Dublin Core Metadata Initiative
Making it easier to find information

Metadata Basics

The word "metadata" means "data about data". Metadata articulates a context for objects of interest -- "resources" such as MP3 files, library books, or satellite images -- in the form of "resource descriptions". As a tradition, resource description dates back to the earliest archives and library catalogs. The modern "metadata" field that gave rise to Dublin Core and other recent standards emerged with the Web revolution of the mid-1990s.

Background

Early Dublin Core workshops [/workshops/] popularized the idea of "core metadata" for simple and generic resource descriptions. The fifteen-element "Dublin Core" [/documents/dces/] achieved wide dissemination as part of the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) [http://www.openarchives.org/pmh/] and has been ratified as IETF RFC 5013 [http://www.ietf.org/rfc/rfc5013.txt] , ANSI/NISO Standard Z39.85-2007 [http://www.niso.org/standards/z39-85-2007/] , and ISO Standard 15836:2009 [http://www.iso.org/iso/search.htm?qt=15836&searchSubmit=Search&sort=rel&type=simple&published=on] .

Starting in 2000, the Dublin Core community focused on "application profiles" -- the idea that metadata records would use Dublin Core together with other specialized vocabularies to meet particular implementation requirements. During that time, the World Wide Web Consortium standardized a generic data model for metadata, the Resource Description Framework (RDF). As part of an extended set of DCMI Metadata Terms, Dublin Core became one of most popular vocabularies for use with RDF, more recently in the context of the Linked Data [http://linkeddata.org/] movement.

The consolidation of RDF motivated an effort to translate the mixed-vocabulary metadata style of the Dublin Core community into an RDF-compatible DCMI Abstract Model [/documents/abstract-model/] (2005). The DCMI Abstract Model was designed to bridge the modern paradigm of unbounded, linked data graphs with the more familiar paradigm of validatable metadata records like those used in OAI-PMH. A draft Description Set Profile [/documents/dc-dsp] specifies a language for expressing constraints in a generic, application-independent way. The Singapore Framework for Dublin Core Application Profiles [/documents/singapore-framework] defines a set of descriptive components useful for documenting an application profile for maximum reusability.

"Levels of interoperability"

From the perspective of the Dublin Core community, the metadata landscape is currently characterized in terms of four "levels" of interoperability: [/documents/interoperability-levels/]

Level 1 (Shared term definitions). At Level 1, interoperability among metadata-using applications is based on shared natural-language definitions. Within an application environment such as an intranet, library system, or repository federation, participants agree what terms to use in their

metadata and how those terms are defined. Terms are hard-wired into applications using specific implementation technologies, and interoperability with "the rest of the world" outside of the implementation environment is generally not a priority. Most existing metadata applications currently operate at this level of operability.

Level 2 (Formal semantic interoperability). At Level 2, interoperability among metadata-using applications is based on a shared, formal model for Linked Data. As defined in Wikipedia, the term "Linked Data" describes "a recommended best practice for exposing, sharing, and connecting pieces of data, information, and knowledge on the Semantic Web using URIs [Web addresses] and RDF." The properties and classes of DCMI Metadata Terms [/documents/dcmi-terms/] have been defined for compatibility with Linked Data principles. Over the past two years, vast amounts of commercial and public-sector data have been added to a growing to a linked data cloud. Search engines such as Yahoo and content-management platforms such as Drupal have implemented support for RDFa, a method for exposing linked data embedded in Web pages. In effect, the founding idea of Dublin Core -- "simple metadata for resource discovery" -- is being reinvented under the banner of "structured data for search engine optimization". Of the four interoperability levels, this one appears to be growing the fastest.

Level 3 (Description Set syntactic interoperability) and Level 4 (Description Set Profile interoperability). At Level 3, applications are compatible with the Linked Data model and, in addition, share an abstract syntax for validatable metadata records, the "description set". At Level 4, the records exchanged among metadata-using applications follow, in addition, a common set of constraints, use the same vocabularies, and reflect a shared model of the world. Levels 3 and 4 are more experimental than Levels 1 and 2 inasmuch they are not as well supported with software tools, though the problems addressed in this work are expected to grow in importance as producers of metadata records move their information into a linked-data environment.

