FULL PROPOSAL ABSTRACT, NARRATIVE, AND SCHEDULE OF COMPLETION

Abstract

The lead applicant is the Maine State Library. This highly collaborative project fully engages three additional State Library Agencies (Massachusetts, Vermont and the Rhode Island) and their professional association Chief Officers of State Library Agencies; Cornerstones of Science; six pilot public libraries in two states; thirteen non-profit research, library, private foundations and informal science organizations and two science and technology corporations.

The overarching goal for this initiative is for the nation's State Library Agencies (SLA), regardless of organizational structures, to have a field-tested, replicable science literacy model and tools. It will advance library practice and empower public libraries to effectively build science literacy capacity that enables them to connect their patrons and communities to engaging and meaningful informal science and technology experiences, equipment, books, media and the scientific community. There is significant evidence that science literacy in America, as compared to other leading nations, is declining. As a result the competitiveness of our nation and our citizens is at risk. Further, experiences in informal settings can significantly improve science-learning outcomes for individuals from groups that are historically underrepresented in science, such as women, low-income families and minorities. (National Academy of Science 2009) Public libraries are *"powerful national assets with capacity that must be developed and fully used to enhance science literacy, economic development and lifelong learning."* (IMLS, 2012) This project is specifically designed to meet this need.

This 30-month initiative (May 2015 – October 2017) supports the IMLS objective of building public library capacity, engaging community and cultivating durable partnerships to support sustained access to science learning in libraries. Our project's audiences are: the fifty State Library Agencies nationwide; public libraries, their library cardholders and members of their community. This initiative will test and refine the decade long experience in Maine of public libraries partnering with a SLA and Cornerstones of Science. Key results of this initiative include: (1) the creation of the online STEM Resources Clearinghouse (how-to guides, database of science programming suitable for public libraries, librarian training programs, evaluation tools, etc.); (2) expanded SLA STEM capacity and advocacy; (3) the expansion of public library capacity that enables them to successfully support ongoing STEM programming within their daily operations; and (4) a Guide that SLA's can use to nurture STEM in public libraries. At the local level this increased local capacity will result in an increase in STEM awareness and understanding among individuals of all ages that participate in local library science experiences and a greater awareness in the local scientific community that libraries are a viable venue for disseminating their research findings.

Our long-term definition of success is that the nation's SLAs enable public libraries to become dynamic community science resources centers that are vibrant and valued by community members.

1. Statement of Need (IMLS STEM Learning in Libraries category)

Evidence of Need

There is considerable research (Aspen Institute 2014; IMLS 2014; National Science Foundation 2009; and the American Association for the Advancement of Science, 2012) and reporting (IMLS Convening on STEM Learning in Libraries, June 5, 2014) that provides the evidence of the nation's need to increase science literacy and that public libraries are *"powerful national assets with capacity that must be developed and fully used to enhance economic development and lifelong learning."* (IMLS, 2012). Providing access and connecting knowledge to the needs of individuals and the community have always been at the center of the mission and purpose of libraries. The Aspen Institute states *"Enabling all public libraries to fulfill their new roles will require community leaders, civic partners and libraries to share a new vision for what libraries can be. Innovations that build on the old distributed model of the lending library will not suffice. What is needed is a new level of interdependence that communities and libraries must embrace together."* Wynn Jennings stated "...*that capacity is the single most important issue that will affect our outcomes* (IMLS, June 2014 Convening, Chicago, IL). His conviction is the shared belief of this project team and the goal of "– *Empowering public libraries to become science resource centers for their communities - A Guide for State Library Agencies*

Building on Previous Investments

We will rely on members of our Advisors Panel (see Supporting Documents), the research of our Project Team, and our direct connections to State Library Agencies (SLA) to develop the proposed *A Guide For State Library Agencies.* In so doing we will intentionally leverage high quality examples of training, programs, research and resources – some of which were developed in previous IMLS projects. We will bring them together into a virtual, online *STEM Resources Clearinghouse* that is easily maintained and readily available to all. (Associated project products will also be posted online.) Examples of these existing resources include: Space Science Institute's *STAR Library Education Network*; *Pushing the Limits* project by Daniel Rockmore, *STEM Guides Project* an NSF initiative by Sue Allen and the Maine Mathematics and Science Alliance of which Cornerstones of Science is a partner, the *Lawrence Hall of Science* by Darrell Porcello and the HowtoSmile.org initiative, to name a few. Further, we have reviewed the 140 IMLS STEM projects funded between 2012-13 and are working with IMLS staff and the Project Directors to build on six that have components that compliment this proposal.

Project Audience, Challenges and Benefits

Our project's audiences are: State Library Agencies (SLAs); public libraries; and library cardholders and members of the community. With more than 17,000 public library branches and 1.6 billion visits a year, there is an enormous potential for engaging a diverse array of individuals including underserved and at-risk youth and their families. Despite this potential the breadth and depth of science activity within public libraries nationwide is minimal. Leading challenges are: 1) lack of science literacy capacity within public libraries; 2) library staff anxieties around science; 3) science is often not infused in daily operations and as a result visitors do not have ongoing access and opportunity; and 4) librarianship is in

flux as libraries transform from repositories of knowledge to community hubs of engagement, particularly around science. The primary benefits of this initiative are 1) SLA's will have a validated, replicable tool to increase science literacy; and 2) that the public will gain access to science experiences and resources that enables them to build scientific knowledge needed to function as citizens and appreciate the world around them.

