Wisconsin Heritage Online Metadata Guidelines

Version 3.0
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Revision History

Revision 1.1: addition to Notes, p. 7.
Revision 1.2: added a note on p. 45 regarding mapping of Local WHO elements
Revision 1.3: added Date Digitized to Table of Contents

Version 2.0
Revised Source element, and corresponding use of Relation element
Clarified and emphasized usage of Submitting Institution element
Expanded WHO comment on DC.RelationIsPartOf for Collection Name information
Added comment to Input Guidelines of Coverage element regarding the spatial qualifier
Added Digitization Information to Metadata Entry Considerations section

Version 3.0
Updated external links, provided internal bookmarks.
Revised estimated date usage to be designated with *ca.* rather than *c.*
Revised element/qualifier Coverage.spatial to specify separate element/qualifiers for city, county, state. Clarified the use of an additional coverage.spatial element.

Edited by Steven J. Miller, revised by Debbie Cardinal

Introduction

Purpose and Scope

The Wisconsin Heritage Online Metadata Guidelines are intended to provide best practice guidelines for creating metadata records for digitized cultural heritage resources for inclusion in the Wisconsin Heritage Online digital repository. Resources may be either born digital or have been digitized from an existing physical resource, and include photographs, text, audio, video, three-dimensional artifacts, and others. This document uses the Dublin Core Metadata Element Set (DCMES) as defined by the Dublin Core Metadata Initiative (DCMI), along with DCMI recommended qualifiers. Application of these guidelines will result in standardized Dublin Core records that:

- Enhance online search and retrieval accuracy in local and shared databases
- Improve resource discovery capabilities
- Improve quality control of metadata records
- Facilitate inter-institutional interoperability

Good-quality, standardized descriptive metadata is critical to the usability of any digital collection. Descriptive metadata provides users with intellectual access to a collection's content. Metadata is necessary for users to be able to discover and identify the digital resources that match their interests and needs. Metadata provides the essential building blocks and framework for collection searching, browsing, and navigation, allowing users to limit searches and collocate results from a large, diverse online collection. High quality metadata conforming to established standards is equally critical for the harvesting, sharing, repurposing, and general interoperability of the metadata itself, both within the Wisconsin Heritage Online collaborative and within the larger global context of aggregated digital collections.

These guidelines have been created to address the needs of a diverse audience of cultural heritage institutions composed of museums, libraries, historical societies, archives, and other cultural memory organizations. This document seeks to accommodate different backgrounds and metadata skill levels of those charged with creating metadata records, including catalogers, curators, archivists, librarians, Web site developers, database administrators, volunteers, authors, editors, or anyone interested in creating digital libraries of cultural heritage materials. We have attempted to provide clear and concise explanation of terms and concepts, as well as examples describing the varied resources found in cultural heritage institutions. Some terms may be used interchangeably, such as catalog, online catalog and database; digital resource and digital object; or controlled vocabulary, thesaurus and subject heading list.

Background

In March 2004, Wisconsin's cultural heritage community, including historical societies, museums and libraries, met as a group to discuss the possibility of forming a statewide collaborative. The enthusiasm generated by the community resulted in an exploratory process to discover whether it was feasible for Wisconsin to establish a statewide digital library. In February 2005, the cultural heritage community held a conference to discuss the findings of the Exploratory Committee. The large group established a vision: **Wisconsin's cultural heritage institutions, through collaborative effort, will provide the global community access to our state's history, culture, environment, government, and economy through a variety of digital formats via the World Wide Web.**

The goals of Wisconsin's digital collaborative are to:

1) Make content accessible from one place
2) Adequately index content

At the end of this meeting, a number of working groups established themselves to agree on, and then write, standards or guidelines for all participants in the Wisconsin Heritage Online collaborative digital program. Several groups held their first meeting that day and established regular meeting times. This document is the result of eighteen months of work by one working group.

Acknowledgements

These guidelines are based on the standards established by the Dublin Core Metadata Initiative (DCMI) <http://dublincore.org/index.shtml>, particularly the Dublin Core Metadata Element Set (DCMES) Version 1.1 (ISO Standard 15836) <http://dublincore.org/documents/dces/>, and DCMI Metadata Terms <http://dublincore.org/documents/dcmi-terms/>, including refinement and encoding scheme qualifiers and recommended vocabularies.

At this time, DCMI elements and qualifiers with the status of conforming have not been included in CDPDCMBP. In addition, we have not included the Audience element at this time, pending further clarification of its use by the DCMI community.

The text of the Wisconsin Heritage Online Metadata Guidelines is in substantial part based on, and heavily indebted to, the *Collaborative Digitization Program Dublin Core Metadata Best Practices* (CDPDCMBP), Version 2.1 <http://www.bcr.org/cdp/best/dublin-core-bp.pdf>. Large sections of the Wisconsin Heritage Online Metadata Guidelines have been taken from the CDP document, either verbatim or with some adaptations. In addition, these Guidelines are also indebted to the *Bibliographic/Multimedia Database Model Documentation (UW Core Metadata Companion*), UW Madison Libraries' Local Usage Guide and Interpretations, Version 1.3 <http://digital.library.wisc.edu/1793/6737>, authored by Kirstin Dougan, Tom Durkin, and Amy Rudersdorf.

The following individuals have participated as members of the Wisconsin Heritage Online Metadata Working Group, making significant contributions to the development of the original document (Version 1.0):

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Using This Document

I. WHO Metadata Quick Guides

Metadata Worksheet:
A table that institutions may use as a template to map their local element names to WHO elements.

Metadata Element Table:
A concise overview of the WHO metadata elements, the applicable qualifiers, and their level of requirement and repeatability.

Metadata Content Guide:
A simple overview of which elements to use for different kinds of information you want to record about a digital resource.

Metadata Entry Guide:
An overview of data entry considerations, such as spelling, capitalization, how to handle proper names, etc.

Metadata Encoding Scheme Guide:
A list of the controlled vocabularies recommended for use with WHO metadata.

Data Dictionary Examples:
Examples of elements and mapping documentation for existing digital collections in Wisconsin.

II. Creating Wisconsin Heritage Online Metadata

A narrative overview of metadata creation and WHO's implementation of Dublin Core. A valuable introduction for those new to metadata creation, especially local project planners. Also serves as official documentation of WHO implementation decisions.

III. WHO DC Metadata Element Descriptions

An in-depth look at the 15 Dublin Core elements, given in alphabetical order, followed by the local WHO elements. Each element description includes the following parts:

DC Definition and Comment:
The official definition and comment from the Dublin Core Metadata Element Set, Version 1.1: Reference Description, ISO Standard 15836 <http://dublincore.org/documents/dces/>

WHO Comment:
WHO's additional comments, interpretations, and application guidelines.

Input Guidelines:
Any additional guidelines specifically for inputting the metadata for this element.

OAI Considerations:
Any additional guidelines regarding Open Archive Initiative (OAI) harvesting issues.

Qualifiers:
All official DC qualifiers applicable to the element with DCMI (Dublin Core Metadata Initiative) status of "recommended," with the qualifier name and the official DC definition. Encoding scheme qualifiers also include a URL to the scheme itself, if available on the Web. Some local WHO encoding scheme qualifiers are listed as well.

Examples:
Illustrative examples: the metadata as it would be entered into the element field in the first column, any applicable refinement or encoding scheme qualifiers in the next columns, and a WHO comment on the type of example in the final column.

Part IV. Metadata Background

A more general overview of metadata and Dublin Core, intended especially for those new to working with metadata

Part I. WHO Metadata Quick Guides

A) Metadata Worksheet
   The worksheet is in the form of a Word document, separate from this document. The worksheet can be used to map your existing local field names to the Dublin Core field elements. The worksheet is available from the WHO resources wiki <https://wiheritage.pbworks.com/f/WHO Metadata worksheet.doc>
B) Metadata Element Table
C) Metadata Content Guide
D) Metadata Entry Guide (Quality Control)
E) Metadata Encoding Scheme Guide
F) Data Dictionary Examples

B) Metadata Element Table

Notes:

- Italicized notes in brackets are WHO definitions of required element content.
- All element refinements and encoding schemes are *optional* except where indicated otherwise.
- Where more than one element refinement or encoding scheme is listed, select one as appropriate for separate instances of that element.
- For more information on the Encoding Schemes, see Quick Guide C
- Non-Repeatable and Repeatable apply only to the Field Labels, not to the information about the resource.

Elements in order of WHO requirement. Red = Mandatory; Blue = Mandatory if Applicable; Green= Recommended; Black = Optional

DC Element	Element Refinements	Encoding Schemes (Vocabulary)	Requirement	Repeatability
Title			Mandatory	Not Repeatable
	Alternative		Optional	Repeatable
Subject		*Strongly Recommended:* LCTGM AAT TGN LCSH LCNAF MeSH Chenhall LCC DDC *Acceptable:* other local or established schemes *Minimum acceptable:* uncontrolled keywords	Mandatory	Repeatable
Type		DCMI Type [mandatory]	Mandatory	Repeatable
Format	[*type of digital file*]	IMT [mandatory]	Mandatory	Repeatable
	Extent Medium		Optional	Repeatable
Identifier	*[filename]*		Mandatory	Repeatable
	[other identifiers, local or standard]	URI ISBN ISSN URN	Optional	Repeatable
Rights	*[institutional copyright statement]*		Mandatory	Repeatable
	[other rights statements]		Optional	Repeatable
Creator		*Strongly Recommended:* LCNAF	Mandatory If Available	Repeatable

DC Element	Element Refinements	*Encoding Schemes (Vocabulary)*	Requirement	Repeatability
Contributor		***Strongly Recommended:*** LCNAF	Mandatory If Available	Repeatable
Date	created [*date of original resource*]	W3C DTF http://dublincore.org/documents/dcmi-period/ [mandatory]	Mandatory If Available	Not Repeatable
	Valid available issued modified dateAccepted dateCopyrighted dateSubmitted	W3C DTF http://dublincore.org/documents/dcmi-period/ [mandatory]	Optional	Repeatable
Language		ISO639-2 [mandatory]	Mandatory if applicable *[e.g., textual resources]*	Repeatable
Relation	isPartOf *[name of local collection]*	URI	Mandatory if Applicable	Repeatable
	isVersionOf hasVersion isReplacedBy replaces isRequiredBy requires hasPart isReferencedBy references IsFormatOf hasFormat conformsTo	URI	Optional	Repeatable
Coverage	Spatial	TGN DCMI Box ISO3166 DCMI Point DecLat DecLat PLSS	Mandatory if Available	Repeatable
	Temporal	W3C DTF http://dublincore.org/documents/dcmi-period/ [mandatory]	Mandatory if Available	Repeatable
Description	tableOfContents abstract		Optional	Repeatable
Publisher			Optional	Repeatable
Source	[information identifying the original object from which a digital reproduction was created]		Optional	Not Repeatable

WHO Local (Non-DC) Element	Requirement	Repeatability
Submitting Institution	Mandatory	Not Repeatable
Date Digitized	Mandatory	Not Repeatable
Date Last Updated	Mandatory if Applicable	Not Repeatable
Digitization Information	Optional	Repeatable
Non-Public Note	Optional	Repeatable

C) Metadata Content Guide

See the Metadata Entry Guide for guidelines for data entry and formatting.

TYPE OF METADATA	*DC or WHO ELEMENT(S) TO USE*
Titles	
Title transcribed from item or supplied by indexer	DC Title
Variant or other form of title	DC Title.Alternative
Names: Creators, Contributors, Publishers	
Author	DC Creator
Photographer	DC Creator or DC Contributor
Artist, Painter, Sculptor, Architect, etc.	DC Creator or DC Contributor
Editor, Translator, Illustrator, etc.	DC Contributor
Organization as creator of content of resource	DC Creator
Role or relationship of named person or organization in relation to the original or digital object	DC Description or DC Relation
Publisher of original object	DC Publisher *Optionally:* DC Relation.IsFormatOf
Publisher of digital object (making it available online)	Submitting Institution (local WHO element)
Institution owning the digital object and submitting it to WHO	Submitting Institution (local WHO element)
Subject Content (strongly recommended to use controlled vocabulary)	
Topical subject terms	DC Subject
Geographic subjects (place names covered in subject content)	DC Coverage.Spatial
Chronological subjects (time periods covered in subject content)	DC Coverage.Temporal
Dates (see Input Guide for formatting dates)	
Date original object was created or published	DC Date.Created or DC Date.Issued [note: "issued" means published]
Date resource was digitized	Date Digitized (local WHO element)
Rights Information (copyright, access restrictions, provenance, etc.)	
Ownership rights for original object	DC Rights *Optionally:* DC Relation.IsFormatOf
Rights and terms of access for digital object	DC Rights

TYPE OF METADATA	*DC or WHO ELEMENT(S) TO USE*
Formats: Digital and Physical Descriptions	
Digital file format of digital object (use IMT file type)	DC Format.IMT
Size or duration of digital object	DC Format. Extent
Physical description of original object	DC Format.Medium *Optionally:* DC Description or DC Relation.IsFormatOf
Identifiers and Standard Numbers	
Identifier of digital object (digital file name)	DC Identifier
Identifier of original object (call number, accession number, ISBN, ISSN, etc.)	DC Identifier *Optionally:* DC Relation.IsFormatOf
General Content, Description, and Type of Resource	
Free text description of any aspects of the object considered valuable for users / researchers, if not elsewhere in the metadata	DC Description
Generic type of content, regardless of whether physical or digital format (use DCMI-Type term)	DC Type
Languages	
Language or languages when there is written, spoken, or sung text (use ISO language codes)	DC Language
Relationships to Other Resources and Collections	
Collection name of which the object is a part	DC Relation.IsPartOf
Citations to other individual resources or collections to which the object being described in the metadata record is related in some way	DC Relation (use one of the specific relationship qualifiers)

D) Metadata Entry Guide (Quality Control)

General Metadata Entry Considerations

1. **Careful data entry:** Consistent data entry may mean the difference between locating related Resources and "losing" those Resources in the online database because they cannot be effectively retrieved by users. Examples such as typos, extraneous punctuation, inconsistency in what data go in which fields, or whether fields are filled in, can all affect retrieval.

