Building Civic Open Data Capacity through Instructional Design

This two-year proposed project to the Laura Bush 21st Century Librarian Program will build and pilot instructional materials focused on building capacity for library participation in their civic data ecosystems. Our goals with this instructional design project are twofold: to create materials that 1. instructors can integrate in MLIS coursework and that 2. can be used in professional development training in library settings. These cross-disciplinary materials will be designed to enable integration in other programs that are preparing students for civic data intermediary roles.

This project is a partnership between the University of Pittsburgh's School of Computing and Information and the Western Pennsylvania Regional Data Center (WPRDC) based in the University Center for Social and Urban Research, with advisory support from the University of Pittsburgh Library System and representatives from libraries and MLIS programs nationally. We will engage our advisors to gather feedback on the instructional materials. In addition to working with our advisors, we will collaborate with the Allegheny County Library System and the Graduate School of Public and International Affairs (GSPIA) at the University of Pittsburgh to pilot the instructional materials. Early in the project, we will also engage state and city chief data officers to identify skills and understandings that they view as essential to civic data work via Civic Analytics Network and the State Data Officers Network.

This project extends the IMLS-funded Civic Switchboard project, with the LB21 project team including Civic Switchboard team members. This project supports the IMLS goal of "Build Capacity." Examples from the field and preceding work point to an opportunity for libraries to be critical contributors in the civic data ecosystems, by providing data literacy education, making civic data more usable, stewarding civic data, and more.[1] To assist library workers to fulfill these roles and feel confident and empowered to engage with civic data, we propose the development of instructional materials that will build capacity and that can be embedded in MLIS courses and professional development programs. This Community Catalyst Grant focuses on Master's-level and Continuing Education project types.

I. Statement of Broad Need

Open civic data provides a conduit for public participation in our communities, a lens into government decision-making, and a resource for innovation.[2] In order for the potential of open civic data to be realized, data producers in community organizations and government must have skills and knowledge that helps them manage data and prepare data for publication. The broader public also needs support using open civic data and data literacy education. In the 2017 IMLS forum on LIS education, Carole Palmer observed that civic agencies " 'are great at opening up the data, making it available on platforms, but not at making it usable to the public. And that is where our [library] expertise really comes in.'"[3] This project is premised on the valuable roles that library workers should play in supporting data producers, intermediaries, and users and also asserts that LIS programs should offer data literacy, management, and analytics preparation for MLIS students so that they can serve as civic data partners and ultimately improve the well-being of local communities.

The notion of the library worker as a "civic data intermediary" is core to this work. The National Neighborhood Indicators Partnership defines the following as core activities of a civic data intermediary: 1.

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[1] See Civic Switchboard Civic Data Roles and case studies: https://civic-switchboard.gitbook.io/guide/library-roles

[2] See Yannis Charalabidis et al., *The World of Open Data: Concepts, Methods, Tools and Experiences* (Cham, Switzerland: Springer, 2018), 7-8.

[3] Ashley E. Sands et al., *Positioning Library and Information Science Graduate Programs for 21st Century Practice*, (Washington, D.C.: Institute of Museum and Library Services, 2017): 10.

Assembling, transforming, and maintaining data; 2. Disseminating information and applying the data to achieve impact; 3. Using data to strengthen civic capacity and governance.[4] This project builds on recent writings that conceptualize library roles as civic data intermediaries and that offer examples of both public and academic libraries' engagement with data about their communities. Robinson and Mather (2017), for example, observe a close alignment between the mission of public libraries and local government's open data initiatives. Citing examples of Edmonton Public Library and Chattanooga Public Library, they assert that libraries are well-suited to be "civic data infomediaries" or a "a person or organization that connects community members with open data so that public value can be derived from the data."[5]

This project builds on the IMLS-funded Civic Switchboard (LG-70-17-0146-17) project, which aims to increase existing librarians' capacity to develop civic data partnerships through workshops, field awards, and a guide. The Civic Switchboard team identified a series of roles for libraries to play in their civic data ecosystem, as well as barriers that library workers experience while engaging with open civic data. Similarly, Fanghui Xiao et al. (2018) argue that there are emerging specialist data roles for working with open government data and maintain that iSchools should respond accordingly with MLIS curriculum that prepares students for these roles.[6]

In a 2018 report focused on public libraries and civic engagement, Chris Coward, Colin Maclay, and Maria Garrido suggest that lack of training serves as an impediment for library workers to take a more active role in community matters and encouraging the public to do so as well. They observe, "Civic engagement typically is not a part of library and information science curriculum, and most working librarians are unlikely to have had classes. Librarians who are thrown into civic engagement efforts might find that they are 'flying blind.'"[7] The Civic Switchboard project similarly found that "feeling unqualified" is one of the main barriers that prevent library workers from engaging in their civic data ecosystems. While MLIS programs and library professional development efforts have directed much attention to open research data services, less attention has been given toward how to build capacity for services and roles focused on open civic data through curriculum and instruction. MLIS programs should offer a curriculum that positions librarians as active and valuable players in their civic data ecosystem and that can prepare MLIS students for positions outside of traditional library settings that involve work with civic data. Our proposed project will fill a gap by designing instructional materials that MLIS programs and libraries can adapt to prepare library workers to be community-focused civic data intermediaries. This project will assess barriers, information needs, and existing understandings around civic data among library workers and MLIS students in order to inform the content. This project will create instructional materials that can be integrated into graduate and professional education and offer scaffolding, direction, and context that will assist library workers to be civically active. The Civic Switchboard-identified library roles and barriers will guide this instructional development.

