DEFENSE TECHNICAL INFORMATION CENTER

DEFENSE VIRTUAL LIBRARY

TECHNICAL METADATA FOR THE LONG-TERM MANAGEMENT OF DIGITAL MATERIALS:

PRELIMINARY GUIDELINES

21 March 2002
Silver Image Management
Contract No. SP4700-01-P-0152

REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704-0188

Public reporting burder for this collection of information is estibated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burder to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

1. REPORT DATE (DD-MM-YYYY)	2. REPORT TYPE	3. DATES COVERED (FROM - TO)
01-03-2002	Final	xx-xx-2002 to xx-xx-2002

4. TITLE AND SUBTITLE
Defense Virtual Library: Technical Metadata for the Long-Term Management of Digital Materials: Preliminary Guidelines
Unclassified

5a. CONTRACT NUMBER
SP4600-01-P-0152

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Flynn, Marcy ;

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME AND ADDRESS
Silver Image Management
8016 East Paraiso Drive
Scottsdale, AZ85255-4204

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME AND ADDRESS
DTIC
8725 John J. Kingman Rd., Suite 0944
Ft. Belvoir, VA22060-6218

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
APUBLIC RELEASE
,

13. SUPPLEMENTARY NOTES

14. ABSTRACT

Long-term preservation of digital information is one of the most critical challenges facing the information community. No single technology will meet that challenge. However, there is agreement that whatever technology, or technologies, may be adopted, success will depend on the availability of adequate metadata describing the technical characteristics of the digital materials being preserved. This report, prepared by Silver Image Management (SIM), proposes technical metadata elements appropriate for digital objects in the Defense Virtual Library (DVL). DVL is a collaborative effort of the Defense Technical Information Center, the Defense Advanced Research Projects Agency (DARPA) and the Corporation for National Research Initiatives (CNRI).

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE	Public Release	126	Fenster, Lynn lfenster@dtic.mil
Unclassified	Unclassified	Unclassified			19b. TELEPHONE NUMBER International Area Code Area Code Telephone Number 703767-9007 DSN 427-9007

TABLE OF CONTENTS

Project Summary Report **2**

Executive Summary *2*

Background *3*

Scope of work *3*

OAIS *5*

ISO/IEC 11179 and Metadata Registries *6*

Other Projects *7*

Future implementation *7*

Technical Metadata for the Long-Term Management of Digital Materials: Preliminary Guidelines **9**

Table 1. Characteristics of Attributes Used for DVL Technical Metadata Elements ... *10*

Appendix A. Diagrams Mapping DVL Data Elements to OAIS Framework **112**

Appendix B. Table Listing DVL Data Elements in OAIS Framework **119**

Appendix C. Definitions of OAIS Terminology **122**

Appendix D. Sources Consulted Including References and Acronyms **123**

Project Summary Report

Executive Summary

Long-term preservation of digital information is one of the most critical challenges facing the information community. No single technology will meet that challenge. However, there is agreement that whatever technology, or technologies, may be adopted, success will depend on the availability of adequate metadata describing the technical characteristics of the digital materials being preserved. This report, prepared by Silver Image Management (SIM), proposes technical metadata elements appropriate for digital objects in the Defense Virtual Library (DVL). DVL is a collaborative effort of the Defense Technical Information Center, the Defense Advanced Research Projects Agency (DARPA) and the Corporation for National Research Initiatives (CNRI).

The Open Archival Information System (OAIS) framework was adopted to provide a conceptual structure for the metadata. Next, the International Organization for Standardization (ISO) International Electrotechnical Commission (IEC) Standard 11179 was used for naming the data elements and describing them with appropriate attributes. The expectation is that an XML DTD will be prepared based on these elements and their attributes. Finally, the guidelines reflect extensive review of the practices of a wide range North American, UK, European and Australian projects similarly concerned with developing technical metadata for preservation.

Documentation prepared for this project consists of a summary report of the project, the guidelines themselves and supporting documentation, including diagrams showing the relationships among the data elements and a table listing the data elements according to the OAIS framework.

Background

The Defense Virtual Library (DVL) was initiated by DTIC in cooperation with the Defense Advanced Research Projects Agency (DARPA) and the Corporation for National Research Initiatives (CNRI). DTIC contracted with Silver Image Management (SIM) to develop procedures and standard practices for describing technical metadata in a digital library application.[1] Dr. Marcia Hanna was DVL program manager at DTIC throughout the period of this contract.

DTIC is the central Department of Defense facility for providing access to and facilitating the exchange of scientific and technical information. DVL objectives are to examine new methods for managing digital information and to identify the metadata required for such long-term management. DVL is the Defense testbed for the Digital Object Architecture developed by CNRI. Uniform Resource Identifiers that use Handle System technology are a fundamental part of that architecture. DVL utilizes standard Internet browsers and advanced commercial search engines. Initially, DVL used the InQuery search engine but replaced it with Verity search technology.

Beginning in 1997, DTIC placed several contracts with SIM to create cataloging guidelines for digital materials in four format categories: still images, recorded sound, moving images and complex digital objects. The DVL currently includes digital files in five broad format categories. There are 1) photographic images from the Trinity project at Los Alamos; 2) audio files with music or documentary sound; 3) video from the DTIC Technical Reports (TR) collection and from Carnegie Mellon University's Informedia Digital Video Library; 4) complex digital objects from DTIC CDs and from the Web; and 5) full-text documents from DTIC's TR collection. SIM did not provide consultation for the TR documents since DTIC cataloging was already available for them. This report does not review the information provided in SIM guidelines or reports prepared for any of these previous components.[2] However, the earlier guidelines are available at the DVL web site and from DTIC's production systems.

Scope of work

In developing digital library applications, a primary concern is how to manage digital materials over time. Although research is continuing on long-term preservation, maintenance issues for digital materials are a major concern. One aspect of ensuring the long-term preservation of digital materials is creating the necessary metadata to communicate information about the materials and their requirements. Identifying the required metadata and defining its parameters will aid in future development of the tools for capture, rendering, management or maintenance. Technical metadata is the specialized metadata that identifies structural, administrative, and preservation details

[1] Contract SP4700-01-P-0152 was awarded on 14 September 2001.
[2] See Defense Technical Information Center contract numbers SP4700-97-M-0348, SP4700-98-M-0450, SP4700-99-M-0592 (with modification DTICZ00179001-A), and SP4700-00-M-0381. Additionally, contract number SP4700-99-M-0502 was awarded in 1999 to furnish Minaret cataloging support.

related to digital files.[3] The DVL is an endeavor to be at the forefront of digital library applications identifying and defining required technical metadata and implementing its use.

The scope of work for the current contract builds upon SIM's previous DVL project work. During the previous contract, SIM began research on technical metadata and prepared two draft documents. The first was a preliminary effort to identify and define technical metadata requirements working within the framework defined by Consultative Committee for Space Data Systems (CCSDS) Open Archival Information System (OAIS). SIM prepared an accompanying table listing *DVL Data Elements Implementing OAIS Preservation Description Information.* That table grouped each element according to Preservation Description Information classes identified in the OAIS Reference Model.[4]

The work done during the current contract updates and expands on this preliminary work, detailing attributes of technical metadata elements following the six-part International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) Standard 11179. This standard facilitates creation of sharable metadata registry content. SIM worked within ISO/IEC 11179 to make recommendations on field syntax, maximum occurrence, obligation, relationships and permissible values for DVL technical metadata.

The selection and description of proposed DVL technical metadata elements is informed by extensive review of related work in the United States, the United Kingdom, Europe and Australia. That work includes but is not limited to:

- Curl (Consortium of University Research Libraries, Cambridge, Oxford and Leeds) Exemplars in Digital Archives (CEDARS);
- Networked European Deposit Library (NEDLIB);
- National Library of Australia (NLA);
- International Research on Permanent Authentic Records in Electronic Systems (InterPARES);
- Metadata Encoding and Transmission Standard (METS);
- Dublin Core (DC);
- Moving Picture Experts Group *Multimedia Content Description Interface* (MPEG7);
- Online Computer Library Center/Research Libraries Group (OCLC/RLG) Preservation Metadata Working Group;

[3] The term 'technical metadata' is used throughout this report to refer to administrative, structural, and preservation metadata related to digital objects. According to *The Making of America II Testbed Project: A Digital Library Service Model* (Washington, DC : Digital Library Federation, Council on Library and Information Resources, December 1999, CLIR pub. 87, http://www.clir.org/pubs/abstract/pub87abst.html) structural metadata is metadata "relevant to the presentation of a digital object to the user" (p. 21) while administrative metadata is metadata that "allows the repository to manage its digital collection" (p. 23). This report does not distinguish between types of technical metadata related to the digital object.

[4] The table followed the pattern established in *Preservation Metadata for Digital Objects: A Review of the State of the Art*, A White Paper by the OCLC/RLG Working Group on Preservation Metadata, January 31, 2001, http://www.oclc.org/digitalpreservation/presmeta_wp.pdf.

- World Wide Web Consortium (W3) Extensible Markup Language XML Schema; and
- IMS Global Learning Consortium projects for Learning Object Metadata (LOM).

Resource sharing among these projects contributes to the creation of a virtual library application that is both extensible and interoperable over the long-term.

Beyond the identified scope of work, SIM assisted DVL project officer Carrie Schwarten in her requests for information about initiating digitization projects in preparation for future DVL endeavors.

OAIS

DVL adopted the OAIS Reference Model as its framework for technical metadata for digital preservation. The Reference Model defines an OAIS as "an archive, consisting of an organization of people and systems, that has accepted the responsibility to preserve information and make it available for a Designated Community."[5] The OAIS model provides a theoretical framework for an archival system, and integrates its conceptual approach with a hierarchical structure for organizing information, particularly as it relates to digital material. The model does not specify an implementation strategy; instead it provides guidelines to address digital archiving concepts.

The OAIS model describes an Archival Information Package (AIP) as an aggregation of four types of Information Objects: content information object, preservation description information object, packaging information object and descriptive information object. Content information includes the data object as well as representation information (structural and semantic information about the object). Preservation Description Information (PDI) is comprised of reference information, provenance information, context information and fixity information.[6] In a publication reviewing recent digital preservation metadata developments, Michael Day, Metadata Research Officer at the United Kingdom Office for Library and Information Networking (UKOLN), noted that library projects tended "…to focus discussion on the terminology defined by the OAIS model" and identified this response as one of the most important consequences of the model.[7]

A White Paper prepared by the OCLC/RLG Preservation Metadata Working Group suggests, "The OAIS model may be a useful starting point for developing a preservation

[5] Reference Model for an Open Archival Information System (OAIS), Consultative Committee for Space Data Systems. CCSDS 650.0-R-1, May 1999, p. 1-11, http://www.ccsds.org/documents/pdf/CCSDS-650.0-R-1.pdf and http://www.ccsds.org/documents/pdf/CCSDS-650.0-R-2.pdf.

[6] The AIP elements and the four formats (image, audio, video, digital object) are not described in the DVL technical metadata documentation, but some summary information is available in the appendix.

[7] "Metadata for Digital Preservation: A Review of Recent Developments," by Michael Day, 2001 September 25, from paper delivered 5 September 2001, http://www.ukoln.ac.uk/metadata/presentations/ecdl2001-day/paper.html

metadata framework of general applicability."[8] It outlines several points of convergence among state-of-the-art digital library applications (primarily CEDARS, NLA and NEDLIB) investigating long-term preservation issues. Areas of commonality include knowledge or adoption of the OAIS Reference Model, agreement about the need for technical metadata to facilitate management and access to archival objects, and the need for technical metadata to be independent of the object itself to support interoperability and preservation. The DVL project at DTIC shares the concerns expressed in this White Paper and has common goals with these state-of-the-art projects.

ISO/IEC 11179 and Metadata Registries

ISO/IEC 11179 specifies basic aspects of data element composition for inclusion in metadata registries. The standard applies to the formulation of data element representations and meaning as shared among people and machines. DVL initiated the use of the ISO/IEC 11179 standard in order to facilitate participation in metadata registry efforts. Metadata registries are authoritative semantic maps with associated procedures for storing and registering detailed metadata from multiple sources and diverse organizations in a common structured form. Extensions to the formats are recorded, as are agreed-upon mappings between diverse formats. Use of the ISO /IEC standard and participation in metadata registries promotes access, understanding, and sharing of data across time and space, all of which are goals of the DVL project.

Further, use of this structure makes it easier to check the metadata for consistent application. This standardized structure for registering metadata elements was used by CNRI in creating a metadata schema for the publication, *D-Lib,* an electronic journal focused on research in digital libraries, and for its participation in the D-Lib Test Suite, a consortium of five universities and *D-Lib*. The Royal Canadian Mounted Police (RCMP), Integrated Police Information Reporting System (IPIRS) Data Standards Secretariat is another example of an organization working to implement use of the 11179 standard.[9] The RCMP IPIRS project has created documentation to aid in the preparation of data taxonomies for data standards and data naming conventions for data dictionaries.

Despite the obvious advantages of working within the framework of ISO/IEC 11179, it was not easy to identify which version to use. The would-be user can locate different versions of each part of the six-part ISO/IEC 11179 standard. Official versions are available but working drafts are also available on the Web. In the early phase of the project, SIM implemented use of a different (and earlier) version of the document than CNRI anticipated. Once all involved realized that several versions were in use,

[8] White Paper by the OCLC/RLG Working Group on Preservation Metadata, *Preservation Metadata for Digital Objects: A Review of the State of the Art,* p. 10, http://www.oclc.org/digitalpreservation/presmeta_wp.pdf.

[9] Royal Canadian Mounted Police (RCMP), Integrated Police Information Reporting System (IPIRS) Data Standards Secretariat documentation: *Data Classification*, version 1.0, 2000 February 14, http://www.rcmp-grc.gc.ca/ipirs/documents/cpsin_data_classification_v1e.pdf and *Data Naming Convention*, 2000 February 10, http://www.rcmp-grc.gc.ca/ipirs/documents/cpsin_data_naming_convention_v1e.pdf.

Christophe Blanchi at CNRI recommended the use of specific versions, namely ISO/IEC 11179, Part 3, "Basic Attributes of Data Elements" (1998) and Part 5, "Naming and Identification Principles" (2001). His recommendation was adopted. The 1998 version of Part 3 is not the most current version, but appears to be less confusing than the 2000 version. The 2001 version of Part 5 is very similar to the 1995 version, but clearer in defining naming principles.

Other Projects

The DVL document *Technical Metadata for the Long-Term Management of Digital Materials: Preliminary Guidelines* does not contain the detailed data elements included in other current work like the National Information Standards Organization (NISO) Draft Standard *Data Dictionary: Technical Metadata for Digital Still Images*, the METS schema, the W3 XML schema, or the Preservation Metadata Working Group's Content Information Recommendations. The DVL *Preliminary Guidelines* attempts to identify the most prominent elements required to begin long-term work. A more specific level of detail will be required later. In the meantime, there is the hope that a compelling standard will eventually emerge that will simplify future digital preservation project work.

In researching results from other projects, it was both educational and perplexing to learn that there were so many different ways to order and classify schema. Here are a few examples. The National Library of the Netherlands *Long Term Preservation Study* distinguishes between Intellectual Preservation, Media Preservation and Technology Preservation. The Making of America project distinguishes between descriptive, administrative and structural metadata. METS classifies administrative metadata into four types: technical metadata, intellectual property rights metadata, source metadata and digital provenance metadata. In "How to Preserve Authentic Electronic Records" InterPARES distinguishes between conservation actions and maintenance activities as part of preservation. Finally, the IMS Learning Object Metadata draft standard includes these categories: general; lifecycle; meta-metadata; technical; educational; rights; relation; annotation; classification. There are many possible levels of granularity and such different ways to categorize information. Working within the OAIS framework and ISO/IEC 11179 is sound strategy because it makes possible improved communication among divergent digital applications.