2. **Follow grammatical rules:** We suggest that Content Providers follow the general grammatical rules of the main language in which the Resource exists when entering descriptive information. In addition, it may be useful to consult the Anglo-American Cataloging Rules (AACR2) for more information and details on general rules and guidelines for data entry. Following are a few brief comments:

> *Punctuation:* Avoid extraneous punctuation or ending punctuation unless it is part of the content of the Resource. However, some punctuation is necessary to make data display more cleanly.
>
> *Abbreviations:* We suggest that abbreviations not be used if they make the record entry unclear or if it will make retrieval of the Resource difficult. For example, if "Madison, WI" is used, you will not be able to search for "Wisconsin" unless you know that it has been entered as "WI." When in doubt, do not use the abbreviation. In general, use common or accepted abbreviations (such as "St." for "Saint"); terms used with dates (such as "b." for "born"); compound words; or distinguishing terms added to names of persons, if they are abbreviated on the source (such as "Mrs."). Also, spell out "&" as "and."
>
> *Capitalization:* In general, capitalize the first word (of a title, for example) and proper names (place, personal and corporate names) and subject terms only. Capitalize content in the description field according to normal rules of writing. Do not enter content in all caps except in the case of acronyms. See specific instructions at DC.Title.
>
> *Spelling:* When a misspelling is encountered, you may choose to put [sic] after the affected word (preferred), or insert the proper letters with brackets, e.g., Shak[e]speare. This, however, will affect searching and indexing, so keep that in mind.

3. **Characters to avoid:**
   - Do not use ampersands (&)
   - Do not use ellipses (…)
   - Do not use line breaks or hard returns (esp. in the Description field)
   - Do not use the less than / greater than symbols (<>)

4. **Diacritics:** Many diacritics and foreign characters are supported. Enter them as you would normally in a word processor (Basic Latin character set). For a chart of diacritics, see http://www.ramsch.org/martin/uni/fmi-hp/iso8859-1.html.

5. **Delimiters:** When a field is repeatable (for example, subject terms), separate entries in your data according to the guidelines provided by your content management tool.
   a. If using SiteSearch, delimit fields with a vertical pipe and space ("|"). (The

vertical pipe is above the back slash on the keyboard.)
e.g., subject term 1| subject term 2| subject term 3
b. If using CONTENTdm, delimit fields with a semi-colon and a space ("; ").
e.g., subject term 1; subject term 2; subject term 3

Metadata Entry Considerations for Dublin Core Elements

1. **DC.Contributor** and **DC.Creator**:
   a. Use of Library of Congress Name Authority File (LCNAF) is strongly recommended.
   b. If LCNAF is not available, please use the following format:
      - Last name, first name, middle initial, Date-Date (unless the rules of the language dictate otherwise, e.g., Jónas Hallgrímson, 1807-1845)
      - Question marks are allowed in this field as "b. date," "d. date", and "ca. date"
      - Examples: Smith, Joe M., 1931-2002
        Smith, Joe M., b. 1931?
        Smith, Joe M., d. 2002
        Smith, Joe M., ca. 1900-1990
   c. Do **not** include Role information (i.e. Smith, Joe M., 1931-2002: Composer)

2. **DC.Coverage**
   a. Specific dates should follow ISO 8601 [W3CDTF] format
   b. See guidelines for entering date and ranges and uncertain dates
   c. Spell out state names
   d. Make sure correct Types and Schemes are being used in the correct manner (See examples under the Coverage element description)

3. **DC.Date**
   a. Proper ISO format, YYYY-MM-DD
   b. See Date element description for entering date and ranges and uncertain dates

4. **DC.Description**
   a. Free text field.
   b. Best practices recommend standard sentence form. Capitalize content in the description field according to normal rules of writing. Do not enter content in all capitals except in the case of acronyms.

5. **DC.Format**
   a. Mandatory: Enter the IMT for the type of digital file.
   b. Optional: Enter digital file size or duration in Format.Extent.
   c. Optional: Enter format of original analog object in Format.Medium.

6. **DC.Identifier**
   In most cases, the DC.Identifier will be the same as the filename of the digital object.

7. **DC.Language**
   a. Use for resources that have linguistic content (text, spoken or sung audio, etc.)
   b. Must use appropriate 3-letter code from the ISO639-2 scheme.

8. **DC.Publisher**
   a. Enter data as "Location: Publisher name"

b. This field must always have the publisher name, but location is optional; cannot have location only.
c. Spell out state names.

9. **DC.Relation**
   a. Free text form -- Name of the collection
   b. Must use ***IsPartOf*** to describe relation to a parent collection. Usage of relational refinements is optional. (See the Relation element description)

10. **DC.Rights**
    Must have a value when applicable

11. **DC.Subject**
    a. For multi-word subject terms, capitalize just the first word, unless other words are proper nouns
    b. Use appropriate delimiter per content management tool.
       * If using SiteSearch, delimit fields with a vertical pipe and space ("|"). (The vertical pipe is above the back slash on the keyboard.) e.g., subject term 1| subject term 2| subject term 3
       * If using CONTENTdm, delimit fields with a semi-colon and space ("; "). e.g., subject term 1; subject term 2; subject term 3
    c. If LCSH terms are being used, follow their formatting (e.g., Main term -- Subterm)

12. **DC.Title** (main and other)
    a. Pay attention to capitalization.
    b. In general, capitalize the first word (of a title, for example) and proper names (place, personal and corporate names) and subject terms only. Do not enter content in all caps except in the case of acronyms.

13. **DC.Type**
    a. Use terms from DCMI Type scheme (See the Type element description)
    b. Follow capitalization from the DCMI Type scheme exactly.

Metadata Entry Considerations for Local WHO Elements

14. **Submitting Institution**
    a. Institution. Department
    b. Should be from LCNAF if possible

15. **Digitization Information**
    a. Type of scanner used - General type, specific manufacturer, model name, and model number); e.g., Microtek ScanMaker 8900XL flatbed scanner
    b. Resolution of master file (TIFF, PSD, etc.; not the access file); e.g., 600dpi.
    c. Optional items at full description

16. **Non-Public Note**
    a. Free text field to be used for internal notes.
    b. This data will not be searchable in the database.

17. **Date Digitized**
    a. Use proper ISO format: YYYY-MM-DD
    b. Record the date of initial digitization

18. **Date Last Updated**
    a. Use proper ISO format: YYYY-MM-DD
    b. Record this date whenever any change has been made to the metadata record.

E) Metadata Encoding Scheme Guide

For our purposes, a metadata scheme is best described by the DCMI glossary:

> In general terms, any organization, coding, outline or plan of concepts. In terms of metadata, a systematic, orderly combination of elements or terms. … In terms of an encoding scheme, is a set of rules for encoding information that supports a specific community of users. An encoding scheme provides contextual information or parsing rules that aid in the interpretation of a term value. Such contextual information may take the form of controlled vocabularies, formal notations, or parsing rules. If an encoding scheme is not understood by a client or agent, the value may still be useful to a human reader.

The following schemes have been selected to standardize the form and content of metadata entry for the WHO collections. Schemes provide known and predictable content for fields, reducing the need for individual encoders to create field content and labels; facilitate future crosswalks and machine translations of data; and, particularly in the case of vocabulary schemes, greatly improve record retrieval success for users.

DCMI Box
http://dublincore.org/documents/dcmi-box/

The DCMI Box identifies a region of space using its geographic limits.

DCMI Point
http://dublincore.org/documents/dcmi-point/

The DCMI Point identifies a point in space using its geographic coordinates.

DDC
Dewey Decimal Classification
http://www.oclc.org/dewey/

A system of classifying library and archival materials, particularly in small and medium size libraries. An all-numeric system, with new numbers added by decimal expansion.

LCC
Library of Congress Classification
http://www.loc.gov/catdir/cpso/lcco/lcco.html

A system of classifying library and archival materials, particularly in larger research collections. Divides human knowledge into 20 broad categories indicated by single letters of the Roman alphabet, with major subdivisions indicated by a second letter, and narrower subdivisions by decimal numbers and further alphabetic notation.

LCNAF
Library of Congress Name Authority File
http://authorities.loc.gov/

A comprehensive controlled vocabulary (established list of preferred terms, often with cross references), primarily of names and jurisdictions, used by thousands of institutions to describe and index persons or bodies who are the subject, or are responsible for the intellectual content of, library and archival material. Part of the *Library of Congress Authorities.* Apply the LCNAF label to your data field only if you have employed an authorized heading from the list.

LCSH
Library of Congress Subject Headings
http://authorities.loc.gov/

A comprehensive controlled vocabulary (established list of preferred terms, often with cross references), primarily of topical subjects, with cross references, broader terms, narrower terms, and scope notes. *LCSH* is used by thousands of institutions to describe and index the content or subject of library and archival material. Developed for print material but also used for moving images. Part of the *Library of Congress Authorities*.

MESH
Medical Subject Headings
http://www.nlm.nih.gov/mesh/meshhome.html

A comprehensive controlled vocabulary (established list of preferred terms, often with cross references), primarily of topical subjects, with cross references, broader terms, narrower terms, and scope notes, used to describe and index the content or subject of library and archival materials in the field of medicine.

ISO639-2
Codes for the Representation of Names of Languages
http://lcweb.loc.gov/standards/iso639-2/langhome.html

Alpha-3 codes arranged alphabetically by English name of language

ISO 3166
http://www.iso.org/iso/en/prods-services/iso3166ma/02iso-3166-code-lists/list-en1.html

Codes for the representation of names of countries

W3CDTF
http://www.w3.org/TR/NOTE-datetime

A refinement of the ISO 8601 date-time standard, this abridged form simplifies the number of options and includes a century designation for dates. Concretely, it provides an unambiguous representation of dates and times.

Year:
YYYY (e.g. 1997)
Year and month:
YYYY-MM (e.g. 1997-07)
Complete date:
YYYY-MM-DD (e.g. 1997-07-16)
Complete date plus hours and minutes:
YYYY-MM-DDThh:mmTZD (e.g. 1997-07-16T19:20+01:00)
Complete date plus hours, minutes and seconds:
YYYY-MM-DDThh:mm:ssTZD (e.g. 1997-07-16T19:20:30+01:00)
Complete date plus hours, minutes, seconds and a decimal fraction of a second
YYYY-MM-DDThh:mm:ss.sTZD (e.g. 1997-07-16T19:20:30.45+01:00)

where:

YYYY = four-digit year
MM = two-digit month (01=January, etc.)
DD = two-digit day of month (01 through 31)
hh = two digits of hour (00 through 23) (am/pm NOT allowed)
mm = two digits of minute (00 through 59)
ss = two digits of second (00 through 59)
s = one or more digits representing a decimal fraction of a second
TZD = time zone designator (Z or +hh:mm or -hh:mm)

F) Data Dictionary Example

Local project elements mapped to simple Dublin Core

Example. UW-Milwaukee Libraries: Milwaukee Neighborhoods Collection

Field Label	DC Mapping	Example	Vocabulary
Title	Title	North 19th Street, Machek House	Free text
View Large Image	Relation. IsFormatOf	me000241xl	
Alternate Title/ Photographer's Note	Title. Alternative	Old house. Mckinley, E of N 20th Street, Milwaukee	Transcribed text
Photographer	Creator	Mayer, Harold	
Date of Photograph	Date.Created	1974	
Description	Description	The house at 1305 North 19th Street was built by Robert Machek, a builder of Austrian descent. Machek's cottage was restored in 1968 and is listed in the National Register of Historic Places.	Free text
Architect/Builder	Creator	Machek, Robert	
Date of Construction	Coverage. Temporal	1886	
Neighborhood	Coverage. Spatial	Milwaukee--Downtown; Milwaukee--Kilbourn Town	
Address	Coverage. Spatial	1305 N 19th St	
Subject	Subject	Residential facilities--Wisconsin--Milwaukee; Houses--Wisconsin--Milwaukee; Historic buildings--Wisconsin—Milwaukee	Controlled Voc. Library of Congress Thesaurus for Graphic Materials
Alternate Terms	Subject	Single family houses--Wisconsin--Milwaukee	
Business/Place	Subject	Machek House--Wisconsin—Milwaukee	
Period	Coverage Temporal	1970s	
Type	Type	Image	DCMI Type
Collection	Relation. IsPartOf	Harold Mayer Collection	
Original Item Medium	Format. Medium	Color slide	Controlled Voc. Art & Architecture Thesaurus
Original Item Size	Format. Medium	35 mm	
Original Item ID	Relation. IsFormatOf	8b, 21-14	
Provenance	Contributor	Donated by Florence Mayer, Harold Mayer's wife	Free Text
Repository	Relation. IsPartOf	American Geographical Society Library, University of Wisconsin-Milwaukee Libraries	
Rights	Rights	The Board of Regents of the University of Wisconsin System	
Publisher	Submitting Institution	University of Wisconsin-Milwaukee Libraries	
Digital ID	Identifier	me000241	
Date.Digital	Date Digitized	2003-04-01	
Digital Collection	Relation. IsPartOf	Milwaukee Neighborhoods: Photos and Maps 1885-1992	
--	Format	Image/jpeg	IMT

Part II. Creating Wisconsin Heritage Online Metadata

Wisconsin Heritage Online Implementation of Dublin Core

Qualified Dublin Core (QDC)

The Wisconsin Heritage Online (WHO) Metadata Working Group has selected Qualified Dublin Core as the native Wisconsin Heritage Online descriptive metadata standard. The details of Wisconsin Heritage Online's implementation of this standard are laid out in the Metadata Element Descriptions section of this document and presented in summary form in the Metadata Element Table and Input Template. In many cases, your collections will have local field names that are similar to or will map easily to the Dublin Core elements. Check out the examples at the ends of element sections, and use the Metadata Worksheet to map your existing field labels and to verify that you will use all the Mandatory fields.

