages 28–29.

- **There is a clear and emerging need to establish a Professional Learning Community (PLC) centered on face-to-face public engagement with scientists within the context of informal science education settings.** This Professional Learning Community would bring often-disparate organizations and individuals together to work toward public understanding of and engagement with science. The PLC could be centered around an affinity group that maintains and contributes to web-based resources, and organizes in-person meetings or workshops at least once a year. More details regarding this topic are on pages 38–41.

- **In-depth research is needed to explore the nature, scope, and impact of face-to-face interactions on science center visitors at Portal to the Public programs.** Specifically, researchers should investigate how these conversations convey the process of science, and the long-term impacts on children who have had early contact with scientists. These findings will be of value to all stakeholders, including individual scientist participants. Further description of this research question and other priorities for future work can be found on pages 36–37.

A scientist's activity engages young visitors.

Defining Portal to the Public

- **Specific criteria should be established that define what can be branded as a Portal to the Public program.** What are the critical programmatic elements, specific expectations for implementation, and indicators of long-term sustainability that meet the standards of being a Portal to the Public effort? These criteria will help establish a clear brand and common understanding for Portal to the Public across the informal science education field. The definition must strike the right balance between meeting core standards while allowing for flexibility for new sites.

- **The Portal to the Public leadership needs to determine the value and feasibility of setting minimum requirements for professional development experiences at participating ISE institutions.** Will minimum requirements ensure program integrity and consistency across sites? At what level of involvement should minimum standards be set? Minimum standards for professional development may address the following dimensions:
  - ❍ Time: number of hours for workshops and/or one-on-one support
  - ❍ Content: depth and quality of material covered
  - ❍ Outcomes: demonstrated skills, knowledge, attitudes

APPENDIX 1:
DOCUMENTATION FROM MEETING DISCUSSIONS

This appendix represents a synthesis of the comments from the eleven discussion topics covered in break-out groups at the Second Synthesis Meeting. Participants were not asked to reach consensus on any issue. The intent of this report, therefore, is to document the diversity of contributions and suggestions, not to summarize findings.

New Public Audiences

Most Portal to the Public programming to date has been designed to bring scientists and general science center visitors together. A minority of programs have been tailored to reach specific, targeted audiences such as adults, summer campers, or school groups. After reaching agreement on these two statements, Synthesis Meeting participants were divided into three groups. Each group was charged with the same tasks: to brainstorm potential new audiences for scientist interactions, to prioritize these audiences, and, finally, to discuss the types of program adjustments required to move the work forward.

Following this initial brainstorming session, the discussion groups were asked to identify up to four specific audience groups they felt were most important to reach going forward. All three groups ranked reaching underserved audiences as a top priority, while two groups also included adults in the top category. All of the prioritized audiences appear in bold in the alphabetical list to the right.

Although by and large the discussion groups agreed that Portal to the Public should be leveraged to strategically reach new audiences, one participant cautioned that, as a young program, Portal to the Public should stay focused on strengthening and growing its current model, serving public audiences that are easy to reach.

Rationale and Strategies for Priority Audiences

Having identified their priority target audiences, participants then moved on to discuss strategies to reach such audiences. Some audience categories lent themselves to discussions of professional development strategies for scientists, while others did not.

Potential New Target Audiences

Adults

Advocates
(for example, health, environmental, lobbyists)

Citizen scientists

Classroom teachers

Community college students

Congressional leaders

Early-learners

Elected officials

English language learners

High school students

Home school students and parents

Individuals who distrust or avoid science

Journalists and media gatekeepers

Middle school students

Opinion leaders

Policymakers

Public audiences who do not visit science centers

Science festival attendees

Science press officers

Scientists who don't participate in Portal to the Public

Seniors citizens

Talented and gifted children

Undergraduate college students

Underserved audiences

Young adults (age 18-31)

Youth organization participants
(for example, Cub Scouts)

Reaching Underserved Audiences

Meeting participants discussed, but did not come to agreement on, the best way to define underserved audiences. Suggested measures included income level, education level, as well as indicators such as first-generation college attendees, or students who qualify for free or reduced lunch programs. Some participants expressed the belief that underserved audiences can only be defined within a community context, taking into account the population, resources, and industry unique to each region. Meeting participants identified reaching underserved populations as a high priority because of the potential to:

- Inspire underserved youth to become interested in science-related careers
- Provide opportunities to become more familiar with scientists personally
- Counteract skepticism towards scientific advances (often medical)

Engagement Strategies

- Partner with community organizations to identify local underserved populations and understand/serve their needs
- Involve families and parents in programming
- Recruit underrepresented scientists to participate in Portal to the Public, including individuals with different ethnicities, languages spoken, and genders
- Create multi-lingual signage for events
- Consider multi-cultural needs

Professional Development Ideas for Scientists

- Challenge scientists to understand their own assumptions about the populations with whom they are preparing to work
- Help scientists understand, from a psychological basis, how public audiences' feelings and attitudes towards science develop, particularly as it relates to religious and cultural experiences
- Share universal design principles that relate to working with blind individuals, deaf individuals, and speakers of other languages
- Build awareness and understanding of potential audiences within the scientist's community

A scientist engages adult visitors in a conversation about her research.

Reaching Adults

Engagement Strategies

- Leverage the desire of some scientists to interact with and impact adult audiences
- Develop ways to "hook and engage" adults as is generally done for children
- Design programs for greater depth and discussion
  - ❍ Consider covering controversial science topics or issues commonly relevant to parents, such as child development
- Host programs in alternate venues, with experts and activities that complement the location (for example, an entomologist in a botanical garden). Suggested venues include:
  - ❍ Arboretums
  - ❍ Botanical gardens
  - ❍ Natural history museums
  - ❍ Science festivals
  - ❍ Community street fairs
  - ❍ Farmers markets

Reaching Policymakers

Engagement Strategies

- Design programs to support "fast and focused" interactions, perhaps using tabletop activities to guide discussion
- Do not include children in events, as it is likely policymakers would stand back and watch instead of interacting themselves

Professional Development Ideas for Scientists

- Help scientists frame their messages with "big picture" context and clear relevance to the policymaker
- Assist scientists in learning to "get to the point" quickly (use only 3 points)
- Help scientists practice articulating funding needs
- Give scientists time to practice answering tricky or controversial questions

Reaching Middle School Students

Engagement Strategies

- Link program topics and content to current science and math standards and classroom curricula
- Collaborate with teachers on program development
- Create cross-disciplinary programs
- Reduce or eliminate admission fee to visit the science center

Professional Development Ideas for Scientists

- Share best practices for handling large groups of students
- Help scientists assess likely prior knowledge of this age group, given the content standards and expectations for each grade level

Reaching Senior Citizens

Engagement Strategies

- Recognize the value of senior citizens as a target audience and as a potential source of scientist participants
- Tap into an existing infrastructure, such as AARP, to develop program platforms
- Encourage grandparents to attend programs with their grandchildren

Visitors speak with a local researcher at a Portal to the Public program at Pacific Science Center.

Scientist Involvement

Scientists involved with Portal to the Public demonstrate an interest in and commitment to participating in extensive professional development, as well as ongoing public engagement activities within informal science education institutions. Across the eight established Portal to the Public sites, a broad range of scientists have participated in the program, including individuals at a spectrum of career stages, from numerous disciplines, and from a variety of institutions both public and private .

Synthesis Meeting participants were asked to discuss strategies that would help sustain scientist involvement in the Portal to the Public program. Participants discussed ideas related to maintaining the engagement of scientists already committed to the program, as well as ways to ensure a ready pool of scientists for ongoing recruitment. Subsequently, participants considered useful strategies that an individual Portal to the Public site might use to broaden the scope and scale of scientist involvement in order to include a greater number and/or diversity of science-based professionals.

It was suggested that ISE institutions develop strategies that engage scientists in new challenges, and create opportunities that provide incentives for sustained Portal to the Public involvement.

Sustaining Scientist Involvement

Generally speaking, meeting participants agreed that Portal to the Public institutions should invest in ongoing relationships with scientists in order to sustain their involvement for the long-term. Participants recognized that these relationships are based on individual interactions, conversations, and collaborations. One group felt strongly that it is the ISE institution's responsibility to proactively establish and maintain these relationships. Meeting participants predicted, however, that the interests and needs of participating scientists would evolve with time. In response, it was suggested that ISE institutions develop strategies that engage scientists in new challenges, and create opportunities that provide incentives for sustained Portal to the Public involvement.

Relationships aren't everything, however. One meeting participant, who was also a Portal to the Public scientist, explained that, "As much as I like the people here, that's not why I come." This participant pointed to the need for programs that continue to recognize and value scientists' core motivations for participating in the first place, including scientists' desire to:

- Communicate their own work and engage with public audiences
- Build professional communication skills and add to their resumes
- Give back to their communities

Yet another participant suggested that ISE institutions could reinforce scientists' motivations to participate by sharing examples of visitor impact and public feedback. For example, posting visitors' thank you letters in a public place, or facilitating a station at special events where visitors can create messages of thanks, thereby providing scientists with instant gratification.

A Portal to the Public staff member meets with a scientist during a workshop at North Museum.

Meeting participants also explored programmatic ideas to support sustained scientist involvement. The groups highlighted the importance of an "ISE pro" being consistently available to provide expertise and support, and the need to always make efficient use of time. Specific ideas to promote sustained involvement include:

- Allowing scientists who are already involved in Portal to the Public activities to become mentors to new scientist participants
- Supporting ongoing community-building amongst scientist participants
- Developing a scientist advisory board for the program
- Creating public program formats with a wide variety of time commitments, allowing scientists to choose the option best suited to them
- Linking scientists to existing ISE infrastructure, thereby creating opportunities for further involvement, such as becoming a science content advisor for an exhibit, or becoming a part of an institution's regular volunteer program
- Incentivizing participation in more advanced professional development by using a "master gardener" format that would require a certain number of hours of participation to achieve and retain certification

Broadening Scientist Involvement

Meeting participants recognized the value of increasing the overall number of scientists participating in a Portal to the Public program, as well as adding diversity to the types of scientists involved. Possible areas of consideration included career stage, research topic, type of work, ethnicity, and background. Meeting participants cautioned that, as scientist involvement is broadened within an institution's program, there must also be a parallel scaling of ISE staff and infrastructure.

One participant emphasized that there is "no limit to the scientists who could benefit from Portal to the Public." Another participant wondered if the program could be broadened too far, to the point that it gets watered down. This participant wondered what limits should be placed on involving science-based professionals such as technicians, nurses, or pharmacists. Yet other participants felt that public audiences would enjoy interacting with individuals who are involved in a range of science-based professions, or even science hobbyists. They expressed the belief that participation in Portal to the Public should not necessarily be limited to scientists working on "current research" or science that is "in the news."

Specific ideas to strategically broaden scientist involvement include:

- Expanding the number of topics covered by recruiting scientists of diverse disciplines and including the full range of local or regional research
- Developing corporate partnerships to recruit industry scientists
- Inviting "celebrity scientists" to participate occasionally in events
- Developing partnerships with professional societies, the American Association for the Advancement of Science, American Geophysical Union, and Materials Research Society, for example
- Targeting early-career scientists because they generally have more time to commit to outreach

Discussion groups also spent time debating the merits of targeting and recruiting more senior scientists to participate in Portal to the Public. Some participants questioned the viability of this idea, given that senior scientists are more likely to be "insanely busy" and may not be motivated in the same way that early-career scientists are. Participants also suggested, however, that senior scientists might be more likely to receive employer support for their participation in outreach, or may recruit their graduate students and postdoctoral researchers to participate.

