The North Dakota State Library, LG-95-18-0024-18

Abstract

The North Dakota State Library will partner with Prenda, the Association for Rural and Small Libraries (ARSL), Linda Braun (YALSA Continuing Education Consultant, LEO Librarians & Educators Online Project Management and Consulting Coordinator), and Crystle Martin (Director of Library and Learning Resources at El Camino Community College District) to demonstrate the viability and impact of library-based code clubs in small and rural communities. These communities are at risk of being left behind as computer programming emerges as a critical skill and the gap in access to computer science education widens between urban and rural America. Coding at Every Library will directly support weekly code clubs at 50 small and rural public libraries, helping an estimated 10,000 youth learn coding while creating resources and a practitioner community to enable many more libraries to offer coding programs. ARSL will consult on project design and assist in outreach. The project will leverage Prenda's expertise and computer science education platform to directly support non-expert facilitators at a low cost. Linda Braun and Crystle Martin will serve as the research and assessment backbone of the project, informed by their work with ALA's Libraries: Ready to Code. Coding at Every Library is a two-year project that will include a full year of weekly code clubs, the establishment of an open online community of practitioners, the development of resources for the sustainability and expansion of informal library coding education, and the distribution of results and recommendations derived from a formal assessment of the undertaking. This project will introduce thousands of rural youth aged 8-14 to coding, helping them gain the skills needed for college and career readiness and life success. Additionally, it will build the competence and confidence of library staff in small and rural communities, showcasing that coding knowledge isn't necessary to successfully facilitate code clubs.

The North Dakota State Library (NDSL) and its partners propose a demonstration project to explore the feasibility of weekly, informal coding programs at small and rural public libraries across the United States. NDSL requests $249,000 over two years to support 50 public libraries, help 10,000 youth ages 8-14 learn coding, and generate resources and a practitioner community that will enable many more libraries to offer coding programs.

Statement of National Need

As computers become increasingly ubiquitous and learning to code is emerging as a critical skill, youth in rural communities are being left behind.

Society is evolving rapidly as the impacts of computer technology are felt in every aspect of human life. This change means a very different landscape faced by the rising generation. Those who can work with a computer will be significantly more successful than those who cannot.[1] The signs are already here: over 500,000 open computer programming jobs, making up 71% of STEM-related jobs today.[2] Coding is not for a niche technology industry: ⅔ of computer programming jobs are outside of the tech sector, and this trend is growing as computer science concepts are applied to many disciplines ("CS+X").[3] Beyond the workplace, computer science has been recognized as "a new basic skill necessary for economic opportunity and social mobility."[4] Efforts in recent years have expanded coding education, but limitations in both people and technology in rural areas has meant very little progress, resulting in a widening gap in access between urban/suburban and rural populations. As one commentator put it, "the most direct road to the modern American Dream doesn't pass through rural America."[5] For example, a 2016 Google study found that computer science is a lower priority in rural schools.[6]

Public libraries serving small and rural communities throughout the U.S. can provide access and exposure to help young people achieve the gains from computer programming. As stated in the American Library Association's Office For Information Technology Report, "Ready to Code: Connecting Youth to CS Opportunities Through Libraries," "communities [where libraries provide coding] will see young people who are ready to take on their futures, who have robust career options, and who guarantee the economic and social vitality of the cities, towns, and

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[1] Cowen, T. (2013). Average is over: Powering America beyond the age of the great stagnation. NY, NY: Dutton.

[2] [Summary of source data for Code.org infographics and states.]. (n.d.). Unpublished raw data.

[3] Catchpole, H. (2016, March 20). *CS + X: Skills for future careers*. Retrieved January 30, 2017 (Link)

[4] Smith, M. (2016, January 30). *Computer Science For All*. Retrieved January 30, 2017 (Link)

[5] MacFarland, M. (2016, November 29). How Rural America is missing out on the modern American Dream. Retrieved December 21, 2017 (Link)

[6] Google Inc. & Gallup Inc. (2016). *Trends in the State of Computer Science Education in U.S. K-12 Schools*. Retrieved December 21, 2017 (Link)

reservations in which they live."[7] By offering consistent informal coding programs, small and rural libraries can play a critical "community anchor" role, creating a safe environment for youth to learn valuable skills and experience a sense of belonging through interactions with peers and adult facilitators.