Additional Non-DC Elements

In addition to the established Qualified Dublin Core elements, Wisconsin Heritage Online has added five local, non-Dublin Core elements, considered necessary for documenting information important for the Wisconsin Heritage Online metadata repository but which the existing DC elements do not accommodate. For the most part, except for **Submitting Institution**, these elements are not intended for public display or searching. Instead, they record information important for the administration and preservation of the metadata and the digital resources the metadata describes.
These elements are listed below, and are explained and documented in the Metadata Element Descriptions section of this document.

- **Submitting Institution (Mandatory)**
- Digitization Information
- **Date Digitized (Mandatory)**
- Date last Updated
- Non-Public Note

Mandatory and Optional Elements

The WHO Metadata Working Group has established three levels of requirement for the metadata elements for institutions contributing metadata to the WHO repository:

- **Mandatory:** elements which must be present in every record submitted to WHO. These include such elements as Title, Identifier, Subject, etc.
- **Mandatory if Available/Applicable:** elements which must be present if they apply to a particular resource, or if the information is available for that resource. For example, the Creator element must be used if the resource described in the metadata clearly has a person or body who can be considered the creator of the resource and if that information is available to the metadata creator.
- **Optional:** elements that are not strictly mandatory but are still recommended

In some cases, the Metadata Working Group has specified a particular type of content that is mandatory for a specific element, such that one instance of that element with the required content is mandatory, and additional instances are optional. Similarly, in some cases the Metadata Working Group has mandated or strongly recommended the use of specific controlled vocabularies or other controlled values (encoding schemes) for the content of specific elements. All of this is spelled out in the Element Descriptions section of this document.

The Metadata Working Group has specified the following mandatory and optional elements for WHO metadata:

Mandatory:

Title
Identifier (unique local ID)
Subject (preferably from a controlled vocabulary; at minimum, uncontrolled keywords)
Rights (institutional copyright statement for the digital object)
Type (DCMI Type designation for the content of the resource)
Format (Internet Media Type for digital file)
Submitting Institution
Date Digitized

Mandatory If Available or Applicable:

Creator
Contributor
Date (date of creation of the original resource)
Language
Relation (name of parent collection, using the *Is Part Of* refinement qualifier)
Coverage (spatial and/or temporal)
Date Last Updated

Optional:

Description
Publisher
Digitization Information
Non-Public Note
Additional instances of most of the elements listed under the first two mandatory categories.

Metadata Creation Fundamentals

Metadata creators and especially project managers, who are responsible for setting up metadata templates for specific collections and training others to input item-level metadata, should understand and keep in mind the following basic considerations for metadata creation, also often called "resource description," "indexing," or "cataloging."

Functions of Metadata Elements for Users

What we call "descriptive metadata" actually performs several functions for users of the metadata database and user interface, only one of which is strictly speaking "description." These functions are important to understand, because they govern the type of content that goes into specific elements and the standards for inputting that content. There are two primary functions of the metadata, and specific elements perform one or sometimes both of these functions:

1. **Description / Identification**
   - Some elements primarily provide information that describes the resource, identifies and represents its intellectual/artistic content and other attributes. This allows the user to identify what the resource is, contains, or is about, to distinguish it from other similar resources, and to evaluate and select those resources that are relevant to their needs. The content of these elements is

usually free-text or transcribed from the resource. Examples include Title, Identifier, Description, and Relation.

2. Access / Retrieval
   - Some elements function as access points for user searching, browsing, and navigation within the database. The content of these fields must be entered consistently in exactly the same format, usually following some kind of controlled vocabulary or authorized list of terms, codes, for format for inputting names, dates, etc. This is critical in order for the data elements to be automatically linked in the database, allowing users to retrieve all instances that match their selections, and to allow use of these terms as search limits and in drop down menu choices. Examples include Creator, Subject, Coverage, Type, Format, and Language.

Description of WHO Digital Resources

The WHO digital repository consists of a collection of digital objects (texts, images, maps, sound and video files, etc.) Each metadata record represents one digital object and its intellectual or artistic content. The content of a digital object includes its title, creator, subject matter, and any other characteristics that are considered important to identify for users and to provide as searchable access points.

A digital image of a photograph of a work of sculpture, for example, has characteristics pertaining to the digital file, the original photograph, and the sculpture depicted in the photograph. Any aspects of these three layers considered important for description and access for researchers should be brought out in the metadata record.

WHO mandates certain pieces of information in each metadata record, as outlined in the Element Table and stated in the element Descriptions. The rest is up to the Content Contributor.

Example (partial record):

Local field name	Dublin Core or WHO element name	Metadata content
Title	Title	The Boxers
Alternative title	Title [Alternative]	The Fight
Description	Description	The photograph, taken by Alfred Stieglitz in 1936, depicts a 1914 bronze statue by Ukrainian sculptor and graphic artist Alexander Archipenko. The statue is an abstract depiction of two men boxing.
Photographer	**Creator**	Stieglitz, Alfred, 1864-1946
Sculptor	**Creator**	Archipenko, Alexander Porfiryevich, 1887-1964
Digital publisher	***Submitting Institution***	University of Wisconsin-Milwaukee Libraries
Digital format	**Format.IMT**	image/jpeg
Physical description	**Format.medium**	Bronze
Date of photograph	**Date.created**	1936
Date of sculpture	**Coverage.temporal. W3CDTF**	1914
Date digitized	***Date Digitized***	2005
Rights	**Rights**	Digital image copyright (c) Board of Regents, University of Wisconsin System
Collection	Relation [IsPartOf]	Documenting Early Twentieth Century Art

Granularity: Collection-Level Description vs. Item-Level Description

The metadata records contributed to the WHO repository will be describing individual resources at the item level, not the entire collection of resources at the collection level. This may become confusing when describing the Rights of the object. While a collection of paintings may be housed at a particular museum, artists often retain reproduction rights to their individual paintings. A single collection-level record about the digital collection as a whole may also be created for a collection; this record might contain certain types of information that the project owner feels compelled to include about the digital version of the collection as a whole.

Depth of Description

Some thought must go into the depth to which you want to describe each resource at the item level.

- Who is the intended audience and what is their general academic level (K-12, university, etc.)?
- What kind of information do you need to provide about each Resource so users can gain access to it through their online searches?
- What do your users need to know about what the Resource is, where it came from, who created it, its significance?

When thinking of end-user retrieval:

- How will users find Resources in your collection?
- What data elements will users look for?
- At what level do you need to distinguish one Resource from another, and at what level do you want to bring like Resources together?

The answers to these questions will also influence how much time and labor you will need for the project.

Use of Controlled Vocabularies

In the broadest sense, "controlled vocabularies" include term lists, code lists, authority files, verbal subject vocabularies, subject headings, taxonomies, and thesauri. They provide standard ways of recording or encoding information for retrieval, collocation, gathering, indexing, and database navigation.

When entering information about digital resources, employing terminology from controlled vocabularies can improve the quality of search results through consistency and a reduction in unintended errors. The best practice is to select terms from controlled vocabularies, thesauri, and subject heading lists for completion of the subject elements, rather than just using uncontrolled keywords.

Recognizing the diverse nature of the statewide initiatives and the involvement of a broad range of cultural heritage institutions, the lists of controlled vocabularies referenced by the WHO Metadata Guidelines have been expanded to include subject discipline taxonomies and thesauri as well as locally developed vocabularies, especially Wisconsin state geographic-based lists of terms. These lists can be helpful in achieving a level of consistency in terminology. Many of the thesauri, subject heading lists, and taxonomies are currently available via the Web, and online links are provided wherever possible.

Keywords vs. Controlled Subject Terms

Best practice recommends that subject terms be taken from a controlled vocabulary whenever possible for more accurate retrieval of resources. However, other non-controlled terms or keywords that identify the resource with some precision can be added to a record to enhance resource retrieval and discovery, especially in cases where such terms are too new to be included in controlled vocabularies.

Interoperability and Usability

Interoperability is the capability that allows different computer systems to share information across a network. In a collaborative context the policies, procedures, and terminology choices local institutions make can have a large impact on the success of interoperability beyond system design. As different sectors of the cultural heritage community have generated automated collections information from systems such as PastPerfect, Argus or CONTENTdm, they have adopted unique practices and semantics for describing their resources that make interoperability more difficult.
By adopting a common set of best practices, controlled vocabularies, and interoperable system architecture, institutions can increase their visibility and provide opportunities for new connections with others to serve the shared needs of constituent communities. Interoperability can also be achieved using existing systems by ensuring that local practices and data can be shared using standardized metadata formats and crosswalks. Projects selecting new systems and software should consider compliance with the following interoperability protocols:

- ANSI Z39.50 Protocol: http://www.loc.gov/z3950/agency/
- Open Archives Initiative – Protocol for Metadata Harvesting (OAI-PMH): http://www.openarchives.org/

OAI Harvesting, Indexing, and Display Issues

What is OAI?

The **Open Archives Initiative** (OAI) defines a specific metadata protocol. This protocol, known as the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH), provides an application-independent interoperability framework based on metadata harvesting. In other words, OAI-PMH is a protocol that allows users to search on digital objects across collections, across institutions, and across various software and hardware platforms.

There are two classes of participants in the OAI-PMH framework:

- ***Data Providers*** (Wisconsin cultural heritage institutions) administer systems that support the OAI-PMH as a means of exposing metadata; and
- ***Service Providers*** (WHO) use metadata harvested via the OAI-PMH as a basis for building value-added services.
    - A *harvester* is a client application that issues OAI-PMH requests. A harvester is operated by a service provider as a means of collecting metadata from repositories.

More about Data Providers and Service Providers

OAI-PMH will support multiple formats (standards) of data. At minimum, however, it requires metadata to be expressed in unqualified Dublin Core. As a Content Provider, for

your data to be harvested by OAI you will need to enter your metadata according to unqualified Dublin Core.

For the purposes of Wisconsin Heritage Online (WHO), librarians and curators will be the data contributors. Content Providers can follow any standard they so desire when entering metadata, but in order for the harvester to harvest metadata across platforms and institutions, metadata must at minimum be served or exposed to the harvester as unqualified Dublin Core. For more information about how to expose your metadata see OAI for Beginners - the Open Archives Forum online tutorial and The Open Archives Initiative Protocol for Metadata Harvesting, section 2.2.

Unqualified Dublin Core is Dublin Core metadata that uses no qualifiers; only the main 15 elements of the Dublin Core Metadata Element Set are expressed as simple attribute-value pairs without any "qualifiers" (such as encoding schemes, enumerated lists of values, or other processing clues) to provide more detailed information about a resource.
WHO will be the service provider.

WHO will harvest data from participants and store that data in the WHO database, which will be hosted by WHO. Thus, users can search multiple collections from various places in one place – the WHO portal.

WHO and OAI

In summary, OAI provides the protocol that will grab existing data, store and index it within the WHO context and ultimately make that data more accessible as well as potentially increase traffic to the content provider's native collection.