Future implementation

The documentation prepared by SIM will be used in the creation of an Extensible Markup Language (XML) Document Type Definition (DTD) for the long-term management of technical metadata. The DVL, CNRI and SIM teams are in agreement that XML is the appropriate technology for this purpose for several reasons. XML is both human readable and relatively machine friendly because it is a text-based file format. Many vendors have become supportive of XML technology since adding XML support to existing applications is not particularly difficult. XML makes data portable instead of relegating it to a proprietary format from which it may not be readily migrated. XML supports the Unicode standard for characters and is useable for a wide variety of languages and enjoys

international acceptance. XML provides structure for data and acknowledges the importance of establishing parent/child relationships. XML files tend to be relatively small and easy to compress and store in archives.

Once the DVL DTD is created, it can be tested and implemented by cataloging specialists. The resulting cataloging work can then be validated against the DTD to be certain that it conforms to the standards the DTD provides. This cyclical process will ensure that consistency of standards is used throughout the DVL application.

After the process is underway, it will be possible to identify new issues in developing digital libraries over the long-term based on actual digital library implementations. Day speculated on the OAIS framework, stating "…more time and effort has been expended on developing conceptual metadata specifications than in testing them in meaningful applications."[10] The next step for the DVL is to work through the technical metadata specifications using actual examples in order to raise issues about the model *per se* as well as its implementation.

[10] Day, "Metadata for digital preservation: a review of recent developments," http://www.ukoln.ac.uk/metadata/presentations/ecdl2001-day/paper.html.

Technical Metadata for the Long-Term Management of Digital Materials: Preliminary Guidelines

These preliminary guidelines work within the OAIS framework to identify data elements and group them according to information classes following conventions established in ISO/IEC11179. Table 1, which appears on the next page, outlines the attributes used for DVL technical metadata elements. Attributes express the characteristics of an object or entity described in the data element. Tables are used in the remainder of the document to represent individual data elements and sub-elements and identify their characteristics.

The data elements are organized according to the OAIS reference model, which divides information into five categories. The first four categories are types of Preservation Description Information. They include reference information, context information, provenance information and fixity information. The fifth category is representation information. For DVL purposes, this category is further subdivided according to format (i.e., image, audio, video, and complex digital object) in order to distinguish the specific representation information that is appropriate to each.

The preliminary guidelines can be used in tandem with the supporting documentation in the appendices. Appendix A contains diagrams that illustrate the relationships between the DVL data elements. Appendix B lists each of the elements in order by identification number and name. It includes definitions of the five broad OAIS data types used to classify the data elements that do not have their own corresponding tables within the guidelines. Appendix C defines basic OAIS terminology for information classes and packages.

Appendix D contains a list of the sources consulted in creating this document, including bibliographic references. This appendix also serves as the key to the acronyms used throughout the guidelines for related project names. In order to conserve space and maximize the visual presentation of this information, acronyms are frequently used in the tables. It is important to consult this appendix in order to understand related work done in other projects.

Table 1. Characteristics of Attributes Used for DVL Technical Metadata Elements

Element name	Name of elements and sub-elements. Element names are composed of the hierarchical string (each term separated with a underscore) in order to keep track of their relationship within the grouping. Some sub-element names used are polymorphs because there are sub-elements with the same meaning within several different element categories (examples include Version, Link, and several sub-elements of Representation_Format).
Identifier	Identification number for the element and sub-element name. Corresponds to the identifiers used in the documentation in the appendices. In cases where a sub sub-element links to multiple sub-elements, 'x' is used instead of an integer (e.g., 1.1.x.1).
Version/version date	Identifies issue of version and date of registration. This version is 0.1.
Registration authority	Organization authorized to register data elements (i.e., Defense Technical Information Center).
Synonymous name	Represents the data element concept with synonymous expressions. Provides another name that is familiar in specific environments.
Context	States where the synonymous name originates if there is a specific application. Blank unless a Synonymous name is present.
Definition	Describes the essence of the element, including definitions provided by reference sources.
Classification scheme	Relates elements to other schemes or models.
Keywords	Search key words to use to retrieve the element.
Related data reference	Used in conjunction with Type of Relationship to explain qualification or hierarchy.
Type of relationship	Includes equivalents, derivatives, listing of sequences within a subset. Terms include: qualifier_of; qualified_by; subject_of; part_of; parent_of; child_of; attribute_of; has_attribute; and derived_from.
Category	Type of designation used to represent an element (bar code, character string).
Form of representation	Description of the form in which the data element is represented (including text; code; date; uri; time; measure; number; amount).[11]
Datatype	Form of representation depicting element's values (character; ordinal number; integer; decimal; real; scaled;

[11] Representation Term List taken from *Using Levels of Abstraction to Name Data Elements* by Judith J. Newton (National Institute of Standards & Technology), The Data Administration Newsletter, http://www.tdan.com/i007ht01.htm. The term 'uri' replaces 'url' as found in ISO11179-3.3 dtd in English.doc supplied by Christophe Blanchi, Corporation for National Research Initiatives.

	bit; rational; date). ISO 11404: http://std.dkuug.dk/JTC1/SC22/WG11/docs/iso11404.pdf METS uses W3 XML schema datatypes, including string, Boolean, decimal, dateTime, and others (see http://www.w3.org/TR/xmlschema-2/#datatype)
Maximum size	Maximum number of units representing the element. ADN includes number of allowable characters per element; their specifications are incorporated here for several elements. Phrasing for attribute is "Unlimited" or "Not to exceed __ digits/characters" or a single integer (i.e. 3).
Minimum size	Minimum number of units representing the element. This attribute has been defaulted to zero (0) for each data element.
Layout of representation	Description of layout of characters in the element, used especially when a specific structure is necessary.
Example/Code	Actual text examples or codes followed by parenthetical explanations of the code as needed.
Permissible values	Set of permissible values (names, codes, and text) pertaining to the data element. Can include pick lists, controlled word lists or more formal schema. ADN uses vocabulary levels (restricted or expandable).
Responsible organization	Organization responsible for the attributes (Defense Technical Information Center).
Status	Registration life-cycle position (Final).
Submitting organization	Organization submitting the element (Defense Technical Information Center).
Comment	Details and notes about the element. For example, some elements include the notation: "Work from an expandable list of values for this element" which means that a controlled list should be maintained and expanded upon as necessary during production.
MARC/DC crosswalk	Indicates comparable MARC or Dublin Core field, if any apply. Some elements with corresponding MARC fields do not distinguish subelements at the subfield level.
Source	CDL uses "Source" to specify whether the source of data is automatically generated or supplied manually. All entries to this table that follow CDL attribution begin with 'CDL.' If entry states only "automatically generated from defaults," the assumption is that this data could be defaulted into a system. For example, many of the sub-elements of Provenance_Action contain technical metadata that would be recorded in batches as digitization occurred and then defaulted into the system.
Applicable to all formats	Indicates conditional use of element based on format

	(image, audio, video, digital object, etc.). If not "All," indicates which formats are valid or invalid ("Only ___" or "All but ___").
Obligation	Indicates input requirement. Terms include: mandatory, optional, desirable or conditional (i.e. mandatory if applicable).
Maximum occurrence	Indicates repeatability of element as well as repeatability patterns. If repeatable, indicates whether the attribute is repeatable or if multiple values should be entered within a single attribute (single, multi-valued attribute). Terms: Repeatable; Repeatable only as attribute; Repeatable only with multiple values; and Not repeatable.

1.0 Reference Information

1.1 Reference Identifier

Element name	Reference_Identifier_Uniform_Resource
Identifier	1.1.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	NLA: "An identifier or 'permanent name' for an object that identifies it uniquely and persistently, and enables links to different manifestations of it, to metadata about it, and to other objects related to it." EUL: Persistent identifier defined as "an identifier for an object that enables links to different manifestations of it, to metadata about it, and to other objects related to it."
Classification scheme	
Keywords	Handle; Persistent identifier; Digital object identifier; Uniform Resource Locator; Uniform Resource Identifier
Related data reference	Reference_Identifier_Version
Type of relationship	qualified_by
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Not to exceed 1024 digits/characters
Minimum size	0
Layout of representation	To date, all DVL handles begin with the prefix hdl:100.1. This is followed with a forward slash and the alphanumeric code representing the digital object.
Example/Code	hdl:100.1/PH24 hdl:100.1/MIADM000385
Permissible values	Follow DTIC/MG
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Unique alphanumeric identifier designed by DTIC for DVL purposes.
MARC/DC crosswalk	856u / <DC>Identifier
Source	CDL automatically generated.
Applicable to all formats	All
Obligation	Mandatory
Maximum occurrence	Not repeatable

Element name	Reference_Identifier_Unique
Identifier	1.1.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Unique alphanumeric identifier representing the digital object.
Classification scheme	
Keywords	Identifier
Related data reference	Reference_Identifier_Version
Type of relationship	qualified_by
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Not to exceed __ digits/characters
Minimum size	0
Layout of representation	The identifier is composed of alphanumeric code.
Example/Code	CXADM001018
Permissible values	Follow DTIC/MG
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Number designed by DTIC for DVL purposes. The URI may serve as the unique identifier. The identifier may be used to represent sub-elements of the object.
MARC/DC crosswalk	035 / <DC>Identifier
Source	CDL automatically generated.
Applicable to all formats	All
Obligation	Mandatory
Maximum occurrence	Not repeatable

Element name	Reference_Identifier_Electronic_File
Identifier	1.1.3
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Identifies the name of digital file. It can include a file extension. This identifier can represent elements and sub-elements.
Classification scheme	
Keywords	File name; Electronic file
Related data reference	Reference_Identifier_Version
Type of relationship	qualified_by
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Not to exceed __ digits/characters
Minimum size	0
Layout of representation	The identifier is composed of alphanumeric code.
Example/Code	SD33.wav MIADM000285_1_clip_1
Permissible values	Follow DTIC/MG
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Identifier designed by DTIC for DVL purposes.
MARC/DC crosswalk	856f / <DC>Identifier
Source	CDL automatically generated.
Applicable to all formats	All
Obligation	Conditional
Maximum occurrence	Repeatable

Element name	Reference_Identifier_Label
Identifier	1.1.4
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Title/creator field linkage to display to end user for identification purposes.
Classification scheme	
Keywords	Label; Title; Creator
Related data reference	
Type of relationship	
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	A Stitch in time [videorecording]
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	1xx and 245 / <DC>Creator and <DC>Title
Source	CDL manually supplied in encoding.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Reference_Identifier_Version
Identifier	1.1.x.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Names, codes, numbers, or text that distinguish one version of a digital file from others.
Classification scheme	
Keywords	Version
Related data reference	Reference_Identifier_Uniform_Resource Reference_Identifier_Unique Reference_Identifier_Electronic_File
Type of relationship	qualifier_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	alpha 3.0 1.2
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	562c / <DC>Identifier
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

1.2 Reference Domain

Element name	Reference_Domain_Electronic_Address
Identifier	1.2.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Domain or host name (network address) for the electronic location
Classification scheme	
Keywords	Electronic address; Domain address; Web address
Related data reference	Reference_Domain_Name
Type of relationship	qualified_by
Category	Character representation
Form of representation	URI
Datatype	Character
Maximum size	Not to exceed __ digits/characters
Minimum size	0
Layout of representation	
Example/Code	dvl.dtic.mil
Permissible values	Follow DTIC/MG
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from an expandable list of values for this element.
MARC/DC crosswalk	856a / <DC>Identifier
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Mandatory
Maximum occurrence	Not repeatable

Element name	Reference_Domain_Name
Identifier	1.2.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Conventional name and location of the host.
Classification scheme	
Keywords	Domain name; Corporate name
Related data reference	Reference_Domain_Electronic_Address
Type of relationship	qualifier_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Defense Technical Information Center, Fort Belvoir, VA
Permissible values	Follow DTIC/MG
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from an expandable list of values for this element.
MARC/DC crosswalk	856n / <DC>Rights
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Not repeatable

2.0 Context Information

Element name	Context_Relation_Manifestation
Identifier	2.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Identifies or describes related material, both digital and analog. Contains textual description of resource and identification number. NLA: Relationships and links between manifestation and other objects. ViDe: Uses Relation field to bring together different instantiations of the information object (analog original, analog preservation format, digital master, use copy).
Classification scheme	
Keywords	Related material; Relationship; Manifestation; Instantiation; File group
Related data reference	Context_Relation_Manifestation_Type Context_Relation_Link
Type of relationship	qualified_by
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Accompanies: DTIC technical report, number, title, control number. This is the 5th generation copy of [unique identifier and type]. Executive summary also available from the DoD web site. Master Thumbnail Gottscho-Schleisner Collection (Library of Congress) (DLC) 85861312 Carnegie-Mellon Collection
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	530 (Additional physical form) and 787 (nonspecific relationship / <DC>Relation.
Source	

Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Context_Relation_Manifestation_Type
Identifier	2.1.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Qualifies type of relationship to resource, including relationship of a part to a whole. Used to relate subunit level of component part hierarchy to unit at collection level. Identifies collection title and identifier, sequence in a presentation or part or a whole (like a grid or detail). NAA: Relation element includes sub-elements Related Item ID, Relation Type (contains/contained in, next/previous, replaces/replaced by, refers to, derived from), and Relation Description. ADN: DLESE kept the old IsBasedOn and IsBasisFor and added HasThumbnail from NASA. GEM: Relation Element Controlled Vocabulary based on Dublin Core: http://www.geminfo.org/Workbench/Metadata/relationtable.html VRA: Contains proposed Relation types for Dublin Core Relation element, including larger entity, copy or, version of references, derived from. Whole/part or associative.
Classification scheme	
Keywords	Manifestation type; Relation type; Whole/Part; Association
Related data reference	Context_Relation_Manifestation
Type of relationship	qualifier_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Is Part Of References Is Format Of
Permissible values	Could use Dublin Core controlled vocabulary of qualifiers as controlled terminology for this element. See: http://dublincore.org/documents/2000/07/11/dcmes-qualifiers/#relation
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center

Comment	Work from an expandable list of values for this element.
MARC/DC crosswalk	787 (Nonspecific relationship) and 773 (Host item entry) / <DC>Relation.
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable only as attribute.

