



Cultivate, Assess, Advocate, Implement, and Sustain: A Five-Point Plan for Successful Digital Preservation Collaborations

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Purpose

For libraries with limited resources, digital preservation can seem like a daunting responsibility. Forming partnerships can help build collective knowledge and maximize combined resources to achieve digital preservation goals.

Design/methodology/approach

In 2015, librarians from four institutions in Montana formed the Digital Preservation Working Group (DPWG), a collaboration to increase digital preservation efforts statewide. The group's immediate goals were to promote digital preservation best practices at each individual institution, as well as to learn about and support each other's work. The group's long-term goal was to implement a shared digital preservation service that would fill gaps in existing digital preservation efforts.

Findings

Beyond the cost savings gained by sharing a digital preservation service, the members of DPWG benefitted from shared knowledge and expertise gained during the partnership. The group also functioned as a sounding board as each institution built its digital preservation program, and it became a system of support when challenges arose.

Practical implications

This article proposes a five-point plan for creating digital preservation partnerships: (1) Cultivate a foundation of knowledge and identify a shared vision; (2) Assess the current digital preservation landscape at each institution; (3) Advocate for the value of digital preservation activities; (4) Implement shared digital preservation services; (5) Sustain group activities and establish structures for ongoing support.

Value

The activities of DPWG provide a model for institutions seeking to collaborate to meet digital preservation challenges. This article demonstrates that by implementing a structured plan, institutions can build and sustain digital preservation partnerships, thus positioning themselves to achieve digital preservation success.

Introduction

For institutions with limited resources, digital preservation can seem like a daunting responsibility. Forming partnerships can help build collective knowledge and maximize combined resources to achieve digital preservation goals. In 2015, librarians from four institutions in Montana formed the Digital Preservation Working Group (DPWG), a

collaboration to increase digital preservation efforts statewide. This article proposes a five-point plan for creating digital preservation partnerships:

1. **Cultivate** a foundation of knowledge and identify a shared vision
2. **Assess** the current digital preservation landscape at each institution
3. **Advocate** for the value of digital preservation activities
4. **Implement** shared digital preservation services
5. **Sustain** group activities and establish structures for ongoing support

This plan, developed from DPWG's experience, can serve as a model for institutions considering a collaborative approach to digital preservation.

Literature Review

In the late 1980s, digital information reached a critical mass that led to a foundational body of scholarship examining digital preservation. The federal government responded to the increasing urgency of digital preservation by releasing a report on preserving Federal electronic records (U.S. House of Representatives Committee on Government Operations, 1990) and by establishing grants to support the preservation of digital records in the United States (OCLC Research, 1997; Ray, 1998). But Paul Conway called digital preservation “as much an educational problem as a financial one,” writing that information professionals “need to define for themselves just what archival preservation entails and assess [their] capacity to develop and administer sophisticated preservation programs” (Conway, 1990, p. 205). Four years later, the Association of Research Libraries addressed this need by forming the Task Force on Digital Archiving, which was charged with creating guidelines to ensure “continued access indefinitely into the future of records stored in digital electronic form” (Waters and Garrett, 1996, p. iii). The final report of this Task Force concludes with a set of recommendations that function as a call-to-action for the library community, focusing on funding, policy development, and community-organized scholarship.

In a 1995 article in *Scientific American*, Jeff Rothenberg brought digital preservation to a broader audience by describing his hypothetical grandchildren going through his belongings fifty years in the future, only to find important information trapped in unreadable, obsolete storage media (Rothenberg, 1995). Twenty years after that article's publication, this risk is no less real, and digital preservation research continues to examine best practices for stewarding the digital future. The factors highlighted in Rothenberg's article—hardware failure/obsolescence and software obsolescence—are important considerations when planning for long-term preservation. Other factors that threaten digital materials are bit-rot; mismanagement or loss of materials prior to acquisition by a repository; and de-contextualization due to insufficient description or metadata (Schumacher, et al., 2014). The digital preservation community has developed standards to help digital repositories address these risk factors.