There is no limit to the scientists who could benefit from Portal to the Public.

Institutional Policies, Cultures, and Practices

Meeting participants brainstormed and discussed the institutional policies, cultures, and practices of science institutions, funding agencies, and ISE institutions that could support broad scientist involvement in Portal to the Public activities. Discussion groups considered the relative importance of making cultural vs. policy changes. Some participants felt that it was imperative to make cultural changes first, as these would create positive attitudes towards outreach and education, especially in science organizations. Changes in policy would then follow. Discussion groups spent some time discussing specific institutional policies, cultures, and practices aimed at supporting and broadening scientist involvement.

Key suggestions were that ISE institutions should:

- Create a stable program with clear expectations and structure. Associate program participation with being an honor. As an example of this, the Science Communication Fellowship program at Pacific Science Center was cited.
- Be confident and proactive about inviting scientists to participate in programs.
- Forge partnerships with scientific associations, such as the American Geophysical Union, and build on the existing outreach efforts of these associations. Make presentations at association events and conferences.
- Ensure that professional museum staff members leading Portal to the Public programs are "grounded in the museum world," with specific expertise in how people learn and informal science education theory.
- Leverage the idea that Portal to the Public programs can increase the visibility and public profile of participating science-related organizations and corporations. Use this to motivate institutional support.
- Increase awareness of Portal to the Public programs amongst science-organization partners, and communicate the opportunity and need to pursue funding for collaborative programs. Specific strategies for effective communication include:
  - ❍ Leveraging leadership staff from ISE institutions to help communicate about Portal to the Public
  - ❍ Delivering presentations about Portal to the Public to research departments and organizations
  - ❍ Including findings from research and evaluation related to Portal to the Public program impact in communication message
  - ❍ Communicating the funding needs for these programs
  - ❍ Creating an online "broader impacts menu" with clear options for collaboration on grant proposals
  - ❍ Obtaining buy-in from administrators who control budgeting

Funding agencies should:

- Continue to support outreach requirements associated with funding, such as the National Science Foundation's broader impact criterion
- Place more weight on the merits of the broader impact criterion of National Science Foundation research grants
- Support research on what motivates scientists to participate in Portal to the Public, with the hope of better understanding the demographic breakdown of current and potential participants
- Facilitate a process for informal science education and K-12 education practitioners and experts to review outreach/broader impact sections of research proposals

Universities and science organizations should:

- Combine broader impact allocations from several research grants to fund scientist participation in Portal to the Public programs
- Create systems that make it easy for research grant writers and principal investigators to learn about Portal to the Public activities and how to include them in their grant proposals
- Focus on achieving cultural and policy changes at the departmental level
- Encourage tenure criteria for university faculty that includes public service, outreach, and education
- Encourage scientists who are experienced with informal education to advocate for its support within their institutions
- Require that job descriptions identify a percentage of time to be committed to education outreach for science positions
- Leverage outreach and education to meet or complement public relations goals

A scientist facilitates an activity based on her research.

Professional Development

Generally speaking, current Portal to the Public professional development resources take the form of workshop experiences for scientists, accompanied by individual mentorship by ISE staff. The objectives of professional development for scientists are:

1. Scientists develop communication strategies that support inquiry.
2. Scientists work with ISE staff to design and facilitate materials-rich and other learning experiences that actively involve and affect scientists and the public.
3. Scientists understand the importance to learning of developing personal connections with audiences based on shared experiences.
4. Scientists develop a broader understanding of how people learn and the nature of informal learning environments.
5. Scientists work with ISE staff to develop an understanding of the organizational culture of each other's institutions.

Synthesis Meeting participants were asked to brainstorm and discuss the next round of innovations in professional development for Portal to the Public and beyond. An overarching theme from all discussion groups was the need to have professional development prepare scientists for the specific public program they will facilitate. As the public program opportunities for scientists expand, so must professional development.

A professional development workshop at Explora.

Essential Portal to the Public Professional Development

Meeting participants recognized the value of the professional development objectives listed at left in contributing to materials-rich, inquiry-based experiences for visitors. They valued the flexible nature of the *Catalog of Professional Development Elements*, which helps sites custom-design Portal to the Public programs. However, all three groups discussed the general need for Portal to the Public leadership to define what is "core" to Portal to the Public, and identify the minimum and crucial professional development components considered necessary for success. One participant made the point that "success" with professional development is not about the hours scientists commit, but rather about the skills they have acquired.

Meeting participants stressed the importance of framing and marketing professional development to scientists as a serious opportunity for them to improve their skills. Scientists are more likely to commit significant time to professional development if they know the material is rich in content and not "watered down." Meeting participants similarly noted the importance of ensuring strong, competent professional development facilitators with informal science education expertise.

Some discussion focused on desired characteristics for all types of professional development for scientists for Portal to the Public and beyond. These characteristics include:

- Clearly identified intended impacts for scientist and public audience participants
- Ongoing practice and feedback throughout professional development and public program experiences
- A culture of "failure as a growth process" that removes negative connotations with mistakes, as they are a productive part of learning
- Experiences tailored to meet the needs of individual scientists
- Support for scientists' self-reflection ("They don't know what they don't know.")

Professional Development Innovations

Synthesis Meeting participants brainstormed many ideas for innovations related to format, approach, and specific content areas. Key priorities for future work include preparing scientists to facilitate conversations on controversial topics related to science and society.

Facilitating Conversations on Controversial Topics

Meeting participants commented on the need to prepare scientists to handle "sticky" issues and challenging questions related to science and society. This notion echoes a recommendation in the Public Program section to offer more programs on these topics (see page 22). Participants felt such training could help scientists apply appropriate communication strategies for different levels and sensitivities, and respect the diverse worldviews of the visitors with whom they interact. One participant commented that ISE staff should be trained to help scientists with these tricky situations.

Peer-to-Peer Professional Development

All discussion groups addressed the value of peer-to-peer support and mentorship amongst participating scientists, creating a "professional development ecosystem" that supports and builds on itself. Participants commented both on the value of peer interactions, feedback, and mutual learning within the initial professional development experiences, and the value of scientists who have mastered the professional development ("alumni" or advanced scientists) becoming mentors to new participants. These strategies emphasize teamwork and build deeper, long-term relationships that can form the base of a community of practice. Networks of committed scientists and ISE staff will ultimately contribute to a self-sustaining program.

Scientists prototype their activities in a workshop at Explora and provide each other with valuable feedback.

Innovations in Format and Approach

*An asterisk indicates strategies and professional development content areas currently in place at one or more Portal to the Public site.

- Facilitate tours of the museum and of the scientists' lab or workspace to promote mutual understanding and respect of each other's culture, areas of expertise, and resources*
- Invite professional science communicators from other fields outside the museum, for example, science journalists, television or radio producers, communication experts, etc. to be guest speakers
- Create videos of professional development experiences that complement or replace in-person programs
- Provide opportunities for scientists to prototype their activities with structured feedback from museum high school interns, visitors, or other museum staff*
- Facilitate collaboration between scientists and artists to improve aesthetics and visual appeal of activities
- Involve staff from across museum departments, such as exhibit staff, in the workshops and activity design process*
- Create a "list serve" of participating scientists to share ideas and experiences
- Include improvisational theater activities in workshops
- Allow scientists to observe and explore a well-designed existing demonstration or activity being facilitated by museum staff*
- Offer a series of workshops that begins with the basics of inquiry and moves to more advanced topics over time*
- Provide training on debate tactics

New Content Areas

- Difficult visitor situations, such as parental, disciplinary, and other customer service issues
- Cross cultural/gender communication
- How to secure support through grants for science center collaborative projects (like NSF broader impact criterion)
- Learning sciences and informal science education research and theory,* including advances as they occur
- Assessment and evaluation methods for determining visitor impact

Face-to-Face Public Programs

To date, Portal to the Public face-to-face programs have largely consisted of materials-based tabletop activities designed for small groups of museum visitors to enjoy. Synthesis Meeting participants were asked to brainstorm and discuss their ideas for additional or complementary face-to-face public program formats.

Some meeting participants framed the discussion with the notion that the "standard Portal to the Public format" is working, and that the project should "stay true to who it is." These participants felt that the face-to-face, materials-based, tabletop programs are central to the project's identity and success, and that it may not be necessary or desirable to change these parameters.

In fact, one Portal to the Public scientist present explained that, while over the long term scientists may be interested in modifying and improving their individual activity (with assistance from ISE staff), for the moment they aren't yet "bored." Initially, scientists may be motivated to participate because small group tabletop formats are less daunting than large lectures. These activities provide scientists with an opportunity to interact with the public on a more personal level.

Face-to-face interactions humanize science, reinforcing the reality that science is done by individuals.

Meeting participants discussed the characteristics and advantages of this format, concluding that face-to-face interactions:

- Allow scientist to "adapt [conversation] on the fly"
- Provide visitors opportunities to ask questions (and immediate follow-up questions)
- Reward scientists immediately with instant feedback and satisfaction with tangible visitor impact
- Humanize science, reinforcing the reality that science is done by individuals
- Break stereotypes about scientists
- Create memorable and personal experiences by virtue of the human connection
- Highlight the joy and passion that scientists feel about their careers
- Expose youth to potential career paths in science fields
- Support a lifelong learning lifestyle amongst public audiences and scientists
- Allow for more genuine, open-ended conversations between public audiences and scientists
- Enable multiple forms of sensory input to support learning
- Support the use of inviting materials to increase visitor comfort
- Can be the peak experience of a museum visit

Multiple discussion groups commented on the power of face-to-face interactions to support mutual learning among scientists and visitors. Participants explained that these interactions provide scientists with an opportunity to gain new perspectives on their own work and on public audiences' knowledge and interests.

One participant explained that this style of mutual engagement reveals the humanity of the scientist and visitor alike by highlighting shared interests and perspectives between two individuals as they converse. Another participant stressed the idea that it is OK for the scientists to not have all the answers, and, in fact, this "levels the playing field" between scientists and visitors. To reinforce the idea that scientists are learning too, it was suggested that ISE institutions avoid marketing taglines like "learn from a scientist" or "meet the experts."

New Innovations in Face-to-Face Interactions

Participants brainstormed a range of new and innovative public program options, and discussed a subset of these ideas in greater depth. Some of the ideas are related to issues of program format such as venue, interaction style, and medium, while others concern the content focus (specific discipline or aspect of science process). Some meeting participants discussed the idea of a hierarchy of program options for scientists, where scientists might begin by developing a tabletop activity for families, and then move on to other options. Many recognized the need to accommodate the needs and interests of individual scientists by taking into account a scientist's specific desire to impact particular age groups or work in certain venues. Participants also noted that effective professional development activities would evolve to support the program format in which scientists are already participating.