But small and rural libraries face challenges: many library staff are apprehensive about leading a coding program because they do not have the expertise they think is required, struggle to find time to prepare lessons, and don't know how to build community partnerships in order to connect with experts that may help them build successful coding activities. As a result, many small and rural libraries across the nation never try to run a coding program.[8]

The struggles to provide coding education in a rural library are evident in the story of Leslie, a librarian at the Wister branch of the Southeastern Public Library System of Oklahoma. As the only librarian in the smallest branch of a rural system, Leslie goes out of her way to offer valuable programming for her community, living up to her motto: "Little bitty library...great big services!" Leslie had heard the buzz about coding programs, but with no understanding of computer programming she felt stuck. When she began working with grant partner Prenda in 2017, Leslie was able to implement a code club. She was amazed to see a strong demand, with over 25 kids showing up for the first session! Leslie worked with colleagues to secure grant funding and help launch code clubs in ten other rural libraries in Southeastern Oklahoma.

Many initiatives in recent years have worked to expand access to computer programming education. However, most of these are limited to urban and suburban settings, and even when they are available to rural communities, the unique constraints on the staff of small and rural libraries prevent their successful adoption.
- ALA's Ready to Code Initiative recently announced grant funding for 28 libraries to design and implement coding programs for young people. Some are rural, but the criteria for getting the grant required past expertise in coding. In effect, the funding was limited to those libraries with a strong track record, leaving behind most small and rural libraries.
- Girls Who Code runs a network of afterschool coding programs for girls. Black Girls Code is a similar program, focusing on girls of color. Because these models depend on volunteers with computer programming expertise, the programs have struggled to reach rural communities.
- Code.org has created interactive and engaging tutorials for learning to code, and resources like Coder Dojo and CS Unplugged have added training for how to implement coding programs. But librarians in small and rural settings are more limited than most.

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[7] Braun, L. W., & Visser, M. (2017, January 6). *Ready to Code: Connecting Youth to Opportunity through Libraries* (Rep.). Retrieved January 30, 2017, from ALA/OITP website (Link)
[8] Ibid.

They are less likely to be comfortable with technology and they are stretched thin with all the other functions and programming they support.

The Coding at Every Library project will specifically address the needs of small and rural libraries, complementing the work of other important learn-to-code initiatives and filling an important gap in the ecosystem. We will work with library staff at every step in the process and adapt our approach to ensure success.

Project Design

Through the Coding at Every Library project, we will support weekly informal code clubs for youth ages 8-14 at small and rural public libraries all over the U.S. The project will directly reach thousands of youth, helping them develop coding skills that will prepare them for success in the 21st century as well as equipping them with an empowering growth mindset. Beyond the direct impact on the youth, the project will help one hundred library staff develop the confidence and capacity to support code clubs, extending the impacts of the project beyond the funding period and spilling over into other informal, tech-focused programming. By the end of the project, we will develop a self-sustaining code club community which will support existing facilitators, attract new practitioners, and drive awareness of the program.

The code club model is a proven approach to introducing youth to computer programming, supported by both theory and practice. The model is grounded in the concepts of informal learning and connected learning, established in recent decades as a critical part of the learning model and creating an important function for libraries in a post-digital era. In practice, the "out-of-the-box" components to be utilized in the program have been developed and refined over four years of implementation by project partner Prenda, who has supported hundreds of library staff and thousands of youth learning computational thinking. Prenda supports code clubs in 22 U.S. states and Canada, and has recently launched an online community. All of these assets will be leveraged and adapted for small and rural libraries to ensure a successful project implementation.

