

UNIVERSITY OF UTAH

J. Willard Marriott Library

Digital Preservation Program: Organizational Policy Framework

(Tawnya Mosier, June, 2010; Updated by Tawnya Mosier Keller and Lisa Chaufy, September, 2011)

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SECTION A

PURPOSE

The J. Willard Marriott Library (hereafter, Library), in keeping with its [mission](#), serves as a trusted caretaker of the Library's collections of enduring value¹, including those in digital format. The Digital Preservation Policy Framework supports this mission and is the highest level digital preservation policy document at the Library. The framework makes explicit the Library's commitment to preserving its digital collections through a comprehensive digital preservation program for both born-analog and born-digital collections. The framework reflects the goals defined in the Library's SMART goals and contains references to other relevant Library policies and procedures. The audience for the framework includes Library employees, digital content contributors, donors, and users.

MANDATE

Although many programs and projects both within and outside the Library make objects available to users online, digital preservation implies more than making an object available in a digital format. Digital preservation has been defined by the American Library Association (ALA) as “policies, strategies, and actions to ensure access to reformatted and born digital content regardless of the challenges of media failure and technological change. The goal of digital preservation is the accurate rendering of authenticated content over time.”

The mandate for digital preservation at the Library is linked to institutional responsibility, legal obligations, scholarly commitment, contractual obligations and grants, and membership services (such as Utah Academic Library Consortium (UALC), Greater Western Library Alliance, Mountain West Digital Library (MWDL), etc). [Special Collections](#), Information Technology, [University Archives](#) and the [Institutional Repository](#) all have missions, whether explicit or implicit, to collect, preserve, and provide access to the historical collections and institutional and scholarly records they hold. In some cases analog preservation will not suffice and the digital preservation of such objects can be inferred.

Additionally, the Library receives grant funding to ensure that specific collections are digitized and made available to online users and the sustainability and long-term accessibility of those collections is often required.

The Library also provides services for outside institutions that need items digitized and made available online. As part of these services, the long-term preservation of selected materials has been written into many formal agreements.

¹ The J. Willard Marriott Library has defined enduring value as unique materials concerning Utah life and/or history as well as materials created by University faculty or Utah residents that fit the Library's collection mission.

OBJECTIVES

The overall mission of the digital preservation program is to preserve and sustain long-term accessibility to all digital collections created or collected throughout the Library by maintaining a comprehensive digital preservation program. Additionally, it should be noted that in order to manage digital collections over time, the program must include the accessibility of the software and other discovery tools associated with those collections.

Within the overall mission, we have the following objectives:

- Enable uninterrupted (not necessarily instant) access to digital content over time as technology for digital content evolves.
- Collaborate with campus partners and regional and national institutions to make the best use of resources and avoid duplication of effort.
- Comply with and contribute to the development of the standards and best practices of the digital preservation community.

SCOPE

The Library has primary responsibility for preservation of:

- Digital library resources of enduring value
- Digital resources from outside sources that the Library has contracted to preserve for long-term access

Program limitations: This program's top priority will not be to preserve objects that are already commercially available elsewhere or that are preserved with a trusted digital repository, except in the case of a future digital preservation strategy (such as the LOCKSS model).² The program will assess candidates for digital preservation within budget limitations as well as explicit criteria specified by the Library's Digital Collections Policy and tool (url forthcoming).

Program priorities:

- Unique materials in danger of obsolescence in analog form and identified as "critical need" for digital preservation
- Unique materials in digital form in danger of obsolescence or loss.
- Digital collections earmarked by our patrons as requiring long-term access

Timeframe: Our policy, procedures, current and needed technical infrastructure, refined selection criteria, and resources framework will be completed in 2012. At that

² There may be cases in which the program will archive an object that is also available within another trusted repository in order to retain the integrity of the collection. An example of this would be if a faculty member deposits her research with the University of Utah's Institutional Repository (USpace) but also deposits or publishes some research elsewhere. Another example would include a case in which the Library digitizes a rare book from its collection and Google Books digitizes the same book at a later date. Although that content may be duplicated, the Library would have a responsibility to retain its copy of the digitally preserved book because Google Books has made no claim to be a Trusted Digital Repository and therefore its content is not guaranteed to be available in perpetuity.

point, we will assess the overall timeframe for an operational, sustainable, comprehensive digital preservation program.

ATTRIBUTES and RESPONSIBILITIES

This framework follows digital preservation standards as defined in OCLC's Trusted Digital Repositories: Attributes and Responsibilities. Accordingly, the attributes of a trusted digital repository are:

- Open Archival Information System (OAIS) compliance
- Administrative responsibility
 - Accept responsibility for the long-term maintenance of digital resources on behalf of its depositors and for the benefit of current and future users.
- Organizational viability
 - Establish an organizational system that supports not only long-term viability of the repository, but also the digital information for which it has responsibility.
- Financial sustainability
 - Demonstrate fiscal responsibility and sustainability.
- Technological and procedural suitability
 - Develop policies, practices, and performance that can be audited and measured.
- Systems security
 - Ensure the ongoing management, access, and security of materials deposited within it.
- Procedural accountability
 - Dependably carry out its long-term responsibilities to depositors and users openly and explicitly.

