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Digital Preservation Strategies for a Small Private College

Meg Miner, *Illinois Wesleyan University*

CASE 16

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AUTHOR: **MEG MINER**
Illinois Wesleyan University
Tate Archives and Special Collections, The Ames Library
mminer@iwu.edu

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ISSUE: Well established "best practices" in digital preservation (DP) do little to address day-to-day realities in repositories that cannot dedicate funds or staff to DP workflows. What can a Lone Arranger do to ensure good stewardship for born digital and digitized institutional records before a complete preservation system is in place?

KEYWORDS: File format issues
Digital preservation
Legacy systems and media
Metadata
Policy documents
Recordkeeping systems
Resource issues (monetary, etc.)
Standards

Background

Illinois Wesleyan University (IWU) was established in 1850 and has been a solely undergraduate institution since the 1970s; it carries a Carnegie Classification of S4/HR: small four-year, highly residential. The library's funding comes through Academic Affairs and relies on a portion of the tuition dollars spread across all academic units, including Information Technology (IT). Between 2012 and 2014, a period of time being described as a "retraction" across campus, the library's budget experienced a reduction of $200,000 and FTE personnel decreased from 19 to 17. By 2018 four additional FTE will retire. The author is IWU's archivist, holds faculty rank, has library liaison responsibilities, and employs an average of three ten-hour-per-week undergraduate student assistants each semester.

The author attended both a Northeast Document Conservation Center (NEDCC) workshop on digital preservation and one by the Inter-university Consortium for Political and Social Research (ICPSR) in 2008. At the time, IWU's newly acquired institutional repository (IR) was presumed to function as a preservation platform. NEDCC's presenters compared and contrasted digital preservation (DP) program attributes to several available repository platforms that were available at the time. It became apparent that IWU's choice (DigitalCommons,[1] hosted by bepress) did not meet the requirements for a full DP system. Recommended processes that it lacked included bit-level analysis on ingest and during storage, file format normalization, and a means for detecting and replacing corrupt files. Since IWU library's usual practice of identifying a vendor-based solution would not meet the needs of both preservation and access with this product, only two of the workshop-recommended practices were possible and implemented at that time: 1) I started an inventory of digital objects, and 2) I started educating others on the differences between digital object storage and DP best practices.

In 2011, IWU's library agreed to join the Institute of Museum and Library Services (IMLS)-funded Digital POWRR (Preserving digital Objects With Restricted Resources) Project with four other Illinois academic libraries. The question posed by the project was, "How can cultural heritage institutions without funds to pay for preservation systems or ready access to staff with technological expertise achieve the standards for digital preservation?" Small institutions often do not have the large quantity of digital objects that would help realize cost savings due to economies of scale, and even vendors who offer lower costs when storing lower amounts of data are not within reach. Limited staff support and funding for IT mean that running the more robust and complicated open source software like LOCKSS,[2] is not an option.

The POWRR Project spanned fall 2011 to fall 2014 and investigated, evaluated, and recommended scalable digital preservation solutions for libraries with smaller amounts of data and/or fewer resources. The project also investigated potential business models that would make access to digital preservation solutions available to libraries of all sizes.

[1] DigitalCommons@IWU, <http://digitalcommons.iwu.edu> (10 April 2015)
[2] Stanford University Libraries, Lots of Copies Keep Stuff Safe (LOCKSS), <http://www.lockss.org/> (10 April 2015)

Northern Illinois University Library was the lead institution for the project and partner libraries included Chicago State University, Illinois State University, Illinois Wesleyan University, and Western Illinois University.

The project summarized all activities and recommendations in a white paper;[3] a website and wiki[4] with documentation contain freely available resources for others to consult and adapt as needed. Members of each institution assessed a common set of tools[5] and provided summaries of their experiences in the project's case study section. Although methodologies were shared, conclusions reached were different due to institutional differences. A variety of backgrounds indicate that other institutions will be able to find something in common with the different approaches to DP.

The following is not a complete summary of the project (see the white paper); rather, this article is an in-depth explanation of actions taken by IWU's archivist prior to the POWRR Project and the workflows established as a result of it. A full scale, bit-level preservation solutions is not part of the IWU archives' preservation services today. However, insights gained during POWRR made it possible to establish digital records' documentation practices and storage strategies. Building support for bit-level preservation storage is a work in progress.

Case Methodology

The Nature of the Records

The archives began participating in digitization projects in 2002. Criteria for selecting records to digitize drew on the previous archivist's experiences with patron requests and consisted largely of un-indexed, text-based content such as student newspapers. The archives experimented with Greenstone but eventually chose CONTENTdm as the public access point. This software is hosted and maintained by the Consortium for Academic Libraries in Illinois (CARLI) for member libraries. CARLI requires members to make their collections freely available, indemnify the organization from liability for copyright, care for their own preservation-quality digital content, and upload only access-quality copies to their servers.

