National Leadership Grants for Museums

Sample Application MG-10-15-0083-15
Project Category: Learning Experiences

Pacific Science Center

Amount awarded by IMLS:	$345,961
Amount of cost share:	$360,277

Attached are the following components excerpted from the original application.

- Abstract
- Narrative
- Schedule of Completion

Please note that the instructions for preparing narratives for FY2016 applications differ from those that guided the preparation of FY2014 and FY2015 applications. Most obviously, the names of the three narrative sections and the order in which they appear have changed. Be sure to use the narrative instructions in the FY2016 Notice of Funding Opportunity for the grant program and project category to which you are applying.

Portal to the Public: Diversifying the Framework, Expanding the Network—Abstract

Pacific Science Center, in partnership with Connor Prairie Interactive History Park and the University of Arizona Museum of Art (herby referred to as the Partner Museums), propose ***Portal to the Public: Diversifying the Framework, Expanding the Network,*** a three-year project designed to provide high-quality, inclusive, accessible learning opportunities for guests at the Partner Museums by facilitating experiences that bring STEM professionals and researchers—scientists, technologists, engineers and mathematicians—and visitors together in non-science based museums. Concurrently, Pacific Science Center will be examining and assessing how artists and historians can fit within the programmatic offerings of science museums. With these interdisciplinary experiences, museums of all types will have the opportunity to expand their reach and serve guests who may not ordinarily visit their museums. The proposed project builds on the successful Portal to the Public (PoP) Guiding Framework, a model project designed to develop, implement and assess the effectiveness of Informal Science Education organizations partnering with scientists to increase visitors' awareness, understanding and appreciation of current science research. Evaluation has proven that the Guiding Framework's concepts, strategies and materials, currently in place at 30 science museums, are adaptable across all sizes of institutions (Tisdal, 2010).

Today, subjects such as science, math, technology, engineering, art and history are often taught as separate content areas in formal learning environments and similarly are often addressed separately in art, history and science museums. However, a new approach has come forward to bring these seemingly disparate areas together in order to understand, address and solve real word challenges in the 21st Century. Museums and the broader education community have come to understand that the arts and humanities help people develop the capacity to think critically, to solve complex problems, and to communicate well. Creating opportunities for people to experience art, history and science in a more holistic way, to understand them as integrated and in combination, encourages a plasticity of mind and evolves complex critical thinking skills (Stokes, 2014). The Partner Museums are addressing this need to increase communication, collaboration and resource sharing across various museum types interested in expanding public engagement at their institutions by bringing scientists and researchers into art and history museums and bringing artists and historians into science museums

The project activities include the following:

1. Adapting the Portal to the Public Guiding Framework
2. Professional Development Workshops for STEM and Humanities Professionals
3. Testing and Implementing the Modified Guiding Framework at PoP Events
4. PoP: A Guide for Bringing STEM and Humanities Professionals and Visitors Together (PoP Guide)
5. Project Dissemination

This three-year project advances the museum field's ability to provide high-quality, inclusive, accessible and audience-focused learning opportunities by facilitating experiences that bring STEM professionals and researchers – scientists, technologist, engineers and mathematicians – and visitors together in non-science based museums and bring artists and historians to science museums. More broadly, the adapted professional development for artists and historians will be beneficial for art and history museums that are looking for more in-depth public engagement in their galleries or on their and museum floor.

The project outcome is to enhance museum professionals' capacity to effectively partner with cross-disciplinary professionals in STEM, art, or history fields and successfully create related programming that helps them achieve their institution's mission and desired impacts and to increase communication, collaboration, and resource sharing across various museum types interested in bringing content experts face-to-face with visitors in cross-disciplinary program formats.

Formative and summative evaluation will measure the success of the project using a combination of quantitative and qualitative methods, including web-based questionnaires, semi-structured telephone interviews and paper-pencil visitor surveys.

Portal to the Public: Diversifying the Framework, Expanding the Network
National Leadership Grant-Learning Experiences

1. PROJECT JUSTIFICATION

The past decade has seen broad changes in the museum field, with Informal Science Education (ISE) organizations expanding their visions beyond presenting only established science and aiming to become places where visitors experience the process and promise of current research. They are striving to become community hubs that facilitate experiences that bring scientists and their neighbors together. To promote this vision, Pacific Science Center partnered with two science museums (Explora in Albuquerque, NM and the North Museum of Natural History and Science in Lancaster, PA) and a research and evaluation organization (Institute for Learning Innovation) in 2007 to develop, implement and assess the effectiveness of ISEs partnering with scientists to increase visitors' awareness, understanding and appreciation of current science research. The resulting Portal to the Public (PoP) was implemented and evaluated at the partner museums and at an additional five science museums from 2007-2011 and the summative evaluation indicated that the Guiding Framework's concepts, strategies and materials are adaptable across all sizes of institutions (Tisdal, 2011).