CHALLENGES and INCENTIVES

- Budget limitations. We must always live within our financial means. Realistically, we will not be able to preserve everything, making our selection criteria for preservation all the more imperative.
- Keeping up with technological change in terms of hardware, software, new formats, etc. A key question here deals with emulation vs. migration of formats.
- Creating and following submission standards
- Meeting the education needs of staff involved *with* (but not explicitly responsible *for*) digital preservation.

OPERATING PRINCIPLES

The Library will strive to:

- Comply with OAIS and other digital preservation standards and practices
- Ensure that content remains readable and understandable
- Participate in the development and adoption of digital preservation community standards, practice and solutions

- Develop a reliable, scalable, sustainable, and auditable digital preservation repository
- Manage the hardware, software, and storage media in accordance with environmental standards, quality control specifications, and security requirements

ROLES and RESPONSIBILITIES

The Library accepts responsibility for preserving its digital assets. The Technology Services Council evaluates high-level policy documents and reviews programmatic plans and progress. The Associate Director for Information Technology and the Associate Director for Scholarly Resources and Collections provide input and guidance to the work being done by the Digital Preservation Archivist to manage the digital preservation program and the lifecycle of digital objects of enduring value within the Library. The Head of Digital Ventures, Head of University Archives and Records Management, and the Institutional Repository Coordinator also contribute to the program at various levels.

COOPERATION and COLLABORATION

The Library acknowledges that its digital preservation goals will likely exceed available resources and therefore not be able to guarantee the safety of all digital assets. Therefore, collaboration and partnerships with regional and/or like-minded organizations will be required to ensure the program's success and to properly prioritize which assets will be addressed and in what order. These may include working with state and regional cultural heritage organizations. Such collaborations may require formal agreements that make explicit the roles and responsibilities of each member in any collaborative.

SELECTION and ACQUISITION for PRESERVATION

The Digital Preservation Decision Chart (Appendix B) guides collection owners regarding preserving digital content of enduring value. The Decision Chart also reflects criteria for deposit.

ACCESS and USE

Stakeholders of the Library's digital preservation program include traditional users such as Library departments, patrons, and faculty, and newer stakeholders such as the University and cultural heritage organizations that have deposited archival masters with the Library for long-term preservation. Restrictions to use of collections are defined by the collection holder and vary from collection to collection.

SECTION B

POLICIES and PROCEDURES

Roles and Responsibilities

There are several individuals responsible for the digital content connected with the Library's Digital Archive throughout the content's lifecycle. Main roles and responsibilities are divided between the collection owner who is submitting materials to the archive (whether they be physical or born digital), collection managers who digitize physical materials, and the Digital Preservation staff.

What are the responsibilities of collection owners?

- Intellectual property rights: Ensure all proper permissions associated with the deposited content are fully established. This includes the content's subsequent preservation treatment, e.g. copying.
- Metadata: Submit appropriate descriptive, administrative, structural and possible preservation metadata³ as required by Library documentation. If collection is submitted to the archive in digital form, technical (and possibly preservation) metadata should be submitted by collection owner at time of deposit. (See <http://mwdl.org/index.php/about> for current Mountain West Digital Library metadata guidelines).
- Agreement: Sign and maintain a formal Agreement with the Library specifying current materials being deposited and current contact information. This must be completed before the digital collection is created.

What are the responsibilities of the collection manager?

- Reliability: Carry out all digitization processes according to formal Agreement between collection owners and the Library.
- Metadata: Create appropriate Technical (including related Preservation metadata) as required by Library documentation (See <http://mwdl.org/index.php/about> for current Mountain West Digital Library guidelines).

³ Preservation metadata stores technical details on the format, structure and use of the digital content, the history of all actions performed on the resource including changes and decisions, the authenticity information such as technical features or custody history, and the responsibilities and rights information applicable to preservation actions. It often includes the following information: Provenance: Who has had custody/ownership of the digital object? Authenticity: Is the digital object what it purports to be? Preservation activity: What has been done to preserve the digital object? Technical environment: What is needed to render and use the digital object? Rights management: What intellectual property rights must be observed?

What are the responsibilities of the Digital Preservation Program?