The OAIS Reference Model (CCSDS, 2012) was developed as a “conceptual framework for an archival system dedicated to preserving and maintaining access to digital information over the long term” (Lavoie, 2000). From this theoretical foundation, concrete metrics began to be developed for digital preservation activities (Beagrie et al., 2002; Ambacher et al., 2007), culminating in the Audit and Certification of Trusted Digital Repositories, which was codified as an international standard in 2012 (ISO 16363, 2012). Responding to and complementing this standard, library literature has outlined strategies for drafting digital preservation plans and policies (Strodl, et al., 2007; Bishoff, 2010; Mannheimer, et al., 2014); developing repositories for digital preservation (Cramer and Kott, 2010; Elstrøm and Junge, 2014); examining library digital preservation practices (Oehlerts and Liu, 2013); establishing and implementing preservation metadata (Lavoie and Gartner, 2013), and building and evaluating preservation-aware digital storage systems (Baker, et al., 2006; Rosenthal, 2010; Han, 2015). Large-scale education and advocacy efforts have also emerged in the library community, including the Library-of-Congress-led National Digital Information Infrastructure and Preservation Program¹ in the United States and the Open Preservation Foundation (formerly Planets Project) in Europe. Even with ample existing research and advocacy, libraries need robust systems and infrastructure in order to act in accordance with digital preservation best practices. A recent survey found that library digital preservation programs can be impeded by “lack of funding,...lack of expertise, lack of administrated support, and not knowing where to start” (Bishoff and Smith, 2015). The library community uses two main strategies to reduce these barriers: digital preservation services and library digital preservation collaborations.

Digital preservation services generally fall into three categories (Schumacher, et al., 2014). The first category includes suites of tools that handle the full digital preservation workflow, including ingest, processing, access, storage, and maintenance of digital materials. This category includes services like Rosetta², Preservica³, and ArchivesDirect⁴. The second category focuses primarily on processing for ingest, and includes services like Archivematica⁵, Curator’s Workbench⁶, and Data Accessioner⁷. The third category provides preservation storage for digital materials, and includes services like DuraCloud⁸, Amazon S3⁹ and Glacier¹⁰, and MetaArchive¹¹. Digital repository software can be used in conjunction with these digital preservation services in order to

¹ <http://www.digitalpreservation.gov/>

² <http://www.exlibrisgroup.com/category/RosettaOverview>

³ <http://preservica.com>

⁴ <http://www.archivesdirect.org>

⁵ <https://www.archivematica.org/en>

⁶ <https://github.com/UNC-Libraries/Curators-Workbench>

⁷ <http://dataaccessioner.org>

⁸ <http://www.duracloud.org>

⁹ <https://aws.amazon.com/s3>

¹⁰ <https://aws.amazon.com/glacier>

¹¹ <https://www.metaarchive.org>

provide access and storage for digital materials; repository software options include open source systems like DSpace¹² and Fedora¹³, as well as hosted, proprietary systems like Digital Commons¹⁴. Whether fee-based or open source, digital preservation services enable libraries with limited resources to implement digital preservation workflows without developing complex internal digital preservation infrastructure (Miller, 2015).

Libraries are also increasingly developing basic digital preservation programs through participation in collaborative efforts such as the e-journal preservation partnership Portico¹⁵ and the collaborative archive LOCKSS¹⁶ (Bishoff and Smith, 2015). MetaArchive Cooperative's 2010 publication "A Guide to Distributed Digital Preservation," outlines collaborative strategies and specific digital preservation models in order to provide institutions with "practical examples of how [digital preservation] can be accomplished in manageable, low-cost ways (Halbert and Skinner, 2010, p. 2). Small and medium-sized libraries have especially found that "forming a community of support is key to meeting the challenges of [digital preservation]" (Rinehart et al., 2014). Collaborations can improve digital preservation practice through combining resources, integrating expertise, and developing joint knowledge to enhance digital preservation (Teper, 2007; Altman et al., 2009). As Schumacher et al. write, "smaller and medium-sized organizations needing digital preservation help are not as alone as we think we are. But we need to help each other while helping ourselves" (2014, p. 14). Collaborations enable even small libraries to develop programs that address basic digital preservation needs.