Portal to the Public earned field-wide recognition and received the Roy L. Shafer Leading Edge Award from the Association of Science-Technology Centers (ASTC) in 2010. Based on the program's success, PSC sought and was awarded an IMLS 21st Century Museum Professionals grant in 2011 to create the PoP National Network, which disseminated the PoP framework to a further 15 science centers; created a website that enables sites to share resources related to the project; and created a network that connects all the dissemination sites with each other. An NSF Advancing Informal Science Learning grant was awarded in 2012 to disseminate the model to an additional 20 ISE sites. Portal to the Public is expanding both the kind and number of institutions involved around the country and is facilitating their capacity to develop a knowledge base, and to share experiences and best practices.

Portal to the Public: The Next Step

Pacific Science Center, in partnership with Connor Prairie Interactive History Park and the University of Arizona Museum of Art (UAMA), propose ***Portal to the Public: Diversifying the Framework, Expanding the Network***, adapt the PoP model to be inclusive of and relevant to art and history museums. Specifically, this three-year project advances the museum field's ability to provide high-quality, inclusive, accessible and audience-focused learning opportunities by facilitating experiences that bring STEM professionals and researchers—scientists, technologist, engineers and mathematicians—and visitors together in non-science based museums. Concurrently, Pacific Science Center will be examining and assessing how artists and historians can fit within the programmatic offerings of science centers. With these interdisciplinary experiences, museums of all types also have the opportunity to expand their reach and serve guests who may not ordinarily visit their museum.

Project Needs

"Five hundred years ago, you couldn't tell the difference between artists and engineers." (Leake in Fountain, 2014)

Today, subjects such as science, math, technology, engineering, art and history are often taught as separate content areas in formal learning environments and similarly are often addressed separately in art museums, history museums and science centers. However a new approach has come forward to bring these seemingly disparate areas together, in order to understand, address and solve real word challenges in the 21st Century. Founded by educator and researcher Georgette Yakman in 2006 and popularized by John Maeda, president of Rhode Island School of Design, the concept of "STEAM" (Science, Technology, Engineering, Art and Technology), has been gaining momentum and is now recognized as an innovative approach to help students see how both art and STEM fields are quests to examine and explain the world around us (Shapiro, 2010).

More recently, museums and the broader education community have come to understand that the arts and humanities help people develop the capacity to think critically, solve complex problems, and communicate well. These fields do not need to be diminished for math and science to flourish; in fact they need to be nurtured (Stokes, 2014). Creating opportunities for

people to experience art, history, science, technology, engineering and math in a more holistic way, to understand them as integrated and in combination, encourages a plasticity of mind and evolves complex critical thinking skills (Stokes, 2014). It is through holistic understanding that people will define new career paths that serve science, math and technology, the arts, the environment and the economy.

In her 2014 *Houston Chronicle* article, educator Karen Stokes, notes that the humanities "…train people to be active contributors to society through science, medicine, engineering, technology, business, education, etc. British-born Stewart Butterfield, the co-founder of Flickr (acquired by Yahoo for $35 million), was a philosophy major. In the U.S., Lloyd Blankfein, the CEO of Goldman Sachs, majored in history. Carly Fiorina, the former CEO of Hewlett-Packard, studied medieval history and philosophy… Promoting science and math at the expense of arts and humanities is a disservice to our collective future" (Stokes, 2014).

Museums across the country are breaking down silos between science and humanities and are creating interdisciplinary exhibits, maker spaces and design competitions. Museums such as the Exploratorium have integrated art into their exhibits for 40 years and recently federal funding agencies are recognizing that the arts help young people stimulate the development of 21st Century skills and innovative processes (Eger, 2012.) The Art of Science Learning received funding from NSF to produce three conferences to look at ways to merge art and science. IMLS has supported several STEAM projects in museums and libraries, including TechHive, located at the Lawrence Hall of Science and The Labs at the Carnegie Library of Pittsburgh. In addition, IMLS awarded the University of Washington a National Leadership Grant in 2014 to integrate the work of cultural organizations with that of science museums to develop and study dialogue-based programs. While not exhaustive, these examples illustrate a few of the strategies science, art and history museums are using to come together to meet the needs of their communities.