OAI Harvesting Example:

This is what your metadata looks like **BEFORE OAI harvesting:**	This is what your metadata looks like **AFTER OAI harvesting:**
Title: House in Kilbourn Town **Photographer**: Smith, John H. **Date photographed**: 1977-10-01 **Location**: Milwaukee—Kilbourn Town **Time Period:** 1886 **Publisher**: Imagination Publications **Description:** The house in Kilbourn Town was built by Joe Builder, an architect of ill repute. **Subjects:** Houses—Wisconsin—Milwaukee **Type**: StillImage **URL**: http://collections.lib.uwm.edu/cgi-bin/pview.exe?CISOROOT=/mkenh&CISOPTR=318&CISORESTMP=/qbuild/templaterep1.html&CISOVIEWTMP=/qbuild/templaterep2.html&CISOROWS=2&CISOCOLS=4 **Image Identifier**: mi000106 **Collection:** Milwaukee Neighborhoods: Photos and Maps 1885-1992 **Larger View**: http://www.uwm.edu/Library/digilib/Milwaukee/images/prints/mi000106xl.jpg **Rights:** Photograph copyright of John H. Smith. For permission to reuse this image, please contact copyright holder **Online Publisher** University of Fictitious Place	**Title**: House in Kilbourn Town **Creator**: Smith, John H. **Date**: 1977-10-01 **Place/Time**: Milwaukee—Kilbourn Town / 1886 **Publisher**: Imagination Publications **Description:** The house in Kilbourn Town was built by Joe Builder, an architect of ill repute. **Subjects:** Houses—Wisconsin—Milwaukee **Type**: StillImage **URL**: http://collections.lib.uwm.edu/cgi-bin/pview.exe?CISOROOT=/mkenh&CISOPTR=318&CISORESTMP=/qbuild/templaterep1.html&CISOVIEWTMP=/qbuild/templaterep2.html&CISOROWS=2&CISOCOLS=4 **Identifier**: mi000106 **Is Part Of**: Milwaukee Neighborhoods: Photos and Maps 1885-1992 **Related Items**: http://www.uwm.edu/Library/digilib/Milwaukee/images/prints/mi000106xl.jpg **Rights:** Photograph copyright of John H. Smith. For permission to reuse this image, please contact copyright holder **Submitter** University of Fictitious Place **Local Identifier**: WHO. smith0001.bib

(Underlined text denotes that this data is "clickable" or "linkable")

This is what your data looks like when it's harvested by OAI (a look behind the scenes)

header:
identifier : oai:digital.library.wisc.edu:WI.400001.bib
datestamp : 2006-08-10
setSpec : WI

metadata:
dc:
title: House in Kilbourn Town
creator: Smith, John H.
subject: Houses—Wisconsin--Milwaukee
description: The house in Kilbourn Town was built by Joe Builder, an architect of ill repute.
date: 1977-10-01
type: StillImage
format: 4 x 6 in. black and white photograph
identifier: http://digital.library.wisc.edu/1711.dl/SSRecIDSearch?repl1=WI&repl2=WI.400001.bib
relation: Milwaukee Neighborhoods: Photos and Maps 1885-1992
rights: Photograph copyright of John H. Smith. For permission to reuse this image, please contact copyright holder

Character Encoding

Another important consideration for portability and interoperability of metadata is the choice of character encoding. Character encoding describes the method with which different systems represent human-readable letters, diacritics, and punctuation in computer-readable code. Project personnel should be aware of the impact character encoding has on their ability to share metadata outside of local systems. When crosswalking data it may also be necessary to translate between character encodings in order to properly represent data in different systems (for example, when crosswalking MARC records stored in MARC-8 character encoding to a Dublin Core XML schema that requires Unicode [UTF-8]). Project managers planning on making records available through OAI harvesting protocols should avoid character encodings not supported by UTF-8 encoding (e.g., extended Latin-1 encoding frequently used in Microsoft Office products). For additional information about character encoding, see "Character Encoding" in Wikipedia.

Wisconsin Heritage Online mandates the use of UTF-8 character encoding for metadata submitted to the WHO repository. This is a software issue, and most current software allows export of data in UTF-8 / Unicode.

Part III: WHO Metadata Element Descriptions

A. Dublin Core Elements

Note: All WHO comments include excerpts from one or both of the following sources: the Collaborative Digitization Project's "Dublin Core Metadata Best practices" <http://www.bcr.org/cdp/best/dublin-core-bp.pdf> and UW-Madison Digital Content Group's "Core Metadata Companion" <http://uwdcc.library.wisc.edu/documents/DC_companionv1.3.pdf>

Contributor — MANDATORY if Available; REPEATABLE

DC Definition: An entity responsible for contributing to the content of the resource.
DC Comment:
Examples of a Contributor include a person, an organization, or a service. Typically, the name of a Contributor should be used to indicate the entity.
WHO Comment:
Person(s) or organization(s) in addition to the Creator who have made significant intellectual contributions to the content of the resource but whose contribution is secondary to that of the Creator.

Input Guidelines:

a. Use of Library of Congress Name Authority File (LCNAF) is strongly recommended.
b. If LCNAF is not available, please use the following format:
   - Last name, first name, middle initial, Date-Date (unless the rules of the language dictate otherwise, e.g., Jónas Hallgrímson, 1807-1845)
   - If you have only a birth or death date, or an approximate ("circa") date, use the following patterns: "b. date," "d. date", and "ca. date." Note: question marks are allowed in this field
   - Examples: Smith, Joe M., 1931-2002
     Smith, Joe M., b. 1931?
     Smith, Joe M., d. 2002
     Smith, Joe M., ca. 1900-1990
c. For corporate body names (i.e., names of organizations, societies, government agencies, etc.), enter the name as it appears. If the name includes a subordinate body which is part of a larger parent body, give the parent body first, encoding with a period, followed by the subordinate body. Example:
   University of Wisconsin. Department of Art History
d. Do **not** include any extraneous explanatory data in addition to the name and dates, such as a person's role (e.g., Smith, Joe, M. 1931-2002: Composer). Including data other than the controlled form of the name will now allow all instances of the name to be hyperlinked and indexed for database users.

Qualifiers:

Refinements: none

Schemes

Scheme Name	Definition

LCNAF [strongly recommended]	Library of Congress Name Authority File: http://authorities.loc.gov/

Examples:

Element Name	Encoding Scheme	Element Content	Comment on the example
Contributor	LCNAF	Kodama, Marìa	Collaborator
Contributor	LCNAF	Kerrigan, Anthony	Translator of a text
Contributor	LCNAF	Albright, Adam Emory, 1862-1957	Illustrator

Coverage — MANDATORY if Available; REPEATABLE

DC Definition: The extent or scope of the content of the resource.

DC Comment:

Coverage will typically include spatial location (a place name or geographic coordinates), temporal period (a period label, date, or date range) or jurisdiction (such as a named administrative entity). Recommended best practice is to select a value from a controlled vocabulary (for example, the Thesaurus of Geographic Names [TGN]) and that, where appropriate, named places or time periods be used in preference to numeric identifiers such as sets of coordinates or date ranges.

WHO Comment:

Spatial refers to the location(s) covered by the intellectual content of the resource (i.e., place names, longitude and latitude, celestial sector, etc.) not the place of publication. This is essentially a subject content element used when the resource depicts or is about a particular place. The spatial characteristics can refer to the place where an artifact/object originated. Keep in mind that not every geographic name or date related to a resource should go in the Coverage field. For example, the location of a publisher should go into the Publisher field.

Temporal coverage refers to the time period covered by the intellectual content of the resource (e.g., Jurassic, 1900-1920), not the publication date. For artifacts or art objects, the temporal characteristics refer to the date or time period during which the artifact/object was made.

If the date refers to the date a Resource was created it should go into the Date field. Coverage refers only to the subject content of the Resource. The name of an institution is not considered a place; however, the city in which it is located is. If the name of the institution must be included in the resource record, it should be placed in the description or subject fields.

Input Guidelines:

a. Specific dates should follow ISO 8601 [W3CDTF] format: see Schemes below.
b. Questionable or approximate dates should be expressed using "ca." [Latin "circa," meaning "about"] and not a question mark. Use "ca." for a single date or date range when you can estimate that this is the probable date or date range, but it is not certain. See the examples below.
c. Spell out state names; do not abbreviate
d. Make sure correct schemas are being used in the correct manner: see examples below
e. Enter each element of the location (spatial) in a separate Coverage.spatial element, e.g.:
   Wausau
   Marathon County
   Wisconsin
f. In addition, when metadata is harvested for Wisconsin Heritage Online's portal into the University of Wisconsin interface, which provides an atlas search, add Wisconsin county information in an additional, separate Coverage.spatial element using this format: Dodge County (Wisconsin).

Qualifiers:

Refinements:

Refinement Name	Definition
Spatial [mandatory if applicable]	Spatial characteristics of the intellectual content of the resource.

Refinement Name	Definition
Spatial [mandatory if applicable]	Spatial characteristics of the intellectual content of the resource.
Temporal [mandatory if applicable]	Temporal characteristics of the intellectual content of the resource.

Schemes:

Spatial Schemes Scheme Name	Definition
TGN [strongly recommend]	The Getty *Thesaurus of Geographic Names*: http://www.getty.edu/research/tools/vocabulary/tgn/index.html
ISO3166 [optional]	ISO 3166 Codes for the representation of names of countries: http://www.iso.org/iso/en/prods-services/iso3166ma/02iso-3166-code-lists/list-en1.html
Box [optional]	The DCMI Box identifies a region of space using its geographic limits: http://dublincore.org/documents/dcmi-box/
Point [optional]	The DCMI Point identifies a point in space using its geographic coordinates: http://dublincore.org/documents/dcmi-point/
Additional WHO authorized schemes:	
DecLat [optional]	Decimal Degree Latitude: http://www.fcc.gov/mb/audio/bickel/DDDMMSS-decimal.html
DecLong [optional]	Decimal Degree Longitude: http://www.fcc.gov/mb/audio/bickel/DDDMMSS-decimal.html
PLSS [optional]	The Public Land Survey System: http://nationalatlas.gov/articles/boundaries/a_plss.html
GNIS [optional]	Geographic Name Information System: http://geonames.usgs.gov/index.html

Temporal Schemes Scheme Name	Definition
W3CDTF [mandatory if applicable]	W3C Encoding rules for dates and times - a profile based on ISO 8601: http://www.w3.org/TR/NOTE-datetime
DCMI Period	A specification of the limits of a time interval: http://dublincore.org/documents/dcmi-period/

Examples:

Element Name	Element Refinement	Encoding Scheme	Element Content	Comment on the example
Coverage	Spatial	TGN	North America	Place name from the *Thesaurus of Geographic Names*
Coverage	Spatial	TGN	Paris	Place name from the *Thesaurus of Geographic Names*
Coverage	Spatial	TGN	Rocky Mountains	Place name from the *Thesaurus of Geographic Names*
Coverage	Spatial	GNIS	394916N0771325 W	Latitude/Longitude for Gettysburg National Military Park
Coverage	Spatial	GNIS	390254N0954040 W	Latitude/Longitude for Topeka, Kansas
Coverage	Temporal	W3C DTF	1776-07-04	Date for July 4, 1776
Coverage	Temporal	W3C DTF	1776-07	Date for July, 1776
Coverage	Temporal	W3C DTF	1776	Date for year 1776
Coverage	Temporal		ca. 1885	Approximate date ["ca." = "circa" = "about"]
Coverage	Temporal		1880-1900	Date range
Coverage	Temporal		ca. 1880-1900	Approximate date range
Coverage	Temporal		Colonial America	Free text time period name

Element Name	Element Refinement	Encoding Scheme	Element Content	Comment on the example
Coverage	Spatial	TGN	North America	Place name from the *Thesaurus of Geographic Names*
Coverage	Temporal		Ming	Free text time period name
Coverage	Temporal		15th century	Free text time period name
Coverage	Temporal		96 B.C.E.	Free text B.C.E. date

Creator — MANDATORY if Available; REPEATABLE

DC Definition: An entity primarily responsible for making the content of the resource.

DC Comment:

Examples of a Creator include a person, an organization, or a service. Typically, the name of a Creator should be used to indicate the entity.

WHO Comment:

There can be more than one Creator. For example, you could have a composer and a lyricist equally responsible for the intellectual content of a musical piece. You could also have two authors of a book or article. With digitized reproductions of original items, you may need to include names in Creator elements for persons or bodies responsible for different aspects of the content of the digital resource. For example, a photograph by Gary Leonard of Frank Gehry's Disney Concert Hall in Los Angeles could have Creator elements for both "Leonard, Gary" and "Gehry, Frank O., 1929-"

Input Guidelines:

a. Use of Library of Congress Name Authority File (LCNAF) is strongly recommended.
b. If LCNAF is not available, please use the following format:
   - Last name, first name, middle initial, Date-Date (unless the rules of the language dictate otherwise, e.g., Jónas Hallgrímson, 1807-1845)
   - If you have only a birth or death date, or an approximate ("circa") date, use the following patterns: "b. date," "d. date", and "ca. date." Note: question marks are allowed in this field
   - Examples: Smith, Joe M., 1931-2002
     Smith, Joe M., b. 1931?
     Smith, Joe M., d. 2002
     Smith, Joe M., ca. 1900-1990
e. For corporate body names (i.e., names of organizations, societies, government agencies, etc.), enter the name as it appears. If the name includes a subordinate body which is part of a larger parent body, give the parent body first, encoding with a period, followed by the subordinate body. Example:
   University of Wisconsin. Department of Art History
f. Do **not** include any extraneous explanatory data in addition to the name and dates, such as a person's role (e.g., Smith, Joe, M. 1931-2002: Composer). Including data other than the controlled form of the name will now allow all instances of the name to be hyperlinked and indexed for database users.

