

## **Lighting the Way: illuminating the future of discovery and delivery for archives**

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### **Abstract**

Stanford University Libraries requests \$149,992 from the Institute of Museum and Library Services National Leadership Grants for Libraries program to convene a series of national meetings focused on the integration of front-end systems for discovery and delivery of archives and special collections. Each meeting will engage representatives and stakeholders across multiple disciplines and job functions both within and outside the context of archives and libraries, including public services and technical services archivists; library administrators; experts in ethical access, intellectual property, and risk management; user experience designers; software developers; product managers; systems architects; and senior management and technical leadership. Through engaging these stakeholders and experts, the project seeks to build consensus around strategic and technical directions to improve user experience, access, and interoperability across systems used by archivists, librarians, and researchers to work with archives, and to provide a model for values-driven technology work within archives and special collections.

Systems integration is understood within the context of information technology as a process focused on interconnecting systems and software functions either physically or functionally to work as an integrated whole. Front-end systems for archives include software platforms that support functions such as search, discovery, and presentation of archival description and related descriptive metadata; delivery and presentation for digital objects; request management; interpretation and online exhibits; and crowdsourcing (e.g. transcription or tagging). Archives and special collections have begun to understand the “ecosystem of systems” they use in a more holistic manner. However, current projects focused on archival systems integration have primarily emphasized integration of “back office” archival systems, such as collection management systems and repositories. Furthermore, while software supporting access to digital archives has progressed, integration of specialized tools for materials like email and emulated software environments with other user-facing systems remains uncertain. These factors, plus the evolution of descriptive standards, shared specifications, and community efforts like International Image Interoperability Framework (IIIF) underscore the importance of coordinating strategy to improve discovery and delivery for archives in a holistic fashion.

As successful archival discovery and delivery relates to the user experience for both archivists and researchers, this provides a timely opportunity to evaluate systems integration in a holistic fashion as it impacts the discovery and delivery user experience. This project is intended to provide broad future applicability for both individual institutions, as well as the network of finding aid aggregators that support regional- and national-level discovery. Rather than focusing exclusively on system- or platform-specific integrations, this project will provide an actionable roadmap containing strategic, practical, and recommendations across the landscape of discovery and delivery systems, informed by standards for archival description, intended to be adapted across various types, sizes, resourcing levels, and collecting focus of institutions.

The project will run from September 1, 2019 to August 31, 2020, with funding primarily supporting a 2.5-day forum of up to fifty participants, and a 2.5-day working meeting of up to twenty-five participants. The forum will focus on progress and challenges regarding discovery and system integration for archives and special collections, and gather ideas, articulate priorities, and identify opportunities for collaboration. The working meeting will focus on collaborative, in-depth discussions about needs, priorities, and potential solutions generated in the first meeting to outline the work necessary to frame progress towards key deliverables such as an implementation-focused integration handbook and a statement of principles for front-end system integration. In preparation for each meeting, the project team will develop foundational resources to provide participants with a shared context. The project team will synthesize and disseminate the activities of the overall project through a white paper, conference presentations, publications, and post-forum webinars.

# Lighting the Way: illuminating the future of discovery and delivery for Archives

Stanford University

## Narrative

Stanford University Libraries requests \$149,992 from the Institute of Museum and Library Services National Leadership Grants for Libraries program to convene a national forum and a subsequent working meeting focused on the integration of front-end systems for discovery and delivery of archives and special collections. Each meeting will engage stakeholders representing archivists, librarians, and technologists. Through engaging these stakeholders and experts, the project seeks to build consensus around strategic and technical directions to improve user experience, access, and interoperability across systems used by archivists, librarians, and researchers to work with archives, and to provide a model for values-driven technology work within archives and special collections.

### 1. Statement of National Need

Archives and special collections are at a critical point of reconsidering discovery, access, and delivery for their collections. Over approximately the last twenty years, we have seen the development and adoption of key technical and community infrastructure that supports access to archival material: standards for archival description and metadata; collections management systems; digitization processes and digital collections platforms; and discovery platforms, including aggregators for finding aids and digital cultural heritage material. Material managed by archives and special collections, as well as the systems that support management and access, are becoming increasingly sophisticated and complex from a technical standpoint, with users and researchers demanding more sophisticated functionality as their own technical sophistication grows. There are concomitant pressures felt by archivists and technologists to use resources wisely, and to address the steep learning curve and retention of technical expertise introduced by the complexity of contemporary archives and the infrastructure they require. These additional pressures are even more striking when one considers the challenges to *systems integration*,<sup>1</sup> which allows the technical platforms and components used by archives and special collections to function smoothly as a whole. Inadequate integration leads to a frustrating user experience and makes the research and fulfillment process more challenging for researchers and archivists. It also impacts archivists and technologists operationally by making systems used to support discovery and delivery harder and more expensive to implement and maintain. Given ongoing concerns about the sustainability of and equitable access to digital infrastructure within the cultural heritage sector, there is an opportunity to get an in-depth understanding of how systems integration impacts archival discovery and delivery, and to develop a forward-looking agenda describing an ethical, equitable, sustainable, and well-integrated future for archives and special collections.

#### 1.1. The need for front-end systems integration: user-focused findings from the ArcLight project

Stanford University Libraries began a process to engage with these challenges through the ArcLight project<sup>2</sup>, an effort to build a web-based environment to improve discovery and digital delivery of information in archives. The ArcLight project completed work across two phases: a community-driven, user-centered design process (November 2014-April 2017), and a software development project to develop a functional proof of concept (April-June 2017). The initial phase of the user-centered design process focused on understanding the major needs of both archivists and researchers through an environmental scan, articulation of stakeholder goals, and in-depth user interviews.<sup>3</sup> Following the analysis of the user interviews, the design team developed a set of design artifacts including user personas<sup>4</sup> and static mockups<sup>5</sup> to elucidate our assumptions and gather feedback from the community. Upon the completion of the design process, the Stanford ArcLight team collaborated with the University of Michigan to develop a “minimum viable product” for ArcLight: a proof of concept demonstrating a subset of the most important features, released under an open source license and intended for adoption, extension, and integration.<sup>6</sup> Our user research, creation of design artifacts, and proof of concept development have identified a number of key needs for both archivists and