Goal	Assumptions	Measurable Outcomes
Direct impact. The project will reach thousands of youth and teens attending code club in small and rural libraries.	The program will support code clubs in 50 small and rural libraries. Each club will meet weekly for a year with a weekly attendance of 5-10.	Number of code clubs: 50 measured through software Average yearly attendance (one club): 200 measured through software Total attendance (50 clubs): 10,000 measured through software

		Coding education progress: 2,000 participants finish intro to coding level in software measured through software 1,000 participants master scratch tracks measured through software 500 participants master web tracks measured through software 200 participants master scripting tracks measured through software 200 participants submit original coding projects measured through software
Build competence and confidence. The project will help library staff in small and rural libraries succeed with coding programs.	Many library staff understand the importance of offering coding education to the young people in their communities. But they feel apprehensive about their ability to develop and implement a program, especially because they assume that they themselves need to know how to code. Our program will reach these people, convince them that they do not need to be coders themselves, and help them develop the confidence and ability to be successful as facilitators.	Average facilitators per participating library: 2 measured through software Total facilitators: 100 measured through software Measurement device for competence and confidence goal: qualitative survey and follow up interviews with facilitators at critical points in the project timeline.
Change mindsets. One of the important benefits of learning to code is the mindset it can help develop.	Many youth (and adults) are conditioned to view learning in terms of the outcome. If you are "smart," then you automatically understand the topic and get an A on the test. If you don't get an A, then you believe your brain is broken and tell yourself that you are not "smart," limiting your effort in future situations. [9] Coding is a great way to	We will conduct pre- and post-program surveys of participating youth, seeking to understand their mindset as it relates to their learning process.

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[9] Dweck, Carol (2006). *Mindset.* Retrieved December 28, 2017 (Link)

	overcome this limitation and support the development of a growth mindset.[10]	
Community engagement. Library staff will connect with community partners, thought leaders, and colleagues to establish long-term relationships that extend beyond this project.	One of the high-level objectives of our project is to build a community that will extend far beyond the funding period. This can be achieved by engaging with practitioners and other stakeholders. Each of the code club facilitators we train and support will be encouraged to share their story with peers and colleagues, supporting organic community growth.	Number of practitioners and stakeholders in the nationwide online code club community: 200 measured through online community Frequency of sharing and interactions: weekly

There are potential risks associated with this project. However, each of these risks has been addressed by the project team in the advance planning, and each risk will be mitigated in the design phase. The risks are outlined below.

- Difficulty managing a large number of participating libraries. Our project plan targets 50 unique small and rural libraries, a formidable scale. The team will leverage past experience and a detailed timeline.
  - Recruitment. Through past outreach efforts, Prenda has accumulated a list of 75 small and rural libraries interested in a funded code club. These libraries are pre-qualified to participate, with a dedicated staff member, a space to run the program, computers and WiFi connection. In addition, ARSL will help promote the project during the application phase. We are confident that we will receive more than 50 qualified applicants.
  - Onboarding. Using "out-of-the-box" training and support processes, Prenda has helped launch nearly 200 code clubs all over the U.S. and Canada. Onboarding takes approximately a half day per library, which means 50 participating libraries will require six weeks. However, to deliver the customization included in the project, we have doubled time in the schedule.
  - Support. Over the course of the implementation period, the project team will remotely support the front line staff at the 50 participating libraries. Based on past experience supporting non-expert code club facilitators, we are confident we will be able to support this volume with the existing project team. The main reason this works is our informal learning model, which does not rely on the adult

[10] Smith, Kelly (2017). *Why Code Club is the best way to develop a growth mindset.* Retrieved December 28, 2017 (Link)

facilitators to learn coding in advance, prepare lesson plans, or provide technical support. Leveraging peer interactions through an online community will further help extend support resources.

- Sustainability challenges. Because our program relies on software, training and support that typically costs money, and because many small and rural libraries do not have internal budgets to support the program in its full form, we recognize that sustainability may be a risk. Specifically, how will participating libraries continue coding programs without our help after the funding period expires? We plan to mitigate this risk by focusing on development of the people as we help them change paradigm to an informal learning model. We have seen this approach work in the past - many of the libraries we have worked with continue a coding program without our direct assistance. In fact, several have applied our informal learning approach to other subject areas, such as robotics, 3D printing, game design, and a variety of maker activities. We will design our online community of practitioners to be open to all, regardless of their involvement in our project, and we expect the peer effects of that network to provide significant benefits that persist well beyond the program timeline.

