CHAPTER 5
METADATA

Metadata is like interest --- it accrues over time. To stretch the metaphor further, wise investments generate the best return on intellectual capital. Carefully designed metadata results in the best information management in the short- and long-term.[1]

Overview

How do we find the materials in our libraries, archives, museums, and historical societies? The descriptive tools that allow special collections to be accessed are in myriad forms. Yet, libraries, archives, museums, and historical societies--indeed all cultural heritage institutions--are dependent upon these tools of access to make them viable.

Among the many information repositories, libraries have the longest history of providing accessibility in a standard format. The broad acceptance of cataloging conventions such as the *Anglo-American Cataloging Rules* and the MARC21 format allows users to move easily from library to library. In contrast, historical societies, museums, and archives, have often used locally developed cataloging and access tools, reflecting the special nature of their holdings. Archives, for example, hold materials in many different formats (e.g., manuscripts, oral histories, photographs, objects, and films). Historical museums are even more idiosyncratic, and art museums are hybrids, combining many objects, archives, and library materials. From institution to institution (and individual collection to individual collection), their access tools vary in descriptive elements and formats. The uniqueness of special collections has made the development and implementation of broad, uniform practices difficult, preventing broad cross-collection access.

Recent advances, however, offer hope for greater, more uniform access in the near future. Digitization has been a clear part of those efforts, and every digital project must address metadata issues to provide the best access to their materials and to ensure that their collection information is available in the larger arena of digital access. Today, there are several good descriptive systems available for use in cultural institutions. The most widely adopted is Dublin Core, a general descriptive system used by many multi-partner digitization projects to manage their electronic resources. Other systems include Encoded Archival Description (EAD), which is a system of encoding archival finding aids, and the Text Encoding Initiative (TEI), a system for encoding textual documents primarily from the humanities and social sciences. These systems are generally favored by large, established institutions. Other descriptive systems have been developed for specific formats.

Often, these individual systems can be related to each other through the descriptive elements that they share (e.g., creator/author or subject). This process is often referred to as "crosswalking." Shared collection access methods (e.g., searching by subject across the holdings of several archives or across an archive, museum, and library) were difficult to

[1] Anne J. Gilliland-Swetland "Setting the Stage" in *Introduction to Metadata* (Getty Standards Program), 7/5/2000, http://www.getty.edu/research/conducting_research/standards/intrometadata/.

accomplish in the pre-digital age. With computers, the dream of shared access is rapidly becoming a reality.

The uniform description of resources (what librarians have always called cataloging) in an electronic form is one of the first steps in creating shared access. Describing a resource is a difficult process, but an important one if the resource is to be accessible to the user. The more conformity to uniform practices, the more likely the resource will be located and used. The choice of a "cataloging system" is actually a choice of "metadata" formats.

What is Metadata?

Metadata is informally defined as “information about information” or any data associated with a resource that describes that particular resource. A more general definition that is useful for cultural institutions is “structured information about any information resource of any media type or format.”[2] In this context, an information object is anything that can be addressed and manipulated by a human or a system as a discrete entity. The essential aspect of a metadata system that describes an object, then, is its ability to provide a structured format for information about that object.

Metadata itself is essentially a modern term for the bibliographic information that libraries traditionally entered into their catalogs or registry information on collections that museums have entered into their systems; however, the term *metadata* is most commonly used to refer to descriptive information about World Wide Web resources. Cultural heritage institutions have been creating metadata for as long as they have been collecting cultural materials for their preservation and presentation to the public. The impact that the digital environment has had on metadata is the creation of electronic information in structured formats.

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

> **Descriptive metadata:** information used for the indexing, discovery, and identification of a digital resource.
>
> **Analytical metadata:** information about the subject and context of a digital resource.
>
> **Structural metadata:** information used to display and navigate a digital resource; also includes information on the 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:** information needed for the management of the digital resource, which includes information regarding access, display, rights management.

[2] Priscilla Caplan, *Metadata Fundamentals for All Librarians,* (Chicago: American Library Association, 2003), p. 3.

Preservation metadata: information about the digital image for preservation purposes, including the resolution at which the images were scanned, the hardware/software used to produce the image, compression information, pixel dimensions, etc., important for migration and long-term sustainability of the digital resource. This includes the technical aspects of the digital asset, including how it was created, what equipment was used, etc.

