

Digital Scriptorium 2.0:

A National Union Catalog of Pre-modern Manuscripts in US Collections for the Digital Age

The University of Pennsylvania, on behalf of the consortium [Digital Scriptorium](#) (DS), requests a National Digital Infrastructures and Initiatives planning grant of \$100,000 from the National Leadership Grants for Libraries program. This funding will support the exploratory phase of redeveloping DS's digital platform. The final objective of this project is to transform the DS digital platform into an inclusive, open access, online national union catalog of pre-modern manuscripts housed in US institutional collections. Digital Scriptorium 2.0 will create a digital infrastructure based on Linked Open Data technologies and practices to support a sustainable project on a national scale. The process of the one-year planning phase proposed here will also serve as a model for how to rebuild an outdated digital project with stakeholder and community input into a viable and sustainable online resource.

1. Statement of National Need

History of the Problem

In 1925 the American Council of Learned Societies decided to create a union catalogue or census of all the medieval manuscripts preserved in the United States. After gathering together librarians, scholars, professors, and administrators, and obtaining the necessary funding, an ambitious cataloging project was launched at a meeting in Cambridge, MA on September 16, 1929, chaired by Robert P. Blake, the director of Harvard Libraries. Thus began Seymour de Ricci's *Census of Medieval Manuscripts in the United States and Canada*,¹ the first effort by anyone to compile a national union catalog of pre-modern manuscripts in North America. As De Ricci himself explained, "In the last few years, quite a number of libraries have compiled or printed more or less elaborate lists of their manuscript holdings; there is still nevertheless far too little information available in print as to early manuscripts in American collections."²

Eighty-five years after De Ricci's first volume was published, this remark still applies to American collections of pre-modern manuscripts, especially if the quotation were slightly altered to include "information available in print or online." It is true that in recent years many institutions with holdings of manuscripts have built some form of online access to their manuscripts, but these have mostly developed on siloed platforms that do not adequately respond to the needs of researchers to find materials in their areas of interest. Many institutions, especially smaller ones, struggle to catalog, much less digitize, their rare and ancient materials. Larger institutions may have the resources to create their own platforms, but separately managed approaches to digital access of early manuscripts have created a crisis of incompatible data produced without common standards or controlled vocabularies. As mentioned in the 2018 IMLS report "National Digital Infrastructures and Initiatives: A Report on the 2017 National Digital Platform at Three Forum," there is a "need to move from bespoke systems development to technologies that work together," and to work toward "the integration of complex library applications, [including] digital collections, so users do not have to navigate from one data silo to

¹ Seymour de Ricci, *Census of Medieval Manuscripts in the United States and Canada* (New York: H.W. Wilson Co., 1935-37) vols. 1-2.

² De Ricci, vol. I, p. viii.

another to find what they need.”³ This challenge can be especially daunting to researchers in the United States, where all pre-modern manuscripts are dislocated from their place of origin, and no collection represents a repository of primary ownership.

Although De Ricci documented collections from one end of America to the other, his work required follow-up in 1962 by a supplement by Faye and Bond,⁴ and in 2015, a summary directory by Conway and Davis.⁵ This last effort is already out of date as collections continue to change and evolve. The Council of Learned Societies’s vision to achieve a national union catalog is thus on-going. Through the application of digital technologies, however, creating a union catalog that can be more easily maintained and updated is far more attainable now than it was in De Ricci’s time. Recently a few collaborative projects have emerged to address this issue on a smaller scale, such as the [OPENN](#) project hosted by the University of Pennsylvania Libraries⁶ and the Indiana University Bloomington-hosted Peripheral Manuscripts Project, the recent recipient of a CLIR Digitizing Hidden Collections grant.⁷ The OPENN project makes available open data sets contributed by dozens of repositories, most of which are from the Philadelphia area. The focus of many of these collections is various, but some, such as [Bibliotheca Philadelphiensis](#), represent institutions with collections of pre-modern manuscripts.⁸ The Peripheral Manuscripts project, focused on collections in the Midwest, is similar to [Bibliotheca Philadelphiensis](#), in that both represent regional consortia in which smaller institutions benefit from collaboration with larger institutions to create public access to pre-modern manuscripts. Further, projects such as the T-AP Digging into Data Challenge recipient [Mapping Manuscript Migrations](#), funded in part by the IMLS, are demonstrating how linked data technologies and practices can unite disparate catalogs and datasets for cross-searching and analysis.⁹