Project Work Plan: The Coding at Every Library project will leverage the expertise and toolsets developed by the project team over thousands of hours of coding in libraries and in programming for small and rural libraries over many years. The team has demonstrated success in helping library staff overcome the challenges outlined in the Ready to Code report and run consistent, well-attended, high quality code clubs. This proposal expands on the solutions already tested, piloted, and scaled by team members in a wide variety of public libraries. The **Association for Rural and Small Libraries** (ARSL) will consult on project design and assist in outreach, ensuring success with the project focused on coding at small and rural libraries.

- **Mary Soucie** is the State Librarian at the North Dakota State Library. She has served small communities through public and school libraries for over 20 years, as well as active involvement in Chief Officers of State Library Agencies (COSLA), and is on the board of the Association for Rural and Small Libraries (ARSL).
- **Eric Stroshane** is the Library Development Manager at the North Dakota State Library. He has worked directly with dozens of rural libraries and expanded the state's technology education offerings. Eric was instrumental in CodeDak, an initiative to provide North Dakota libraries with the resources, skills, and inspiration necessary to host Hour of Code events and support regular code clubs.
- **Kelly Smith** is the founder and CEO of Prenda, a technology company on a mission to help libraries offer computer programming education to young patrons. Prenda **(website)**, provides web-based software, training and support to help library staff run successful code clubs, even if they have no prior experience in computer programming.

- **Luke Miller** is the Customer Success Director at Prenda. He has trained hundreds of librarians all over the country, taking them from zero knowledge of computer coding to confident, effective facilitators of weekly code clubs. Luke also supports code club facilitators and manages an online community where they share ideas, ask and answer questions, and brainstorm ways to improve their code clubs.
- **Linda Braun** served as the lead researcher for the ALA Libraries: Ready to Code project. In focus groups and interviews with hundreds of people directly involved in coding programs in public and school libraries. She has a strong background in informal learning, libraries, and research focused on coding and libraries. Linda consults with LEO: Librarians & Educators Online, and is active in the YALSA community, as well as many other organizations in the library field.
- **Crystle Martin** has deep experience in connected learning and research methods, specifically related to coding programs. She has shared findings from her research at ALA and many other thought leadership avenues, and served as an advisor on the Libraries: Ready to Code project. Crystle currently serves as Director of Library and Learning Resources at El Camino Community College District.

The starting point for the Coding at Every Library project is the code club model developed and refined by Prenda over the past four years. The "out-of-the-box" components (remote training, web-based software, support) have been proven in the field. LSTA-funded pilot projects in Arizona and Utah demonstrated success with cohorts of 19 and 13 libraries. Prenda currently supports 8,000 young coders at 100+ code clubs in 22 states and Canada. The proposed project will demonstrate the ability of the model to scale nationally at a level previously unseen. Specifically, it will establish the viability of non-expert facilitators succeeding with code club at a low cost, enabled by technology and remotely delivered services. While some existing code clubs serve rural communities, this project will focus specifically on small and rural libraries. To ensure success with the target audience, the project team will consult with each participating library to adapt the program for their individual communities. Participating libraries will fulfill the community anchor role, helping youth gain the skills needed for college and career readiness and life success.

The project will directly support code clubs at 50 public libraries, chosen through a competitive application process. After ensuring eligibility (i.e. meets the requirement of "small and rural library"), each library will be vetted for technical viability (computers, internet connection), staffing (at least one person willing to facilitate code club) and community interest.

- Phase 1 (Months 1-3): Finalize project design (team), review with ARSL Board (Soucie), manage and launch application process (Prenda).