Element name	Context_Relation_Bibliographic_Record
Identifier	2.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	Control number
Context	MARC
Definition	A unique system-generated number identifying the MARC bibliographic record linked with the digital object.
Classification scheme	
Keywords	Bibliographic record control number; MARC control number
Related data reference	Context_Relation_Link
Type of relationship	qualified_by
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Not to exceed __ digits/characters
Minimum size	0
Layout of representation	Alphanumeric identifier.
Example/Code	DTIC-000001
Permissible values	Follow DTIC/MG
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	001 / <DC>Relation.Is Referenced By or References
Source	CDL manually supplied in data capture.
Applicable to all formats	All
Obligation	Mandatory
Maximum occurrence	Not repeatable

Element name	Context_Relation_Documentation
Identifier	2.3
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Details about documentation related to the material, including codebooks, manuals, and other documentation. PMWG: Documentation necessary or useful for display or interpretation.
Classification scheme	
Keywords	Documentation; Codebooks; Manuals
Related data reference	Context_Relation_Link
Type of relationship	qualified_by
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Documentation in 'readme' file. Glossary available at http://www.info
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	556 / <DC>Format
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Context_Relation_Finding_Aid
Identifier	2.4
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Description of related finding aid, including title and notes as needed. NLA Access Facilitators includes finding aids.
Classification scheme	
Keywords	Finding aid
Related data reference	Context_Relation_Link
Type of relationship	qualified_by
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Not to exceed __ digits/characters
Minimum size	0
Layout of representation	
Example/Code	Finding aid (electronic): available on the Internet at the DVL Web site. Finding aid (unpublished): Lists items in numerical order. Available in library Reading Room.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	555 / <DC>Relation.Is Referenced By or References
Source	CDL manually supplied in data capture.
Applicable to all formats	All
Obligation	Mandatory
Maximum occurrence	Not repeatable

Element name	Context_Relation_Link
Identifier	2.x.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Provides linkage between related digital objects, whether reference sources, other digital files representing the same content, or similar materials. NLA: Linkage to other manifestations including finding aids.
Classification scheme	
Keywords	Linkage; Finding aids; Reference sources
Related data reference	Context_Relation_Manifestation Context_Relation_Bibliographic_Record Context_Relation_Documentation Context_Relation_Finding_Aid
Type of relationship	qualifier of
Category	Character representation
Form of representation	URI
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Examples from Library of Congress: http://hdl.loc.gov/loc.mbrsmi/sawmp.1447 [motion picture with bib record] http://hdl.loc.gov/loc.music/eadmus.mu998001 [EAD finding aid]
Permissible values	Uniform Resource Identifier.
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Can include introductory phrase to express date information was checked: Address as of [date]:
MARC/DC crosswalk	<DC>Relation.
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

3.0 Provenance Information

Element name	Provenance_Location
Identifier	3.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Name of the organization or agency holding the material or providing access to it. This organization or agency is the source of the material being described.
Classification scheme	
Keywords	Organizational name; Institutional name; Corporate name; Source; Location
Related data reference	Provenance_Location_Address Provenance_Location_Uniform_Resource_Identifier Provenance_Location_Source_Code
Type of relationship	qualified_by
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Air Combat Command Heritage of America Band
Permissible values	When available, use form of name listed in DTIC Corporate Source Authority System at: http://www.dtic.mil/corpsource/.
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	852 / <DC>Rights
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Provenance_Location_Address
Identifier	3.1.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Address of the organization or agency holding the material or providing access to it. This organization or agency is the source of the material being described.
Classification scheme	
Keywords	Street address; Mailing address
Related data reference	Provenance_Location
Type of relationship	qualifier_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	[Street name], [City], [State abbreviation] [Zip code]
Example/Code	86 Hickory Street, Langley Air Force Base, VA 23665-2192 USA
Permissible values	When available, use form of address listed in DTIC Corporate Source Authority System at: http://www.dtic.mil/corpsource/.
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	852 / <DC>Rights
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Provenance_Location_Uniform_Resource_Identifier
Identifier	3.1.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Uniform resource identifier to link to the organization or agency holding the material or providing access to it. This organization or agency is the source of the material being described.
Classification scheme	
Keywords	Uniform resource identifier
Related data reference	Provenance_Location
Type of relationship	qualifier of
Category	Character representation
Form of representation	URI
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	http://www.lanl.gov/worldview/
Permissible values	Uniform Resource Identifier.
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Can include introductory phrase to express date information was checked: Address as of [date]:
MARC/DC crosswalk	<DC>Rights.
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Provenance_Location_Source_Code
Identifier	3.1.3
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Source code of the organization or agency holding the material or providing access to it. This organization or agency is the source of the material being described.
Classification scheme	
Keywords	Source code
Related data reference	Provenance_Location
Type of relationship	qualifier of
Category	Character representation
Form of representation	Code
Datatype	Integer
Maximum size	Unlimited
Minimum size	0
Layout of representation	6 digit number
Example/Code	428826
Permissible values	When available, use source code listed in DTIC Corporate Source Authority System at: http://www.dtic.mil/corpsource/.
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	<DC>Rights.
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Provenance_Custodial_History
Identifier	3.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Ownership of the material beginning with its creation through to the point of accession.
Classification scheme	
Keywords	Custodial history; Provenance; Custodianship; Source; History
Related data reference	
Type of relationship	
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	From the collection of… Purchased from creator in 1910 by Anne Hall.
Permissible values	Follow MARC.
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Distinguish between provenance of original and subsequent digital object using repeated fields.
MARC/DC crosswalk	561 / <DC>Source
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable.

3.3 Provenance_Conditional

Element name	Provenance_Conditional_Jurisdiction
Identifier	3.3.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Name of jurisdiction that imposes and/or enforces terms and restrictions.
Classification scheme	
Keywords	Jurisdictional name; Corporate name
Related data reference	Provenance_Conditional_Jurisdiction_Address Provenance_Conditional_Jurisdiction_Source_Code Provenance_Conditional_Jurisdiction_Authorization Provenance_Conditional_Jurisdiction_Authorized_Users
Type of relationship	qualified_by parent_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Naval Air Warfare Center Aircraft Div., Technical Publishing Team.
Permissible values	When available, use form of name listed in DTIC Corporate Source Authority System at: http://www.dtic.mil/corpsource/.
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	540b / <DC>Rights
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable only as element.

Element name	Provenance_Conditional_Jurisdiction_Address
Identifier	3.3.1.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Address of the jurisdiction that imposes and/or enforces terms and restrictions.
Classification scheme	
Keywords	Street address; Mailing address
Related data reference	Provenance_Conditional_Jurisdiction
Type of relationship	qualifier_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	[Street name], [City], [State abbreviation] [Zip code]
Example/Code	3550 Aberdeen Ave., SE, Kirtland, AFB, NM 87117-5776.
Permissible values	When available, use form of address listed in DTIC Corporate Source Authority System at: http://www.dtic.mil/corpsource/.
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	852 / <DC>Rights
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Provenance_Conditional_Jurisdiction_Source_Code
Identifier	3.3.1.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Source code of the jurisdiction that imposes and/or enforces terms and restrictions.
Classification scheme	
Keywords	Source code
Related data reference	Provenance_Conditional_Jurisdiction
Type of relationship	qualifier of
Category	Character representation
Form of representation	Code
Datatype	Integer
Maximum size	Unlimited
Minimum size	0
Layout of representation	6 digit number
Example/Code	428826
Permissible values	When available, use source code listed in DTIC Corporate Source Authority System at: http://www.dtic.mil/corpsource/.
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	<DC>Rights.
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Provenance_Conditional_Jurisdiction_Authorization
Identifier	3.3.1.3
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Authority source for restriction (statutes, contracts). Include title and version when known.
Classification scheme	
Keywords	Authorization; Statute; Contract; Restriction
Related data reference	Provenance_Conditional_Jurisdiction
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Title 50, chapter 401, U.S.C. Critical Technology
Permissible values	DoD statements in current use: Export Control. Journal Articles: DTIC Users Only. US Gov't only: DOD Controlled. Controlled: DOD Controlled. Export Controlled; DLSE Certified. DOD Only; Non-DOD Controlled. CNWDI (Critical Weapons and Design Information) Further dissemination only as directed.
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Permissible value and its source must be stated as clearly as possible, given the information available. Work from an expandable list of values for this element.
MARC/DC crosswalk	540c / <DC>Rights
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable only as element.

Element name	Provenance_Conditional_Jurisdiction_Authorized_Users
Identifier	3.3.1.4
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Names/titles of individuals and agencies authorized to be users.
Classification scheme	
Keywords	Authorized names; Authorized users
Related data reference	Provenance_Conditional_Jurisdiction Provenance_Conditional_Jurisdiction_Authorized_Users_Date
Type of relationship	child_of qualified_by
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Employees with a need to know.
Permissible values	DoD statements in current use: Public release (Unclassified Unlimited) US Gov't and their contractors. US Gov't agencies only. US Gov't ONLY; DoD Controlled. Registered DTIC Users Only DoD and their Contractors. DOD Only; Non-DOD Controlled.
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Permissible value and its source must be stated as clearly as possible, given the information available. Work from an expandable list of values for this element.
MARC/DC crosswalk	540d / <DC>Rights
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable only as element.

Element name	Provenance_Conditional_Jurisdiction_Authorized_Users_Date
Identifier	3.3.1.4.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Date of authority source for restriction.
Classification scheme	
Keywords	Authorization date
Related data reference	Provenance_Conditional_Jurisdiction_Authorized_Users
Type of relationship	qualifier_of
Category	Character representation
Form of representation	Date
Datatype	Date
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	1997:03:03 1996:02
Permissible values	Follow TIFF date/time format: [yyyy:mm:dd] or [yyyy:mm:dd hh:mm:ss]
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	540d / <DC>Rights
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable only as element.

Element name	Provenance_Conditional_Access
Identifier	3.3.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	Restrictions on access
Context	MARC
Definition	Terms regarding access to the material (digital and analog). Access relates to physical, legal or procedural situations. This includes instances when a password is required for access, access is granted for official use only, or a subscription is required for access as well as instructions for gaining access to physical property at the holdings institution.
Classification scheme	
Keywords	Access terms; Restriction
Related data reference	
Type of relationship	
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Appointment required to examine original material, microfilm or transcripts. Contact the Air Force Historical Research Agency, Maxwell Air Force Base, for further information.
Permissible values	Work from an expandable list of values for this element
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	506a / <DC>Rights
Source	CDL automatically generated from defaults.
Applicable to all formats	All
Obligation	Conditional
Maximum occurrence	Repeatable

Element name	Provenance_Conditional_Use
Identifier	3.3.3
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Terms governing use of the material (digital or analog) after access has been provided, particularly related to reproduction, copyright, and other restrictions. NLA: Uses Preservation Action Permission as a statement of whether or not permission is held to create copies of the object for preservation purposes.
Classification scheme	
Keywords	Use terms; Restriction; Reproduction; Copyright
Related data reference	Provenance_Conditional_Use_Rights/Restrictions Provenance_Conditional_Use_Rights_Holder Provenance_Conditional_Use_Credit_Line Provenance_Conditional_Use_Cost(Fee) Provenance_Conditional_Use_Permission
Type of relationship	parent_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	This element can be used to note whether permission is granted for in-house copying, migrating or emulation of the materials. Work from an expandable list of values for this element.
MARC/DC crosswalk	540a / <DC>Rights
Source	CDL automatically generated from defaults.
Applicable to all formats	All
Obligation	Conditional
Maximum occurrence	Repeatable

Element name	Provenance_Conditional_Use_Rights/Restrictions
Identifier	3.3.3.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Rights and restrictions governing use of the material (digital or analog) after access has been provided, particularly related to reproduction, copyright, and other restrictions.
Classification scheme	
Keywords	Restriction; Rights; Reproduction
Related data reference	Provenance_Conditional_Use
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Reproduction rights may be restricted through copyright. No reproduction restrictions. Classified.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from an expandable list of values for this element.
MARC/DC crosswalk	540a / <DC>Rights
Source	CDL automatically generated from defaults.
Applicable to all formats	All
Obligation	Conditional
Maximum occurrence	Repeatable

Element name	Provenance_Conditional_Use_Rights_Holder
Identifier	3.3.3.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Name of rights holder or owner, including holder of copyright, patent, or trademark.
Classification scheme	
Keywords	Rights holder; Copyrighter; Name
Related data reference	Provenance_Conditional_Use
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	540a / <DC>Rights
Source	CDL automatically generated from defaults.
Applicable to all formats	All
Obligation	Conditional
Maximum occurrence	Repeatable

Element name	Provenance_Conditional_Use_Credit_Line
Identifier	3.3.3.3
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Formal statement of the ownership or source of the material that is used in a display label or publication.
Classification scheme	
Keywords	Credit line
Related data reference	Provenance_Conditional_Use
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Credit line: Air Force Historical research Agency, Maxwell Air Force Base, AL. Credit line: Courtesy of [name].
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	540a / <DC>Rights
Source	CDL automatically generated from defaults.
Applicable to all formats	All
Obligation	Conditional
Maximum occurrence	Repeatable

Element name	Provenance_Conditional_Use_Cost(Fee)
Identifier	3.3.3.4
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Identifies any costs or fees for use of the material, including reproduction in publications or displays. Specifies whether use of the material requires payment.
Classification scheme	
Keywords	Cost; Fee
Related data reference	Provenance_Conditional_Use
Type of relationship	child_of
Category	Character representation
Form of representation	Amount
Datatype	Decimal
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	$12.00
Permissible values	Monetary amounts.
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	540a / <DC>Rights
Source	CDL automatically generated from defaults.
Applicable to all formats	All
Obligation	Conditional
Maximum occurrence	Repeatable

Element name	Provenance_Conditional_Use_Permission
Identifier	3.3.3.5
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Track permissions granted for use, including reproduction and other ordering information. Use for record keeping and rights management.
Classification scheme	
Keywords	Permission; Record keeping; Rights management; Ordering
Related data reference	Provenance_Conditional_Use Provenance_Conditional_Use_Permission_Name Provenance_Conditional_Use_Permission_Date
Type of relationship	child_of qualified_by
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Provenance_Conditional_Use_Permission_Name
Identifier	3.3.3.5.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Name of person or organization granted permission.
Classification scheme	
Keywords	Personal name; Corporate name
Related data reference	Provenance_Conditional_Use_Permission
Type of relationship	qualifier_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Provenance_Conditional_Use_Permission_Date
Identifier	3.3.3.5.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Date permission was granted.
Classification scheme	
Keywords	Date
Related data reference	Provenance_Conditional_Use_Permission
Type of relationship	qualifier_of
Category	Character representation
Form of representation	Date
Datatype	Date
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	2002:12:12
Permissible values	Follow TIFF date/time format: [yyyy:mm:dd] or [yyyy:mm:dd hh:mm:ss]
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

3.4 Provenance_Action

Element name	Provenance_Action_Method
Identifier	3.4.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Technique used to perform processing or preservation actions, including format of the manifestation. NLA: Process element includes "all relevant details of any process applied to a digital object or file, including software, specific settings or actions that were required to produce the current manifestation, details of all equipment and responsible agencies or persons." IU/RKMS: sub-element of action is date/time, type, description, next action and next action due. LOM: Uses Life Cycle for history and current state of object, as well as those who affected it during its evolution.
Classification scheme	
Keywords	Action method; Process; Action type; Transformation; Lifecycle
Related data reference	Provenance_Action_Method_Specifications
Type of relationship	parent_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	MARC: "reformatted;" and "will reformat." NLA: conversion of .wav to .aiff; copy from floppy disk to CD-R. IU/RKMS: backed-up; imaged; medium refreshed; microfilmed; migrated.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Use this element only when describing processing or preservation action. Work from an expandable list of values for this element.
MARC/DC crosswalk	583a and i / <DC>Format
Source	

Applicable to all formats	All
Obligation	Conditional
Maximum occurrence	Repeatable only as element.

