

## Abstract

Queens College, the lead applicant, and Texas Woman's University will host a National Forum on **Integrating Computational Thinking into LIS Youth Services Courses**. Currently a disconnect exists between computational thinking (CT) as defined by computer science (CS) and CT in the context of Library and Information Science (e.g., CT as a literacy) creating conflict within both communities as to what the library contribution should be in this space. CT skills transcend the CS arena, as these skills transfer to multiple curricular areas, college readiness, career readiness, and everyday life issues. CT in CS focuses on skills required for computing. LIS, while acknowledging the necessity for our youth to be STEM proficient, focuses on people holistically, acknowledging people and communities need problem solving skills applicable to multiple arenas, and that such skills should be taught both inside and outside the context of computing.

The forums, to be held at ALA MidWinter 2020 and ALA Annual 2020, will bring together interdisciplinary faculty, pre-service librarians, and in-service librarians to collaboratively develop a framework for a model curriculum, course modules, or class activities integrating computational thinking (CT) into Library and Information Studies (LIS) youth services courses. Materials created in this forum will be shared within the Libraries Ready to Code (RtC) website to complement the resources already available to the library community. Forum findings will also be disseminated within the LIS community through journal articles, conference presentations, and other venues. Materials may also be used by ALA's Washington Office for advocacy and to inform policy priorities.

The proposed forum on Integrating Computational Thinking into LIS Youth Services Courses addresses existing gaps in LIS research by taking a multi-tiered approach: interdisciplinary faculty developing curriculum and resources to be integrated into pre-service library graduate programs and then developing and disseminating additional resources for pre- and in-service librarians at the national level. The proposed forum also extends the RtC initiative by responding to initial findings identifying a need (1) for pre-service librarians to have access to courses preparing them to embed LIS-specific CT skills and activities in youth programs; (2) for targeted support for LIS faculty to develop CT activities for their courses; (3) for an opportunity to consult with an interdisciplinary faculty cohort with expertise in CT to offer insight and inform LIS practice; (4) for exploring CT as a literacy applicable to LIS contexts beyond coding and CS; and (5) to create resources to be disseminated to school and public librarians, thus increasing access to CT, especially for underrepresented populations

## **Proposal Narrative**

Queens College and Texas Woman's University respectfully request \$150,000 to host a National Forum on **Integrating Computational Thinking into LIS Youth Services Courses**. The forum, a series of workshops, will bring together interdisciplinary faculty, pre-service librarians, and in-service librarians to collaboratively develop a framework for a model curriculum, course modules, or class activities integrating computational thinking (CT) into Library and Information Science (LIS) youth services courses. Materials created in this forum will be shared within the Libraries Ready to Code (RtC) website to complement the resources already available to the library community. Forum findings will also be disseminated within the LIS community through journal articles, conference presentations, and other venues. Materials may also be used by ALA's Washington Office for advocacy and to inform policy priorities.

### **Statement of Need**

Computational thinking (CT) traditionally has been widely associated with computer science (CS). Within the context of CS, CT has been identified as a systematic problem-solving process involving the formulation of problems in such a way for a computer to understand. LIS youth services faculty identified CT as a critical literacy for youth (Martin, 2017), preparing them to master K-12 STEM (Science, Technology, Engineering, Math) standards (Yadav, Hong, and Stephenson, 2016) and to guarantee youth have skills essential to future employment and civic participation. CT literacy includes strategies and skills from problem solving, critical thinking, debugging, creativity, and collaboration. All of these skills are already in demand in many sectors of the workforce and are anticipated to be essential for the future workforce when today's K-12 students graduate. To ensure the youth in their communities have opportunities to develop CT literacies, library staff must themselves have opportunities to build skills and confidence to incorporate CT into the programs they design with and for youth. To address gaps in opportunity, it is especially important that libraries, whose missions focus on equity, diversity, and inclusion, provide CT programs for youth with less access or exposure to such programs.