IMLS Category: STEM Learning in Libraries – This project will build capacity, engage both the library community and local organizations, and create durable partnerships that will support STEM learning in libraries. It will produce a replicable model that State Library Agencies can use nationwide.

2. Impact

Science literacy issues in public libraries - This project builds on lessons learned and best practices from more than a decade of work by Cornerstones of Science and informal science practitioners at the local and national level. The leading issues the project addresses include: 1) many librarians and their institutions are anxious about offering science programming; 2) science is not infused into daily library operations; 3) patrons do not have ongoing access to science experiences and resources; 4) the science community does not recognize public libraries as a viable venue to disseminate science; 5) science literacy is not a focus for many State Library Agencies; and 6) most Americans are uncomfortable with science. Our experience suggests that when these issues are systematically addressed within the public library environment science literacy in public libraries can flourish.

Consensus building

The project is designed (see Logic Model in Supporting Documents) to routinely solicit advice and build consensus among the nation's State Library Agencies (through COLSA), the four participating SLAs, the six pilot libraries, corporate leaders, informal science educators and others. (See Letters of Commitment in Supporting Documents for levels of participation and support)

Learning outcomes

The specific learning outcomes of the project are that: 1) the Cornerstones Model for building science literacy capacity in public libraries can be validated, strengthened and replicated for national dissemination; 2) state library agencies see themselves and pilot libraries recognize them as science literacy leaders and advocates; 3) the online STEM Resources Clearinghouse is seen as user-friendly, effective and efficient – as a result library staff are more confident in providing activities and their anxieties around science are reduced; 4) pilot library directors see value of science programming to library and community and integrate this into daily operations; 5) there is increased access to science-related activities at the pilot libraries; 6) public participants in library activities report greater interest/knowledge in science; and 7) community partners see the library as a viable venue for disseminating current research and information around critical community issues.

Performance indicators and related project targets

The project's performance indicators, associated measurable targets, and tools (e.g., interviews, surveys, on-site observations, circulation and library activity data, etc.) are described in the project logic model and evaluation plan (see Supporting Documents). They seek to build on and extend evaluation results collected by Cornerstones over the past decade. For example, 1) there was an increase of participating library partners from 22 to 50 that allocate their own money to build science capacity within their institution; 2) the integration of telescopes into library circulation as a means for the library to create public demand for science led to a 20% increase in new library card memberships just so that patrons could check the telescope out; and finally, 3) the increased number of libraries borrowing Science Trunks/Kits for after-school programs increased from our 22 library partners using them to now over 70 libraries. The five core questions of the Evaluation Plan include: Were the major elements of the initiative implemented effectively? Was the initiative successful in building the capacity of the state library agencies to help local libraries become science resource centers? Were the initiative's efforts successful in building the capacity of the pilot local libraries to serve as science resource centers in their communities? Did the initiative's efforts have an impact on the STEM literacy of library users in the pilot communities and on support for the library as a STEM resource? Finally, what lessons were learned through the initiative that can inform efforts to adopt the model in other states and communities?

Tangible products and values

The Project Design and Logic Model (in Supporting Documents) specifies the products that will be produced as well as the associated activities and lead entities. Each is designed to address the specific issues and conditions described above.

Sustainability of project benefits

Using the evaluation results we will continue to refine and enhance the model, tools and resources needed to increase science literacy through public libraries. The results will be integrated into our missions and ongoing efforts to enable public libraries to become community science learning centers.

3. Project Design

The overarching goal for this initiative is for the nation's State Library Agencies (SLA), regardless of their range of organizational structures, to have a field-tested, replicable science literacy model for public libraries. It will contain user-friendly tools, training and guides that are downloadable through an online repository called the *STEM Resource Clearinghouse* (see Project Logic Model in Supporting Documents). It will advance library practice and empower public libraries to effectively connect their patrons and communities to engaging and meaningful science and technology experiences, equipment, books, media and the scientific community. Our research question focuses this goal:

> *How can the decade-long experience of public libraries in Maine, that partner with the Maine State Library and Cornerstones of Science, be effectively replicated by State Library Agencies nationwide to support their public libraries abilities to offer STEM programming and services to their communities?*

The research question builds on science literacy partnership of the Maine State Library and Cornerstones of Science. For over a decade the Cornerstones of Science Model, which has its origins within the public

library setting, has evolved to partner with over 50 public libraries interested in building their science literacy capacity. This collaborative work has demonstrated that the following core elements are required to build and sustain science literacy capacity in public libraries: 1) external community support; 2) an innovative library director and staff; 3) a designated STEM librarian; 4) high quality content that is relevant to the community; and 5) communication strategies that create public demand for science programming. Finally, the major strategic effort by the Maine State Library to bring digital literacy and broadband technology access to rural libraries through the Broadband Technology Opportunity Program (BTOP) over the past seven years provides crucial inputs for the demonstration and validation of this project.