Background and Case Study

Digital Preservation Working Group

In November 2014, librarians from Montana State University, University of Montana, Montana Tech, and the Montana Historical Society identified a common need to develop digital preservation workflows at their respective institutions. Under the leadership of Sam Meister, who at that time was Digital Archivist at the University of Montana, the four institutions formed the Montana Digital Preservation Working Group (DPWG) to explore partnerships supporting statewide digital preservation efforts. As the participating institutions have varying levels of staff and resources dedicated to digital preservation, the DPWG partnership allowed them to learn from each other and begin to build collective expertise. DPWG structured its activities around a five-point plan to facilitate building and sustaining cross-institutional partnerships (see Figure 1).

Figure 1. Five-Point Plan for Successful Digital Preservation Collaborations

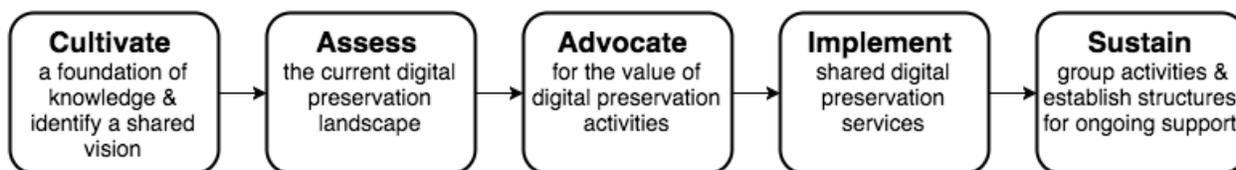
¹² <http://www.dspace.org/>

¹³ <http://fedorarepository.org/>

¹⁴ <http://digitalcommons.bepress.com/>

¹⁵ <http://www.portico.org/digital-preservation>

¹⁶ <https://www.lockss.org>



1. Cultivating a Foundation of Knowledge and Identifying a Shared Vision

Literature Review

At the beginning of the collaboration, DPWG took time to compile a shared library of digital preservation literature. By reviewing this literature, the group gained a broad knowledge of existing collaborative digital preservation efforts. The work of Preserving (Digital) Objects with Restricted Resources (POWRR) influenced DPWG's initial direction (Schumacher, et al., 2014). This paper and others were shared among DPWG, and each member was encouraged to submit and share suggestions for review. This cooperative literature review aided DPWG in forming its initial vision and scope, and raised the group's collective understanding of digital preservation best-practices.

Project Charter

DPWG held its first monthly phone meeting in February 2015, at which point the group outlined its goals and project timeline in a project charter. The one-page charter identified an overarching purpose: to share knowledge and coordinate digital preservation activities across Montana. The charter established a primary goal: to produce a set of recommendations for a collaborative digital preservation service amongst the participating institutions. In order to produce a quality Archival Storage Recommendations Report, DPWG determined that each institution should 1) perform a digital preservation institutional readiness assessment, 2) complete digital content profiles in order to identify baseline requirements, and 3) research possible shared digital preservation solutions based on the assessment results and preservation requirements. The group set a deadline of June 2015 to complete these initial tasks. Taking the time to draft a simple project charter proved extremely helpful for establishing the groundwork for collaboration, reminding the group of its overall purpose.

By reviewing existing literature and forming a project charter, DPWG laid the foundation necessary to become a successful collaboration.

2. Assessing the current digital preservation landscape at each institution

Institutional Assessments

DPWG's first task was to conduct digital preservation assessments to better understand the lay of the land at each of the four institutions. For these assessments, DPWG used the Survey of Institutional Readiness¹⁷ from *Digital Preservation Management: Implementing Short-Term*

¹⁷ <http://www.dpworkshop.org/sites/default/files/readiness.pdf>

Strategies for Long-Term Solutions, an online tutorial developed for the Digital Preservation Management Workshops series (MIT Libraries, 2012). Each institution completed the Survey of Institutional Readiness in order to assess the status of their digital collections. The assessment required each member to reflect on their current status in the areas of Organizational Infrastructure, Technological Infrastructure, and Resources. Organizational Infrastructure related to policies and procedures, mission statements, and administrative support; the Technological Infrastructure section required responses about storage practices, digital content and OAIS compliance; and the Resources section concerned sustainability issues such as funding and staffing.