Corporate, professional, and government entities, including College Board; the National Academies of Science, Engineering, and Medicine's Computer Science and Telecommunications Board; the National Science Foundation; Microsoft Research; and Google have been developing CT-specific initiatives to be implemented into K-12 curriculum (Wing 2010; Grover and Pea, 2013). The current iteration of International Society for Technology in Education (ISTE) Standards for Students (2019a) and International Society for Technology in Education (ISTE) Standards for Educators (2019b) identifies CT as one of the six major standards students should master during their K-12 experience, positing "students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to

develop and test solutions.” The American Association for School Librarians (AASL, 2018a) emphasizes the need for schools to embed the ISTE standards in curriculum, including the development of CT skills.

Currently a disconnect exists between CT as defined by CS and CT in the context of LIS (e.g., CT as a literacy) creating conflict within both communities as to what the library contribution should be in this space. CT skills transcend the CS arena, as these skills transfer to multiple curricular areas, college readiness, career readiness, and everyday life issues. CT in CS focuses on skills required for computing. LIS, while acknowledging the necessity for our youth to be STEM proficient, focuses on people holistically, acknowledging people and communities need problem solving skills applicable to multiple arenas, and that such skills should be taught both inside and outside the context of computing. Youth need access to formal and informal learning opportunities allowing them to develop CT skills in a wider context (Sykora, 2014; Smith, 2016; Braun & Visser, 2017). Public and school librarians have provided resources and programming to encourage lifelong, formal, and informal learning, thus making libraries an ideal space to facilitate CT skill development. Moreover, the Young Adult Library Services Association (2017), the American Association of School Librarians (2018b), and the Association for Library Services to Children (2015), in their recently revised and respective research agenda, standards, and competencies, address the need for youth services librarians to provide youth with formal and informal learning spaces, to address curricular and personal needs of youth patrons, to provide equity of access to resources and services, and to prepare youth to be lifelong learners.

While CT opportunity is widely endorsed by the education community and the resulting skills desired by employers, current initiatives and investments made indicate the focus has been on in-service professional development. This approach is important but inadequate, leaving new librarians ill-prepared to meet the needs of the youth and the communities they will ultimately living and working in. For example, previously funded IMLS projects exploring CT and youth have typically focused on coding and/or training the trainer models, revealing a continued gap in research and materials to prepare librarians with skills necessary to design and implement programs through which children and youth develop CT literacies.

Arizona State University’s Center for Gender Equity in Science & University of Michigan’s School of Information provide public library staff with professional development and training to teach CT skills. The North Dakota State Library project is also working with current library staff and focusing on specific coding programs to promote CT skills. These two examples (and those in Addendum 1) and existing LIS research indicate that in-service librarians and library staff are being trained to integrate CT into library programming, and specific libraries are experimenting with developing CT programs for youth. Absent, however, are projects for pre-service librarians through their formal graduate programs, aside from Phase II of the Libraries Ready to Code

(RtC) initiative. Further, a scan of National Science Foundation (NSF), which has heavily invested in CS education, shows thousands of CT-focused funded grants with emphasis on computer science and/or K-12 education but not youth services libraries.

Launched in 2016, Phase I of the American Library Association and Google-sponsored Libraries Ready to Code (RtC) initiative produced a report based on an environmental scan of the current status of computer programming activities in U.S. public and K–12 libraries. Results from Phase I concluded youth librarians doubt their abilities to integrate CT into curricula and programming (Braun & Visser, 2017). From these findings, a second phase of RtC was designed with the goal of bringing CT into the current LIS youth services curriculum at several LIS programs in the United States. Phase II of RtC featured a cohort of six LIS faculty members who collaboratively revised their LIS youth services technology courses for pre-service librarians, integrating CT activities.

The review of previous and existing work on CT in LIS and CS, coupled with the recently revised YALSA research agenda, AASL standards, and ALSC competencies, indicate CT in LIS needs to expand beyond CS and coding, connecting CT to a wide variety of curricular and personal needs of youth patrons. Additionally, because the RtC Phase II project only included six faculty, its impact has been relatively narrow while at the same time implications for continued work, uncovered through the evaluation, indicate the experiences and prototype materials produced by the faculty cohort could provide a strong foundation for launching a larger initiative. Findings from the subsequent Phase III of the RtC initiative also call out the need for pre-service librarians to have opportunity in their courses to develop requisite skills and confidence to provide high-quality CT programs for children and youth.