Qualifiers:

Refinements: none

Schemes

Scheme Name	Definition
LCNAF [strongly recommended]	Library of Congress Name Authority File: http://authorities.loc.gov/

Examples:

Element Name	Encoding Scheme	Element Content	Comment on the example
Creator	LCNAF	Brahms, Johannes, 1833-1897	Composer of musical piece contained in digitized sound file
Creator	LCNAF	Borges, Jorge Luis, 1899-	Author of text contained in digitized text file
Creator	LCNAF	Gaskell, Charles A.	Author of text

Creator	LCNAF	Rilke, Rainer Maria, 1875-1926	Poet
Creator	LCNAF	Gehry, Frank O., 1929	Architect of building depicted in digitized photograph
Creator	LCNAF	Leonard, Gary	Photographer of original photograph from which digital image was made
Creator		Jones, Martha Anne, ca. 1860-1920	Author, name not in LCNAF, and dates not known

Date — MANDATORY if Available; REPEATABLE

WHO Requirements:

Mandatory if available: one date element containing the date of creation of the original resource, using the Created refinement qualifier.

Optional: additional date elements for local database using one of the other refinement qualifiers. If used, these additional dates should not be exposed for OAI harvesting.

DC Definition: A date associated with an event in the life cycle of the resource.

DC Comment: Typically, Date will be associated with the creation or availability of the resource. Recommended best practice for encoding the date value is defined in a profile of ISO 8601 [W3CDTF] and follows the YYYY-MM-DD format.

WHO Comment:

A resource may have many dates associated with it, including: creation date, copyright date, revision date, edition date, modification date, issued date, valid date, available, etc. WHO mandates including the date of the creation of the original resource from which the digital object is derived, or the date of creation of a born-digital object. For dates other than creation date, use separate Date elements with the appropriate refinement qualifier for each additional date associated with the resource.

Input Guidelines:

a. Specific dates should follow ISO 8601 [W3CDTF] format: see Schemes below.
b. Questionable or approximate dates should be expressed using "ca." [Latin "circa," meaning "about"] and not a question mark. Use "ca." for a single date or date range when you can estimate that this is the probable date or date range, but it is not certain. If you can determine with certainty that a resource was created during a given date range, give that date range without the "ca." See the examples below.

OAI Considerations:

1. If including dates in addition to the date of original creation, clearly label those dates in the local database, but do not expose them for harvesting.

Qualifiers:

Schemes

Scheme Name	DC Definition
W3C-DTF [mandatory if applicable; i.e. a single certain date]	W3C Encoding rules for dates and times - a profile based on ISO 8601: http://www.w3.org/TR/NOTE-datetime
DCMI Period	A specification of the limits of a time interval: http://dublincore.org/documents/dcmi-period/

Refinements

Refinement Name	DC Definition
Available [optional]	Date (often a range) that the resource will become or did become available.
Created	Date of creation of the resource.
Date Accepted	Date of acceptance of the resource (e.g. of thesis by university department, of article by journal, etc.).
Date Copyrighted	Date of a statement of copyright.
Date Submitted	Date of submission of the resource (e.g. thesis, articles, etc.).

Issued	Date of formal issuance (e.g., publication) of the resource.
Modified	Date on which the resource was changed.
Valid	Date (often a range) of validity of a resource.

Examples:

Element Name	Element Refinement	Encoding Scheme	Element Content	Comment
Date	Issued	W3C-DTF	1927	Date of original text, published in 1927 (Year)
Date	Created	W3C-DTF	1927-07	Date of original art work, created in year July, 1927 (Month and Year)
Date	Created	W3C-DTF	1927-07-03	Date of original photograph taken on July 3, 1927 (Year, Month and Day)
Date	Created		1910-1920	Date range: original art work known to have been created between these dates. For a serial, these are the beginning and ending dates of publication
Date	Issued		ca. 1927	Approximate single date: original text probably published in this year or close to it
Date	Created		ca. 1910-1920	Approximate date range: original work probably created sometimes between these dates, but not certain

Description OPTIONAL; REPEATABLE

DC Definition: An account of the content of the resource.
DC Comment:
Description may include but is not limited to: an abstract, table of contents, reference to a graphical representation of content or a free-text account of the content.
WHO Comment:
Description may include but is not limited to: an abstract, edition information, a table of contents, information about the physical description or condition of the resource, and any free-text notes about the resource

Input Guidelines:
a. This is a free text field.
b. Best practices recommend standard sentence form. Capitalize content in the description field according to normal rules of writing. Do not enter content in all capitals except in the case of acronyms

Qualifiers:

Refinements

Refinement Name	DC Definition
Abstract [optional]	A summary of the content of the resource.
Table of Contents [optional]	A list of subunits of the content of the resource.

Schemes: none

Examples:

Element Name	Element Refinement	Element Content	Comment on the example
Description		Addie Tripp was a single woman, perhaps a domestic servant, who lived with the William Johnson family of Onalaska, Wisconsin, during the Civil War. Her diary describes her daily household tasks for the family and community life during the war.	Description of the author of a digitized personal diary.
Description		Top row: left to right: Charles, Louise, Louis, Mary and Henry. Bottom row: left to right. Fourth person is Mary Van Pay, Louis Brice's wife and Mayme Brice's mother. Mayme Brice married Albert Kolodzik.	Description of persons depicted in a digitized photograph.
Description		Commercial stretch of Brady Street including Regano's Roman Coin bar and Glorioso Brothers grocery store. St. Hedwig's church in background.	Description of a place depicted in a digitized photograph.
Description	Abstract	The rapid growth of Internet resources and digital collections has been accompanied by a proliferation of metadata schemas, each of which has been designed based on the requirements of particular user communities, intended users, types of materials, subject domains, project needs, etc. Problems arise when building large digital libraries or repositories with metadata records that were prepared according to diverse schemas. This article (published in two parts) contains an	Abstract of a digital journal article

Element Name	Element Refinement	Element Content	Comment on the example
Description		Addie Tripp was a single woman, perhaps a domestic servant, who lived with the William Johnson family of Onalaska, Wisconsin, during the Civil War. Her diary describes her daily household tasks for the family and community life during the war.	Description of the author of a digitized personal diary.
		analysis of the methods that have been used to achieve or improve interoperability among metadata schemas and applications, for the purposes of facilitating conversion and exchange of metadata and enabling cross-domain metadata harvesting and federated searches.	
Description	Table of Contents	Title page. Prefatory. Preparatory. Southwest Kansas and the Arkansas Valley. What the Government Reports Show. Government Land Office Statistics. The Arkansas Valley. The Old and the New. Pawnee Rock and its Inscriptions. In and About Kinsley. Wheat Raising. Wool Growing. Cattle Raising. In the Mountains. Cañon City and Vicinity. Oak and Oil Creek Cañons. The Grand Cañon of the Arkansas. The Hayden Survey. Ouray to South Arkansas. Twin Lakes and Mount of the Holy Cross. Manitou and Colorado Springs.	Table of contents of a digitized book

Format — MANDATORY; REPEATABLE

WHO Requirements:

Mandatory: one Format element containing the MIME Internet Media Type (IMT) designation for the digital file, using the IMT encoding scheme qualifier.

Optional: additional Format elements, either qualified or unqualified, containing the extent (file size or duration) of the digital file, and/or a physical description of the original resource.

DC Definition: The physical or digital manifestation of the resource.

DC Comment:

Typically, Format may include the media-type or dimensions of the resource. Format may be used to determine the software, hardware or other equipment needed to display or operate the resource. Examples of dimensions include size and duration. Recommended best practice is to select a value from a controlled vocabulary (for example, the list of Internet Media Types [MIME] defining computer media formats)

WHO Comment and Input Guidelines:

There will always be one Format element containing the Internet Media Type of the digital resource. An unqualified Format element may also be used to describe the software, hardware, or other equipment needed to display or operate the digital resource. Optionally, the size or duration of the digital file may be given in a separate Format element using the "Extent" qualifier. In addition, physical description information about the original analog resource, such as the physical material or carrier can be included in a separate Format element with the "Medium" qualifier.

Do not use the Format element for subject genre or musical medium, such as musical or artistic work (this would go into Description or Subject elements), because they really speak more to the intellectual content of the Resource.

Input Guidelines:

a. Mandatory: Enter the IMT for the type of digital file.
b. Optional: Enter digital file size or duration information in Format.Extent.
c. Optional: Enter format of original analog object in Format.Medium.

Qualifiers:

Refinements

Refinement Name	DC Definition
Extent [optional]	The size or duration of the resource.
Medium [optional]	The material or physical carrier of the resource.

Schemes

Scheme Name	DC Definition
IMT [mandatory]	The Internet media type of the resource. http://www.iana.org/assignments/media-types/

Examples:

Element Name	Element Refinement	Element Encoding Scheme	Element Content	Comment on the example

Format		IMT	image/jpeg	Internet Media Type designation for a jpeg image file
Format		IMT	application/pdf	Internet Media Type designation for a PDF text file
Format	Extent		3,000,000 bytes	file size for a 3 megabyte file
Format	Extent		1 minute	play time for a digital audio file
Format	Medium		oil on canvas	the physical characteristics/material of the resource depicted in a digital image
Format	Medium		linen with beads	the physical characteristics/material of the resource depicted in a digital image

Identifier — MANDATORY; REPEATABLE

WHO Requirements:

Mandatory: one Identifier element containing a unique file name for the digital object represented by the metadata record

Optional: additional identifier elements, if appropriate

DC Definition: An unambiguous reference to the resource within a given context.

DC Comment:

Recommended best practice is to identify the resource by means of a string or number conforming to a formal identification system. Example formal identification systems include the Uniform Resource Identifier (URI) (including the Uniform Resource Locator (URL)), the Digital Object Identifier (DOI) and the International Standard Book Number (ISBN).

WHO Comment:

A unique file name that ties the metadata record to the digital file it describes is required for WHO. Optional additional Identifier elements could include a number created by the submitting institution, a call number, a number unique to a digital collection, or it could be a number that conforms to a formal identification system such as a Uniform Resource Identifier (URI) and International Standard Book Number (ISBN), etc.

Input Guidelines:

1. Record the identifier according to common formatting conventions for the type of identifier being used. See examples below.

Qualifiers:

Refinements: none

Schemes

Scheme Name	DC Definition
URI [optional]	Uniform Resource Identifier

Additional WHO authorized schemes:

Scheme Name	Definition
URN [optional]	Uniform Resource Number
DOI [optional]	Digital Object Identifier
ISBN [optional]	International Standard Book Number
ISSN [optional]	International Standard Serial Number

Examples:

Element Name	Encoding Scheme	Element Content	Comment on the example
Identifier		abc0049501	Local file name for the digital object represented in this metadata record
Identifier		F 587 .A15 S32 1937	LC call number for original book
Identifier	ISBN	0374512671	ISBN for original book
Identifier	DOI	10.1000/182	DOI for digital article
Identifier	URI	http://www.xxx.edu/collection7/image22.htm	URL for Web page containing the digital resource

Language — MANDATORY IF APPLICABLE; REPEATABLE

DC Definition: A language of the intellectual content of the resource.

DC Comment:

Recommended best practice is to use RFC 3066 [RFC3066], which, in conjunction with ISO 639 [ISO639], defines two- and three-letter primary language tags with optional sub-tags. Examples include "en" or "eng" for English, "akk" for Akkadian, and "en-GB" for English used in the United Kingdom.

WHO Comment:

The language in which a text is written or the spoken language(s) of an audio or video resource. Visual images do not usually have a language unless there is a significant text in a caption or in the image itself. Sound recordings without sung or spoken words are also lack linguistic content. Include language codes for each language that makes up a significant portion of the resource.

Input Guidelines:

a. Must use the appropriate 3-letter code from the ISO639-2 scheme.

b. For resources with no linguistic content, either omit the language element or use the code "zxx" for "no linguistic content."

Qualifiers:

Refinements: none

Schemes

Scheme Name	DC Definition
ISO 639-2 [mandatory]	ISO 639-2: Codes for the representation of names of languages: http://lcweb.loc.gov/standards/iso639-2/langhome.html

Examples:

Element Name	Encoding Scheme	Element Content	Comment on the example
Language	ISO 639-2	eng	ISO 639-2 code for English
Language	ISO 639-2	zxx	ISO 639-2 for "No linguistic content" –an option for an image or other non-linguistic resource; the other option is to not use this element for non-linguistic resources
Language	ISO 639-2	spa	ISO 639-2 code for Spanish
Language	ISO 639-2	ger	ISO 639-2 code for German
Language	ISO 639-2	fre	ISO 639-2 code for French

Publisher OPTIONAL; REPEATABLE

DC Definition: An entity responsible for making the resource available.
DC Comment:
Examples of a Publisher include a person, an organization, or a service. Typically, the name of a Publisher should be used to indicate the entity.
WHO Comment:
Publisher is the name of the person, organization, or service responsible for publishing the original resource that the digital file represents. For born-digital resources, Publisher is the person, organization, or service responsible for making the digital resource available online. Publishers can be a corporate body, museum, historical society, university, project, repository, etc.
This field may also optionally contain the place of publication in addition to the publisher name.

