

<b>1. TITLE</b> SYSTEM REQUIREMENTS DOCUMENT (SRD)		<b>2. IDENTIFICATION NUMBER</b>  LOC-DAVRS-02	
<b>3. DESCRIPTION/PURPOSE</b>  The System Requirements Document (SRD) specifies the requirements for the Digital Audio-Visual Repository System (DAVRS). The purpose of the SRD is to establish a baseline of capabilities and characteristics of the system that are conditions for its acceptance.			
<b>4. APPROVAL DATE</b> (YYMMDD) 000228	<b>5. OFFICE OF PRIMARY RESPONSIBILITY</b> M/B/RS	<b>6a. COTR</b> Carl Fleischhauer	<b>6b. AUTHOR</b> UTA
<b>7. BACKGROUND</b>  This document presents the requirements for developing a digital audio-visual repository system to support efforts by the Library of Congress to digitally preserve and provide access to its motion picture, broadcast, and recorded sound collections. This requirements document and a concept design document are the initial deliverables of the first phase in the Digital Audio-Visual Repository System (DAVRS) Prototyping Project.  The next phases will address feasibility testing, as well as the preparation of a detailed prototype design. The goal of the DAVRS support contract is to identify, design, and integrate commercial software and hardware components that provide a robust, reliable, and cost-effective infrastructure while still providing the agility to adapt to changing Library processes. This will be accomplished by constructing a fully functional but reduced-scale prototype prior to the development of the full-scale system at the National Audio-Visual Conservation Center in Culpeper, VA.  During the next few years, the Library of Congress will improve its automated means to support the controlled storage, maintenance, management, and archiving of complex digital objects. These objects include copyright deposits, current electronic acquisitions, historical collections, works acquired by gift or exchange, and materials generated and used for support of Congress. Since these requirements are Library-wide, the solutions sought must be modular, scalable, and interoperable with other components of the Library's technical environment, follow open standards, enable the long-term preservation of data, and be compatible with the Library's long-term strategic directions.			
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*Library of Congress*

*Digital Audio-Visual Repository System (DAVRS)*

**System Requirements Document**

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- 1 **Scope.** This document addresses the requirements of the Digital Audio-Visual Repository System (DAVRS) system from ingestion to presentation. It does not include those “production” functions and/or components associated with the conversion of analog source materials and/or the reformatting of digital source materials prior to ingestion by the DAVRS. This document addresses the requirements of the full-scale system, hereafter referred to as the system. Decisions regarding the scope of the prototype system will be made at the end of Phase II of the DAVRS Project.
- 2 **Document Organization.** This document is organized into six major sections. Section 1 describes the scope of this document. Section 2 describes the organization of this document. Section 3 specifies the requirements of the system. Section 4 specifies the method(s) to be used to ensure that the requirements are being met throughout the system development life cycle. Section 5 specifies the methods to be used to trace requirements throughout the system development life cycle. And Section 6 contains general information that aids in understanding this document.
- 3 **Requirements.** This section is divided into subsections that specify the system requirements. Each requirement is assigned a paragraph number to support testing and tracing and is stated in such a way that an objective test can be defined for it. Included are those capabilities and characteristics of the system that are conditions for system acceptance; excluded are those capabilities and characteristics that are left up to the developer. If there are no requirements in a given subsection, the subsection so states. If the requirements in a given subsection have not yet been determined, the subsection so states. If a given requirement fits into more than one subsection, it is stated once and referenced from the other subsections.
  - 3.1 **Required States and Modes.** The full-scale version of the system shall operate in only one state or mode referred to as “operational” mode. The prototype version of the system may also operate in a “test” mode to be defined in Phase II of the DAVR Prototyping Project. This document defines only the requirements for the “operational” mode of the full-scale system.
  - 3.2 **System Capability Requirements.** This subsection specifies the requirements associated with each capability or characteristic of the system.
    - 3.2.1 **General System Requirements.** The following requirements apply to the system in general and provide a high-level context for the detailed system requirements specified later in Subsections 3.2.2 through 3.18 of this document.
      - 3.2.1.1 The system shall be capable of ingesting, storing, managing, administering, accessing, and presenting digital content that represents the audio-visual collections of the Library of Congress.
      - 3.2.1.2 The system shall be capable of performing the functions of ingestion, storage, management, administration, access, and presentation concurrently.
      - 3.2.1.3 The system shall be capable of storing 85,000 audio items totaling approximately 40TB,

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including their related text and still-image items.

- 3.2.1.4 The system shall be capable of storing 150,000 audio-visual items totaling approximately 5 petabytes.
  - 3.2.1.5 The system shall be capable of supporting 200 simultaneous Patrons.
  - 3.2.1.6 The system shall support up to 50 simultaneous submission sessions.
  - 3.2.1.7 The system shall be capable of preserving its content for its lifetime and of outputting the content at the end of its life in a manner suitable for loading into another system.
  - 3.2.1.8 The system shall be capable of interfacing with external Library systems.
  - 3.2.1.9 The system shall be capable of supporting multiple essence types.
  - 3.2.1.10 The system shall be capable of supporting multiple metadata types.
  - 3.2.1.11 The system shall be capable of adapting to changes in technology.
  - 3.2.1.12 The system shall adhere to Library-approved safety standards.
  - 3.2.1.13 The system shall adhere to Library-approved security standards.
  - 3.2.1.14 The system shall operate under normal computer room conditions.
  - 3.2.1.15 The system shall use available Library computer resources wherever practical.
  - 3.2.1.16 The system shall adhere to Library-approved communications standards.
  - 3.2.1.17 The system shall adhere to Library-approved quality standards.
  - 3.2.1.18 The system shall adhere to Library-approved design and construction standards.
  - 3.2.1.19 The system shall be capable of being used, operated, and maintained by Library personnel.
  - 3.2.1.20 The system shall include training support.
  - 3.2.1.21 The system shall include logistics support.
  - 3.2.1.22 The system shall include packaging support.
- 3.2.2 Ingestion.** This subsection specifies the Ingestion requirements of the system. Ingestion is defined as the capability to input data (essence) and metadata into the repository system.
- 3.2.2.1 The system shall input Submission Information Packages consisting of essences and metadata created by Producers.
  - 3.2.2.2 The system shall be capable of validating the integrity of essence and metadata input.
  - 3.2.2.3 Submission Information Packages may be input individually or in batches.
  - 3.2.2.4 The repository shall be capable of inputting essence and metadata at separate times.
  - 3.2.2.5 The system shall be capable of inputting metadata with no essence.
  - 3.2.2.6 The system shall be capable of editing and updating values in individual fields of the metadata.
  - 3.2.2.7 The system shall be capable of providing security for metadata entry.
  - 3.2.2.8 The system shall be capable of maintaining multiple versions of metadata.
  - 3.2.2.9 The system shall be capable of generating metadata from essence.
  - 3.2.2.10 The system shall be capable of providing default values for metadata.