Element name	Provenance_Action_Method_Specifications
Identifier	3.4.1.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Information about processing action. LC/CORE and CF: capture_device_settings contains variables applied to equipment used for digital capture.
Classification scheme	
Keywords	Action settings; Specifications
Related data reference	Provenance_Action_Method
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	File was scanned with batch 69 with OCR turned on. The relevant files were identified and batch scanned with the OCR option turned off.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Use this element only when describing processing or preservation action.
MARC/DC crosswalk	583x / <DC>Format
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Provenance_Action_Composition
Identifier	3.4.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Physical description of material that was reformatted. Can include number of items and/or dimensions. NLA/PMWG uses Technical Infrastructure of Complex Object, which enumerates the components of the digital object and its interrelationships, including the number of files and types of each file.
Classification scheme	
Keywords	Composition; Substance of material; Infrastructure
Related data reference	
Type of relationship	
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	(53 items) Web page consists of one ASCII HTML file, three embedded static GIF files and one embedded audio WAV file. CD-ROM containing 22 files – 14 .gif image files, 3 .wav audio files, 3 .txt files and 2 .ex executables assembled in accordance with ISO 9660.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Use this element only when describing processing or preservation action.
MARC/DC crosswalk	533e / <DC>Format.Extent
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Provenance_Action_Software
Identifier	3.4.3
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Information about software applications used to process. RLG: Name of software, including version, settings, etc.
Classification scheme	
Keywords	Software; Capture
Related data reference	
Type of relationship	
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Gathered using Harvest version 2.2; File save, using Netscape.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Use this element only when describing processing or preservation action.
MARC/DC crosswalk	583x / <DC>Format
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Provenance_Action_Hardware
Identifier	3.4.4
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Information about hardware equipment. LC/CORE and CF: capture_device_ID is the equipment used for digital capture, including all elements in digitization production system (manufacturer, model no., serial no., etc.). RLG: Capture device: make and model of digital camera or scanner. NISO: Uses HostComputer and DeviceSource to describe hardware at the time of file creation.
Classification scheme	
Keywords	Hardware; Capture
Related data reference	
Type of relationship	
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Brand and model of digital camera; Brand and model of digital converter; Brand and model of scanner.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Use this element only when describing processing or preservation action.
MARC/DC crosswalk	583x / <DC>Format
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Provenance_Action_Date_Time
Identifier	3.4.5
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Date, or date range, in which the action or process was performed. NLA: Date that this manifestation of the object or file came into being.
Classification scheme	
Keywords	Datetime
Related data reference	
Type of relationship	
Category	Character representation
Form of representation	Date
Datatype	Date
Maximum size	Not to exceed 20 digits/characters
Minimum size	0
Layout of representation	
Example/Code	1985:11:23
Permissible values	Follow TIFF date/time format: [yyyy:mm:dd] or [yyyy:mm:dd hh:mm:ss]
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Use this element only when describing processing or preservation action.
MARC/DC crosswalk	583c / <DC>Format.DateModified
Source	CDL automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable only as element

Element name	Provenance_Action_Date_Time_Interval
Identifier	3.4.5.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Time period that cannot be expressed as a specific date. Can be used to represent a schedule of publication, migration, backup, or to track inspection or appraisal.
Classification scheme	
Keywords	Time interval; Schedule
Related data reference	
Type of relationship	
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Biannually.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Use this element only when describing processing or preservation action. Includes start and end times, start and duration, and duration and end times.
MARC/DC crosswalk	583d / <DC>Format
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Provenance_Action_Modification_History
Identifier	3.4.6
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Note pertaining to details of modification. NEDLIB/MD: Information about every change that has occurred in the digital object and which has implied a change in any metadata for long term preservation
Classification scheme	
Keywords	Change history; Modification
Related data reference	
Type of relationship	
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	NLA: File names were modified to display through nph-arch program; Data now stored in standard Word 97 format.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Use this element only when describing processing or preservation action. Also use for PMWG and NLA Quirks information (e.g., The Shockwave files could not be captured from the source document).
MARC/DC crosswalk	533n / <DC>Format
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Provenance_Action_Site
Identifier	3.4.7
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	ScanningAgency
Context	NISO
Definition	Name of agency performing action or process. NISO: Uses "ScanningAgency" to identify the organization-level producer/s of the file. RLG: Producer is the agency responsible for the physical creation of the file. Record the name of the agency responsible for the actual creation of the file, not the delegating agency.
Classification scheme	
Keywords	Action site; Scanning agency; Producer; Corporate name
Related data reference	Provenance_Action_Site_Place Provenance_Action_Site_Agent
Type of relationship	qualified_by
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Luna Imaging, Inc.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Use this element only when describing processing or preservation action.
MARC/DC crosswalk	583j / <DC>Format
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Provenance_Action_Site_Place
Identifier	3.4.7.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Geographic location of agency where action or process was performed.
Classification scheme	
Keywords	Scanning location; Site place
Related data reference	Provenance_Action_Site
Type of relationship	qualifier_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	[name of city], [2 digit state abbreviation]
Example/Code	Fort Belvoir, VA
Permissible values	When available, use form of name listed in DTIC Corporate Source Authority System at: http://www.dtic.mil/corpsource/.
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Use this element only when describing processing or preservation action.
MARC/DC crosswalk	533b / <DC>Format
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Provenance_Action_Site_Agent
Identifier	3.4.7.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Person or organization performing the action or applying the process. RLG: Optionally, identify the individual primarily responsible for scanning. LC/CORE and CF: capture_entity_corporate and capture_entity_individual identifies producers of the file/bitstream.
Classification scheme	
Keywords	Agent; Personal name; Producer
Related data reference	Provenance_Action_Site
Type of relationship	qualifier_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Beatrice O'Leary.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Use this element only when describing processing or preservation action.
MARC/DC crosswalk	583k / <DC>Format
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Provenance_Action_Agency
Identifier	3.4.8
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Name of the agency responsible for the initiating the processing or preservation action.
Classification scheme	
Keywords	Action agency; Responsible agency
Related data reference	
Type of relationship	
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Defense Technical Information Center
Permissible values	When available, use form of name listed in DTIC Corporate Source Authority System at: http://www.dtic.mil/corpsource/.
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Use this element only when describing processing or preservation action.
MARC/DC crosswalk	533c / <DC>Format
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Provenance_Action_Status
Identifier	3.4.9
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Status of material resulting from action. NLA defines this as result, to note the success or otherwise of the process. ADN: Following IMS (and LOM), uses Draft, Final, Revised, Unavailable. Digital Library for Earth System Education (DLESE, part of the ADN group) added Unknown.
Classification scheme	
Keywords	Action status; Result
Related data reference	
Type of relationship	
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Reformatted Revision NLA: File successfully converted; File converted, however, data was lost from the header.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Use this element only when describing processing or preservation action.
MARC/DC crosswalk	583l / <DC>Format
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Provenance_Action_Label
Identifier	3.4.10
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Information about reformatting action to display to end user.
Classification scheme	
Keywords	Action label; Display
Related data reference	
Type of relationship	
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Digitally remastered under auspices of the Defense Virtual Library for the Defense Technical Information Center.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Use this element only when describing processing or preservation action.
MARC/DC crosswalk	583z / <DC>Format
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

4.0 Fixity Information

Element name	Fixity_Checksum
Identifier	4.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Alphanumeric value used for data validation. LC/CORE and CF: Value created by MD5 program, used to verify data integrity. NISO: Local repository policies regarding file integrity metadata should govern implementation of this field. RLG: algorithm based on a manipulation of the sum of the bits that make up a file to yield a number that serves as a unique identifier for that file. Used as a validation key.
Classification scheme	
Keywords	Checksum; Algorithm; Validation
Related data reference	Fixity_Checksum_Date_Time Fixity_Checksum_Type
Type of relationship	qualified_by
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	57edf4a22be3c955ac49da2e2107b67a
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Not repeatable

Element name	Fixity_Checksum_Date_Time
Identifier	4.1.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	LC/CORE and CF: Date and time checksum created. NISO: The enumerated type values should be defined locally, as should the rule regarding when the checksum is generated: prior to deposit, at the time of deposit, or both.
Classification scheme	
Keywords	Checksum datetime
Related data reference	Fixity_Checksum Fixity_Checksum_Date_Time_Qualifier
Type of relationship	qualifier_of qualified_by
Category	Character representation
Form of representation	Date
Datatype	Date
Maximum size	Not to exceed 20 digits/characters
Minimum size	0
Layout of representation	
Example/Code	1999-04-12
Permissible values	Follow TIFF date/time format: [yyyy:mm:dd] or [yyyy:mm:dd hh:mm:ss].
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Not repeatable

Element name	Fixity_Checksum_Date_Time_Qualifier
Identifier	4.1.1.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Describes date and time when checksum is generated, e.g. at file creation, at the time of deposit, when modified or when accessed.
Classification scheme	
Keywords	Checksum datetime qualifier
Related data reference	Fixity_Checksum_Date_Time
Type of relationship	qualifier_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Not to exceed 20 digits/characters
Minimum size	0
Layout of representation	
Example/Code	Creation Modification
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from an expandable list of values for this element.
MARC/DC crosswalk	
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Not repeatable

Element name	Fixity_Checksum_Type
Identifier	4.1.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Type of algorithm used. NLA: Validation mechanism verifying authenticity. CEDARS: Authentication indicator is sub-element of fixity information.
Classification scheme	
Keywords	Checksum type; Validation mechanism; Authentication
Related data reference	Fixity_Checksum
Type of relationship	qualifier_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Standard internet checksum Roland checksum MD5 RSA-MD4
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from an expandable set of values for this element. May want to broaden scope to include Error Detection and Correction (EDAC), e.g. Reed-Solomon.
MARC/DC crosswalk	
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Not repeatable

Element name	Fixity_Access_Inhibitor
Identifier	4.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	NLA: Access inhibitor includes encryption, watermarking and password protection. It is defined as any method used to inhibit access that impacts on preservation procedures. PMWG defines these features as Access inhibitors (encryption, watermarking, password protection). Identifies access facilitators (navigational links) as an element. NAA: Use in conjunction with sub-element for Digital signature.
Classification scheme	
Keywords	Access inhibitor; Security
Related data reference	Fixity_Access_Inhibitor_Encryption Fixity_Access_Inhibitor_Watermark Fixity_Access_Inhibitor_Password_Protection Fixity_Access_Inhibitor_Digital_Signature
Type of relationship	parent_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	PMWG places access inhibitors in Representation Information.
MARC/DC crosswalk	
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Conditional
Maximum occurrence	Repeatable

Element name	Fixity_Access_Inhibitor_Encryption
Identifier	4.2.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	PITT: Encryption Method identifies the algorithms used by the record originator to encrypt the record's content.
Classification scheme	
Keywords	Encryption
Related data reference	Fixity_Access_Inhibitor
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	RSA Public Key Cryptosystem.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Conditional
Maximum occurrence	Repeatable

Element name	Fixity_Access_Inhibitor_Watermark
Identifier	4.2.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Webopedia definition: A pattern of bits inserted into a digital image, audio or video file that identifies the file's copyright information (author, rights, etc.). The purpose of digital watermarks is to provide copyright protection for intellectual property that's in digital format. Unlike printed watermarks, which are intended to be somewhat visible, digital watermarks are designed to be completely invisible, or in the case of audio clips, inaudible.
Classification scheme	
Keywords	Watermark; Steganography
Related data reference	Fixity_Access_Inhibitor
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Watermark by Invisible Ink for Images embedded before acquisition. Watermark by Digimarc Professional.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Conditional
Maximum occurrence	Repeatable

Element name	Fixity_Access_Inhibitor_Password_Protection
Identifier	4.2.3
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	High-Tech Dictionary: "A technology that allows a system to assign login names and passwords to users. Files and directories are protected from unauthorized access by requiring users to enter a password before access is allowed."
Classification scheme	
Keywords	Password protection; User authorization; Login
Related data reference	Fixity_Access_Inhibitor
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Use password.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Conditional
Maximum occurrence	Repeatable

Element name	Fixity_Access_Inhibitor_Digital_Signature
Identifier	4.2.4
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	A digital signature ensures that the document originated with the person signing it and that is was not tampered with after the signature was applied. However, the sender could be an impersonator and not the person claimed. To verify that the message was sent by the person claiming to send it requires a digital certificate (digital ID) issued by a certification authority. NEDLIB "Metadata for the Long Term Preservation of Electronic Publications" defines digital signature as "a digital code that can be attached to an electronically transmitted message that uniquely identifies the sender." NAA: An encrypted, tamper-proof piece of data which creates a unique and unforgeable identifier of the Document Author, Record Creator, Transactors, or Action Officers.
Classification scheme	
Keywords	Digital signature
Related data reference	Fixity_Access_Inhibitor
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Digital Signature Algorithm
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	
Source	Automatically generated from defaults.
Applicable to all formats	All
Obligation	Conditional
Maximum occurrence	Repeatable

5.0 Representation Information

Element name	Representation_Composition
Identifier	5.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Physical description of material. Can include number of items and/or dimensions. NLA/PMWG uses Technical Infrastructure of Complex Object, which enumerates the components of the digital object and its interrelationships, including the number of files and types of each file.
Classification scheme	
Keywords	Composition; Physical description; Technical infrastructure; Substance
Related data reference	
Type of relationship	
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	(53 items) Web page consists of one ASCII HTML file, three embedded static GIF files and one embedded audio WAV file. CD-ROM containing 22 files – 14 .gif image files, 3 .wav audio files, 3 .txt files and 2 .ex executables assembled in accordance with ISO 9660.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	533e / <DC>Format.Extent
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_File_Modality
Identifier	5.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Expression of type of material (media/medium) being described. PITT: File modality (text, numeric, graphic, geographic, image, sound, video, multimedia, etc.) CEDARS: File modality is a "higher level of Element Name, similar to Dublin Core 'Type,' i.e. text, graphic, sound, video, etc." NLA/PMWG: Uses term 'structural type' to describe object (image, sound, video, text, database, software, web document or multi-media). NAA: Media format includes audio, compound, image, text and video. IU/RKMS: Media format identifies the type of data representation and file types; generic format. ADN: Controlled vocabulary for Educational.LearningResourceType.Langstgring includes list subdivided into the following areas: audio, data, learning materials, portal, service, text, tool, visual (http://www.dlese.org/Metadata/vocabularies/vocabs.htm).
Classification scheme	
Keywords	Media Type; Structural type; Media format; File modality
Related data reference	
Type of relationship	
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Not to exceed 512 digits/characters.
Minimum size	0
Layout of representation	
Example/Code	Image. Photograph. Clip of audio. Segment of videorecording. Interactive multimedia. Text. Audio. Video. Application.
Permissible values	

Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from an expandable list of values for this element. iLumina element "TechnicalMediatype includes categories: http://dl.uncwil.edu/documents/datacategories.htm
MARC/DC crosswalk	856/3 / <DC>Format
Source	CDL automatically generated from defaults
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Not repeatable

Element name	Representation_Format_Type
Identifier	5.3
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Code or textual information about format type. MARC21: Identification of the electronic format type; can use enumerated lists like registered MIME types or record textual information. PITT: File Data Representation identifies the data encoding standards used by the file (ASCII, EBCDIC, UNICODE, CCITT Group III raster, etc). NISO: Uses MIME type. IU/RKMS: Uses data format to identify the encoding standards used to represent the record.
Classification scheme	
Keywords	Format type; MIME type; File data
Related data reference	Representation_File_Extension Representation_Format_Type_Version
Type of relationship	parent_of qualified_by
Category	Character representation
Form of representation	Code
Datatype	Character
Maximum size	Not to exceed 64 digits/characters.
Minimum size	0
Layout of representation	
Example/Code	html ascii jpeg tif gif mpg AIFF interleaved Quicktime IMS: non-digital
Permissible values	What is.com: Every File Format in the World: http://whatis.techtarget.com/fileFormatG/0,289943,sid9,00.html Computer High-Tech Dictionary, File Types: http://www.computeruser.com/resources/dictionary/filetypes.html Freetext or MIME type at: http://www.isi.edu/in-notes/iana/assignments/media-types/media-types

Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from an expandable set of values for this element.
MARC/DC crosswalk	856q / <DC>Format.
Source	CDL automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Format_Type_File_Extension
Identifier	5.3.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	Format
Context	NISO
Definition	3 character string (code) describing file format. NISO: Uses Format to record 3-character name corresponding to the standard file extension.
Classification scheme	
Keywords	File extension
Related data reference	Representation_Format_Type
Type of relationship	child_of
Category	Character representation
Form of representation	Code
Datatype	Character
Maximum size	3
Minimum size	0
Layout of representation	
Example/Code	GIF JPG TIF
Permissible values	What is.com: Every File Format in the World: http://whatis.techtarget.com/fileFormatG/0,289943,sid9,00.html Computer High-Tech Dictionary, File Types: http://www.computeruser.com/resources/dictionary/filetypes.html
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from an expandable set of values for this element.
MARC/DC crosswalk	<DC>Format
Source	Automatically generated.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Format_Type_Version
Identifier	5.3.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Names, codes, numbers, or text that distinguish one version of the format from others.
Classification scheme	
Keywords	Version
Related data reference	Representation_Format_Type
Type of relationship	qualifier_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Not to exceed 64 digits/characters.
Minimum size	0
Layout of representation	
Example/Code	1.1 4.0
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	<DC>Format
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_File_Size
Identifier	5.4
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Actual uncompressed size. MOA: distinguishes between size of object sent to client/tool and size of object stored and captured. NLA: Term 'storage information' indicates storage capacity on physical format.
Classification scheme	
Keywords	File size
Related data reference	
Type of relationship	
Category	Character representation
Form of representation	Measure
Datatype	Integer
Maximum size	Not to exceed 64 digits/characters.
Minimum size	0
Layout of representation	
Example/Code	43370 bytes 19602 bytes
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Initial DVL entries used KB, not bytes, per DVL staff. Since most projects specify that bytes be used, it is anticipated that future DVL work will use bytes.
MARC/DC crosswalk	856s / <DC>Format.Extent
Source	CDL not supported.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Compression
Identifier	5.5
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	CDL: Type of algorithm needed to decompress the image, with note of software package used to apply the format, and degree/percentage of compression used where options exist. LC/CORE: datastream_compression is algorithm used to compress the terminal object. AVPP: Video compression is the type and amount of digital compression, e.g. Predictive-10:1, RLE-2:1. NEDLIB: process of reducing number of bits required to store or transmit info. RLG: Whether the file has been compressed/reduced in size.
Classification scheme	
Keywords	Compression
Related data reference	
Type of relationship	
Category	Character representation
Form of representation	Code
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Photo: TIFF; CCIT 4; JPEG; LZW Sound: WAV; MPEG3 Video: MPEG1; Predictive-10:1, RLE-2:1 Digital Object: .zip file
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from an expandable list of values for this element. Bit-rate reduction. Audio and video are lossy, non-reversible.
MARC/DC crosswalk	856c / <DC>Format
Source	CDL automatically generated from defaults.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Physical_Carrier
Identifier	5.6
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	Medium
Context	NAA
Definition	Description of physical carrier on which the material is stored. IU/RKMS: physical medium on which record is stored (CD-R, hard disk, microfilm, videotape). NAA: Uses Medium with options CD-R, DVD, floppy disk, hard disk, WORM, ZIP drive.
Classification scheme	
Keywords	Physical carrier; Medium
Related data reference	
Type of relationship	
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	CD-R WORM
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from an expandable list of values.
MARC/DC crosswalk	<DC>Format
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Requirements
Identifier	5.7
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Contains general description of system requirements. NLA: System or software necessary to access the information in the object or to use it. State whether the requirements are preferred or mandatory. ADN: Extends IMS type vocabulary (operating system, browser) to add in plug-in, subscription, membership and software.
Classification scheme	
Keywords	System requirements
Related data reference	Representation_Requirements_Installation Representation_Requirements_System Representation_Requirements_Software Representation_Requirements_Hardware Representation_Requirements_Operating_System Representation_Requirements_Peripheral
Type of relationship	parent_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	System requirements: Windows 95, Netscape Navigator v 4.0.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	538a <DC>Format
Source	Optional
Applicable to all formats	All
Obligation	
Maximum occurrence	Repeatable

Element name	Representation_Requirements_Installation
Identifier	5.7.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	PMWG: any specialized procedures needed to install an object. NLA: Record specific instructions on passwords, how to start the program, etc. ADN: Description on how to install the resource, software, or plug-ins in order to access, interact with or execute the resource.
Classification scheme	
Keywords	Installation requirements
Related data reference	Representation_Requirements
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Computer must be re-booted after installation. Copy to C drive and click on icon.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	<DC>Format
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Requirements_System
Identifier	5.7.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Detailed system information about hardware, software, or peripheral requirements. PMWG: Uses Underlying Abstract Form Description for a human readable description of the content data object.
Classification scheme	
Keywords	System specifics
Related data reference	Representation_Requirements
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	16 MB RAM
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	538 / <DC>Format
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Requirements_Software
Identifier	5.7.3
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Information about software applications used to render the material, including the name, version, registration information and display information (e.g. font sets). RLG: Name of software, including version, settings, etc. PMWG Environment Description component includes Software Environment Rendering Programs (*Transformation Process*, Transformer Engine, Parameters, Input format, Output format, Location, Documentation, *Display/Access Application*, Input format, Output format, Location, Documentation).
Classification scheme	
Keywords	Software requirements
Related data reference	Representation_Requirements
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Adobe Acrobat Reader: must use PDF files.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	583x / <DC>Format
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Requirements_Hardware
Identifier	5.7.4
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Information about hardware needed to render the material, including the name, model number, configuration and output information (e.g. viewers required). RLG: Name of hardware, including version and settings. NEDLIB/MD: Description of non-standard platform configuration or hardware requirements (sub-elements Microprocessor, Multimedia device, Peripheral device).
Classification scheme	
Keywords	Hardware requirements
Related data reference	Representation_Requirements
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Intel Pentium III microprocessor required; 128 MB RAM.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	583x / <DC>Format
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Requirements_Operating_System
Identifier	5.7.5
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Information about the operating system needed to render the material, including the name, version, configuration and other information. PMWG Environment Description component includes Software Environment Rendering Programs (*Operating System* name, version, Location, Documentation). ADN: extends IMS name vocabulary (PC-DOS, MS-Windows, MacOS, Unix, Multi-OS, Other, None, Any, Netscape, Microsoft Internet Explorer) to include Unknown, Shockwave Flash Player, Real Player, QuickTime, Adobe Acrobat, Platform emulation.
Classification scheme	
Keywords	Operating system requirements
Related data reference	Representation_Requirements
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Windows 98 and higher. MS-Windows PC-DOS MacOS Unix Multi-OS
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from an expandable set of values for this element.
MARC/DC crosswalk	583x / <DC>Format
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Requirements_Peripheral
Identifier	5.7.6
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Information about peripherals needed to render the material, including the name, model number, configuration and other information. NEDLIB/MD: Description of non-standard peripheral devices.
Classification scheme	
Keywords	Peripheral requirements
Related data reference	Representation_Requirements
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	ZIP storage device; CD-ROM drive
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	583x / <DC>Format
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Delivery_Method
Identifier	5.8
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Access method that makes the online resource available.
Classification scheme	
Keywords	Delivery method; Online access
Related data reference	Representation_Delivery_Method_Format Representation_Delivery_Method_Display
Type of relationship	parent_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	email ftp dial-up http
Permissible values	Can incorporate IMS use of specific browser names as needed: Any, Netscape Communicator, Microsoft Internet Explorer, Opera, Other.
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from an expandable list of values for this element.
MARC/DC crosswalk	856/_1
Source	Automatically generated.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Delivery_Method_Format
Identifier	5.8.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Format in which item is delivered to the user. CEDARS: Formats that enable access to the bit stream MOA: Indicates requirements for playback/viewing. NDLP: Indicates the nature of the data found in the content portion of the data element (if applicable, express as MIME type). NEDLIB: Format is the arrangement of data for computer input/output. NISO: Uses MIME Type and Format (3 character name, like extension) NLA: Encapsulation is the delivery format and the version, (e.g. Real Audio II). IU/RKMS: Uses the term standards to identify standards (e.g. TIFF) applied to the record that affect how it can be rendered.
Classification scheme	
Keywords	Delivery format; MIME type
Related data reference	Representation_Delivery_Method
Type of relationship	child_of
Category	Character representation
Form of representation	Code
Datatype	Character
Maximum size	Not to exceed 10 digits/characters.
Minimum size	0
Layout of representation	
Example/Code	Photo: JPEG; GIF; TIFF Sound: RA; WAV; AU; RM Video: MPEG1; RM; AVI; Quicktime Digital Object: pdf; ZIP
Permissible values	Use MIME type. What is.com: Every File Format in the World: http://whatis.techtarget.com/fileFormatG/0,289943,sid9,00.html Computer High-Tech Dictionary, File Types: http://www.computeruser.com/resources/dictionary/filetypes.html
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center

Comment	Work from an expandable list of values for this element.
MARC/DC crosswalk	<DC>Format
Source	Automatically generated.
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Delivery_Method_Display
Identifier	5.8.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	NISO: Uses PreferredPresentation to designate device, application, medium, viewing environment, etc. to render the data.
Classification scheme	
Keywords	Preferred presentation; Display details
Related data reference	Representation_Delivery_Method
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	45 MB free hard disk space required to install the program.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	<DC>Format
Source	
Applicable to all formats	All
Obligation	Optional
Maximum occurrence	Repeatable

5.9 Representation_Format_Details

5.9.1 Representation_Format_Details_Image

Element name	Representation_Format_Details_Image_Orientation
Identifier	5.9.1.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	NISO: Orientation presented to a conventional monitor.
Classification scheme	
Keywords	Image orientation; Portrait; Landscape
Related data reference	Representation_Format_Details_Image
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Not to exceed 10 digits/characters
Minimum size	0
Layout of representation	
Example/Code	
Permissible values	Portrait Landscape
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	<DC>Format
Source	
Applicable to all formats	Only images
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Format_Details_Image_Color_Space
Identifier	5.9.1.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Method used to represent color for display and printing. CDL: Color space used, often needed by viewer; indicates whether image was initially created for onscreen display or for pre-press output. (Some color space parameters such as white point may require individual tags.) CDL Best Practices: Number of channels. DIG35: Specifies the colorspace of the decompressed image data. Details component information (e.g. RGB) separately. MOA: Scanner profile describes the color artifacts introduced by the scanner; need to map images into standard color space and adjust for display/printing. Indicates creation for onscreen display or prepress output. NISO: Uses "PhotometricInterpretation" to designate the color space of the decompressed image data. Uses SamplesPerPixel to designate the number of color components per pixel.
Classification scheme	
Keywords	Color space; Photometric interpretation; Samples per pixel
Related data reference	Representation_Format_Details_Image
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	CMYK RGB Grayscale CIELab
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from expandable list of values for this element.

MARC/DC crosswalk	<DC>Format
Source	CDL automatically generated from defaults.
Applicable to all formats	Only images.
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Format_Details_Image_Color_Management
Identifier	5.9.1.3
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	On-screen proofing capabilities. NLA and RLG: system used to improve consistency of color across capture, display and output of image. CDL Best Practices: software that controls capture and reproduction of color.
Classification scheme	
Keywords	Color management
Related data reference	Representation_Format_Details_Image
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	PhotoCD OptiCal Profile/80 Softproof Photoshop 5
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from expandable list of values for this element.
MARC/DC crosswalk	<DC>Format
Source	
Applicable to all formats	Only images
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Format_Details_Image_Resolution
Identifier	5.9.1.4
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	LC/CORE: dpi, complements but not the same as pixels horizontal and vertical. MOA: settings on scanning device (dimensions or dpi). NDLP: Quality or sharpness of image, expressed in dpi. NLA: spatial resolution in ppi or dpi. NEDLIB: Measure of sharpness in screens. RLG: Number of pixels used to represent the scanned item (either pixel dimensions, ppi or dpi).
Classification scheme	
Keywords	Resolution; Spatial resolution; dots per inch (dpi)
Related data reference	Representation_Format_Details_Image
Type of relationship	child_of
Category	Character representation
Form of representation	Measure
Datatype	Integer
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	200 dpi (8x10 image) 400 dpi interpolated to 600 dpi
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	<DC>Format
Source	
Applicable to all formats	Only images.
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Format_Details_Image_Dimension
Identifier	5.9.1.5
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	MOA: provided in pixels, indication of quality of image. Distinguishes between dimensions of object sent to client/tool and dimensions of object stored and captured. NLA: image dimension is number of pixels along the vertical and horizontal dimensions. CDL Best Practices: Resolution of capture is the number of pixels per inch in both height and width that are sampled from the original to create the digital image.
Classification scheme	
Keywords	Dimensions; Pixels per inch
Related data reference	Representation_Format_Details_Image
Type of relationship	child_of
Category	Character representation
Form of representation	Measure
Datatype	Integer
Maximum size	Unlimited
Minimum size	0
Layout of representation	Use Format: [wwww:hhhh]
Example/Code	1200:1600 pixels 4096:6144 pixels
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	<DC>Format
Source	CDL automatically generated from defaults.
Applicable to all formats	Only images.
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Format_Details_Image_Bit_Depth
Identifier	5.9.1.6
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	LC/CORE and CF: Number of bits per pixel conveying color information. NDLP: Number of different colors or shades of gray that can be stored in each pixel of a scanned image. Also referred to as color depth; expressed as number of bits per pixel. Color mode indicates associated colors or shades of gray (bitonal, color, or grayscale). NLA: Uses Image Tonal Resolution to express bit depth of each pixel and whether multiple bits convey gray tones or color. CDL Best Practices: Number of bits of color data to store the image data for one pixel. NISO: Uses BitsPerSample to represent number of bits per component for each pixel.
Classification scheme	
Keywords	Bit depth; Color depth; Image tonal resolution
Related data reference	Representation_Format_Details_Image
Type of relationship	child_of
Category	Character representation
Form of representation	Measure
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	24 bit color (RGB) 8 bit grayscale 8 bit color binary (b&w)
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from an expandable set of values for this element.
MARC/DC crosswalk	007c/06-08 / <DC>Format
Source	CDL automatically generated from defaults.
Applicable to all formats	Only images.
Obligation	Optional
Maximum occurrence	Repeatable