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[4] Leah Hendey, Jake Cowan, G. Thomas Kingsley, and Kathryn L.S. Pettit, "NNIP'S Guide to Starting a Local Data Intermediary," National Neighborhood Indicators Partnership (May 2016), https://www.urban.org/sites/default/files/publication/80901/2000798-NNIP%27s-Guide-to-Starting-a-Local-Data-Intermediary.pdf

[5] Pamela J Robinson and L.W. Mather, "Open Data Community Maturity: Libraries as Civic Infomediaries," *URISA Journal* 28(1) (2017): 31.

[6] Fanghui Xiao, Liz Lyon, Ning Zou, and Robert M. Gradeck, "Emerging Roles for Optimising Re-Use of Open Government Data," *International Journal of Digital Curation* 13, no. 1 (2018): 370-371.

[7] Coward, McClay, and Garrido, "Public Libraries as Platforms for Civic Engagement," Seattle: Technology & Social Change Group, University of Washington Information School (2018). https://digital.lib.washington.edu/researchworks/bitstream/handle/1773/41877/CivLib.pdf

This proposed project connects to recommendations put forth in the IMLS-funded Data Science in Libraries Project.[8] This project, led by Matt Burton, considers what it means to be a "data-savvy" librarian and the drivers and barriers to maintaining a data-savvy library and workforce. The project considered LIS education, recommending the "moderniz[ation of] library and information school programs to be more data-centric and oriented towards the changing research and societal needs" (p. 12). Through our project, we will respond to this recommendation.

This effort complements two projects that are supported by the IMLS: Open Data Literacy (LG-70-17-0146-17) at the University of Washington's Information School and the Training Future Librarians for Civic Engagement and City Collaboration (RE-17-19-0036-19) at the University of Michigan's School of Information. The Open Data Literacy project provides University of Washington students meaningful field experiences with open data and "advances data literacy by developing new curriculum for iSchool students and public librarians."[9] This project has pushed the MLIS education forward in developing strategies for experiential learning in the civic data sector. We will be informed by the University of Michigan's training in civic technology, librarianship, and city data and PI Cliff Lampe will serve as an advisor to this team. We will be mindful of developing materials that complement, rather than recreate, existing curricular efforts.

This project is at the piloting phase. It builds on preceding work by the Civic Switchboard team and Xiao et al. to identify civic data roles for library workers. This piloting work will craft instructional materials and, through testing and assessment, demonstrate the readiness of adoption of the instructional materials for instructors and facilitators of library professional development. We will engage individual instructors and facilitators and offer to provide support during their implementation in order to yield positive results and lessons within the target audiences.

The Community Catalyst category includes projects that "enhanc[e] educational or training programs related to professionals' skills and expertise in strengthening civic and cultural engagement" and that "have a significant impact on the capacity of library and archives professionals to contribute to the well-being of communities." The premise of this project is that libraries serve as valuable civic data intermediaries and, when capacity is built, library workers can empower community members to make meaning of civic data and improve their communities and their lives. Civic data work is community engagement work and our project will build materials that can be implemented by MLIS programs and libraries to strengthen community-focused data work in our country's libraries. This project aligns with the IMLS goal of "Build Capacity"; we will "share and adopt best practices" for civic data education and development. Library workers equipped to assume civic data roles will contribute to the creation of "trusted spaces for community engagement and dialogue."[10]

II. Project Design

The central goal of this project is to build instructional material that will equip future and current library workers to engage with civic open data. An assumption of this project is that the exploratory work on library roles in civic data ecosystems by Civic Switchboard and researchers like Xiao et al. is valuable framing for our materials. Because the roles and common barriers articulated by Civic Switchboard were identified following conversations with numerous library workers who participated in the project's workshops, field

[8] Matt Burton, Liz Lyon, Chris Erdmann, and Bonnie Tijerina, "Shifting to Data Savvy: The Future of Data Science In Libraries," 2017, http://d-scholarship.pitt.edu/33891/1/Shifting%20to%20Data%20Savvy.pdf

[9] Open Data Literacy, "About," https://odl.ischool.uw.edu/about/

[10] IMLS, Laura Bush 21st Century Librarian Program: FY 2020 Notice of Funding Opportunity, 8.

award program, and community of practice calls, these findings will be the starting point for designing learning outcomes. We will round out this foundational work through the needs assessment in phase 1 of this project.

The project's primary outputs will be instructional materials that can be integrated into MLIS curriculum and adapted for professional development opportunities for library workers. These instructional materials will include lesson plans, lecture notes, presentations, assignments for courses and exercises. During the project, we will make these versions materials available on a project website and develop web-based mechanisms for community feedback throughout the project. We will target Library Carpentry as primary strategy for publishing final outputs and will communicate the availability of these materials through library channels and conferences. In addition, we will share final versions of our materials via our project website.

The target audience are MLIS instructors who may adapt these materials, MLIS students, and library workers in the field who wish to deepen their engagement with civic data. This project intends to prepare MLIS students to engage with civic data work as library workers or to enter careers as civic data intermediaries in other organizations. With these paths in mind, our project will assess the instructional materials through discussions with both MLIS instructors and civic data workers who represent potential employers for MLIS graduates.