The extensive use of partnerships in this proposal demonstrates both the importance and diversity of organizations that need to be involved in augmenting the abilities of public libraries to build science literacy capacity. These partnerships consists of: four State Library Agencies (ME, MA, RI, VT) and their professional organization – the Chief Officers of State Library Agencies (COSLA); six pilot public libraries in ME and MA that were chosen to be representative of varying sizes and STEM capacities; thirteen non-profit research laboratories, private foundations, and informal science organizations; and two science and technology companies that are committing in excess of $500,000 in matching support to the proposed grant. (See Summary and *Letters of Commitment and Support* in the Supporting Documents)

A. Project Goals, Objectives, Activities, and Partners

Over the past decade Cornerstones of Science has made considerable investments in public libraries that contribute directly to the project's goals and objectives. These science literacy tools, trainings and guides will be refined for nationwide application. New materials will be developed that both leverage high quality informal science materials and build-on the findings from the best practices research we will conduct. The graphic below presents the process and steps that all of the final products will take throughout this project. As noted in the graphic, evaluation of the efforts, quality and impact will be conducted throughout the project.

The Project Logic Model is the primary learning and management tool that will be used throughout the project's life. (emphasis added) "Using evaluation and the logic model results in effective programming and offers greater learning opportunities, better documentation of outcomes and

shared knowledge about what works and why (W.K. Kellogg Foundation, 2001)." Development and use of this logic model over the past few months has facilitated effective communication and program planning. It has enhanced our ability to clearly explain and illustrate program concepts, approaches and to garner the participation of the high caliber stakeholders in this project. This model will serve as our road map for describing the sequence of related events and connecting the need for the planned program with the program's desired results.

The main assumptions of the Cornerstones Model are that: 1) we have identified the core elements that are required to be fully functioning within public libraries if they are going to be successful with sustaining their own science literacy efforts; 2) State Library Agencies can accelerate the progress of their public libraries in cultivating a scientifically and technologically literate citizenry; and 3) the increased public access and awareness of science experiences and resources through public libraries provides the foundation for community members to build their own scientific knowledge and increase appreciation of how science affects their daily lives and communities.

Outlined in the **Project Logic Model** (see Supporting Documents section) are descriptions of the goals, objectives, activities and final products of the project. In addition, the Project Logic Model reflects the roles and commitments of our partnering organizations. A brief description of the Core Element Themes, goals and final products are described in the table below.

<table>
<tr><th>Core Element Theme #1</th><th>Goal</th></tr>
<tr><td>Build Library Director and Staff Capacity to be STEM Facilitators</td><td>Library directors and staff become "local champions of science" and are confident in their abilities to facilitate the science literacy programs and connections with the science community.</td></tr>
<tr><td colspan="2">Final Products
(1) A Guide to Building Science Literacy Capacity in Public Libraries - Comprised of six modules it offers step-by-step methods to build the science literacy proficiency of libraries.
1. Internal assessment of science literacy capacities in a library and methods to integrate it into daily operations
2. Communication strategies to engage and connect patrons to science
3. Secure the funds needed to sustain science literacy efforts
4. Training to become STEM facilitators and to cultivate durable partnerships with community-based organizations
5. Increase demand and public awareness of science literacy efforts
6. Evaluation tools to understand the value and impact of science literacy programs and resources on libraries as a community institution and their patrons
(2) On-line access to high quality informal science programs and resources suitable for public library audiences - Tasks include: Document librarian needs; design a methodology to identify high quality STEM materials suitable for public libraries; create the design/wireframe for a dynamic web interface that meets librarian requirements; locate materials, assess quality, catalogue and upload to beta site.</td></tr>
<tr><th>Core Theme Element</th><th>Goals</th></tr>
</table>

Build State Library Agency Science Literacy Capacity	State Library Agencies have the science literacy capacity and infrastructure they need to (1) empower and incentivize public libraries to be community science resource centers and (2) integrate science literacy into public libraries.

Final Products

State Library Agency Guide to Building Science Literacy Capacity In Public Libraries - A step-by-step guide for State Library Agencies to enhance their abilities to work successfully with public libraries to build their science literacy capacity. Modules of the Guide include:

1. A framework, process and benchmarks to help public libraries transform into a Community Science Resources Center
2. How to use and conduct a Public Library Science Literacy Capacity Assessment;
3. Methods to prepare a Public Library Science Capacity Development Plan

Transforming State Library staff into a STEM Liaison that provides ongoing support to libraries to build their science literacy capacities

Core Theme Element #3	**Goals**
Pilot libraries apply, test and evaluate tools to create community science resource center	(1) Pilot libraries create and nurture community science resource centers within their institutions; (2) the science community affirms that libraries are viable venues for dissemination of research; (3) community-based organizations are engaged; and (4) the public has increased access and seeks out more science experiences and resources.

Products

Field-tested and refined products including:

1. Application and assessment of *A Guide to Building Science Literacy Capacity in Public Libraries* Strategies
2. Use and assessment of high quality standards-based STEM learning science resources and tools suitable for public libraries

Core Theme Element #4	**Goal**
Produce and broadly disseminate a STEM Resources Clearinghouse & Implement Communications Plan	Create an online repository where State Library Agencies and public libraries nationwide have access to the science tools and resources needed to effectively build their capacity and increase the science literacy of their patrons.

Products

(1) A STEM Resources Clearinghouse that contains:

1. *The State Library Agency Building Science Literacy Capacity In Libraries Manual, Process and Model*
2. *Public Library Building Science Literacy Capacity Guide*
3. Online Directory of informal science programs and resources
4. Librarian Community of Practice
5. 2-year Clearinghouse Maintenance Plan

(2) Implement Project Communications Plan

Broadly disseminate materials from this initiative in a manner that has a demonstrable impact on the field of librarianship. Target audiences in the Plan are: 1) the nation's State Library Agencies; 2) public library directors and staff; and 3) library cardholders and members of the six-pilot

communities.