1. Insure digital stewardship for all objects.
Collection managers and Digital Archive staff must work together to manage stored digital objects throughout all phases of the objects' life cycle. The phases are:
 - a. Assessment phase: Collection manager performs a curatorial assessment of materials intended for the Archive. Assessment includes filling out the New Collection Deposit Form, which specifies such things as initial format, archival format, access considerations, copyright restrictions, etc.
 - b. Acquisition and creation phase: Collection manager selects digital formats and defines technical specifications and workflow processes for creation of objects and related metadata. For objects that the Library will be digitizing, this will include a workflow for digitizing according to archival specifications and metadata creation. For born-digital objects submitted to the Archive, this will include a workflow for possible migration to accepted Archive format and initial checksum verification.
 - c. Deposit phase: Digital Archive validates each package of digital objects and related metadata that is submitted.
 - d. Archive and preservation phase: Digital Preservation staff will perform yearly fixity checks to ensure the usability of digital objects over time. This includes periodic reports to collection managers about their objects and their refreshment and possible migration to new formats.
2. Reliability: Provide services as agreed to in all Agreements with collection owners.
3. Documentation: Maintain current documentation of supported formats and disseminate the preservation action plan for each supported format. (See Appendix C for supported formats).
4. Financial: Determine costs of long-term preservation and services and disseminate them to Library Administration and collection owners.
5. Preservation: Provide data preservation treatments that are as lossless as required given the Library's resources and current knowledge.
6. Sustainability: Professionally manage the Program in a way that is administratively, financially, and technically viable long-term.

DIGITAL ASSETS

Quality Creation and Benchmarking

The Library's Digital Archive is committed to providing long-term storage to all deposited content by applying best practices for data management and digital preservation while also acknowledging the complexities involved in preserving digital information. The Archive commits to preserving content in the form it is originally

deposited if deposited in an acceptable format (See Appendix C). The Archive will preserve the content, structure and functionality of the files through migration to newer formats or other preservation strategies, where feasible. The Archive will provide basic services including secure storage, backup, management, and fixity-checks.

At the outset, the Archive will provide preservation support for specific file formats only. We have determined these by applying a set of evaluation criteria including: prevalence of the format in the marketplace, availability of tools for migration and availability of local resources to take specific preservation actions. Over time, our ability to provide full preservation support for more formats is likely to grow as additional tools and techniques are developed and adequate staff and resources are allocated to fully support the service offered.

This service is currently provided only for formats that are both publicly documented and widely used, giving us a high degree of confidence in our preservation commitment, making it more likely that tools will exist or be developed to undertake preservation actions, and that those actions will result in an understood and controlled migration. The content may also be normalized (transformed to another stable format) to provide additional assurance that functionality is preserved. Finally, if possible, the content will be preserved as originally deposited to ensure the original bit stream is always available. TIFF is an example of a supported format, as its specifications are publicly available and it is well supported and widely deployed.

The formats specified in Appendix C will be re-evaluated at the end of each calendar year to determine if new standards should be adopted. New formats will be evaluated on a periodic basis and when determined to be acceptable standards, those formats will be accepted and old formats migrated to the new standard. In the early days of the program, the Library's Digital Archive is highlighting functionality over format, meaning it is more important to archive and make accessible the content of a digital item than the actual format it was originally presented in. In the future, it may be possible to preserve both functionality and format.

Selection and Acquisition Policies and Procedures

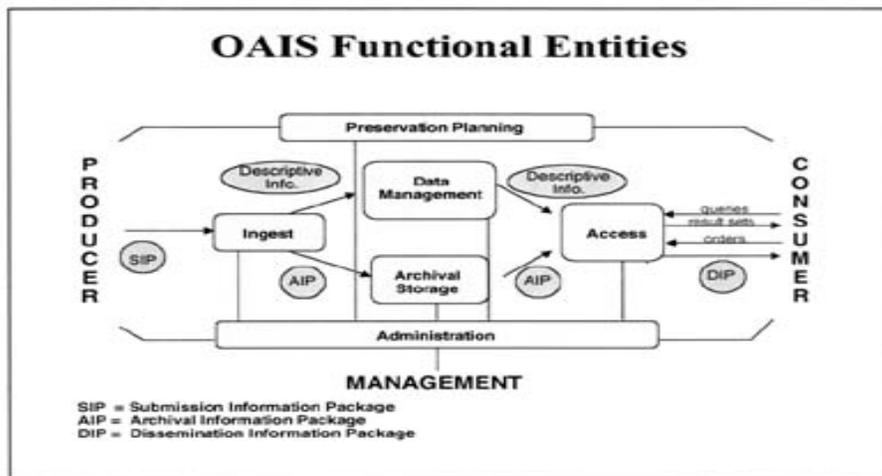
It is important to note that while several types of digital collections will be supported by the Library for access purposes, only unique collections that are selected for long-term preservation will become the highest priority for long-term management and preservation.

Digital Preservation staff and the Technology Services Council will make the final decision regarding which collections will be preserved within the Digital Archive (following the recommendations of collection owners, archivists [and perhaps subject specialists] who are depositing materials into the archive and who will in turn become some of the archive's main community of users). The Digital Preservation Decision Chart (Appendix B) will be used as a guide in this process.

As mentioned in Section A, in order to maintain their research value, significant individual collections may be retained in their entirety, even if only a portion of the collection is unique material. This will be done on a case-by-case basis and be decided by the collection owner and the Technology Services Council. If space and funding constraints become too difficult, these will be the first collections to be re-evaluated. This process, if undertaken, will be an open process and will incorporate the Digital Preservation Chart as well. However, it should be noted that the Digital Archive, guided by the Technology Services Council, reserves the right to de-accession collections from long-term preservation on a case-by-case basis, with due observance of institutional and contractual obligations. In cases of de-accession, collections can and should be transferred to another trusted digital repository, if appropriate. De-accession criteria is detailed in Appendix D.