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<sup>1</sup> MITRE. (2019). *Identify and Assess Integration and Interoperability (I&I) Challenges*. MITRE Systems Engineering Guide. <http://bit.ly/2GIBua2>

<sup>2</sup> *ArcLight*. (2018). <https://bit.ly/arclightproject>

<sup>3</sup> Stanford University Libraries. (2016). *ArcLight Interview Analysis*. <https://purl.stanford.edu/vq276iq8115>

<sup>4</sup> Stanford University Libraries, Georgia Tech, University of Michigan. (2017). *ArcLight Personas*. <https://purl.stanford.edu/hk349dn1751>

<sup>5</sup> Stanford University Libraries. (2017). *ArcLight Wireframes and Mockups*. <https://purl.stanford.edu/hd302yz0755>

<sup>6</sup> *sul-dlss/arclight: a Rails engine supporting the discovery of archival material*. (2019). <https://github.com/sul-dlss/arclight>

researchers concerning improved discovery of and access to archival materials, as well as a set of systems integration issues relating to discovery and delivery raised by archivists.

- *The importance of improved access to digital materials (either digitized or born digital) when available in an archival collection:* Both archivists and researchers stated that discovery and delivery is highly siloed across multiple platforms.
- *Delivery of digital objects within the context of archival relationships:* Archivists and researchers both emphasized the importance of understanding the association between a digital object and the collection component with which it is associated, as well as relationships with other entities. Researchers also articulated the need for understanding the archival arrangement for digital material and noted that this is currently difficult given how discovery and delivery platforms are siloed.
- *Integration of discovery systems to support embedded viewers for digital material has significant technical barriers:* Archivists recognize that no single viewer can handle all file formats or object types, but there is a clear need to integrate existing viewers or new and emerging tools to support access to born digital materials.
- *Data management for archival discovery is still a major challenge, especially given siloed nature of platforms and use of multiple backend systems:* Archivists often need to publish and update finding aids from multiple systems or data sources and want to automate manual parts of publication workflows.
- *Integration with request management systems:* Archivists have begun to adopt or develop applications that allow researchers to request the paging of material for research, to be digitized, or for permission to be granted access when materials are restricted. By and large, there has been little to no integration of request management systems to access digital archival material in a replicable manner across institutions.
- *Discovery of archives on and across the broader web:* Not all discovery systems are exposed to web search engines. Search engine optimization and the availability of persistent structured data about archival materials will help improve discovery on platforms managed by archives as well as throughout the Web.

## 1.2. Complementary investigations into understanding the ecosystem of archival systems

These needs and concerns about improved discovery and delivery, as well as systems integration for archives and special collections resonate broadly across the sector in both strategic and operational ways. The *Research and Learning Agenda for Archives, Special, and Distinctive Collections in Research Libraries*, written by Chela Scott Weber and published by OCLC Research in 2017, identifies access to collections and the interplay of data and systems as two of its core thematic areas.<sup>7</sup> Weber describes “evolving systems environments” as a major area of focus, recognizing the need to both “map the systems ecosystem” and develop practical guidance for framing business processes and systems architectures for special collections. Initiatives such as OSSArcFlow,<sup>8</sup> the Bentley Historical Library’s archival workflow integration project,<sup>9</sup> and the Rockefeller Archive Center’s Project Electron<sup>10</sup> focus on workflow analysis and systems integration albeit with a heavy, but not exclusive, focus on integration of “back office,” staff-facing archival systems, including collection management systems (e.g. ArchivesSpace), repositories (e.g. Samvera or DSpace), and digital preservation environments.

The *Agenda* also recognizes that increased user expectations about online discovery and delivery are impacted by systems integration. In addition to ArcLight, improving discovery for special collections and archives has emerged as a high priority across the sector. The ArchivesSpace project designed and developed a new version of their public user interface within roughly the same timeframe as the ArcLight design and prototyping work. This work, as well as related efforts on user-centered design and assessment processes, was presented and served as the focus of facilitated conversations at the 2017 Annual Meeting of the Society of American Archivists.<sup>11</sup> Weber argues fulfillment and request management systems are becoming central to the operation of contemporary archives special collections.

<sup>7</sup> Weber, Chela Scott. (2017). *Research and Learning Agenda for Archives, Special, and Distinctive Collections in Research Libraries*. Dublin, OH: OCLC Research. <https://doi.org/10.25333/C3C34F>

<sup>8</sup> Educopia Institute. (2019). *OSSArcFlow: Investigating, Synchronizing, and Modeling a Range of Archival Workflows for Born-Digital Content*. <https://educopia.org/ossarcflow/>

<sup>9</sup> Eckard, Max, Dallas Pillen, and Mike Shallcross. (2017). “Bridging Technologies to Efficiently Arrange and Describe Digital Archives: the Bentley Historical Library’s ArchivesSpace-Archivematica-DSpace Workflow Integration Project.” *Code4Lib Journal* 35. <http://journal.code4lib.org/articles/12105>

<sup>10</sup> Rockefeller Archive Center. (2019). *Project Electron: building infrastructure for data in motion*. <https://projectelectron.rockarch.org/>

<sup>11</sup> See “User Centered Collaboration for Archival Discovery (Part 1).” (2018). *bloggERS!* <https://saaers.wordpress.com/?p=2038> and “User Centered Collaboration for Archival Discovery (Part 2).” (2018). *bloggERS!* <https://saaers.wordpress.com/?p=2040>

Such systems include Aeon<sup>12</sup>, a commercial product of Atlas Systems, and Circa<sup>13</sup>, an open source application developed by NCSU Libraries, and feature the ability to manage requests for physical materials, digitization orders, or other common workflows that require paging or preparing material for access. While complementary to systems supporting document delivery, the challenges to integrating fulfillment systems are high given variance in configuration or necessary data for requests and the need to establish, review, or reengineer workflows and policies within a single department or across multiple parts of an organization.