- Phase 2 (Months 4-6): Select (team) and train participating libraries (Prenda), provide consulting for tailoring to communities (Braun), develop evaluation protocols (Martin).
- Phase 3 (Months 7-18): Support participating libraries in weekly code clubs (Prenda), provide additional training and consulting (Prenda), create online community (team).
- Phase 4 (Months 19-24): Evaluate project (Martin), build resources for sustainability of impacts (Braun, Soucie), disseminate results (team).

Diversity Plan: The target audience for the Coding at Every Library project are small and rural libraries across the United States. To be eligible to participate in the program, an institution must be a public library that meets one of two criteria: either 1) meet the IMLS definition of small or rural libraries[11], or 2) be a member of the Association for Rural and Small Libraries (ARSL).

Rural communities continue to lag behind urban and suburban areas in internet access and connectivity, with 22% of individuals relying on connections outside of home or work (e.g. public libraries).[12] Recent surveys of rural community residents have identified challenges including health, demographics, education, and economic struggles.[13]

Besides the limited economic, connectivity, and educational opportunities faced in rural communities, recent research has revealed an increase in ethnic diversity, driven primarily through immigration to rural areas. This has led to "a change from white dominance to a 'multigroup mix,' with some combination of whites, blacks, Latinos and Asians."[14]

The target audience for our project needs access to coding. Computer science opens doors to economic success for individuals and lifts entire communities. Minority groups are traditionally underrepresented in computer science. Our project aims to fill these gaps through public libraries as community anchors.

To ensure the project meets the unique needs of diverse community members, we will work separately on a diversity plan for each participating library, incorporating input from existing staff, program participants, and other stakeholders to customize the design of the code club to serve the needs of the community.

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[11] Swan, Grimes and Owens (2013). *The State of Small and Rural Libraries in the United States*. IMLS (Link)

[12] Rainie, Reddy, and Belle (2004). *Rural areas and the Internet.* Pew Research Center. Retrieved December 28, 2017 (Link).

[13] Environmental Protection Agency (2014). *What are some of the challenges facing Rural and Small Town America?* Retrieved December 28, 2017 (Link)

[14] The Conversation (2017). *Diversity is on the rise in urban and rural communities, and it's here to stay*. Retrieved December 28, 2017. (Link)

National Impact: Research and initiatives conducted by the project team have shown that small and rural libraries are capable of running successful, frequent, informal code clubs. Based on past experience, a small code club will reach between 50-100 individuals over the course of a year, with many coming to multiple sessions for an average attendance of 200 youth in a year.

This project will build on past work and prove that informal coding programs can be successful in diverse libraries serving unique rural communities all over the country. Through our work with 50 participating small and rural libraries, we will achieve a total estimated attendance of 10,000 youth nationwide, opening doors to technology careers and building growth mindsets. Beyond the direct impact, the project will demonstrate that libraries can drive coding education in small and rural communities.

The work will provide summative evaluation data to support the idea that public libraries can and should provide coding activities in their communities. The team will measure specific qualitative outcomes through surveys and interviews at the beginning, middle, and end of the project, and through reflection journals focused on development and including artifacts such as video, photos, screenshots, and links. Specific outcomes to be measured include:

1. Direct impact. The software platform will record total attendance, number of unique users, and learning objectives like skills mastered and projects built. Metrics will be analyzed by age and gender to better understand the participants who choose to come. These data will be collected in a sensitive way (i.e. allowing expression for non-gender conforming individuals) and kept anonymous in all reporting activities.
2. Build competence and confidence. Through the training and support provided by this project, library staff will have opportunities to take risks, revise based on challenges and successes, and reflect continually on their learning and experience. All leading to greater competence and confidence in critical development areas for library staff.[15]
3. Change mindsets. One of the key features of the code club model is the connected learning approach. Instead of relying on an expert instructor to pour knowledge into their minds, coders learn on their own terms and at their own pace. Library staff are well-suited to facilitate this type of learning.
4. Community engagement. Library staff will connect with community partners, thought leaders, and colleagues to establish long-term relationships that extend beyond this project.

The project team will connect participants with each other and share challenges and successes. This will include virtual meetings and an online community to enable coding activities in libraries across the United States. We will connect this effort with other ongoing initiatives promoting coding education in libraries, such as the Ready to Code project.