The Partner Museums are taking a different approach to addressing the need to increase communication, collaboration and resource sharing across various museum types interested in expanding public engagement at their institutions. By bringing scientists and researchers into art and history museums, the perceived differences will be broken down and the connection between these fields will be demonstrated. An informal survey of museum professionals carried out during the planning phase of this project found strong interest in the project from history museums (Branigan Cultural Center, Bryn Athyn Historic District and Willamette Heritage Center), art museums (Marianna Kistler Beach Museum of Art, Beach Museum of Art, and the Alyce de Roulet Williamson Gallery) and those that offer both (Oakland Museum of California.) **See letters in supplemental documents**. At a time when museum attendance is in decline, and museums are looking for ways to attract younger audiences (NEA, 2013), initiatives that bring new content, in new ways may contribute to helping to increase interest in visiting museums.

Project Audience

The **primary** audience for this project is museum professionals at science centers, history museums and art museums. The project enhances museum professionals' capacity to partner with local experts (STEM-based professionals, artists and historians) to execute public programs. Each site's visiting public (the **ultimate audience** of this project) will connect face-to-face with STEM professionals, artists and historians giving them a greater appreciation and understanding of the work taking place in their community. The **secondary** audience, STEM-based and humanities professionals, will gain critical communication skills to enable them to deliver educational outreach. Over the last two decades there has been an unprecedented level of encouragement for scientists to share their work with public audiences (Davies, 2008.) Despite this encouragement, many scientists face challenges in communicating with lay audiences and partnering with the appropriate venues to do this work. Research by Poliakoff and Webb (2007) found that a primary barrier to scientists' participation in public engagement is a self-identified lack of effective communication skills. These findings underscore the importance of communication training for scientists, but there is also evidence that "historians are increasingly understanding the value of and need to engage with the public in a wide variety of settings and on a wide variety of topics" and they "must bring that knowledge back to the public in the language of the public without claiming the authority of expertise, but rather relying upon persuasion in the public sphere"(Bender, 2010) Further, a discussion paper published by the Canadian Council for the

Arts recommended the possibility of growth for artists in a variety of areas including their ability to communicate with the public (Canada Council for the Arts, 2012)

Performance Goal and Intended Impacts

The primary goal is to grow the capacity of museum professionals to increase communication, collaboration, and resource sharing across various museum types interested in public engagement with science and in a variety of ways. Specifically, this Learning Experiences National Leadership Grant Project will:

1. Broaden the scope and adaptability of the PoP Guiding Framework to become relevant to art and history museums: non-science based institutions that may or may not already have connections to the research community, but are looking for consistent and proven approaches to engage scientists and other STEM professionals with public audiences through their unique collections and strengths.
2. Extend the possibilities of the Framework to include engaging artists and historians in meaningful public programs at science-based museums. Most science-based institutions rarely engage artists or historians in sharing their current works through the lens of science, yet many are looking for reliable methods to engage the public in exploring topics in new ways, creating newer and more unique interactive programming and implementing programs that encourage holistic, interdisciplinary learning at our institutions.
3. Test the adapted Framework at PoP events at each participating site.
4. Support collaboration among participating institutions by expanding the online component of the PoP National Network to include more varied ideas for engagement and opportunities for those in the Network to reach out to one another to explore differing options, offerings and experiences. The PoP National Network website and new webinars developed through this project will connect an increasingly diverse group of museum professionals in conversations about best practices in guest engagement and offer concrete and tested examples of creating viable interdisciplinary programs.
5. Adapt and implement training and professional development programs, tools or resources that build the knowledge, skills and abilities of museum staff and volunteers across the field and in multiple institutions.

2. PROJECT WORK PLAN

1. Adapting the Portal to the Public Guiding Framework

The Portal to the Public Guiding Framework is a structured set of concepts designed to help informal science education staff develop a program to bring scientists and public audiences together within an informal learning environment. The PoP model includes three basic components:

- Partnerships between ISE institutions and research organizations which are crucial to delivering successful current science programming.
- Public programs of varying sizes and formats where scientists engage with visitors through face-to-face conversations, often using hands-on tabletop exhibits and activities based on their research.
- Communication workshops (PD) and assistance for scientists, where they learn the best methods and practices of engaging the public.

The proposed project will begin by taking the proven Guiding Framework and adapting it to be inclusive of and relevant to art and history museums, while looking at expanding the Framework to bring artists and historians into science centers to connect their work with STEM content in these institutions in ways that engage the general public. Through a series of collaborative meetings, team members from Pacific Science Center, Connor Prairie and the UA Museum of Art will assess the existing PoP Framework and materials and create a modified Framework.