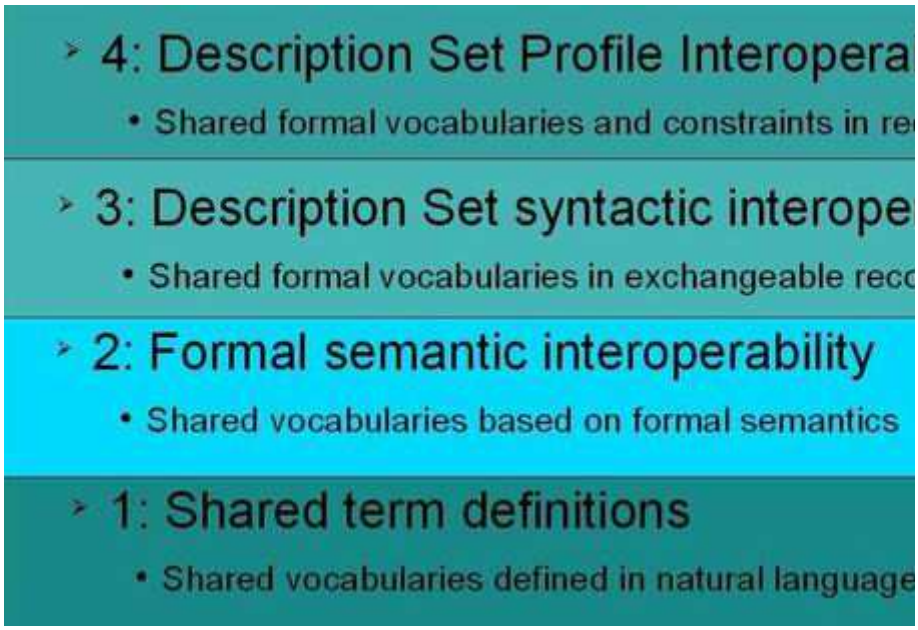
To the reader: If you are evaluating implementation options, it is good to start by defining your requirements:

- If the needed functionality can be met with a closed system, consider Level 1 solutions; DCMI Metadata Terms provides a useful starter set of elements, many good tools are available, and implementation is often straightforward.
- If exchangeability of metadata with "the rest of the world" is important, consider Level 2. Month by month, new platforms, tools, and data sources are coming online. Note that implementations do not need to use URIs and RDF natively in order to be compatible with the linked data cloud. With careful design and planning, just about any technology can be configured to export data in RDF.
- If your metadata needs to be designed both in

accordance with Level 2 *and* with validatable records, consider Levels 3 and 4 and join the community of pioneers on the DCMI Architecture Forum mailing list [http://www.jiscmail.ac.uk/lists/dc-architecture.html] .

Next steps:

- For a friendly introduction to the Dublin Core "mixed-vocabulary" style of metadata, see Guidelines for Dublin Core Application Profiles [/documents/profile-guidelines/] .
- Join the mailing list for one of DCMI's many communities of practice [/groups/#communities] and introduce yourself or ask a question. Read more... [/beta/community-and-events]
- Subscribe to DCMI's RSS news feed [/news.rss] or follow Dublin Core on Twitter [http://twitter.com/DublinCore] .
- Check out recent presentations and tutorials [/resources/training/] about Dublin Core metadata.
- Explore the available technical specifications and guidelines [/beta/specifications/] .



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DCMI Specifications

As part of its mission, the Dublin Core Metadata Initiative develops and maintains specifications in support of resource description. Specifications developed and reviewed in the context of DCMI's formal approval process [/documents/approval/] are assigned a status (in ascending order of maturity and stability) of "DCMI Working Draft", "DCMI Proposed Recommendation", or "DCMI Recommendation". DCMI also provides pointers to guidelines and services developed outside of this formal review context ("Recommended Resources").

This selection highlights the specifications that currently attract the most attention in the Dublin Core community. Links to additional specifications (including superseded specifications) may be found at http://dublincore.org/documents/ [/documents/] . Some of the specifications have been translated [/resources/translations/] into one of twenty-five languages.