The proposed forum on Integrating Computational Thinking into LIS Youth Services Courses addresses existing gaps in LIS research by taking a multi-tiered approach: interdisciplinary faculty developing curriculum and resources to be integrated into pre-service library graduate programs and then developing and disseminating additional resources for pre- and in-service librarians at the national level. The proposed forum also extends the RtC initiative by responding to initial findings identifying a need (1) for pre-service librarians to have access to courses preparing them to embed LIS-specific CT skills and activities in youth programs; (2) for targeted support for LIS faculty to develop CT activities for their courses; (3) for an opportunity to consult with an interdisciplinary faculty cohort with expertise in CT to offer insight and inform LIS practice; (4) for exploring CT as a literacy applicable to LIS contexts beyond coding and CS; and (5) to create resources to be disseminated to in-service school and public librarians, thus increasing access to CT, especially for underrepresented populations (Martin, 2017).

In accordance with IMLS forum criteria, this proposed forum will convene qualified experts and key stakeholders to address how to integrate an interdisciplinary CT perspective into LIS coursework and youth services library programming. This integration will prepare the next generation of library staff to provide quality library service for and with youth, culminating in significant positive impact for communities throughout the United States. Non-LIS faculty with CT expertise in the contexts of classroom learning and/or other new frameworks for learning add value to both the LIS curriculum and youth services library profession by providing insights and experiences outside the LIS realm, helping LIS educators move existing LIS CT concepts forward and/or narrow down where and how LIS educators and library professionals can contribute differently, thereby building upon existing work and not merely duplicating it. Including practicing library staff supports an important research practice continuum so LIS courses are designed based on identified needs experienced by the profession, thus leading to more relevant and timely curriculum.

### **Project Design**

The proposed forum addresses the IMLS project category of Lifelong Learning through collaboration, communication, curriculum development, skill development, and critical thinking. In Workshop I, Learning Sciences faculty, Educational Technology Faculty, and LIS faculty will collaboratively develop and pilot curricular resources to integrate into youth services LIS courses. Pre-service librarians will gain expertise and develop skills necessary to assist their youth patrons in developing the CT skills required to be critical thinkers and problem solvers in school and beyond. Workshop II will foster collaborations between academia and in-service library professionals, as in-service librarians will develop additional resources to be disseminated to a wider body of in-service library professionals.

Additionally, the proposed forum realizes the IMLS Agency Goal of Lifelong Learning, expanding the community of practice (CoP) from academia to pre-service librarians to in-service librarians. This multi-tiered approach will ultimately facilitate the literacy development of diverse youth patrons, preparing them to be lifelong learners in a global society by promoting the development of problem solving skills applicable to K-12 schooling, college, career, and everyday life experiences.

Queens College and Texas Woman's University will create a working group of thirty-two faculty, pre-service librarians, and in-service librarians to collaborate to build resources bridging computational thinking with everyday librarian practices and community voices. The evaluation reports from the Ready to Code initiative indicate that the existing CT framework does not directly align with LIS. For example, CT does not address people, communities, or empowerment. In part, this is because CT, as has been presented, is too heavily connected to computer science both as a framework and as a process. However, if CT within an LIS context

can be better aligned, the cognitive dissonance that occurs when pre-service librarians are introduced to CT will be minimized.

Simply stated, computer science is about algorithms, and Library and Information Science is about technology and people. This forum will focus on recontextualizing CT outside of the computer science domain by creating CT resources highlighting the connection between technology and people rather than efficient computation. By doing this we will expand the CT knowledge domain from computer science into a grounded LIS domain.

The forum on Integrating Computational Thinking into LIS Youth Services has four goals:

1. Extend the current understanding of CT by inviting faculty scholars from outside of computer science who are teaching and researching in the areas of CT to work with LIS faculty to create class activities or modules to further develop CT as a critical literacy.
2. Connect faculty with projects and resources completed by school and public librarians to demonstrate how they have uniquely interpreted CT for use with their youth communities.
3. Include fresh voices in the CT conversation by inviting pre-service librarians to discuss ways of embedding the concept into library programs for youth.
4. Broaden the CoP formed through the RtC program by disseminating the resources created through the forum to improve the research practice continuum.