Table 1. Summary of Self-Assessment Responses

Assessment Criteria	Library #
Wide range of digital content managed across various departments	4/4
Mission statements include a commitment to long-term digital preservation	2/4
Policies and procedures in place that address long-term access	0/4
Systems in place for storage and backup of digital collections	4/4
Current technological infrastructure sufficient for long-term preservation	0/4
Adequate funding and staffing levels	Varied
Digital preservation documents vetted by senior administration	0/4

These assessments allowed members to examine their institutions' existing digital preservation practices and to identify strengths and opportunities for future improvement. In order to provide accurate responses to some questions, representatives from each library consulted across various library departments, and in some instances these efforts prompted necessary internal discussions about policies and practices. The opportunity to open internal lines of communication about digital preservation proved to be one of the most beneficial outcomes of the institutional assessments.

While each institution was at a different stage of digital preservation readiness, all recognized a common need for a more robust digital preservation system. As a result, DPWG decided to work together to explore a shared digital preservation service.

Content Profiles

In an effort to better understand the digital collections managed at each institution, DPWG's next step was to create content profiles for each institution's digital resources. Content profiles are an

established strategy for preparing for collaborative digital preservation or data management projects (Pardo, et al., 2006; Witt, et al., 2009). Content profiling aims to record high-level information useful for determining long-term preservation requirements. The British Library notes the advantages of using content profiles for preservation planning purposes, and suggests that content profiles can benefit an organization by providing “opportunities to build conversations with curators and content specialists about specific preservation requirements” (Day, et al., 2014).

The University of Montana created a content profile template (see Appendix A) and shared it with the other DPWG libraries. The profiles documented basic information for each collection, including content type, format, a brief description, and data size. The profiles required each institution to consider their collections in relation to one another, including their relative complexity level (e.g. variety of file formats), value and preservation priority. They also documented current practices for the creation, acquisition, rights management, and storage of each collection. The content profiles allowed the group to determine the collective size of the institutions’ digital resources, and identify the most critical content for preservation. By using a shared template for this process, DPWG was able to easily compare the various collections and preservation practices at each institution. The profiles continue to serve as a useful reference, providing an overall “snapshot” of the content managed by DPWG.

Identifying Archival Storage Requirements

Armed with information about each institution’s digital preservation readiness, resources, and digital content, DPWG met to review the responses. The group prioritized requirements and discussed how it could work together to support them. One of the key objectives identified for all libraries was securing digital archival storage beyond the systems already in place for basic storage and backup. Using the information provided by the self-assessments and content profiles, DPWG identified baseline requirements for archival storage solutions.

The four institutions identified their immediate needs as follows:

- Bit-level integrity checks
- Geographic distribution of storage servers
- Ability to access content and associated metadata (not a dark archive)
- System usability, including a web interface
- Ability to accommodate multiple administrators and multiple logins

Based on these requirements, DPWG set out to research what digital preservation services would fulfill these joint requirements. The group created a list of currently available solutions, and the work of the POWRR project team (Schumacher, 2014) informed the digital preservation services chosen for research. The team selected services scalable for shared, cross-institutional preservation efforts. In addition to identified needs and requirements, several factors related to financial and institutional resources impacted the final recommendation: (1) the need for hosted

services that would support a shared environment, as overall the group lacked the IT infrastructure to locally host a shared solution, (2) length of commitment, as DPWG is still in the evaluative phase and did not want to be locked into a multi-year contract, and (3) available pricing options, since DPWG sought a price plan that could translate into cost savings for the group.

Given these factors, the following digital preservation services were identified as candidates:

- Preservica¹⁸
- Rosetta¹⁹
- DuraCloud²⁰
- MetaArchive²¹

The research process included reviewing the digital preservation literature, direct contact with vendors and customers, and reading product documentation. The costs, applicable plans, and preservation services offered were summarized for each service. Based on services provided, the four services researched were broadly classified into two groups: Archival Storage only options that provide redundant, distributed storage with regular fixity checking (DuraCloud and MetaArchive), and Archival Storage + Ingest options that provide additional functionality for ingesting, processing and publishing digital content (Preservica and Rosetta).

Through the use of self-assessments and content profiles to determine a common set of digital preservation requirements, DPWG chose to focus efforts on a solution that would benefit each of its members.

3. Advocating for the value of digital preservation activities

Internal Advocacy

After discussing the results of the digital preservation services review, the group compiled an Archival Storage Recommendations Report that was presented to administration at each institution. The report included an executive summary of the group's findings, content profiles, institutional assessments, digital archival storage requirements, profiles of each digital preservation service, and a final recommendation. The collaborative nature of this report carried more weight and cost less individual effort than if a single member had created a similar recommendation on their own.