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- 3.2.2.11 The system shall permit the addition, modification, and derivation of metadata elements during the ingestion process.
  - 3.2.2.12 The system shall be capable of inputting and/or generating structural, administrative, and descriptive metadata.
  - 3.2.2.13 The system shall be capable of inputting essence and metadata via online telecommunications sessions and/or via tangible media (e.g., CD, tape, etc.).
  - 3.2.2.14 The system shall be capable of encapsulating essence and metadata to form digital objects.
  - 3.2.2.15 The system shall be capable of monitoring the state of digital objects during the ingestion process.
  - 3.2.2.16 The system shall be capable of performing error checking and reporting on digital objects created during ingestion (e.g., duplicate checking).
  - 3.2.2.17 The system shall be capable of assembling the digital objects into Archival Information Packages that comprise all the digital objects associated with individual items (e.g., record albums, motion picture films, videos).
  - 3.2.2.18 The system shall be capable of associating each Archival Information Package with a persistent name and determining the resolution for that name.
- 3.2.3 Archival Storage.** This subsection specifies the archival storage requirements of the system. Archival storage is defined as the capability to receive digital objects, store digital objects, detect and correct errors in digital objects, migrate digital objects between media, and respond to requests for access to digital objects.
- 3.2.3.1 The system shall accept and acknowledge the receipt of Archival Information Packages.
  - 3.2.3.2 The system shall be capable of storing Archival Information Packages.
  - 3.2.3.3 The system shall be capable of associating the storage location of Archival Information Packages with their unique persistent names.
  - 3.2.3.4 The system shall be capable of periodically checking the integrity of all Archival Information Packages stored within the system.
  - 3.2.3.5 The system shall be capable of detecting and correcting single-bit and burst-bit errors from 1 to 64 bits in length within Archival Information Packages.
  - 3.2.3.6 The system shall be capable of migrating Archival Information Packages within an internal media hierarchy.
  - 3.2.3.7 The system shall validate the accuracy of Archival Information Packages when migrating them within the storage hierarchy.
  - 3.2.3.8 The system shall be capable of retrieving and outputting Archival Information Packages in the form of Dissemination Information Packages in response to requests consisting of the resolutions of persistent names.

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- 3.2.3.9 The system shall validate the accuracy of Archival Information Packages when outputting them in response to requests.
- 3.2.3.10 All access to Archival Information Packages shall be automated within the system.
- 3.2.3.11 The system shall be capable of following business rules that govern the preservation of content, either through maintenance of existing digital objects or via their transformation.
- 3.2.4 Data Management.** This subsection specifies the data management requirements of the system. Data management is defined as the capability to receive and perform database updates, to perform database management, to process database queries, and to generate database reports.
  - 3.2.4.1 The system shall be capable of managing Archival Information Packages.
  - 3.2.4.2 The system shall be capable of updating Archival Information Packages.
  - 3.2.4.3 The system shall be capable of applying business rules to the management and updating of Archival Information Packages.
  - 3.2.4.4 The system shall be capable of processing queries for Archival Information Packages.
  - 3.2.4.5 The system shall be capable of generating data management reports.
  - 3.2.4.6 The system shall be capable of locating Archival Information Packages using the resolution of persistent names.
  - 3.2.4.7 The system shall use positive transaction control to ensure that Archival Information Packages are managed correctly in the repository system.
  - 3.2.4.8 The system shall provide mechanisms and tools for ensuring integrity of objects, metadata, links between objects and with metadata, as well as duplicate checking.
  - 3.2.4.9 The system shall provide efficient indexing of Archival Information Packages, with no downtime for reindexing.
  - 3.2.4.10 The system shall be capable of creating temporary relationships among Archival Information Packages for management purposes.
  - 3.2.4.11 The system shall be capable of managing groups of Archival Information Packages in the form of aggregates, collections, or sets.
  - 3.2.4.12 The system shall provide version control for Archival Information Packages.
  - 3.2.4.13 The system shall be capable of tracking the history of changes to Archival Information Packages by maintaining all earlier versions of the metadata for that package.
  - 3.2.4.14 The system shall support the references to copies of content held on Offline Protection Copies.
  - 3.2.4.15 The system shall be capable of supporting the security and authorization for retrieval, based on user profile and the terms and conditions of use assigned to each object.
  - 3.2.4.16 The system shall be capable of supporting invisible watermarking of objects or packages.
  - 3.2.4.17 The system shall be capable of supporting encryption or secure “envelopes” for storage, administration, and/or authentication.

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- 3.2.4.18 The system shall be capable of permitting different operations to be performed on different versions of an object or components of an object.
  - 3.2.4.19 The system shall have extensible methods for authenticating users and user attributes.
  - 3.2.4.20 The system shall prevent unauthorized update or replacement of digital objects, its essence, or its metadata.
  - 3.2.4.21 The system shall provide mechanisms for optimizing the storage of different digital object types and formats.
- 3.2.5 Administration.** This subsection specifies the administration requirements of the system. Administration is defined as the capability to control submission of digital objects, authenticate requests for access to digital objects, control access to digital objects, audit the access of digital objects, manage the repository system configuration, monitor the performance of the repository system, and provide customer services such as accounting and statistics.
- 3.2.5.1 The system shall be capable of providing authentication, security, and access control for all digital objects ingested, stored, managed, administered, accessed, and presented.
  - 3.2.5.2 The system shall be capable of associating terms and conditions of use at all levels, including digital objects, Submission Information Packages, Archival Information Packages, Dissemination Information Packages, and Aggregates.
  - 3.2.5.3 The system shall be capable of applying business rules to its administrative functions.
  - 3.2.5.4 The system shall be capable of administering digital objects using persistent names.
  - 3.2.5.5 The system shall support attribute-level security for all digital objects.
  - 3.2.5.6 The system shall be capable of authenticating requests to input essence and metadata as Submission Information Packages.
  - 3.2.5.7 The system shall be capable of controlling and scheduling the input essence and metadata as Submission Information Packages.
  - 3.2.5.8 The system shall be capable of controlling and scheduling the assembling of Archival Information Packages.
  - 3.2.5.9 The system shall be capable of controlling and scheduling the storage of Archival Information Packages.
  - 3.2.5.10 The system shall be capable of determining a resolution for each persistent name and of transmitting that resolution to an external persistent name service when Archival Information Packages are acknowledged and accepted.
  - 3.2.5.11 The system shall report the transmission of the persistent name and its resolution to the Producer for comparison with reports generated by the external persistent-name system.
  - 3.2.5.12 The system shall be capable of managing access, including the provision of writing and editing

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power to members of Responsible Organizations and the provision of read-only access to Patrons based on rules established by members of Responsible Organizations.