Current state of DS

Digital Scriptorium, which has a much longer history than the above-mentioned projects, has developed from a similar approach to both shared technology and institutional collaboration, but with aspirations to support a national digital infrastructure from its inception. Digital Scriptorium is a consortium of 34 institutional members (Appendix I) representing American libraries and

³ “National Digital Infrastructures and Initiatives: A Report on the 2017 National Digital Platform at Three Forum,” *IMLS* (June 2018), pp. 6, 13; *Institute of Museum and Library Services*, <https://www.imls.gov/publications/national-digital-infrastructures-and-initiatives-report-2017-national-digital-platform> (accessed 23 February 2020).

⁴ C.U. Faye and W.H. Bond, *Supplement to the Census of Medieval and Renaissance Manuscripts in the United State and Canada* (New York: Bibliographic Society of America, 1962).

⁵ Melissa Conway and Lisa Fagin Davis, “Directory of Collections in the United States and Canada with Pre-1600 Manuscript Holdings,” *The Papers of the Bibliographical Society of America*, Vol. 109:3 (Sept 2015), pp. 273-420.

⁶ OPENN, <http://openn.library.upenn.edu/ReadMe.html> (accessed 21 February 2020).

⁷ “Digitizing Hidden Collections: Funded Projects,” *CLIR*, <https://www.clir.org/hiddencollections/funded-projects/> (accessed 21 February 2020).

⁸ “Bibliotheca Philadelphiensis,” OPENN, <http://bibliophilly.pacscl.org/> (accessed 21 February 2020).

⁹ *Mapping Manuscript Migrations*, <https://mappingmanuscriptmigrations.org/> (accessed 23 March 2020).

museums across the country (<http://www.digital-scriptorium.org/>). A 501(c)(3) organization, DS is led by a Board of Directors (Appendix II) composed of seven elected representatives of member institutions. DS is and has since its inception been committed to providing free cross-institutional digital access to member collections with pre-modern manuscripts through an online database open to the public. When it began in 1997, DS realized success as an early adopter of digital and web technologies with a rudimentary online platform that addressed the immediate needs of access and discoverability for United States institutions with pre-modern manuscript collections. Since then, its online database, accessible via its website, has grown to serve an international community of scholars, librarians, teachers, and students (for a sample of usage statistics showing top 25 countries with highest number of pages per session from 1 March 2019 to 29 February 2020, see Appendix III).

Over the past four years the present Board of Directors has worked to fortify DS for future sustainability in terms of governance and fiscal management. We have also improved the online catalog through the addition of faceted search tools to improve user search and discovery. DS in its current state, however, faces serious threats to its sustainability if it does not adapt its data platform to meet the user and member institution demands that new technologies have created. Users today expect free, facile, and open access to all library content. In fall of 2017, the DS board conducted a user survey to ask users directly how they used the DS online catalog and what improvements they would like to have added to it. Posted on the home page of the DS website, the survey continues to collect ideas from our users. Some of their suggestions include:

- Better descriptions with consistency
- More filters, better navigation (user-centered design)
- A dedicated iconographic search
- Making the metadata structured data and searchable/sortable
- Fully digitized manuscripts, rather than just samples
- One single portal that led to *all* manuscripts everywhere
- Consistent links to the holding library catalog entry
- One cross-site search for digitized MSS, catalogue descriptions, editions, etc.

Plans for the future

Our goal now is to respond to these user requests by providing not just an aggregated catalog but a distribution and authority management platform for premodern manuscripts in US collections. In February 2019, the DS Board held a planning meeting and invited a select group of stakeholders to discuss what a DS 2.0 might look like and how it might be accomplished. This meeting resulted a list of principles and objectives that will guide the development of DS 2.0 and a plan of action upon which this current proposal is based (see Appendix IV for summary and results).