A secondary audience for these materials includes instructors in urban studies, public policy, and political science programs that may prepare students for careers working with civic data. Our instructional materials will be shared with piloted with students in the University of Pittsburgh's Graduate School for Public and International Affairs for their feedback. We will work with GSPIA instructors and civic open data intermediaries to identify strategies for sharing versions of the materials broadly with instructors in peer programs.

We will structure the project using the ADDIE instructional systems design (ISD) framework. ADDIE is an acronym for Analysis, Design, Development, Implementation and Evaluation and is a framework that allows for iterative development of instructional content. In the Analysis stage, instructional designers, in partnership with stakeholders, identify instructional needs based on learner characteristics and gaps in learner understanding. This information is used to develop instructional goals and objectives in the Design phase. Instructional designers also determine how learners will demonstrate that they have acquired the understanding and skills needed to accomplish these objectives. Decisions about instructional tools, media, and environments also must be made in the Design phase, and lead to the Development phase, where instructional strategies and tactics are storyboarded, revised based on feedback, and then created. Implementation occurs when the learning environment and/or instructional content is made available to learners. Typically, the instructional content goes through alpha and beta testing before being released to a larger audience. In the last phase, Evaluate, learning is assessed and the quality of the instructional content is evaluated. While this process is described linearly, stages can be revisited and repeated until the instructional content meets its goals.

The work will be conducted in four main phases:

Phase 1: Information Gathering (September 2020 to February 2021)*.* Through focus groups and a survey, the project team will build an understanding of barriers to open data work and gaps in understanding that affect public and academic library workers' comfort with beginning to engage with civic data. This is in keeping with the LB21 program's essential idea of "the importance of understanding the needs of end users and then improving services to meet those needs."[11] We will also learn from the perspectives of civic open data leaders to understand the skills and understandings essential to civic data intermediary roles. This work will

[11]IMLS LB21 Notice of Funding, p. 2.

complement the research by the Civic Switchboard project. This information needs assessment work will be supported by a PhD Student Researcher. This phase will entail:

- Designing a survey and focus group instruments and obtaining IRB approval.
- Using professional channels such as RDAP, PLA, DLF Records Transparency/Accountability Interest Group, and the Civic Data Operators Group to connect with library workers during the needs assessment. We will disseminate a survey through these channels and will arrange in-person focus groups or conference calls with library workers to understand learner characteristics and gaps in learner understanding about civic data and interconnections with LIS.
- Running focus groups with enrolled MLIS students to understand learner characteristics and gaps in learner understanding about civic data and interconnections with LIS.
- Identifying spaces in MLIS curriculum where civic open data education can be embedded through a content analysis of course offerings in a sample of programs and discussions with our advisors from MLIS programs.
- Conducting a needs assessment with civic data intermediaries to affirm the skills and understandings that are essential to data intermediary work. We will engage two networks of Chief Data Officers at this stage: the Civic Analytics Network based at Harvard University and the State Chief Data Officers Network based at Georgetown University.
- Consulting with the Center for Diversity in Curriculum at the University of Pittsburgh and Kayla Booth of the iSchool Inclusion Institute (i3) for guidance on building DEI principles into our instructional materials, and engagement strategies with professional networks, students, library workers, MLIS programs, and intermediary organizations.
- Creating a communications plan for this project.

***Phase 2: Instructional design and development* (March 2021-September 2021)**. While we will take an iterative approach to design in this project, we will use this phase to analyze the focus group and survey data and identify data-related barriers and pain points facing librarians and civic data sector employees. We will develop instructional goals and objectives in this phase and select instructional tools, media, and environments. We will design instructional materials, in the form of a lesson plans, instructor notes/facilitator guide, presentation slides, recordings, exercises, and assignments for courses. These outputs will be designed so they can be customized for use by the primary target audiences: MLIS educators and library staff who run or deliver professional development programs. We will build materials that are sufficiently adaptable so that they can be used by other audiences, namely instructors in public policy, urban studies, and political science programs who are preparing students for civic data roles. We will ensure project deliverables are readily adaptable for the local data context, offering strategies that MLIS instructors and professional development organizers can employ for examining and describing their data ecosystem.

***Phase 3: Implementation, Assessment, and Revision Phase* (September 2021 to April 2022).** Request review of instructional materials by individuals from library and civic sector. These reviewers will include our advisors, as well as individuals identified during Phase 1 of this project. During this phase, we will develop a sustainability plan for publication and longevity of the instructional content. Additionally, we will pilot instructional content with a cohort of public librarians in Allegheny County in Pennsylvania. Assessment of learning through pre-tests/post-tests and quizzing will provide insight into whether the learning objectives are being met, and will indicate if changes need to be made in the content or presentation of the content. The pilot cohort will share their general feedback through surveys about the usability and quality of the instruction. In addition, we will run a pilot course in our MLIS program to drive testing and embed instruments throughout the course that would collect student feedback on individual assignments and lessons. We will

share with our advisors, who represent stakeholders in the library and MLIS education community. Feedback will be used to make improvements to the instructional materials during this phase.

Phase 4: Sharing and Publication Phase **(May 2022 to September 2022)**: We will implement the sustainability plan finalized in Phase 3 of the project. We will target the Library Carpentry as the home for the materials following the Lesson Development Process outlined by the organization and also publish the materials through our project website. While we will present and publish on our work throughout the project, we will target spring and summer 2022 conferences to present the final outputs.