"Finding" or "accessing" holdings is the most visible role of metadata in the electronic environment. Today's users are coming to the digital resource from their home, work, school, etc., at any time of the day, and often without the assistance of a librarian, archivist, curator, museum educator, or other cultural heritage professional. In addition, digital resources present their own unique characteristics, and cultural institutions need to consider these characteristics as they try to integrate management of these resources into their traditional holdings. Metadata for digital resources 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;
- provides information about the digital resource to the information professional to aid in the resource's sustainability.

Unfortunately, there is no uniform metadata solution for all cultural materials. The metadata for text is different from the metadata for visual images. Further, the elements used to describe an object can change and grow as more becomes known about that object. Metadata should be thought of as a dynamic process. New metadata schemes for different formats of cultural materials or for different needs in managing those cultural materials emerge. It is important to stay current as the field of metadata grows and changes.

How do I select the best metadata standard for my materials?

As indicated above**,** there is a wide variety of metadata standards available to cultural institutions. Selection of a standard should be based on the needs of the repository and its users. Deciding which metadata system to use for a collection can be a very individualized process and a daunting one. Here are some general guidelines that can be followed while making choices about metadata systems:

What is the **purpose** of the metadata process?

Is there an **institution similar to ours** that is using a particular metadata documentation standard? Are they happy with the standard they chose? What would they do differently if they had it to do over?

What is the **reputation of the selected standard**? How widely used is it? How old is the standard? Is it likely to be around for some time?

Is my practice and experience **compatible** with the standard? Can I understand the elements as they relate to my collection?

What sort of **system** am I going to be using to maintain my metadata? Does it have pre-defined fields, need additional resources, or do I need to develop a metadata system on my own?

If I select a specific standard, will my metadata be **compatible with larger systems**? (i.e., NC ECHO or one of the local major university's initiatives.)

Recommended Metadata Standards for North Carolina

After a review of the most prominent metadata systems, consortial requirements, the descriptive tools being used by the state's largest digitization projects, and the types and holdings of institutions throughout the state, NC ECHO issued the following policy on metadata:

> *North Carolina ECHO recommends that North Carolina institutions wishing to participate in the statewide digitization project follow the metadata standards of at minimum North Carolina Dublin Core, while acknowledging that some participating institutions may additionally employ the more robust descriptive systems such as MODS, EAD, TEI and others.*

NC ECHO chose Dublin Core because it can be used to describe a wide variety of digital resources. It is the base line of metadata standards. In its simplest form, it provides a basic level of access that involves the completion of only seventeen fields of information. In addition, Dublin Core is relatively easy to crosswalk from other metadata systems, so existing descriptive systems (even if they are pretty minimal and homegrown) can conform to the Dublin Core fields, which are extremely basic. To learn more about the Dublin Core consult its web site (http://www.dublincore.org/).

Dublin Core Elements

Dublin Core is composed of 17 element sets (see table below). They are familiar points of description and access to most workers in and users of cultural institutions.

The 17 Dublin Core Metadata Element Set*
Summary

TITLE	DC.Title	The name of the object. The title of a book, name given a work of art, name of manuscript collection, map name, etc. If item is unnamed, give the item descriptive title. Omit articles such as 'the', 'a', 'an', etc., which often come at the beginning of a descriptive title.
CREATOR	DC.Creator	The person(s), family(ies), organization(s), or corporate body(ies) primarily responsible for the creation of the object, collection, item being described.

SUBJECT	DC.Subject	What the content of the resource is about or what it is, expressed by terms, including: topical, personal, corporate, or geographic for significant people, places, organizations, events, and topics reflected.
DESCRIPTION	DC.Description	A textual description of the content of the resource, such as an abstract, tables of contents, or free-text account of the object. This information can be taken from the object or provided by the record creator and can include specialized information not included in other elements.
PUBLISHER	DC.Publisher	The institution or repository that makes the resource available on the Web.
CONTRIBUTOR	DC.Contributor	The person(s), family(ies), organization(s), or corporate body(ies) that made significant secondary contributions to the creation of the object, collection, or item being described.
DATE	DC.Date	The date of creation of the original item.
TYPE	DC.Type	The genre or nature of the resource, such as sound recording, image, physical object, collection, or text.
FORMAT	DC.Format.Extent	The extent of the original item being described. Can be in number of pages or linear feet, dimensions, etc.
	DC.Format.Medium	The physical manifestation of the original object represented by a controlled vocabulary term.
IDENTIFIER	DC.Identifier	A character string or record number that clearly and uniquely identifies a digital object or resource. The Identifier element ensures that individual digital objects can be managed, stored, recalled, and used reliably. NC ECHO recommends the use of This element may be the accession number, record number, ISBN number, or the URL (Universal Resource Locator or World Wide Web address).
SOURCE	DC.Source	A reference to an aggregated resource from which the present resource is derived. The Source element is used to cite any other resource from which the digital resource was derived, either in whole or in part. Some digital resources are “born digital” and derive from no pre-existing resource; in these cases, the Source element is not used. Note the relationship between the Source element and the Relation element. Because the Source element shows a derivative relationship with another resource, it is used only for that purpose. Other relationships should be included in the Relation element.
LANGUAGE	DC.Language	The language(s) of the intellectual content of the resource. This can be the language(s) in which a text is written or the spoken language(s) of an audio or video resource.