A Phase I planning period will allow DS to plan for what this platform might look like, whether a simple registry of manuscripts in collections pointing out to full institutionally-managed descriptions or a full database with complete metadata or somewhere in between. Any of these approaches would necessarily depend on the use of established and new metadata terms in DS

records through the application of Linked Open Data.¹⁰ For instance, new Semantic Web technologies now make it possible to link to existing authority files, such as VIAF, the Getty Vocabularies, and GeoNames, in order to both control descriptive metadata through an interoperable data platform and expand access and discovery beyond institutional silos. These new technologies will help DS achieve its goal to serve as a national union catalog, not only by establishing consistent metadata standards, but also by allowing us to build a system for creating a manuscript authority system based on creating stable and unique identifiers for premodern manuscript books. A similar effort is under consideration through an international consortium known as ISMI: International Standard Manuscript Identifier.¹¹ ISMI's goal is to create unique identifiers for manuscript books to facilitate discovery and access to premodern manuscripts and to encourage developers to provide interoperability among digital manuscript resources as these continue to grow around the world. DS recently joined the ISMI consortium and intends to be prepared to act as the representative for U.S. premodern manuscript collections.

DS 2.0 will build on the strengths of its invested membership and existing data to adapt to this constantly changing digital landscape and address the need for a national union catalog of premodern manuscripts. A national union catalog based on a sustainable national digital infrastructure will provide a center of authority control and standardization for manuscript cataloging practices, interoperable discovery, and equitable access. Even at this early planning phase, DS 2.0 will serve as a leading model for providing an example of how to transform and re-imagine a legacy digital project, in order to amplify scale and audience, broaden collaboration and inclusion, diversify content and contributors, and facilitate discovery and access to artifacts of our shared intellectual and cultural heritage in the digital age. To achieve this end, DS 2.0 is committed to achieving these objectives:

- Provide a low barrier to both the contribution and use of metadata and images
- Build upon a clear, adaptable, and scalable data model
- Employ linked and linkable data
- Support interoperability with other manuscript research projects
- Enable content contributors to maintain management and ownership of data while sharing in the continuing benefits of national collaboration

2. Project Design

DS 2.0 will be carried out in two phases: Planning (Phase I) and Implementation (Phase II). The current proposal seeks funding to support Phase I, a planning term of one year to achieve the

¹⁰ For example, see “Getty Vocabularies as Linked Open Data,” *The Getty Research Institute*, <https://www.getty.edu/research/tools/vocabularies/lod/index.html#definition> (accessed 05 March 2020). See also *VIAF: Virtual International Authority File*, <http://viaf.org/> (accessed 05 March 2020); “Getty Vocabularies,” *The Getty Research Institute*, <https://www.getty.edu/research/tools/vocabularies/index.html> (accessed 05 March 2020); GeoNames, <https://www.geonames.org/> (accessed 05 March 2020).

¹¹ Matthieu Cassin, “ISMI: International Standard Manuscript Identifier. Project of unique and stable identifiers for Manuscripts,” Universität Hamburg, Centre for the Study of Manuscript Cultures, https://www.manuscript-cultures.uni-hamburg.de/files/mss_cataloguing_2018/Cassin_pres.pdf (accessed 06 March 2020)

following four goals: 1) refine the purpose and scope of DS 2.0, 2) develop the DS 2.0 data model, 3) create a plan for technological sustainability, and 4) create a plan for financial sustainability. The project will be carried out by the following staffing:

Project Staff

Phase I grant-funded positions

Project Manager (100% FTE for one-year; to be hired): Working closely with the DS Board of Directors, the Project Manager (PM) will drive the workflow of Phase I and manage communications among the Board of Directors and DS stakeholders throughout Phase I. The Project Manager (PM) will be responsible for carrying out the activities listed in the project schedule. The final product of the PM's tenure will be a fully detailed proposal for implementation. (A job description is provided with the staff resumes).

Project Technical Consultant (50 hours; one year): Mikko Koho (Semantic Computing Research Group, Aalto University) will provide expertise on linked open data and semantic web design in the cultural heritage sector through weekly consultations with the PM to design the data model. Mr. Koho is the lead developer of the *Mapping Manuscript Migrations* data model and brings current and unique knowledge of manuscript description practices and linked open data to the project.

University of Pennsylvania Libraries-funded positions

Principal Investigator (10% FTE for one year): Lynn Ransom (Curator of Programs, Schoenberg Institute for Manuscript Studies) will oversee the PM and provide content and project management expertise.