4. Diversity Plan

Diversity of library populations in our six pilot communities and their libraries

We chose six libraries in two states to ensure they are representative of those from around the country so that our model could be tested in a variety of settings and to grow our confidence that the Cornerstones Model is replicable in all types of libraries (e.g., small and large, urban, suburban and rural, etc.) These communities range in size (Portland has a service area of 203,914 while Shutesbury is 1,800). The US Census reports these communities have a mix of races (a high of 93% Caucasian (Bar Harbor) while other pilot libraries have 18% Hispanic (Methuen) and 4% Asian (Portland) populations). This mix contributes to considerable racial and ethnic (e.g., nationalities, languages and culture) diversity. For example, in Methuen the Hispanic/Latino population doubled in the past 10-years and Portland and Auburn have growing immigrant populations (e.g., Somalis, Hispanic, etc.) in their service area. In 2012, per capita income ranged from $26,691 (Portland) to $36,629 (Shutesbury); unemployment from 5.8% (Portland) to 9.1% (Methuen); and the percentage of population living in poverty from 3.8% (Shutesbury) to 22% (Bar Harbor). The libraries have confirmed that this diversity walks through the door everyday.

Diversity is also considered by level of science literacy capacity. These pilot libraries were chosen based on preliminary criteria defining "levels of science literacy" (Level 1 – little to none to Level 3 have considerable capacity however not consolidated in an operational manner). Public library staff size ranges from 102 (Portland) to 3 (Shutesbury) and the collections, staff capacity and budgets reflect these considerable differences.

Library service needs

While each library serves the needs of their community some have chosen focus areas for STEM programming. For example, Bellingham chose to increase science literacy for public school students as part of their school day, homeschooled students, afterschool student programming and adult library users in response to poor state test scores of their students. They uncovered statistics that showed programming to engage students and spark their interest in STEM topics was needed, especially at the middle school level. Methuen has a significant library-user base of at-risk youth, non-native English speakers, and adults living below or near the poverty line with low literacy skills. (Their Literacy Volunteers program is consistently at capacity.) The library and the School District have assisted in the development and maintenance of a Satellite Library and Homework Center in the community center in the Arlington Neighborhood (the area of the city that has the densest and poorest population) that serves at-risk children. In Shutesbury the lack of high speed internet puts teens and college students at risk as they cannot rely on internet access at home to do research or complete assignments. This problem extends to self-employed residents. In Auburn library patrons are not only economically challenged but many are newly settled in this country as they are in Portland (e.g., new Mainers and non-English speakers).

As anchor institutions in their communities, public libraries serve the diverse populations and needs found in their communities. The libraries in this project are representative of public libraries nationally and can demonstrate how the Cornerstones model can work for libraries from small to large, urban, suburban and rural. Further, with representatives from the Vermont State Library and the Rhode Island State Library on our Advisory Panel we can broaden our perspectives around diverse populations and

libraries as well as the steps needed at the local level to provide successful STEM programming for their individual communities.

5. Personnel, timeline and budget

Personnel (see Supporting Documents section for resumes)
The Project Director is Janet McKenney, Director of Library Development (Maine State Library - MSL) and the Co-Project Director is Cynthia Randall, Executive Director (Cornerstones of Science). Combined they have 60+ years of project management, library science, and scientific experience. They will devote 10/30 percent of their time respectively to their Director duties.
Key project staff includes Dr. Carol Gordon (project researcher), Alan Melchior – Brandeis University (evaluator), Stephanie Zurinski - MSL, Cindy Roach and Shelley Quezada – Massachusetts Board of Library Commissioners - MBLC (State Library STEM Liaisons), Dr. Paul Dusenbery – SSI/NCIL (Advisor and prepare modules 4 & 7), Adam Fisher – MSL (project website and module 2), David Keeley – CoS (Project Coordinator & module 5), Stephanie Pomerleau – MSL (financial management).

Timeline
This project will occur over a 30-month period commencing on July 1, 2015 and concluding December 30, 2017. A detailed project timeline, as directed in the IMLS guidance, is located in the Supporting Documents section.

[redacted]

[redacted]

Project benefits to the applicant and partners: The MSL (and MBLC, VT, and RI) will benefit by testing and honing their science literacy approaches. They will also have ready access to new products and relationships. The partners will gain visibility with their peers and develop ongoing relations with others. They will develop new products and services for their own use and make them available to others. The pilot libraries will have greater science literacy capacity, new tools and products. The nation's SLAs and public libraries will have access to the STEM Resources Clearinghouse, that includes project guides and other project products that will provide them with the additional support needed to successfully build their STEM literacy capacity.

6. Communications Plan

The Plan seeks to widely disseminate materials from this initiative in a manner that has a demonstrable impact on the field of librarianship. The project's target audiences are: 1) the nation's State Library Agencies; 2) public library directors and staff; and 3) library cardholders and members of the six-pilot communities.

Engage State Library Agencies (SLA): Throughout the project we will communicate with SLA's nationwide in the following ways: 1) in collaboration with Tim Cherubini, Executive Director of COSLA we will conduct a SLA videoconference session on the project, provide periodic updates via COLSA communications with its members, convene work sessions at their annual meeting, and post materials to their website. These methods will allow us to solicit feedback from participating COSLA members; 2) the Maine State Library and Cornerstones of Science are on the agenda for the June 2015 American Library Association conference in San Francisco, CA. This venue will allow us to interact directly with the library community about this initiative; 3) Cornerstones of Science is on the August 2015 National Science Foundation Conference on STEM in Libraries agenda. The Space Science Institute will sponsor this event. We will convene a forum on this initiative and engage in dialogue about our methods and discuss other ways, previously not considered, to build science literacy capacity in public libraries. These are examples of direct connections with libraries and we expect others to occur.