Transfer Requirements and Deposit Guidelines

The diagram below provides a visual representation of the Open Archival Information System (OAIS) model and shows the relation of the various steps in the archival process. The next two pages will go into further detail with regards to the following terms: Submission Information Package (SIP), Archival Information Package (AIP), Dissemination Information Package (DIP). For a more detailed listing of the activities contained in the OAIS model below, please see Appendix F.



Deposit process: It is our aim to provide public access to as many collections as possible via our Digital Asset Management system (DAM)⁴ because we believe that preservation is of little use without minimum level access. Therefore, when a collection is deposited for long-term preservation, the process will depend on whether or not:

⁴ Currently, our digital asset management is CONTENTdm, which is OCLC's single software solution that handles the storage, management and delivery of digital collections to the Web.

1. The collection will be or has been uploaded to our DAM for public access
or
2. It is a private collection that needs to be archived but its content not made available to the public for a specified time period

If the collection IS being uploaded to our DAM

- Submission Information Package (SIP) needs to be created and master files and associated metadata need to be transferred to the DAM archival file folders on our servers.

If the collection is NOT being uploaded to our DAM

- Submission Information Package (SIP) needs to be created

SIP Requirements

- The SIP consists of:
 - Submitted Digital Preservation Decision Chart (see Appendix B)
 - Original objects to be digitized or the digital objects to be submitted
 - Associated descriptive (and sometimes technical/preservation) metadata received from collection owners.

All information on the decision chart and deposit form is informative for digital preservation, but the essential information to document the deposit transaction includes:

- Information that identifies the depositor and a description of the deposit
- Exact listing of the files received (original file name and checksum are good identifiers)
- Date of the deposit

The SIP includes additional metadata, files, or replacement files that were requested or received from the depositor to complete the deposit, when applicable. Persistent identifiers for the submission and the files should be assigned upon arrival or as soon after as possible. The SIP could also include the Metadata Encoding and Transmission Standard (METS), which is the standard for encoding descriptive, administrative, and structural metadata regarding objects within a digital library, expressed using the XML schema language.

The SIP forms the basis of the Archival Information Package (AIP). As the scope of digital content received by the Library expands (e.g., websites, audio and video files), the level and nature of the metadata for new digital content will adjust accordingly.

Deposit agreement requirements and responsibilities

Collection managers can de-accession objects from the Digital Archive as part of a responsible collection management decision, but the Archive will not be a temporary storage solution for digital objects. Temporary storage can be dealt with on a more cost-effective, less management intensive basis by other solutions offered by local or external IT providers.

Access and Use Policies

What are the Library's access and use policies for objects held in the Digital Archive?

An important part of the Archival Information Package (AIP) is the Dissemination Information Package (DIP). The DIP includes derivative versions of the processed files in acceptable distribution formats, relevant set-up files, and metadata required to read and use the files by patrons of the Digital Archive who will be accessing the content after it has been deposited with the Archive.

For most objects, public access will be via our DAM. The DAM allows most objects within the Digital Archive to be seen by the public, but it does not constitute the archive itself. Currently, access to derivative files will be through CONTENTdm. Collections that are not included in our DAM will be accessible via special request with due recognition of the Government Records Access Management Act (GRAMA) and the Freedom of Information Act (FOIA).

The Library's Digital Archive does not manage descriptive metadata. Collection owners, along with collection managers, are responsible for making sure that descriptions of their objects are available in the access portal (i.e. our DAM). This requirement exists at the metadata level only; there is no requirement that the general public has instant access to the high-resolution files for any stored objects. In fact, many collections, due to copyright and donor restrictions, will never make their archival files available to the general public without prior consent by the collection owner.

DIGITAL PRESERVATION STRATEGIES

The digital preservation strategies employed by the Digital Archive can be divided between program and collection level.

Program-level

- Monitor collection owners/users to track changes in their service requirements.
- Monitor available technologies for possible upgrades.
- Assess risks for loss of content posed by technology variables such as commonly used proprietary file formats and software applications.

Collection-level

- Every two years, the Digital Preservation staff will evaluate the digital content objects to determine what type and degree of format conversion or other preservation actions should be applied.

- Metadata attachment. The Digital Preservation staff will determine the appropriate metadata needed for each object type and how it is associated with relevant objects.

TECHNOLOGICAL INFRASTRUCTURE

Digital Archive Operations

Ingest file formats

Pre-ingest files need to be in one of the acceptable formats outlined in Appendix C. Whether this is accomplished by the collection owner or collection manager once the collection has been transferred to the Digital Archive will be on a case-by-case basis.

Security

The current security of objects within the Digital Archive is assured following specifications outlined in Appendix E.

Emergency Planning

The Digital Archive's current emergency plan is detailed in Appendix E.