Large-scale multi-year digitization projects like newspapers, yearbooks and one other campus periodical were completed by offsite vendors who returned tiffs and pdfs on disk-based media initially. Eventually transfers took place on external hard drives. Each

[3] Schumacher, Jaime, et al. (2014). "From Theory to Action: 'Good Enough' Digital Preservation Solutions for Under-Resourced Cultural Heritage Institutions." <http://commons.lib.niu.edu/handle/10843/13610> (10 December 2014)

[4] Digital POWRR Web site,<http://digitalpowrr.niu.edu> and <http://powrr-wiki.lib.niu.edu/index.php/Main_Page> (10 December 2014)

[5] Digital POWRR Tool Grid, <http://digitalpowrr.niu.edu/tool-grid> (10 December 2014). The reader should be aware of the difference between tools that provide processing actions only (*e.g.*, Archivematica and DataAccessioner) and products or services that combine processing with storage and access (*e.g.*, Preservica and Rosetta). POWRR contributed Tool Grid findings to a wiki called the "Community Owned digital Preservation Tool Registry" (COPTR), <http://coptr.digipres.org/Main_Page> (9 April 2015). Anyone can contribute new products and update existing tool attributes and definitions. The Library of Congress adopted COPTR as a means for the public to keep abreast of the rapidly changing DP sector. <http://digitalpreservation.gov/tools/> (9 April 2015).

project was returned with md5 checksums, usually associated with a periodical's issue and not the individual pages. Copies on microfilm and/or acid free paper were made when warranted by content value or condition; original formats were retained.

Patron research requests drive selection for photograph digitization and the resulting copies are uploaded to the hosted CONTENTdm collection. Metadata associated with these digital objects include the originals' locations; preservation-quality copies are only made when patrons request them. The online collection includes some donor-provided born-digital images[6] that are not in preservation quality formats but that do have archival value.

In 2006, IWU's University Librarian and the Scholarly Communications Librarian secured funding for DigitalCommons. During a two year IR implementation phase, the archives provided specific student-created content for in-house scanning with the goal of making access possible through IR series associated with departments-of-origin. Archival collections that were digitized for the IR in-house serve our access needs but are considered surrogates for the originals. The IR is a suitable platform for specific types of born-digital institutional records; namely, those that are valuable to retain in searchable, electronic form. A detailed description of this work is available in an article titled "Collecting Campus Culture: Collaborations and Collisions."[7] Text formats with archival value that do not have long term value as searchable files are printed and stored in the University Archives.

As the campus adopted a content management system-based Web site, individuals in units developed a practice of posting institutional records on Web pages they had access to. Reports, programs, policies, etc. that would have been routed through campus mail to all offices 15 years ago decreased as physical objects and now exist solely as digital objects. Email is sometimes used for distribution but typically only announces content that is posted elsewhere. Methods for capturing such content are *ad hoc*, drawing on retention decisions whenever possible. In other cases, we apply previously established collection policies.

Almost all of the DigitalCommons records and all of the CONTENTdm collections are open to the public. The exceptions are faculty and student governance-related content in DigitalCommons. Campus personnel have unrestricted access via IWU IP ranges and authentication through our proxy server. Unmediated access to all content is not a sustainable service model; finding aids make clear what content exists and where it is located, but assistance may still be needed to access off-line collections.

Preservation Environment

IWU's current storage options do not include file degradation analyses at the binary level (to monitor for "bit rot") and workflows do not include format migration. It is unlikely these levels of protection will occur in the near future. Master files of digitized materials are held on the CDs or DVDs, if provided by vendors. In 2009, these files, as well as vendor-provided files shipped via hard drive, were copied to a 5-disk Redundant Array of

[6] Copies of these images are located in an offline location described below.

[7] Miner, M, Davis-Kahl, S. (2012). "Collecting Campus Culture: Collaborations and Collisions." *Journal of Librarianship and Scholarly Communication* 1(2):eP1053. <http://dx.doi.org/10.7710/2162-3309.1053> (10 December 2014)

Independent Disks (RAID) drive that was monitored by library IT. One disk failed in 2014 and the entire RAID was replaced with one of reduced capacity and relocated from the library. It is now monitored by campus IT in their server rooms. Removal from the library offers increased protection against loss because the digital files are not in the same place as the analog originals or disk media copies.

Metadata Creation, Transfer and Ingest Processes

Version 1.0 of DataAccessioner (DA)[8] is IWU's archives DP processing tool. DA is an open source tool that creates checksums and performs automatic technical metadata capture utilizing File Information Tool Set (FITS) on transfer. DA also allows unlimited user input fields for descriptive metadata that map to Dublin Core elements. Seth Shaw developed[9] the tool for use when moving files off of disks, but DA processes will run against any drive, file or folder that can be pointed to from a processing workstation (i.e., a computer that the software can be downloaded to). The tool allows item-level exclusion during the transfer, if needed, but leaves a record in the DA XML output and so provides an audit trail.