- 3.2.5.13 The system shall have extensible set of parameters for access profiles, including attributes of the digital item, user types, access operations allowed, and policies.
- 3.2.5.14 The system shall support explicit check-in and check-out of a digital object and its components.
- 3.2.5.15 The system shall set time-outs for specific users and groups.
- 3.2.5.16 The system shall be capable of authenticating requests to access digital objects, Archival Information Packages, or Aggregates.
- 3.2.5.17 The system shall be capable of controlling access to Archival Information Packages and Aggregates at the digital object level.
- 3.2.5.18 The system shall be capable of backing up and recovering lost or damaged Archival Information Packages.
- 3.2.5.19 The system shall be capable of authenticating requests for Dissemination Information Packages.
- 3.2.5.20 The system shall be capable of controlling and scheduling the output of Dissemination Information Packages.
- 3.2.5.21 The system shall be capable of supporting workflow and business processes.
- 3.2.5.22 The system shall be capable of monitoring and auditing workflow and business processes.
- 3.2.5.23 The system shall be capable of managing the configuration of components within the system.
- 3.2.5.24 The system must be capable of monitoring and reporting on the performance of the system, including system resource usage, network traffic, response/throughput, and bottlenecks.
- 3.2.5.25 The system shall be capable of process prioritization and balancing online retrieval with updates and other transactions.
- 3.2.5.26 The system shall be capable of using administrative tools for automatic and user-defined allocation of digital objects and metadata to improve performance.
- 3.2.5.27 The system must be capable of monitoring and reporting on the quality of the contents of the system.
- 3.2.5.28 The system shall be capable of providing accounting, performance, and statistical reports by user, by information package, by function, and for the system as a whole.
- 3.2.6 Access and Dissemination.** This subsection specifies the access and dissemination requirements of the system. Access and dissemination is defined as the capability to receive dissemination requests, generate queries, assemble Dissemination Information Packages, and deliver Dissemination Information Packages to Patrons.
  - 3.2.6.1 The system shall be capable of receiving dissemination requests.
  - 3.2.6.2 The system shall be capable of generating queries based upon dissemination requests.
  - 3.2.6.3 The system shall be capable of receiving and storing the results of queries in sets.

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- 3.2.6.4 The system shall be capable of generating queries against the result sets of other queries.
- 3.2.6.5 The system shall be capable of associating the results of queries with the unique persistent names of Archival Information Packages.
- 3.2.6.6 The system shall be capable of querying the external persistent-name system for the locations of Archival Information Packages.
- 3.2.6.7 The system shall be capable of decomposing Archival Information Packages into their component digital objects.
- 3.2.6.8 The system shall be capable of reformatting or compressing the essence (“lower resolution”) of digital objects.
- 3.2.6.9 The system shall be capable of converting metadata into format(s) that can be exchanged with other systems.
- 3.2.6.10 The system shall be capable of assembling Dissemination Information Packages from the digital objects contained in Archival Information Packages.
- 3.2.6.11 The system shall be capable of formatting and delivering Dissemination Information Packages according to pre-defined profiles or scripts, e.g., for researchers with high-end workstations and broadband networking, for other researchers, and for Offline Protection Copies.
- 3.2.6.12 The system shall be capable of delivering Dissemination Information Packages to Patrons.
- 3.2.6.13 The system shall be capable of auditing and reporting on the delivery of Dissemination Information Packages.
- 3.2.7 Discovery and Presentation.** This subsection specifies the discovery and presentation requirements of the system. Discovery is defined as the capability to support a user in searching for and identifying content of interest. Presentation is defined as the capability to display Dissemination Information Packages to an end user.
  - 3.2.7.1 The system shall be capable of composing and issuing internal queries against metadata and other searchable resources stored in the system.
  - 3.2.7.2 The system shall be capable of composing and issuing external queries against metadata stored in external Library systems such as the Integrated Library System (ILS).
  - 3.2.7.3 The system shall be capable of receiving, displaying, and saving results from internal and external queries.
  - 3.2.7.4 The system shall be capable of composing and issuing nested queries, i.e., queries against previous query results.
  - 3.2.7.5 The system shall be capable of requesting the external persistent-name system to resolve the locations of persistent names.
  - 3.2.7.6 The system shall be capable of generating dissemination requests based upon requests received

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that represent the resolution of persistent names.

- 3.2.7.7 The system shall be capable of receiving Dissemination Information Packages in response to dissemination requests.
- 3.2.7.8 The system shall be capable of decomposing Dissemination Information Packages into their associated digital objects.
- 3.2.7.9 The system shall be capable of navigating among the digital objects of a Dissemination Information Package.
- 3.2.7.10 The system shall be capable of rendering or shaping digital objects in complete, clear, workmanlike, comprehensible, and usable form.
- 3.2.7.11 The system shall be capable of customizing the presentation to meet the look-and-feel requirements of the end user.
- 3.2.7.12 The system shall be capable of displaying elapsed time (time code) when presenting audio and video.
- 3.2.7.13 The system shall be capable of displaying signal waveforms when presenting audio and video.
- 3.2.7.14 The system shall provide controls for and the capability to play, pause, fast forward, rewind, slow-play, fast-play, and step-play for both audio and video.
- 3.2.7.15 The system shall be capable of adjusting viewing and listening factors such as color rendition, contrast, brightness, and audio equalization and of applying anti-pop/anti-click software and Dolby or other noise reduction systems for recordings when it is unknown whether noise reduction had been used.
- 3.2.7.16 The system shall be capable of tabbing (flagging or marking spots or segments) within audio and video selections and of looping playback between tabs.
- 3.2.7.17 The system shall be capable of comparing two passages in different sound recordings, e.g., have two recordings of the same segment of the same musical composition available for one-after-the-other comparative playback.
- 3.2.7.18 The system shall be capable of presenting audio and video during fast forward and rewind to locate desired portions.
- 3.2.7.19 The system shall be capable of normalizing the pitch of slow-play and fast-play audio.
- 3.2.7.20 The system shall be capable of producing an edit-decision-list document for researchers that the researcher can use in future editing sessions after he or she is provided with a copy of the content.
- 3.2.7.21 The system shall be capable of dual viewing of video, e.g., the researcher is able to compare two segments of video footage, typically in two different items, sequentially (required) or concurrently (optional but desired).
- 3.2.7.22 The system shall be capable of freeze-framing video segments and of “grabbing” those frames to produce still images.

- 3.2.7.23 Grayscale or color images shall be used to reproduce printed matter with significant graphic elements, e.g., jackets or covers for phonograph records, or for manuscript items, e.g., pages of handwritten notes found in recording tape boxes.
- 3.2.7.24 Bitonal images shall be used to reproduce printed matter or typescripts that consist of typography and/or line art, e.g., lyric sheets, phonograph album liner notes, or typed documents that accompany archival tape recordings.
- 3.2.7.25 The system shall be capable of printing texts and images, including frame grabs from a video program, using typical computer printers.
- 3.2.7.26 The system shall be capable of adding an annotated warning about copyright to all printouts.
- 3.2.7.27 The system shall support standard web browser technology, including IE Explorer and Netscape.
- 3.2.7.28 The system shall use an accepted standard version of HyperText Markup Language (HTML) for the presentation of web pages.
- 3.2.7.29 The system shall be capable of creating web pages in HTML format on the fly.
- 3.2.7.30 The system shall support both client-based software applications and web-enabled applications.

**3.3 System External Interface Requirements.** This subsection specifies the requirements for the system's external interfaces. External interfaces are defined as connectivity between the repository system and systems outside the repository system itself.

**3.3.1 General.**

- 3.3.1.1 The system shall be capable of interfacing with external Library systems.
- 3.3.1.2 The system shall be capable of interfacing with the Internet.
- 3.3.1.3 The system shall use TCP/IP protocol to interface with external systems and the Internet.
- 3.3.1.4 The system shall use Z39.50 search and retrieval protocol for interface with bibliographic systems.
- 3.3.1.5 The system shall use SQL protocol for relational database interfaces.
- 3.3.1.6 The system shall adhere to HyperText Transfer Protocol (HTTP) standards.
- 3.3.1.7 The system shall provide application programming interfaces (API) or remote procedure calls (RPC) to facilitate external system access to repository system functionality.