Platform Requirements and Procedures

Platform requirements and procedures most likely will change as improved technology becomes available. These changes can be made by the Digital Archive without the consent of the collection owner, but must maintain the current level of service. Current platform requirements and procedures are detailed in Appendix E.

SECTION C

IMPLEMENTING THE FRAMEWORK

Our short-term plan for implementing the Organizational phase of our Digital Preservation Policy includes both ongoing, yearly actions as well as a multi-year strategy towards the implementation of a viable digital preservation program.

Ongoing actions occurring every two years

- Conduct format migration appraisal and migrate to new formats as needed. This will be accomplished in-house, until an improved viable, affordable digital preservation solution is available.
- Continue to provide skilled staff and research, with links to a wider network of distributed development activity, researchers, and services for digital preservation.
- Add to our set of central services, standards, and tools for a greater range of distributed digital preservation services.

2011

- Engage in pilot projects with OCLC's Digital Archive, Ex Libris' Rosetta, Archivematica, etc. to more fully evaluate and understand Digital Preservation solutions currently available.
- Use the Data Seal of Approval for Trusted Digital Repositories criteria and checklist to conduct a gap analysis to determine the trustworthiness of our proposed Digital Preservation Program. This will be done by mapping the complete framework to the existing components, technical infrastructure, and available resources of our digital preservation practices. By doing this, we will be able to more fully understand where we are en route to becoming a Trusted Digital Repository and can more fully map out the specific steps that will lead to our goal. The next steps will become additional goals.

2012

- Further explore other Digital Preservation solutions by extending pilot projects or by working with one on a more permanent basis.
- Plan for and gain approval for financial considerations related to implementing a viable digital preservation program.
- Draft and vet the Technological phase of our Digital Preservation Policy.
- Draft and vet the Financial phase of our Digital Preservation Policy.

- Implement the technological and financial phase of our Digital Preservation Policy via a viable digital preservation solution. This could extend beyond 2012.

PUBLICIZING and PROMULGATING THE POLICY and PLAN

The first steps in publicizing the organizational framework will be to:

- Create and maintain a website with links to all related policies, forms and appendixes.
- Engage in public relations activities surrounding website to highlight and disseminate our policy and future plans.
- Engage in training/education activities surrounding policy and plan implementation.
- Compile the experience of research undertaken to draft the policy framework for potential conference presentation and/or written articles on the subject.

APPENDIX A: DEFINITIONS and FURTHER RESOURCES (Updated: September, 2011)

Digital Archive: A digital library which is intended to be maintained for a long time, i.e. periods longer than individual human lives and certainly longer than individual technological epochs. Digital archives are distinct from digital libraries in the sense that digital libraries are repositories that collect and provide access to digital information, but may or may not provide for the long-term storage and access of that information.

Source: <http://info.wgbh.org/upf/glossary.html>

Digital Preservation:

Short Definition: Digital preservation combines policies, strategies and actions that ensure access to digital content over time.

Medium Definition: Digital preservation combines policies, strategies and actions to ensure access to reformatted and born digital content regardless of the challenges of media failure and technological change. The goal of digital preservation is the accurate rendering of authenticated content over time.

Long Definition: Digital preservation combines policies, strategies and actions to ensure the accurate rendering of authenticated content over time, regardless of the challenges of media failure and technological change. Digital preservation applies to both born digital and reformatted content. Digital preservation policies document an organization's commitment to preserve digital content for future use; specify file formats to be preserved and the level of preservation to be provided; and ensure compliance with standards and best practices for responsible stewardship of digital information. Digital preservation strategies and actions address **content creation, integrity and maintenance**.

Content creation includes: clear and complete technical specifications, production of reliable master files, sufficient descriptive, administrative and structural metadata to ensure future access, and detailed quality control of processes.

Content integrity includes: documentation of all policies, strategies and procedures, use of persistent identifiers, recorded provenance and change history for all objects, verification mechanisms, attention to security requirements, and routine audits.

Content maintenance includes: a robust computing and networking infrastructure, storage and synchronization of files at multiple sites, continuous monitoring and management of files, programs for refreshing, migration and emulation, creation and testing of disaster prevention and recovery plans, and periodic review and updating of policies and procedures. Source: American Library Association (ALA)
<http://www.ala.org/ala/mgrps/divs/alcts/resources/preserv/defdigpres0408.cfm>

Migration: Migration focuses on the digital object itself and is the act of transferring or rewriting data from an out of date medium to a current medium and is considered

one of the only viable approaches to long-term preservation of digital objects.
Source: http://en.wikipedia.org/wiki/Data_migration

Preservation Metadata: Preservation metadata stores technical details on the format, structure and use of the digital content, the history of all actions performed on the resource including changes and decisions, the authenticity information such as technical features or custody history, and the responsibilities and rights information applicable to preservation actions. It often includes the following information:

Provenance: Who has had custody/ownership of the digital object?

Authenticity: Is the digital object what it purports to be?

Preservation activity: What has been done to preserve the digital object?

Technical environment: What is needed to render and use the digital object?

Rights management: What intellectual property rights must be observed?