Semantic Recommendations

DCMI Metadata Terms [/documents/dcmi-terms/] [DCMI Recommendation]. This periodically updated document provides a one-stop source of up-to-date information on DCMI metadata terms, including the classic Dublin Core Metadata Element Set, the DCMI Type Vocabulary, and resource classes used as formal domains and ranges. Supporting documents includes

- DCMI Namespace Policy [/documents/dcmi-namespace/] [DCMI Recommendation]. This document describes how metadata terms are assigned URIs by DCMI and the policies governing changes to the documented meanings associated with those URIs.
- DCMI term declarations represented in RDF schema language [/schemas/rdfs/] . Since 2001, DCMI term declarations have been published as Web documents (with the status DCMI Recommendation) and, in parallel, as machine-processable RDF/XML documents.
- The Dublin Core Metadata Registry [http://purl.org/dcregistry/] [DCMI Recommended Resource]. This application, hosted at the University of Tsukuba as a service for the DCMI community, provides a navigational interface [http://dcmi.kc.tsukuba.ac.jp/dcregistry/navigateServlet] to DCMI's machine-processable RDF term declarations. The registry is under development as an open-source software project.
- Dublin Core Metadata Element Set [/documents/dces/] [DCMI Recommendation]. This document excerpts from DCMI Metadata Terms the fifteen elements of the classic "Dublin Core", which has been standardized as ISO Standard 15836:2009 [http://www.iso.org/iso/search.htm?qt=15836&searchSubmit=Search&sort=rel&type=simple&published=on] .

User guidelines

Interoperability Levels for Dublin Core Metadata [/documents/interoperability-levels/] [DCMI Recommended Resource]. This document articulates current thinking in the Dublin Core community about the nature of metadata interoperability. Read more... [/beta/metadata-basics]

Guidelines for Dublin Core Application Profiles [/documents/profile-guidelines/] [DCMI Recommended Resource]. This document provides guidelines for the creation of Dublin Core Application Profiles. The document explains the key components of a Dublin Core Application Profile and walks

through the process of developing a profile. The document is aimed at designers of application profiles -- people who will bring together metadata terms for use in a specific context.

Singapore Framework for Dublin Core Application Profiles [/documents/singapore-framework/] [DCMI Recommended Resource]. The Singapore Framework for Dublin Core Application Profiles is a framework for designing metadata applications for maximum interoperability and for documenting such applications for maximum reusability. The framework defines a set of descriptive components that are necessary or useful for documenting an Application Profile and describes how these documentary standards relate to standard domain models and Semantic Web foundation standards. The framework forms a basis for reviewing Application Profiles for documentary completeness and for conformance with Web-architectural principles.

Using Dublin Core [/documents/usageguide/] [DCMI Recommended Resource]. From January 1998 through the latest version in November 2005, this document was maintained as the main entry point for new users of Dublin Core metadata. While this document is accessibly written, with useful concrete examples, readers should be aware that the document is by now somewhat out of date and is best used in conjunction with Guidelines for Dublin Core Application Profiles [/documents/profile-guidelines/] .

Model-related specifications

DCMI Abstract Model [/documents/abstract-model/] [DCMI Recommendation]. This document specifies an abstract syntax for "description sets" (metadata records). Finalized as a DCMI Recommendation in March 2005, the DCMI Abstract Model (DC-AM) expressed the style of metadata that had emerged in the Dublin Core community over the previous decade as formal constructs based on the W3C Resource Description Framework (for example, by giving a formal definition to the DC-specific notion of a "vocabulary encoding scheme" and providing for the use of parallel labels in multiple languages). The Abstract Model was designed to bridge the modern paradigm of the unbounded, linked data graph and the more familiar paradigm of the validatable metadata record, providing a foundation for the development of application-independent syntax specifications and constraint languages.

Expressing Dublin Core metadata using the DC-Text format [/documents/dc-text/] [DCMI Working Draft]. DC-Text is a syntax for representing a DC-AM Description Set in plain text. Its primary use is in presenting metadata constructs for human consumption.