The group decided that the Archival Storage + Ingest solutions considered would not be feasible for the purposes of the pilot project due to financial and technical constraints. Of the two

¹⁸ <http://preservica.com/preservica-works/>

¹⁹ <http://www.exlibrisgroup.com/category/RosettaOverview>

²⁰ <http://www.duracloud.org/overview>

²¹ <https://www.metaarchive.org/>

Archival Storage services, MetaArchive membership required a three-year minimum commitment. For these reasons, the group chose DuraCloud as the service that best fit the group's needs while still fitting within the scope of its limitations. DPWG ultimately recommended moving forward with a one-year multi-institutional pilot project with DuraCloud Enterprise Plus in order to investigate the feasibility of a shared digital preservation system. By purchasing the service as a group, DPWG reduced costs per institution.

Collaborating on the Archival Storage Recommendations Report also helped the group promote digital preservation best practices at each of the institutions. As each DPWG member presented the recommendation to their advisory or executive teams, questions arose about how a digital preservation service would add value to the existing backup practices within each institution. The group relied on shared expertise to advocate for more robust digital preservation practices, and ultimately developed a more persuasive and informed response by working together. These internal conversations helped clarify the group's mission and built broader institutional consensus and support. In this way, DPWG continues to serve as a system of support when questions or concerns arise.

DPWG saved time and reinforced efforts by building on individual strengths to investigate vendor services, write a recommendation report, and advocate for digital preservation best practices to administration.

4. Implementing shared digital preservation services

Foundation of Pilot Project

In April 2016, the four DPWG institutions embarked on a one-year pilot project that will assess the feasibility of a multi-institutional subscription to DuraCloud Enterprise. Each member of DPWG obtained institutional support and funding for a one-year collaborative pilot project with DuraCloud. The group is currently implementing the shared preservation system, identifying content to contribute, and integrating it into their existing workflows. As a result, DPWG will assess whether to continue this partnership beyond a one-year pilot.

Before starting the pilot, DPWG drafted and signed a Memorandum of Understanding (MOU) between the four institutions (see Appendix B). The MOU outlined the following points of understanding:

- The purpose of the pilot project;
- Project participants and staff needed to carry out the pilot;
- Project timeline, deliverables, and requirements;
- Responsibilities and expectations for institutions and vendors;
- Expectations during the pilot;
- Estimated costs.

The MOU was signed by each institution as a supplement to the contracts signed with DuraCloud. Establishing an understanding of the scope and objective of the pilot project provided a foundation of trust for the collaborative project.

Shared Administration

The pilot project began with training on the shared DuraCloud environment, an introduction to the concept of DuraCloud “spaces,” and a demonstration of the levels of access permission (administrator, user, or public view). All members of DPWG attended this training webinar with DuraCloud and brought in additional stakeholders from their institutions. After the webinar, DuraCloud set up administrative accounts for each member of DPWG.

Since the DuraCloud database structure is directory-based, administrators from each institution may view collections uploaded by other institutions. Administrators at each institution are able to create additional accounts for other members at their institutions as needed, and are able to limit access to specific collections if necessary. Given that the content is in a shared environment, DPWG members agreed to inform the rest of the group when additional administrative accounts are created.

As of this paper’s publication, members of DPWG began conducting test uploads in order to develop a hands-on understanding of the system. However, documentation outlining administration of DuraCloud in a collaborative environment did not exist at the time of the pilot. DPWG member Tammy Troup of the Montana Historical Society raised questions and concerns with DuraCloud staff, resulting in useful documentation that was shared with the group. This documentation may also benefit future DuraCloud customers who choose to implement within a shared infrastructure. This case demonstrates how the efforts of individuals within a collaborative project can serve to benefit the group as a whole.

This collaborative pilot project enabled DPWG to reduce individual costs, while building knowledge and expertise in common.