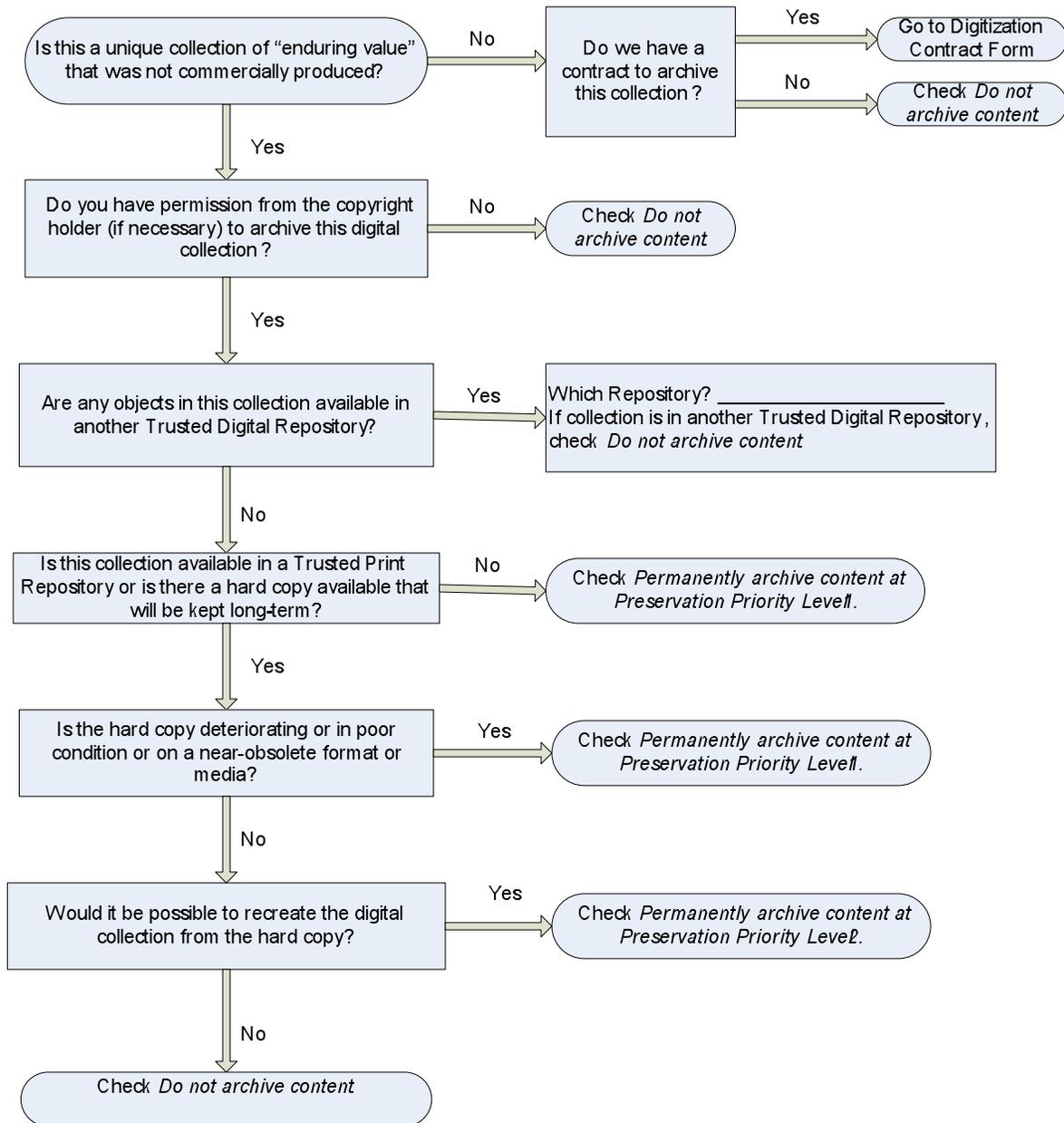
Source: http://en.wikipedia.org/wiki/Preservation_metadata

For an in-depth introduction to the terms and issues surrounding digital preservation management, please see this online tutorial:

http://www.icpsr.umich.edu/dpm/dpm-eng/eng_index.html

APPENDIX B: DIGITAL PRESERVATION DECISION CHART

(This is IN-PROGRESS as of 09/23/2011. We still need to add the other side of this document, which will define key terms as well as help collection owners decide how to deal with the collection once it has been earmarked for digital preservation. This entire chart should be complete by the end of October, 2011.)



APPENDIX C: SUPPORTED FORMATS TABLE (This is IN-PROGRESS as of 09/23/ 2011. We are re-evaluating all preferred formats.) This table summarizes the formats that the Library's digital archive will provide preservation for. The 1st column refers to the type of resource. The 2nd column refers to the physical version of the resource to be digitized and archived. The 3rd column specifies which digital formats we will accept from collection owners in the case that the object is already digitized. The 4th column specifies which formats we will store the digital object in, with our preferred format in bold. The final column lists some resources for transferring your digital object into a format we support. See the Western States Digital Imaging Best Practices for specifics regarding digitization specifications. http://www.bcr.org/dps/cdp/best/wsdibp_v1.pdf This table is subject to change at any time.