**3.3.2 User Interface Requirements.** *TO BE DETERMINED*

**3.3.3 Library Persistent-Name System Interface Requirements.**

- 3.3.2.1 The system shall be interoperable with the Library persistent-name system (Handle Server).
- 3.3.2.2 The system shall be capable of interfacing with the persistent-name system to register and provide the resolutions for the persistent names of Archival Information Packages.
- 3.3.2.3 The system shall be capable of querying the persistent-name system for name resolutions. See also requirements in section 3.2.2 (17), 3.2.3 (3, 8), 3.2.4 (5), 3.2.5 (3, 9, 10, 11), 3.2.6 (5,6),

and 3.2.7 (5, 6).

### **3.3.3 Integrated Library System (ILS) Interface Requirements.**

3.3.3.1 The system shall be interoperable with the ILS.

3.3.3.2 The system shall be capable of providing ILS-relevant metadata to the Producer as part of the Archival Information Package registration report.

3.3.3.3 The system shall be capable of composing and issuing queries to the ILS (see also 3.2.7.2).

### **3.3.4 Production System Interface Requirements.**

3.3.4.1 The system shall be capable of inputting video at the rate of 270 Mb/s.

3.3.4.2 The system shall be capable of inputting audio at a rate of 96 Kb/s

3.3.4.3 The system shall be capable of inputting metadata at a rate of 56 Kb/s.

### **3.4 System Internal Interface Requirements.**

3.4.1 The system shall use TCP/IP protocol to interface between its major components.

### **3.5 System Internal Data Requirements.**

#### **3.5.1 Essence Requirements.**

3.5.1.1 The system shall be capable of ingesting, storing, and disseminating essences in multiple formats.

3.5.1.2 The system shall be capable of transforming essences from one format to another.

3.5.1.3 The system shall be capable of incorporating new essence formats without significant system redesign.

3.5.1.4 At a minimum, the system shall be capable of ingesting, storing, and disseminating essences in the following formats:

Format:	TIFF or JPEG
Tonal depth:	Grayscale: 8 bits per pixel; color: 24 bits per pixel
Compression:	Uncompressed
Spatial resolution:	600 dpi
Format:	TIFF or JPEG
Tonal depth:	Grayscale: 8 bits per pixel; color: 8 bits per pixel
Compression:	10:1
Spatial resolution:	300 dpi
Format:	TIFF (BITONAL)
Tonal depth:	1 bit per pixel
Compression:	ITU Group IV
Spatial resolution:	200-400 dpi
Format:	GIF
Tonal depth:	Grayscale: 8 bit; color: 6 colors
Compression:	Native LZW
Spatial resolution:	150x150 pixels
Format:	WAV
Sampling rate:	48 or 96 kHz
Compression:	None
Word length:	24 bit
Format:	MP3

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Sampling rate:	48 kHz
Compression:	6:1
Word length:	16-bit stereo
Format:	D-1
Sampling rate:	4:2:2
Compression:	None
Word length:	8 bit
Format:	Digital Betacam
Sampling rate:	4:2:2
Compression:	2:1
Word length:	8 bit
Format:	MPEG-2
Sampling rate:	4:2:2
Compression:	8:1
Word length:	8 bit

### 3.5.2 Metadata Requirements.

- 3.5.2.1 The system shall be capable of ingesting, archiving, managing, administering, accessing, and presenting structural metadata, administrative metadata, and descriptive metadata.
- 3.5.2.2 The system shall use XML as the markup language for the Library's metadata.
- 3.5.2.3 All new tags created by the system shall adhere to XML rules for forming semantic tags.
- 3.5.2.4 The presentation of all metadata will adhere to predefined Document Type Definition (DTDs).
- 3.5.2.5 The system will be capable of providing singular and cascading metadata category creation and deletion.
- 3.5.2.6 The system shall automatically validate metadata formatting using DTDs.
- 3.5.2.7 The system shall allow DTDs to be applied to new XML documents while leaving existing documents unchanged.
- 3.5.2.8 The system shall be capable of universally applying updated DTDs to existing metadata to resolve errors.
- 3.5.2.9 The system shall be capable of ingesting, storing, managing, administering, accessing, and presenting the following metadata:

access_category	Code for the category of access, to be used to control access to digital objects by Patrons.
access_expiration_date	Date that the access category is expected to change.
access_data	Any additional data needed to control access to digital objects; not to be confused with data about rights, rights-holders, etc.
access_rights	Pointer to location that contains a record of the rights-holders, e.g., intellectual property owner, donor, etc...., and to related information.
archive_date_time	Date and time of archiving. Associated with a particular archiving event, thus with a particular archive_identifier. Likely to be subsumed within

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	archive_history.
archive_history	Listing of archiving events; in effect, a compendium of all archive_date_time and archive_identifier data (which two fields may in the end simply be subsumed within this field).
archive_identifier	Pointer to the entity that has been archived according to the application of the archiving_profile on a particular archive_date_time. Likely to be subsumed within archive_history.
archive_next_date_time	Date and time for creation of an additional access controlled copy of this object. Some archiving will be triggered by changes in an entity made by the “producer.” This trigger is proposed for situations when there are no producer-warranted changes and would be based on, say, longevity analysis of the storage media or format.
archiving_profile	Identifies the program (or equivalent) used to manage the archiving of this object for users. The program will build the entity to be archived, which will be assigned a persistent name (handle). Compare to presentation_profile.
associated_file_name	Name of the support file, e.g., 11320.ent, cw005.ram.
associated_file_type	Purpose or function of support file (e.g., pgi or ent file for SGML).
audio_bits_per_sample	For sound files (where relevant), number of bits per sample. Compare to image_bit_depth.
audio_channel_configuration	Indicator for audio channel configuration (e.g., stereo, mono, surround sound, bilingual, etc.) for the digital file. Not to be confused with similar data for original within reformatting_documentation.
audio_channel_data	Additional data about audio channel configuration (e.g., which languages, which channels to rear speakers, etc.). Not to be confused with similar data for original within reformatting_documentation.
audio_sampling_frequency	For sound files (where relevant), number of samples per second. Compare to image_spatial_resolution and video_data_rate.
capture_device_identification	Identifier for equipment used for digital capture, understood to include all elements in digitization production system. May include serial numbers if the identification of the individual machine is important. Repeatable because multiple devices may be used to digitize.
capture_device_settings	Settings or other variables applied to equipment used for digital capture, understood to include all elements in digitization production system. For audio, for example, one may wish to document play-stylus diameter, equalization setting, etc.
capture_entity_corporate	Identifies the organization-level producer of the “file/bitstream,” i.e., the scanned image, transcribed text, audio file, etc. May also be assembler of an