5. Sustaining group activities and establishing structures for ongoing support

Communication and shared documentation

Moving forward, maintaining regular communication will be essential to the success of the DPWG collaboration. DPWG holds monthly phone meetings to discuss project progress and future directions. Although in-person meetings can be challenging with geographically-distant collaborators (the repositories are all several hours away from each other), DPWG has made an effort to organize annual in-person meetings. The group also established a precedent of rolling membership, ensuring at least one member from each institution is involved with the group. These steps have enabled DPWG to sustain active participation from all of its members.

DPWG has also created a cloud-based folder to store shared materials and documentation. The folder contains the group's library of digital preservation literature, and provides a space where DPWG can post documentation (e.g., project charter, Memorandum of Understanding, and meeting minutes). As the project continues, this folder serves as a growing record of DPWG's efforts.

Evaluating progress

Through these regular channels of communication, DPWG will continue to evaluate its activities. DPWG is at the beginning stages of the pilot project, and is still in the process of creating the policies and workflows that support a shared digital preservation system. As the group continues with the pilot, members will communicate experiences and lessons learned with one another. This project has already had a positive impact on existing digital preservation workflows, providing participants with experience drafting organizational policy and preparing digital objects according to established best practices. Even when the pilot project ends, these structures will be used to support long-term preservation efforts at each of the institutions. DPWG will monitor the project past the conclusion of the shared instance of DuraCloud, and will determine whether or not to continue with the DuraCloud service based on its findings.

At the end of the pilot, DPWG will revisit the self-assessments completed by each institution at the beginning of the partnership in order to reflect on the impact that the collaboration has had on digital preservation practices. Using this method, the group will determine what aspects of the collaboration proved most successful, and what areas may be improved. The progress of each member of DPWG will be assessed from the point of the group's initial formation to the completion of the pilot project. This information will be used by DPWG to inform its next direction.

By remaining in direct contact and utilizing shared spaces for collaboration, DPWG is able to sustain momentum, provide ongoing support, and evaluate its progress.

Lessons Learned

A few lessons have emerged from DPWG's experience developing a digital preservation program. First, the group learned the importance of being prepared to advocate for the value of a digital preservation service. Early in the process, it became clear that the value of digital preservation work was not completely self-explanatory to other library stakeholders. This gap in understanding compelled DPWG to provide reasoning for why expanded digital preservation activities were necessary at each institution. By conducting research into digital preservation advocacy and best practices, DPWG was able to provide evidence to support the value of its work. This research also strengthened general knowledge, both within DPWG and throughout the affiliated institutions.

Working with four institutions—and therefore four institutional administrations—also meant that some time-dependent parts of the process proceeded at varying paces. For example, administrators at each institution had different schedules for approving DPWG’s Archival Storage Recommendations Report and Memorandum of Understanding, and some institutions required that vendor contracts be reviewed by legal counsel. Awareness of the time needed to negotiate the schedules and requirements of four individual institutions will allow future collaborative efforts to proceed with more realistic timelines. Additionally, DPWG’s archival storage pilot project was slowed by challenges related to ensuring web accessibility for archived content and developing workflows for METS record creation. These challenges were difficult to anticipate without hands-on access to the archival storage tool. The group spent a few months establishing policies and workflows, which delayed the full implementation of the year-long pilot. A solution could have been to negotiate a shorter-term trial license for an archival storage service, as other projects have shown is possible (North West Region Digital Preservation Group, 2016). A shorter-term trial license could help build preliminary knowledge in order to draft policy, prepare files, and develop workflows before launching into the full, year-long pilot.

Another important lesson is to be prepared for any potential changes in personnel. For DPWG, Sam Meister of the University of Montana was the only group member with the official title of Digital Archivist. When Meister accepted a position elsewhere in the summer of 2015, DPWG was left to proceed without a “resident expert.” The group was able to turn a potential roadblock into an opportunity: instead of relying on the expertise of one group member to lead efforts, DPWG distributed responsibilities more evenly. In so doing, all members of the group developed a deeper understanding of digital preservation. The change in personnel also underscored the importance of detailed documentation. Meeting minutes, shared citation libraries, workflow documentation, and other shared materials allow existing members to understand the work that has been done by previous members. Good quality documentation also allows new members to easily grasp what work has been completed and to understand future directions. Ideally, a cross-institutional collaboration should continue to operate successfully, even with changing membership.