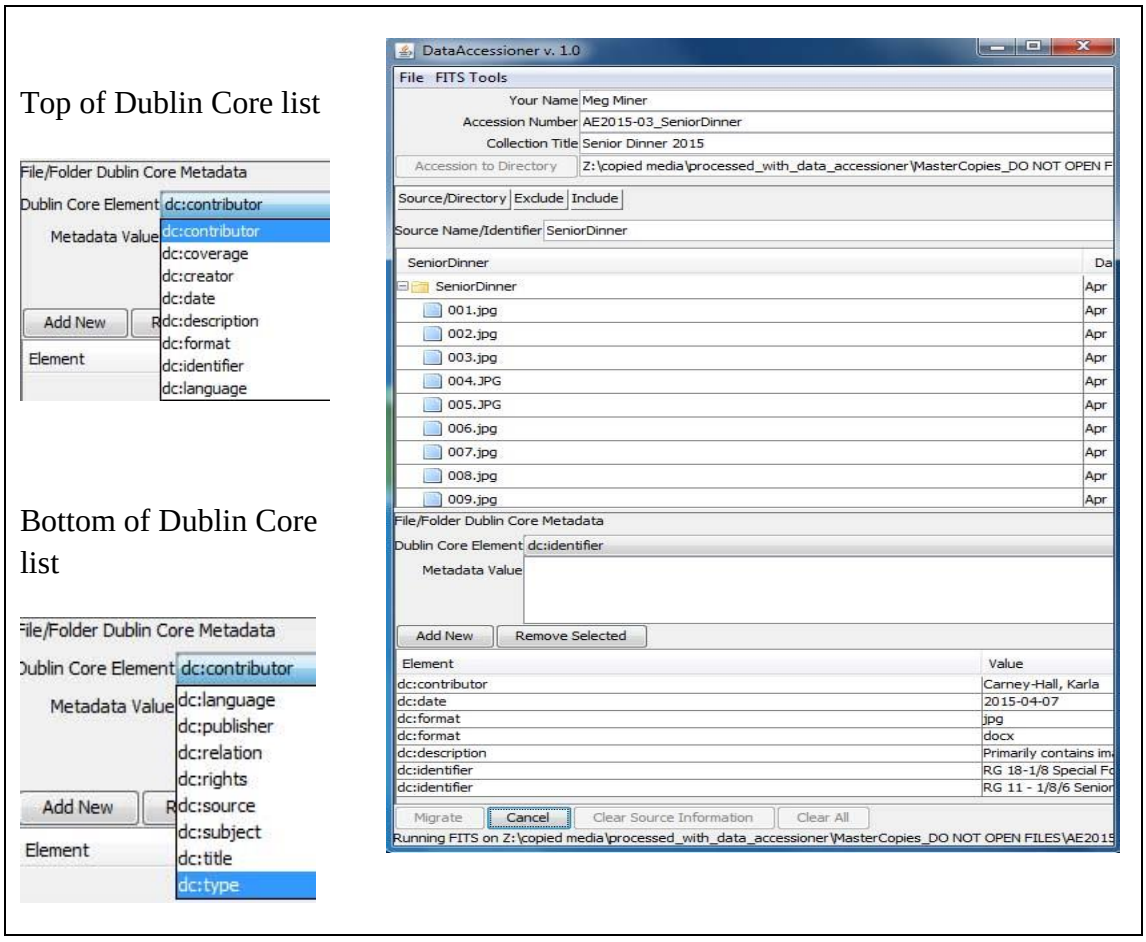

Figure 1. Dublin Core List

[8] DataAccessioner, <http://dataaccessioner.org> (10 December 2014)

[9] Development took place in 2008-2009 when Shaw was at Duke University and some readers may know the tool as the Duke DataAccessioner; the current version was made possible through funding by the POWRR Project.

During ingest, a Master Copy file folder location on IWU archives' RAID is the "Accession to" selection in the tool. DA places copies of the selected objects from the "Source" file or directory and an XML file containing a snapshot of the records' metadata at the time of the accession into the Master Copy folder. The XML will be used during future file transfers and so offers assurances about record authenticity as well as data integrity. Once the Master and XML are stored, an Access Copy is created (using the right-click or Ctrl+C functions) in a location that is accessible for meeting patron needs.

A companion tool that was also created by the DA developer is used to convert the XML output into sortable data fields. This tool is named the DataAccessioner Metadata Transformer (DA-MT).[10] Shaw may further refine DA so that aggregation of XML data into human readable forms takes place as part of the transfer process.