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[15] YALSA (2010). Teen Services Competencies for Library Staff. Retrieved January 4, 2018. (Link)

Sustainability and systemic change: The benefits of this project will extend beyond the funding period. Through our training and support, we will help a cohort of library staff change their thinking and evolve to support frequent, informal programming in STEM and other fields. This shift in mindset will expand to colleagues and peers and complement similar efforts through coding and other initiatives. The member-supported code club community developed through the project will persist beyond the funding horizon and reach many more library professionals, supporting them in their efforts to provide coding programs in their communities. Finally, the evaluation data and research findings from this project will be shared through webinars and conference presentations to all practitioners and stakeholders, driving even greater impacts and leading to true systemic change. These benefits will reach not only small and rural libraries, but extend to all public and school libraries. This table summarizes the expected benefits of the project.

Audience	Benefit(s)	Sustainability
Youth participants in code club programs	Introduction to computational thinking - career prep, development of growth mindset	Skills acquired over months or full year of participation in code club can persist over a lifetime.
Library staff facilitating code club under the project	Confidence and skills to administer coding program and other topics	Staff may continue to offer code club beyond the program term and can apply core concepts to other topics.
Library staff involved in coding in other capacities	Webinars, conference presentations, resource sharing and spread of best practices via community	More libraries offer code club and other programming to help youth develop 21st century technology skills.

Libraries in small and rural communities are uniquely equipped to introduce young people to computer programming. The Coding at Every Library project will leverage a strong team, build on past work, and adapt an existing toolset to ensure that 50 libraries are successful with weekly, informal code clubs. By customizing the model for small and rural libraries, partnering with existing networks, developing an online community, and sharing results, the project impacts will extend to many more libraries beyond the two-year funding period.

Coding at Every Library - Schedule of Completion

Activty #	TASK TITLE	YEAR ONE - 2018-19												YEAR TWO - 2019-20											
		O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
1	Phase 1																								
1.1	Finalize project design	■																							
1.2	Review with ARSL Board	■																							
1.3	Collect input from small/rural libraries	■																							
1.4	Design application process	■																							
1.5	Application open		■																						
1.6	Review applications			■																					
2	Phase 2																								
2.1	Notify participating libraries				■																				
2.2	Code club training				■	■	■	■																	
2.3	Consulting/tailoring for community needs					■	■																		
2.4	Develop diversity plans						■	■																	
2.5	Pre-program facilitator surveys																								
2.6	Develop evaluation protocols					■	■	■																	
3	Phase 3																								
3.1	Weekly code clubs running							■	■	■	■	■	■	■	■	■	■	■	■						
3.2	Supplemental training + support							■	■	■															
3.3	Mid-program surveys									■	■	■													
3.4	Launch online community												■												
3.5	Refine and update program													■	■	■	■	■	■						
4	Phase 4																								
4.1	Post-program surveys																			■					
4.2	Evaluation analysis																			■	■				
4.3	Hand off community to members																					■			
4.4	Summarize evaluation data																					■	■		
4.5	Begin disseminating results																							■	■

DIGITAL PRODUCT FORM

Introduction
The Institute of Museum and Library Services (IMLS) is committed to expanding public access to federally funded digital products (i.e., digital content, resources, assets, software, and datasets). The products you create with IMLS funding require careful stewardship to protect and enhance their value, and they should be freely and readily available for use and re-use by libraries, archives, museums, and the public. However, applying these principles to the development and management of digital products can be challenging. Because technology is dynamic and because we do not want to inhibit innovation, we do not want to prescribe set standards and practices that could become quickly outdated. Instead, we ask that you answer questions that address specific aspects of creating and managing digital products. Like all components of your IMLS application, your answers will be used by IMLS staff and by expert peer reviewers to evaluate your application, and they will be important in determining whether your project will be funded.

Instructions

✗ Please check here if you have reviewed Parts I, II, III, and IV below and you have determined that your proposal does NOT involve the creation of digital products (i.e., digital content, resources, assets, software, or datasets). You must still submit this Digital Product Form with your proposal even if you check this box, because this Digital Product Form is a Required Document.