Recommendations for Successful Digital Preservation Collaborations

Collaborative partnerships like DPWG can act as important stepping stones toward digital preservation best practices. By collaboratively implementing a shared digital preservation environment, DPWG collectively developed hands-on experience with a digital preservation system. DPWG attended training as a group, troubleshoot issues as a group, and developed institutional workflows that could be shared among the group, thus making all of these workflows stronger. DPWG also facilitated increased collaboration and awareness of digital preservation efforts statewide. The activities of DPWG provide a model for institutions seeking

to collaborate to meet digital preservation challenges. The group suggests a five-point plan for building successful collaborations.

1. **Cultivate** *a foundation of knowledge and identify a shared vision.* Read and share published research, investigate digital preservation best practices, and review digital preservation programs at other institutions. Establish a foundational vision and scope for the collaboration. Draft a project charter and document each stage of the collaboration in order to articulate an agreed-upon purpose and goal for the group. Create action items in support of the overall goal and map these tasks to a timeline.
2. **Assess** *the current digital preservation landscape at each institution.* Self-studies identify the strengths and growth opportunities at each institution. Conduct institutional assessments to evaluate digital preservation requirements and readiness. Use digital content profiles to identify common digital preservation needs between institutions. Review existing policies and workflows to understand where and how a digital preservation system can be incorporated. By using common assessment rubrics, individual responses can be compared in order to create an overall snapshot of the group's current preservation practices. Identify the group's common needs and prioritize a list of requirements moving forward.
3. **Advocate** *for the value of digital preservation activities.* At the early stages of digital preservation program development, create informational materials and talking points to present to administrators, IT professionals, and library colleagues in order to foster institutional understanding of digital preservation efforts. Compose recommendations that highlight long-term benefits and generate institutional buy-in. As digital preservation projects are implemented, written reports on project results can help demonstrate impact and advocate for ongoing support of digital preservation activities.
4. **Implement** *shared digital preservation services.* Co-implementation of a digital preservation service allows for cost-sharing, collective training, collective troubleshooting, and development of administrative expertise. A limited-term pilot project is a practical approach to establishing joint digital preservation efforts. For a successful pilot project, create and agree upon a Memorandum of Understanding that clearly outlines expectations. Share knowledge and experience gained to the benefit of the group. Review existing digital preservation workflows and align them with best-practices.
5. **Sustain** *group activities and establish structures for ongoing support.* Throughout each stage of a collaborative digital preservation project, establish channels for regular communication. Periodic phone calls, group emails or forums, and in-person meetings help ensure mutual understanding and agreement among the group. Prepare for changes in institutional representation and group leadership. Regularly review progress and ensure that it aligns with the group's project charter. Shared documentation helps promote understanding between partners who are geographically distant. Establish resource-

sharing spaces and document each stage of collaborative projects, from research to results. Finally, develop a methodology to evaluate the efficacy of the collaboration.

Conclusion

Collaboration is a powerful tool for addressing challenges. The Digital Preservation Working Group (DPWG) provides an example of how four institutions in Montana used collaboration to support digital preservation efforts across the state. To build and sustain this digital preservation partnership, DPWG structured its activities around a five-point plan. The plan provides a practical roadmap for digital preservation collaborations:

1. **Cultivate** a foundation of knowledge among the group, and identify a shared vision for how the collaboration will proceed;
2. **Assess** the digital preservation landscape at each institution in order to identify shared needs and goals;
3. **Advocate** for the value of digital preservation activities to administrators and other stakeholders;
4. **Implement** shared digital preservation services in order to benefit from cost-sharing and in order to collectively train, troubleshoot, and develop administrative expertise;
5. **Sustain** group activities by establishing structures for ongoing support, creating shared documentation, and/ developing evaluation methods.

DPWG's experience illustrates the power of collaboration, and it also emphasizes the importance of a structured plan. By working together strategically, institutions can position themselves to achieve digital preservation success.

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Appendix A: Content Profile Template

Content type = Main area or content stream

Description = high level descriptive information about content type

Acquisition = how content types are created and/or acquired by the Library

Size = current total data size of content type

Complexity level = designation related to variety / range of file formats that are typically included in content type

Current management / storage = how / where digital objects within content type are currently stored and managed.