2. Professional Development Workshops for STEM and Humanities Professionals

By and large the existing professional development materials and workshops created for STEM professionals and researchers, as well as those for artists and historians, focus on working in a classroom setting, providing lectures for adults or communicating with the media. Few resources have been explicitly devoted to preparing them to work in an informal learning environment like a museum. While this work has been done across many Informal Science Education institutions, as Pacific Science Center has done with its Portal to the Public programs, there is a clear need to identify best practices for

training STEM professionals to communicate with the public in non-science based museums, such as art and history museums, to rigorously evaluate and redevelop the communication workshop as needed for a variety of museums, and to disseminate the resulting information to the museum field at large. If history and art museums are to imbed public engagement with research activities into their ongoing programs, it is important that they have access to professional development curriculum so that they can deliver effective communication workshops to STEM professionals and researchers. The PoP Professional Development Science Communication Workshop developed for informal science education institutions will serve as the model the Partner Museums will adapt to fit the needs of non-science based museums and for involving artists and historians in science museums. The original PoP model has been tested at more than 30 science centers and related museums (natural history museums and zoos) and has been shown to be effective at helping scientists improve their communication skills and increase their comfort with engaging members of the general public with their research.

The proposed project will adapt the PoP professional development model so that STEM professionals learn to engage with visitors in a wide variety of museum types with methods such as simple hands-on activities and attention-grabbing displays. Similarly, artists and historians who participate will gain tools to better share the STEM encapsulated in their work or research. The workshop will be designed in a modular format that will allow various users to scale the program up or down, or adapt it to accommodate different time slots. At least two days of professional development programming will be developed and tested by each of the three partner museums, and modifications based on the formative evaluation and research findings will inform the final product. An outline of the current PoP Professional Development Science Communication Workshop content is included in the supplemental documents.

An advisory committee of non-science based museums professionals who are looking at and have developed ways to increase STEM content in their institutions, programs and exhibits, as well as professionals that that have experience with training researchers to communicate with the public will be formed and will give input in to the adaptation of the Guiding Framework. Please see page six for a description of this committee and its members. Adapting this model is the main work of the first year of the grant.

3. Testing and Implementing the Modified Guiding Framework at Pop Events.

The modified activities will be tested through a series of PoP events occurring at the three Partner Museums. The individual elements of the events will be designed to be successful as standalone options without the context of an extended public event and easily integrated into the existing museum structure. Each event at Connor Prairie and UA Museum of Art will feature STEM professionals and researchers from university research groups, government agencies and/or business/industry groups. At PSC, artists and historians will be drawn from working professionals, as well as from academia that may include graduate and/or undergraduate students. Two events will be held at each of the three institutions during the first two years of the project to test the viability of the adapted PoP model. The scope, duration and specific elements of each event will vary, dependent upon the needs of the museums and partnering STEM professionals, historians and artists. Events at the Partner Museums will be developed during the first meeting of the group and may include:

- **Hands-on Activity Centers:** Activities developed collaboratively by museum education staff and STEM and humanities professionals before the event that cater to a wide range of ages. For children and adults, the hands-on activity may include tools that the scientists or artists use, or a simple activity demonstrating a particular concept. Activities of this sort provide a human connection to work these professional do.
- **Live Demonstrations**: Live demonstrations developed by STEM and humanities professionals teamed with museum education staff, which includes interaction with the audience, as well as entertainment elements.
- **Table Top or Free-Standing Displays:** Staffed by STEM and humanities professionals, displays such as interactive computer programs allow for one-on-one conversation with visitors. This type of interaction gives visitors a chance to see STEM and humanities-based professionals as real people and gives these professionals an opportunity to express their passion for their work.

PSC will reach out to others that have experimented with involving art and/or history with science-based programs, such as U.S. Space & Rocket Center, which offered the 2013 exhibition *Da Vinci: The Genius,* that explored science through art; Tannery Pond Community Center in North Creek, New York that in conjunction with the 2013 exhibit *AntARTica*, offered joint programs by artist Laura Von Rosk and cell biologist Sam Bowser; and Portland State University's department of history's faculty and graduate students' work in the history of science and its cultural, social, and political relations. The final versions of events held at the Partner Museums, however, depend on the informal educators from these different types of museums and what they feel will best meet the mission of their institutions, best serve their goals and incorporate their collections and can best reach their community.

4. PoP: A Guide for Bringing STEM and Humanities Professionals and Visitors Together (PoP Guide)

By the end of year 2, the Partner Museums will produce adaptations to the step-by-step Guiding Framework for implementing the activities and professional development workshops created during the project. Depending on the work of the Partner Museums completed in years 1 and 2, this may be one new adaptation, or three different versions contingent on the changes, additions and inputs needed to allow the Framework to function successfully in art and history museums, as well as incorporate artists and historians into science museum offerings. Because PoP is a collaboration of museums of varying sizes, needs and resources, the adaptations to the Guide that result need to be applicable to a wide range of informal learning institutions. The free, downloadable guide will be distributed via collaborating museum websites, publicized on a variety of museum-related listservs, and via the Portal to the Public website**.** A description of the existing PoP Guiding Framework, from the Portal to the Public Implementation Manual, is included in the supporting documents.