RELATION	DC.Relation	The relation of the resource being described to other resources. Element includes a variety of refinements to express the kind of relationship that exists between the resource and the other objects.
COVERAGE	DC.Coverage.Spatial	The geographic location(s) associated with the resource.
	DC.Coverage.Temporal	The time period associated with the resource.
RIGHTS	DC.Rights	A rights management or usage statement, a URL that links to a rights management statement, or a URL that links to a service providing information on rights management of the resource.
AUDIENCE	DC.Audience	The audience for whom the resource is intended. Not application in all situations.
PROVENANCE	DC.Provenance	Information about the custodial history or acquisition of the resource by the institution.

NC ECHO has a working group that examines the Dublin Core standard and provides implementation guidelines for NC ECHO participating institutions. These guidelines provide a general introduction to the Dublin Core standard and should assist institutions in analyzing their existing descriptive systems and adapting them to at least the minimal requirements of Dublin Core. Each element has been examined and specific implementation guidelines are included in the guidelines. In addition, the NC ECHO Dublin Core template provides an online tool for the creation of Dublin Core metadata. This web form will help with syntactic expressions and assure uniformity in the creation of HTML-coded Dublin Core so that institutions can concentrate on the content of the metadata rather than its computerized structure. The template and use documentation are available at http://www.ncecho.org/ncdc/index.htm

Other Metadata Standards

While Dublin Core is the base line, minimum recommendation for metadata standards, there are other standards that provide richer descriptive tools, retrieval possibilities, and other management capabilities for specific types of cultural materials. For example, Dublin Core is not as efficient a tool as some systems when describing relationships between materials and hierarchies of information. This can be significant in creating description for manuscript and archival collections. Typically, individual collections of manuscripts are composed of series of materials, and a series of material is composed of subseries of materials, and a subseries of material is composed of boxes of materials, and a box of material is composed of folders of materials, and a folder of material is composed of individual items. Another metadata standard, Encoded Archival Description (EAD), has been developed to address the need to describe relationships between materials and is discussed here in more detail. A brief list of other metadata standards follows.

EAD - (Encoded Archival Description)

Encoded Archival Description (EAD) is a metadata system that leverages the structure of archival description found in archival finding aids through its encoding standard. It is an Extensible Markup Language (XML) document type definition (dtd) that enables EAD-encoded finding aids to be searched, retrieved, displayed, and exchanged. EAD is platform-

independent and is maintained by the Society of American Archivists. It is a recognized international standard.

EAD is especially helpful in information retrieval because of its ability to identify particular areas of description in the finding aid and its ability to present information in a hierarchical fashion. By marking up a finding aid in EAD, the relationships between the series and subseries are maintained in the retrieval of the information about the collection.

NCEAD is NC ECHO's working group on the implementation of EAD in North Carolina. NCEAD has generated Best Practice Guidelines, tools, and supporting documentation to ease the implementation of EAD for North Carolina institutions. See http://www.ncecho.org/ncead/index.htm.

Society of American Archivists EAD Resources

- Encoded Archival Description Application Guidelines, Society of American Archivists, 1999, http://www.loc.gov/ead/ag/aghome.html
- Encoded Archival Description Tag Library Version 2002, Society of American Archivists, 2002, http://www.loc.gov/ead/tglib/index.html
- Official EAD Web Site, http://www.loc.gov/ead/
- EAD Help Pages, EAD Roundtable, http://www.iath.virginia.edu/ead/

EAC (Encoded Archival Context)

EAC is an emerging standard for the description of record creators. It provides sections on identity, description (both formal and informal), relationships, and record maintenance. The standard approaches cultural heritage materials from a new perspective. Rather than describing materials, it describes the creators and provides connections to the materials relevant to those creators. NC ECHO has a working group, NCEAC, that has examined the beta standard and adopted a union model for the NC ECHO project, entitled "North Carolina Biographical and Historical Information Online" (http://digitalnc.org/ncbhio/index.htm). This project includes content guidelines, input forms, and browse capabilities for existing records. Most importantly, the project relies on partner institutions contributing information about the people, families, and corporate bodies that have created the state's cultural heritage materials.