Input Guidelines:
a. This field must always have the publisher name, but location is optional; it cannot have location only.
b. If including the place of publication, enter data as, "Location: Publisher name"
c. Spell out state names.

Qualifiers:

Refinements: none
Schemes: none

Examples:

Element Name	Element Content	Comment on the example
Publisher	Scofield Souvenir & Postcard Co.	Publisher of the original postcard, now digitized
Publisher	Philadelphia: John Benjamins Publishing Company	Publisher of the original printed text, now digitized, including place of publication
Publisher	Wisconsin Historical Society	The agency making the digitized text available online
Publisher	University of Wisconsin-Milwaukee Libraries	The agency making the digitized image available online

Relation — MANDATORY; REPEATABLE

WHO Requirements:
Mandatory: one **Relation Is Part Of** element containing the name of the parent collection, **physical or digital**, of which the resource is a part. Do not use the Source element to reflect a collection relationship.
Optional: additional Relation elements using one of the Refinement qualifiers

DC Definition: A reference to a related resource.
DC Comment:
Recommended best practice is to reference the resource by means of a string or number conforming to a formal identification system.
WHO Comment:
This element contains information necessary to show a relationship with another resource separate from the resource being described/represented by the current metadata record.
See the list of refinements below for the many types of relationships that this element can show. Relationships can be from the resource being described to another resource in the same online collection, in a different online collection, or to an external resource. Each refinement qualifier can be used to indicate more than one type of thing in a collection (e.g., "Is Part Of" can refer to both a movement within a work and a work within a series).
Recommended best practice is to always use one of the refinement qualifiers listed below to explain the nature of the relationship between the described resource (i.e., the resource being described by the metadata record) and the related resource being referred to in the Relation element. The refinement is included in the element encoding; do not repeat it in the element value.

Input Guidelines:
a. Free text form: Name of the collection
b. Must use *IsPartOf* to describe relation to a parent collection.

Qualifiers:

Refinements

Refinement Name	DC Definition
Is Part Of [mandatory]	The described resource is a physical or logical part of the referenced resource.
Conforms To [optional]	A reference to an established standard to which the resource conforms.
Has Format [optional]	The described resource pre-existed the referenced resource, which is essentially the same intellectual content presented in another format.
Has Part [optional]	The described resource includes the referenced resource either physically or logically.
Has Version [optional]	The described resource has a version, edition, or adaptation, namely, the referenced resource.
Is Format Of [optional]	The described resource is the same intellectual content of the referenced resource, but presented in another format.
Is Referenced By [optional]	The described resource is referenced, cited, or otherwise pointed to by the referenced resource.
Is Replaced By [optional]	The described resource is supplanted, displaced, or superseded by the referenced resource.

Refinement Name	DC Definition
Is Part Of [mandatory]	The described resource is a physical or logical part of the referenced resource.
Is Required By [optional]	The described resource is required by the referenced resource, either physically or logically.
Is Version Of [optional]	The described resource is a version, edition, or adaptation of the referenced resource. Changes in version imply substantive changes in content rather than differences in format.
References [optional]	The described resource references, cites, or otherwise points to the referenced resource.
Replaces [optional]	The described resource supplants, displaces, or supersedes the referenced resource.
Requires [optional]	The described resource requires the referenced resource to support its function, delivery, or coherence of content.

Schemes

Scheme Name	DC Definition
URI [optional]	Uniform Resource Identifier

Examples:

Element Name	Element Refinement	Element Content	Comment
Relation	Is Part Of	African Heritage	The digital image described in the metadata is a part of the "African Heritage" online collection
Relation	Is Part Of	Milwaukee Neighborhoods	The digital image described in the metadata is a part of the "Milwaukee Neighborhoods" online collection
Relation	Is Part Of	Library Journal v. 127, no. 9 (May 15, 2002) p. 32-4	The digitized article described in the metadata is part of this particular issue of Library Journal
Relation	Is Part Of	Mesa Verde Black-on-white kiva jar (Vessel 25)	The resource described in the metadata is a digital image of the jar's lid, and the lid is part of the overall pottery piece
Relation	Is Part Of	Canterbury Tales	A digitized text of The Knight's Tale is part of the larger work The Canterbury Tales
Relation	Is Part Of	Knight's Tale	A digitized text of the complete Canterbury Tales include The Knight's Tale as a part within it
Relation	Is Version Of	Adaptation of the play Death of a Salesman by Arthur Miller	The digital text described in the metadata is a adaptation of the Arthur Miller play
Relation	Is Format Of	Digital reproduction of the poster Wildflowers Amuk, City Museum of Wildflowers, New York.	
Relation	Is Format Of	Digital reproduction of Diary of a Physician in California from microfilm version by University Microfilms, 1971 as part of American Culture Series II, reel 450, pt. 19.	
Relation	References	American Culture Series II	The described resource is an index to the series

Element Name	Element Refinement	Element Content	Comment
Relation	Is Part Of	African Heritage	The digital image described in the metadata is a part of the "African Heritage" online collection
Relation	Is Referenced By	The New Sabin, v. 1, no. 333. ISBN 0878750495	The described resource is referenced in this volume of The New Sabin
Relation	Replaces	Western States Dublin Core Metadata Best Practices, version 1.2, January, 2003	The document described in the metadata replaces the Western States document referenced in the Relation element
Relation	Is Replaced By	CDP Dublin Core Metadata Best Practices, version 2.1, September 2005	The document described in the metadata is replaced by the CDP document referenced in the Relation element
Relation	Requires	Adobe Acrobat Reader, version 6.0	The resource described in the metadata requires Adobe Acrobat Reader

Rights — MANDATORY; REPEATABLE

WHO Requirements:

Mandatory: one Rights element containing a free text institutional copyright statement applicable to the institution holding the rights to the digital resource (image, text, etc.)

Optional: additional Rights elements, unqualified or qualified

DC Definition: Information about rights held in and over the resource.

DC Comment:

Typically, a Rights element will contain a rights management statement for the resource, or reference a service providing such information. Rights information often encompasses Intellectual Property Rights (IPR), Copyright, and various Property Rights. If the Rights element is absent, no assumptions can be made about the status of these and other rights with respect to the resource.

WHO Comment:

This element has two aspects: (b) ownership and rights information pertaining to the original object and (b) rights and terms of access for the digital object.
WHO requires at minimum a copyright statement of the person or body owning rights to the digital resource made available online.

Qualifiers:

Refinements: none

Schemes: none

Examples:

Element Name	Element Content	Comment on the example
Rights	Copyright © 2006 University of Wisconsin Regents	Free text institutional copyright statement
Rights	These materials may be copied freely by individuals and libraries for personal use, research, teaching (including distribution to classes), or any 'fair use' as defined by U.S. copyright laws. Please include this statement and author or photographer attribution with any copies you make. The materials may be linked to freely in non-commercial, non-subscription Internet editions created for an educational purpose.	Free text rights management / terms of use statement
Rights	Anyone interested in any other use of these materials, including for-profit Internet editions, should obtain permission from Fairview Public Library which retains copyright for all other purposes. Contact Fairview Public Library through the Reference Department, Fairview Public Library, 123 Main Street, Fairview, Wisconsin 535XX (info@zzz.lib.wi.us).	Free text rights management statement, adding to the information in the rights statement above
Rights	U.S. and international copyright laws protect this digital image. Commercial use or distribution of the image is not permitted without prior permission of the copyright holder. Please contact XXX for permission to use the digital image.	Free text rights management statement
Rights	Copyright to this resource is held by XXX and is provided here for educational purposes only. It may not be downloaded, reproduced, or distributed in any format without written permission of XXX. Any attempt to circumvent the access controls placed on this file is a	Free text rights management statement

Element Name	Element Content	Comment on the example
Rights	Copyright © 2006 University of Wisconsin Regents	Free text institutional copyright statement
	violation of United States and international copyright laws, and is subject to criminal prosecution.	

Source — OPTIONAL; NOT REPEATABLE

WHO Requirements:
Optional

DC Definition: A related resource from which the described resource is derived.
DC Comment: The described resource may be derived from the related resource in whole or in part. Recommended best practice is to identify the related resource by means of a string conforming to a formal identification system. This term is intended to be used with non-literal values as defined in the DCMI Abstract Model <http://dublincore.org/documents/abstract-model/>. As of December 2007, the DCMI Usage Board is seeking a way to express this intention with a formal range declaration.
WHO Comment: The source element should only be used for information identifying the original object from which a digital reproduction was created. Wisconsin Heritage Online recommends restricting use of the Source element to reference another individual resource from which the current resource was derived in whole or in part. Do not use Source for the name of a collection, whether original or digital, from which the current resource was taken or of which it is a part; use *Relation.IsPartOf* instead. See Relation element for more information and examples. Limit use of *Source* element. It is not harvested into Wisconsin Heritage Online.

Input guidelines:

1. Enter multiple source information in order of importance. Use separate ***Source*** elements to enter multiple sources or *clearly separate each entry* by a semicolon and a space within an element. Usually there will be only one source from which the present digital resource has been derived.

2. If, as in most cases, the ***Source*** element describes an originating resource upon which the digital resource is somehow *based*, then also include a ***Relation*** element such as ***Relation [IsVersionOf***] — see ***Relation*** element for more information. Such ***Relation*** elements often duplicate information given in the ***Source*** element, but in shorter form and often with a hyperlink added.

3. The ***Source*** element may consist of a combination of elements such as free text combined with a formal identification system (such as an ISBN to describe a book).

4. Whenever possible, include a unique standard identifier such as an ISBN, ISSN, LC call number, Dewey call number, or NTIS report number. If no standard identifier exists, use a local call number, control number, accession number, or barcode. Identify the institution associated with such locally derived numbers.

5. Clarify the nature of the relationship between the two resources by using an initial phrase such as "Originally published as:," "Excerpted from:," "Original book:," "Original format:," or "Reproduction of:," etc.

Notes:

1. The ***Source*** element usually is used in conjunction with a corresponding ***Relation*** element. Because ***Source*** elements show a derivative relationship with another resource, they generally have a corresponding ***Relation*** element to show that relationship. Not all ***Relation*** elements, however, conversely require a

corresponding ***Source*** element because not all related resources are derivative. For example, a resource might require another resource to *support* it or it might be *referenced by* another resource. In both these cases, a ***Relation*** element might be required (i.e., ***Relation [Requires]*** and ***Relation [IsReferencedBy]***), but a ***Source*** element would not. See ***Relation*** for more information.

2. In general, include information about a previous version which does not fit easily into ***Relation***.

Qualifiers:

Refinements: None

Schemes

Scheme Name	Definition
URI	Uniform Resource Identifier http://www.ietf.org/rfc/rfc2396.txt

Subject — MANDATORY; REPEATABLE

WHO Requirements:
Mandatory: at least one, preferably more, subject elements; strongly recommended: use terms from one of the established controlled vocabularies listed under encoding schemes below; acceptable: use terms from a local or other established vocabulary; minimum acceptable: use uncontrolled keyword terms.
Optional: additional subject elements with uncontrolled terms in addition to controlled vocabulary terms

DC Definition: The topic of the content of the resource.
DC Comment:
Typically, a Subject will be expressed as keywords, key phrases or classification codes that describe a topic of the resource. Recommended best practice is to select a value from a controlled vocabulary or formal classification scheme.
WHO Comment:
What the content of the resource is *about* or what it *is*, expressed by headings, phrases, names and sometimes keywords. Subject terms usually originate from an established thesaurus or discipline-related word lists.

Input Guidelines:
a. For multi-word subject terms, capitalize just the first word, unless other words are proper nouns
b. Use appropriate delimiter to separate multiple subject terms according to your local content management tool.
* If using SiteSearch, delimit fields with a vertical pipe and space ("| ").
(The vertical pipe is above the back slash on the keyboard.)
e.g., subject term 1| subject term 2| subject term 3
* If using CONTENTdm, delimit fields with a semi-colon and space ("; ").
e.g., subject term 1; subject term 2; subject term 3
c. If LCSH terms are being used, follow the standard formatting, using space dash space to separate headings and subdivisions (note; on standard keyboards, two hyphens are used to equal a dash); e.g., Heading -- Subdivision.