Weber's *Agenda* places a high emphasis on the importance of understanding access needs for digital delivery systems, such as for born digital records and audiovisual material. Over the last six years, significant progress on born digital access has been made both from a conceptual, practical, and technological perspective. Conceptually and practically, much of this work has been led by the Digital Library Federation's Born-Digital Access Group<sup>14</sup>, which originated out of exploratory research<sup>15</sup> to inform the development of training opportunities for archivists. The exploratory research showed that the most significant gap as of 2015 was in tools and systems, with a notable subset of the mentioned gaps concerning systems integration.<sup>16</sup> The Group also has been working to develop a Levels of Access framework<sup>17</sup> for born-digital materials, and while useful, it does not yet address the integration of systems necessary to provide access. From a technical perspective, the possibility of online delivery is significantly improved by the emergence of platforms like ePADD<sup>18</sup> for email archives and the Emulation as a Service Infrastructure project<sup>19</sup>; however, their integration with other user-facing systems remains uncertain. Similarly, the expansion of the International Image Interoperability Framework (IIIF) to support audiovisual resources as well as images, and its creation of an Archives Community Group,<sup>20</sup> have articulated the importance of coordinating strategy. As yet, however, best practices for structuring or presenting archival material using IIIF have yet to be developed.

The possibility of successful, cost-effective, interoperable, inclusive, and cutting-edge archival discovery and delivery is closer now than it ever has been, and the time is right to evaluate systems integration in a holistic fashion. In response to challenges for archival discovery systems, like mounting technical debt and inadequate integration with description, contextual information, digital objects delivery, and publication, California Digital Library's *Towards A National Archival Finding Aid Network* project articulates a clear opportunity to streamline workflows and develop a strong collaborative network of domain specialists and technical specialists.<sup>21</sup> It is clearly essential to bring together archivists and technologists in collaboration to develop a mutual understanding of needs, constraints, and opportunities; successful technology projects in archives rely on such a close connection. Accordingly, this project is intended to leverage the past successes of archival systems integration projects to support and inform a forward-looking vision, and to allow a wide variety of institutions across resourcing levels to engage with the challenges at hand in a broader alliance.

## 2. Project Design

### 2.1. Goals, outputs, and conceptual framework

*Lighting the Way* will center its activities around four primary project goals: **goal 1)** mapping the ecosystem of discovery and delivery systems used by archives and special collections; **goal 2)** building a shared understanding between archivists and technologists around the integration points and requirements between these systems needed to support common use cases; **goal 3)** creating conceptual and practical recommendations for front-end system integration, such as statements of values, principles, and architectural patterns informing integration and implementation; and **goal 4)**

<sup>12</sup> Atlas Systems. (2019). *Aeon*. <https://www.atlas-sys.com/aeon/>

<sup>13</sup> Thornton, Trevor. (2018). "Circa." NCSU Libraries. <https://www.lib.ncsu.edu/projects/circa>

<sup>14</sup> Born Digital Access Group. (2018). Digital Library Federation. <https://www.diglib.org/groups/born-digital-access-group/>

<sup>15</sup> Appel, Rachel, Alison Clemens, Wendy Hagenmaier, and Jessica Meyerson. (2017). *Participatory Archival Research and Development: The Born-Digital Access Initiative*. <http://hdl.handle.net/1853/58923>

<sup>16</sup> Appel, Rachel, Alison Clemens, Wendy Hagenmaier, and Jessica Meyerson. (2015). *Born-Digital Access in Archival Repositories: Mapping the Current Landscape. Preliminary Report*. <http://bit.ly/hackbdaccess-report>

<sup>17</sup> DLF Born-Digital Access Group. (2017). *Levels of Access*. <http://bit.ly/2THOPMW>

<sup>18</sup> Stanford Libraries. *ePADD*. (2018). <https://library.stanford.edu/projects/epadd>

<sup>19</sup> Software Preservation Network. (2018). *About EaaS*. <https://www.softwarepreservationnetwork.org/eaasi/>

<sup>20</sup> IIIF. *IIIF Archives Community Group*. (2018). <https://iiif.io/community/groups/archives/>

<sup>21</sup> CDL Publishing and Special Collections Team. (2018). *Towards A National Archival Finding Aid Network* (LSTA project proposal). <https://confluence.ucop.edu/x/SYFCD>

activating a diverse group of forum participants and the broader archives and special collections community to adopt and use those recommendations within their archival discovery and delivery environments, across a variety of institutional contexts, software platforms, and levels of resources.

Work towards these goals will produce five key deliverables, prepared by the project team and a subset of project participants, and released under a CC BY 4.0 license unless otherwise noted. The outputs below will offer practical and strategic advances for archives and special collections discovery and delivery and will include:

- **Foundational resources** prepared in advance of and shared publicly before each meeting, including a literature review, an environmental scan, and a taxonomy of systems and types of integrations. This output will fulfill project goals 1 and 2.
- An implementation-focused **integration handbook**, with sections each identifying specific use cases, the systems to be integrated, and specific integration patterns and strategies as practical recommendations. This output will fulfill project goals 2 and 3.
- A **statement of principles** for front-end system architecture and integration, synthesized from the outputs of the forum and working meeting, and released under CC0 (worldwide public domain). This output will fulfill project goal 3 and 4.
- A **white paper** for the overall project to synthesize the activities and outputs of the project, establishing a shared agenda for improved front-end system integration and shared specifications for archives and special collections, and identifying key partners for future advancement and sustainability of that agenda. This output will address project goals 1, 2, 3 and 4.
- **Presentations, peer-reviewed publications, and post-forum webinars**, which will further share information about project activities and outputs, and engage archivists, technologists, and other key stakeholders around these issues. We will submit articles to journals that are fully open access to ensure broader reach and impact. This output will address project goals 1, 2, 3 and 4.