Public Libraries: Communication of the work and results of this project to public libraries will: 1) occur through the annual Cornerstones Library Partner Summit in Maine as well as Massachusetts where we meet with public libraries to share best practices and provide resources for building science literacy capacity; 2) presentations will be made within the New England, Maine and Massachusetts Library Association conferences; 3) a brief video will be produced and made available on participating SLA, pilot libraries and Cornerstones of Science websites. This will highlight the lessons learned and provide participant perspectives for promoting science literacy in libraries. This video will also be a promotional tool for SLA's and public libraries as a means to develop community partnerships and possible fundraising efforts; 4) a downloadable one-pager describing the project and evaluation results will be important to other libraries interested increasing science literacy in their libraries; 5) the communications staff at the Maine State Library will build on existing materials and prepare a communications toolkit for public libraries that they will use to make people aware of this initiative and increase demand for science programming.

Public: Project presence will be highlighted on all participating SLA, pilot library, Cornerstones of Science and partner websites and social media sites (e.g. Facebook, Twitter) so that people are informed of this effort; 2) signage will be directly applied to any scientific tools, instructional guides and other resources being borrowed by the public; 3) signage will also be available for pilot libraries to post in their institutions of any upcoming events sponsored directly by the project; 4) presentations will highlight the role of IMLS and other funders.

7. Sustainability

Project benefits beyond the grant **-** Ongoing institutional support by the lead project proponents (Maine State Library, Massachusetts Board of Library Commissioners, Cornerstones of Science, SSI/NCIL) of the STEM Resource Clearinghouse will continue, minimally for an additional two years. We are currently making important science literacy commitments and anticipate growing those beyond the life of the grant through staff time, contract support and in-kind contributions. Through our websites (including COSLA) and professional interaction we will promote project products to state library agency, public library and community partners. In addition, Cornerstones of Science will continue to support the pilot libraries with training for loanable science tools, programming and other services.

Sustainability planning – During the proposal development phase we have begun to explore how the STEM Resource Clearinghouse and other project products can be maintained and upgraded by integrating it into current operations. Examples of those we will explore include: 1) the library community of practice at the Space Science Institute/National Center for Interactive Learning; and 2) Web Junction to house and communicate aspects of the project specifically around professional development training. During the project will also initiate conversations with COSLA about ongoing buy-in and/or adoption of project products.

Systemic change – We anticipate the following changes: 1) Cornerstones will have refined the model and developed the tools such that State Library Agencies are more effective and efficient at working with public libraries, throughout northern New England, to build their science literacy capacity; 2) The Maine State Library will integrate the duties of the STEM Liaison into those of its District Consultants; 3) State Library Agencies nationwide will have a road map and the tools to serve as a leader and advocate in the transformation of libraries into community science learning centers; 4) public libraries will begin to integrate science literacy efforts into daily operations and see its value as an economic driver rather than just a programmatic one; and 5) community partners will understand the value of public libraries as a viable venue for disseminating science information.

Task	2015			2016				2017			
	Apr-Jun	Jul-Sept	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sept	Oct-Dec	Jan-Mar	Apr-Jun	July - Sept	Oct - Dec
Award – May 2015	X										
Element #1: Build Library Director and Staff Capacity to be STEM Facilitators											
Develop, implement, evaluate, adapt, and finalize Modules 1-6		←									→
Develop clearinghouse & maintenance plan						←					→
SLA STEM Liaison		←									→
STEM Advisors Panel advice and counsel		←									→
Public Library Capacity Development Plan		←							→		
Element #2: Build State Library Agency Science Literacy Capacity											
SLA STEM Liaison		←									→
STEM Advisors Panel advice and counsel		←									→
SLA Comparative Assessment		←	→								
Public Library Science Literacy Assessment		←	→								
Element #3: Pilot libraries apply, test and evaluate tools to create community science resource centers											
Panel and Community Summits			←	→				←	→		
Case study of Curtis Memorial Library		←	→								
Pilot Library technical assistance initiative			←							→	
Loanable Science Tools, Science Provider Network, Science Trunks/Kits			←							→	
STEM public librarian support		←									→
Element #4: Produce and broadly disseminate STEM Resources Clearinghouse											
Publish online STEM Resources Clearinghouse				←							→
Implement communications plan				←							→

OMB No. 3137-0071, Exp. Date: 09/30/2015

DIGITAL STEWARDSHIP SUPPLEMENTARY INFORMATION FORM

Introduction:
IMLS is committed to expanding public access to IMLS-funded research, data and other digital products: the assets you create with IMLS funding require careful stewardship to protect and enhance their value. They should be freely and readily available for use and re-use by libraries, archives, museums and the public. Applying these principles to the development of digital products is not straightforward; because technology is dynamic and because we do not want to inhibit innovation, IMLS does not want to prescribe set standards and best practices that would certainly become quickly outdated. Instead, IMLS defines the outcomes your projects should achieve in a series of questions; your answers are used by IMLS staff and by expert peer reviewers to evaluate your proposal; and they will play a critical role in determining whether your grant will be funded. Together, your answers will comprise the basis for a work plan for your project, as they will address all the major components of the development process.