The forum will be carried out in five phases over a one-year period: two concept development pre-workshops, two participatory design workshops, and a community of practice and dissemination process. Each phase begins with a virtual conversation (pre-workshop) conducted over Flipgrid, a video discussion tool, and an introductory webinar. Participants will be expected to introduce themselves and describe their current use of CT in their teaching and research. The PIs will lead discussions to leverage the expertise of the participants in a constructive way to begin recontextualizing CT into the LIS domain. Participants will complete a reading packet and introductory exercises before convening for the forum. Content developed, including discussion captured by a research consultant will inform the two participatory design workshops (e.g., Faculty Participatory Design Workshop I and In-service and Pre-service Participatory Design Workshop II).

**Phase 1. - Pre-workshop Concept Development (Sept 1, 2019 - Dec 2019):** The project Co-PIs and Marijke Visser (Associate Director, Public Policy, ALA and the RtC liaison) will meet to select a diverse and interdisciplinary list of participants for the faculty forum (see Diversity Plan). Based on the work of the participants, a reading packet will be created to demonstrate how each of the members is contextualizing CT in their research and teaching. Themes will be drawn from the participants to begin shaping the forum agenda. Referencing the RtC evaluation from

the Phase III project, we will also pick sample library RtC projects to share with the faculty participants as exemplars of the breadth and variety of how libraries implement CT programs. This pre-workshop will be conducted virtually in multiple 90-minute sessions. Google, a partner of RtC, will be invited to participate in the planning sessions. A written summary from these conceptual planning sessions will be shared with participants for workshop preparation.

**Outcome:** An attendee list for the participatory design workshops, the development of pre-workshop reading materials, an agenda, and small group exercise modules for the workshop.

*Phase 2. - Faculty Participatory Design Workshop I* (January 24, 2020, Philadelphia at ALA Midwinter): With the aid of a participatory design workshop facilitator, 12 participants from LIS, Learning Sciences, and Educational Technology will actively engage in recontextualizing CT beyond the computer science domain. This workshop is intentionally set at the low number of twelve so participants can thoroughly explore one another's work and can collaborate closely to develop youth-focused LIS course activities, modules, and/or curriculum grounded in CT. This workshop will provide a strategic collaboration opportunity for faculty who are teaching and researching in the area of CT but whose work straddles different disciplinary domains to share their knowledge and expertise. Adding new voices to the CT conversation is critical to recontextualize the current work of CT and ground it within the LIS domain. The types of people that will be invited are

- Dr. David James, an Assistant Professor at Spelman College, whose research and teaching focuses on computer coding through Hip-Hop and the making of musical instruments.
- Dr. Martez Mott, a Postdoctoral researcher at Microsoft, who studies Accessible Touch Input for People with Motor Impairments and who formally taught programming at the University of Washington.
- Dr. Cecilia Fernandez, a Postdoctoral Research Fellow at the University of Michigan, who conducts sociocultural research that examines the educational and community experiences of students from non-dominant communities
- Dr. Abigail Phillips, an Assistant Professor at University of Wisconsin-Milwaukee, whose research focuses on making, critical librarianship, and mental health advocacy, while teaching youth librarianship.

The participant list will emphasize the connection between people and technology, especially underrepresented groups, rather than efficient computing, in an effort to ground CT in LIS.

**Outcome:** A new working conceptualization of computational thinking grounded in the LIS domain and sample course activities or outlines and reading lists for course modules that implement the newly conceptualized CT.

**Phase 3. - Pre-workshop Concept Development for In-service and Pre-service Forum**

(February - May 2020): With the aid of a participatory design workshop facilitator, the project team will design a full-day workshop to engage in-service and pre-service librarians in the design of CT library activities. A new group of participants will be selected including ten current MLIS students working in youth services from Queens College, Texas Woman's University, the University of Maryland and others that have had exposure to CT. Ten in-service librarians will also be invited to participate in the second forum. In addition to those names listed below, possible participants will be recruited from the ALA Spectrum Scholars program and ALA Ethnic caucuses.

