LIBRARIES AS COMMUNITY HUBS FOR CITIZEN SCIENCE

Arizona State University (ASU), along with Arizona State Library, Archives and Public Records (ASL), SciStarter, the National Informal STEM Education Network (NISE Net), and additional library and science museum partners, proposes a National Leadership project grant proposal, *Libraries as Community Hubs for Citizen Science.* The $250,000 project will develop a field-tested, replicable suite of citizen science resources for the nation's State Library Agencies (SLAs), with the goal of **enabling public libraries to become hubs for citizen science in their communities**. The project team leverages the complementary expertise of libraries that are experienced in lending physical STEM activity resource kits, museums that are experienced in creating lifelong STEM learning experiences, university faculty that are recognized leaders in the field of citizen science, and SciStarter, a centralized online resource for public participation in science. The project team of librarians, informal STEM educators, and scientists, will collaborate to: 1) develop and evaluate a physical citizen science toolkit that can be lent through the public library system; 2) create associated physical and online resources to train, support, and communicate with volunteer researchers; and 3) work with stakeholders to create a plan to scale the model nationwide through the SLAs and NISE Net. The project will enable libraries to offer their communities **engaging and meaningful opportunities to participate in citizen science**, which will complement resources and informal learning activities they may already offer and provide opportunities for deeper engagement in lifelong learning. In addition to empowering libraries to serve as community hubs for STEM learning, this project **addresses critical barriers in citizen science infrastructure**, including lack of access to necessary instruments, which prohibits broad participation in citizen science projects.

1. STATEMENT OF NATIONAL NEED. Increasingly, libraries are seeking to act as strong community anchors, enhance civic engagement, and prepare people to be full participants in their local communities and our global society. Citizen science is a fast-growing field that engages the public in scientific inquiry through data collection and analysis, and provides a great variety of authentic lifelong learning opportunities for diverse public participants. The SciStarter database includes thousands of project opportunities for volunteer researchers of all ages and backgrounds (including families), focusing on a wide range of topics with varying requirements in terms of equipment, preparation, and time commitment.

The project team is well positioned to test and evaluate this model in Arizona, and if successful, to scale it nationwide through the SLAs and NISE Net. The team's needs assessment with stakeholders over the past year uncovered a variety of challenges and opportunities, as well as near-universal support for the partnership and resource model we propose: creating statewide partnerships among libraries and STEM-rich museums to serve as community hubs for citizen science, and creating physical lending toolkits paired with online support for use by volunteer researchers (funding through NSF #1645382; see also van den Bergh & Goodman, 2016). Prototyping efforts have demonstrated the viability of the citizen science kit model on a national scale (in collaboration with NASA #NNX16AC67A).

Libraries as Community Hubs for Citizen Science will build on a number of related projects by the project team that focus on citizen science and/or museum library partnerships for lifelong learning in STEM, including *SciStarter 2.0: A Dashboard to Drive Research, Participation, and Community-building in Citizen Science* (NSF #1516703), *Exploring a Taxonomy for Citizen Science Tools Database* (NSF #1644554), and *Satellite Science* (IMLS #NL-30-00-0044-00). In addition, the proposed project will be informed by related efforts by other investigators, including Maine State Library and Cornerstones of Science's *Empowering Public Libraries to be Science Resource Centers for their Communities* (IMLS #LG-80-15-0041-15).

2. PROJECT DESIGN. *Libraries as Community Hubs for Citizen Science* is planned as a two-year project beginning on November 1, 2017, with three primary phases. **Phase 1: November, 2017-May, 2018.** During the first phase of the project, the team will work collaboratively to iteratively develop, evaluate, and improve a **citizen science toolkit** designed to be lent to patrons through the Arizona public library system, together with a supporting **microsite on SciStarter**. The toolkit will provide sturdy, reliable instruments and supporting instructions for several complementary and related research projects related to the natural environment of Arizona, including a project that tracks climate data. A custom SciStarter microsite will allow the data for these

related projects to be collected and entered at one time, allowing volunteer researchers to easily contribute to multiple, related projects. SciStarter will also work with project owners to provide regular updates to volunteer researchers, increasing their learning from and investment in the projects. The projects, instruments, and supporting materials will be chosen and designed so they can be used by individual volunteers, as well as in the context of library and museum programming. Formative evaluation will focus on usability and utility of these resources from the perspective of all stakeholders, as well as participant engagement and learning.