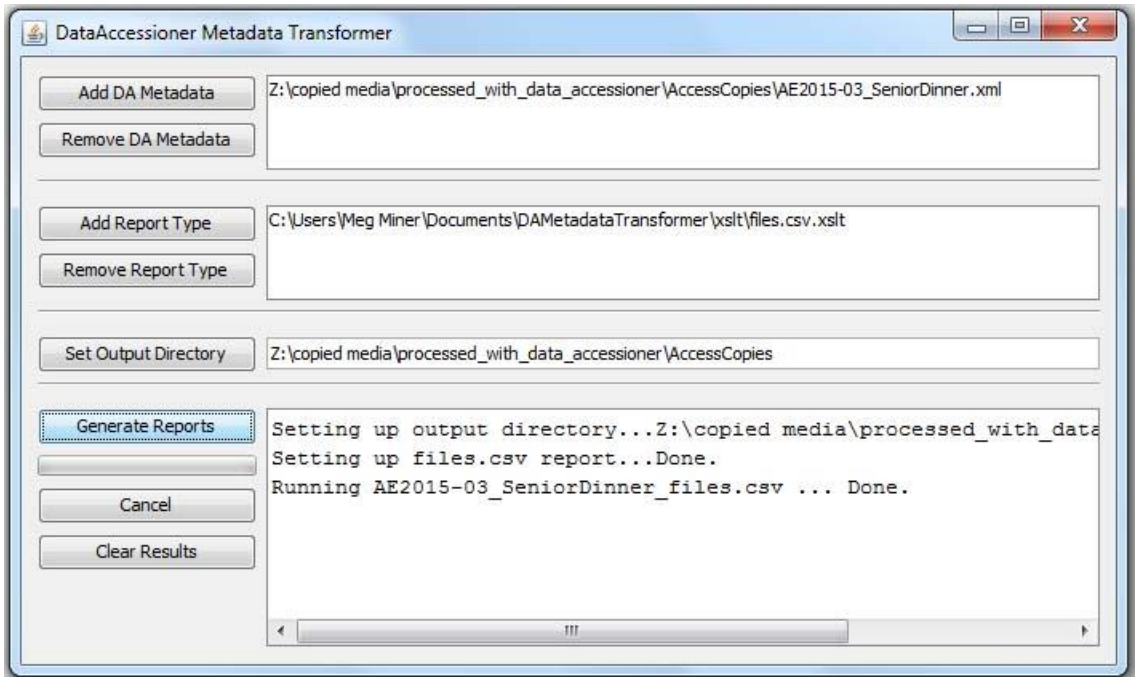

Figure 2. DataAccessioner Metadata Transformer

After importing the resulting CSV data into Excel, data fields are easily sorted in order to more readily understand the file types and total size-per-type of new accessions. With the aggregate accession data made possible by DA-MT, projecting the rate of digital content growth overall is possible and this information will be used to make a case for purchasing better storage systems.

Because normalizing file formats is not part of this workflow, any uncommon or at-risk file types must be noted at this stage. Accession records identify collections containing formats that may be cause for concern in the future. Accessioned formats received so far are well known and not at risk for obsolescence in the short term.

[10] DataAccessioner-Metadata Transformer, <http://dataaccessioner.org/da-mt.htm> (3 February 2015)

Analysis

Lessons Learned

Acquisition of electronic records remains a challenge, but after speaking with representatives from four back-end, bit-level storage providers during the POWRR Project, it also became apparent that not every digital object is at risk for loss due to bit rot at the same rate. Over a decade has passed since consortia and corporations began developing back-end DP storage systems. One would expect data to be available regarding file degradation rates by format type. At the very least, the quantity of files these systems had to replace should be available to the cultural heritage community by now.

However, only one company consulted during the POWRR testing period was able to state how many files have suffered from bit rot. That number was zero for a company that has operated a preservation storage system for four years. Companies with more experience and with assurances about their "self-healing" file fixity systems could not answer the question. Educating laymen on the concept of bit rot is difficult at a theoretical level and even more so when arguing for a portion of diminished budget lines in order to monitor for unseen problems. Until risk management data become available, full preservation systems are not warranted for every object created.[11]

While it is true that many objects will be stable in their current formats for a long time, creators and custodians can intervene and mitigate more widespread threats. A term that is used in analog preservation training is "inherent vice." Just as acid makes paper brittle and some inks blur or disappear, content in digital files may be lost due to their inherent qualities. At least one of the phenomenon's digital equivalents will be familiar to most people. The inherent vices in digital objects are loss of

- ability to open and read a file due to software and hardware obsolescence,
- records due to files that exist as a sole copy or are stored in a single location (*e.g.*, through accidental erasure or failure of a drive),
- ability to understand a file due to poor metadata, and
- bit-level file integrity.