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	object comprising multiple files/bitstreams. Not to be confused with responsibility_entity.
capture_entity_individual	Identifies the individual producer (operator, scanning technician) of the “file/bitstream,” i.e., the scanned image, transcribed text, audio file, etc. Not to be confused with responsibility_entity.
capture_production_identifier	Tracking number related to digital production data, e.g., production batch number.
checksum_creation_date_time	Date and time checksum was created.
checksum_value	Checksum (or equivalent). The proposed checksum is the MD5 type used to verify file integrity.
creation_date_time	Date/time of creation of terminal object, i.e., the date/time that the “underlying content bitstream” was created. Compare deposit_date_time, which is the date/time that the entity (at any level) was deposited.
datastream_compression	Algorithm used to compress the entity, including compression (1) indicated by internet_media_type, i.e., JFIF/JPEG, (2) not indicated by internet_media_type, i.e., ITU Group IV in a TIFF file [also indicated in bitstream/file header], and (3) “external” compression, e.g., ZIP.
deposit_date_time	Date and time entity deposited in repository. Compare creation_date_time, for the date/time that a file is created.
description_content_list	List of segments or units within an entity, similar to a table of contents. Developed in this metadata set to serve sound recordings in which a number of cuts or tracks are imbedded within a single bitstream/file, which may employ a segment number, start time (elapsed time), performer, title, composer, recording date, original matrix number, etc. See also description_title and feature_label.
description_creator	Person or organization primarily responsible for creating the intellectual content of a resource. May also be used for performer, e.g., for sound recording selections, where it may be repeated for composer. This field is modeled on the Dublin Core definition, which adds to the preceding: “For example, authors in the case of written documents, artists, photographers, or illustrators in the case of visual resources.”
description_source_physical_description	Modeled on (with data copied from) MARC field 300 or its equivalent in non-MARC data.
description_source_publication	Modeled on (with data copied from) MARC field 260 or its equivalent in non-MARC data.
description_subject	Topic(s) of the resource. This is modeled on the Dublin Core definition, which adds to the preceding: “Typically, subject will be expressed as keywords or phrases that describe the subject or content of the resource. The use of controlled vocabularies and formal classification schemas is encouraged.”

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description_summary	Textual description (abstract) of the content of the resource. This is modeled on the Dublin Core definition, which adds to the preceding: “. . . including abstracts in the case of document-like objects or content descriptions in the case of visual resources.”
description_title	Name given to the resource by the creator or publisher or, in the absence thereof, a title supplied by the digitizing entity. The first part of this definition is modeled on the Dublin Core definition. See also description_content_list and feature_label.
Duration	Duration of audio or video entity (primary, intermediate, or terminal object).
external_descriptive_data	Pointer or citation to external descriptive information, e.g., a book, scope and content note, or web site.
external_migration_identifier	Identifier, e.g., shelf number, for the migration master when it is external to the repository.
external_migration_data	Information about the migration master when it is external to the repository.
external_record_identifier	Identifier of external descriptive record.
external_record_type	Type of external descriptive record, e.g., MARC, EAD.
external_reproduction_identification	Identification needed to order reproductions of an entity from a source external to the repository, e.g., to fill Patron orders for an 8x10 print or a videotape.
external_reproduction_procedure	Data or pointer to data needed to order reproductions of an entity from a source external to the repository, e.g., to fill Patron orders for an 8x10 print or a videotape.
feature_label	Data consists of the generic name that may applied to the entity, e.g., “back,” “front,” “cover,” “table of contents,” etc. These terms will not be indexed for use in a discovery system but will be useful in making presentations comprehensible to users. Compare to segment_type and segment_value.
file_extension	Digital format indicator (.tif, .gif, .mpg, .sgm, etc.) associated with terminal object. Compare with internet_media_type.
frame_rate	Rate at which a video plays back expressed in frames per second.
Handle	Persistent Identifier. Required at Prime Object level, optional at all levels.
image_bit_depth	For still and moving image files, number of bits per pixel. Compare to audio_bits_per_sample.
image_color_space	Indicator of color space (sometimes color mode) for a color still image (i.e., RGB, CMYK, etc.). Note that alternate systems apply to moving image color. Not to be confused with image_bit_depth.
image_orientation	Orientation of image in terms of needed rotation: 0=none, 90=90 degrees, etc. Question: should there

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	be a convention for polarity or mirror images?
image_pixels_horizontal	Horizontal dimensions of an image or video terminal object.
image_pixels_vertical	Vertical dimensions of an image or video terminal object.
image_spatial_resolution	Resolution of an image (i.e., dpi). Complements but is not the same as image_pixels_horizontal and image_pixels_vertical. Questions: Will we have any images with different horizontal and vertical resolutions? Will we want another field that might indicate “resolution relative to physical original?” when this is the case and we wish to so indicate?
internet_media_type	Formerly MIME type.
original_content_type	General or specific physical nature of original item (i.e., sound recording, document, still pictorial, moving image, map).
parent_object_identifier	Identifier (could be a handle) for the entity above this intermediate or terminal object in the hierarchy below a primary object. This field is intended for use by an application to generate a “tree” that represents the object, identifies each component entity, and provides a count of the intermediate and terminal objects within the primary object.
presentation_profile	Identifies the program (or equivalent) used to manage the presentation of this primary or intermediate object for users. Compare to <u>archiving_profile</u> .
preservation_information	Information about preservation and reformatting not recorded elsewhere.
quantity_intermediate_objects	Generated by application. Quantity of intermediate objects within this primary object.
quantity_terminal_objects	Generated by application. Quantity of terminal objects within this primary or intermediate object.
reformatted_original_information	Information regarding the disposition of the original item (e.g., discarded, condition, storage, etc.).
reformatting_documentation	Additional documentation of interest to reformatting program managers pertaining to this terminal object. See samples.
reformatting_guidelines	Pointer to the documentation of the guidelines, policies, or standards that were followed for the digital reformatting of this entity.
reformatting_method	Approach or method used for digital reformatting.
relationship_type	Nature of the relationship between entities (e.g., “stand-alone,” “presentation sequence,” “part of a whole”).
relationship_value	Value of relationship type (e.g., grid indicators for multipart image object such as a map or large poster, a sequence number for pages).
responsibility_entity	Entity responsible for digital administration, i.e., the management of the digital object (set, aggregate, or whatever). Not to be confused with

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	capture_entity_corporate, typically used at the “file/bitstream” level to identify the producer of the scanned image, transcribed text, audio file, etc.
responsibility_information	Information about current or former entity responsible for digital administration, e.g., “object acquired from UMI on 19970624.”
revision_date_time	Date and time of last revision.
segment_type	Indicates aspects of the terminal object that have a sequential character but are not intended for use in sequencing presentation; compare to relationship_type and relationship_value (which are used for sequencing in presentation). Examples may include (1) “print page number,” (2) “assigned cut,” or “assigned track” on a phonograph record, e.g., Side B, Track 4, when this same entity carries relation_value “18,” or (3) “chapter” on a laser videodisc, when not used as relationship_type. These terms will not be indexed for use in a discovery system but will be useful in making presentations comprehensible to users. Compare to feature_label for non-sequential, not-to-be-indexed labeling.
segment_value	Coded value associated with the segment_type, e.g., “page 13” for the type “Print page number.”
Size	Extent of terminal object in bytes.
Use	Code that indicates the role an entity plays in a presentation; operates in reference to the presentation_profile. Proposed business rule: use the term <i>master</i> exclusively when that terminal element is the migration master.
video_data_rate	For video files (where relevant), data rate in megabits per second (mbps). Compare to audio_sampling_frequency and image_spatial_resolution.

**3.6 Adaptation Requirements.**

- 3.6.1 The system shall be capable of adapting to changes in technology without significant system redesign.
- 3.6.2 The system shall be capable of adapting to changes in workload without significant system redesign.
- 3.6.3 The system shall be capable of adapting to changes in Producer and Patron data format requirements without significant system redesign.
- 3.6.4 The system shall be capable of adapting to changes in user data format requirements without significant system redesign.