5.9.2 Representation_Format_Details_Audio

Element name	Representation_Format_Details_Audio_Channel _Information
Identifier	5.9.2.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	LC/CORE and CF: Additional information about audio channel configuration (languages, channels to speakers). AVPP: Number and information about channels/tracks. NLA: Uses Track Number and Type to state number of tracks and their relationship. HAR: Uses Number of channels to designate the number of audio channels present. Uses Sound channel map (with subelements of assignment, number, and location).
Classification scheme	
Keywords	Audio channel; Track number; Track type; Number of channels
Related data reference	Representation_Format_Details_Audio
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	2-trk 4-trk 8-trk 2 track stereo 5 channel surround
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from an expandable set of values for this element.
MARC/DC crosswalk	<DC>Format
Source	
Applicable to all formats	Only audio
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Format_Details_Audio_Duration
Identifier	5.9.2.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Playing time of performance or recording, entered according to standard time format.
Classification scheme	
Keywords	Running time; Duration
Related data reference	Representation_Format_Details_Audio
Type of relationship	child_of
Category	Character representation
Form of representation	Time
Datatype	Integer
Maximum size	Not to exceed 12 digits/characters
Minimum size	0
Layout of representation	
Example/Code	01:20:45
Permissible values	Follow TIFF date/time format: [hh:mm:ss].
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	306 / <DC>Description
Source	
Applicable to all formats	Only audio.
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Format_Details_Audio_Sound
Identifier	5.9.2.3
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	LC/CORE and CF: Indicator for audio channel configuration (stereo, mono, surround sound, etc.) AVPP: Sound field is aural space on source recording, e.g. monophonic, stereophonic, surround. HAR: Uses Sound field for aural space on sound recording.
Classification scheme	
Keywords	Audio channel configuration; Sound field; Aural space
Related data reference	Representation_Format_Details_Audio
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Stereophonic Monophonic Surround
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from an expandable set of values for this element.
MARC/DC crosswalk	<DC>Format
Source	
Applicable to all formats	Only audio.
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Format_Details_Audio_Resolution
Identifier	5.9.2.4
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	LC/CORE: Number of samples per second. NLA: uses audio resolution for sampling frequency in kHz. Techtarget definition: "The more samples taken per second, the more accurate the digital representation of the sound can be. For example, the current sample rate for CD-quality audio is 44,100 samples per second." AVPP: Rate at which the audio was sampled. HAR: Uses Sample rate to designate the number of samples per second in sample frames.
Classification scheme	
Keywords	Resolution; Sampling frequency; kHz; Sample rate
Related data reference	Representation_Format_Details_Audio
Type of relationship	child_of
Category	Character representation
Form of representation	Measure
Datatype	Integer
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	44.1 kHz 96 kHz
Permissible values	Generally 32, 44.1, 48, 88.2, 96 or 192.
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from an expandable list of values for this element.
MARC/DC crosswalk	<DC>Format
Source	Automatically generated from defaults.
Applicable to all formats	Only audio.
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Format_Details_Audio_Bit_Depth
Identifier	5.9.2.5
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	LC/CORE and CF: Number of bits per sample (bps). NLA: Audio bit rate is word length to encode audio, indicating dynamic range. AVPP: Number of bits in a digital audio sample. HAR: Uses bit depth to designate the number of bits per sample point of audio data.
Classification scheme	
Keywords	Bit depth; Audio bit rate; Bits per sample
Related data reference	Representation_Format_Details_Audio
Type of relationship	child_of
Category	Character representation
Form of representation	Measure
Datatype	Integer
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	16 bps 24 bps
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from an expandable set of values for this element.
MARC/DC crosswalk	007c/06-08 / <DC>Format
Source	CDL automatically generated from defaults.
Applicable to all formats	Only audio.
Obligation	Optional
Maximum occurrence	Repeatable

5.9.3 Representation_Format_Details_Video

Element name	Representation_Format_Details_Video_Frame_Rate
Identifier	5.9.3.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	LC/CORE and CF: Rate at which a video plays back in frames per second (fps). NLA: Standard frame rate per second of the video. AVPP: Uses 'frames' to represent number of fames and frame rate of video source item.
Classification scheme	
Keywords	Video frame rate; Frames per second
Related data reference	Representation_Format_Details_Video
Type of relationship	child_of
Category	Character representation
Form of representation	Measure
Datatype	Integer
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	25 fps
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	<DC>Format
Source	Automatically generated from defaults.
Applicable to all formats	Only video
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Format_Details_Video_Data_Rate
Identifier	5.9.3.2
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	AVPP, CF and LC/CORE: Data rate of video source item in megabits per second (mbps).
Classification scheme	
Keywords	Video data rate; Megabits per second (mbps)
Related data reference	Representation_Format_Details_Video
Type of relationship	child_of
Category	Character representation
Form of representation	Measure
Datatype	Decimal
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	4.0, 8.25, 100.0
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	<DC>Format
Source	Automatically generated from defaults.
Applicable to all formats	Only video
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Format_Details_Video_Duration
Identifier	5.9.3.3
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Playing time of performance or recording, entered according to standard time format.
Classification scheme	
Keywords	Running time; Duration
Related data reference	Representation_Format_Details_Video
Type of relationship	child_of
Category	Character representation
Form of representation	Time
Datatype	Integer
Maximum size	Not to exceed 12 digits/characters
Minimum size	0
Layout of representation	
Example/Code	01:20:45
Permissible values	Follow TIFF date/time format: [hh:mm:ss].
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	306 / <DC>Description
Source	
Applicable to all formats	Only video.
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Format_Details_Video_Sound
Identifier	5.9.3.4
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	AVPP: Uses sound field for digital sound format used in the video source item, e.g. mono, stereo, DTS, etc. NLA: Uses Video Sound to express the sound parameters where they are incorporated into a single video file structure.
Classification scheme	
Keywords	Video sound; Channel configuration; Sound field; Aural space
Related data reference	Representation_Format_Details_Video
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Stereophonic Monophonic Surround DTS
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from an expandable set of values for this element.
MARC/DC crosswalk	<DC>Format
Source	
Applicable to all formats	Only video
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Format_Details_Video_Resolution
Identifier	5.9.3.5
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	MOA: provided in pixels, indication of image quality. Distinguishes between dimensions of object sent to client/tool and dimensions of object stored and captured. METS: Distinguishes between pixels_horizontal and pixels_vertical for size of a frame in picture elements. NLA: video frame dimension is resolution in pixels of a single still frame. AVPP: Horizontal and vertical dimensions in pixels and aspect ratio of the frame.
Classification scheme	
Keywords	Resolution; Pixels; Video frame dimension
Related data reference	Representation_Format_Details_Video
Type of relationship	child_of
Category	Character representation
Form of representation	Measure
Datatype	Integer
Maximum size	Unlimited
Minimum size	0
Layout of representation	Use format: [wwww:hhhh]
Example/Code	0176:0120 0640:0480
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	<DC>Format
Source	Automatically generated from defaults.
Applicable to all formats	Only video.
Obligation	Optional
Maximum occurrence	Repeatable

Element name	Representation_Format_Details_Video_Bit_Depth
Identifier	5.9.3.6
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	METS: Number of bits of sample depth, e.g. 8, 24.
Classification scheme	
Keywords	Bit depth; Bits per sample
Related data reference	Representation_Format_Details_Video_
Type of relationship	child_of
Category	Character representation
Form of representation	Measure
Datatype	Integer
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	32 bit color
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	Work from an expandable set of values for this element.
MARC/DC crosswalk	007c/06-08 / <DC>Format
Source	CDL automatically generated from defaults.
Applicable to all formats	Only video.
Obligation	Optional
Maximum occurrence	Repeatable

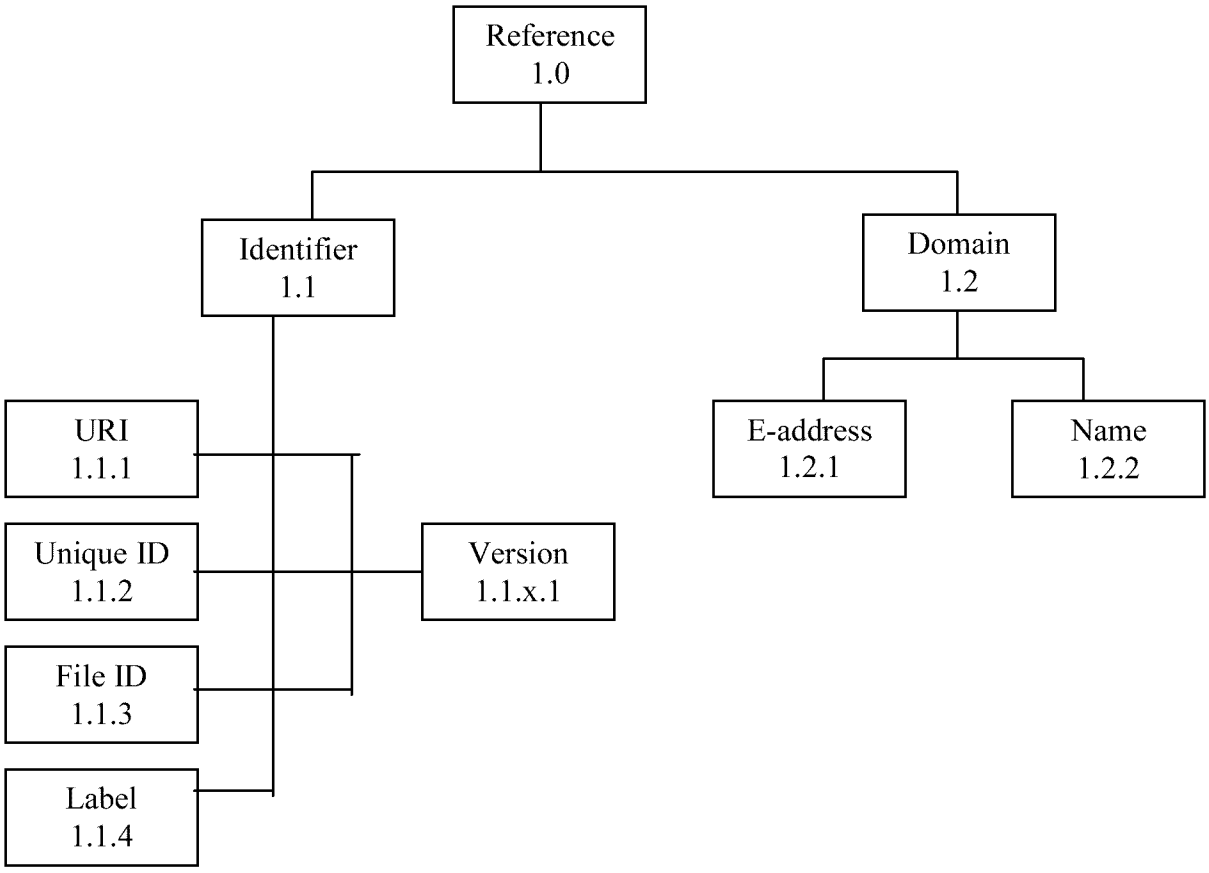
5.9.4 Representation_Format_Details_Digital_Object

Element name	Representation_Format_Details_Digital_Object_Code
Identifier	5.9.4.1
Version/version date	0.1
Registration authority	Defense Technical Information Center
Synonymous name	
Context	
Definition	Code type and version used to execute program. NEDLIB/MD: Uses Interpreter and compiler to reference programming that allows analysis and execution of source program or translation of program. Includes Name, Version, and Instruction. NLA: Code type used to compile the executable and version.
Classification scheme	
Keywords	Code type; Program executable; Interpreter; Compiler
Related data reference	Representation_Format_Details_Digital_Object_Code
Type of relationship	child_of
Category	Character representation
Form of representation	Text
Datatype	Character
Maximum size	Unlimited
Minimum size	0
Layout of representation	
Example/Code	Compiled using Intel code executable for Windows 95 environment. Compiled using Perl script. Java version 1.2.
Permissible values	
Responsible organization	Defense Technical Information Center
Status	Final
Submitting organization	Defense Technical Information Center
Comment	
MARC/DC crosswalk	<DC>Format
Source	
Applicable to all formats	Only complex digital objects.
Obligation	Optional
Maximum occurrence	Repeatable

Appendix A. Diagrams Mapping DVL Data Elements to OAIS Framework

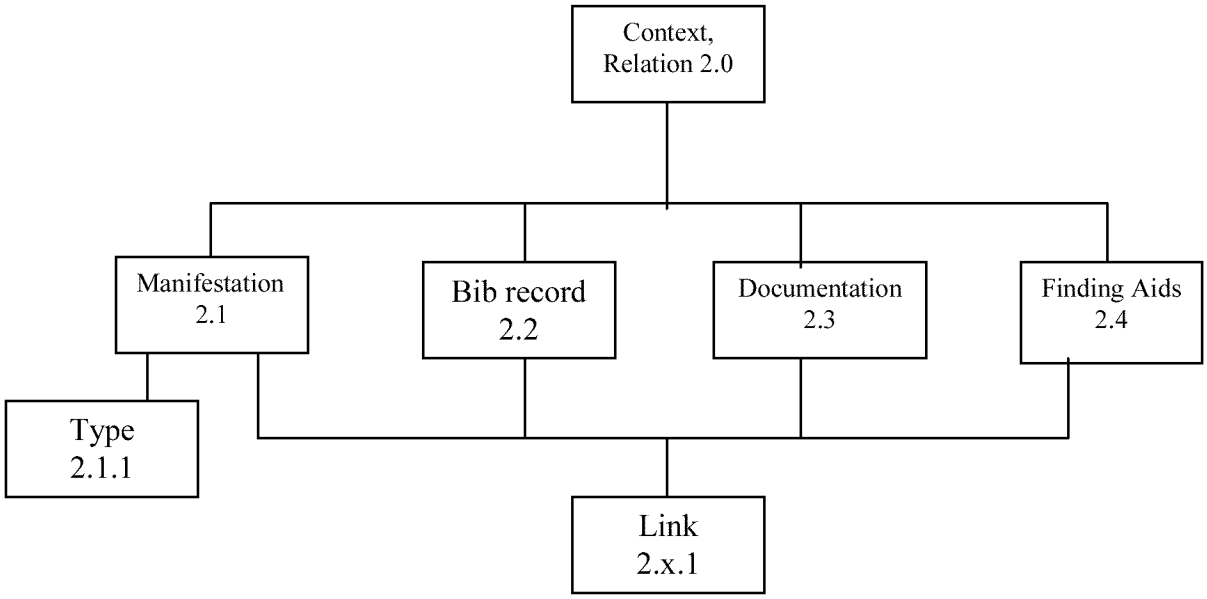
Reference Information

This diagram illustrates Reference subelements.