All four are addressed by full scale digital preservation programs, but only the latter is beyond human ability to mitigate without such programs. Steps can be taken by individual content creators and custodians to lessen the likelihood of irrecoverable loss from digital inherent vices.

The realization that preservation issues do not all have to be dealt with at the same time was the most surprising aspect of POWRR's exploration. Members of the National

[11] I authored Appendix B of the POWRR whitepaper where this idea accompanies two other recommendations for DP system developers. Schumacher, Jaime, et al. (2014). "From Theory to Action: 'Good Enough' Digital Preservation Solutions for Under-Resourced Cultural Heritage Institutions," 19. <http://commons.lib.niu.edu/handle/10843/13610> (10 December 2014)

Digital Stewardship Alliance's (NDSA) Infrastructure Working Group presented a conceptual framework called *Levels of Digital Preservation*[12] at the 2013 Society of American Archivists conference. Only novice-levels of DP knowledge to understand this tool; it provides a four-level planning rubric (Protect, Know, Monitor and Repair Your Data) based on five aspects of preservation (Storage, Fixity, Security, Metadata, and File Formats).

Table 1. Levels of Digital Preservation

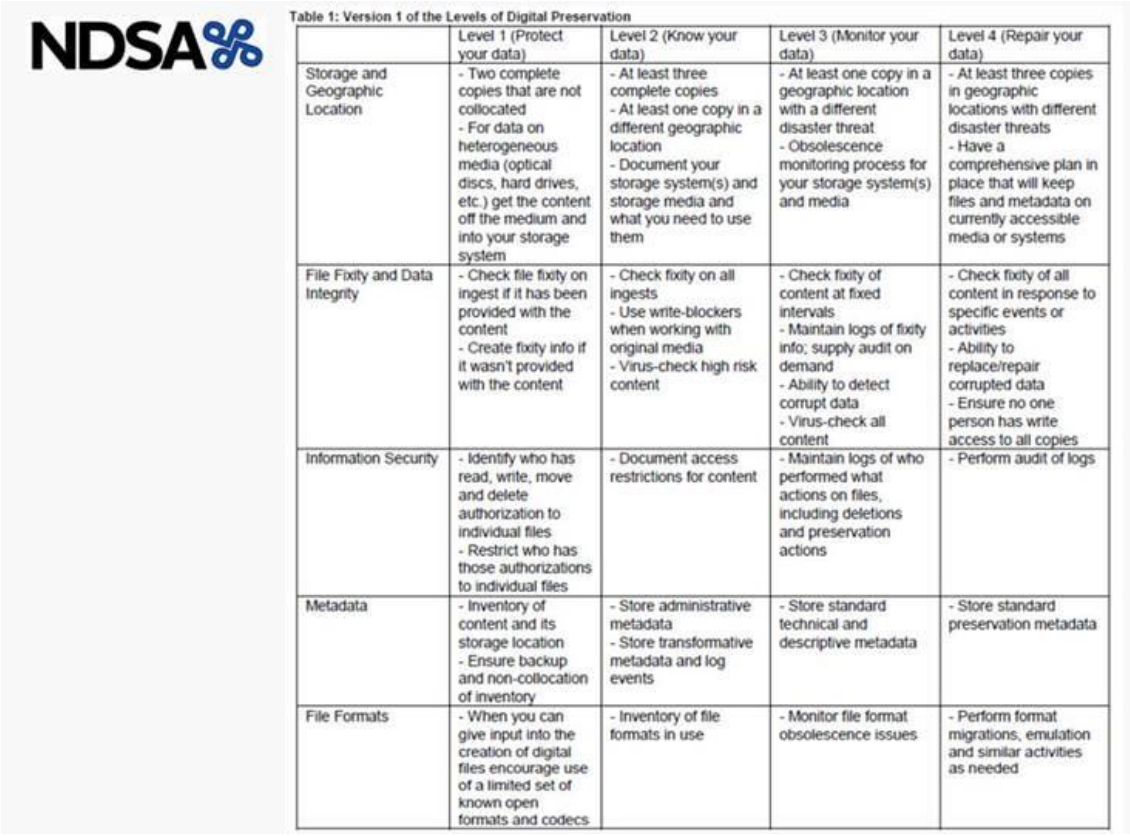

Table 1: Version 1 of the Levels of Digital Preservation

	Level 1 (Protect your data)	Level 2 (Know your data)	Level 3 (Monitor your data)	Level 4 (Repair your data)
Storage and Geographic Location	- Two complete copies that are not collocated - For data on heterogeneous media (optical discs, hard drives, etc.) get the content off the medium and into your storage system	- At least three complete copies - At least one copy in a different geographic location - Document your storage system(s) and storage media and what you need to use them	- At least one copy in a geographic location with a different disaster threat - Obsolescence monitoring process for your storage system(s) and media	- At least three copies in geographic locations with different disaster threats - Have a comprehensive plan in place that will keep files and metadata on currently accessible media or systems
File Fixity and Data Integrity	- Check file fixity on ingest if it has been provided with the content - Create fixity info if it wasn't provided with the content	- Check fixity on all ingests - Use write-blockers when working with original media - Virus-check high risk content	- Check fixity of content at fixed intervals - Maintain logs of fixity info; supply audit on demand - Ability to detect corrupt data - Virus-check all content	- Check fixity of all content in response to specific events or activities - Ability to replace/repair corrupted data - Ensure no one person has write access to all copies
Information Security	- Identify who has read, write, move and delete authorization to individual files - Restrict who has those authorizations to individual files	- Document access restrictions for content	- Maintain logs of who performed what actions on files, including deletions and preservation actions	- Perform audit of logs
Metadata	- Inventory of content and its storage location - Ensure backup and non-collocation of inventory	- Store administrative metadata - Store transformative metadata and log events	- Store standard technical and descriptive metadata	- Store standard preservation metadata
File Formats	- When you can give input into the creation of digital files encourage use of a limited set of known open formats and codecs	- Inventory of file formats in use	- Monitor file format obsolescence issues	- Perform format migrations, emulation and similar activities as needed

POWRR partner institutions explored how the NDSA's *Levels* would fit into DP workflows. The members agreed on its value in a triage-based approach to decision making for different record types as well as for its ability to provide forward momentum in at least some areas of preservation planning. Not every person can make one decision about DP that will work for every aspect of a collection and NDSA's tool shows how different pieces of the preservation puzzle fit together.