Alternate Formats

- Presentations and activities with museum science camps
- Presentations at conferences/workshops for girls interested in science
- Podcasts
- News segments on TV
- Forums on controversial issues
- Science Cafés
- Multi-media kiosks on the exhibit floor that feature video of individual scientists
- Distance learning programs to classrooms
- School field trips
- Exhibit interpretation for visitors
- Museum stage presentations
- Doing research on-site with participants, followed by scientists coming back to museum to present findings
- Preparation labs that allow visitors to interact with working scientists
- Cognitive scientists doing research on museum visitors
- Exhibits and programs involving visitor participation and contribution

Alternate Venues

- Gardens
- Arboretums
- Zoos
- Libraries
- Cafés and bars
- Farmers markets
- K-12 schools
- Scientists' labs
- Hospitals

Controversial Science

Many meeting participants advocated that Portal to the Public programs should highlight societal, ethical, and controversial themes. Participants felt this programming would require specific professional development for scientists, and some strategies for this are noted in the Professional Development section of this report (see pages 19–20). Meeting participants wondered how an Informal Science Education institution might set priorities for these topics, and what level of advocacy could be considered appropriate. One participant explained that ISE institutions can talk about risk and safety without becoming an advocate for specific positions, while another pondered how an advocacy role for the museum might affect community relationships.

A professional development workshop for scientists at Explorit Science Center.

"Scientific reality isn't linear—there is creativity, messiness, and fun in science."

Science Process

Meeting participants saw an opportunity for Portal to the Public programs to highlight the scientific method and processes, especially illustrating that, "Scientific reality isn't linear—there is creativity, messiness, and fun in science." Meeting participants suggested that the scientists' presentations should also include examples of "comedic failures," citing that sharing processes is more important than specific factual information.

Living Room Science

One discussion group developed a public program concept called "Living Room Science." This program proposed bringing together a small group of visitors (< 10) with one or more scientists in a space that is cozy and comfortable with plenty of relaxed seating, such as couches. The space would support in-depth, prolonged conversations on a variety of science topics. One participant suggested that tabletop activities might be used to "break the ice" and provide prompts for conversation. A different discussion group considered how the space might display and support content from the cumulative conversation over time, enabling visitors to view questions posed by previous participants, review ideas from past conversations, and leave comments for future participants.

Participants cautioned that, while the Living Room Science space may be inviting for some visitors, it might intimidate others. Concern that, with this open-ended format, scientists will not be able to answer every question was also expressed. In many cases, scientists will not be experts in areas the conversation may go. Countering this concern, participants felt it was important to frame visitors' expectations in such a way that they understand scientists will not have all the answers, citing specifically that scientists shouldn't be put up on a "high horse."

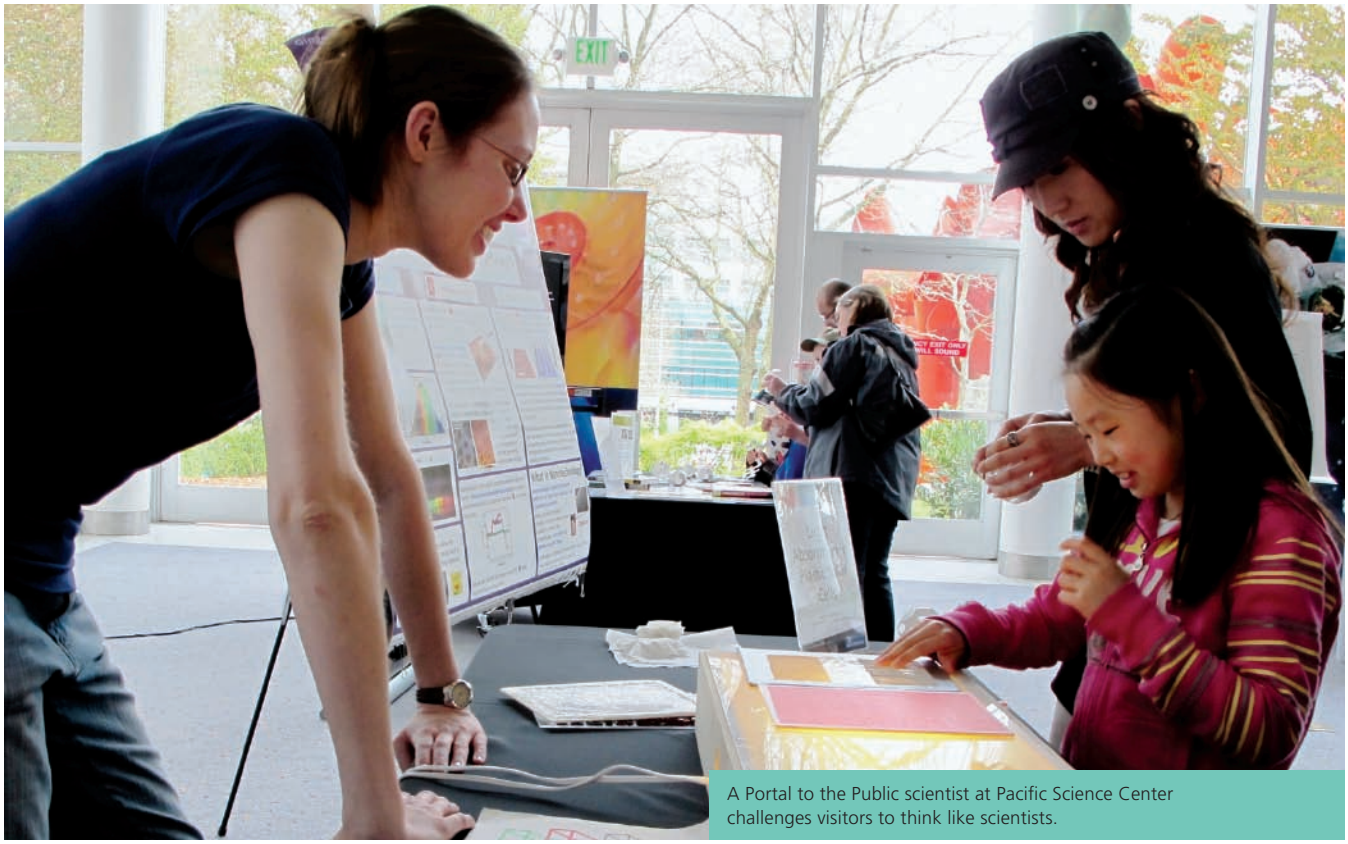
Impromptu Activities

Meeting participants developed a public program concept loosely called "Impromptu Activities" in which a scientist would be stationed at a table with a variety of open-ended materials that could be used to conduct experiments and "do science." Impromptu Activities would focus on group-inquiry, perhaps taking scientists out of their particular research context, but provide visitors with an experience that highlights the scientific process. For example, "Let's make something with such and such materials and see what happens."

Programs for Large Groups

Two discussion groups spent time discussing the challenges and opportunities associated with serving large visitor groups, such as large-volume school groups or high attendance on busy weekends. Participants commented that the program format and expectations for visitor impact must be adjusted for large groups. Participants envisioned programs that would still bring scientists and visitors together in small group interactions using tabletop activities, but had the following recommendations:

- Provide guidance or support in dealing with behavior management with large school groups.
- Distribute activities evenly throughout the space. Research shows people spend more time at exhibits when exhibit stations are spread out over a larger space.
- Make sure that the ratio of scientists to visitors is appropriate. A high ratio is considered key.
- Provide partitions within the space between activities to help visitors focus and deter environmental distractions.
- ISE staff and volunteers could assist with programs at scientists' tables.
- Allowing groups of scientists to work together on an activity will help to facilitate the experience for larger groups.



A Portal to the Public scientist at Pacific Science Center challenges visitors to think like scientists.

Non Face-to-Face Interactions

A separate discussion group discussed how some of the strengths and features of face-to-face interactions between scientists and public audiences could be leveraged and applied to other public engagement formats. Recommendations from this discussion include:

- Create opportunities for two-way dialogue between scientists and public audiences
  - ❍ Virtual lab visits: use live feeds and two-way video
  - ❍ Radio programs: allow listeners to submit questions and engage in dialogue via the web, phone, and text
  - ❍ Web based experiences: set up live chat rooms or message boards
- Leverage hands-on activities and materials to tell the story of current science
  - ❍ Virtual lab visits: send materials to participants, intended for use during the actual program
  - ❍ Exhibits: look to Portal to the Public scientists' activities for concepts and ideas that could inspire the creation of un-facilitated exhibits

Face-to-face interactions leverage hands-on activities and materials to tell the story of current science.

- Use scientists' personal stories to engage visitors, create relevance, and highlight career paths
  - ❍ Exhibits: create panels with narrative examples of scientists' stories
  - ❍ Television, online video, and exhibits: make use of video interviews of scientists and footage of scientists at work
- Showcase authentic science materials and methods to help illustrate the nature and process of science
  - ❍ Virtual lab visits, television, and online video: ensure participants can see equipment and processes

Local Sustainability

Sustainable initiatives are more than financially secure. They are part of an institution's vision and are integrated effectively into ongoing operations. Creating a thriving, sustainable program requires consideration of three overlapping dimensions of sustainability.

- **Attitudinal sustainability** includes building support for and commitment to the program amongst key collaborators and stakeholders.
- **Programmatic sustainability** includes integrating and scaling programs appropriately, involving the right staff, and responding to community needs.
- **Financial sustainability** includes strategic planning for short- and long-term funding needs.

Synthesis Meeting participants considered and discussed how these three dimensions inform Portal to the Public local sustainability. Much of the discussion in this section echoes themes brought up in other groups, specifically the scientist involvement, professional development, and face-to-face public programs discussions. This fact emphasizes how strategies required to successfully build a Portal to the Public program in the first place must be continued and embraced for the program's sustainability over the long haul.

Attitudinal Sustainability

Meeting participants identified numerous general and stakeholder-specific strategies to build genuine awareness, advocacy, and commitment amongst the leadership of ISE institutions and partner science organizations that will support attitudinal sustainability.

General Strategies

- Align the Portal to the Public program plan with institutional mission, vision, and strategic plans. Look for synergy with existing strategic initiatives.
- Develop relationships with stakeholders, including leadership staff, and board members.
- Promote the program and its intended impacts to stakeholders, using photos and testimonials (from visitors and scientists) to build awareness and positive attitudes.
- Set realistic expectations for impacts and rate of progress towards program implementation. Do not set stakeholders up for disappointment.
- Support policy changes at both governmental and institutional levels that will instill a culture of support within the research community, for example, requiring broader impact components in federal research grants.

ISE Institution-specific Strategies

- Invite staff and board members to professional development workshops and public programs
- Bring a sample program or activity to a board meeting or staff gathering

Science Organization-specific Strategies

- Frame Portal to the Public programs as a resource to help science organizations achieve outreach goals and requirements
- Ensure dual ownership of Portal to the Public programs, involving both the science organization and ISE institution
- Obtain commitment and support from science organization leadership so that lower-level scientists do not feel like they are abandoning their "real work"

Programmatic Sustainability

Meeting participants discussed how Portal to the Public programs should be scaled and integrated into an institution's operations to optimize efficiency and quality. One participant urged the group that "It's not about efficiency; it's about quality." Another participant argued that above all other considerations, a program design must be responsive to community needs. Across the three discussion groups, strategies fell within five major categories:

Scope and Scale

- Balance the cost of recruitment, relationship management, and professional development with the ultimate audience impacts achieved
- Consider the resources that are available to dedicate to the program
- Maintain a pool of scientists large enough to meet the needs of a wide variety of events

Institutional Integration

- Manage Portal to the Public scientist participants by using the institution's volunteer program procedures and systems, such as hours tracking, background checks, etc.
- Integrate infrastructure and staffing into the entire organization, as opposed to isolating responsibility in one department or individual, to leverage institutional strengths and avoid "reinventing the wheel"
- Develop a succession plan for program staff

A scientist tests his activity materials at a professional development workshop at Explora.