Our core framing is that it is possible to provide broad future applicability for individual institutions as well as finding aid aggregators that support regional- and national-level discovery. Accordingly, the project team assumes that the project will be most impactful if it focuses on shared and holistic concerns and recommendations, rather than focusing exclusively on system- or platform-specific integrations. We believe that communicating across professional boundaries, establishing shared approaches, and building consensus will allow archives and special collections to steward their collections and resources appropriately. As this project is intended to expand the capacity of archives and special collections to provide effective discovery and delivery, it can only be truly successful if its outputs and recommendations are equitable and adaptable to a variety of contexts, communities, and resourcing levels. Accordingly, this project will develop its recommendations consciously as an inclusive expression of professional ethics and values, following the revision process for the Statement of Principles of *Describing Archives: A Content Standard*.<sup>22</sup> This also promulgates a broader recognition that the development, integration, and use of discovery, access and delivery systems for archival collections are themselves interventions that impact how records themselves are used and understood.

## 2.2. Project structure and phasing

*Lighting the Way* is a 12-month project to be held from September 1, 2019 to August 31, 2020. IMLS funding will primarily support participant support costs and facilities costs for two meetings over the course of the project: a 2.5-day *forum* of up to 50 delegates, and a 2.5-day *working meeting* of up to 25 delegates. To achieve the goals for the project, work will be structured into four phases: 1) pre-forum planning and research; 2) the forum; 3) forum synthesis and the working meeting; and 4) project synthesis and communication.

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<sup>22</sup> DACS Change Proposal: Revised Preface and Principles. (2018). <http://bit.ly/2SLqSXQ>

## 2.2.1. Pre-forum planning

Given our understanding of need, we envision the *forum* as the first of the two meetings for this project to focus on defining front-end systems integration for archives and special collections, understanding use cases for integration, and having participants develop fluency with how to discuss these integrations. Pre-forum planning comprises three major strands: engaging participant-advisors, participant recruitment and selection, and foundational research.

The project will have a designated group of *participant-advisors*, akin to a project advisory board. Participant-advisors have been selected based upon demonstrated expertise in archives, technology, and related concerns about front-end integration, or ethics, legal concerns including intellectual property, and risk management.<sup>23</sup> Based upon scheduling availability, participant-advisors may also be forum participants, working meeting participants, or both, as described below. At the start of the project, the project team will convene the participant-advisors to review the project timeline, goals, and outputs, and to confirm their ability to participate in the project. As participation is critical to establishing a national agenda around improving front-end systems integration for archives, much of the effort in this phase of the project will focus on recruitment and selection of participants. Participants in the project represent the primary audiences and stakeholders for the project across multiple disciplines and job functions both within and outside the context of archives and libraries, in two complementary and inter-reliant groups:

- **Archives and special collections staff**, including archivists, special collections librarians, and administrators, who represent the primary functional stakeholders in front-end systems integration. We intend to invite and solicit participants from many organizational contexts, including academic libraries, public libraries, museums, community archives, historical societies, and state archives. We are also seeking participation representation across job function and specialization, including arrangement and description, public services and reference, metadata management, and digital collections. We have confirmed preliminary commitments from **Linda Hocking** (Archivist, Litchfield Historical Society), **Dorothy Berry** (Digital Collections Program Manager, Houghton Library, Harvard University), **Max Eckard** (Lead Archivist for Digital Initiatives, Bentley Historical Library, University of Michigan), **Julie May** (Director of Library and Archives, Brooklyn Historical Society), **Greg Wiedeman** (University Archivist, University at Albany), **Elvia Arroyo-Ramírez** (Assistant University Archivist, University of California, Irvine), **Sara Logue** (Assistant University Archivist for Public Services, Mudd Library, Princeton University), **Sandra Phoenix** (Executive Director, HBCU Library Alliance), and **John Rees** (Archivist/Digital Resources Manager, National Library of Medicine). Other potential invitees include: **Michael Pahn** (Head Archivist, National Museum of the American Indian, Smithsonian Institution), **Meredith McDonough** (Digital Assets Coordinator, Alabama Department of Archives and History), and **DeLisa Harris** (Reference Librarian for Special Collections, Fisk University).
- **Technologists**, including software developers, user experience designers, product managers, systems architects, and technical leadership. We intend to invite and solicit participants from affiliated with institutions holding archives and special collections, as well as vendors, service providers, and open source software communities that serve archives and libraries. We have confirmed preliminary commitments from: **Laney McGlohon** (Technical Lead, ArchivesSpace), **Geoff Froh** (Deputy Director, Densho), **Gloria Gonzalez** (Senior Library Strategist, Zepheira), **Sean Aery** (Digital Projects Developer, Duke University), **Hillel Arnold** (Assistant Director for Digital Programs, Rockefeller Archive Center), **Amelia Abreu** (Design Researcher and Founder, UX Night School), and staff from **University of Michigan Library's Digital Library Platforms and Services** division. Other potential invitees include: **Jason Roy** (Director of Digital Library Services, University of Minnesota), **Adrian Turner** (Senior Product Manager, California Digital Library), **Shane Huddleston** (Product Manager, OCLC), **Sara Carlstead Brumfield** (Software Engineer and Partner, Brumfield Labs), **Toby Reiter** (Web Software Developer, Archives of American Art, Smithsonian Institution), and **Aaron Cope** (Head of Internet Typing, SFO Museum).

In addition to the participants identified above, we will create an open application process for participation and encourage nominations of potential participants. The open call for participation will be included in a project website

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<sup>23</sup> See the application's supporting documents for a list of preliminarily confirmed participant-advisors (Supportingdoc1.pdf).

created at the beginning of this phase of the project, following the example of previous IMLS National Forum Grant projects such as *Always Already Computational: Collections as Data*<sup>24</sup> and the *National Web Privacy Forum*.<sup>25</sup> Avenues for publicity include emails and social media channels, most notably to communities such as sections of the Society of American Archivists, software projects and technical efforts like ArchivesSpace, ArcLight, and the IIF Archives Community Group, and targeted outreach to initiatives such as the American Association for State and Local History and the Authenticity Project Fellowship managed jointly by the Digital Library Federation and the HBCU Library Alliance.