**3.7 Safety Requirements.**

- 3.7.1 The system shall adhere to Library-standard guidelines for safety.

**3.8 Security and Privacy Requirements.**

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- 3.8.1 The system shall authenticate users' privileges to use the system and gain access to data.
- 3.8.2 The system shall support the use of digital certificates for authentication of users.
- 3.8.3 The system shall have extensible methods for authenticating users, such as user IDs, passwords, PINs, biometrics, etc.
- 3.8.4 The system shall support the integration of a single external security implementation.
- 3.8.5 The system shall support but not require the use of encryption to secure preservation content.
- 3.8.6 The system shall support but not require the use of secure transport mechanisms to secure preservation content.
- 3.8.7 The system shall provide data security at the digital object level.
- 3.8.8 The system shall provide explicit security validation of access rights and terms for every transaction.
- 3.8.9 The system shall be capable of permitting different levels of access to different versions (copies) of a digital object.

3.8.10 Reference requirements 3.2.4.15 through 3.2.4.20.

3.8.11 Reference requirements 3.2.5.4 through 3.2.5.11.

**3.9 System Environment Requirements.**

3.9.1 The system shall be capable of operating under normal computer room conditions.

3.9.2 The system shall operate on 60 Hz, 120/208 vac, 3-phase electrical power.

3.9.3 *ADDITIONAL SPECIFICATIONS TO BE DETERMINED UNDER TASK ORDER 02.*

**3.10 Computer Resource Requirements.**

3.10.1 The system shall use computer resources available at the Library wherever practical.

**3.10.2 Computer Hardware Requirements.**

3.10.2.1 The system shall use Library-standard hardware wherever practical.

3.10.2.2 The system shall use commercially available hardware that follows industry standards, protocols, and reference models, wherever possible.

3.10.2.3 The system shall use no more than 50% of the total available CPU capacity of its processing components when operating at peak capacity.

**3.10.3 Computer Software Requirements.**

3.10.3.1 The system shall use Library-standard software wherever practical.

3.10.3.2 The system shall use commercially available software that follows industry standards, protocols, and reference models, wherever practical.

3.10.3.3 The system shall use the AIX or Solaris variants of Unix or Windows NT as its operating system.

**3.11 Computer Communications Requirements.**

3.11.1 The system shall use TCP/IP as the primary communications protocol both internally and

externally.

**3.11.2** The system shall use 100 Mbit/second fast Ethernet or 155 Mbit/second ATM internally.

**3.12 System Quality Factors.**

**3.12.1** The system shall possess a Mean-Time-Between-Failure (MTBF) of no less than 2,000 hours.

**3.12.2** The system shall not permit any content to be permanently lost or corrupted.

**3.12.3** The system shall be available 99.95% of the time with the exception of planned downtime.

**3.12.4** The system shall require no more than 2 hours of planned downtime per month.

**3.13 Design and Construction Requirements.**

**3.13.1** The repository design shall be designed in consideration of other Library efforts.

**3.13.2** The system shall be designed to documented Library standards and/or Library-approved industry standards.

**3.13.3** The system shall use a modular architecture.

**3.13.4** The system shall design and construction shall follow formal standards and industry practice.

**3.13.5** The system shall be designed and developed using an object-oriented methodology.

**3.13.6** The system shall be designed and developed using one common application development toolkit.

**3.13.7** The system shall be designed and developed using a flexible high-level development toolkit to allow for rapid prototyping and incremental development.

**3.13.8** The system shall be based upon an open system architecture, with well-defined and public protocols and formats, to link system components and facilitate exchange of data.

**3.13.9** The system shall base its primary retrieval interface on technology widely available.

**3.13.10** The system shall make effective use of Library staff resources for application development and maintenance.

**3.13.11** The system shall make effective use of Library hardware resources for systems support and operations.

**3.13.12** The system shall be designed so that specific functions or modules can operate on separate server nodes or processors for performance improvements.

**3.14 Personnel-Related Requirements.** *TO BE DETERMINED IN PHASE II.*

**3.15 Training-Related Requirements.** *TO BE DETERMINED IN PHASE II.*

**3.16 Logistics-Related Requirements.** *TO BE DETERMINED IN PHASE II.*

**3.17 Packaging Requirements.** *TO BE DETERMINED IN PHASE II.*

**3.18 Precedence and Criticality of Requirements.** *NONE.*

**4 Qualification Provisions.** This section defines a set of qualification methods to ensure that the requirements are being met throughout the system development life cycle.

**4.1 Feasibility Demonstration.** This subsection specifies the requirements for demonstrating the capability and characteristics of the repository system prior to operational deployment.

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- 4.1.1 Key capabilities of the system shall be demonstrated prior to system development to assess the feasibility and cost-effectiveness of developing the prototype DAVRS, including ingestion, archival storage, data management, access, and presentation.
- 4.1.2 The feasibility demonstrations shall involve the ingestion, storage, management, administration, access, and presentation of no fewer than three-hundred (300) hours of audio items, including master and service copies. The Library will furnish the content to be ingested in mutually agreed-upon formats.
- 4.1.3 The feasibility demonstrations shall involve the ingestion, storage, management, administration, access, and presentation of no fewer than forty (40) hours of video items, including master and service copies. The Library will furnish the content to be ingested in mutually agreed-upon formats.
- 4.2 **Testing.** This subsection specifies the requirements for testing the capability and characteristics of the repository system throughout the system development life cycle.
  - 4.2.1 **Unit Testing.**
    - 4.2.1.1 The system shall be tested at the software unit level during the development phase.
    - 4.2.1.2 Unit testing shall be performed using common automated testing tools.
    - 4.2.1.3 Unit-level testing shall be documented in unit development folders.
  - 4.2.2 **Subsystem Testing.**
    - 4.2.1.4 The system shall be tested at the subsystem level during the development phase.
    - 4.2.1.5 Subsystem testing shall be performed using common automated testing tools.
    - 4.2.1.6 Subsystem-level testing shall be documented in subsystem development folders.
  - 4.2.3 **Acceptance Testing.**
    - 4.2.1.7 The system shall be tested at the system level at the conclusion of the development phase to determine its acceptability in accordance with the requirements specified in this SRD.
    - 4.2.1.8 System acceptance testing shall be performed using common automated testing tools.
    - 4.2.1.9 System acceptance testing shall be documented in acceptance test folders.
- 4.3 **Inspection.** This subsection specifies the requirements for inspecting the capability and characteristics of the repository system throughout the system development life cycle.
  - 4.3.1 The hardware components of the system will be inventoried, bar-coded, and tagged and the information entered into an inventory database.
  - 4.3.2 The software components of the system will be inventoried, bar-coded, and tagged and the information entered into an inventory database.
  - 4.3.3 The documentation components of the system will be inventoried, bar-coded, and tagged and the information entered into an inventory database.

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- 5** **Requirements Traceability**. For system-level specifications, this paragraph does not apply. For subsystem-level specifications, this paragraph shall contain traceability from each subsystem requirement in this specification to the system requirements it addresses.
- 5.1** The requirements of the system shall be traced throughout the system development life cycle.
- 5.2** The system shall use a unified process for requirements traceability.
- 5.3** The system shall use a common application development toolkit to trace requirements to the SRD.
- 6** **Appendixes**. This section is composed of appendixes containing general information that aids in understanding this document. Appendix A contains definitions of terms used in the System Requirements Document that are applicable to the Digital Audio-Visual Repository System (DAVRS) Project and the Library of Congress.