NDSA's *Levels* are useful in identifying cost points for different aspects of preservation. That purpose helps in communicating needs to administrators and IT, but the rubric may still be complicated for conveying potential actions to donors or content creators. A

[12] Infrastructure Working Group, National Digital Stewardship Alliance. *Levels of Digital Preservation*. <http://www.digitalpreservation.gov/ndsa/activities/levels.html> (10 December 2014)

flowchart created by archivists at the University of Utah[13] contains a simple visual aid that is used at IWU. Triage steps in this tool include asking if a hard copy of the object can be used to recreate it or if a copy is held in a Trusted Digital Repository. Follow up actions range from rejecting the content up through recommending "Full Preservation" activities (defined in the tool). The scope of this tool has broader applications for DP planning and includes questions regarding digitization decisions and definitions at a laymen's level. When used at IWU, the flowchart becomes part of the accession documentation as a record of the donor agreement as much as of the archives' decisions.

Unresolved Issues

The most rewarding activities during POWRR Project were the conversations with people about what they value now and what they think will be valuable in the future, but their values are often not the same as "archival value." With unlimited means of distributing their work, the implications that their actions have on the institution's future are far reaching. Content creators have their own inherent vices and put digital objects at risk by using off campus servers or by overwriting Web-based content without retaining earlier versions. Individuals agree to third-party licensed products for unique content and then use individual password protected accounts. Education on digital object curation (*e.g.*, good back up practices, consistent file naming, and use of widely adopted formats) will never be resolved.

These threats are regular topics of conversation during outreach efforts to campus units and offices, but a significant amount of work remains in making people aware of digital preservation issues. Some inroads are being made, but the pool of proponents is limited at present. The institution's digital heritage may be lost if people beyond the library and campus IT do not accept that they have both capabilities and responsibilities in this effort.

Ultimately, IWU's full engagement in digital preservation activities is lacking in 1) a culture of records transfer to a central location for processing, and 2) staff devoted to the nuances of metadata creation and capture. Any preservation service subscribed to in the future must accommodate these limitations.

Unsuccessful Strategies

Current processing with DataAccessioner is helpful for responsible stewardship of media-dependent transfers, long-term data collection planning and manual format obsolescence awareness but no part of the existing IWU workflow includes format migration. High-risk content such as video formats are the archives' highest priority for migration when possible. A standalone open source version of Archivematica[14] (0.9-beta) was tested during POWRR and while finding the workflows valuable in principle, the tool was also difficult to implement and understand without assistance. Using Archivematica for processing would accomplish all recommended digital object analysis and normalization

[13] Keller, Tawnya. "Digital Preservation Decision Flowchart." *Digital Preservation Program: Digital Preservation Policy, J. Willard Marriott Library, University of Utah*. (Appendix B) <http://www.lib.utah.edu/collections/digital/DigitalPreservfationPolicy2012.docx> (10 December 2014)

[14] Artefactual Systems, Inc., Archivematica, <https://ww.archivematica.org/en/> (10 April 2015)

goals. Archivematica also offers a "community of practice"[15] which makes it possible for a Lone Arranger to feel less alone.