- Marc Gartler, Manager Sequoia & Alicia Ashman Libraries Madison Public Library (Wisc.)
- Dr. Chris Harris, Director for the Genessee Valley Educational Partnership
- Joanna Fabicon, Senior Librarian for Children's Services at the Los Angeles Public Library and current RtC task force member
- Claudia Haines, Youth Services Librarian at the Homer Public Library (Alaska) Homer Public, author of *Becoming a Media Mentor: A Guide for Working with Children and Families*.

The reading packet derived from the faculty forum will be used to demonstrate the products created and ideas generated during the faculty forum and to provide participants with a framework to start their in-person discussions. A webinar will be held to discuss ways that CT is being recontextualized for LIS, and during the session, areas of interest, gaps in understanding, and themes will be drawn from the participants to begin shaping the forum agenda. Referencing the RtC evaluation from Phase III will provide sample library projects from the RtC program to share with the participants as exemplars of the breadth and variety of how libraries implement CT programs. This pre-workshop will be conducted virtually in multiple 90-minute sessions. Google, a partner of RtC, will be invited to participate in one of the planning sessions. The project team will seek participation from additional technology sector (e.g., Microsoft, Verizon, or Yelp). A written summary from these conceptual planning sessions will be shared with participants for workshop preparation.



**Outcome:** An attendee list for the participatory design workshops, the development of pre-workshop reading materials, an agenda, and small group exercise modules for the workshop.

*Phase 4. In-service and Pre-service Participatory Design Workshop II* (June 25, 2020 at ALA Annual in Chicago). During Workshop II, ten in-service and ten pre-service librarians (selected through an online survey which will be distributed through LIS and ALA communication channels) will collaborate to further develop the newly conceptualized materials from Workshop I. They will examine the resources and create new CT projects, library programs, or sample student activities for mass dissemination. The forum will be led by a participatory design workshop facilitator who will lead small group interactions and design sessions to create new CT resources.

**Outcome:** The creation of CT library activities for youth and training materials for in-service librarians.

*Phase 5 –Community of Practice and Dissemination* (July - Aug 2020): Workshop participants will produce tangible products to either implement in their courses (Workshop I) or distribute nationally through multiple communication channels (Workshop II). Project PIs will disseminate the results of the forum via a webinar (up to 500 participants), a podcast, the RtC website (<https://librariesreadytocode.org>), and ALISE and/or ALA conference presentations. Flipgrid will be used to facilitate communication between the participants and the RtC cohorts both before and after the forum.

**Outcome:** Workshop materials, a podcast of “How to use the materials,” a webinar, and ALISE/ALA conference presentations, all of which will be incorporated into the RtC Collection website.

This proposal uses an iterative assessment throughout the project. Additional measures of success will include: aligning project deliverables with the schedule of completion timeline; tracking the number of streams and downloads of webinars and podcasts; keeping a running tally of the visitors being directly linked to resources created through this project on the RtC website; and collecting assessment data based on surveys created for each forum.

### **Project Personnel**

Dr. Jose Sanchez (co-PI) is an Assistant Professor at Queens College in the Graduate School of Library and Information Studies where he teaches media production and programming courses. His most recent work focuses on the information practices of Mexican-American high school

## Queens College

students and diversity issues in Library and Information Science. As a consultant he has worked with Latina high school students through the Girlstart Program in Austin, Texas to teach computational thinking with Python and Java. Prior to his faculty positions he worked as a systems analyst and training specialist at The University of Texas at Austin where he designed multimedia projects, taught programming classes, and developed online teaching materials.

Dr. Jennifer Moore (co-PI) is an Associate Professor at Texas Woman's University in the School of Library and Information Studies where she teaches school library certification courses. Her recent areas of research include data literacy leadership and computational thinking for youth in libraries. Since being accepted as a faculty fellow for Libraries Ready to Code, she has published and presented three refereed works and four professional works on computational thinking for youth in libraries, and she has both a professional publication and presentation forthcoming. Prior to entering academia, she was an elementary school librarian.