This project requests funding for two years. As the budget and budget justification illustrate, this funding will largely support personnel resources, including the time of a PhD student at the University of Pittsburgh. In addition, we are requesting support that would allow us to provide small compensation amounts to participants of focus groups, both at the needs assessment phase (Phase 1) and implementation, assessment, and revision phase (Phase 3). We will use tools and platforms that are free for our team to adopt: Slack as a communications platform, our University-licensed Box account for file management, and GitHub pages for our website.

The core project team includes faculty in the School of Computing and Information, a funded PhD Student Researcher, and staff in the Western Pennsylvania Regional Data Center (WPRDC) at the University of Pittsburgh. They bring the following expertise and backgrounds to the project, in brief, and will play the following roles:

Team Member	**Background**	**Project Role**
Jake Biehl	Faculty member in MLIS program, School of Computing and Information; PhD in Computer Science	Data science-focused content contributor; Supervisor to PhD Graduate Student Researcher
Matt Burton	Faculty member in MLIS program, School of Computing and Information; PI of IMLS-funded Data Science in Libraries Project; PhD in Information	Data science-focused content contributor; Co-manage dissemination and sharing phase
Bob Gradeck	Member of the Civic Switchboard Project Team; Project Director, Western Pennsylvania Regional Data Center where he leads relationship-building efforts with data publishers and users and community engagement efforts	Liaison to civic data intermediary community; assist with information gathering with civic data groups and piloting instructional materials; civic data-focused content creator
Eleanor Mattern	Member of the Civic Switchboard Project Team; Faculty member in MLIS program, School of Computing and Information where she designed and delivered a course on Open Government Data (fall 2019); PhD in Library and Information Sciences	Project PI; Manage Phase 1 information gathering; Civic data and information stewardship-focused content creator; Co-lead piloting efforts; Co-lead dissemination and sharing phase
Liz Monk	Project Manager of the Civic Switchboard Project; Community Engagement and	Liaison to civic data intermediary community; assist with information

	Special Projects, Western Pennsylvania Regional Data Center	gathering with civic data groups and piloting instructional materials with GSPIA and others; Civic data-focused content creator
Marcia Rapchak	Faculty member in MLIS program, School of Computing and Information; Ed.D. in Instructional Design	Lead expert in Instructional Design during Phase 2; Co-lead piloting efforts and lead expert on assessment
PhD Graduate Student Researcher	TBD; PhD Student in School of Computing and Information or GSPIA	Assist in information gathering and analysis; serve as an instructional content creator based on expertise; assist with piloting instruction, assessment, and revisions; build and manage project website

We have assembled a group of advisors that includes faculty in ALA-accredited LIS programs and library practitioners. Our individual advisors include:

- **Kayla Booth:** Director of the iSchool Inclusion Institute (i3); Research Assistant Professor at the University of Pittsburgh
- **Aaron Brenner**, Associate University Librarian for Digital Scholarship & Creation; PI for Civic Switchboard Project, University of Pittsburgh Library System
- **Alexandra Chassanoff**, Assistant Professor, North Carolina Central University, School of Library and Information Sciences (SLIS)
- **Kris Kasianovitz**, Government Information Librarian for International, State and Local Documents and Head of Social Science Group, Stanford University Library
- **Jeff Lambert**, Assistant Director of Digital Inclusion and Workforce Readiness, Queens Public Library
- **Cliff Lampe**, Professor in the School of Information at the University of Michigan
- **Colin Rhinesmith**, Assistant Professor, School of Library and Information Science, Simmons College
- **John Ridener**, San Mateo County Office of Budget, Policy, and Performance
- **Lisa Spiro**, Executive Director, Digital Scholarship Services, Fondren Library at Rice University

Additionally, we have commitment from Jane Wiseman of the Civic Analytics Network, yler Kleykamp at the State Chief Data Officers Network, the Center for Diversity in the Curriculum at the University of Pittsburgh, Allegheny County Library System, and Sabina Deitrick at the Graduate School of Policy and International Affairs to partner with us. We will work with these parties in the following ways at distinct points in the project:

- **Jane Wiseman of the Civic Analytics Network**, a Harvard University-led group for urban and local chief data officers: During Phase 1 of the project, we will hold a remote or in-person meeting with chief data officers in CAN to identify skills and understandings that they view as essential to civic data work. Jane Wiseman, a fellow with the network, will be our point person at CAN for organizing this information gathering session and has provided a letter of commitment.
- **State Chief Data Officers Network,** a Georgetown University-based network that brings together 25 executive level data leaders in state government: During Phase 1 of the project, the Network will help us to organize a meeting with state data officers to identify skills and understandings that they view as essential to civic data work. Tyler Kleykamp, Director of the State Chief Data Officers Network, will be our point person and has provided a letter of commitment.