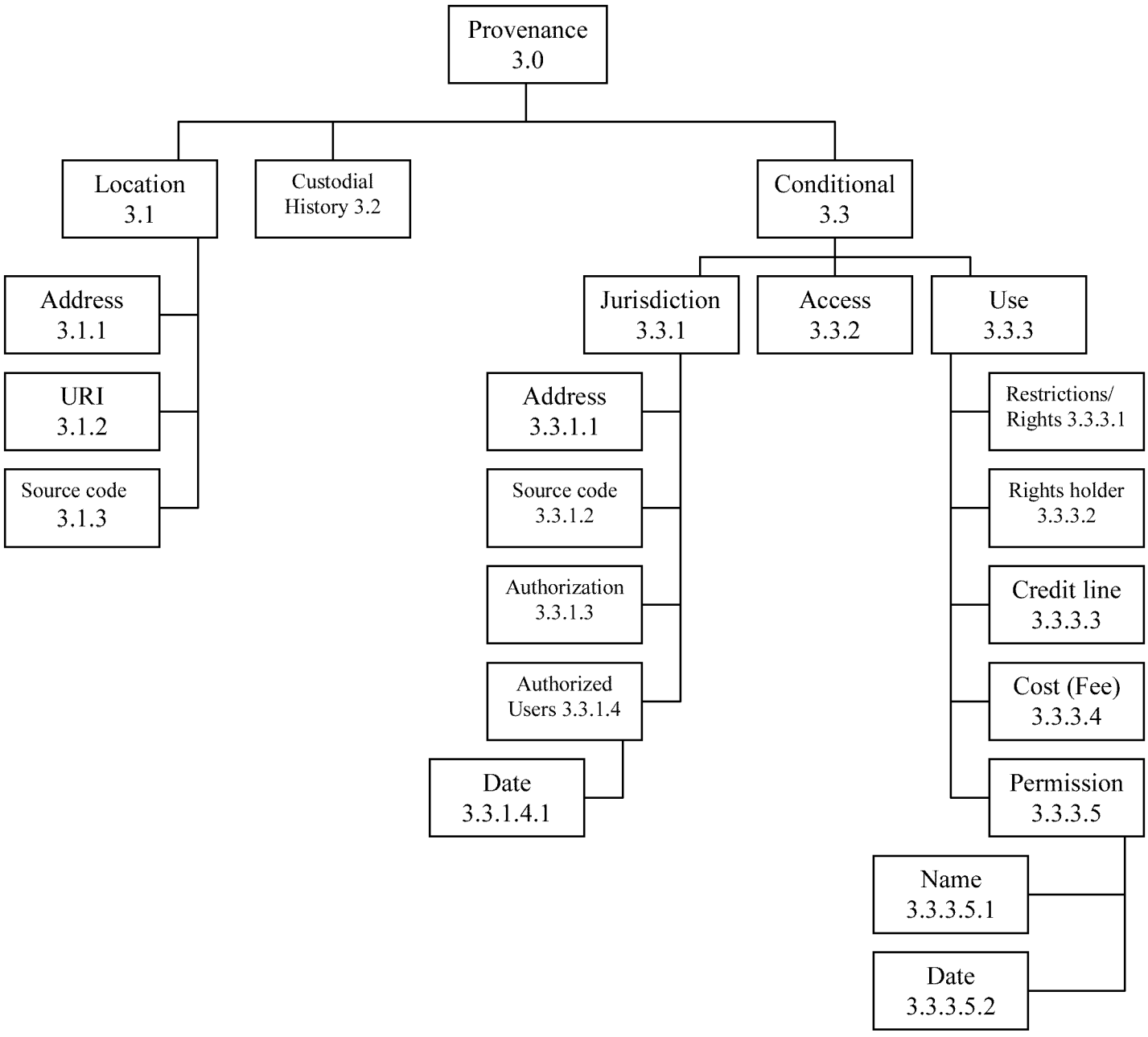
Context Information

This diagram illustrates Context subelements.



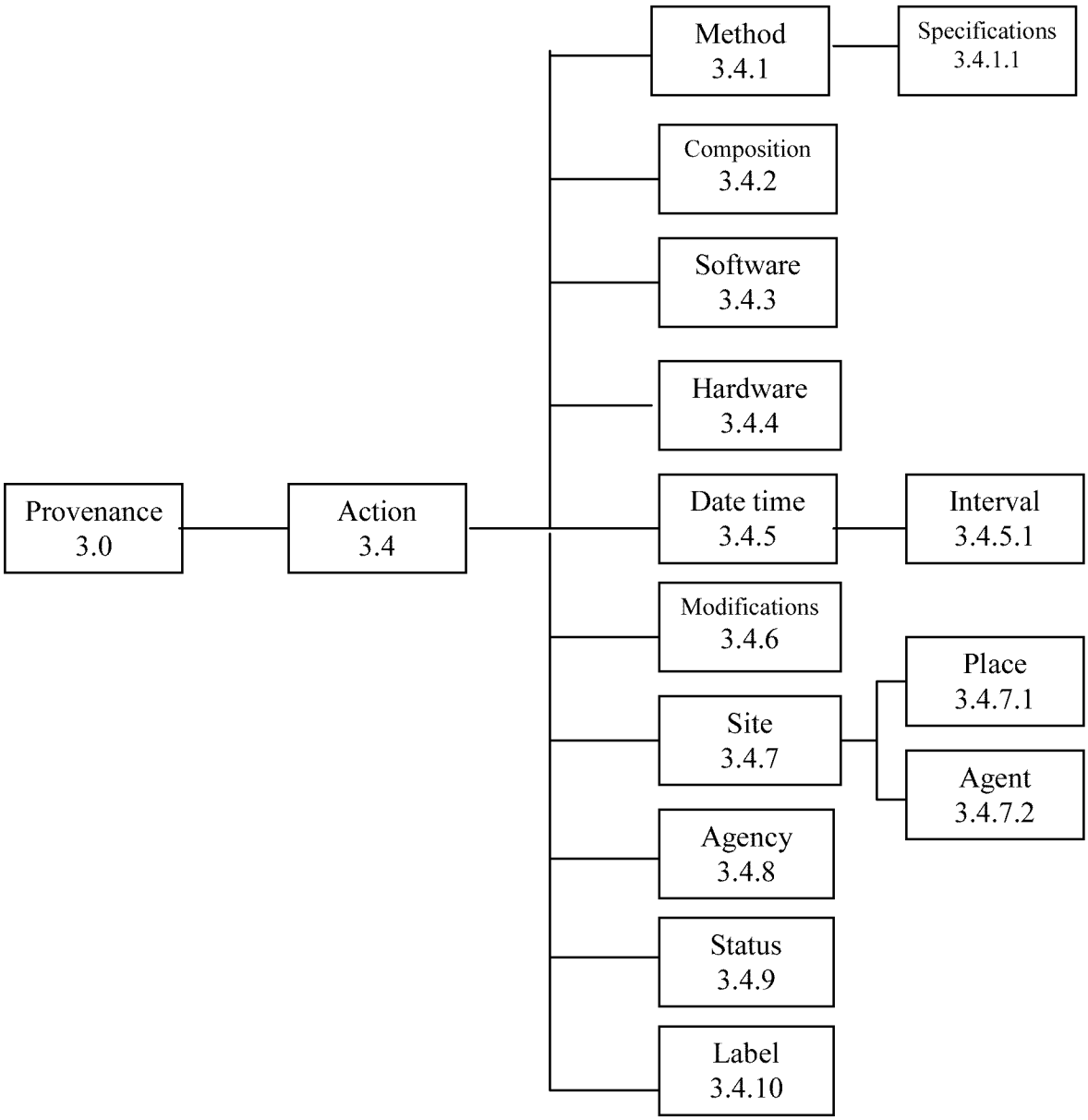
Provenance Information

This diagram illustrates Provenance subelements: Location, Custodial history and Conditional. Action subelements are listed in the tree on the following page.



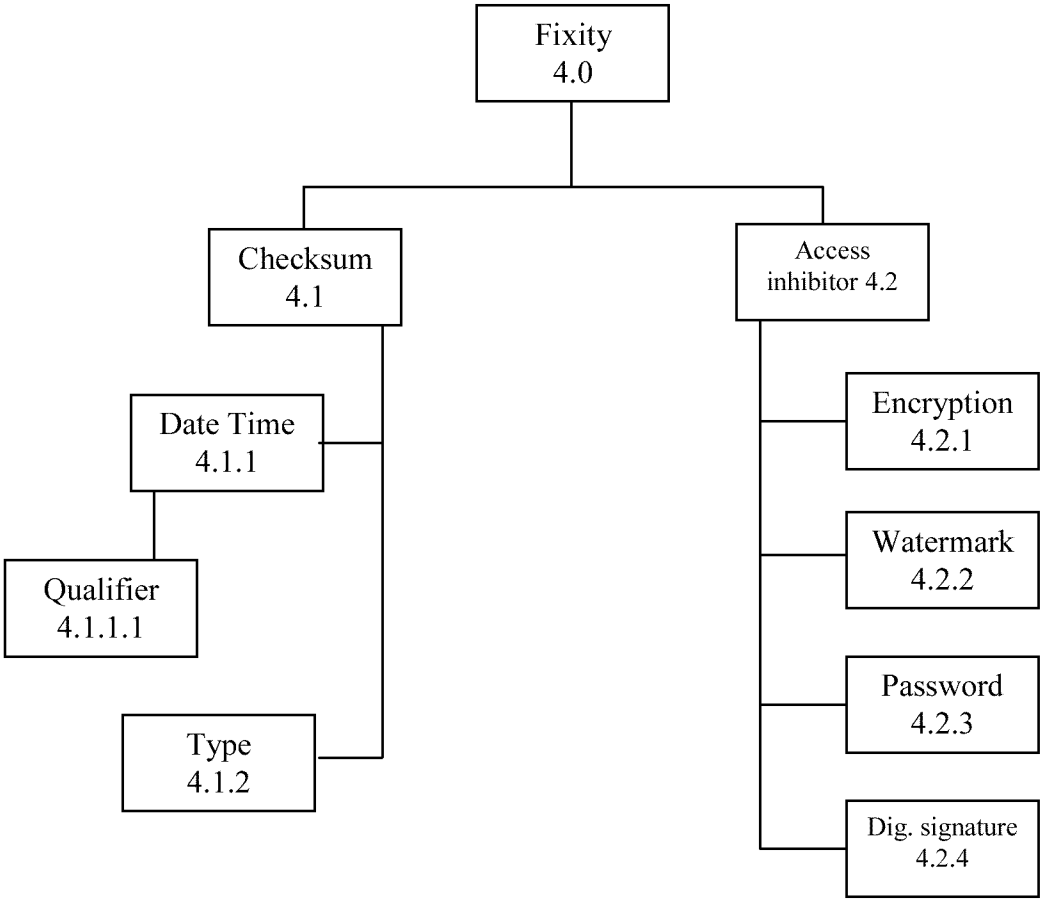
Provenance Information (continued)

This diagram illustrates Provenance_Action subelements.



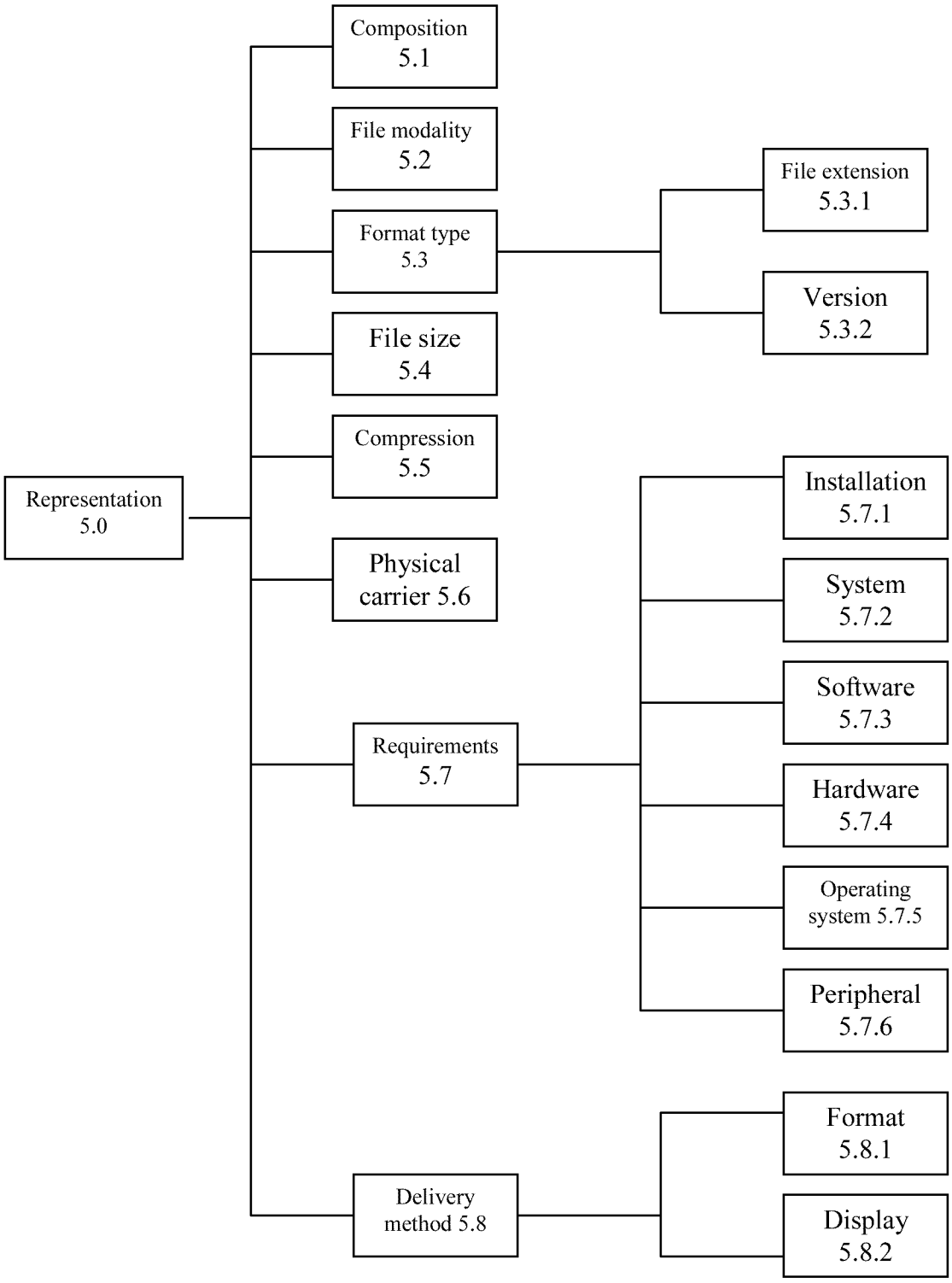
Fixity Information

This diagram illustrates Fixity subelements.



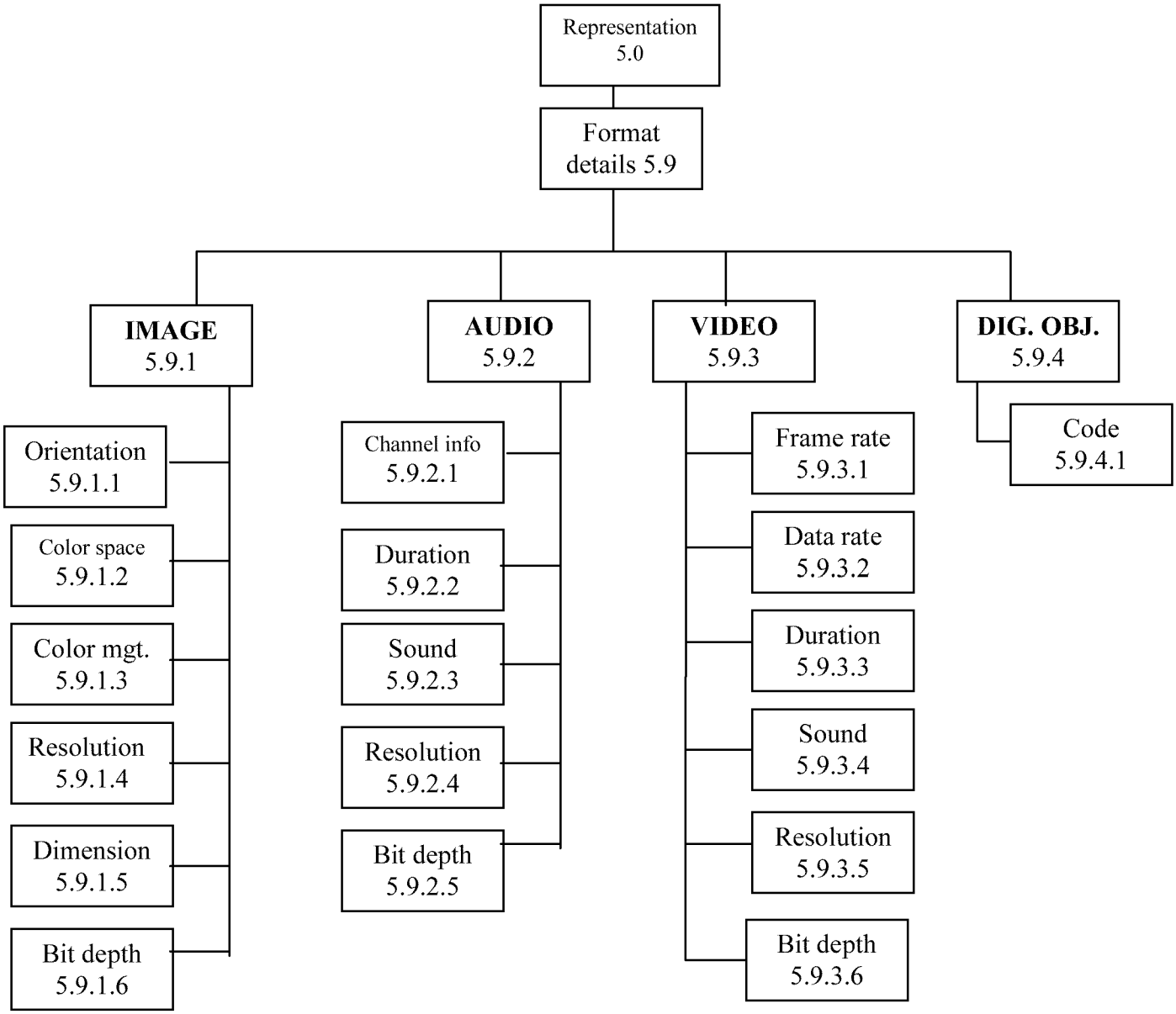
Representation Information

This diagram illustrates general Representation subelements. Subelements grouped by format are contained in the tree on the following page.