Of the 50 participants in the forum, 30 will be fully funded through grant funds; of those 30, approximately 15 will be included via direct invitation, and 15 will be included via the application process. To ensure diverse representation, the project will reserve funding for up to 10 participants in the forum for those working with collections of underrepresented communities, or archives, library, or technology workers from groups that are underrepresented in their field. The remaining 20 unfunded participants will include up to 10 directly invited participants receiving institutional support, with the remainder drawn from applicants. With this balance informed by the design of the *National Web Privacy Forum*, we intend to identify participants through targeted recruitment and an open nomination process that will allow us to include participants that otherwise may not have been known to the project team. Participants will be selected based upon their experience or interest in the areas of focus for the project: archives and special collections, discovery, delivery, or experience with systems integration.

The project team will also undertake *foundational research* contemporaneously with the recruitment and selection process. This will include a comprehensive environmental scan and literature review regarding topics such as archival discovery, archival front-end system development, and systems integration. As part of the application process for forum participation, the project team will also gather high-level information from both participant-advisors and prospective forum participants about the state of integrations (e.g. desired, planned, or implemented), systems in use that require integration, the use cases or functional needs, and within the context of their institutions or projects. With this information, the project team will begin to generate a taxonomy or conceptual framework that identifies the type and function of front-end systems (the “who” or “what”), their integrations and implementations (“the how”), and their motivations (“the why”). The project team will then re-engage with the participant-advisors in advance of the forum to review and gather feedback about the framework and preliminary findings. Based upon this feedback, the project team will revise the framework. The revised framework will be posted publicly and shared with forum participants in advance of the meeting as preparatory material, and for further review and feedback. These resources will be organized and made available through the project website and archived in the Stanford Digital Repository.<sup>26</sup>

## 2.2.2. The forum

The forum will take place over 2.5 days at Stanford University in Stanford, California in January 2020, and will include context-setting information sharing and breakout sessions. Context-setting will include a presentation from the project team about the pre-forum research and conceptual framework produced during pre-forum planning, and presentations from invited guests about the current state of front-end systems integration within their institutions. These presentations are intended to highlight both progress and challenges regarding discovery and delivery integration, and to serve as a catalyst for participants to share needs, concerns, and information freely. The breakout sessions are intended for forum participants to define problems, propose ideas, articulate priorities, and identify opportunities for collaboration. The breakout sessions will progress in three rounds, informed by human-centered design principles and facilitated using techniques drawn from *Liberating Structures*,<sup>27</sup> a set of proven techniques to increase inclusion and engagement. The breakouts will be structured as follows:

- **Day 1: context setting and exploration.** The first day will be dedicated to introducing the areas of focus and exploring the topic. Using the framework and other foundational resources developed in the pre-forum planning

<sup>24</sup> *Always Already Computational - Collections as Data*. (2018). <https://collectionsasdata.github.io/>

<sup>25</sup> Montana State University Library. (2018). *National Web Privacy Forum: Achieving Privacy in the Age of Analytics*. <https://www.lib.montana.edu/privacy-forum/>

<sup>26</sup> Stanford Libraries. (2019). *Stanford Digital Repository*. <http://library.stanford.edu/research/stanford-digital-repository>

<sup>27</sup> *Liberating Structures: Including and Unleashing Everyone*. (n.d.) <http://www.liberatingstructures.com/>

phase, the first round of breakout sessions will include exploratory exercises that clarify the vision and challenges from the perspective each participant, stakeholder group, and job function.

- **Day 2: creativity and ideation.** The second day will be dedicated to identifying requirements, opportunities, and solutions for systems integration. This round of breakouts will focus on generative activities and exercises to have participants articulate these ideas from technical, ethical, and collaborative perspectives.
- **Day 3: refinement and appraisal.** The final day will focus on iterating on and selecting ideas produced in Day 2. Participants will assess these ideas based on viability (in terms of up-front costs or sustainability), feasibility (technically or politically possible), and desirability (if they address core use cases or needs). These breakouts will focus on evaluative activities to determine the potential of proposed requirements, solutions, or opportunities.

This structure will allow the participants to surface their perspectives, concerns, and needs to construct a holistic vision to addressing the project's areas of focus. For those unable to attend the Forum in person, we will live-stream and record the plenary presentations by the project team and invited speakers, using either a Zoom webinar or YouTube live. Videos will be made available following the forum on the project website and will be archived in the Stanford Digital Repository. We will also ensure that the conversations are documented through collaborative note-taking that will be added to the project website, and through monitoring social media platforms including Twitter using a designated hashtag for the forum.

### 2.2.3. Forum synthesis and the working meeting

Following the forum, the project team will review and synthesize the forum's outputs into a set of preliminary findings and will solicit contributions from forum participants for the integration handbook. The project team will also ask all forum participants to complete a feedback form about their experience, intended to address the capacity-building intent of the project. Questions will address required performance metrics as defined by IMLS; the participants' understanding of the ecosystem of front-end systems, potential next steps, and opportunities for collaboration; and feedback on forum facilitation and inclusiveness. In preparation for the working meeting, the project team will meet virtually with the participant-advisors to review the preliminary post-forum findings and feedback, identifying areas of agreement, disagreement, and potential gaps. After this virtual meeting, the preliminary findings will be published on the project website. This work will prepare the project team and participant-advisors for a focused working meeting to be held in May 2020 at Stanford University, Princeton University, or the University of Michigan.<sup>28</sup>

This working meeting will focus on collaborative, in-depth discussions about the proposed requirements, solutions, and principles generated in the forum, and outline the work necessary to frame additional progress towards the deliverables, especially in terms of identifying a broader set of principles, architectural patterns, or areas of future work. By the conclusion of the working meeting, the project team and working meeting participants will accept assignments for additional contributions to the integration handbook and the project white paper, define the statement of principles, and articulate a set of goals for how to carry forward the vision laid out in the principles in their own institutions and projects. Working meeting participants represent those stakeholders likely to have direct responsibility for carrying this work forward within their institution or project. Working meeting participants will be selected from participant-advisors, and forum participants that have demonstrated their willingness to contribute to the project in depth or based on demonstrated expertise that aligns with the project's needs.<sup>29</sup> Grant funds will support full attendance and travel for 20 working meeting participants, with up to four reserved spots for participants working with collections of underrepresented communities, or archives, library, or technology workers from groups that are underrepresented in their field.