Description Set Profiles: A constraint language for Dublin Core Application Profiles [/documents/dc-dsp/] [DCMI Working Draft]. This document specifies an application-independent language for the constraints used in defining "templates" for metadata records -- for example, to specify a

template for records which describe exactly "one book", with "up to ten authors", using "subject headings from the Library of Congress". This specification represents work in progress and is likely to evolve in response to implementation experience.

Criteria for the Review of Application Profiles [/documents/profile-review-criteria/] [DCMI Recommended Resource]. This document was developed by the DCMI Usage Board to evaluate Application Profiles for documentary completeness and for conformance with linked-data principles. The criteria are based on the DCMI Abstract Model, Description Set Profile (DSP) language, and Singapore Framework. Even when conformance with these specifications is not a requirement, implementers may find these review criteria useful for uncovering flaws or weaknesses in the logic of an application profile.

A MoinMoin Wiki Syntax for Description Set Profiles [/documents/dsp-wiki-syntax/] [DCMI Working Draft]. Using this draft syntax, editors can embed formal constraint information about application profiles into normal Wiki documents and extract this information using an Open Source MoinMoin Wiki tool [/documents/2008/10/06/dsp-wiki-syntax/DescriptionSetProfile-dist.zip] into an XML representation. This functionality is illustrated by the MoinMoin Wiki document for the Scholarly Works Application Profile [http://dublincore.org/architecturewiki/EprintsApplicationProfile?action=DSP2XML] .

Syntax guidelines

DC-HTML [/documents/dc-html/] [DCMI Recommendation]. "Expressing Dublin Core metadata using HTML/XHTML meta and link elements" describes how a Dublin Core metadata description set can be encoded using the HTML/XHTML <meta> and <link> elements. This specification is also an HTML "meta data profile" as defined by the HTML specification. See also:

- RDFa [http://rdfa.info/] , another syntax for embedding Dublin Core descriptions in Web pages, which became a W3C Recommendation [http://www.w3.org/TR/rdfa-syntax/] in October 2008 and has strong tool support in platforms such as Drupal [http://drupal.org/] and Yahoo's Search Monkey [http://developer.yahoo.com/searchmonkey/] .
- The predecessor specification for DC-HTML, DCQ-HTML [/documents/dcq-html/] (last updated in 2003), consistently remains one of the most-accessed documents on the DCMI Web site despite its clearly marked status as a "Superseded Recommendation". Early versions of this specifications used the so-called "dotty" syntax for appending an additional "qualifier" to an element name. as with "DC.Coverage.temporal" -- an encoding style that is now discouraged. This and other related issues are discussed in "Notes on DCMI

specifications for Dublin Core metadata in HTML/XHTML meta and link elements" [/documents/dc-html-notes/] .

DC-DS-XML [/documents/dc-ds-xml/] [Proposed Recommendation]. "Expressing Dublin Core Description Sets using XML (DC-DS-XML)" specifies an XML format for representing a Dublin Core metadata description set. The specification supports all of the features of a Description Set as described by the DCMI Abstract Model. Related resources include:

- Notes on DC-DS-XML XML Format [/documents/dc-ds-xml-notes/] , which describes the development of the format and its relationship to the 2003 specification, DC-XML-GUIDELINES.
- DC-XML-GUIDELINES [/documents/dc-xml-guidelines/] [DCMI Recommendation]. The specification "Guidelines for implementing Dublin Core in XML" of April 2003 has been used in numerous implementations and remains popular despite its well-described limitations (see above). XMLS schemas [/schemas/] implementing the 2003 encoding conventions are available in several variants.

DC-RDF [/documents/dc-rdf/] [DCMI Recommendation]. "Expressing Dublin Core metadata using the Resource Description Framework (RDF)" describes how constructs of the DCMI Abstract Model may be expressed in RDF graphs. How this document relates to earlier styles for expressing Dublin Core metadata in RDF is discussed in "Notes on DCMI specifications for Dublin Core metadata in RDF". [/documents/dc-rdf-notes/]

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