After POWRR, the archives participated in testing a hosted version, ArchivesDirect,[16] which combines Archivematica's technical processing strengths and DuraCloud's community-built back-end storage. However, the processing requirements are still too complex for the archives' most reliable labor pool—undergraduate assistants—and the subscription costs are too great. The underlying philosophies of openness and community contributions are compatible with those of IWU's library and future developments will be evaluated.

As stated previously, Web site content capture at IWU also presents difficulties. No-cost, in-house preservation can happen when the location and nature of digital objects are known, but automated workflows involving subscriptions for Web site capture products are available from non-profit and commercial sources. Tests of the product *Archive-It*[17] prior to the POWRR Project and of the Web-capture modules of *Preservica*[18] during POWRR revealed that excessive staff intervention would be necessary in order to ensure that objects without archival value were excluded from the products' workflows. It is possible to capture everything in a root directory of a Web site, but decisions regarding selection for long term preservation remain. Selection prior to ingest in a bit-level storage environment prevents the accumulation of non-archival content that will increase storage costs.

Inconsistent file naming practices are also a challenge to automation in a free and simple utility named CINCH.[19] This tool runs automated checks for record updates but unlike the more robust tools above, it requires a specific URL for harvesting content rather than a root directory. As file naming problems are resolved for identified records through outreach and education efforts, CINCH will become the IWU archive's capture tool for Web-based content.

Implications

IWU's institutional history is in jeopardy when born-digital content is posted to our website and older content is not consistently transmitted to the archives. Adoption of consistent file naming conventions would make it possible to automate harvesting with Web-archiving tools, but in the foreseeable future there will not be widespread agreement on this practice. Campus personnel need to develop a sense of urgency that this discussion is important and devote time to working on it.

Stakeholders who agree to discuss these issues and more standardized content creation practices are needed. Creating and storing high-quality digital objects that make long

[15] Schumacher, Jaime, et al. (2014). *From Theory to Action: "Good Enough" Digital Preservation Solutions for Under-Resourced Cultural Heritage Institutions*, 14. <http://commons.lib.niu.edu/handle/10843/13610> (10 December 2014)
[16] ArchivesDirect, <http://archivesdirect.org/> (10 April 2015)
[17] Internet Archive, Archive-It, <http://archive-it.org/> (10 April 2015)
[18] Preservica Digital Preservation, <http://preservica.com/> (10 April 2015)
[19] CINCH (Capture INgest CHecksum), <http://cinch.nclive.org/Cinch/> (10 December 2014)

term DP possible is the ideal outcome. Until then, the high-cost investment represented by full service products like *Preservica* and the high-cost and high-technology needs of cooperatives like MetaArchive[20] are not realistic goals. For units that generate content needing full DP treatment, cost-sharing for storage out of diminished budgets will be the next challenge.

Next Steps

Providing unmediated access to all institutional records is unnecessary and unsustainable at current staffing and funding levels. The accession practices that existed in IWU's archives a decade ago are still in place and only the methods for acquiring metadata while accessioning born-digital content changed. As of this writing, analog originals are treated as the preservation copy for most of IWU's digitized records. Born-digital records are receiving minimal preservation processing with DataAccessioner and are placed on a 3-disk RAID. At-risk content selected from these accessions will be transferred to preservation quality storage when available.

Digital audiovisual (A/V) material is treated as high-risk at this time. Decisions regarding capture of A/V material depend on the records' origins and whether they are designated for offline storage or publicly accessible locations online. Video content creation is increasing but most of these files have a public relations focus and hold little long-term value. Major campus event recordings are selected for preservation, but challenges remain for selecting from among the many athletic event videos, audio recordings of student recitals, and low-resolution still photographs of student events. All of these records proliferate with digital device availability from multiple manufacturers. Content creators' input on their practices assists in determining the ultimate disposition, but IT staff consultation is needed for some proprietary formats.

Securing funding for a DuraCloud subscription[21] to monitor born-digital A/V records is a near-term storage goal. DuraCloud is the most affordable option for IWU of the back-end storage systems tested during POWRR. At its most basic level, the product offers geographically-distributed storage for one copy. Account administrators can access checksums and reports that list file types and quantity per type. DuraCloud will not compare the checksums created at ingest to ones created during a previous accession, so detection of changes to content that has been stored on the RAID or elsewhere has to be accomplished through another process.[22] Comparison of file integrity values at the time of transfer to the next storage device ensures that content being stored is still usable when it moves to successive systems.

At the next DuraCloud subscription level, rates include an added copy from a different storage provider and automated file repair but still no preexisting checksum comparison. There is no public access interface for DuraCloud at any subscription level, but it is possible to provide links to stored content. IWU's archivist believes this attribute will help relieve loads on campus servers for an ever-increasing amount of audiovisual

[20] Educopia Institute, MetaArchive Cooperative, <http://metaarchive.org/> (10 April 2015)
[21] DuraCloud "Subscription Plans," <http://duracloud.org/pricing> (9 April 2015)
[22] A tool for this need, called *Fixity*, is discussed below.

records and could make paying for hosting services within a preservation storage system more appealing. The drawback for every level of DuraCloud services is that they do not offer file format normalization or other digital object processing services.