- **Center for Diversity in the Curriculum** at the University of Pittsburgh's Center for Teaching and Learning**:** As our Diversity Plan indicates, we will receive consultative support from this office at the start of the project, during the development phase, and prior to dissemination to ensure we build and represent diversity, equity, and inclusivity principles in our outputs.
- **Allegheny County Library System:** During Phase 1, we will meet with library staff who are part of the 46 libraries in this system to understand information needs. During Phase 3, we will pilot the instructional materials via the Allegheny County Library System's continuing education programming for library staff at 46 public libraries, including the Carnegie Library of Pittsburgh and Allegheny County Libraries. This will ensure that we understand and incorporate perspectives of the target audience of library practitioners during the assessment phase.
- **Sabina Deitrick, Graduate School of Public and International Affairs** (GSPIA) at the University of Pittsburgh: During Phase 3, we will broaden the impact of our work by piloting instruction on civic open data to students studying public policy who are preparing for data-related careers in public service. While not the main audience for these instructional materials, we will endeavor to create iterations that can be adopted by instructors in programs like GSPIA and, by doing so, have cross-disciplinary reach.

III. Diversity Plan

As intermediaries to civic open data, library workers have the ability to design outreach, education, and means of access that empower marginalized communities that can benefit from open data to use it. This project is committed to building a corpus of instructional materials that will equip library workers, library science students, and civic sector open data workers with a mindset and set of skills that help to ensure open civic data is useful to all and that harm is minimized through the availability of data. We will employ the following strategies to ensure that we are building DEI principles into our instructional materials.

- A guiding premise for our instruction is that data is not neutral and that there are ethical issues in the collection, dissemination, and use of civic data. Our instructional materials will encourage MLIS students and practicing library workers to be mindful of ways that data can create harm and institute strategies for mitigating harm as intermediaries.
- We will employ universal design principles for learning in the materials we produce. Universal design generates inclusive instruction by using evidence-based approaches to education. The UDL guidelines suggest that learning environments should allow for learners to engage with content in various ways, that content should be represented in multiple modalities in structured ways, and that learners should be able to use various tools to access content, facilitate communication, and set their own goals.
- We will consult with Kayla Booth, Director of the IMLS-funded i3 Institute on culturally sensitive instructional design and incorporating diversity, equity, and inclusivity principles into our lessons, activities, engagement and dissemination strategies. In addition, we will use the instructional materials to deliver workshops to the participants of i3 in summer 2021. I3 "is an undergraduate research and leadership development program that prepares students from underrepresented populations for graduate study and careers in the information sciences."[12] We will use this opportunity to connect students to civic data library roles even before potential matriculation into a MLIS or IS program. We have also extended an offer of admission to the Ph.D. program in Library and Information Science to a

[12] http://www.i3-inclusion.org/

prior participant in i3 and, if the student accepts admission, will recruit them for the PhD researcher role on this project.

- We will work closely with the University of Pittsburgh's Center for Diversity in the Curriculum throughout the project. The Center for Diversity in the Curriculum, housed in the Center for Teaching and Learning, offers one-on-one consultative support and workshops designed to support faculty to build diversity and inclusion concepts into courses and curricula. We will seek consultative support to get initial guidance, to get feedback on drafts, and to get feedback on the final materials before they are finalized and disseminated.

IV. Broad Impact

Open data portals and initiatives continue to grow in number and, in public and academic libraries, there is a community of practice around open civic data that is simultaneously growing. However, new professionals who are entering the library field are not being sufficiently equipped to join this community of practice. IMLS can support the creation of data management, analytics, and literacy instructional materials that are sharply focused on preparation for library civic data roles. Ultimately, the project team aims to shift library workers' and students' preconceptions of the boundaries of librarianship, foster "data savviness" and confidence within libraries, and advance library patrons' abilities to effectively and ethically use open civic data to improve their local communities. Through educational scaffolding that this project will build, library workers can make civic open data more usable and accessible to the communities they serve. This project is a critical step toward the expansion of library workers' roles, engagement with civic data, and systematic change in library services. The goal of expanding librarians' role and engagement within the civic data ecosystem will ensure that additional career pathways will be open to library students, and will also help to improve data management capacity in non-library organizations.

We will be deliberate with our information needs assessment and testing strategy in order to ensure that the curriculum and training materials are relevant to students, libraries, government and nonprofit organizations, and other members of the civic data community. A measure of success will be adoption of materials. We will monitor the success of this piloting project by assessing how and what instructional materials are integrated into MLIS and professional development programs. We will encourage use of the materials by reaching out directly to MLIS programs and professional development efforts run by state libraries and consortia and offer to provide direct guidance on facilitating instruction using the materials.

While our primary audiences for the instructional materials are library workers and instructors and students in MLIS programs, we will work toward achieving broad impact in other disciplinary communities. In the civic sector, the literature on open civic data calls attention to the data curation challenges that civic sector employees are confronting.[13] There is a shared interest and opportunity to prepare students for roles in civic open data inside and outside LIS programs. While the instructional materials will be tightly scoped to help library workers move into civic data roles, we will create iterations that can be more widely utilized by educators in academic programs like public policy, urban studies, and political science. We will pilot these materials in partnership with the Graduate School of Public and International Affairs (GSPIA). In this way, the IMLS funding will benefit library workers, library science students and instructors, first, while having reach in other domain communities.

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[13] See Charalabidis et al., *The World of Open Data* and Peter Conradi and Sunil Choenni, "On the Barriers for Local Government Releasing Open Data. *Government Information Quarterly*, 31(1), S10-S17.