EAC Standards Documentation

- Encoded Archival Context Beta http://www.iath.virginia.edu/eac/

MODS (Metadata Object Description Schema)

MODS is an XML schema developed by the Library of Congress. It is described as a bibliographic element set, but it may be used for a variety of different types of resources. MODS should be considered a richer metadata set than Dublin Core, with the advantages of the XML platform. It has been derived from the MARC standard, but provides a flexible platform for the description of digital objects.

Library of Congress MODS site

- Metadata Object Description Schema http://www.loc.gov/standards/mods/

Visual Resources & Object Standards

Categories for the Description of Works of Art (CDWA)
CDWA was created by the Getty Art Museum for the description of works of art and is used throughout California Museums cataloging information for their holdings. See http://www.getty.edu/research/conducting_research/standards/cdwa/

Cataloging Cultural Objects (CCO)
CCO was designed for the description of many types of cultural objects, including architecture, archaeological sites, and artifacts as well as functional objects from the realm of material culture. Like CDWA, though, it focuses on works of art and their visual surrogates and is not directly intended for historical objects, science and technology specimens, and the like. It focuses on the data content standard and recommendations of controlled vocabularies. The primary emphasis is descriptive metadata intended to describe a cultural work. That description is then used in systems intended to manage that data. CCO excludes administrative and technical metadata in so far as they do not impact the description of the object, and it is therefore recommended that CCO be used in conjunction with other standards to address all the metadata needs of an institution.

Visual Resources Association Core Categories (VRA Core)
This standard was created for the description of visual resources, such as photographs. It is a content standard and therefore does not provide structured environment to leverage the standard in a computer environment. However, like CDWA, it can provide some help in determining where to find(?) certain points of information regarding an item that you will use in your metadata. http://www.vraweb.org/vracore3.htm

To address the issue of metadata for visual resources and objects, NC ECHO has collaborated with the North Carolina Museums Council (NCMC) and visual resources archivists to create a Metadata Working Group. This group is analyzing existing metadata standards, primarily CCO, to create basic content guidelines for the description of visual resources and objects. These guidelines, along with recommendations for implementation with various collection management systems, will be available soon.

Text Encoding Standards

Text Encoding Initiative (TEI)
TEI is the standard system of encoding transcribed documents for presentation on the Web (often rare books, pamphlets, etc.). It is not used to mark up finding aids or to "catalog" digital resources as Dublin Core is. TEI is, however, one of the most prominent systems used to bring full-text resources (and not just images of those resources) to researchers via the WEB. The TEI (http://www.tei-c.org/) provides guidelines for the long-term preservation of electronic data, and a means of supporting effective usage of such data in many subject areas. It is the encoding scheme of choice for the production of critical and scholarly editions of literary texts, for scholarly reference works and large linguistic copora, and for the management and production of detailed metadata associated with electronic text and cultural heritage collections of many types. NC ECHO is working on recommendations for the implementation of TEI for various texts, focusing in particular on the structure of the “bibliographic information” located in the TEI header. These guidelines will provide both

general information on the TEI standard as well as document-type templates to be used for the wide variety of materials that can be encoded using TEI.

Oral Histories

Oral histories present interesting issues for metadata. NC ECHO is working with an Oral History Metadata Group to provide guidance on metadata for institutions that maintain oral history collections. The group will produce recommended guidelines for collection description as well as item-level oral history description.

Preservation Metadata

Maintaining information about the creation and maintenance of your digital objects is an important aspect of digitization because it ensures the longevity of your work. NC ECHO has constructed a preservation metadata standard to aid in the long-term sustainability of the digital content created in digitization projects. The tools developed include a content standard as well as a Microsoft Access database tool available for institutions that might need it. See http://www.ncecho.org/presmet/index.htm for more information.

"Crosswalking"

"Crosswalking," the ability to move data across several different platforms, may be thought of as translating an element set in one metadata system to a related element set in another metadata system. This translation allows a user to search across the two systems. Crosswalking is also referred to as "mapping." As defined by a NISO White Paper, October 1998, a crosswalk is "a set of transformations applied to the content of elements in a source metadata standard that results in the storage of appropriately modified content in the analogous elements of a target metadata standard." For more detailed information on crosswalking, see "Issues in Crosswalking Content Metadata Standards" (http://www.niso.org/press/whitepapers/crosswalk.html).