Representation Information (continued)

This diagram illustrates Representation_Format_details subelements grouped by format.



Appendix B. Table Listing DVL Data Elements in OAIS Framework[12]

OAIS	Identifier	Element Name
	1.1	Reference_Identifier
1.0 Reference Information [13]	1.1.1	Reference_Identifier_Uniform_Resource
	1.1.2	Reference_Identifier_Unique
	1.1.3	Reference_Identifier_Electronic_File
	1.1.4	Reference_Identifier_Label
	1.1.x.1	Reference_Identifier_Version
	1.2	Reference_Domain
	1.2.1	Reference_Domain_Electronic_Address
	1.2.2	Reference_Domain_Name
2.0 Context Information[14]	2.1	Context_Relation_Manifestation
	2.1.1	Context_Relation_Manifestation_Type
	2.2	Context_Relation_Bibliographic_Record
	2.3	Context_Relation_Documentation
	2.4	Context_Relation_Finding_Aid
	2.x.1	Context_Relation_Link
3.0 Provenance Information [15]	3.1	Provenance_Location
	3.1.1	Provenance_Location_Address
	3.1.2	Provenance_Location_Uniform_Resource_Identifier
	3.1.3	Provenance_Location_Source_Code
	3.2	Provenance_Custodial_History
	3.3	Provenance_Conditional
	3.3.1	Provenance_Conditional_Jurisdiction
	3.3.1.1	Provenance_Conditional_Jurisdiction_Address
	3.3.1.2	Provenance_Conditional_Jurisdiction_Source_Code
	3.3.1.3	Provenance_Conditional_Jurisdiction_Authorization
	3.3.1.4	Provenance_Conditional_Jurisdiction_Authorized_Users
	3.3.1.4.1	Provenance_Conditional_Jurisdiction_Authorized_Users_Date
	3.3.2	Provenance_Conditional_Access
	3.3.3	Provenance_Conditional_Use
	3.3.3.1	Provenance_Conditional_Use_Rights/Restrictions
	3.3.3.2	Provenance_Conditional_Use_Rights_Holder
	3.3.3.3	Provenance_Conditional_Use_Credit_Line

[12] Based on OAIS research documented in the OCLC/RLG Preservation Metadata Working Group White paper, *Preservation Metadata for Digital Objects: A Review of the State of the Art* [http://www.oclc.org/digitalpreservation/presmeta_wp.pdf], January 31, 2001.
[13] Describes identifiers assigned to the content information, e.g. URN, ISBN.
[14] Documents relationship of Content Information to its environment, e.g. why created.
[15] Documents source of the content information, e.g. origins, actions, custody, migration.

OAIS	Identifier	Element Name
	3.3.3.4	Provenance_Conditional_Use_Cost(Fee)
	3.3.3.5	Provenance_Conditional_Use_Permission
	3.3.3.5.1	Provenance_Conditional_Use_Permission_Name
	3.3.3.5.2	Provenance_Conditional_Use_Permission_Date
	3.4	Provenance_Action
	3.4.1	Provenance_Action_Method
	3.4.1.1	Provenance_Action_Method_Specifications
	3.4.2	Provenance_Action_Composition
	3.4.3	Provenance_Action_Software
	3.4.4	Provenance_Action_Hardware
	3.4.5	Provenance_Action_Date_Time
	3.4.5.1	Provenance_Action_Date_Time_Interval
	3.4.6	Provenance_Action_Modification_History
	3.4.7	Provenance_Action_Site
	3.4.7.1	Provenance_Action_Site_Place
	3.4.7.2	Provenance_Action_Site_Agent
	3.4.8	Provenance_Action_Agency
	3.4.9	Provenance_Action_Status
	3.4.10	Provenance_Action_Label
4.0 Fixity Information[16]	4.1	Fixity_Checksum
	4.1.1	Fixity_Checksum_Date_Time
	4.1.1.1	Fixity_Checksum_Date_Time_Qualifier
	4.1.2	Fixity_Checksum_Type
	4.2	Fixity_Access_Inhibitor
	4.2.1	Fixity_Access_Inhibitor_Encryption
	4.2.2	Fixity_Access_Inhibitor_Watermark
	4.2.3	Fixity_Access_Inhibitor_Password_Protection
	4.2.4	Fixity_Access_Inhibitor_Digital_Signature
5.0 Representation Information[17]	5.1	Representation_Composition
	5.2	Representation_File_Modality
	5.3	Representation_Format_Type
	5.3.1	Representation_Format_Type_File_Extension
	5.3.2	Representation_Format_Type_Version
	5.4	Representation_File_Size
	5.5	Representation_Compression
	5.6	Representation_Physical_Carrier
	5.7	Representation_Requirements
	5.7.1	Representation_Requirements_Installation

[16] Documents authentication mechanisms, e.g. checksum.

[17] Information needed to make the Data Object understandable, including structure information, semantic information, representation network, representation rendering software, and access software.

OAIS	Identifier	Element Name
	5.7.2	Representation_Requirements_System
	5.7.3	Representation_Requirements_Software
	5.7.4	Representation_Requirements_Hardware
	5.7.5	Representation_Requirements_Operating_System
	5.7.6	Representation_Requirements_Peripheral
	5.8	Representation_Delivery_Method
	5.8.1	Representation_Delivery_Method_Format
	5.8.2	Representation_Delivery_Method_Display
	5.9	Representation_Format_Details
	5.9.1	Representation_Format_Details_Image
	5.9.1.1	Representation_Format_Details_Image_Orientation
	5.9.1.2	Representation_Format_Details_Image_Color_Space
	5.9.1.3	Representation_Format_Details_Image_Color_Management
	5.9.1.4	Representation_Format_Details_Image_Resolution
	5.9.1.5	Representation_Format_Details_Image_Dimension
	5.9.1.6	Representation_Format_Details_Image_Bit_Depth
	5.9.2	Representation_Format_Details_Audio
	5.9.2.1	Representation_Format_Details_Audio_Channel_Information
	5.9.2.2	Representation_Format_Details_Audio_Duration
	5.9.2.3	Representation_Format_Details_Audio_Sound
	5.9.2.4	Representation_Format_Details_Audio_Resolution
	5.9.2.5	Representation_Format_Details_Audio_Bit_Depth
	5.9.3	Representation_Format_Details_Video
	5.9.3.1	Representation_Format_Details_Video_Frame_Rate
	5.9.3.2	Representation_Format_Details_Video_Data_Rate
	5.9.3.3	Representation_Format_Details_Video_Duration
	5.9.3.4	Representation_Format_Details_Video_Sound
	5.9.3.5	Representation_Format_Details_Video_Resolution
	5.9.3.6	Representation_Format_Details_Video_Bit_Depth
	5.9.4	Representation_Format_Details_Digital_Object
	5.9.4.1	Representation_Format_Details_Digital_Object_Code

Appendix C. Definitions of OAIS Terminology

Archival record equates to Content Information in an Archival Information Package.

Archive Information Package: aggregation of the four types of Information Object.

Content Information: data object of primary interest; data object and representation information. Content Information is information the archive is mandated to preserve.

Descriptive Information: facilitates access through search and retrieval; package descriptions to support order of information.

Information object: Data Object combined with Representation Information. 4 classes of information objects are: Content Information, Preservation Description Information, Packaging Information and Descriptive Information.

Information Package: aggregation of Content Information Object, Preservation Description Information Object, Packaging Information Object and Descriptive Information Object. It is a container for Content Information and Preservation Description Information, encapsulated by the Packaging Information, and discoverable with Descriptive Information.

OAIS: Open Archival Information System. Reference model establishes a conceptual framework for a digital archive.

Packaging Information: binds object and metadata into identifiable unit

Preservation Description Information: 4 types: Provenance, Reference, Fixity and Context Information (see Appendix B); information necessary to preserve Content Information.

Representation Information: Structure information (data structure concepts like bits and pixels) and semantic information (complex meanings associated with structure information elements).

Appendix D. Sources Consulted Including References and Acronyms

All links verified 2-21-2002.

ADN: ADN (ADEPT/DLESE/NASA) Joint Metadata Framework. Metadata Working Group. http://www.dlese.org/Metadata/index.htm

AVPP: Audio-Visual Prototyping Project Working Documents. Extension Schemas for the Metadata Encoding and Transmission Standard (METS) http://lcweb.loc.gov/rr/mopic/avprot/metsmenu.html

CDL: California Digital Library. Digital Image Collection Standards (Sept. 1999) and Digital Object Standard: Metadata, Content and Encoding (May 2001). http://www.cdlib.org/about/publications/

CDL Best Practices: "Best Practices for Image Capture," Version 1.0, February 2001, maintained by the CDL Technical Architecture and Standards Workgroup. http://www.cdlib.org/about/publications/

CDL Digital Image Format Standards. July 9, 2001. http://www.cdlib.org/about/publications/

CDP: Colorado Digitization Project. Metadata Matrix. http://coloradodigital.coalliance.org/matrix.html

CF: Carl Fleishhauer's AV Metadata Table. http://lcweb.loc.gov/rr/mopic/avprot/avmeta.html

CEDARS: Cedars Preservation Metadata Elements. http://users.ox.ac.uk/~cedars/Papers/AIW02.html [no longer available] and Rethinking Preservation Description Information (PDI) for the Cedars Project. http://www.ukoln.ac.uk/metadata/cedars/papers/AIW03/

DIG35: Digital Imaging Group (DIG). DIG35 Specification: Metadata for Digital Images. Version 1.0. August 30, 2000. http://www.digitalimaging.org/i_dig35.html

DTIC/MG: Defense Technical Information Center. Metadata Guidelines. http://dvl.dtic.mil/notes.html

EUL: Digital Preservation at EUL (Edinburgh University Library)/Edinburgh Metadata Schema. http://www.lib.ed.ac.uk/lib/sites/digpres/metadataschema.shtml

EAD: Encoded Archival Description. http://www.loc.gov/ead/ead.html

GEM: Gateway to Educational Materials. GEM Element List. http://www.geminfo.org/Workbench/Metadata/GEM_Element_List.html

HAR: Harvard University Library. Library Digital Initiative. Administrative Metadata for Digital Audio Files. http://sylvia.harvard.edu/~robin/drsaudionew.doc

IMS: Instructional Management Systems (IMS) Global Learning Consortium. IMS Learning Resource Meta-Data Information Model; IMS Learning Resource Meta-Data Best Practice and Implementation Guide; and IMS Learning Resource Meta-Data XML Binding, version 1.2.1 final specification, 28 September 2001. http://imsglobal.org/metadata/index.html

IU/RKMS: Comparison of Indiana University Recordkeeping Metadata Specifications (IU RMS) to the Recordkeeping Metadata Standard of the National Archives of Australia (RKMS), September 2001. http://www.indiana.edu/~libarch/ER/NHPRC-2/iu-aus-metadata.pdf

LC/CORE: Table of Core Metadata Elements for Library of Congress Digital Repository Development. http://lcweb.loc.gov/standards/metable.html

LC/CNRI: Metadata Table for the Coolidge-Consumerism Experiment. http://lcweb2.loc.gov/ammem/award/docs/nisometa/metawww1.html#IV.C

LOM: Draft Standard for Learning Object Metadata. Institute of Electrical & Electronics Engineers (IEEE) Learning Technology Standards Committee Working Group, version 6.1, 18 April 2001. http://ltsc.ieee.org/doc/wg12/LOM_WD6-1_1_without_tracking.pdf

LTP: Long Term Preservation – Research Study by IBM and Koninklijke Bibliotheek (National Library of the Netherlands) http://www.kb.nl/kb/ict/dea/ltp/ltpstudy-overview.pdf

MARC21: MARC21: Format for Bibliographic Data, 1999 edition (hard copy).

METS: Metadata Encoding & Transmission Standard. http://www.loc.gov/standards/mets/

MOA2: The Making of America II Testbed Project. http://www.clir.org/pubs/reports/pub87/contents.html

OAIS: Reference Model for an Open Archival Information System. http://www.ccsds.org/documents/pdf/CCSDS-650.0-R-2.pdf

NDLP: National Digital Library Project. Structural Metadata Dictionary for LC Digital Objects. http://lcweb.loc.gov:8081/ndlint/repository/attdefs.html

NAA: National Archives of Australia. Recordkeeping Metadata Standard for Commonwealth Agencies. http://www.aa.gov.au/recordkeeping/control/rkms/summary.htm

NLA: National Library of Australia. Preservation Metadata for Digital Collections. http://www.nla.gov.au/preserve/pmeta.html

NEDLIB: Networked European Deposit Library. NEDLIB Glossary (available in PDF) http://www.konbib.nl/nedlib/

NEDLIB/MD: Metadata for the Long Term Preservation of Electronic Publications. NEDLIB Report Series 2. http://www.konbib.nl/nedlib/

NISO: NISO Draft Standard. Data Dictionary: Technical Metadata for Digital Still Images. http://www.niso.org/pdfs/DataDict.pdf

PITT: Metadata Specifications Derived from the Functional Requirements: A Reference Model for Business Acceptable Communications. http://www.sis.pitt.edu/~nhprc/meta96.html [no longer available]

PMWG: Preservation Metadata Working Group. A Recommendation for Content Information. http://www.oclc.org/research/pmwg/

RLG: Research Libraries Group Working Group on Preservation Issues of Metadata. http://www.rlg.org/preserv/presmeta.html

ViDe: Video Development Initiative. ViDe User's Guide: Dublin Core Application Profile for Digital Video. http://www.vide.net/conferences/vide_dc_app.pdf

VRA: Visual Resources Association (VRA) Data Standards Committee. VRA Core Categories, version 3.0. http://www.gsd.harvard.edu/~staffaw3/vra/vracore3.htm