5. Project Dissemination

Once the final version of the adapted PoP Guiding Framework is completed, a modified PoP implementation manual, catalog of professional development activities and video resources will be added to the Portal to the Public Network website for members of the National Network. The Partner Museums will meet at PSC to design a one-day and a half-day dissemination workshop as well as conference session descriptions and format, and webinar offerings. The Partner Museums will distribute the adapted PoP Guiding Framework at national and regional conferences appropriate to the field as described in the "Sharing Project Results" section, page nine.

PROJECT MANAGEMENT

Portal to the Public: Diversifying the Framework, Expanding the Network will be housed in the Science and Education division at Pacific Science Center under the direction of **Keni Sturgeon, MA,** Director of Science and Education. Ms. Sturgeon has been involved with Portal to the Public at PSC since July 2014 and has more than 18 years of experience connecting museum audiences with current research in a variety of disciplines, including science, anthropology, history, art and ethnographic institutions. Ms. Sturgeon will oversee the implementation, committing 10% of her time to the project. **Dr. Ann McMahon (PhD),** VP for Science and Education at PSC, is dedicating 5% of her time to the project. Dr. McMahon will serve as the primary liaison with the Advisory Committee and will participate in developing committee meeting agendas and facilitating the meetings. She will also serve as liaison and advocate for the project with several of valued partner and peer groups and organizations, such as the Association for Science and Technology Centers and the Western Museums Association. Portal to the Public Manager **Eve Klein M.Ed.** will serve as the Project Manager. She will work with Ms. Sturgeon to create a strong cooperative relationship with the Partner Museums and will organize and facilitate model-building Project partner meetings, oversee the creation and delivery all the products associated with the project and manage day to day activities. Ms. Klein will commit 40% of her time to the project. **Anna Johnson, MA,** Portal to the Public Project Specialist, working under the supervision of Eve Klein and will be responsible for coordinating, organizing and facilitating the professional development Workshops and events as well as collaborating on planning for the dissemination workshops and webinars. Ms. Johnson will commit 75% of her time to the project. A **Project Coordinator** (TBD), will commit 50% of her/his time to the project and will be responsible for coordinating and organizing for Partner Museum and Advisor meetings, invoice tracking, and taking care of logistics for all travel, professional development workshops and staffing during events. **Christina Cadenhead,** PSC's internal evaluator, will work with the contract evaluator to schedule and implement data collection. She will commit 2% of her time in Year 1 and 1% in Years 2 and 3 to the project.

Partner Museum Team

The partner museums represent three diverse content areas, in differing geographic locations, with varying numbers of visitors reached. Two of the partner organizations are IMLS National Medal awardees. Pacific Science Center is located in Seattle, the fastest growing city in the US. The Science Center reaches an average of one million visitors and program participants each year on-site and through outreach programs delivered across Washington State.

Connor Prairie Interactive History Park inspires curiosity and fosters learning about Indiana's past by providing engaging, individualized and unique experiences. Connor Prairie is located thirty miles northeast of Indianapolis, Indiana and reached nearly 340,000 guests in 2013. In 2012 Connor Prairie received a National Science Foundation grant to create and distribute an open-source-model for integrating informal science education into exhibits and programs of historic sites and museums across the nation. Under the direction of Cathy Ferree, Vice President of Exhibits, Programs & Facilities, Connor Prairie is strongly positioned to create interdisciplinary experiences for guests that will be enhanced and expanded through the proposed project.

The University of Arizona Museum of Art is a forum for teaching, research and services related to the history and meaning of the visual arts for the University community. The museum collects, preserves, exhibits and interprets original works of art. In all of its efforts, the museum serves as an advocate for the expressive, intellectual and sensory importance of art in society. Located on the UA campus in Tucson, the Museum of Art galleries offer a unique teaching atmosphere that inspires students to engage in conversations about original works of art. As part of the University of Arizona, the Museum will also have ample opportunities to collaborate with STEM-based professionals within the institution under the direction of Olivia Miller, Curator of Exhibitions and Education

Advisory Committee Members: The eight-member committee represents a spectrum of people involved with programs related to the various aspects of the project, including STEM-based and humanities-based professionals, museum professionals with experience in informal education, professional development, and creating networks, and consultants for STEAM-based projects. The committee includes both advisors who have been involved with the PoP project through various types of participation as well as new advisors bringing in expertise in humanities-based content and education. They will meet in years one, two and three of the project and provide guidance to our work. Letters of commitment are included in the supporting documents; summaries of their qualifications are listed below.