Relationship Management

- Designate ISE staff members to actively maintain relationships with scientists
- Maintain clear and organized scientist contact information and records of individual participation

Incentivizing Participation

- Institutionalize incentives for scientists' participation in outreach, for example, through the broader impact criterion of NSF grants or by awarding graduate school teaching assistant credit

Flexibility

- Develop new program formats for scientists to participate in as their skills and interests develop over time
- Schedule public program topics flexibly, or make public programs non topic-specific, as an available scientist's work may not always match an ISE institution's desired program theme

Financial Sustainability

Meeting participants discussed financial sustainability, considering what models and strategies will support short- and long-term needs. Participants noted that there are as many potential streams of funding for Portal to the Public programs as there are for the science centers themselves. Participants thought a programmatically well-integrated Portal to the Public effort would allow institutions to seek unrestricted financial support and funding consistent with the institution's vision, as opposed to changing directions for each new grant. Meeting participants noted that the ISE institution and the science organization partner should work together to identify resources and secure funding.

There are as many potential streams of funding for Portal to the Public programs as there are for the science centers themselves.

Grants

Much conversation centered on pursuing grant opportunities, both as stand-alone proposals and as integrated parts of larger projects. The discussion groups cited enormous opportunity to fund Portal to the Public with funds devoted to outreach within federally funded research projects. For example, National Science Foundation (NSF) research grants have a broader impact criterion, which requires researchers to include outreach in their proposals. Meeting participants cited that researchers do not necessarily consider working with ISE institutions on these projects, often working with K-12 schools or developing web-based resources instead. Alternatively, scientists who do approach ISE institutions often do so too late in the process, or fail to include money dedicated to outreach in their budgets. In some cases, where the project is funded, there is poor communication and coordination between the partners and the deliverable is not completed.

For NSF broader impact and other similar proposals involving scientists and ISE institutions, meeting participants identified these strategies for successful collaborations:

- Ensure a realistic timeline for proposal development; don't start the broader impact planning at the last minute.
- Develop a common understanding of and realistic expectations for project goals, deliverables, and collaborators roles. Create formal agreements and contracts as appropriate.
- Be selective about which projects to pursue.
- Pursue projects that fit into an established and proven program plan, such as the Portal to the Public guiding framework.
- Establish and articulate the expertise of the ISE institution within the proposal, based on research and experience, regarding developing and implementing informal education projects.

Individual Giving

- Recruit participating scientists to become donors or plan estate gifts. For corporate scientists, this may allow matching donations from their employers.
- Invite scientists to participate in or co-facilitate donor events or fundraising trips, for example, a tour through the Galapagos or a star-gazing party.

Corporate Support and Sponsorship

- Ask science corporations, such as pharmaceutical corporations or engineering firms, to sponsor individual scientist participants or public programs. Benefits to the company may include attaching their name to the program title, and/or offering their employees and family free or reduced admission to the event. The ISE institution can ensure high visibility and handle all public relations and marketing.
- Encourage science corporations to support scientist participants by agreeing to consider their time devoted to outreach as paid work time. Leverage programs to build relationships with science corporations that may be potential sponsors or donors in the future.
- Target local workforce investment boards and chambers of commerce for sponsorship. These groups are likely to be interested in showcasing the regional research community and developing youth's interest in science-based careers.
- Secure in-kind gifts of materials and expertise for activity development.

Revenue-generating Opportunities

- Provide fee-based professional development workshops for corporations, universities, and other science-based organizations.
- Leverage a Science Café model, where restaurants/bars give a portion of profits from event nights to the host ISE institution.
- Integrate Portal to the Public scientists into revenue generating programs such as summer camps and planetarium shows. Create special, fee-based programs for homeschoolers or other target audiences that involves these scientists.

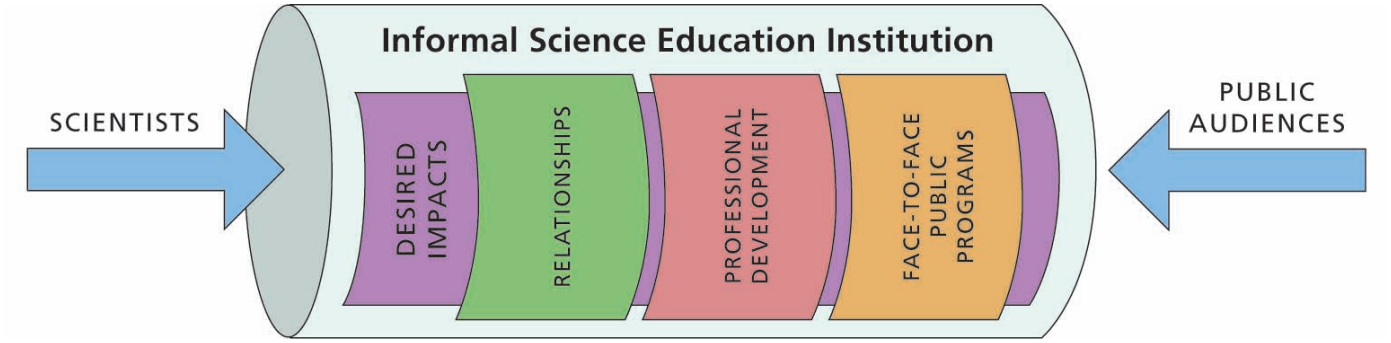
The Sustainability Balancing Act

Finally, Synthesis Meeting discussion groups focused on what balance between all three dimensions of sustainability, attitudinal, programmatic, and financial would ensure long-term program success. The majority of participants agreed that attitudinal sustainability is the most important because it is the shift to fully embrace the Portal to the Public endeavor that will lead to its successful integration within ISE institutions. Participants cited the idea that you can't ask for funding until a commitment to the program exists, and that a lack of commitment would therefore undermine the project as a whole. A minority of participants, however, felt strongly that financial sustainability is the most important, explaining that "Even when everyone loves and feels passionate about a program, without financial sustainability, it falls apart." Regardless of relative importance, the groups agreed that all three areas complement and work together to build a sustainable program.

Meeting participants also cautioned that short-term funding often allows for "dream-like" experiments that are not necessarily sustainable, and advocated that all three dimensions of sustainability should be addressed from the beginning of project development.

Broad Implementation

The Portal to the Public guiding framework was designed to be flexible and scalable, thereby enabling it to be adopted at a wide range and number of ISE institutions. Understanding this premise, meeting participants discussed both the feasibility (can it?) and desirability (should it?) of broad implementation of the Portal to the Public guiding framework at numerous, diverse ISE institutions. Meeting participants also discussed specific dissemination strategies and resources designed to support broad implementation. These aspects are covered in the next section, Programs and Resources for Dissemination. For ease of referring to the guiding framework, its graphic representation is repeated below.



Portal to the Public Guiding Framework

Feasibility of Broad Implementation

Participants felt positively about the feasibility of broad implementation, noting that Portal to the Public resonates with the mission of many ISE institutions, and that the program has been tested in institutions both large and small. However, one participant questioned whether the current evaluation provides strong enough evidence that goals were accomplished similarly at both large and small institutions. Some participants cautioned that large institutions may be too inflexible, and that small institutions may lack the funding and resources to adopt the framework. In terms of initial implementation, small ISE institutions may need "seed money" to get started.

Many meeting participants wondered if there might also be different levels of implementation. Could institutions use just a piece of the framework? Others felt it was important to require full implementation in order to maintain integrity of the Portal to the Public program. Regardless, meeting participants acknowledged that Portal to the Public approaches and strategies will continue to evolve and change as new experiences and related learning occurs.

Discussion groups spent time articulating criteria they imagined would be most successful as institutions seek to implement the Portal to the Public guiding framework:

- *Institutional Fit and Buy-in*
  Portal to the Public must clearly align with the organization's mission. There should be support from and enthusiasm from the top (Director or CEO and the Board of Directors).
- *Devoted Resources*
  Appropriate funding and/or staff resources must be identified and allocated.
- *Science Community*
  Successful implementation requires access to a community of scientists who are receptive to collaboration with the ISE institution.
- *Flexibility*
  ISE institutions must adapt the guiding framework to match their vision, institutional goals, capacity, and the needs and interests of their science community. The framework is accessible for many institutions because it allows each one to determine the best balance of components for their own Portal to the Public program.

Desirability of Broad Implementation

Discussion groups were also asked to examine the overall value, advantages, and challenges of pursuing a broad implementation of Portal to the Public. Generally speaking, all discussion groups agreed that there is value to broadly implementing the program at new ISE institutions. Groups saw benefits of participation for scientists, ISE institutions, and public audiences. One group remarked that engaging scientists in their communities should be a "big part" of what science centers do. One individual commented that it is important to consider how the guiding framework could be adopted in communities that have large resources of scientists and research institutes but no science centers.

Engaging scientists in their communities should be a "big part" of what science centers do.

Advantages of Broad Implementation:

- *Leveraging Scientists' Commitment and Skills*
  Portal to the Public can support a general "pool" of scientists who are trained and excited to work with ISE institutions. Scientists could move from institution to institution with an acknowledged training base, such as a certification as a "Fellow."
- *Ease of Adoption*
  The Portal to the Public guiding framework will help ISE institutions avoid "reinventing the wheel." Portal to the Public also leverages a public program format (tabletop activities) with which many museums are already familiar.
- *Community Relationships*
  Portal to the Public helps ISE institutions foster relationships with corporations and donors, and promotes the science center brand in the community.
- *Benefits for ISE Staff*
  Portal to the Public professional development activities can also be used to train ISE staff and volunteers, enhancing the capacity of the field as a whole.

Synthesis meeting participants break into small groups for focused discussions.

Challenges of Broad Implementation:

- *Maintaining Standards for Professional Development*
  Sufficient expertise and competence of museum staff is crucial for providing professional development to scientists. It may be difficult to ensure standards are consistent across different ISE institutions.
- *Difficult Financial Model*
  Portal to the Public may not be sustainable without ongoing funding. There must be enough lead time and commitment to submit appropriate grants, or ISE staff must find a way to create revenue, such as a "camp-in" model. There must be mission-based incentives for the institution to commit the appropriate resources.
- *Relationship-dependent*
  The guiding framework is centered on personal relationships, making staff and volunteer turnover a challenge to program continuity and sustainability.