If you ARE creating digital products, you must provide answers to the questions in Part I. In addition, you must also complete at least one of the subsequent sections. If you intend to create or collect digital content, resources, or assets, complete Part II. If you intend to develop software, complete Part III. If you intend to create a dataset, complete Part IV.

Part I: Intellectual Property Rights and Permissions

A.1 What will be the intellectual property status of the digital products (content, resources, assets, software, or datasets) you intend to create? Who will hold the copyright(s)? How will you explain property rights and permissions to potential users (for example, by assigning a non-restrictive license such as BSD, GNU, MIT, or Creative Commons to the product)? Explain and justify your licensing selections.

A.2 What ownership rights will your organization assert over the new digital products and what conditions will you impose on access and use? Explain and justify any terms of access and conditions of use and detail how you will notify potential users about relevant terms or conditions.

A.3 If you will create any products that may involve privacy concerns, require obtaining permissions or rights, or raise any cultural sensitivities, describe the issues and how you plan to address them.

Part II: Projects Creating or Collecting Digital Content, Resources, or Assets

A. Creating or Collecting New Digital Content, Resources, or Assets

A.1 Describe the digital content, resources, or assets you will create or collect, the quantities of each type, and format you will use.

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

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

B. Workflow and Asset Maintenance/Preservation

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

B.2 Describe your plan for preserving and maintaining digital assets during and after the award period of performance. Your plan may address storage systems, shared repositories, technical documentation, migration planning, and commitment of organizational funding for these purposes. Please note: You may charge the federal award before closeout for the costs of publication or sharing of research results if the costs are not incurred during the period of performance of the federal award (see 2 C.F.R. § 200.461).

C. Metadata

C.1 Describe how you will produce any and all technical, descriptive, administrative, or preservation metadata. 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).

C.2 Explain your strategy for preserving and maintaining metadata created or collected during and after the award period of performance.

C.3 Explain what metadata sharing and/or other strategies you will use to facilitate widespread discovery and use of the digital content, resources, or assets created during your project (e.g., an API [Application Programming Interface], contributions to a digital platform, or other ways you might enable batch queries and retrieval of metadata).

D. Access and Use

D.1 Describe how you will make the digital content, resources, or assets 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).

D.2 Provide the name(s) and URL(s) (Uniform Resource Locator) for any examples of previous digital content, resources, or assets your organization has created.

Part III. Projects Developing Software

A. General Information

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

A.2 List other existing software that wholly or partially performs the same functions, and explain how the software you intend to create is different, and justify why those differences are significant and necessary.

B. Technical Information

B.1 List the programming languages, platforms, software, or other applications you will use to create your software and explain why you chose them.

B.2 Describe how the software you intend to create will extend or interoperate with relevant existing software.

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

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

B.5 Provide the name(s) and URL(s) for examples of any previous software your organization has created.

C. Access and Use

C.1 We expect applicants seeking federal funds for software to develop and release these products under open-source licenses to maximize access and promote reuse. What ownership rights will your organization assert over the software you intend to create, and what conditions will you impose on its access and use? Identify and explain the license under which you will release source code for the software you develop (e.g., BSD, GNU, or MIT software licenses). Explain and justify any prohibitive terms or conditions of use or access and detail how you will notify potential users about relevant terms and conditions.

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

C.3 Identify where you will deposit the source code for the software you intend to develop:

Name of publicly accessible source code repository:

URL:

Part IV: Projects Creating Datasets

A.1 Identify the type of data you plan to collect or generate, and the purpose or intended use to which you expect it to be put. Describe the method(s) you will use and the approximate dates or intervals at which you will collect or generate it.

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

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

A.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.

A.5 What methods 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).

A.6 What documentation (e.g., data documentation, codebooks) will you capture or create along with the dataset(s)? 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?

A.7 What is your plan for archiving, managing, and disseminating data after the completion of the award-funded project?

A.8 Identify where you will deposit the dataset(s):

Name of repository:

URL:

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