TYPE	SUPPORTED PHYSICAL VERSION	SUPPORTED DIGITAL FORMAT	DIGITAL ARCHIVE STORAGE FORMAT	FILE CONVERSION RESOURCES
Text	Book, Loose leaf sheet, Manuscript, Map	<ul style="list-style-type: none"> - JPEG2000 - PDF - PDF/A-1 (ISO 19005-1) - TIFF (minimum 8 bit grayscale, 24 bit color, 3000 to 5000 pixels across the long dimension) 	<ul style="list-style-type: none"> - PDF/A-1 ISO 19005-1 - JPEG2000 (lossless) - TIFF (uncompressed) 	<ul style="list-style-type: none"> http://irfanview.com http://www.adobe.com/products/acrobatpro/
Image	Photograph print, Photograph negative (sheet film, 35mm)	<ul style="list-style-type: none"> - JPEG2000 (lossless) - TIFF (uncompressed) 	<ul style="list-style-type: none"> - JPEG 2000 (lossless) - TIFF (uncompressed) 	<ul style="list-style-type: none"> http://irfanview.com/
Audio	Audio cassette, Reel-to-Reel audio tape, Phonograph record (33, 45, 78 rpm)	<ul style="list-style-type: none"> - AIFF (PCM) - FLAC - WAV (PCM) 	<ul style="list-style-type: none"> - AIFF (PCM) - FLAC - WAV (PCM) 	<ul style="list-style-type: none"> http://irfanview.com/ http://foobar2000.org
Moving Image	VHS videotape, Mini DV videotape, 16mm film	<ul style="list-style-type: none"> - AVI (uncompressed, motion JPEG) - Motion JPEG 2000 (ISO/IEC 15444-4) - Quicktime Movie (uncompressed, motion JPEG) 	<ul style="list-style-type: none"> - AVI (uncompressed, motion JPEG) - Motion JPEG 2000 (ISO/IEC 15444-4) - Quicktime Movie (uncompressed, motion JPEG) 	<ul style="list-style-type: none"> http://irfanview.com/
Web	N/A	<ul style="list-style-type: none"> - PDF/A-1, ISO19005-1 - XML 	<ul style="list-style-type: none"> - XML (includes XSD/ XSL/XHTML, etc.; with included or accessible schema and coding explicitly specified) - PDF/A-1, ISO19005-1 	<ul style="list-style-type: none"> http://www.adobe.com/products/acrobatpro/

APPENDIX D: DE-ACCESSION CRITERIA (Updated: 09/03/2011)

To be considered for de-accessioning, an object must meet at least one of the following criteria and the de-accession decision must be authorized by the Technology Services Council and original collection owner.

- **Relevance:** inclusion of the object in the collections does not support the Digital Archive's mission or fit within its collecting goals.
- **Care of the Object:** the Digital Archive is no longer able to provide proper care for special preservation requirements associated with the object.
- **Duplication:** the object is an exact duplicate or unnecessarily duplicates the subject matter or relevance of another object within the Digital Archive.

No action pertaining to the de-accessioning or disposition of an object will be undertaken that would impair the integrity and good standing of the J. Willard Marriott Library within the community at large or within the Library profession.

APPENDIX E: CURRENT SECURITY, EMERGENCY PLANNING, PLATFORM REQUIREMENTS and PROCEDURES (Updated: 03/01/2010)

Security

- Security of files is assured via a Storage Attached Network (SAN).
- SAN is a high availability, highly redundant storage system, capable of providing storage for multiple servers attached to a fibre channel fabric.
- All Logical Unit Numbers (LUNs) are RAID-5 (Redundant Array of Independent Disks) with hot spares drives for each drive enclosure.
- To lose data permanently, three drives associated with one RAID-5 LUN have to fail simultaneously. It has to be two of the array drives, AND the hot spare.
- Digital Library servers are running as Virtual Machines under a VMWare ESX cluster. The cluster is attached to the SAN fibre channel fabric, and all Virtual servers have access to storage resources on the SAN.
- Library maintains a 200-tape library with four drives.
- Backup software is CommVault Simpana 8. A full data backup is made once a week with differential backups nightly. Quarterly copies of the full backup are sent to Perpetual Storage, and rotated once a year. The on-site backups give us about a 4 week 'look-back' window.

Emergency planning

In an incident requiring data restoration from the backup tapes at Perpetual Storage (such as catastrophic destruction of the data center), data will be restored as of the time the last set of tapes was delivered to Perpetual Storage (e.g., one to three months prior to the incident.)

Other incidents, which do not damage the on-site backup tapes, will be restored to the prior day.