## APPENDIX A

### Glossary

TERM	DEFINITION
<b>Acceptance and Acknowledgement</b>	Completion of the ingestion of content and the assembly of an Archival Information Package, followed by the transmission of an acknowledgement message by the repository system. See also <i>Archival Information Package</i> and <i>Ingestion</i> .
<b>Access</b>	The services and functions that make the system's holdings and related services available to users.
<b>Access Aids</b>	Resources (databases, searchable texts, etc.) that may be indexed by access tools to permit users to discover content. See also <i>Index</i> .
<b>Access Management</b>	The capability of the repository system to control and limit access to digital objects to authorized users only
<b>Access Tools</b>	Search and retrieval applications that permit users to discover content. See also <i>Access Aids</i> and <i>Indexes</i> .
<b>Administration</b>	The services and functions that control the operation of the repository system. The services and functions include the capability to control submission of digital objects, authenticate requests for access to digital objects, control access to digital objects, audit the access of digital objects, manage the repository system configuration, monitor the performance of the repository system, and provide support service activities related to the original collections and their reformatting, such as the compilation of statistics and usage reports.
<b>Administrative Metadata</b>	Data that supports the unique identification, maintenance, and archiving of digital objects, as well as related functions of the organization managing the repository. Administrative metadata includes data identifying the owner and the provenance of a digital object, enabling use management of a digital object and supporting the migration of digital objects from one format to another for long-term preservation. Other administrative meta-data may support the compilation of statistics pertaining to reformatting or may document the treatments applied when an item was digitized.
<b>Aggregate</b>	A group of Archival Information Packages capable of being managed as an entity by the repository system. The Library of Congress uses the term to name a group of items within a larger collection. See also <i>Collection</i> , <i>Item</i> , and <i>Set</i> .
<b>Archival Information Package (AIP)</b>	All the digital objects associated with a single custodial item (e.g., a record album, a motion picture film, a video). The form in which digital objects are stored and maintained in the repository. Compare to <i>Submission Information Package</i> and <i>Dissemination Information Package</i> .
<b>Archival Storage</b>	The services and functions used to store and retrieve digital objects within the repository system.
<b>Archive</b>	That portion of the repository system that physically stores digital objects. See also <i>Offline Protection Copy</i> .
<b>Archiving</b>	The act of storing the digital objects in the repository system. See also <i>Offline Protection Copy</i> .
<b>Audio File</b>	An essence or bitstream that represents recorded-sound content.

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<b>Batch</b>	Multiple information packages.
<b>Catalog</b>	A set of bibliographic records that describe items or groups of items in a collection. In some cases, groups of items are further described in a finding aid, which may take the form of a database or a text document. See also <i>Access Aid</i> and <i>Descriptive Metadata</i> .
<b>Collection</b>	A set of Archival Information Packages capable of being managed as an entity by the repository system. The Library of Congress uses the term to name a group of aggregates (sets of items). See also <i>Aggregate</i> , <i>Item</i> , and <i>Set</i> .
<b>Consumer</b>	Those persons or client systems that interact with the repository system to find and access its Content. See also <i>Patron</i> , <i>Producer</i> , and <i>User</i> .
<b>Content</b>	Generic term for data and metadata stored in the repository, individually or collectively described.
<b>Conversion</b>	The digitization and/or reformatting of custodial items by the Producer for the purpose of ingestion by the repository system.
<b>Data</b>	Information in digital format. See also <i>Content</i> and <i>Essence</i> .
<b>Data Dissemination Session</b>	A telecommunications session that provides digital objects to a user.
<b>Data Management</b>	The services and functions to manage data, including the capability to control, manipulate, copy, and transform digital objects within the repository system.
<b>Data Submission Session</b>	A telecommunications session that submits packages of essences and metadata for ingestion in the repository system.
<b>Deposit</b>	The act of transferring essence and its associated metadata into a repository system with positive acknowledgement and acceptance of custodial responsibility by the repository system. See also <i>Acceptance and Acknowledgement</i> , <i>Ingestion</i> , and <i>Load</i> .
<b>Derivative</b>	See <i>Master</i> and <i>Service Copy</i> .
<b>Descriptive Metadata</b>	Data that describes the digital object. See also <i>Intellectual Metadata</i> , <i>Access Aid</i> , and <i>Catalog</i> .
<b>Digital Object</b>	A unit of data composed of essence and its associated metadata. An information package typically comprises multiple digital objects. See also <i>Archival Information Package</i> , <i>Dissemination Information Package</i> , and <i>Submission Information Package</i> .
<b>Discovery</b>	The process by which a User searches for and identifies content of interest; system tools or support for that process.
<b>Dissemination Information Package (DIP)</b>	The form of the digital objects as output by the repository, e.g., to be rendered for a researcher or as a protection copy. See also <i>Archival Information Package</i> , <i>Offline Protection Copy</i> , and <i>Submission Information Package</i> .
<b>Emulation</b>	The creation of an artificial environment within a new generation of technology that allows processes and data from an older generation of technology to exist and perform in their native format.
<b>Encapsulation</b>	The process by which a unit of essence is bound to its associated metadata to create a digital object.
<b>Essence</b>	The bitstreams within a digital object that represent sound, texts, or still or moving images.
<b>Event-Based Order</b>	A request that is generated by a user for data that is to be delivered periodically on the basis of some event or sequence of events.
<b>Fixity Data</b>	This data documents the authentication mechanisms and provides authentication keys to ensure that the essence and metadata have not been

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	altered in an undocumented manner.
<b>Format</b>	The sequential organization of the bitstreams within a digital object.
<b>Functions</b>	The primary services, components, or subsystems associated with the repository system, including Ingestion, Archival Storage, Data Management, Administration, Access, and Presentation.
<b>Generation</b>	The configuration of a repository between significant modifications to hardware and/or software.
<b>Handle</b>	A persistent name ( <i>Uniform Resource Identifier</i> , or <i>URN</i> ) in a form developed by the Corporation for Research Initiatives (CNRI). At the Library, handles are assigned to digital objects and take a form such as <i>loc.mbrsrs/lp0001.mer39016</i> ( <i>loc</i> =Library of Congress; <i>mbrsrs</i> =Motion Picture, Broadcasting, and Recorded Sound Division recorded sound; <i>lp0001</i> =first collection of digitally reformatted long playing records; <i>mer39016</i> =identifier for a specific reformatted phonodisc). See also <i>Persistent Name</i> and <i>Uniform Resource Name</i> .
<b>Handle Server</b>	An automated system that resolved the handle (name) of a specific item for retrieval from a repository.
<b>Hand-Off</b>	The transfer of content or metadata to or from a repository system.
<b>Image File</b>	An essence or bitstream that represents graphic or typographic content.
<b>Indexes</b>	One or more databases of bibliographic information used by Patrons to <i>discover</i> (search for and identify) items of interest. Also indexes for full text resources that support the use of an access tool. See also <i>Access Aids</i> and <i>Access Tools</i> .
<b>Information</b>	Any data that can be stored or exchanged.
<b>Information Package</b>	One or more digital objects grouped together for the purpose of Submission, Archiving, or Dissemination. See also <i>Submission Information Package</i> , <i>Archival Information Package</i> , and <i>Dissemination Information Packages</i> .
<b>Ingestion</b>	The services and functions that accept Submission Information Packages from Producers and prepare Archival Information Packages for storage. See also <i>Deposit</i> and <i>Load</i> .
<b>Intellectual Metadata</b>	See <i>Descriptive Metadata</i> .
<b>Item (Custodial Item)</b>	Typically, an individual work in the library sense, i.e., a phonograph record, video program, or book as described in a bibliographic record and associated with a persistent identifier. Sometimes the term <i>item</i> may also be applied to multiple works described in a single bibliographic record. See also <i>Aggregate</i> , <i>Collection</i> , and <i>Set</i> , which are names for groups of items, and <i>Representation</i> .
<b>Load</b>	The act of transferring essences and associated metadata into a repository system without positive acknowledgement and acceptance of custodial responsibility by the repository system. See also <i>Deposit</i> , <i>Ingestion</i> , and <i>Acceptance and Acknowledgement</i> .
<b>Master</b>	The highest-quality essence for a given content element, used as the source for service or derivative copies of the same content element. See also <i>Derivative Copy</i> and <i>Service Copy</i> .
<b>Media (Medium)</b>	The physical storage unit on which data is recorded (e.g., magnetic tape, CD, magnetic disk, etc.)
<b>Metadata</b>	Data about data, i.e., data used to describe, administer, or define the structure of essences. In the digital library context, metadata is often categorized as <i>descriptive</i> , <i>administrative</i> , and <i>structural</i> .
<b>Migration</b>	The transfer of digital objects from one level of a storage hierarchy to