We will also strive to create broad impact by connecting students participating in the 2022 i3 cohort. The i3 Summer 4-week Introductory Institute includes special topics workshops for the cohort that highlight research areas and focuses within information sciences. We will include a workshop on civic data in which team members will pilot materials that we have developed through our instructional design. In doing so, we will connect with students from populations that are underrepresented in graduate studies in information and draw linkages between their intended career path and civic open data.

We will place an emphasis on communications with library and civic data stakeholders throughout this project. Following the WPRDC's release of a "Data 101" data literacy toolkit, the WPRDC learned that people from the UN have adapted the materials for use in other contexts. The participation of the WPRDC in data literacy communities of practice enabled the UN staff to learn about these materials, and the detailed facilitators guide was mentioned by UN staff as being essential for being able to adapt these materials for re-use. This past experience justifies why we will put so much focus on communications with library and civic data networks and involving these communities of practice during the design, development, and assessment phases of this project.

We will take a national approach to dissemination of instructional materials. We will encourage use throughout the project by posting versions on our website and soliciting ongoing feedback on the content and their adoption. Our ultimate plan for dissemination of materials is to contribute to the Library Carpentry, following its lesson development process. The Library Carpentry has broad reach and is a familiar resource for library workers. As its Audience page indicates through persona descriptions, the instructional materials available via Library Carpentry are used by library workers running workshops, library workers interested in building skills and knowledge, and students.[14] These personas are in alignment with our target audiences. Additionally, there is an ongoing maintenance strategy around Library Carpentry modules that will help to ensure ongoing relevance.

The Library Carpentry has designated Curriculum Advisors who provide support for maintaining and updating the curriculum. In addition, the project team is committed to ongoing sustainability of the outputs. We will ask for guidance from the Center for Teaching and Learning at the University of Pittsburgh on maintaining relevancy and, following the project, we will evaluate the content of the modules on a six-month cycle for currency. We will make updates to the versions available on our project website.

Finally, we will disseminate data collected through our information gathering phase, applying guidance from the IRB and data aggregation strategies to ensure that the data is reusable. Data about current library engagement with civic open data, barriers to this engagement, and essential skills and understandings for civic open data work may have research value for others in the library and civic open data communities.

[14] https://librarycarpentry.org/audience/

Building Civic Open Data Capacity through Instructional Design

Schedule of Completion

Task	Start Date	End Date
Recruit PhD Student Researcher in advance of project commencement	7/1/20	7/31/20
Build project website	9/1/20	9/30/20
Develop questionnaires/interview instruments for focus groups with MLIS educators, MLIS students, library workers, and civic data intermediaries	9/1/20	10/31/20
Complete IRB approval for information needs assessment	9/1/20	10/31/20
Arrange and conduct calls with project advisors	11/1/20	1/31/21
Run focus groups with MLIS educators, MLIS students and library workers to identify instructional needs based on learner characteristics and gaps in learner understanding; disseminate online survey to understand library workers needs	11/1/20	2/15/21
Conduct call with Civic Analytics Network and State Data Officers network	11/1/20	1/31/21
Meet with the Center for Diversity in the Curriculum and advisor Kayla Booth about DEI principles	1/15/21	1/31/21
Analyze data from information gathering and develop instructional goals and objectives	2/1/21	4/15/21
Select instructional tools, media, and environments	4/16/21	5/1/21
Storyboard instructional strategies and tactics	5/1/21	6/15/21
Design instructional materials	6/16/21	8/31/21
Request review of materials by advisors, MLIS program instructors, and library/civic data workers	9/1/21	12/31/21
Pilot materials with MLIS students	9/1/21	2/15/22
Pilot materials with focus groups of library workers	9/1/21	12/31/21
Post for commentary on project website	9/1/21	2/15/22
Revise instructional materials based on feedback	2/16/22	4/30/22
Develop a communications plan for publication of content	1/15/22	4/30/22
Develop a sustainability plan for longevity of content	1/15/22	4/30/22
Implement communications plan	5/1/22	8/31/22
Publish final materials	5/1/22	8/31/22
Present and participate in outreach on project work	4/15/21	8/31/22

DIGITAL PRODUCT FORM

INTRODUCTION

The Institute of Museum and Library Services (IMLS) is committed to expanding public access to digital products that are created using federal funds. This includes (1) digitized and born-digital content, resources, or assets; (2) software; and (3) research data (see below for more specific examples). Excluded are preliminary analyses, drafts of papers, plans for future research, peer-review assessments, and communications with colleagues.

The digital products you create with IMLS funding require effective stewardship to protect and enhance their value, and they should be freely and readily available for use and reuse 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

If you propose to create digital products in the course of your IMLS-funded project, you must first provide answers to the questions in **SECTION I: INTELLECTUAL PROPERTY RIGHTS AND PERMISSIONS.** Then consider which of the following types of digital products you will create in your project, and complete each section of the form that is applicable.

SECTION II: DIGITAL CONTENT, RESOURCES, OR ASSETS

Complete this section if your project will create digital content, resources, or assets. These include both digitized and born-digital products created by individuals, project teams, or through community gatherings during your project. Examples include, but are not limited to, still images, audio files, moving images, microfilm, object inventories, object catalogs, artworks, books, posters, curricula, field books, maps, notebooks, scientific labels, metadata schema, charts, tables, drawings, workflows, and teacher toolkits. Your project may involve making these materials available through public or access-controlled websites, kiosks, or live or recorded programs.

SECTION III: SOFTWARE

Complete this section if your project will create software, including any source code, algorithms, applications, and digital tools plus the accompanying documentation created by you during your project.