### 2.2.4. Project synthesis and communication

Following the forum and the working meeting, the project team will review and synthesize the ideas and materials produced in both meetings. The project team will expand the preliminary findings into the project white paper, augmenting it with the output of the working meeting. In addition, the project team will compile contributions to the

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<sup>28</sup> Budget estimates are based on hosting the working meeting at Stanford University in space available at no charge to the project team.

<sup>29</sup> See the application's supporting documents for the preliminarily confirmed participant-advisors (Supportingdoc1.pdf) and provided letters of support reflecting interest, motivation, and commitment to contribution (Supportingdoc2.pdf).



integration handbook from participant-advisors, working meeting participants, and designated forum participants. The project team will also issue a second feedback form to all project participants following the model of that following the forum, with additional questions about facilitation and inclusiveness of the working meeting, the effectiveness of participant-driven contributions, and specific plans to apply their experience to their institutions and projects. We will also seek feedback on project outputs and the project's activities through engagement in conferences focused on archives and library technology, through presentations, workshops, or working groups, and to generate dialogue around front-end system integration concerns for archives and special collections. Travel to conferences such as the Fall 2019 DLF Forum, the Summer 2020 RBMS Conference, and the Summer 2020 SAA conference will allow the project team to engage with archivists, special collections librarians, and technologists. We intend to present our final project outputs at the Summer 2020 SAA conference, where we expect the largest impact given the focus of the project. We will also solicit and cultivate contributions to the project through the project website and social media. Following the completion of the project's white paper, integration handbook, and statement of principles, we intend to work with SAA, DLF, and the OCLC Research Library Partnership to develop a series of open, online webinars so that the project's insights can be shared broadly through the archives and special collections community. These synthesis and communication activities will help ensure that feedback from the broader, national community of stakeholders are represented in the project outputs, and that our findings and outputs reach a broad audience.

## **2.3. Project resources**

### 2.3.1. Budget

Our request for \$149,992 primarily includes support for event planning costs (venue fees, catered meals, and supplies); participant support costs (air travel, lodging, meals, and transportation) for 30 forum participants and 20 working meeting participants; travel for the project team to engage stakeholders and disseminate project progress and outcomes; salary support for the project team; supplies for the forum and working meeting; and indirect costs. Event coordination, participant recruitment, meeting facilitation and synthesis, and output dissemination will be done by the project team using their allotted time.

### 2.3.2. Project timeline

The project will run from September 1, 2019 to August 31, 2020, and will occur in four phases as indicated in ***Project structure and planning*** above: 1) pre-forum planning (September 2019-January 2020), 2) the forum (January 2020), 3) forum synthesis and the working meeting (February-May 2020), and project synthesis & communication (May-August 2020). A detailed description of the project's activities and their proposed sequence can be found in the Schedule of Completion included in the application.

### 2.3.2. Personnel

The core project team consists of a cross-functional team representing technical and strategic leadership, archival practice, product management, software engineering, and logistics. The project personnel have the experience necessary to convene and organize project participants, ensuring that the project goals will be realized.

- **Mark A. Matienzo (Project Director)**, Collaboration and Interoperability Architect at Stanford University Libraries. They will be responsible for leading the overall project activities, including oversight, administration, and execution, including recruitment of forum participants and project communication. Mark's work at Stanford focuses on managing collaborative, multi-stakeholder projects focused on discovery and access and bridging the gap between stakeholders and technical teams.
- **Josh Schneider (Project Analyst)**, Assistant University Archivist and Product & Service Manager at Stanford University Libraries. He will be responsible for pre-meeting preparation and foundational research, forum and working meeting facilitation, and will lead post-meeting synthesis activities. He will contribute to the preparation of the project's final deliverables and project communication, including presentations and webinars. Josh brings experience as an archivist, product manager, and community lead for ePADD and the IIIF Archives group.
- **Camille Villa (Project Analyst)**, Digital Library Research Engineer at Stanford University Libraries. She will be responsible for pre-meeting preparation and foundational research, forum and working meeting facilitation, and will lead post-meeting synthesis activities. She will contribute to the preparation of the project's final deliverables

and project communication, including presentations and webinars. Camille is a software engineer focusing on access and discovery systems managed by Stanford Libraries, including ArcLight.

- **Supavadee (Jib) Kiattiant (Project Assistant)**, Administrative Associate at Stanford University Libraries. She will serve as administrative support for the project for meeting and travel logistics and will leverage her experience with planning events hosted by Stanford Libraries' Digital Library Systems and Services division.

## 2.4. Risks

While our overall assumptions and project design are intended to allow the project to broaden its impact, some of them introduce risks to the project itself. For example, our intent to focus on a shared framework rather than on system- or platform-specific integrations may also limit the impact of the project, as the recommendations developed will take more effort to become actionable. We intend to address that through the engagement of stakeholders who can speak to functional needs about systems integration and will use their expertise to document these as use cases, and where applicable, provide detail on how an integration was accomplished. In addition, the project leverages strong expertise in terms of both teams and identified participants with software and initiatives such as ArchivesSpace, ArcLight, Aeon, ePADD, and IIF.

A further risk relates to overlooking values-driven work when effective front-end systems integration and the presumption that unmediated open access are a highly-linked desirable end state. While effective front-end integration for archives and special collections can improve access, the project also centers the importance of respecting and enabling the introduction and enforcement of restrictions to access to archival material, such as cultural protocols, donor agreements, the rights of content creators, or intellectual property limitations. Mukurtu<sup>30</sup> and Documenting the Now<sup>31</sup> are exemplary as both software and community projects that have engaged with this as a central part of their purpose and define what their platforms enable or limit as a reflection of their values.