Qualifiers:

Refinements: none

Schemes

Scheme Name	DC Definition
DDC	Dewey Decimal Classification: http://www.oclc.org/dewey/index.htm
LCC	Library of Congress Classification: http://lcweb.loc.gov/catdir/cpso/lcco/lcco.html
LCSH	Library of Congress Subject Headings: http://authorities.loc.gov/
MESH	Medical Subject Headings: http://www.nlm.nih.gov/mesh/meshhome.html
NLM	National Library of Medicine Classification: http://wwwcf.nlm.nih.gov/class/
UDC	Universal Decimal Classification: http://www.udcc.org/

Additional WHO authorized schemes:

Scheme Name	Definition

AAT	Getty Art and Architecture Thesaurus: http://www.getty.edu/research/conducting_research/vocabularies/aat/
Chenhall	The Revised Nomenclature for Museum Cataloging: A Revised and Expanded Version of Robert G. Chenhall's System for Classifying Man-Made Objects
LCNAF	Library of Congress Name Authority File: http://authorities.loc.gov/
LCTGM	Library of Congress Thesaurus for Geographic Names I: Subject Terms: http://www.loc.gov/rr/print/tgm1/
TGN	Getty Thesaurus of Geographic Names: http://www.getty.edu/research/tools/vocabulary/tgn/index.html

Examples:

Element Name	Encoding Scheme	Element Content	Comment on the example
Subject	AAT	Textiles	The book is about textiles, or image depicts textiles, etc.
Subject	AAT	Table Linens	The resource is about or depicts table linens, or is a table linen
Subject	LCSH	Animals, Mythical	The resource is a text about mythical animals, or an image depicting a mythical animal, etc.
Subject	LCSH	Bridges -- Wisconsin -- Racine	The image depicts a bridge in Racine, Wisconsin
Subject	LCNAF	Schafer, Joseph, 1867-1941	The resource is a biography of Joseph Schafer
Subject	Chenhall	Machine, Adding	The item depicted in the digital image is an adding machine

Title — MANDATORY; REPEATABLE

WHO Requirements:

Mandatory: one Title element, either from the resource or devised by the metadata creator.

Optional: additional Title elements for other titles born by the resource; recommended to use the Alternative qualifier for these additional Title elements.

DC Definition: A name given to the resource.

DC Comment:

Typically, a Title will be a name by which the resource is formally known.

WHO Comment:

Normally Title is the name given to the resource by the creator or publisher. If the name is unknown, or the resource does not have a formal name assigned, an identifying name or phrase must be provided by the contributing institution. This element could also contain a subtitle if there is one.

Input Guidelines:

a. Pay attention to capitalization.

b. In general, capitalize the first word (of a title, for example) and proper names (place, personal and corporate names) and subject terms only. Do not enter content in all capital letters except in the case of acronyms.

Qualifiers:

Refinements

Refinement Name	DC Definition
Alternative [optional]	Any form of the title used as a substitute or alternative to the formal title of the resource. Description: This qualifier can include Title abbreviations as well as translations.

Schemes: none

Examples:

Element Name	Element Refinement	Element Content	Comment on the example
Title		Aunt Jane	Title taken from handwritten caption on original photograph
Title		Dia de la Tierra	Title appearing on original poster
Title		Fishing Near Holcolm, Wisconsin	Title of original painting assigned by the artist
Title		Untitled	Title of an artwork actually assigned by the artist
Title		Triangulations	Title of original book
Title	Alternative	Try angulations	Alternative version of title appearing in original book
Title		Main Street, La Crosse, Wisconsin, circa 1920s	image of downtown La Crosse, title supplied by the metadata creator
Title		Bear statue with bugle	sculpture of a bear, title supplied by metadata creator
Title		Mr. And Mrs. Steenbock sitting	Title taken from label

Element Name	Element Refinement	Element Content	Comment on the example
Title		Aunt Jane	Title taken from handwritten caption on original photograph
		under a tree on campus	affixed to original slide

Type — MANDATORY; REPEATABLE

WHO Requirements:

Mandatory: a value selected from the DCMI Type scheme for the predominant content of the resource.

Optional: additional Type elements if applicable, e.g., a digital resource in which text, image, and sound are integrated and are all of equal importance.

DC Definition: The nature or genre of the content of the resource.

DC Comment:

Type includes terms describing general categories, functions, genres, or aggregation levels for content. Recommended best practice is to select a value from a controlled vocabulary (for example, the DCMI Type Vocabulary [DCMITYPE]). To describe the physical or digital manifestation of the resource, use the Format element.

WHO Comment:

A term selected from the DCMI Type list that best characterizes the content of the resource, regardless of its original or digital manifestation. For example, a book digitized as a set of image files would still be Type Text, whereas its digital Format would be image.

Input Guidelines:

a. Follow capitalization and spacing from the DCMI Type scheme exactly.

Qualifiers:

Refinements: none

Schemes

Scheme Name	DC Definition
DCMI Type [mandatory]	DCMI Type Vocabulary: A list of types used to categorize the nature or genre of the content of the resource: http://dublincore.org/documents/dcmi-type-vocabulary/

Examples:

Element Name	Encoding Scheme	Element Content	Comment on the example
Type	DCMI Type	Still Image	A digital image of a photograph, slide, painting, drawing, graphic design, plan, map
Type	DCMI Type	Text	A digitized book, document, scrapbook, diary, poem, manuscript, music score
Type	DCMI Type	Sound	A digitized audio recording of a personal narrative or interview, instrumental or sung music, natural sounds
Type	DCMI Type	Collection	A collection of things, such as an image collection being described in the metadata at the collection level rather than the item level

B. Local WHO Elements (mapped to NONE when using Dublin Core)

Submitting Institution

MANDATORY; NOT REPEATABLE

Local WHO Element

WHO Definition:

The name of the agency, institution or administrative unit (library, museum, archive, etc.) owning the digital object and submitting the digital object and its accompanying metadata to Wisconsin Heritage Online.

WHO Comment:

Information in this element will sometimes duplicate the Owner or Digital Publisher field. Since Submitting Institution has no Dublin Core equivalent, it MUST be explicitly added to item metadata for the collection to be included in Wisconsin Heritage Online.

Input Guidelines:

a. Recommended best practice is to record the name of the institution in a standard format, according to a controlled vocabulary such as LCNAF if possible.
b. When applicable, enter subordinate body names as follows: Institution. Department; e.g.: University of Wisconsin-Milwaukee. Special Collections.

Qualifiers: none

Examples:

Submitting Institution	Comment
Wisconsin Historical Society	Name of institution submitting the digital object and its metadata to WHO
University of Wisconsin-Oshkosh	
State of Wisconsin. Dept. of Public Instruction	

Digitization Information — OPTIONAL; REPEATABLE

Local WHO Element

WHO Definition:

Non-public technical information for the long-term preservation of the digital resource.

WHO Comment:

The Digitization Information element is a non-Dublin Core, local WHO element. The purpose of the element is to record technical information needed primarily for preservation of the digital resource. Although optional, WHO strongly recommends its inclusion. If used, this element should be exposed for harvesting by WHO for internal documentation about each file, but it will not be publicly displayed or searchable. This element is free text, and is not based on any Dublin Core recommendations.

Input Guidelines:

1. Strongly Recommended for visual resources:

a) **Type of scanner used** - General type, specific manufacturer, model name, and model number); e.g., Microtek ScanMaker 8900XL flatbed scanner

b) **Resolution of master file** (TIFF, PSD, etc.; not the access file); e.g., 600dpi.

2. Optional:

c) File size for master file - The number of bytes as provided by the computer system. Best practice is to record the file size as bytes (e.g., 3,000,000 bytes) and not as kilobytes (Kb), megabytes (Mb), etc.

d) Quality - For visual resources, other characteristics in addition to resolution, such as bit depth; for multimedia resources, other indicators of quality, such as 16-bit audio file.

e) Compression - Electronic format or compression scheme used for optimized storage and delivery of digital object. This information often supplements the *Format* element.

f) Extent of master file - Pixel dimensions, pagination, spatial resolution, play time, or other measurements of the physical or temporal extent of the digital object. Some of this information could be recorded in the Format [Extent] element instead.

g) Other technical and preservation information.[1]

Examples:

Digitization Information	Comment
Scanned with Microtek ScanMaker 8900XL flatbed scanner at 600dpi.	Typical example, includes: Scanner and scan resolution for a digitized image
Master file format: 3,000,000 bytes, 24 bits; 600 ppi, CCITT Group 4; Checksum: 2224446888; Epson 1640XL scanner; PhotoshopCS.	More a-typical, detailed example, includes: file size, bit depth, spatial resolution, and lossless TIFF compression algorithm for master file format; Checksum value for a 1,001,000 byte file; Scanner hardware; Creation software

[1] A useful resource to consult is NISO document Z39.87-2002, *Data Dictionary: Technical Metadata for Digital Still Images* < http://www.loc.gov/standards/mix/ > which provides an excellent element-by-element example of detailed of technical metadata that could be recorded about every digital object. This document focuses on visual resources, but many of the technical metadata elements would apply to any digital file.

Date Digitized — MANDATORY; NOT REPEATABLE

Local WHO Element

WHO Definition:

The date on which the digital file was created, whether the resource was born digital or is a digitization of a resource originally in a non-digital format.

Input Guidelines:

1. This date might be system-generated at the time of digital file creation.

Qualifiers: none

Examples:

Date Digitized	Comment
2005-06-15	Date photograph was scanned to make a digital image file
2006	Date book was scanned as multiple image files to make complex digital text object

Date Last Updated — MANDATORY IF APPLICABLE; NOT REPEATABLE

Local WHO Element

WHO Definition:

The date on which the metadata about the digital resource was last updated.

Input Guidelines:

a. This date may be computer or system generated.

Qualifiers: none

Examples:

Date Last Updated	Comment
2006-08-16	System generated date of last update of the metadata

Non-Public Note

OPTIONAL; REPEATABLE

Local WHO Element

WHO Definition:

A free text note for internal use by the local institution and/or by Wisconsin Heritage Online. The note can contain any kind of non-public information about the digital resource which an institution wishes to record and which does not fit into one of the other DC or WHO elements.

Qualifiers: none

Examples:

Non-Public Note	Comment
Debbie's map project	An informal name for a project in process, in which the materials digitized were a portion of a larger formal collection.

Part IV. Metadata Background

What is Metadata?

Metadata is a recent term that includes the kind of bibliographic data that libraries have entered into their catalogs and databases and the kind of registration data about collections that museums have entered into their systems for decades. In its broadest sense, metadata is any kind of data that describes, provides access to, manages, structures, and performs other functions in relation to information resources. The term is most commonly used, however, to refer to information needed for digital resource management, discovery, identification, and retrieval.

The creation of metadata for digital resources is an important part of a digitization project, and must be incorporated into a project's workflow. Metadata should be created and associated with a digital resource to support the discovery, use, management, reusability, and sustainability of the resource. Metadata is most often divided into three conceptual types (with some overlap between the three):

- Descriptive metadata: used for the indexing, discovery, and identification of a digital resource
- Structural metadata: information used to display and navigate digital resources; also includes information on internal organization of the digital resource. Structural metadata might include information such as the structural divisions of a resource (i.e., chapters in a book) or sub-object relationships (such as individual diary entries in a diary section).
- Administrative metadata: represents the management information for the digital object, which may include information needed to access and display the resource, as well as rights management information. Administrative metadata might include technical information, such as the resolution at which the images were scanned, the hardware and software used to produce the image, compression information, pixel dimensions, etc. Administrative metadata may also assist in the long-term preservation of digital resources.

Today's users are accessing digital resources from their home, work, school, etc, at any time of the day, and often without the assistance of a librarian, archivist, curator, or museum educator. Therefore, metadata needs to provide information that:

- Certifies the authenticity and degree of completeness of the content
- Establishes and documents the context of the content
- Identifies and exploits the structural relationships that exist between and within information objects
- Provides a range of intellectual access points for an increasingly diverse range of users
- Provides some of the information that an information professional might have provided in a physical reference or research setting

Importance of Metadata Standards

Metadata standards are intended to help anyone provide a consistent level of information in support of any products they make available to others.[2] Standards are necessary for

[2] Collaborative Digitization Program Dublin Core Metadata Best Practices: http://www.bcr.org/cdp/best/dublin-core-bp.pdf

metadata usability, interoperability, "shareability," harvesting, and aggregating, especially within a collaborative project involving numerous diverse institutions.

What Is Dublin Core and Why Use It?

The Dublin Core is an internationally recognized metadata standard of fifteen basic elements, or descriptive categories, used to describe a variety of digital resources. The semantics of these elements have been established through consensus by an international, cross-disciplinary group of professionals from the library, museum, publishing, computer science, and text encoding communities, as well as from other related fields of scholarship. The Dublin Core Metadata Initiative Element Set has been formally endorsed by both the International Standards Organization (ISO Standard 15836-2009) and the National Information Standards Organization (NISO Standard Z39.85-2007).

The Dublin Core metadata standard embodies the following characteristics:

- *Simplicity of creation and maintenance*
  The intention of the Dublin Core element set is to remain as simple and accessible as possible, in order to allow a non-specialist to create descriptive records for online resources both easily and efficiently, while providing optimum retrieval of those resources in an online environment.
- *Commonly understood terminology*
  The Dublin Core was developed with the non-specialist searcher in mind. By supporting a common set of elements, the semantics of which are universally understood and supported, resource discovery across different descriptive practices from one field of knowledge to another will increase. By using terminology that is generic yet applicable to a variety of disciplines, the visibility and accessibility of resources across these disciplines is enhanced.
- *International in scope*
  The involvement of representatives from almost every continent in establishing Dublin Core specifications has ensured that the standard will address the multicultural and multilingual nature of digital resources.
- *Extensibility*
  Although the Dublin Core element set was developed with simplicity in mind, the need for precise retrieval of resources has also been recognized. As the standard develops, the Dublin Core element set could serve as the core descriptive information that will be usable across the Internet, while also allowing other, additional elements to be added that make sense within a specific discipline. These additional element sets can be linked with the Dublin Core to meet the need for extensibility, to aid in additional resource discovery, and to accommodate the granularity (defined by Wikipedia as "the extent to which a system contains discrete components of ever-smaller size") needed for access.