Programs and Resources for Dissemination

The Portal to the Public collaborative has developed a number of programs, resources, and strategies to assist in the dissemination of the guiding framework to new informal science education institutions and communities. These resources include:

- **Portal to the Public Implementation Manual**, including these features:
  - *Instructional Guide for Portal to the Public Implementation*
    Informational text provides background, guidelines, strategies, and reflection prompts designed to help ISE staff implement Portal to the Public at their site. Chapters cover the major components of Portal to the Public, including: Conceptual Planning, Partnership and Relationship Building, Professional Development, Public Programs, Reflection and Evaluation, and Local Sustainability.
  - *Catalog of Professional Development Elements*
    Instructions and resources for facilitating a wide range of professional development experiences for scientists. Includes workshop activities and systems for one-on-one mentoring and activity development. Users can utilize the catalog to create a customized professional development program at their institutions. Instructional how-to videos are in development for some elements.
  - *Case Studies*
    Narrative examples from existing Portal to the Public sites reflect on each institution's successes, challenges, strategies, and insights with the program.
  - *Supplemental Materials*
    Appendices provide templates and sample materials from the existing sites. These include marketing materials, press releases, public program logistics checklists, scientist recruiting materials, and evaluation instruments.
- **Informational Video**
  (http://www.pacificsciencecenter.org/portal/video/)
  This 6-minute video provides a basic overview of Portal to the Public. The target audience is ISE institutions and scientific organizations that are potential adopters of the guiding framework. The video features footage of professional development workshops, scientist-visitor interactions, and interviews with visitors, ISE staff, and scientists.
- **3-day Dissemination Workshop for other ISE Organizations**
  This workshop agenda was originally designed and facilitated for a group of five ISE institutions who were part of a pilot dissemination project in 2009-10. Two staff from each new site attended the pilot workshop, joined by staff from established sites. The workshop includes opportunities to experience professional development elements, interact with Portal to the Public scientists, and begin developing a conceptual plan.

In addition, the Portal to the Public team has developed plans, and is pursuing funding for further dissemination based on the pilot model, as well as the establishment of a permanent network of Portal to the Public sites. Features of this network include an online hub and an annual meeting of network members. Synthesis Meeting participants were asked to consider how existing and envisioned resources should be used to support Portal to the Public broad implementation, as well as what additional support services should be developed.

Use of Existing Dissemination Resources

Meeting participants discussed the value of, and best uses for, the existing set of Portal to the Public dissemination resources, as outlined in the section above. The majority of participants felt that, of these existing resources, the Implementation Manual is most important. Many participants also specifically cited the value to the ISE field as a whole of the *Catalog of Professional Development Elements*. General discussion comments regarding Portal to the Public dissemination resources are:

Implementation Manual

Strengths

- Useful in the face of staff turnover--when someone leaves, all the essential information is captured in the manual.
- Taken as a whole, the manual is a tool for management staff to explain the bigger picture and foundational information to program staff and institution leadership.
- Case studies within the manual will help "hook" new ISE staff and scientists with engaging stories.

Ideas for Future Use

- Use a "wiki site" to post the manual material to facilitate ongoing experimentation and constant dialogue between practitioners.
- Given the expense of professional printing, the manual should be available online and/or on a CD in a format that is easy to navigate. Printed copies could be available for training workshops or individually printed on-demand.

Concerns and Questions

- How do you ensure that the Implementation Manual doesn't just sit on the shelf?
- If the manual provides the "30,000 ft view" of Portal to the Public, is this of value to "on-the-ground" practitioners?
- Given the extensive scope of the manual, it is probably a tool best used with people who are already "sold" on the program. It would be an intimidating initial marketing tool.

Staff from Portal to the Public dissemination sites celebrate the completion of the three-day dissemination workshop.

Dissemination Workshop

- An in-person workshop is "absolutely necessary" to maintain program integrity.
- As the Portal to the Public network evolves, it will be important to decide who should lead these workshops and take ownership for the content.

Informational Video

- The video is a good tool to help ISE institutions visualize the program's end result of dynamic interactions between scientists and visitors. ISE staff may not be motivated to read the manual or engage with the project until they understand the ultimate outcome.
- Slightly different versions of the video could target different stakeholders. For example, simple stories of success with less "nitty gritty" will resonate with funders.

How-to Videos of Professional Development Elements

- How-to videos will help train staff who were unable to attend an in-person workshop.
- Developing how-to videos is a "mammoth project," so it is not worth the effort and resources to create them unless they will be used.

Potential New Dissemination Resources

Synthesis Meeting participants also discussed potential new resources that could support dissemination and community building, considering both new ideas and resources already envisioned by the Portal to the Public team.

Official Portal to the Public Network & Online Hub

- Supports stakeholders in sharing experiences and collaborating on new program and strategy development
- Common online system for storing and organizing Portal to the Public evaluation instruments, data, and reports

Annual Meeting

- Select the appropriate focus for the meeting and who should be invited. Should it be strictly representatives of Portal to the Public sites, or have a broader Public Engagement with Science focus?
- Consider the relative advantages and disadvantages of hosting "webinars" or regional meetings as opposed to a national, in-person event

Synthesis meeting participants in a large group discussion.

Should Portal to the Public dissemination products and resources become licensed materials, and, if so, how should these products and resources be funded?

Materials to Help ISE Staff Build Institutional Buy-in

- Succinct Portal to the Public talking points with anecdotes and evidence of success
  - ❍ These points should be custom-tailored for discussions and presentations with different audiences, for example their institution's CEO, board, and program staff, as well as local scientists
- Brochures and marketing materials that are specifically designed to build stakeholder buy-in for particular audiences, such as scientists, leadership, and/or museum members

Knowledge Sharing

- Practitioner and research journal articles
- Conference sessions, for example at the Association of Science and Technology Centers (ASTC) annual conference
- ASTC Roundtables for Advancing the Professions (RAP) workshop

Financial Model for Portal to the Public Network

Synthesis Meeting participants were asked to consider what a sustainable financial model for the twin goals of Portal to the Public dissemination and the establishment of a national network might look like. In the discussions, two major questions emerged: Should Portal to the Public dissemination products and resources become licensed materials, and, if so, how should these products and resources be funded?

Licensing

Meeting participants expressed varied opinions regarding the level of control or ownership (via some form of licensing/copyright) Portal to the Public leadership should maintain over the materials, especially the Implementation Manual, which includes the Catalog of Professional Development Elements. Some participants advocated that licensing helps maintain quality control, keeping the content from being "watered down."

Conversely, some participants worried that if the dissemination materials are too strictly controlled through licensing and/or copyright, they will not be widely used or continue to evolve with the ongoing enhancements that occur at each new site. One participant suggested using a Creative Commons License to allow for quality control and consistency, while still promoting adaptation and ongoing improvements to the dissemination materials as a whole.

Another participant argued that ISE institutions should only be considered as new Portal to the Public sites, and therefore part of the national network, if they have been through an official training workshop. This would exclude groups who use pieces of the framework, such as utilizing some of the professional development elements without implementing a full program, from being official Portal to the Public sites. One participant explained that, if too many people use professional development elements that are not committed to the program as a whole, it could give Portal to the Public a less than favorable name.

Financial Model

Meeting participants noted that, regardless of if and how materials are licensed and distributed, the question of whether the materials would be available for free or at a cost still remained. Several participants argued that the materials should be free or low-cost to encourage expansive implementation and general awareness in the informal science education field. Two groups discussed services that could be offered for a fee after an institution has begun initial implementation, such as individual consulting and site visits. One group recommended surveying the willingness of potential new sites to pay for these products and services. For more discussion of financial sustainability at the local level for each ISE institution involved, see the section on Local Sustainability beginning on page 25.

Public Policy

Policies and institutional practices influence the implementation and sustainability of outreach programs involving scientists. Policies and practices can be formal, with specific requirements from research funders, or informal, such as workplace attitudes towards outreach. In addition, they can occur at different levels, including institutional, local, and national. Synthesis Meeting participants were asked to characterize the institutional and governmental policies and practices that must be in place in order to encourage widespread participation of scientists and ISE institutions in face-to-face public engagement activities.

The Role of Informal Science Education in Public Policy

While some Synthesis Meeting participants wondered if ISE institutions should tackle issues of policy at all, most participants generally supported the notion of ISE institutions and/or science organizations becoming policy advocates for specific causes/subjects/areas, as appropriate. In small group discussions, participants expressed the importance of defining clear, overarching goals and statements related to public and scientist engagement that can then form the basis of public policy. While meeting participants recognized that they would be unable to establish goals in the context of the Synthesis Meeting, they brainstormed several possible advocacy statements:

- Face-to-face engagement between scientists and public audiences is valuable.
- Scientific knowledge and expertise positively inform general policymaking.
- Informal science education is a valuable contributor to K-12 science education, as well as to adult learning.
- ISE institution and science organization partnerships increase public engagement with and understanding of science, and contribute to workforce development.
- Funding ISE/science organization partnerships and outreach initiatives is important.

Meeting participants discussed how Portal to the Public partnerships and programs showcase how ISE institutions can address issues relevant to government interests. One participant cited the National Lab Network initiative, which fosters scientists' involvement in education activities, primarily as volunteers in K-12 schools. Participants asked: How can the knowledge built across ISE institutions and science partners through Portal to the Public contribute to broader initiatives? How does Portal to the Public build the credibility of the informal science education field in the eyes of policymakers?

Meeting participants described ISE institutions as offering a unique perspective to policy arenas, often being able to represent public views or facilitate community events to gather public input. Meeting participants recognized how science centers can inform and empower citizens to participate in and influence policymaking. Some meeting participants expressed that addressing policy issues would give ISE institutions a serious voice in community conversations.

Synthesis Meeting participants contribute recommendations during group discussions.

A young visitor and a scientist experiment with underwater sound.

Strategies for Influencing Public Policy

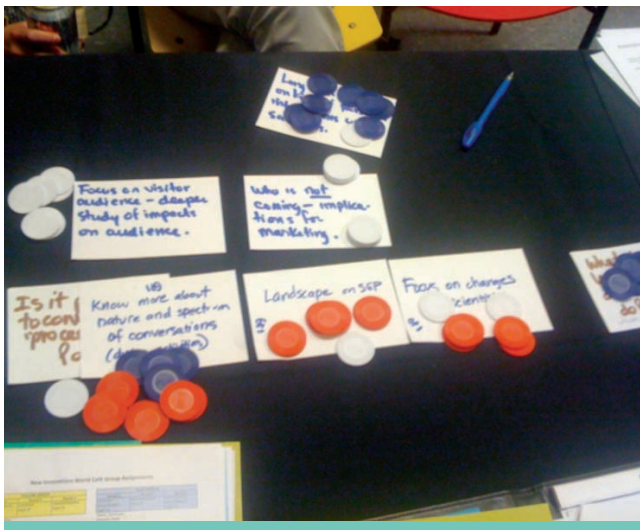
Meeting participants also brought up many practical recommendations, strategies, and considerations related to influencing government policy. These include:

- Hiring lobbyists to advocate for large-scale changes
- Developing grassroots collaborations at the local level amongst ISE institutions, science organizations, and policymakers
- Working with entities such as the school board and city council to accomplish local policy goals
- Creating a fellowship program involving scientists and ISE professionals that specifically addresses policy
- Building the capacity of smaller institutions to participate in lobbying and advocacy activities
- Leveraging evaluation and research findings to "make the case" for public engagement with scientists in ISE programs
- Developing local collaborations of ISE organizations and groups, such as zoos, Boy and Girl Scouts, aquariums, and 4H programs, to advocate for policy issues together
- Supporting unified efforts to lobby for ISE issues in Washington, D.C.
- Including specific language within institutional mission and vision statements related to policymaking goals
- Articulating the voices of all perspectives (scientist, ISE institution, and the general public) within policy advocacy messages
- Encouraging scientists with in-depth experience working with an ISE institution (through Portal to the Public or other initiatives) to be advocates for Informal Science Education policy issues
- Integrating policy and advocacy roles into specific ISE staff and scientist job descriptions because, "These types of changes are driven by individuals."