Locally vs. vendor / hosted

Rights = how rights are captured / transferred to Library

Value = designation related to value and preservation commitment for content type

Priority = numerical assignment of priority for preservation activities

Content type	Description	Acquisition	Size	Complexity level	Current management / storage	Rights	Value	Priority
Digitized content	Digital content created through digitization of analog materials by library staff							
Institutional repository content	Research, creative, scholarly and administrative documents created by faculty, students, and staff; mostly born-digital content							
Born-digital content from Archives and Special Collections	Born-digital materials acquired from individuals and organizations within archival collections, oral history collections, and special collections materials							
Web Archives content	Web content created by University departments, units, and affiliated entities							
Licensed electronic resource (permanent acquisitions)	Electronic resources purchased with perpetual access							
Licensed electronic resource (subscription)	Electronic resources purchased on a subscription basis							

Appendix B: Memorandum of Understanding for a DuraCloud Digital Preservation Pilot

December 15, 2015

The Montana Tech Library, the Montana Historical Society, the Montana State University Library, and the University of Montana's Maureen and Mike Mansfield Library will collaborate in a one-year pilot project to test the viability and practicality of an inter-institutional membership with DuraCloud Digital Archiving and Preservation Services.

Implementing a robust digital preservation strategy at our institutions ensures that our libraries' digital content will be trusted by and be meaningful to users for the long term. The DuraCloud digital preservation system provides cloud backup, regular monitoring and integrity checks of our digital archival content, and geographical distribution of digital preservation copies. These functions will help our institutions comply with library preservation standards like Trusted Digital Repository guidelines and the OAIS Reference Model.

By jointly pursuing this pilot, our four institutions will explore how we may be able to act as a consortium to obtain affordable digital storage services for the long term. A shared digital preservation solution (whether with DuraCloud or another provider) in which we jointly contribute significant amounts of data (i.e. in excess of 25TB) could enable our institutions to exploit the economies of scale and price breaks that no single institution will be eligible for if acting alone. The pilot will also facilitate the sharing of knowledge and expertise between the participating institutions

Purpose

The purpose of this Memorandum of Understanding (MOU) is to outline plans for the DuraCloud pilot, including responsibilities and expectations for each project participant.

Project Participants

The DuraCloud pilot is proposed by an inter-institutional Digital Preservation Working Group. The group is comprised of the following members:

- Conor Cote, Montana Tech
- Christine Kirkham and Tammy Troup, Montana Historical Society
- Sara Mannheimer, Montana State University
- Donna McCrea, University of Montana Mansfield Library

Project Timeline

The one-year pilot is expected to begin January 2016 and will be subject to evaluation November 2016, at which time the group will decide whether or not to continue service with DuraCloud. A decision on project extension will be made by January 1, 2017.

Deliverables and Requirements

The Digital Preservation Working Group will continue to discuss the DuraCloud pilot's progress. At the end of the one-year pilot, the group will draft a report describing our experience with DuraCloud, including benefits, challenges, and recommendations for next steps.

Responsibilities

Member institutions will be individually responsible for the following actions:

- Procurement of funds;
- Development of a project-based preservation plan and appropriate workflows;
- Identification, formatting, description, and upload of digital objects;
- Regular communication with the Digital Preservation Working Group.

Expectations

- DuraCloud will provide the following services, as described in the DuraCloud documentation: <http://www.duracloud.org/overview>
 - Geographical distribution: content is replicated using Amazon Simple Storage Service (S3) and Amazon Glacier;
 - Integrity checks (MD5 checksums) are conducted at upload, with continual automated checks;
 - Web interface for managing content and accessing integrity reports;
 - Tools for synchronizing local backups with cloud content;
 - Archived content that is accessible immediately, at no additional cost;
 - Training for the DuraCloud digital preservation interface and tools;
 - Troubleshooting and Help services.
- This agreement requires each institution to purchase of a minimum of 1 TB of storage during this pilot. Additionally, each institution will receive one fourth (1/4) of the 1 TB of storage included in the annual subscription fee.
- Each institution will pay one fourth (1/4) of the yearly subscription fee.
- Each institution will select, upload, manage and maintain its own content.

Estimated Costs:

All four institutions will equally share the annual subscription cost. Each institution will pay its own storage fees, as outlined below, and each institution will be invoiced individually by DuraCloud. At the end of the one-year pilot, this MOU will be reevaluated to account for continued growth of preserved digital content.