Monitoring collections

- Fixity checks
 - The Digital Archives will use checksum software to conduct fixity checks on files when they are first transferred to the archive via hard drive or disk and when migrated to new formats. At the outset, the Digital Archive will be using MD5 checksum software though the actual software used may change over time.
- Migration plans
 - Accepted archival formats will be assessed for migration every two years and monitored throughout each year. The Digital Archive will only

migrate to new formats when general consensus of both the Archive and the Digital Preservation community has agreed on a viable archival format for migration. These may be ultimately approved by the Technology Services Council.

Platform Requirements and Procedures

For archival CONTENTdm collections

- The Marriott Library currently runs CONTENTdm, Version 5.2 on a Windows 2003 server VM under VMWare ESX. It has 2 virtual CPUs of 3.4GHz and 4GB of virtual RAM. It is connected to NTFS volumes hosted on a Dell/EMC CX3-40 SAN of reconfigurable size.
- This process most likely will change as improved technology becomes available. These changes can be made by the Digital Archive without the consent of the collection owner, but must maintain the current level of service

For ALL collections held in the Digital Archive

- The Digital Archive currently uses a Dell ML6020 Power Vault Tape Library with 92 tape slots and 4x Ultrium LTO3 drives, which have a capacity of 400/800GB per tape when used with LTO 3 media.
- This process most likely will change as improved technology becomes available. These changes can be made by the Digital Archive without consent of the collection owner, but must maintain the current level of service

APPENDIX F: DETAILED FUNCTIONAL MODEL OF THE OAIS REFERENCE MODEL

(Updated: 03/16/2010)

Common Services

- Operating System Services
- Network Services
- Security Services

Ingest

- Receive Submission
- Quality Assurance
- Generate AIP
- Generate Descriptive Information
- Coordinate Updates

Archival Storage

- Receive Data
- Manage Storage Hierarchy
- Replace Media
- Error Checking
- Disaster Recovery
- Provide Data

Data Management

- Administer Database
- Perform Queries
- Generate Report
- Receive Database Updates

Administration

- Negotiate Submission Agreement
- Manage System Configuration
- Archival Information Update
- Physical Access Control
- Establish Standards and Policies
- Audit Submission
- Activate Requests
- Customer Service

Preservation Planning

- Monitor Designated Community
- Monitor Technology
- Develop Preservation Strategies and Standards
- Develop Packaging Designs and Migration Plans

Access

- Coordinate Access Activities
- Generate DIP
- Deliver Response

APPENDIX G: REFERENCES (Updated: 03/16/2010)

The following organizations and resources informed the development of this framework:

Brigham Young University

“Preserving Content in the BYU Permanent Digital Archive: Digital Preservation Decision Tool” by Chris Erickson

Digital Preservation Matters Blog by Chris Erickson

British Library Digital Preservation Strategy

<http://www.bl.uk/aboutus/stratpolprog/ccare/introduction/digital/digpresstrat.pdf>

California Digital Library

<http://www.cdlib.org/>

Center for Research Libraries: Digital Archives

<http://www.crl.edu/archiving-preservation/digital-archives>

ERPA Digital Preservation Policy Tool

<http://www.erpanet.org/guidance/docs/ERPANETPolicyTool.pdf>

The Florida Digital Archive

<http://www.fcla.edu/digitalArchive/dalInfo.htm>

Harvard University: Library Preservation

<http://preserve.harvard.edu/guidelines/imagedig.html>

Inter-University Consortium for Political and Social Research

<http://www.icpsr.umich.edu/icpsrweb/ICPSR/>

ICPSR Workshop Action Plan #1

<https://www.library.utah.edu/personal/u0079759/Shared%20Documents/Forms/AllItems.aspx>

ICPSR Digital Preservation Policy Sample Framework

<http://www.icpsrdirect.org/DP/policies/dpp-framework.html>

ICPSR Deep Blue Preservation pages

<http://deepblue.lib.umich.edu/about/deepbluepreservation.jsp>

J. Willard Marriott Library

Smart Goals for 2008-2009

<https://www.library.utah.edu/sites/intranet/staff/Shared%20Documents%20for%20Everyone/Forms/AllItems.aspx?RootFolder=%2fsites%2fintranet%2fstaff%2fS>

[hared%20Documents%20for%20Everyone%2fSMART%20Goals&FolderCTID=&View={90AD30FD-16C1-4434-84E2-8ACA1860BA5A}](#)

Institutional Repository Policies
<http://uspace.utah.edu/about.php>

Digital Collections Policy (draft)
(url forthcoming)

Library of Congress Digital Preservation
<http://www.digitalpreservation.gov/>

Massachusetts Institute of Technology Museum De-accession Criteria
<http://web.mit.edu/museum/pdf/Manual-text3.pdf>

North Carolina Digital Preservation Policy Framework
http://statelibrary.ncdcr.gov/digidocs/documents/policy_framework.pdf

OAIS Reference Model
<http://public.ccsds.org/publications/archive/650x0b1.pdf>

Trusted Digital Repositories: Attributes and Responsibilities
<http://www.oclc.org/programs/ourwork/past/trustedrep/repositories.pdf>

Yale University Digital Preservation Policy
<http://www.library.yale.edu/iac/DPC/final1.html>