Setting a Research Agenda

Portal to the Public research and evaluation contributes to a growing base of knowledge regarding the impacts of face-to-face engagement between scientists and public audiences in ISE settings. This work connects to a broader body of work in multiple disciplines, including public understanding of science, public engagement with science, science communication, informal science education, and learning sciences. Synthesis Meeting participants were asked to brainstorm, discuss, and prioritize research questions and areas of study for future research agendas related to Portal to the Public. Lively conversation took place as participants debated the merits of particular areas of study. Many participants expressed their need to better understand the current body of research directly focused on and related to Portal to the Public before setting new priorities.

In order to facilitate prioritization, three discussion groups were established and each was asked to allocate hypothetical grant funds of two million "dollars" (represented by poker chips) amongst the research questions they felt most important to study. Six million "dollars" were allocated across the potential areas of research. These allotments shed light on the relative value meeting participants placed on each area of study. Through conversation and the funding allotment game, several themes emerged as priorities for future research. Priority research questions, together with their hypothetical funding allotments, are described in the section that follows.



The "poker chip game" helps meeting participants to set funding priorities.

Priority Research Questions

What is the nature and scope of conversations between scientists and visitors through Portal to the Public? ($1,200,000)

- To what extent do these conversations convey the nature of science, including scientific processes and methods?
- What is the involvement of parents in these conversations and how do parents aid in learning?
- How is the audience impact different for Portal to the Public activities that are facilitated by scientists vs. activities that are facilitated by museum educators?

What is the long-term impact on children who have early contact with scientists? ($1,000,000)

Across the field, what is the landscape of programs and initiatives that support scientists' engagement with public audiences? ($900,000)

Which public audiences choose to attend Portal to the Public programs? Who isn't showing up, and why aren't they coming? ($800,000)

- Are potential visitors more attracted to the topic of Portal to the Public programs, or to the idea of meeting a scientist?
- Is the scientists' presence a reason people choose to visit the science center? If so, does this create a more valuable visitor experience? Is the value of the experience different for people who come specifically for Portal to the Public programs vs. people who stumble upon the program unexpectedly during their museum visit?
- Are science-based professionals or educators more likely to attend Portal to the Public programs as visitors? Do they have a vested interest?
- Do particular event topics and/or particular marketing messages draw specific audience types? What are the implications of this research for marketing strategies?

What are the impacts of face-to-face interactions with scientists on public audiences? ($700,000)

- Do public audiences value exposure to current science? What do audiences find valuable about interacting with scientists?
- What are the audience impacts of interacting face-to-face with a scientist compared to other approaches such as videos, one-to-one virtual situations, or online?
- How do face-to-face interactions impact visitors' attitudes toward science?
- Are visitors more interested in "participating in science" after conversations with scientists?

What do scientists learn from or about public audiences through face-to-face interactions? ($700,000)

- How are scientists changed by interacting and sharing their work with public audiences (generally speaking, not just within Portal to the Public)?
- How are scientists' attitudes of the public shaped by face-to-face interactions?

What are the impacts of Portal to the Public professional development and face-to-face interactions on participating scientists? ($700,000)

- What are the long-term impacts on scientists of participating in Portal to the Public? Are there any links to increases in publishing, grant writing, or other professional activities?
- Does participating in Portal to the Public influence scientists' career choices or trajectories?

What is the long-term impact on children who have early contact with scientists?

Although meeting participants did not allocate any dollars to the following research questions, they still considered them of interest:

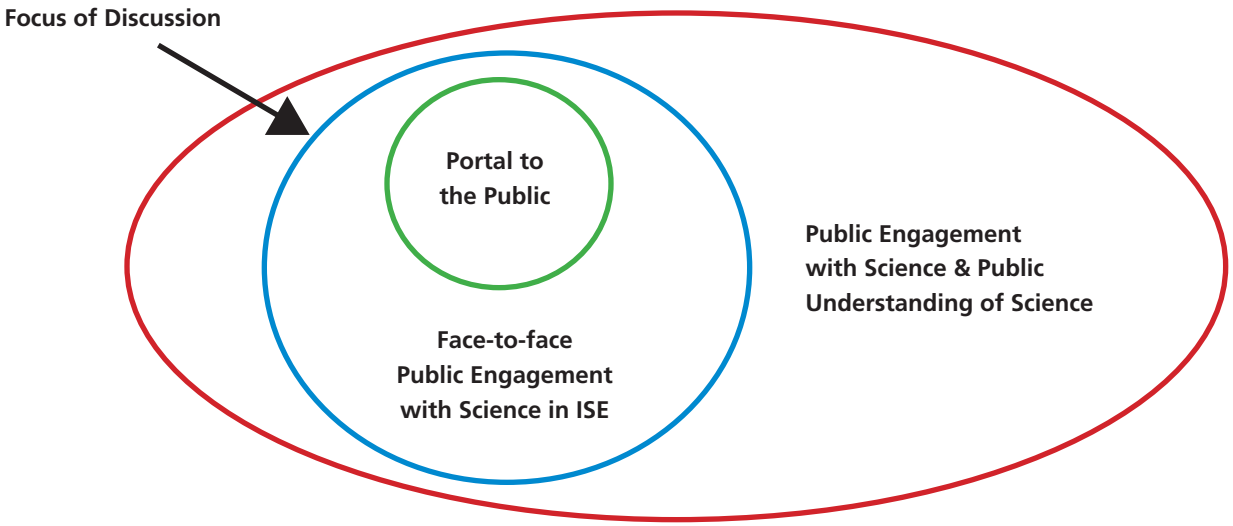
- What are the dynamics between a materials-rich environment and conversation between scientists and visitors?
- What are the impacts of Portal to the Public on informal science educators?
- What characterizes the relationship between science centers and scientists (beyond Portal to the Public)?
- What types of scientists choose to participate in Portal to the Public and what types do not? What are the scientist motivations behind these decisions?
- How does the institutional culture of science organizations influence individual scientists' motivations to participate?
- What aspects of the Portal to the Public professional development are crucial for successful implementation of the framework?
- How we can maximize scientist engagement and satisfaction?

A scientist shares his research with a science center visitor during a face-to-face interaction. Photo credit: NWABR

Building a Professional Learning Community

A Professional Learning Community (PLC) is a network of individuals and a set of ongoing learning opportunities that foster collaborative learning among colleagues within a particular interest area, work environment, or field. Often, individuals involved in the work of face-to-face public engagement with science come from different scientific fields and/or professional affinity groups, including community education, science centers, research societies, and universities. A Professional Learning Community that is able to bring these professionals and stakeholders together increases collaboration, collective knowledge building, and resource sharing. Synthesis Meeting participants further defined a PLC as a group of people and institutions with the following:

- Common goals, interests, and needs
- Shared language and attitudes about a professional issue
- Dispersed geographic locations and/or topic areas
- Interest in belonging to a formal or informal community (virtual or physical)



A Professional Learning Community can be large or small in size or scope of focus. The diagram above shows several possible scopes for potential PLCs related to Portal to the Public.

For the purposes of discussion, Synthesis Meeting participants were charged primarily to describe the interest in and need for a Professional Learning Community amongst stakeholders involved in face-to-face interactions between scientists and public audiences within the setting of informal science education institutions, as represented by the blue (middle) circle in the diagram above.

The Need

All discussion groups strongly supported the notion of developing and nurturing a Professional Learning Community focused on face-to-face public engagement with science in ISE settings. Meeting participants saw such a community as mutually beneficial to all parties, citing that the Professional Learning Community would bring together individuals with knowledge but no outlet, such as researchers, and organizations with outlets in need of knowledge, such as ISE institutions. One participant explained, "We're not in competition. There's no danger in sharing; there's no reason why we shouldn't learn from each other." Meeting participants elaborated on many of the current conditions that demonstrate the need for a Professional Learning Community. These include:

- Complexity of collaborating and communicating across distinct but established fields, for example informal science education institutions, a variety of science disciplines, funders, and corporations
- Lack of communication between university researchers engaged in outreach across the nation
- Missed opportunities for collaborative projects because, "Nobody knows who should be spearheading them."
- Difficulty of networking across different scales: local, national, and international

Synthesis Meeting participants experience an example of a scientist's activity.

Meeting participants cited successful, thriving Professional Learning Communities as evidence that this endeavor is "realizable." Specific examples included the Association of Science and Technology Centers (ASTC), Center for the Advancement of Informal Science Education (CAISE), InformalScience.org, Coalition on the Public Understanding of Science (COPUS), American Association for the Advancement of Science (AAAS), Nanoscale Informal Science Education Network, (NISE Net), Science Festival Alliance, and various professional societies, such as American Geophysical Union (AGU), and APS American Physical Society (APS).

At many points in the discussion, meeting participants reiterated the importance of "cross-fertilizing" and developing a specific plan for connecting a new Professional Learning Community with existing communities. Some meeting participants argued the advantages of focusing effort on strengthening and integrating existing local and industry-specific PLCs, instead of building a new community centered on face-to-face public engagement with science in informal science education settings.

Across the discussion groups, many participants asked broad questions to incite deeper thinking about the issues at stake. Many of these questions are prompts to identifying clear goals and a vision for the Professional Learning Community. For example:

- Aren't we already our own PLC? We're all here. What do we need to keep ourselves going, and what do we want to get out of it?
- Why do we want to continue? What do we want to continue?
- What's our basic goal? Is this about Portal to the Public, or is it about public engagement with scientists? Does this go beyond Portal to the Public?
- How do you crystallize and maintain focus on the appropriate scope in a PLC?
- Who is responsible for leading and managing this Professional Learning Community? Is it about responsibility or opportunity?
- How loose (informal) or tight (formal) is our definition of Professional Learning Community?
- How do we create a PLC and why would people want to join it? How can we advertise the benefits of this community?

A scientist prototypes her activity with Discovery Corps youth at Pacific Science Center.

Developing a Professional Learning Community

Meeting participants described the essential characteristics of a PLC focused on public engagement with science in informal science education settings. These general ideas are listed below.