SECTION IV: RESEARCH DATA

Complete this section if your project will create research data, including recorded factual information and supporting documentation, commonly accepted as relevant to validating research findings and to supporting scholarly publications.

SECTION I: INTELLECTUAL PROPERTY RIGHTS AND PERMISSIONS

A.1 We expect applicants seeking federal funds for developing or creating digital products to release these files under open-source licenses to maximize access and promote reuse. What will be the intellectual property status of the digital products (i.e., digital content, resources, or assets; software; research data) you intend to create? What ownership rights will your organization assert over the files you intend to create, and what conditions will you impose on their access and use? Who will hold the copyright(s)? Explain and justify your licensing selections. Identify and explain the license under which you will release the files (e.g., a non-restrictive license such as BSD, GNU, MIT, Creative Commons licenses; RightsStatements.org statements). 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.

The outputs of this project, instructional materials, will be designed to be freely and widely used and customizable. We will assign all materials a Creative Commons Attribution (CC BY 4.0) license. This license encourages reuse, dissemination, and sharing. The expectation for attribution will ensure that a link is maintained between the IMLS funded project and the materials.

Our team's goal is to contribute the instructional materials to Library Carpentry, which makes lessons available under a CC BY license. We will also make the materials available on a project website under the CC BY license.

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.

The CC BY license will encourage free sharing, customization, and use of the instructional materials. The instructional materials will be marked with a CC BY License, which will notify users that they have permission to share and adapt the materials freely with the expectation that they will attribute the original work. With the exception of attribution, no limitations will be places on the outputs based on the project team's copyright.

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.

There are no privacy concerns associated with the instructional materials. During our Phase 1 information gathering, we will inform the civic data intermediaries, MLIS students, and library workers that the information we learn about essential skills regarding civic data work and existing barriers to this work will inform our design and development of the materials.

As our Diversity Plan indicates, we are committed to creating culturally sensitive instructional materials. We will be consulting with the Center for Diversity in Curriculum at the University of Pittsburgh and Kayla Booth, Director of i3 on this matter.

SECTION II: 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.

The digital outputs will include lesson plans, instructor guides, slides, activity overviews, and likely recordings. While the specific nature of these assets will be informed by our information gathering work, these materials will be customizable and targeted to two primary audiences: instructors in MLIS programs and facilitators of professional development programs. We will make these materials available on an open, versionable platform like GitBook or GitHub Pages. When we make files available for download, we will use formats that are open, such as .pdf.

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

We will be using the ADDIE framework for our instructional design. This means that decisions about instructional tools, media, and environments will be made during the Design and Development Phase. We will storyboard instructional strategies and tactics and get feedback during this phase. However, we expect that we will create digital lesson plans and instructor guide content using GitHub, Markdown and Jekyll that will live on GitBook or GitHub Pages. Our approach to creating digital content will be closely aligned to the Library Carpentry's, as our sharing plan is to make the instructional materials available through the Carpentries.

We will use collaborative tools for file sharing — namely the University of Pittsburgh's licensed Box account. For creation, we may choose to use collaborative editing tools like Google Docs and Google Slides, but will export the content to an open platform and file format.

A.3 List all the digital file formats (e.g., XML, TIFF, MPEG, OBJ, DOC, PDF) you plan to use. If digitizing content, describe the quality standards (e.g., resolution, sampling rate, pixel dimensions) you will use for the files you will create.

We will use GitHub to manage text files written with Markdown syntax. If we disseminate presentation files, we will make them available as .pdf and .mp3 files.

Workflow and Asset Maintenance/Preservation

B.1 Describe your quality control plan. How will you monitor and evaluate your workflow and products?

The project team will meet monthly as a group to track overall project activities against the schedule of completion. The project design is based on an iterative model of development that focuses on gathering feedback, revising and stregthening our instructional materials. The entire project team will make use of web-based task tracking tools and file sharing platforms with which they have existing experience.

B.2 Describe your plan for preserving and maintaining digital assets during and after the award period. Your plan should 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).

We will be using GitHub as a publication strategy during the project, with GitPages or GitBook acting as an access layer. For preservation purposes, we will deposit a PDF version of the materials, with a clear capture date, in D-Scholarship@Pitt, the University of Pittsburgh's institutional repository. Also in year two, the project team will work to make the insturctional materials available on Library Carpentry, according to the outlined lesson development process. The Library Carpentry is community-supported initiative and has designated Curriculum Advisors who provide support for maintaining and updating the curriculum. Given the widespread of use of the Carpentries' resources, sharing via this project will itself will serve as sustainability strategy.

Metadata

C.1 Describe how you will produce any and all technical, descriptive, administrative, or preservation metadata or linked data. Specify which standards or data models you will use for the metadata structure (e.g., RDF, BIBFRAME, Dublin Core, Encoded Archival Description, PBCore, PREMIS) and metadata content (e.g., thesauri).

Metadata for the instructional materials that lives the open platform will include elements such as title, date of last update and date of first publication, authors and contributors, license, and description. The metadata associated with the version deposited in D-Scholarship@Pitt will clearly indicate the date for the version.

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

The metadata that we will maintain is basic descriptive metadata that will live beside the instructional materials. We will maintain this metadata on the project website and preserve it with the final versions of the materials shared in D-Scholarship@Pitt and, if accepted, Library Carpentry.