Lauren Moreno is Director of Strategic Partnerships at the Oregon Museum of Science and Industry. Ms. Moreno was project manager of the Portal to the Public project on which the current proposal is based and was involved in developing and using the framework. **Karen Peterson** is the founder and CEO of the National Girls Collaborative, a nonprofit designed to further collaboration between programs serving youth in STEM. Ms. Peterson has expertise in STEM education as well as leveraging network tools and resources to maximize collaboration. **John Russick** is the Director of Curatorial Affairs at the Chicago History Museum. Mr. Russick has expertise in exhibition development and label writing and has a strong interest in linking humanities-based and STEM-based content. **Kim Richards** is the founder and principal of KDR PR, a communications group that works to fuse creativity and the arts into education. Ms. Richards co-founded STEAMConnect, an organization providing a forum for community collaboration and a collection of STEAM resources to further both STEM and STEAM. **Dr. Lorraine McConaghy** is the Public Historian Emeritus at the Museum of History and Industry in Seattle. In addition to teaching at the University of Washington, Dr. McConaghy also acts as a consulting historian for various organizations including the Smithsonian Institution. **Dr. Bonnie Light,** Principle Scientist at the Polar Science Center at the University of Washington and **Dr. Guillaume Mauger,** a Research Scientist at Applied Physics Lab, University of Washington, have both been an active contributors to Pacific Science Center, participating in both PoP professional development and Portal to the Public events such as Polar Science Weekend. **Dr. Stephen Jett** is Professor and Director of the Electron Microscopy Facility at University of New Mexico Health Sciences Center. Dr. Jett has been involved with the Portal to the Public program at Explora and the Visiting Scientist Program of the New Mexico Academy of Sciences.

PROJECT TIMELINE

First four months (December 2015 - March 2016):

- Host meeting for Partner Museums at PSC to discuss the project plan and schedule dates for two additional in-person meetings and an ongoing communication. Discussions will include assessment of the Portal to the Public Guiding Framework and how adaptions and modifications will be made to meet the needs of different types of non-science based museums, and those needed to meet the needs of artists and historians in science museums.
- The evaluator will work with the project team to finalize the evaluation questions and create a plan for how to collect data and implement the evaluation plan.
- The Partner Museums will develop the initial draft of the adapted Framework and will distribute it to the advisors and evaluator.
- The Advisory Committee will meet for two days at PSC to give input on adapting the Framework, based on the needs identified by the Partner Museums for their different types of museums.

Next 10 months (April 2016 - January 2017):

- Connor Prairie and UAMA will begin reaching out to STEM-based professionals and researchers and/or organizations that will participate in the first of the two public engagement events, one at each institution.
- Connor Prairie and UAMA will develop the agenda and activities for the professional development workshop for STEM professionals and researchers that meet their needs and missions.
- PSC will begin reaching out to artists and historians and/or art and history organizations that will participate in the first of the two public engagement events.
- The PD workshops for STEM professionals, artists and historians held and assessed at the Partner Museums.
- By end of December 2016, the first of the two PoP events will be held at each of the Partner Museum sites.
- By end of January 2017, evaluation results of the PD and the 1st public events will be collated and analyzed.

Next eight months (February – September 2017):

- Formative evaluation and the research results from the first PoP PD workshops and public events will be distributed to the Partner Museums and Advisory Committee, which will refine the nature of their offerings.
- The concepts behind the Guiding Framework will be modified based on the data collected at the first event.
- The Advisory Committee will meet via videoconference to learn about the successes and challenges of the first year, and provide input regarding the planned changes to the Guiding Framework and PD workshop.
- The Partner Museums will plan with the STEM professionals and with the artists and historians who will participate in the second event, one at each institution.
- The second iteration of the PD workshop for the STEM professionals, artists and historians will be tested by the Partner Museums with those who will participate in the second PoP event.
- By September 2017, the second PoP events will be held and evaluated.

Next two months (October – November 2017)

- Formative evaluation finding from the second PoP PD workshops and public events will be distributed to the Partner Museums and Advisory Committee.
- At an in person meeting in November, Partner Museum staff will meet at PSC to assess the adapted Portal to the Public Guiding Framework based on the evaluations from the two PD workshops and public events, and will make final modifications to the Guiding Framework. They will also begin developing the one day and half-day dissemination workshops, and webinar offerings as well as a draft workshop and session proposal that can be modified for different associations and formats.

Last 12 months (December 2017 – November 2018):

- A final draft of the PD workshops will be completed and included in the adapted PoP Guiding Framework.
- The Advisory Committee will meet via videoconference to conduct a review the of the adapted Framework draft. Final revisions will be made based on the group's input.