Inputs

- Leadership
- Participants who are interested in and willing to share information and interested in collaboration (especially "fresh blood")
- Mutually interesting and relevant topics
- Common interests and goals

Necessary Qualities

- Collaborative environment
- Participant and institutional accountability
- Focused scope
- Productive and efficient
- Safe environment for challenges and critiques

Activities and Outputs

- A web-based community supporting:
  - ❍ a dynamic set of core materials and resources that are modified over time with ongoing updates and changes provided by participants (like a "wiki")
  - ❍ online conversation, community building, and networking
  - ❍ a means of archiving and disseminating materials and information
- In-person meetings and workshops (regional and/or national) supporting:
  - ❍ face-to-face contact, networking, and socializing between and amongst participants
  - ❍ opportunities to collaborate and "workshop" new ideas together
  - ❍ time to reflect and plan
- Journals and newsletters
- Shared criteria for managing the quality of new product and program development
- Compiled research and evaluation instruments and findings
- Professional development for participants
- Formalized body of knowledge that validates practice

Implementation Strategies

- Focus on reaching people "where they already are" by combining meetings with already established events
- Build awareness and recruit members by partnering with existing organizations and networks
- Leverage the ability of a Professional Learning Community to initiate relationships that will exist independently of the PLC infrastructure

Outcomes

- "Raise the field" by improving practice

Potential Members

Meeting participants recognized the importance of clearly defining Professional Learning Community goals and potential members before building an infrastructure. One participant explained, "An important part of this project is identifying people who should be involved who aren't. We're only loosely connected. Who do you know that I should know too?" Meeting attendees discussed the tension between striving for a broad base of participants ("don't box ourselves in"), and losing focus with a group that is too disconnected. They felt it was important to consider potential participant motives and agendas in order to build a common agenda and shared vision for the PLC. Meeting participants identified and discussed the following categories of potential Professional Learning Community institutional and individual members:

- Science-based organizations and professionals
- Universities
- ISE institutions and professionals (beyond science centers)
- K-12 Educators
- Public audiences and community groups (e.g. Boys and Girls Clubs, 4H, Big Brothers Sisters of America)
- Social science researchers
- Evaluators
- Funders
- Policymakers

A Broader Professional Learning Community

Synthesis Meeting participants also reflected on the value of supporting a broader PLC involving institutions, programs, and individuals involved in general public engagement with science (PES) and understanding of science efforts (PUS). This type of Professional Learning Community is designated by the largest circle in the diagram that appears at the beginning of this section.

Most participants appreciated the general value of a broad PLC noting that, "Everybody is cut off from one another. How can we bridge the gap?" Other participants, however, noted that, while cross-communication between fields and projects is needed, a Professional Learning Community or affinity group might not be the right solution if it lacks sufficient focus. A PLC should have common ground and it can be unhelpful to "force [distinct groups and organizations] into one box."

Meeting participants offered a range of additional comments regarding a broad PLC:

- Leadership should be chosen carefully. Portal to the Public may be a member of this broader community but not necessarily the leader.
- Even with this broader focus, there are a relatively small number of organizations and professionals working in public engagement with science and public understanding of science efforts.
- There could be real advantages to developing a broadly focused PLC (that extends beyond programs focusing on face-to-face interactions), but within the bounds of individual regions. This could inform work done later on a national level.
- Two-way communication between the broad PLC (outermost, red circle) and more focused PLC (middle, blue circle) is important.

APPENDIX 2:
MEETING MATERIALS

Meeting Goals

DAY ONE: *Where have we been?*

1. Build a common understanding of the Portal to the Public guiding framework and its impacts on ISE, scientist and public audiences
   - Theoretically: share the guiding framework in diagram form and describe its rationale
   - Concretely: share concrete examples, programs, and scientists' personal insights
   - Analytically: share findings, outcomes and impacts derived from research and summative evaluation
2. Synthesize key learnings from Portal to the Public. Identify understandings and practices that have the potential to significantly impact the field

Synthesis Meeting participants experience an example of a scientist's activity.

DAY TWO: *Where can we go from here?*

1. Identify "next step" innovations that will advance face-to-face public engagement with scientists in ISE institutions and professional development that prepares scientists for these experiences.
2. Consider ways that Portal to the Public dissemination programs and resources can and should be used to support broad implementation and complement or connect to other public engagement efforts.
3. Assess how key understandings and practices from face-to-face programs can inform and enhance non face-to-face public engagement efforts.
4. Describe the interest in and need for a Professional Learning Community (PLC) and/or professional affinity group amongst stakeholders in face-to-face public engagement with scientists in ISE institutions.
5. Identify necessary conditions for and strategies to support local sustainability within communities adopting the Portal to the Public framework.
6. Characterize what institutional and governmental policies and practices need to be in place to encourage widespread participation of scientists and ISE institutions in face-to-face public engagement activities.
7. In context of the previous six goals, consider how Portal to the Public can complement and collaborate with other existing public engagement efforts.

Agenda

PORTAL to the Public

Innovations to Advance Public Engagement with Scientists in Informal Science Education Institutions:
The Second Portal to the Public Synthesis Meeting
September 27 & 28, 2010 at the Pacific Science Center in Seattle, WA

DAY 1: Monday, September 27th

8 – 8:45 a.m.	**Registration & Breakfast** Browse displays showcasing Portal to the Public programs from across the nation
8:45 – 9:45 a.m.	**Welcome & Meeting Overview** Introduction to the Portal to the Public Guiding Framework
9:45 – 10:15 a.m.	**Break** Browse displays showcasing Portal to the Public programs from across the nation
10:15 – 11:15 a.m.	**Scientist Spotlight** Experience activity tables facilitated by Portal to the Public scientists, Ackerley Family Gallery
11:15 – 11:45 a.m.	**Presentation of Research Findings** Jessica Sickler, Angie Ong, and Susan Foutz, Institute for Learning Innovation
11:45 – 12:45 p.m.	**Lunch**
12:45 – 1:45 p.m.	**Panel Discussion with Portal to the Public Scientists**
1:45 – 2:45 p.m.	**Speed Professional Development** Experience samples of professional development activities at table stations hosted by Portal to the Public science center staff
2:45 – 3 p.m.	**Break**
3 – 4:15 p.m.	**Presentation of Evaluation Findings** Carey Tisdal, Tisdal Consulting **Panel Discussion with Research and Evaluation Team**
4:15 – 4:40 p.m.	**Reflection and Small Group Discussions**
4:40 – 5 p.m.	**Large Group Discussion & Closing**

PORTAL to the Public

Innovations to Advance Public Engagement with Scientists in Informal Science Education Institutions:

The Second Portal to the Public Synthesis Meeting

September 27 & 28, 2010 at the Pacific Science Center in Seattle, WA

DAY 2: Tuesday, September 28th

8 – 8:45 a.m.	**Breakfast**
8:45 – 9:15 a.m.	**Large Group Discussion**
9:15 – 10:30 a.m. 9:25 – 9:55 a.m. 10 – 10:30 a.m.	**New Innovations World Café Small Group Discussions** Introduction and process explanation Round 1 Round 2
10:30 – 10:45 a.m.	**Break**
10:45 – 12 p.m. 10:45 - 11:15 a.m. 11:20 – 12 p.m.	**New Innovations World Café Small Group Discussions, cont.** Round 3 Large group re-cap and discussion
12 – 1 p.m.	**Lunch**
1 – 2:35 p.m. 1:10 – 1:50 p.m. 1:55 – 2:35 p.m.	**Topical Small Group Discussions** Introduction and process explanation Round 1 Round 2
2:35 – 2:50 p.m.	**Break**
2:50 – 4:15 p.m. 2:50 – 3:30 p.m. 3:35 – 4:15 p.m.	**Topical Small Group Discussions, cont.** Round 3 Large group re-cap and discussion
4:15 – 5 p.m.	**Large Group Discussion & Closing**

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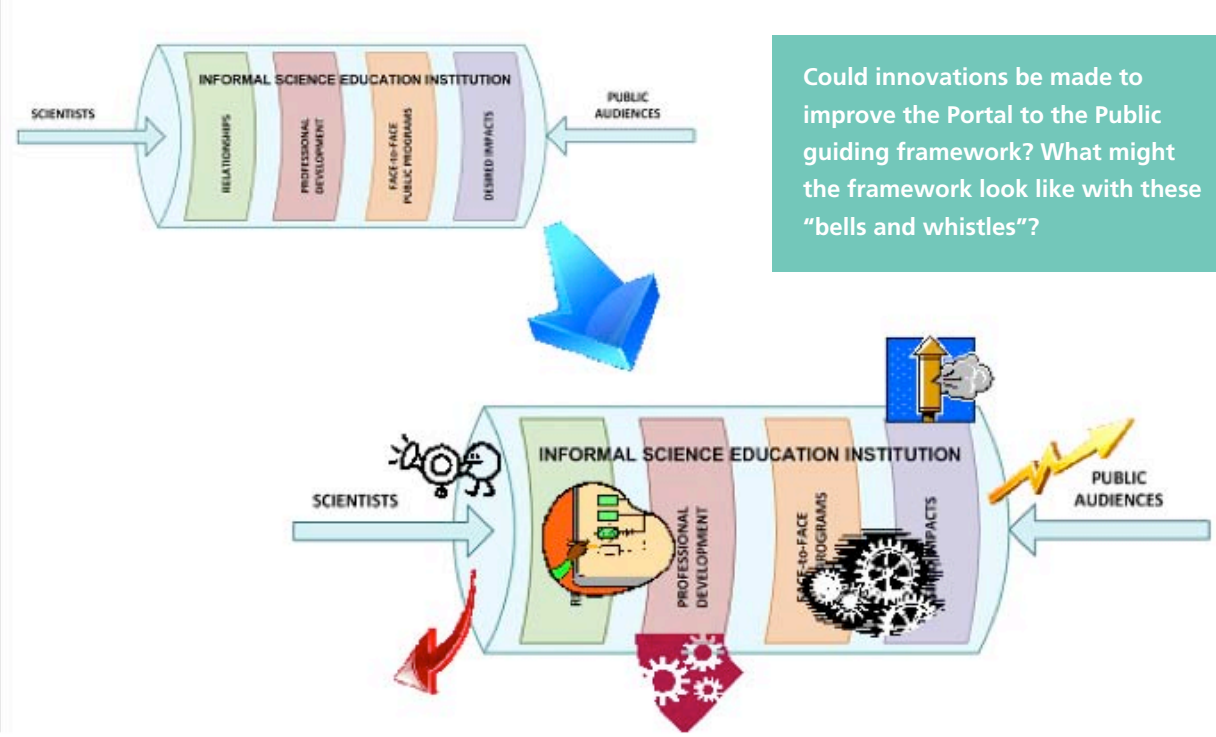
Discussion Guides

PART 1 Discussion Guide: New Innovations World Café

Overall Goal:

Identify "next step" innovations that will advance face-to-face public engagement with scientists in ISE institutions and professional development that prepares scientists for these experiences



Could innovations be made to improve the Portal to the Public guiding framework? What might the framework look like with these "bells and whistles"?

Process:

- Assigned groups will participate in three of six discussion groups. Groups will move together in a specified rotation after each 30 minute round.
- Each group will be hosted by a designated facilitator and scribe, who will capture the conversations for subsequent reports.
- In a World Café style, facilitators will integrate insights and comments from previous rounds into each discussion.
- Facilitators will summarize the major findings from each topic for the full group, prior to a collective debrief and reflection.

TOPIC A: SCALE

The Portal to the Public framework was designed to be flexible and scalable, such that it could ultimately be adopted at a wide range and number of ISE institutions.

The questions now are:

- Can the Portal to the Public framework be adopted at any ISE institution? If not, why not? If not, what are the criteria for selecting potential adopters?
- Should the Portal to the Public guiding framework be broadly implemented in other ISE institutions?
- What are the pros and cons of promoting and leveraging this particular framework for broad implementation?

TOPIC B: AUDIENCE

Portal to the Public programs implemented to date have mostly reached casual science center visitors, although some programs have specifically targeted adults, summer campers and school groups.