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).

Discovery of metadata, digital outputs, and data files will be supported by creating a GitBook or GitPages layer to a GitHub repository and making data files and metadata accessible via D-Scholarship@Pitt. These access strategies will facilitate discovery via search engines and Google Scholar.

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, delivery enabled by IIIF specifications).

The materials will be openly available online, using GitBook or a GitHub repository with a static site overlay. These outputs will be made available on the project website throughout the piloting phase and we will invite open review of the materials through our project website. We plan to make final versions available on our project website and, in order to have broad reach, work to make the materials available via the Library Carpentry following their lesson development process.

D.2. Provide the name(s) and URL(s) (Universal Resource Locator), DOI (Digital Object Identifier), or other persistent identifier for any examples of previous digital content, resources, or assets your organization has created.

Civic Switchboard guide (authors include Gradeck, Mattern, and Monk): https://civic-switchboard.gitbook.io/guide/

Data 101 Toolkit (authors include Gradeck and Monk): http://www.wprdc.org/news/data-101-toolkit/

Western Pennsylvania Regional Data Center Data Guides (authors include Gradeck and Monk): http://tools.wprdc.org/guides/

Shifting to Data Savvy: The Future of Data Science In Libraries (authors include Burton): http://d-scholarship.pitt.edu/id/eprint/33891

SECTION III: SOFTWARE

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.

Part III is not applicable as no software will be created during the course of this project.

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

N/A

Technical Information

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

N/A

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

N/A

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

N/A

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

N/A

B.5 Provide the name(s), URL(s), and/or code repository locations for examples of any previous software your organization has created.

N/A

Access and Use

C.1 Describe how you will make the software and source code available to the public and/or its intended users.

N/A

C.2 Identify where you will deposit the source code for the software you intend to develop:

Name of publicly accessible source code repository:

URL:

SECTION IV: RESEARCH DATA

As part of the federal government's commitment to increase access to federally funded research data, Section IV represents the Data Management Plan (DMP) for research proposals and should reflect data management, dissemination, and preservation best practices in the applicant's area of research appropriate to the data that the project will generate.

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

Phase 1 of our project is an information gathering phase that will run from September 2020 to February 2021. Through focus groups, interviews, and a survey, the project team will build an understanding of barriers to open data work and gaps in understanding that affect public and academic library workers' comfort with beginning to engage with civic data. We will also learn from the perspectives of civic data workers to understand the skills and understandings essential to civic intermediary roles. This data will inform our instructional design.

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?

We will consult with the IRB at the start of the project. We anticipate that this study will be classified as minimal risk research and we will follow the instructions for submitting an "Exempt" Application through the University of Pittsburgh IRB review portal. These instructions are outlined on the IRB website http://www.irb.pitt.edu/ExemptReview2018

A.3 Will you collect any sensitive information? This may include personally identifiable information (PII), confidential information (e.g., trade secrets), or proprietary information. If so, detail the specific steps you will take to protect the information while you prepare it for public release (e.g., anonymizing individual identifiers, data aggregation). If the data will not be released publicly, explain why the data cannot be shared due to the protection of privacy, confidentiality, security, intellectual property, and other rights or requirements.

We do not anticipate collecting confidential or proprietary information. We plan to administer a survey to librarians to understand existing engagement with civic data, barriers to civic data work, and existing understandings. This survey instrument will not collect any identifying information, but instead ask for type of library (public, academic, government), geographic type (rural, urban, city), and role. Data will be reported in aggregate.
We will be conducting interviews and focus groups in this project. This data will be reported in the aggregate.

A.4 What technical (hardware and/or software) requirements or dependencies would be necessary for understanding retrieving, displaying, processing, or otherwise reusing the data?

No hardware or software will be required for accessing or reusing the data.

A.5 What documentation (e.g., consent agreements, data documentation, codebooks, metadata, and analytical and procedural information) will you capture or create along with the data? Where will the documentation be stored and in what format(s)? How will you permanently associate and manage the documentation with the data it describes to enable future reuse?

We anticipate that the study will be exempt and, because of this, that the IRB will recommend verbal consent. We will create study level documentation that records data collection methods (such as sampling design and instruments used), an overview of the structure of data files and a short description of each file, a variable list for survey data results, and an overview of data processing activities such as data aggregation. This documentation will be recorded in a text file that will live beside the instructional materials and uploaded to D-Scholarship@Pitt, the University's instructional repository, with the data files.

A.6 What is your plan for managing, disseminating, and preserving data after the completion of the award-funded project?

We will share and preserve the data by making it available in D-Scholarship@Pitt. All data and associated documentation will be made available in open file formats, include csv and .txt files.

A.7 Identify where you will deposit the data:

Name of repository:

D-Scholarship@Pitt

URL:

http://d-scholarship.pitt.edu/

A.8 When and how frequently will you review this data management plan? How will the implementation be monitored?

We will review this data management plan as a project team twice during Phase 1 information gathering and quarterly for the remainder of the project. The Project Director will be responsible for monitoring the implementation of the data management plan throughout the project, ensuring that data access is available to the team during the project and that documentation is maintained on an ongoing basis. The Project Director will work with team member Matt Burton, whose project role includes co-managing the sharing and dissemination of digital outputs and data, to prepare the data for release via the D-Scholarship@Pitt repository.