Technical Consultant (5% FTE for one year): Doug Emery (Cultural Heritage Programmer, Penn Libraries) will oversee and provide expertise on the technical development of the data model design.

Phase I Schedule

Phase I follows a 12-month work plan based on the following primary activities (see also Project Schedule):

PM Hire (Month 1)

The project will begin with the hiring of the Project Manager (PM) in Month 1. Upon notification of award, PI Lynn Ransom begins recruitment immediately.

Membership Surveys (Months 1-2 and 10)

The PM's first tasks will be to prepare for the first planning meeting and conduct a survey among existing and potential member institutions to gather information about the on-the-ground needs for and expectations of DS 2.0 among DS's member institutions. The survey, to be designed by the PM in consultation with the DS Board, will ask members, associates (non-voting

members who do not pay fees),¹² and potentially interested institutions to answer such questions as: what are or would be the advantages and disadvantages of DS membership, what are or would be the institutional challenges in maintaining DS membership, and what else could a DS 2.0 offer to justify membership costs? The results of the survey will be presented at the first planning meeting and will help determine the framework for creating the value proposition of DS 2.0 that will be the subject of a second survey in Month 10.

Planning Meetings (Months 2 and 11)

The two planning meetings, to be held at the University of Pennsylvania Libraries in Months 2 and 11, will bring together representatives of DS member institutions, technical experts, and other stakeholders in conversation with the Board of Directors and the Advisory Council to engage their voices and develop a plan for implementing DS 2.0 in Phase II. The first meeting will accomplish the following tasks: 1) determine the scope of DS 2.0; 2) define the principles of the data model design; 3) outline technical and financial sustainability requirements; and 4) set the Phase 1 development timeline (see Appendix V for a proposed agenda). The second meeting will assess Phase I progress and responses to the value proposition presented in the Month 10 survey and will begin the preparation of the Phase II plan. The Project Manager will work with the DS Board of Directors to determine the agenda and invited participants. Both meetings will be open to all DS Membership, and results of each meeting will be posted to the DS website.

Current DS Database Assessment (Months 2-4)

Starting in Month 2, the PM will perform a deep-dive assessment of the structure and contents of the current DS database. In consultation with DS Technology Host, Lynne Grigsby (University of California, Berkeley), the PM will review the structure and rationale behind the current platform. The PM will quantitatively and qualitatively assess, in consultation with each contributing member, the current data content and evaluate the state of each institution's data viability in a DS 2.0 environment. For example, the University of Pennsylvania's data in DS is incomplete and fifteen years old; it has been superseded by Penn's current online catalog made available through OPENN. The PM would need to decide how much, if any, of Penn's current DS data could be carried over into DS 2.0.

Environmental Scan (Months 4-6)

The PM will conduct an environmental scan of current online cataloging projects occurring at institutional, regional, national, and international levels. The primary focus of the scan will be to identify trends in current description practices, looking in particular at culturally inclusive methods of description; to assess the state of relevant controlled vocabularies; and to survey the use and impact of linked open data technologies and practice in the cultural heritage sector. Other outcomes of the environmental scan will include a measurement of national interest in creating a national union catalog of manuscripts in US collections and the potential for long-term funding and support for such a project.

Data Model Development (Months 6-11)

¹² For more details about current membership requirements, see "For Content Contributors," *Digital Scriptorium*, <https://digital-scriptorium.org/about/for-content-contributors/> (accessed 12 March 2020).

After gathering the results of the current DS database assessment and the environmental scan, the PM will work with the Project Technical Consultant Mikko Koho and Technical Consultant Doug Emery to develop a data model based on linked open data principles and technology for DS 2.0. The PM will also develop, test, and finalize a workflow for data entry and management that will make it possible for DS 2.0 to achieve the project objectives outlined above in the Statement of Need and will prepare recommendations for long-term sustainability.

Project Reports (Months 3, 6, and 9)

The PM will submit three project reports at three-month intervals to the DS Board and membership detailing progress and results of activities outlined in this schedule.

Prepare Implementation Plan (Month 12)

In the final month of the project, the PM will prepare and submit an implementation plan for DS 2.0. The plan will propose a data model, workflow, budget, and timeline for implementation, recommendations for culturally-inclusive cataloging practices, responsive design compliance, and long-term funding and sustainability practices.