Documentation and further information is available on the Dublin Core Metadata Initiative Web site at http://dublincore.org/, including the Dublin Core FAQ: http://dublincore.org/resources/faq/

Using Dublin Core for Digital Collections

Despite its positives, Dublin Core also has its limitations as a resource description and discovery standard. The 15 simple elements were originally intended as a core set of resource descriptors that any Web page creator could easily apply, without training, to his or her own Web pages and other "document-like objects" on the Web. For various reasons,

this use of Dublin Core has not come to fruition. Instead, Dublin Core is used today largely by information professionals at cultural heritage institutions and other organizations for the description of collections of various types of digital resources. Among these are the growing number of collections of digitized images, texts, maps, and other unique local resources made available through Web-based interfaces. The strengths and limitations of Dublin Core for resource description in this context will be seen in terms of its applicability to description of original vs. digital manifestations of a resource, level of granularity, and specificity and depth of description and access.

Simple vs. Qualified Dublin Core[3]

The original 15 Dublin Core elements by themselves provide only a very shallow, lowest-common-denominator level of resource description. For that reason, element extension or qualifiers have been devised to further specify and refine the meaning of many of the elements, and to apply specific controlled vocabularies and other encoding schemes to element content.

"Simple Dublin Core" is Dublin Core metadata that uses no qualifiers. Only the main 15 elements of the Dublin Core Metadata Element Set are expressed as simple attribute-value pairs without any "qualifiers" (such as encoding schemes, enumerated lists of values, or other processing clues) to provide more detailed information about a resource.

"Qualified Dublin Core" employs additional qualifiers to further refine the meaning of a resource. One use for such qualifiers are to indicate if a metadata value is a compound or structured value, rather than just a string.

Qualifiers allow applications to increase the specificity or precision of the metadata. They may also introduce complexity that could impair the metadata's compatibility with other Dublin Core software applications. With this in mind, designers should only select from the set of approved Dublin Core qualifiers that were developed by the Dublin Core community process.

The DCMI recognizes two broad classes of qualifiers:

- ***Element Refinement.*** These qualifiers make the meaning of an element narrower or more specific. A refined element shares the meaning of the unqualified element, but with a more restricted scope. A client that does not understand a specific element refinement term should be able to ignore the qualifier and treat the metadata value as if it were an unqualified (broader) element. The definitions of element refinement terms for qualifiers must be publicly available.
- ***Encoding Scheme.*** These qualifiers identify schemes that aid in the interpretation of an element value. These schemes include controlled vocabularies and formal notations or parsing rules. A value expressed using an encoding scheme will thus be a token selected from a controlled vocabulary (e.g., a term from a classification system or set of subject headings) or a string formatted in accordance with a formal notation (e.g., "2000-01-01" as the standard expression of a date). If an encoding scheme is not understood by a client or agent, the value may still be useful to a human reader. The definitive description of an encoding scheme for qualifiers must be clearly identified and available for public use.

[3] Most of the content of this section has been taken directly from the Dublin Core FAQ: http://dublincore.org/resources/faq/

Need for Local Guidelines

Implementation of Dublin Core metadata for a digital project, collection, or collaborative requires locally-developed best practices, which include local specifications on element requirements, repeatability, input guidelines, and the application of qualifiers and controlled vocabularies. Most statewide digital collection initiatives have developed such best practice guides. One of the best known and most widely used is the multi-state *Collaborative Digitization Program Dublin Core Metadata Best Practices* (CDPDCMBP), Version 2.1 <http://www.bcr.org/cdp/best/dublin-core-bp.pdf>, mentioned in the Introduction to this document.

Best Practices for Shareable Metadata

The Digital Library Federation (DLF) and National Science Digital Library (NSDL) OAI and Shareable Metadata Best Practices Working Group is actively working on developing best practices for metadata for data providers who expose their metadata to service providers via the Open Archives Initiative Protocol for Metadata Harvesting. See "Best Practices for OHI PMH Data Provider Implementations and Shareable Metadata" <http://www.diglib.org/pubs/dlf108.pdf> The following text is taken directly from this document.

Why Best Practices for Shareable Metadata Are Necessary

Participants in the OAI PMH are many and diverse. Each data provider has its own needs and methods for describing its resources; therefore, metadata from one data provider may look very different from metadata from any other data provider, even when in the same metadata format. This diversity, however, makes it difficult for OAI PMH service providers to aggregate metadata from multiple data providers together in a meaningful way. However, the goal of these best practices is not to ask data providers to make all metadata more consistent to ease the burden for service providers, but rather, to offer guidance on how to author metadata that can be used successfully outside of its local environment. Often the shared metadata is not optimized for sharing; that is, it loses meaning and context when pulled out of its local environment. The more interoperable or shareable the metadata, the more robust and useful are the services that can be built on top of it. The best practices included here represent the consensus of participants from a range of communities. As such, they are, for the most part, not specific to a particular metadata format or to a particular community, but instead offer general guidelines and best practices. The working group fully expects and encourages the further adaptation of these best practices for use by specific communities and domains.

Quality Metadata and Shareable Metadata

Thomas R. Bruce and Diane I. Hillmann (2004) discuss twelve characteristics of quality metadata:

Completeness. Two aspects of this characteristic are described: choosing an element set allowing the resources in question to be described as completely as economically feasible, and applying that element set as completely as possible.

Accuracy. This characteristic is defined as the metadata being correct, factual, and conforming to syntax of the element set in use.

Provenance. Here provenance refers to providing information about the expertise of the person(s) creating the original metadata and its transformation history.

Conformance to expectations. Metadata elements, use of controlled vocabularies, and robustness should match the expectations of a particular community. This aspect of metadata quality is particularly problematic for OAI PMH data providers, as sharing metadata via OAI PMH allows it to be used by a wider variety of communities than previously targeted.

Logical consistency and coherence. This characteristic is defined as element usage matching standard definitions, and consistent application of these elements.

Timeliness. Two concepts make up this characteristic of metadata quality. *Currency* refers to metadata keeping up with changes to the resource it describes. *Lag* refers to a resource's availability preceding the availability of its metadata.

Accessibility. Proper association of metadata with the resource it describes and readability by target users contribute

to this characteristic. Quality metadata may or may not be shareable. That is, metadata may be of high quality within its local context, but for various reasons may be compromised when it is taken out of this context. Shareable metadata should, of course, have the above characteristics of quality metadata. However, there are some additional characteristics that make quality metadata more useful in
a shared environment:

Proper context. In a shared environment, metadata records will become separated from any high-level context applying to all records in a group, and from other records presented together in a local environment. It is therefore essential that each record contain the context necessary for understanding the resource the record describes, without relying on outside information.

Content coherence. Metadata records for a shared environment need to contain enough information so the record makes sense standing on its own, yet exclude information that only makes sense in a local environment. This can be described as sharing a "view" of the native metadata (Lagoze 2001).

Use of standard vocabularies. The use of standard vocabularies enables better integration of metadata records from one source with records from other sources.

Consistency. Even high-quality metadata will vary somewhat among metadata creators. All decisions made about application of elements, syntax of metadata values, and usage of controlled vocabularies should be consistent within an identifiable set of metadata records so those using this metadata can apply any necessary transformation steps without having to process inconsistencies within such a set.

Technical conformance. Metadata should conform to the specified XML schemas and should be properly encoded.

Benefits of Creating Shareable Metadata

Creating shareable metadata requires an investment of time. However, there are many benefits gained from making this investment. The first and perhaps most significant benefit to creating shareable metadata is that it will be interoperable, or meaningful, when combined with metadata from other sources. By using metadata schemas and rules for creating metadata values similar to those used by others, your resources can meaningfully appear in search results alongside related resources from other metadata providers. When creating truly shareable metadata, your resources are more likely to be found when pooled together with resources from other providers. Inconsistencies or gaps in descriptions of your metadata may mean that your resources will not be retrieved by searchers. Shareable resources will receive more exposure, and end-users will have the opportunity to make previously unseen connections between your resources and those from other metadata providers.

Finally, creating shareable metadata increases the number of access points for your resources available to end-users. Aspects of a resource not previously explicitly described are often added when metadata creators think in terms of shareable metadata.

Emerging Trends

Although the Wisconsin Heritage Online Metadata Working Group has selected Qualified Dublin Core as the basis for these guidelines, it is important to recognize that metadata standards for digital resources continue to evolve. The following section identifies a number of emerging trends that are shaping the future of digital object repositories.

Metadata Encoding and Transmission Standard (METS)

METS is an XML-based encoding standard for digital library metadata. It is both powerful and inclusive, making provision for encoding structural, descriptive, and administrative metadata. It is designed not to supersede existing metadata structures such as Dublin Core or Text Encoding Initiative (TIE) headers, but rather to provide a means of including them in the METS document. It is a way of bringing together a wide range of metadata about a digital object. Through its structural metadata section, it allows the user to express relationships between multiple representations or manifestation of the digital object, for example, text encoded with TEI XML markup, the scanned page image, and audio recordings. It also allows one to express the relationship between multiple parts of a single digital representation, such as the chapters of a book. The administrative metadata section support the encoding of the kinds of information such as file format and creation; digital

rights management information including copyright and licensing information; and information on the provenance and revision history of the digital object, including migration data and transformation that have been performed over time. METS is in its early stages of development and as of this writing has been adopted by a number of digital library projects.

Metadata Object Descriptive Schema (MODS)

Maintained by the Library of Congress, the Metadata Object Description Schema (MODS) lies between the full MARC XML schema and Dublin Core. MODS is a derivative of the MARC21 bibliographic format (Machine-Readable Cataloging) and as such includes a subset of MARC fields, using language-based tags rather than numeric ones." MODS offers a more robust schema than MARC 21 for describing digital objects, particularly for bibliographic resources.

Preservation Metadata

Preservation metadata is the information needed to execute, document and evaluate the processes that support and facilitate the long-term retention of digital content. Digital objects are subject to change, so the change history of the object must be maintained over time to ensure its authenticity and integrity. It is important to record this information because the equipment or software required to access the digital object may no longer be available. The best practice is to capture information about the hardware, operating system, and software used to create the digital object. This information, as well as other forms of description and documentation, can be detailed in the metadata associated with a digital object. Preservation metadata provides digital archives managers with sufficient information to maintain the digital object into the future.

In particular, preservation metadata may be used to:

- Store technical information supporting preservation decisions and actions
- Document preservation actions taken, such as migration or emulation policies
- Record the effect of preservation strategies
- Ensure the authenticity of digital resources over time
- Note information about collection management and the management of rights

The types of information listed above address two functional objectives:

1) Providing preservation managers with sufficient knowledge to take appropriate actions in order to maintain a digital object's integrity over the long-term, and
2) Ensuring that the content of an archival object can be rendered and interpreted, in spite of future changes in access technologies.

Data Dictionary: Technical Metadata for Digital Still Images (Z39.87)

The National Information Standards Institute (NISO) has also released a Data Dictionary: Technical Metadata for Still Images (Z39.87), with the purpose of supporting image quality assessment and data processing needs through an image's life cycle. Elements captured by Z39.87 include spatial resolution, spatial dimensions, capture hardware and software, compression schemes, color profiles, and other metrics that define still images. <http://www.loc.gov/standards/mix/>

Preservation Metadata Implementation Strategies (PREMIS)

Recognizing that preservation of digital media would be a critical issue for libraries, OCLC (Online Computer Library Center) and RLG (Research Libraries Group) formed a partnership to explore issues involved in implementing preservation metadata. PREMIS is based on work by RLG's Working Group on Preservation Issues of Metadata, which in May 1998 released a set of sixteen recommended metadata elements considered essential for preserving a digital master file over the long-term. In 2002, the new working group released A Metadata

Framework to Support the Preservation of Digital Objects. In May 2005, OCLC and RLG published Data Dictionary for Preservation Metadata: Final Report of the PREMIS Working Group.

Crosswalks

Crosswalks are processes and procedures that translate one metadata format into another metadata format. Crosswalks provide the ability to create and maintain a local set of metadata and to map the metadata into any number of related metadata format standards. In order to build successful crosswalks and mapping schemes, it is important to maintain consistency within metadata standards adopted by local databases or catalogs. The following are examples related to the Dublin Core standard:

Metadata Standards Crosswalks

http://www.getty.edu/research/conducting_research/standards/intrometadata/crosswalks.html

Dublin Core to MARC21 to GILS:
http://www.loc.gov/marc/dccross.html
Dublin Core to UNIMARC:
http://www.ukoln.ac.uk/metadata/interoperability/dc_unimarc.html/
TEI header to USMARC:
http://etext.lib.virginia.edu/tei/tei-marc.html
GILS to USMARC:
http://www.itl.nist.gov/fipspubs/192-b.pdf
FDGC to USMARC:
http://www.alexandria.ucsb.edu/public-documents/metadata/fgdc2marc.html
MARC to Dublin Core:
http://loc.gov/marc/marc2dc.html