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	another within the repository system or the transfer of digital objects from one generation of a repository system to another.
<b>Object</b>	A unit of data.
<b>Offline Protection Copy</b>	A copy of content stored in a location outside the repository system, created to provide a high level of redundancy. Produced by creating a Dissemination Information Package in a format with minimal system dependence and capable of serving as a Submission Information Package to a different repository system.
<b>Owner</b>	The individual or individuals who own the rights to an item (e.g., copyright holders, publishers, etc) that is held by the organization responsible for the repository and managing the item. See also <i>Responsible Organization</i> .
<b>Package</b>	A set of digital objects comprising essences and metadata, grouped together for submission, archiving, or dissemination. See also <i>Information Package</i> .
<b>Packaging Data</b>	That data used to group together and identify a set of digital objects.
<b>Patron</b>	Those persons or client systems that interact with the repository system to find and access its Content. See also <i>Consumer</i> , <i>Producer</i> and <i>User</i> .
<b>Persistence</b>	The attribute of essence that stands for long life expectancy; <i>persistence</i> is provided by appropriate management of the content. Content may persist when the underlying <i>bitstreams</i> , the sequences of zeroes and ones that comprise the data, are maintained through time. In order to ensure the persistence of a <i>representation</i> of a library item, it may also be necessary to migrate or transform the component zeroes and ones. See also <i>Representation</i> .
<b>Persistent Name</b>	A permanent, unique, location-independent name assigned by the Producer to an Archival Information Package that associates it with a custodial item. See also <i>Handle</i> and <i>Uniform Resource Name</i> .
<b>Persistent Storage</b>	Any electronic storage device in which the data remains intact when the power is removed [e.g., optical disk, magnetic tape (but not random access memory)].
<b>Presentation</b>	The rendering or shape given to a unit of content when it is presented to a researcher in comprehensible, usable, and navigable form.
<b>Preservation</b>	<i>Preservation</i> in this document has two meanings. First, the term may be used in association with what library and archive professionals call <i>reformatting</i> , the making of “preservation copies” of endangered or deteriorating originals, for example by microfilming. Second, the term may refer to the <i>persistence</i> of content. See also <i>Persistence</i> and <i>Reformatting</i> .
<b>Producer</b>	Those persons or client systems that provide content to the repository. See also <i>Consumer</i> , <i>Patron</i> , and <i>User</i> .
<b>Production</b>	The process by which the cataloging (or other indexing), digital reproductions (digital files containing images, audio, texts, etc.), and metadata to be preserved by the repository system are created. The <i>output</i> of the production process is the <i>input</i> to the repository system, i.e., the source of the digital data to be ingested.
<b>Reformatting</b>	The production by a library or archive of high-quality copies of endangered or deteriorating originals, for example by microfilming.
<b>Refreshment</b>	Making an unchanged copy of the “bits” that comprise content (“refreshing the bits”) or fitting the repository with new storage media (“refreshing the media”).
<b>Registration</b>	The establishment by the handle server (external to the repository) of a relationship between the handle assigned to an Archival Information Package and its resolution. The handle server registers handles in response to a

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	request generated by the repository system. See also <i>Acceptance and Acknowledgement</i> .
<b>Replication</b>	Copying repository content from one media type to an identical media type without change to the content.
<b>Repository</b>	The facilities, personnel, processes, systems, and media used to store, manage, and provide access to digital objects.
<b>Repository System</b>	An automated system that stores digital content and uses various services to ingest, archive, preserve, and disseminate that content.
<b>Responsible Organization</b>	The organization that has the responsibility for managing digital content. See also <i>Owner</i> .
<b>Representation</b>	The expression of a custodial item by an Information Package that “stands for” that item. The reformatting of an historical sound recording, for example, produces a digital surrogate that <i>represents</i> the original item without replicating its artifactual presence. The shape of a representation reflects the collection custodians’ interpretation and may evolve over time.
<b>Service Copy</b>	An essence for a given content element that is of lower quality than the master, typically used as the delivery copy for patrons. See also <i>Derivative Copy</i> and <i>Master</i> .
<b>Set</b>	Library of Congress term for a group of aggregates or items, synonymous with <i>collection</i> . See also <i>Aggregate</i> , <i>Collection</i> , and <i>Item</i> .
<b>Structural Metadata</b>	Data that represents the relationships between components of complex multipart objects, e.g., the indication that this image represents “page one,” this image “page two,” and so on. Structural metadata supports the presentation and navigation of these objects.
<b>Submission Agreement</b>	An agreement reached between the owner of the repository system and the Producer that specifies a data model for an Ingestion Session including the formats/contents and logical constructs used by the Producer and how they are represented on each media delivery or telecommunications session.
<b>Submission Information Package</b>	The form of the digital objects as input to the repository system, e.g., to be ingested for archiving. See also <i>Dissemination Information Package</i> and <i>Archival Information Package</i> .
<b>Text File</b>	An essence or bitstream that represents alphanumeric content.
<b>Transformation</b>	The alteration of the format or structure of essence or metadata, including the generation of new master or derivative service copies. Transformation preserves digital content in the face of changes in format.
<b>Uniform Resource Name</b>	The URN is a <i>persistent name</i> , as defined by the Internet Engineering Task Force (IETF). A URN is valid for the long term and independent of location, while still being globally unique. The Library is using the <i>handle</i> scheme for URNs developed by the Corporation for Research Initiatives (CNRI). See also <i>Handle</i> and <i>Persistent Name</i> .
<b>User</b>	Generic term for any person or automated entity that uses the system. See also <i>Consumer</i> , <i>Patron</i> , and <i>Producer</i> .
<b>Video File</b>	An essence or bitstream that represents moving-image content.