Phase 1 Project Outputs:

In addition to producing a data model based on linked open data principles and technologies, we intend Phase I to provide a model for successful redevelopment of other outmoded database projects. The primary output of Phase 1 will be the implementation plan. This plan will be the basis for an application for a 3-year implementation grant. In addition, the three progress reports will document and share results and lessons learned from our collaborative and member-inclusive approach of the planning phase as they develop. Summaries of the two planning meetings, the three progress reports, and the final implementation plan will be made available on the DS website as blog posts for distribution to the wider DS community as well as to the general public. We also seek publication of the environmental scan in the Association of College and Research Libraries's journal *RBM: A Journal of Rare Books, Manuscripts, and Cultural Heritage*. A final report on the planning phase, which will include the implementation plan, will be submitted to *Manuscript Studies*, the journal of the Schoenberg Institute for Manuscript Studies, for publication on its open access platform (https://repository.upenn.edu/mss_sims/) in Fall 2021.

Members of the DS board will also seek to share Phase 1 results of the data model design at multiple national and international professional, academic, and digital humanities conferences in the academic year 2021-2022, including the annual LITA/ALCTS/LLAMA Forum, “a 3-day, hands-on interactive conference focused on the intersection of technology, collections, preservation, assessment, metadata, and leadership,” sponsored by the Library and Information Technology Association (LITA) of the American Library Association (ALA).¹³ Several institutional members as well as individuals involved with DS governance are already active in the IIF community (International Image Interoperability Framework), which holds regular international conferences and workshops concerning open-source software tools for cultural heritage image management in the Linked Open Data environment.¹⁴ The online magazine,

¹³ LITA, ALCTS/LLAMA Forum, <https://forum.lita.org/> (accessed 06 March 2020).

¹⁴ International Image Interoperability Framework, <https://iif.io/>.

Digital Meets Culture, provides an open news forum in which DS can present its work to a broad readership in the field of digital cultural heritage.¹⁵ We will also prepare a white paper summarizing our process and evaluating the results and lessons learned of our collaborative, member-inclusive approach to redeveloping the Digital Scriptorium platform.

For Phase I, we anticipate few risks to achieving a successful outcome. Two possible risks are: 1) we are not able to develop an implementation-ready data model by the end of the twelve-month cycle and 2) we do not receive full support from our member institutions for implementation of the proposed plan. The first risk can be mitigated if we can accept that failure to finalize a data model will lead to a better understanding of what a successful model would be. The second risk will be mitigated by our efforts to keep the membership and other stakeholders regularly informed of our progress with the three project reports and planning meeting reports and providing them with an open avenue to the DS Board for feedback and response throughout the planning phase.

3. Diversity Plan

We intend to broaden representation of and access to pre-modern manuscripts by providing digital inclusion across languages, geographies, and cultural traditions in US collections. While DS has historically emphasized manuscripts in Latin and other European vernacular languages, DS 2.0 will also include pre-modern manuscripts in other languages, including but not limited to Hebrew, Arabic, Persian, Ge'ez, and Sanskrit. DS 2.0 will also seek to reach out to persons with values and worldviews arising from differences of culture and circumstances through rethinking and implementation of culturally sensitive cataloging terminology. By presenting metadata and images of holdings across public/private, rural/urban, and large/small institutional special collections, DS 2.0 will engage and broaden access to collections, nationally and internationally while allowing consistent discoverability for all users. DS 2.0 will also aim to provide the technological tools and expertise to support under-described collections and elevate them to the same level of discoverability as those of larger research institutions. DS defines itself as a national consortium with a database, rather than merely a database, and firmly believes that the expertise of its members is among the organizations greatest assets; creating a workflow that minimizes technical barriers for contributors, particularly at smaller institutions, is a core tenet of DS 2.0.

Particular attention and consideration will be given to the unique needs of students, teachers, professors, curators, librarians, and researchers as well as those with physical limitations or barriers to access. Our commitment to a free and open-access platform will eliminate geographic and financial barriers that have hindered or privileged the study and scholarship of pre-modern manuscripts and other rare materials from around the world. Through a webinar series sponsored by the United States Access Board, the PM will learn how to incorporate and build ADA compliance into the proposed new platform to ensure accessibility of manuscripts to diverse users across multiple devices.¹⁶ The W3schools website includes a tutorial on Responsive

¹⁵ *Digital Meets Culture*, <https://www.digitalmeetsculture.net/open-newsroom/> (accessed 06 March 2020).