Phase 2: June-December, 2018. During the second phase of the project, ten copies of the toolkits will be produced and entered into circulation at two public libraries in Arizona: Burton Barr Central Library in downtown Phoenix and Apache Junction library 40 miles outside of the metropolitan area, both of which have partnered with the project team on previous projects. Summative evaluation will focus on public participants' learning, engagement, and sense of self-efficacy resulting from their participation in the project.

Phase 3: January-June, 2019. During the third and final phase of the project, the project team will convene stakeholders to create a plan to scale up the program to more communities in Arizona and increase the scope to additional kits and research projects. The team will also consider models for replicating the program in other states. Finally, the team will disseminate findings among the library, museum, and citizen science fields.

The project team has previously collaborated on successful projects related to citizen science and lifelong STEM education in library settings. The project will be directed by **Darlene Cavalier, MA**, professor of practice at ASU and founder of SciStarter, who is a nationally recognized expert in citizen science, and **Rae Ostman, PhD**, associate research professor at ASU and director of the NISE Network of museums and science centers at Science Museum of Minnesota, who has extensive experience developing physical toolkits for informal STEM learning. The team also includes **Jeannie Colton**, program coordinator at Arizona State University, who has worked on multiple collaborations among science museums, libraries, and ASU; **David Hondula, PhD**, assistant professor of geographic sciences and urban planning and lead researcher of Arizona-based citizen science research projects; **Dan Stanton, MA,** associate librarian at ASU and past president of Arizona Library Association; **Nico Franz, PhD**, director of ASU's Natural History Collections; **Chris Guerra**, project specialist at Arizona State Library, Archives and Public Records; **Sari Custer**, vice president of exhibits and collections at Arizona Science Center; **Kelly Pearson,** assistant manager for youth services at Burton Barr Central Library in Phoenix (pending); **Risa Robinson,** Supervisory Librarian, Adult Services at Apache Junction Public Library; additional staff at participating organizations; and project advisors from multiple fields.

Evaluation of the project will be the responsibility of ASU's independent evaluation unit, the University Office of Evaluation and Educational Effectiveness (UOEEE). **Shelly Potts, PhD,** senior director, and her staff will design and implement a strategy to assess the objectives of the project. Qualitative and quantitative data collection and analysis methods will be used to formulate feedback that is relevant, actionable, and useful at various stages in the project's development and implementation. Written evaluation reports will be provided by UOEEE as part of the ongoing feedback loop and will be included along with annual project progress reports.

3. NATIONAL IMPACT. *Libraries as Community Hubs for Citizen Science* will develop an understanding of how libraries and museums can partner to become community support hubs for citizen science. The project will make use of infrastructure and elements already in place to expand the engagement of citizen scientists in multiple projects. This effort will empower citizens to participate in the process of scientific research, and will also provide a useful, scalable and sustainable solution for scientists leading citizen science research projects. If successful, the toolkit lending library model will be expanded statewide and replicated in other states.

BUDGET. The project budget is approximately $247,500. A preliminary budget includes approximately $52,000 for salaries and wages, $11,000 for fringe benefits, $7,500 for materials, $89,000 for contracts and consulting services, $6,000 for other costs, and $82,000 for indirect costs.

REFERENCE CITED. Van den Bergh, V. & Goodman, I.F. (2016). *CoCoRahs library needs assessment: Final report.* Boston, MA: Goodman Research Group, Inc.