Instructions:
If you propose to create any type of digital product as part of your proposal, you must complete this form. IMLS defines digital products very broadly. If you are developing anything through the use of information technology – e.g., digital collections, web resources, metadata, software, data– you should assume that you need to complete this form.

Please indicate which of the following digital products you will create or collect during your project.
Check all that apply:

	Every proposal creating a digital product should complete …	Part I
	If your project will create or collect …	**Then you should complete …**
x	Digital content	Part II
x	New software tools or applications	Part III
	A digital research dataset	Part IV

PART I.

A. Copyright and Intellectual Property Rights

We expect applicants to make federally funded work products widely available and usable through strategies such as publishing in open-access journals, depositing works in institutional or discipline-based repositories, and using non-restrictive licenses such as a Creative Commons license.

A.1 What will be the copyright or intellectual property status of the content you intend to create? Will you assign a Creative Commons license to the content? If so, which license will it be? http://us.creativecommons.org/

We will assign our work the Creative Commons license "Attribution-Non Commercial 4.0 International". Commercial use will be allowed on a case by case basis, with proper attribution.

A.2 What ownership rights will your organization assert over the new digital content, and what conditions will you impose on access and use? Explain any terms of access and conditions of use, why they are justifiable, and how you will notify potential users of the digital resources.

There will be no conditions on access or personal use of the content. The only conditions on use will pertain to commercial use, which will be considered on a case by case basis. We will request that when utilizing our materials they be sufficiently cited (with a link to origin if applicable). As most interested parties will be other like-minded individuals/institutions, we do not anticipate any issues with access and use.

A.3 Will you create any content or products which may involve privacy concerns, require obtaining permissions or rights, or raise any cultural sensitivities? If so, please describe the issues and how you plan to address them.

No

Part II: Projects Creating Digital Content

A. Creating New Digital Content

A.1 Describe the digital content you will create and the quantities of each type and format you will use.

We will be creating a website database of quality, tested STEM activities and programming for use in public and school libraries. The database will be vast, due to the nature of the endeavor. To aid in ease of use, the database will be searchable based on categories determined to be most useful by an initial survey of interested librarians. These categories may include specific STEM topic, age range, implementation time, standards alignment and any other categories deemed useful by the participating library staff. Our current Community of Practice, which houses some of our resources, has approximately 10 categories (by topic) with 15-30 activities in each category. We anticipate between 50 and 100 categories, with anywhere from dozens to hundreds of activities (depending on the area).

Activities (when possible) will be made available in both pdf and word format, to allow users to easily modify the activity for their location/needs. Video tutorials of activities will be included when they exist, as links to YouTube videos, or as movie files (compatible with Macs or PCs)

A.2 List the equipment and software that you will use to create the content or the name of the service provider who will perform the work.

We will use DreamWeaver to create the site, likely with a template purchased from Template Monster or a similar site.

A.3 List all the digital file formats (e.g., XML, TIFF, MPEG) you plan to create, along with the relevant information on the appropriate quality standards (e.g., resolution, sampling rate, pixel dimensions).

Most of the file formats we will be gathering will be pdf or .docx files. Unless the images contained in them are crucial, these will be provided in lower (web-quality) versions, so that people with slower download speeds can still access them. We will also be provided video and images, as necessary to the resources. In that case, we will standardly use.mov files for the movies, and .jpg for the images. Videos and images will be available at low (web-quality) resolution, and high resolution, so institutions can choose what best fits their needs.

B. Digital Workflow and Asset Maintenance/Preservation

B.1 Describe your quality control plan (i.e., how you will monitor and evaluate your workflow and products).

The work plan for constructing this database will be part of the larger work plan for our STAR_Net Phase II project. As this work will impact the workflow of other projects, we will need to adhere strictly to deadlines. Our initial survey of librarians and library staff of their needs will help us craft this plan. Much depends on the number and type of resources it is decided this project will need. We will also work with the libraries to develop a plan to continue expanding this database after the life of the project, as up-to-date resources are essential.

B.2 Describe your plan for preserving and maintaining digital assets during and after the grant period (e.g., storage systems, shared repositories, technical documentation, migration planning, commitment of organizational funding for these purposes). Please note: Storage and publication after the end of the grant period may be an allowable cost.

During the grant period, all resources and assets will be housed on our local servers, and backed up to the cloud. After the grant period, little will change. Our related programs will be able to shoulder the cost of keeping the database up and running for years to come. As this project will be intimately linked in with other programs, this cost sharing will not be a problem.

C. Metadata

C.1 Describe how you will produce metadata (e.g., technical, descriptive, administrative, preservation). Specify which standards you will use for the metadata structure (e.g., MARC, Dublin Core, Encoded Archival Description, PBCore, PREMIS) and metadata content (e.g., thesauri).

All our data will be in HTML format on our website, and we will use Dublin Core for the metadata structure. Depending on the desires of the surveyed librarians, we may use other structures to better catalogue the items. We will also rely heavily on meta-tags, to aid in searches both on the site and for search engine optimization.

C.2 Explain your strategy for preserving and maintaining metadata created and/or collected during your project and after the grant period.

Data will remain readily available on our website, as it will also be serving other projects.

C.3 Explain what metadata sharing and/or other strategies you will use to facilitate widespread discovery and use of the digital content created during your project (e.g., an Advanced Programming Interface, contributions to the DPLA or other support to allow batch queries and retrieval of metadata).