If DuraCloud funds are not available, exploring the free storage version of the Internet Archive[23] is the next step. Anyone can create an account with the Internet Archive and receives bit-level preservation storage with two caveats: 1) content will be open access, and 2) the provider does not offer built-in reports or added file repair options of a product like DuraCloud. As with all "free" third-party services online, the Internet Archive is not guaranteed to remain available at all or even freely available.[24] Nevertheless, its existence since 1996 indicates remarkable stability and its founder, Brewster Kahle, is a well-known advocate for digital preservation.

Subscription-based Web site archiving with the Internet Archive's *Archive-It* would be valuable at IWU but the library should not take on the cost when campus personnel are trained but unwilling to implement recommended records retention practices. Even if the campus paid for *Archive-It*, staff reductions are increasing workloads everywhere and accepting the idea of adding new responsibilities anywhere is unlikely. Office and unit responsibilities for transferring content will continue to be emphasized.

Future Plans

In keeping with the POWRR motto of "good enough digital preservation for real people," the answer to the question, "What can a Lone Arranger do?" is to use a minimal processing tool, a separate bit-level analysis tool, and at least two storage locations that are separated by some geographic distance.

The DataAccessioner/DA-MT workflows cost no money, require no technical expertise (beyond downloading Java and two processing tools via ZIP) and take very little extra time to create sufficient metadata for understanding record accessions. A significant added benefit of this tool is that the standardized Dublin Core template for descriptive metadata creation is a feature that will enable undergraduate student assistants to be trained for this work.

After the POWRR Project ended, AVPreserve's open source software *Fixity*[25] was tested with the objects on the archives' RAID. This tool runs regular checks on stored content to identify file degradation if it develops. It cannot repair or replace lost objects as a full digital preservation storage system does, but detection would make manual replacement possible from other copies. Users control the frequency of the emailed reports. More importantly from a budgetary standpoint, any file degradation detected by *Fixity* will make costs expended on long term bit-level solutions for affected content unnecessary unless replacement copies (analog, or digital on the original transfer media) are available.

[23] Internet Archive, <https://archive.org/create/> (10 April 2015)

[24] Internet Archive's Terms of Use, Privacy Policy, and Copyright Policy (last updated 14 December 2014) "The Archive has no present intention to charge for access to the Collections." <https://archive.org/about/terms.php> (10 April 2015)

[25] AudioVisual Preservation Solutions, Fixity, <http://www.avpreserve.com/tools/fixity/> (10 April 2015)

All of the above workflows are only effective once content is in the archives' custody. Several years ago, a two-tiered approach was developed for capturing content identified in the existing archives collection development policy: 1) through monitoring email distribution networks (alumni, faculty, staff and student), and 2) through monitoring websites for specific campus units. This practice of manual record harvesting from selective Web sites is admittedly time-consuming and labor-intensive but it is successful for capturing content from pages with known institutional records and also works well with irregular content that is publicly announced. One library staff member assists with the latter process by retrieving specific Web-based or emailed records on a regular basis and uploading them to the IR. This work takes approximately five staff hours per month and is self-sustaining with only occasional consultation required.

Conclusion

Tool choices are what everyone seemed to want to hear about during the POWRR Project. Thinking back to the beginning of the work in 2011, several project members expressed a desire for a quick, simple solution, too. Working with commercial and non-profit tools and services during the IMLS grant period was interesting and informative, but no tool will replace the work of making decisions about which historical records hold significance to our institutions. These values and individual behaviors are what the cultural heritage community truly needs to spend time on. That realization is not unique; in fact, much of the Digital POWRR Project reaffirms the work of Anne Kenney and Nancy McGovern on digital preservation: "A fully implemented and viable preservation program addresses organizational issues, technological concerns, and funding questions, balancing them like a three-legged stool."[26]

Nevertheless, a lack of answers for everything does not mean being free to stand by and do nothing. If support for a full preservation program is unlikely, there are less resource-intensive ways to provide good stewardship for digital records. The results expressed in the work of Digital POWRR and confirmed by practices now in place at IWU show that slight modifications to familiar accession workflows will create an audit trail and prepare digital objects for bit-level preservation storage. We can document our decisions today so that our future selves, the repository managers who will inherit the outcomes of our work, will be able to carry these objects into the next generation of preservation products.

[26] Digital Preservation Management: Implementing Short-term Strategies for Long-term Problems, <http://dpworkshop.org/dpm-eng/conclusion.html> (10 December 2014)