- The adapted PoP implementation manual, catalog of PD activities and video resources will be completed and added to the Portal to the Public Network website for members of the National Network.
- Beginning in summer 2018, broad dissemination of the adapted Guiding Framework will occur via Partner Museum staff who will submit proposals to offer sessions at national conferences appropriate to their field. A full list of dissemination sites in described "Sharing Project Results".
- By October, summative evaluation findings will be completed and will be made available on the Portal to the Public Network website for members of the National Network. Evaluation results will also be presented in sessions and/or posters at the Visitor Studies Association Meeting, AAM and AALSH annual conferences and will be published on the Portal to the Public website. Articles will be submitted to professional journals such as Curator, Museum News, Visitor Studies, History News, and Museums and Society.

PSC Resources Contributed to the Project

Over the past 52 years, PSC has implemented many federally funded grant programs that require the same administrative, accounting and support services necessary to carry out this program. Pacific Science Center brings a plethora of resources previously developed for the Portal to the Public Program including the Guiding Framework, research and evaluation findings, expertise in working with STEM professionals, the Portal to the Public manual and catalog, a network of existing PoP sites and the Portal to the Public website. For this project, PSC's VP of Science and Education, Director of Science and Education and the Web Publisher/Database Marketing Specialist will donate their time to the project, along with a portion of the project time of the Portal to the Public Manager, Project Specialist and Coordinator, and PSC's in-house Evaluator. In addition, PSC will contribute all materials and supplies costs, the costs for updating and maintaining the Portal to the Public National website, program marketing and all facilities and equipment for the workshops and events held at PSC.

Project Evaluation

A formal formative and summative evaluation of *Portal to the Public: Diversifying the Framework, Expanding the Network,* will be conducted by Spotlight Impact, LLC led by Angelina Ong, Principal. Since 2007, Ms. Ong has participated as an evaluator and researcher for the Portal to the Public (PoP) project. She contributed to front-end and formative evaluation in addition to the directed research exploring the value of the PoP guiding framework in the original Portal to the Public project (Sickler, et al., 2011). Most recently, Ms. Ong served as the external evaluator for two Portal to the Public broader dissemination projects as the summative (IMLS) and formative (NSF) evaluator. The following outlines the key facets of the formative and summative evaluation studies.

Formative Evaluation will take place in Years 1 and 2 and will provide each partner museum with the opportunity to reflect, refine, and improve upon the PoP-based framework applied to recruiting and training STEM-based and humanities professionals, and designing and facilitating STEM in art and history museums, and art and history at a science museum public program at their museum. Specifically, evaluation will center on understanding how partner museums are adapting and implementing the Portal to the Public Guiding Framework and how they can improve their practice to increase implementation success. To this end, formative evaluation will focus on the question of: How should the PoP dissemination framework and its elements be refined and enhanced to meet the needs of non-science based museums, their science community, and their visitors? Additionally, it is important to understand the inverse scenario – how should the PoP dissemination framework and its elements be refined and enhanced to meet the needs of science-based museums collaborating with non-science based professionals?

Using a combination of quantitative and qualitative methods— including web-based questionnaires, semi-structured telephone interviews and paper-pencil visitor surveys—formative evaluation will specifically explore: the challenges of the framework for non-science based museums; whether the needs of non-science based Partner Museums differ from traditional science-based museums that have implemented the PoP framework; how and to what extent the framework needs to be adapted to work with non-science based experts (e.g. artists and historians); and whether framework refinements and adaptations are isolated (to a particular site) or global (across all partner museums).

Summative Evaluation will focus on the culminating PoP-based dissemination framework implemented by Partner Museums in Year 3. This study will assess the extent to which the project's intended impacts were achieved with its target audiences, especially the partner museums and science-based and humanities professionals. The summative study will be guided by the following evaluation questions: 1) To what extent are the intended impacts of the grant achieved with partner museum, STEM-based and humanities professionals, and museum visitors? and 2) As Portal to the Public expands to incorporate non-science based museums and experts, how and to what extent does the PoP Guiding Framework need to adapt and change?

Similar to formative evaluation, this study will include both qualitative and quantitative methods to assess the extent to which the project's goals have been achieved. Museum professionals at Partner Museums will be asked to partake in pre- and post-program telephone interviews that provide information about their incoming attitudes, competencies, strengths and weaknesses; as well as their reflective program experiences and resulting changes to their skills, attitudes and intentions. Additionally, they will be asked to consider how their implementation changed over time and their views on the PoP Guiding Framework as a model for non-science based museum adoption. Participating STEM-based and humanities professionals will be required to complete a retrospective post-program online survey that asks them to comment on their overall program experience and assess their capabilities and learning, and interest in continuing with public outreach. Museum visitors will be invited to participate in an onsite paper-pencil questionnaire that provides feedback on program satisfaction, their interest in interdisciplinary STEM-based content, their views on appropriateness/success of art, history or STEM-based program at partner museums, and the extent to which they learned new STEM information presented in the program.