While we have no current plans to submit our content to the DPLA, we hope to encourage others to submit to our database in a similar fashion. Because our content is aimed at a particular audience, less effort will be used to allow for discovery from outside the site, and more will be put into making the site easily searchable. This strategy will obviously affect the types of meta-data used.

D. Access and Use

D.1 Describe how you will make the digital content available to the public. Include details such as the delivery strategy (e.g., openly available online, available to specified audiences) and underlying hardware/software platforms and infrastructure (e.g., specific digital repository software or leased services, accessibility via standard web browsers, requirements for special software tools in order to use the content).

The content will be easily accessible to the public at large through our website. No special software will be required. While compatibility across all browsers is always a concern, we will ensure a quality experience across the major platforms (IE, Chrome, Firefox and Safari). This site will be actively promoted to various library communities and across our related sites.

D.2 Provide URL(s) for any examples of previous digital collections or content your organization has created.

The prototype for the proposed database is the STAR_Net Online Community, the Community of Practice site for the STAR_Net Project. The community can be found at http://community.starnetlibraries.org

Part III. Projects Creating New Software Tools or Applications

A. General Information

A.1 Describe the software tool or electronic system you intend to create, including a summary of the major functions it will perform and the intended primary audience(s) the system or tool will serve.

The project team will create an online database where librarians and library staff can quickly find resources, activities, presentations and media relevant to their needs. The goal is for the library staff to use this database to supplement exhibits and speakers they may have at their library, or to provide STEM programming relevant to current local events.

A.2 List other existing digital tools that wholly or partially perform the same functions, and explain how the tool or system you will create is different.

Our existing community of practice site has some basic functionality for this purpose. However, summative evaluation of the STAR_Net project (for which the site was created) showed that librarians had a hard time sifting through the resources to find what was most relevant to their audience. The proposed database will include multiple, relevant search terms and descriptors to allow them to quickly and easily find something that matches their needs.

B. Technical Information

B.1 List the programming languages, platforms, software, or other applications you will use to create your new digital content.

We will be using html (DreamWeaver), with an undetermined pre-made template for the actual database (this will be choosen based on the needs identified by the librarians in the initial survey.)

B.2 Describe how the intended software or system will extend or interoperate with other existing software applications or systems.

We will likely continue using our Community of Practice site to highlight "most popular" or "most relevant" resources and activities. This is a wordpress site, that can pull that data from the new database and self populate.

B.3 Describe any underlying additional software or system dependencies necessary to run the new software or system you will create.

None

B.4 Describe the processes you will use for development documentation and for maintaining and updating technical documentation for users of the software or system.

End users of the system (librarians) will have access to a video that will instruct them in best practices for using the system. The project team will document all stages of setup and create a troubleshooting guide for future administrators of the system.

B.5 Provide URL(s) for examples of any previous software tools or systems your organization has created.

http://community.starnetlibraries.org

C. Access and Use

C.1 We expect applicants seeking federal funds for software or system development to develop and release these products as open source software. What ownership rights will your organization assert over the new software or system, and what conditions will you impose on the access and use of this product? Explain any terms of access and conditions of use, why these terms or conditions are justifiable, and how you will notify potential users of the software or system.

We will share any information/manuals developed as part of this project with any interested party.

C.2 Describe how you will make the software or system available to the public and/or its intended users.

The database will be openly available to the public on the internet, and will be promoted to the specific intended audience through our various related sites, and state library associations listservs.

Part IV. Projects Creating Research Data *(N/A)*

1. Summarize the intended purpose of the research, the type of data to be collected or generated, the method for collection or generation, the approximate dates or frequency when the data will be generated or collected, and the intended use of the data collected.

2. Does the proposed research activity require approval by any internal review panel or institutional review board (IRB)? If so, has the proposed research activity already been approved? If not, what is your plan for securing approval?

3. Will you collect any personally identifiable information (PII) about individuals or proprietary information about organizations? If so, detail the specific steps you will take to protect such information while you prepare the research data files for public release (e.g. data anonymization, suppression of personally identifiable information, synthetic data).

4. If you will collect additional documentation such as consent agreements along with the data, describe plans for preserving the documentation and ensuring that its relationship to the collected data is maintained

5. What will you use to collect or generate the data? Provide details about any technical requirements or dependencies that would be necessary for understanding, retrieving, displaying, or processing the dataset(s).

6. What documentation will you capture or create along with the dataset(s)? What standards or schema will you use? Where will the documentation be stored, and in what format(s)? How will you permanently associate and manage the documentation with the dataset(s) it describes?

7. What is the plan for archiving, managing, and disseminating data after the completion of research activity?

8. Identify where you will be publicly depositing dataset(s):

Name of repository: _____

URL: _____

9. When and how frequently will you review this data management plan? How will the implementation be monitored?

ORIGINAL PRELIMINARY PROPOSAL

Enabling Public Libraries to become Science and Technology Community Resource Centers: A Template for State Library Agencies

I. Project Director and Partners

Project Director - Maine State Library: Janet McKenney, Director of Library Development
Co-Project Directors - Cornerstones of Science: Cindy Randall, Executive Director
-Academic researcher - Marcianna Ptak Delaney, Ph.D.