There is also a set of risks related to project organization and management. Event planning and logistics will require interaction with participants and contributors, and insufficient planning may compromise the success of the meetings. The project team will mitigate this risk by applying past experience in managing conferences such as LDCX (an unconference with 80-100 attendees) and the 2017 Personal Digital Archiving conference. The team will also work closely with administrative and event planning staff to ensure logistical concerns are addressed well in advance. Similarly, agendas, recommended readings, and expectations on participation will be communicated well in advance to allow participants to prepare for the forum and working meeting. Finally, the projects deliverables represent a risk in that they rely on contributions from both the project team and a subset of participants in the meetings. We will work with external contributors to set clear deadlines and ensure that we follow up to mitigate this risk of slippage as much as possible. In addition, we have mitigated this risk through expressed commitments to contribution reflected in letters of support provided by prospective participants.<sup>32</sup>

## 3. Diversity Plan

This project is envisioned as a capacity building project for the archives and special collections community across types of institutions, resourcing levels, and roles of staff. While many of the project's concerns are technical, we also seek to approach the project as a means to address inequity that impacts under-resourced institutions, as well as individuals who work with collections of underrepresented and marginalized communities, and archives, library, and technology staff from backgrounds underrepresented in their fields. To this end, we are providing structural support for participation in both meetings as described in the project design section for those working with collections of underrepresented and marginalized communities, and those from communities underrepresented within their profession through guaranteed travel support. We intend to undertake targeted outreach as part of the recruitment of potential forum participants to groups including the Authenticity Project fellowship program (a collaboration between the Digital Library Federation and the HBCU Library Alliance) and sections of the Society of American Archivists (Archives and Archivists of Color Section, Diverse Sexuality and Gender Section, Latin American and Caribbean

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<sup>30</sup> About - Mukurtu CMS. (2018). <http://mukurtu.org/about/>

<sup>31</sup> Documenting the Now (2018). <https://www.docnow.io/>

<sup>32</sup> See the application's supporting documents for all the letters of support for this application (Supportingdoc2.pdf).

Cultural Heritage Archives Section; Native American Archives Section). In addition, the project team has extensive experience developing, implementing, and enforcing codes of conduct<sup>33</sup> and applying anti-oppressive facilitation techniques. The project team will apply these methods, artifacts, and processes together to establish a welcoming, inclusive, and constructive space for idea generation and collaboration.

#### 4. National Impact

This project is intended to provide a collaborative framework through a forum and working meeting for archivists and technologists to develop a forward-looking agenda to address the long-standing challenges of front-end systems integration for archives and special collections, such as cost, complexity, and specificity in terms of institution, system, or platform. Through its meetings, activities, and outputs, the project will have national impact in four specific areas:

- **Development of a common understanding and a shared vocabulary around the ecosystem of discovery and delivery for archivists and technologists, as well as the creation of stronger community bonds.** Interdisciplinary conversations between archivists and technologists can be challenging given their depth in their respective domains. Through forum and working meeting participation and the project outputs, we expect that this will improve mutual understanding of the concerns of each sector when addressing front-end systems integration. Furthermore, the project intends to develop and foster an inclusive community with a broad base of participants across size and type of institution, collecting focus, and user-facing systems. We also believe this will make the process of collaboration between archivists and technologists to be more effective over time given the relationships that are developed between project participants.
- **Reduction of barriers, including cost, to building and maintaining user-facing systems and environments for access.** While integrations of front-end systems may be institution-specific, the development of the integration handbook will identify practical, common patterns that describe the motivation for specific integrations, and how they are implemented. With additional context, this documentation will inform the development of common perspectives about comprehending user-facing systems as a larger ecosystem and provide potential models that can be applied elsewhere, including smaller and less-resourced institutions. We believe the integration handbook serve as an important reference for archives and special collections as they plan further work on systems that support discovery and delivery. Accordingly, the project team is considering ways in which integration handbook could be maintained as resource updated past the project's conclusion.
- **Improvement of the user experience for researchers for both analog and digital collections.** Effective systems integration will make it easier for both researchers and archivists to discover, deliver, and provide access to archives, and will improve on-site and in-person research and fulfillment interactions. This will in turn make the research process more effective and more rewarding. It may also provide additional insight into further refinements that could be made to front-end systems to better serve all users.
- **Serving as the basis of future implementation, collaboration, and research projects for archives and special collections.** The forum and working meeting are intended to catalyze opportunities for further activities that advance the project's findings. Participant-advisors and working meeting participants in particular will be encouraged to identify how their participation will inform and support the future efforts of their institutions and projects. We expect that this may include articulating plans around integrations in product roadmaps for software projects such as ArchivesSpace, ArcLight, and ePADD. The project team will also leverage its connections to within communities such as IIF and the DLF Born Digital Access Working Group to encourage similar efforts to continue. Furthermore, the project itself provides a model for values-driven collaboration on technical projects; accordingly, it can inform how individual institutions or multi-institutional projects approach similar work.

As a practitioner-focused initiative, the project will enable archivists and technologists to work more effectively together and to envision new possibilities that will transform the future discovery and delivery for archives and special collections. The project's forum, working meeting, and outputs will allow the archives and special collections community to leverage past breakthroughs, identify new possibilities, and remove hurdles together, illuminating a path towards more effective, sustainable, and equitable access to archives for everyone.

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<sup>33</sup> See, for example, the LDCX Code of Conduct: <https://library.stanford.edu/projects/ldcx/2019-conference/code-conduct>

Stanford University

### Schedule of Completion

[illegible]



## DIGITAL PRODUCT FORM

### Introduction

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

### Instructions

All applications must include a Digital Product Form.

☐

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

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

### Part I: Intellectual Property Rights and Permissions

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

In order to maximize dissemination and reuse of project resources, all project resources will be released under either the Creative Commons Attribution License (CC BY) 4.0 (most written products), the CC Attribution, Non-commercial, No Derivatives License (CC BY-NC-ND) 1.0 (recorded presentations from the forum), or the CC0 Public Domain Dedication 1.0 (the statement of principles). The project team is committed to making all project materials and resources available gratis and without access restrictions. Resources will be made available through the project website, hosted by Stanford University, and archived in the Stanford Digital Repository: <https://library.stanford.edu/research/stanford-digital-repository>. The content of the project website will also be licensed under CC BY 4.0.