Both formative and summative evaluations will leverage methods used in prior Portal to the Public research and evaluation studies. This strategy will allow for these findings to be compared with other science-based museum implementations of the PoP Guiding Framework as well as yield learning for broader dissemination initiatives within non-science based museums in the future. Each evaluation phase will use a similar combination of quantitative and qualitative methods that will require each audience group to provide feedback on various aspects of the dissemination process and resulting public program. To ensure consistency, methods and instruments will be standardized across all partner museums, their STEM-based or humanities professionals and museum visitors.

3. PROJECT RESULTS

For professionals and public audiences, it is expected that their participation in or exposure to this project will positively impact their knowledge, skills and attitudes related to the project and to public engagement with science broadly. Using results from previous PoP evaluation studies, metrics are assigned to specific audience impacts as follows in the table below. Further details can be found in the accompanying Impacts and Indicators document.

Sharing Project Results

Partner Museum staff will submit proposals to offer workshops and or sessions at annual meetings being held during or after summer 2018. Those conferences include: The Association for Living History, Farm and Agricultural Museums and the Association of Midwest Museums both in summer 2018, the American Association for State and Local History (AASLH) in September 2018, the Mid-Atlantic Association of Museums in October 2018, the Western Museums Association and the Mountain-Plains Museums Association both in fall 2018. In addition, the partner museums will develop outlines and plans for hosting webinars or special workshops in partnership with the American Alliance of Museums (AAM), the Association of Academic Museums and Galleries, the National Arts Education Association, the New England Museum Association, and the Southeastern Museums Conference. Evaluation results from the project will be presented in sessions and/or posters at the Visitor Studies Association Annual Meeting, the AAM and AALSH annual conferences, will be published on the PoP website and will be submitted to professional journals such as Curator, Museum News, Visitor Studies, History News, and Museums and Society. The summative report from the research and evaluation studies undertaken for this project will be made available on the Portal to the Public Network website.

Project impacts by category

Category	*Intended Impacts*
MUSEUM PROFESSIONALS at partner museums:	
Skills or abilities	• 100% will experience an increase their capacity to develop and facilitate PoP-based programming (i.e., professional development, face-to-face interactions, etc.) with STEM-based or humanities professionals in their community • 100% will develop or contribute to strategies and practices that promote collaboration with participating science-based or humanities professionals
Attitudes	• 100% will experience an increase their confidence in ability to successfully implement PoP-based programs • 66% will see value collaboration with science-based or humanities professionals in their community • 66% will see value inclusion of art, history or STEM-related content into their public program offerings
Behavior	• 66% will incorporate art, history or STEM-related programming into their public program portfolio • 66% will express an ongoing commitment to deliver art, history or STEM-related programming at their institutions
STEM-BASED & HUMANITIES PROFESSIONALS at partner museums:	
Awareness, knowledge, or understanding	• 60% will report an increase their understanding of principles and strategies for teaching and learning in informal settings
Skills or abilities	• 75% will experience an increase their ability to communicate with public audiences
Behavior	• 50% will express an ongoing commitment to participate in public outreach at partner museums or within their community
MUSEUM VISITORS to partner museums:	
Engagement or interest	• 40% will demonstrate an interest in art, history or STEM-related content and programming offered at partner museums • 70% will express an interest in attending future art, history or STEM-related programs at the partner museums • Visitors will rate their public program experience at least a 5 out of 7 on a satisfaction scale
Awareness, knowledge, or understanding	• 40% will become aware and/or gain an understanding art, history or STEM-related topics and concepts presented

Value to the Museum Field

Specifically, this three-year project advances the museum field's ability to provide high-quality, inclusive, accessible and audience-focused learning opportunities by facilitating experiences that bring STEM professionals and researchers – scientists, technologist, engineers and mathematicians – and visitors together in non-science based museums and bring artists and historians to science museums. More broadly, the adapted professional development for artists and historians will be beneficial for art and history museums that are looking for more in-depth public engagement in their galleries or on their and museum floor.

Project Sustainability

The existing PoP Guiding Framework has been tested nationwide to ensure its scalability and utility for the diverse ISE field. The proposed project leverages this groundwork to diversify and expand the reach of a proven model which will have deep and lasting impacts. The concept of sustainability is embedded in the Guiding Framework and those who implement it to choose appropriate programs and strategies that leverage their own community resources and build a lasting initiative. Strategies implemented at current PoP Network sites include pursuing broader impact collaborations with NSF funded researchers; offering fee-for-service professional development workshops; reaching out to industry professionals looking to increase their impact in the local community and incorporating trained STEM professionals into existing program platforms and new grant proposals.

Schedule of Completion