Partners

- Massachusetts Board of Library Commissioners
- Dr. Bill Nave - Evaluation
- Participating Public Libraries: Jesup Memorial Library (Bar Harbor), Auburn Public Library, Portland Public Library in Maine; Billerica Public Library; Bellingham Public Library; M. N. Spear Library (Shutesbury) in Massachusetts

Advisors Panel

National Center for Interactive Learning at Space Science Institute, Paul Dusenbery,
Oregon State University, Lynn Dierking; Concord Consortium, Chad Dorsey
Bigelow Laboratory for Ocean Sciences, Ben Twining; Jackson Laboratory, Michael Kernan
American Science and Engineering, Laura Berman; FHC, Fred Haer; Massachusetts Board of Library Commissioners, Shelly Quizada; Maine State Library, State Librarian

II. Work Plan

Goal: State Library Agencies advance library practice and empower public libraries to effectively connect their patrons and communities to engaging and meaningful informal science experiences, equipment (e.g. telescopes, microscopes and science kits), books, media and the scientific community.
Objective: Create a replicable model that enables State Library Agencies nationwide to work with public libraries to build and sustain effective informal science programming and services that prepare people to full participants in their communities and global society.
There are extensive peer-reviewed needs assessments that call for a replicable model. This includes over 10-years of informal STEM learning investment by Cornerstones of Science with nearly 50 public libraries. (The genesis of Cornerstones was started by a MIT professor and prolific inventor who has a passion for learning, books and science literacy. Cornerstones began at the Curtis Memorial Library in Brunswick Maine.) Finally, this proposal will leverage early results of a current NSF grant, which Cornerstones is part of in Maine, testing how libraries can serve as their community science centers.
Research question: This proposal will investigate and document what core elements are needed for public libraries to sustain patron-oriented science and technology literacy efforts. Our experience indicates the following: external community support; innovative library director and staff; a designated STEM librarian; and creating public demand for STEM programming (e.g. loanable telescopes).

Project tasks include:

1. Build State Library Agency science literacy capacity – We will develop, test, evaluate and produce an interactive, web-based "how-to" guide for the nation's state library agencies that enables them to serve as a state's science literacy leader with their public libraries. Six public libraries of varying capacities will serve as the test-bed for developing and applying the model. In addition, the State library agencies in Maine and Massachusetts will have liaisons to work with libraries statewide. This project will also explore how the different current operating environments and strategic goals, of each state library agency, also affect the dissemination of science literacy support at the local public library level. A Forum will be held midway through the project to enable libraries, partners and participants to engage in conversations around STEM and libraries.
2. Enable public librarians to be successful S&T facilitators for their patrons and communities – Examples of tasks include compiling science literacy-related best practice professional development programs to create, implement and assess a training initiative. Adapt State Library van delivery systems (and other methods) to maximize support for public libraries to offer quality science programs and services. Build

and support dynamic State Library science literacy web pages that are constantly used by public libraries. Assist libraries to build creative and sustainable partnerships with community-based organizations and businesses with an interest in science and technology that leverage their skills, give them visibility and result in more patron visits to libraries.

3. Identify S&T funding opportunities for public libraries and creative approaches - Identify and promote funding links and highlight creative informal science education funding strategies public libraries around the nation have used. (An inter-state work group will provide a direct conduit to end-users.)
4. Create an online "programmatic pipeline" that delivers high quality informal science education products and services to public libraries – Locate and "point to" existing high quality informal science products, services, and organizations that rural, underserved libraries can implement with a focus on science related social issues that are important to the host community. Focus on methods that help patrons move from vicarious science learning to action (e.g., citizen science, community service, advocacy, personal decision-making, etc.) and use associated measurement and assessment metrics; Connect public libraries with quality science providers; and finally, implement techniques to engage the local S&T business community in supporting local informal science learning and their local public library.
5. Provide evaluation and assessment tools – Determine whether the contents of the research question are valid and complete. Further, compile evaluation and assessment tools that public libraries can use to measure the impact of science programing on their patrons.

III. Relevance to IMLS funding priority: STEM in libraries

This proposal responds to the IMLS Strategic Plan and 2014 IMLS Focus Groups that called for replicable models, particularly for rural, underserved communities. We will produce a model that enables public libraries to effectively and sustainably offer STEM learning.

IV. Project Impact

The project will impact the way the State Library Agencies in Maine and Massachusetts work with their public libraries; will affect the institutional culture in the six pilot libraries and the way they deliver S&T experiences to their patrons; will impact library patrons that participate in S&T programming; and will affect STEM learning in public libraries nationwide.

V. Performance goals and outcomes

Our performance goal is to create, test, evaluate and produce in 2016 a replicable model that State Library Agencies and their public library partners can use to increase measurable informal science learning experiences. Examples of outcomes include: Changes in Librarian attitudes towards science literacy; Librarians able to access informal science programming at a higher frequency and provide greater program diversity; Libraries able to sustain their own science literacy efforts; and library patrons have ongoing access and opportunities to science experiences, information and resources and are better able to be full participants in their communities and global society.

VI. Project Draft Budget

Maine State Library	
1 part-time library liaisons x 18-months	[redacted]
Project admin, travel and STACAP, STEM Forum	[redacted]
Library stipends (6 sites [redacted])	[redacted]
Massachusetts Board of Library Commissioners	
Project administration, travle and other	[redacted]
Cornerstones of Science	
Evaluator	[redacted]
Researcher	[redacted]
Project manager, panel manager, panel costs, etc.	[redacted]
Total grant request	[redacted]