**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.

Project resources will be publicly available without any access restrictions. Use will be governed by a CC BY 4.0, CC BY-NC-ND 4.0, or CC0 1.0 license that will be noted on the materials themselves, and in their description or metadata. Published materials will be copyright by the authors and will be made open access using the Stanford Digital Repository, the institutional repository of Stanford University: <https://library.stanford.edu/research/stanford-digital-repository>.



**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.

The project will include products created by external contributors (e.g. recordings of invited presentations at the forum or contributions to the integration handbook or white paper). Prior to their contribution, these contributors will be asked to complete a copyright release granting non-exclusive use of the materials in perpetuity by Stanford University for their contributed products. The Stanford Office of University Communications provides a standard release form for speakers or presenters to grant permission for audio and/or video capture ([https://ucomm.stanford.edu/wp-content/uploads/sites/15/2018/07/SU\\_speaker\\_release.pdf](https://ucomm.stanford.edu/wp-content/uploads/sites/15/2018/07/SU_speaker_release.pdf)). The project team will work with Stanford Libraries administration to develop a comparable release form for contributions to the written products.

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

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

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

Project resources will include a website, literature review, environmental scan, video recordings of approximately 10 forum plenary presentations, notes created during the forum, a white paper, an integration handbook, conference presentations, and peer-reviewed publications. Document resources will be distributed as HTML and PDF files, and conference videos will be provided as MPEG4 video files.

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

Documents will be created using standard web services, word processing software, and presentation software, including Google Docs, Microsoft Word, and Microsoft PowerPoint. Videos will be produced by AV staff from the Bechtel Conference Center, Freeman Spogli Institute, Stanford University.

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

HTML, PDF, MPEG4 (H.264 MPEG-4 AVC Part 10; 30 fps; 1920x1080; MPEG AAC audio at 44.1 kHz)



## B. Workflow and Asset Maintenance/Preservation

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

The project will be led and managed by Project Director Matienzo. Production and dissemination of the project resources will be led and managed by Project Director Matienzo. Project Analysts Schneider and Villa will provide support throughout the duration of the project. The project's participant-advisors will provide additional reviews, evaluation, and consultation in the production of project resources.

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

Resources will be made available through the project website, hosted by Stanford University. Project resources will be archived in the Stanford Digital Repository, the institutional repository of Stanford University: <https://library.stanford.edu/research/stanford-digital-repository>.

## C. Metadata

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

Stanford Digital Repository uses MODS for its descriptive metadata. Documents will be submitted through SDR's self-deposit interface which uses guided entry forms to produce the necessary descriptive information to be included in the MODS record. Videos will be submitted using a designated accessioning process for AV materials and will have a spreadsheet with the descriptive metadata that will be automatically transformed into MODS records. All digital objects will then go through a set of partially automated assembly processes, which creates or associates descriptive, technical, and administrative metadata with the object to be accessioned, creates checksums and necessary derivatives, and validates the readiness of the object for accessioning by validating incoming files against their format specifications.

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

The project will leverage Stanford University Libraries' overall vision and investment in long-term preservation, access and discovery products and services, ensuring that the collection does not become technologically isolated. Stanford Libraries has world-class digital library infrastructure for a wide spectrum of content. At its core is the Stanford Digital Repository (SDR), a secure, sustainable, scalable environment for digital content of enduring value to the research community at Stanford and beyond. In production since 2006, SDR contents currently include over 467 terabytes of unique content. Multiple redundant copies of the ingested digital objects are stored on geographically-distributed media (both hard disk and LTO-6 tape) to protect against loss, and fixity checks are used to protect against file corruption and bit errors. Descriptive metadata is reviewed for quality control and maintained by Stanford Libraries' Metadata Development Unit.



**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).

Stanford Libraries has experience in search engine optimization and will apply that expertise to the project website and its resources. Each resource will have its own unique persistent URL (PURL) and will be discoverable within SearchWorks, Stanford Libraries' information discovery platform. Videos will also be hosted on the Stanford Libraries' Digital Library Systems and Services YouTube account. Stanford Libraries are also in the process of developing an API for SearchWorks and releasing descriptive metadata under a CC0 public domain dedication. We will also encourage all project participants to promote and reuse the digital content produced in this project.

#### **D. Access and Use**

**D.1** Describe how you will make the digital content, resources, or assets available to the public. Include details such as the delivery strategy (e.g., openly available online, available to specified audiences) and underlying hardware/software platforms and infrastructure (e.g., specific digital repository software or leased services, accessibility via standard web browsers, requirements for special software tools in order to use the content).

All project resources will be openly available via the project website and the Stanford Digital Repository. Stanford Digital Repository provides a streaming delivery platform and viewer for AV content, and an integrated viewer for PDF and image resources. No special software or tools will be necessary; all materials will also be downloadable for viewing locally.

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

ePADD project website: <https://library.stanford.edu/projects/epadd>

### **Part III. Projects Developing Software**

#### **A. General Information**

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

N/A



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

N/A

## **B. Technical Information**

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

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) and URL(s) for examples of any previous software your organization has created.

N/A

### **C. Access and Use**

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

N/A

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

N/A

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

Name of publicly accessible source code repository:

N/A

URL:

N/A

## **Part IV: Projects Creating Datasets**

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

N/A

**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?

N/A

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

N/A

**A.4** If you will collect additional documentation, such as consent agreements, along with the data, describe plans for preserving the documentation and ensuring that its relationship to the collected data is maintained.

N/A

**A.5** What methods will you use to collect or generate the data? Provide details about any technical requirements or dependencies that would be necessary for understanding, retrieving, displaying, or processing the dataset(s).

N/A

**A.6** What documentation (e.g., data documentation, codebooks) will you capture or create along with the dataset(s)? Where will the documentation be stored and in what format(s)? How will you permanently associate and manage the documentation with the dataset(s) it describes?

N/A

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

N/A

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

Name of repository:

N/A

URL:

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

N/A