¹⁶ "United States Access Board," <https://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-ict-refresh> (accessed 06 March 2020).

Design, which assures web content is accessible from multiple devices in multiple formats.¹⁷ Consultation with the K-12 Outreach Committee of the Medieval Academy of America could help DS reach a younger audience, as would contact with the Teaching Association for Medieval Studies (TEAMS), which lists online resources on their website.¹⁸

4. National Impact

As a national union catalog of pre-modern manuscripts in the US, DS 2.0 will galvanize manuscript studies through multi-institutional collaboration and provide a platform for international collaboration and data sharing. As mentioned above, DS has already joined the recently established International Standard for Manuscript Identifiers Consortium (ISMI), led by the *Institut de recherche et d'histoire des textes* in Paris in collaboration with Christoph Flueler from the University of Fribourg. The benefit of a standardized way of identifying premodern manuscripts fulfills an international need. DS 2.0 will be prepared to join this effort and perhaps even function as a first test case for implementing ISMI numbers. Working in this global arena will inform planning as DS embarks on this new strategic direction.

DS 2.0 will also provide an unequalled resource for underrepresented US libraries and museums to make otherwise hidden and understudied manuscript holdings freely available to researchers, teachers, students, curators, and librarians around the world. An IMLS planning grant will make possible a thoughtful, successful, and sustainable approach to creating such a resource that will stand as a model for similar projects. The two planning meetings, for example, will serve as a model of how to bring stakeholders together with experts in information architecture to discuss the unique metadata needs of collections, and how those needs might be met by the forward-thinking technology of Linked Open Data to ensure interoperability and sustainability. DS's established practice of documentation and progress reporting will offer a record that other similar projects can use as a starting point for moving forward. Our planned publications and conference representation will allow us to reach audiences beyond the manuscript studies community, including librarians and scholars in the cultural heritage sector and digital humanities communities. DS's commitment to transparency and knowledge sharing is already evident in its web presence, where updates of board activities, meetings, and enhancements to the database have been provided at regular intervals and information about fee structures, finances, and governance has been freely available since DS began.

By creating an interoperable platform and combining it with transparent and shared database architecture, improvements to DS will be adaptable by other projects beyond the world of premodern manuscripts. As noted in the Phase 1 Project Outputs and Outcomes subsection of the Project Design section (p. 7), we will strive to share through publications and presentations the experience of planning and developing DS 2.0 not only within the community of manuscript

¹⁷ "HTML Responsive Web Design," *W3schools.com*, https://www.w3schools.com/html/html_responsive.asp (accessed 06 March 2020).

¹⁸ "Medieval Worlds: K-12 Learning Resources," *Medieval Academy of America*, <https://sites.google.com/pdx.edu/medievalacademyk12/home> (accessed 06 March 2020); *TEAMS: Teaching Association for Medieval Studies*, https://teams-medieval.org/?page_id=38 (accessed 06 March 2020).

studies but also with those interested in the application of digital technologies to cultural heritage collections.

DS 2.0 will serve the needs of scholarship and learning in the United States and around the world with a platform supported and used by an international community of libraries, museums, scholars, researchers, and students involved in premodern manuscript studies. Since 1997, DS has built and nurtured a committed community of practice and support that remains its greatest strength and asset. An IMLS Planning grant focused on the development of DS 2.0 will ensure that this community will continue to exist and expand as DS 2.0 establishes itself as a leader in making digital cultural heritage collections available through a barrier-free platform of discovery and access based on systemic, sustainable, and shared solutions.

Digital Scriptorium 2.0 Planning Phase Schedule of Completion

Activity	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Hire Project Manager												
Membership Surveys												
Stakeholder Meetings												
Current Data Content Assessment												
Environmental scan												
Data Model Development and Implementation plan												
Project Reports												
Prepare Implementation Plan												



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.

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.

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.

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.

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.

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. 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).

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).

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).

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).

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.

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.

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.

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.

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

Access and Use

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

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.

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 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.

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

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

A.7 Identify where you will deposit the data:

Name of repository:

URL:

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