Marijke Visser (Ready to Code liaison) is Senior Policy Advocate at the American Library Association's Washington Office. Her portfolio includes issues related to youth and technology as well as telecommunications policy. In her role in the Public Policy Unit of ALA, she advocates for policies at the federal level that advance equitable access to information. Her advocacy raises the awareness of decision makers of the role of libraries in education, employment and entrepreneurship, civic engagement, and individual empowerment. She leads ALA's work on the federal E-rate program which ensures public libraries have access to high-capacity broadband. She covers issues related to broadband adoption and use through libraries, especially for populations with unique challenges. She also leads ALA's Libraries Ready to Code initiative. This partnership with Google builds library capacity to provide programs that foster computational thinking literacies among youth. Most recently she is leading a new initiative in 2019 with Grow with Google focused on workforce development, small business and public libraries.

### **Diversity Plan**

Both Queens College and Texas Woman's University are Hispanic Serving Institutions and have a history of serving diverse students. A search for diverse faculty participants in the workshop will be conducted by inviting faculty working in CT who are members of organizations such as the iSchools Inclusion Institute, the Multicultural, Ethnic, and Humanistic concerns SIG of ALISE, the Multicultural / Multiethnic Education: Theory, Research, and Practice SIG at AERA and other similar groups. Workshop II selection criteria will focus on in-service librarians working in both urban and rural settings with diverse populations. Pre-service and in-service librarians will be recruited from the ethnic caucuses of ALA such as Reforma, the American Indian Library Association, the Asian Pacific American Library Association, and the Black Caucus of the American Library Association. Applicants for the the in-service librarian

workshop will be asked to include a plan on how the proposed project would connect with diverse youth in their communities.

### **Broad Impact**

Project outcomes have far-reaching implications. The interdisciplinary collaborative work both informs work in the field of LIS and also helps legitimize the work LIS is doing within the broader education community and other disciplines. The mass dissemination of these collaboratively developed resources can be utilized to expand the formal education of pre-service librarians and various training programs for in-service library professionals. In turn, the in-service library professionals will educate youth and potentially other community stakeholders about CT, facilitating the development of critical literacies applicable to STEM learning, college and career readiness, and everyday life issues, as well as fostering their desire to become and remain lifelong learners.

### **Project Budget and Resources**

The budget and resources to support the forum on **Integrating Computational Thinking into LIS Youth Services Courses** is designed based on years of experience with the RtC initiative. The financial resources needed for catering, lodging, stipends, and facilitators are commensurate with forums of similar size conducted over the last three years. The stipends and associated travel costs will allow participation without creating additional financial barriers for attendees. Queens College and Texas Woman's University are teaching schools and the co-PIs have 4/4 and 3/3 teaching loads during the academic year. The requested resources, one course release and six weeks of summer pay will provide them with the support needed to complete this project.

	SEP-19	OCT-19	NOV-19	DEC-19	JAN-20	FEB-20	MAR-20	APR-20	MAY-20	JUN-20	JUL-20	AUG-20
Project Launch	Active											
Phase 1: Identify Participants; select participants	Active	Active										
Phase 1: Develop reading packets			Active	Active								
Phase 1: Introductory webinars			Active	Active	Active							
Phase 1: Develop agenda and exercises for Forum 1		Active	Active	Active	Active							
Phase 2: Faculty Forum 1					Active							
Phase 3: Forum 2- Identify Participants; select participants						Active	Active					
Phase: 3: Develop reading packet							Active	Active	Active			
Phase 3: Introductory Webinars								Active	Active			
Phase 4: Practitioner and Pre-Service Participatory design Forum										Active		
Phase 5: Release resources from forums on website						Active	Active	Active	Active	Active	Active	Active
Phase 5: Create "How to use Resources" podcast											Active	
Phase 5: Host CT in LIS webinar												Active
Phase 5: Submit ALISE/ALA conference materials										Active	Active	Active



## DIGITAL PRODUCT FORM

### Introduction

The Institute of Museum and Library Services (IMLS) is committed to expanding public access to federally funded digital products (e.g., 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. 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

All applications must include a Digital Product Form.

- 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 the format(s) 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. How will you 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?