The questions now are:

- Could Portal to the Public programs serve other target audiences? What are these potential audiences?
- How should these audiences be prioritized?
- What programmatic and implementation considerations/modifications must be made for programs that reach the priority target audiences?

TOPIC C: UNDERSTANDING

Portal to the Public research and evaluation has contributed to a growing base of knowledge regarding impacts of face-to-face public engagement with scientists in an ISE context.

The questions now are:

- What are the next research questions that should be asked and answered?
- How should these questions be prioritized?
- How are these questions informed by what we know today?

TOPIC D: SCIENTIST INVOLVEMENT

Scientists involved with Portal to the Public have demonstrated an interest in and commitment to participating in extensive professional development and ongoing public engagement activities with ISE institutions. In many instances, this has involved scientists committing over 40 hours to projects. This has ultimately led to deep positive impacts on the scientists and the public audiences who participate.

The questions now are:

- Should we broaden the involvement of scientists participating in Portal to the Public (number of scientists per site, extent and quality of individual commitment, type of scientist)?
- Considering the various types of scientists that could be engaged in Portal to the Public activities (as defined by employer, career stage, subject matter, etc.) are there specific scientist audiences that we should target? Or that we should deliberately not target?
- What institutional policies, cultures, and practices (like broader impact mandates or outreach incentives) will support enhanced relationship building between ISEs and scientists that will ultimately lead to greater involvement of scientists in Portal to the Public activities?

TOPIC E: PROGRAMMING

To date, Portal to the Public face-to-face public programs have largely used materials-based tabletop activities designed for small groups of museum visitors to enjoy.

The questions now are:

- What are the next innovations in face-to-face public program formats?
- How should Portal to the Public sites strategically develop new and innovative program formats? Consider these dimensions:
  - ❍ Location (fairs, classrooms, community centers)
  - ❍ Interaction format (large group presentation, forum, types of materials)
  - ❍ Frequency and duration (have a scientist on site every day)
  - ❍ Topics (math, social science, controversial issues)
- How can Portal to the Public programs complement and build on other existing public program formats and initiatives?
- Which formats should be prioritized and developed?
- What kinds of professional development will prepare scientists to participate in these programs?

TOPIC F: PROFESSIONAL DEVELOPMENT

The current set of Portal to the Public professional development resources collectively address five specific content objectives and generally take the form of workshop programs and individual mentorship.

Portal to the Public Professional Development Objectives

1. Scientists develop communication strategies that support inquiry
2. Scientists and informal science education staff work together to design and facilitate materials-rich and other learning experiences that actively involve and affect all parties

3. Scientists understand the importance to learning of developing personal connections with audiences based on shared experiences
4. Scientists develop a broader understanding of how people learn and of the nature of informal learning environments
5. Scientists and informal science education staff develop an understanding of the organizational culture of each other's institutions

The questions now are:

- What are the next innovations in professional development? Are there new formats, content areas, or approaches to try?
- How can Portal to the Public programs complement and build on other existing professional development formats and initiatives?
- Which formats should be prioritized and developed?

PART 2 Discussion Guide: Small Group Discussions

Process:

- Meeting participants will self-select three of five groups to join during the afternoons' 40 minute discussion rounds. Signups will be posted at lunch.
- Each group will be hosted by a designated facilitator and scribe, who will capture the conversations for subsequent reports.
- Facilitators will summarize the major findings from each topic for the full group, prior to a collective debrief and reflection.

TOPIC A: PROGRAMS & RESOURCES FOR DISSEMINATION

Context:

The Portal to the Public collaborative has developed a number of programs, resources, and strategies to assist in dissemination to new ISE institutions and communities. See examples of these resources in the chart below.

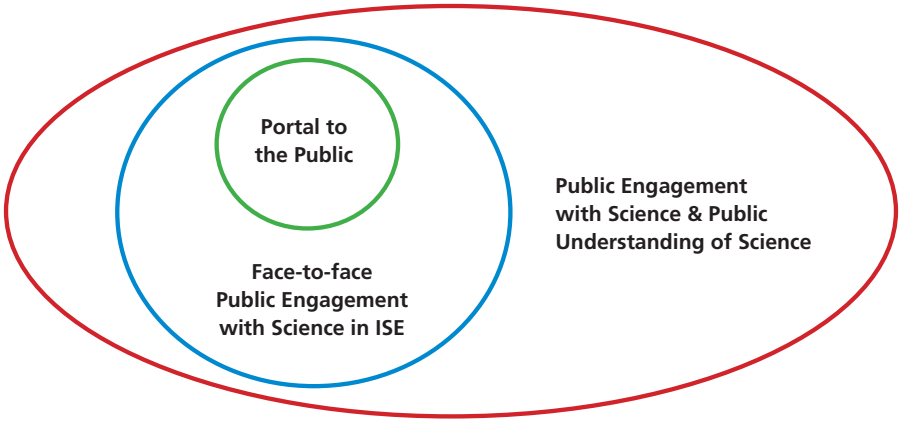
Goal:

Consider ways that Portal to the Public dissemination efforts and resources can and should be used to support broad implementation of Portal to the Public activities and to complement or connect to other public engagement efforts

Discussion questions:

- How can the products, services, and strategies listed on the chart can be optimized? How do these resources complement and work together? What programs and resources should be prioritized?
- What additional programs or resources can and should be developed?
- What should the financial model for providing these products and services be (free vs. fee)? How will these efforts be sustained over time?
- How should/can these products, services, and strategies complement and/or connect to other public engagement activities?

Developed Resources	Envisioned Resources
Portal to the Public Implementation Manual, including: • Instructional text • Case studies • Program and marketing templates and examples Catalog of Professional Development Elements How-to Professional Development videos 3-day dissemination workshop	Official Portal to the Public Network Online Network Hub • Sharing existing and new materials • Community building Annual Portal to the Public Meeting



TOPIC B: NON FACE-TO-FACE INTERACTIONS

Context:

Portal to the Public has deliberately and strategically focused on developing program models that bring public audiences and scientists together **face-to-face**, complementing many other initiatives in the field that have a similar focus. Numerous non face-to-face public engagement efforts also exist, alongside or independent of face-to-face programs.

Goal:

Assess how key understandings and practices from face-to-face programs can inform and enhance non face-to-face public engagement efforts

Discussion questions:

- How can face-to-face programs enhance and inform other engagement formats such as:
  - ❍ virtual lab visits
  - ❍ exhibitions
  - ❍ radio presentations
  - ❍ television presentations
  - ❍ web-based materials
  - ❍ science writing
  - ❍ blended experiences
- How can these non-face-to-face formats enhance and inform face-to-face efforts?
- What types and formats of professional development will best prepare scientists to be successful in these activities? What professional development does ISE staff need?

TOPIC C: BUILDING A PROFESSIONAL LEARNING COMMUNITY

Context:

A Professional Learning Community (PLC) is an extended learning opportunity to foster collaborative learning among colleagues within a particular interest area, work environment or field. Institutions and individuals involved in face-to-face public engagement work often come from different scientific fields and/or professional affinity groups (community education, science center, research society, university, etc.). A PLC that is able to bring these professionals and stakeholders together may increase collaboration, collective knowledge building, resource sharing, etc. See the possible scope for potential PLCs in the diagram above.

Goal:

Describe the interest in and need for a Professional Learning Community (PLC) and/or professional affinity group amongst stakeholders in face-to-face public engagement with scientists in ISE institutions (blue circle).

Discussion questions:

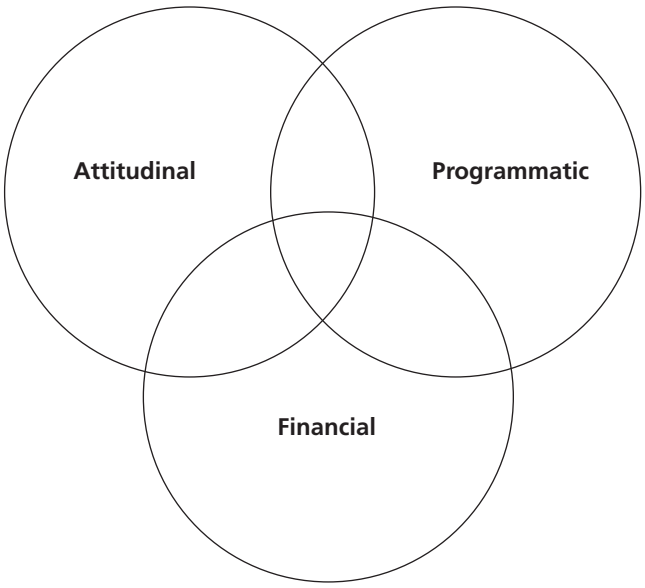
- Is there interest in developing and nurturing this PLC (blue circle)? What are likely outcomes from supporting this PLC?
- Who are the members and stakeholders for this PLC (the blue circle)?
- What does this PLC (the blue circle) look like, what are the needs (infrastructure, people, and activities)?
- Is there a desire for a broader PLC involving institutions, programs and individuals (within the red circle)? This group would include not just face-to-face, but all PES activities; not just activities associated with ISEs, but also other groups—universities, professional societies, etc.

TOPIC D: LOCAL SUSTAINABILITY

Context:

Creating a thriving, sustainable program requires consideration of three overlapping dimensions of sustainability (see diagram below). Sustainable initiatives are more than financially secure—they also are part of an institution's vision and are integrated effectively into ongoing operations. The three dimensions of sustainability that we will consider here are:

- **Attitudinal sustainability**, which includes building buy-in and support for the program amongst key collaborators and stakeholders.
- **Programmatic sustainability**, which includes integrating and scaling programs appropriately to the size of the ISE and available science-based professionals, plus involving staff and responding to community needs.
- **Financial sustainability**, which includes strategic planning for short- and long-term funding.



Dimensions of Portal to the Public Sustainability

Goal:

Identify the necessary conditions for and strategies to support local sustainability within communities adopting the Portal to the Public framework. Describe the balance needed between attitudinal, programmatic, and financial dimensions of sustainability.

Discussion questions:

- Supporting attitudinal sustainability: How can program implementers and stakeholders build genuine awareness, advocacy, and buy-in amongst leadership in ISE institutions and partner science organizations?
- Supporting programmatic sustainability: How can Portal to the Public programs be appropriately scaled and integrated into an institution's operations to optimize efficiency and quality? What infrastructure is needed to support this effort?
- Supporting financial sustainability: What financial model (for both ISE and partner scientific organizations) will support short and long-term program success?
- What is the appropriate balance between these dimensions to ensure long-term sustainability? How do they interact?

TOPIC E: PUBLIC POLICY

Context:

Many people argue that there would be greater scientist participation in public outreach if there were more incentives by scientific research organizations that encourage employees to participate in such activities (e.g. promotion tied to involvement in outreach to the public, paid time off to participate in outreach activities).

Goal:

Characterize what institutional and governmental policies and practices need to be in place to encourage widespread participation of scientists and ISE institutions in face-to-face public engagement activities.

Discussion questions:

- What is the role for advocacy (by whom for what)?
- What policy changes need to occur within ISE institutions, science organizations, and government entities? How are the approaches different for each of these stakeholders?
- How can funding requirements (like NSF broader impact criterion) support public engagement in a sustainable way?