The crosswalking chart below demonstrates that many metadata systems share the same conceptual fields, even if those fields are not called the same thing in different systems. It is NC ECHO's goal to use crosswalks to tie together the different metadata standards employed by the state's cultural institutions. By creating consistent and standardized metadata throughout the digitization projects and representations of your collections, you are contributing to this goal.

The inclusion of the metadata standards below does not provide the comprehensive

Crosswalking summary

Manuscripts and Archives		Photographs	Oral History	Objects	Maps	MARC	Dublin Core	EAD <archdesc>
Title		Title	Title	Object name or Title	Title	245	Title	<unittitle>
Author/Creator		Photographer	Interviewee	Creator/Maker	Cartographer	1XX	Creator	<origination>
Contributor		Contributor	Interviewer	Contributor	Contributor	7XX	Contributor	<origination>
Notes: Biographical, Scope & Content		Notes: Biographical, Scope & Content	Notes: Biographical, Scope & Content	Notes: Description of Object	Notes: Description of Map	520 545	Description	<abstract> <bioghist> <scopecontent>
Date(s)		Date of creation	Date(s) of interview	Date of creation	Date of creation	245 ǂf 245 ǂg 260 ǂc	Date	<unitdate>
Material type		Physical medium	Physical medium	Medium of material, material type	Geospatial reference data	340 342	Format. Medium	<physdesc>: <genreform> <physfacet>
Volume(s)		Number of photographs, Dimensions	Length of interview, number of tapes	Dimension	Dimension	300 360	Format. Extent	<physdesc>: <extent> <dimensions>
Accession number, collection number		ID number	ID number	ID number	ID number	035	Identifier	<unitid>
Language		n/a	Language	n/a	Language	040	Language	<langmaterial>
Access & Reproduction, Copyright		Permissions Copyright	Permissions Copyright	Permissions	Permissions Copyright	540	Rights	<userestrict>
Repository		Repository	Repository	Repository	Publisher Repository	500 710	Publisher	<repository>
Subjects	Personal names	Personal names	Personal names	Personal names	Personal names	600	Subject	<controlaccess> <persname>
	Corporate names	Corporate names	Corporate names	Corporate names	Corporate names	610	Subject	<controlaccess> <corpname>
	Places	Geographical names	Geographical names	Geographical names	Geographical name	651	Coverage. Spatial	<controlaccess> <geogname>
	Topics	Subject	Subject	Subject	Subject	650	Subject	<controlaccess> <subject>

Shareable Metadata

The principle of shareable metadata goes to the heart of metadata for digitization projects that are published on the Web. Shareable metadata refers to the concept that metadata be generated that conforms to standards and is inclusive of data elements that allow for contextual understanding. Fields such as “repository” (DC.Publisher) and conformance to technical standards all comprise components of shareable metadata. NC ECHO promotes the creation of shareable metadata by its partner institutions through its various implementation and best practice guidelines. For more information about the concept of shareable metadata and the reasons for its application, see “Moving toward shareable metadata” by Sarah Shreeves, Jenn Riley, and Liz Milewicz, available at http://www.firstmonday.org/issues/issue11_8/shreeves/index.html.

Controlled Vocabularies

A controlled vocabulary is a set of terms used consistently and defined very carefully. It helps little if archivists, museum professionals, and librarians recognize the same metadata fields, but then choose to fill them with their own descriptive phrasing. That is where controlled vocabularies enter the picture. A controlled vocabulary is used when the search results need to be consistent. If indexing is to work, a controlled vocabulary is a must.

Several different descriptive elements lend themselves to controlled vocabularies. Names of creators or contributors, genres or mediums, and subject listings all reap the benefits of controlled vocabularies. Other fields, such as Date and Language rely on data content standards that dictate the way that that information is entered. NC ECHO metadata guidelines provide instructions on these data content standards wherever possible.

The best practice is to select terms from controlled vocabularies, thesauri, and subject heading lists to use as subject elements, rather than just using keywords. Employing terminology from controlled vocabularies ensures consistency and can improve the quality of search results. It also can reduce the likelihood of spelling errors when inputting metadata records. Recognizing the diverse nature of the statewide initiatives and the involvement of a broad range of cultural heritage institutions, controlled vocabularies have been expanded to include subject discipline taxonomies and thesauri. Several states are developing geographic-based lists of terms that may 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.

Each controlled vocabulary or thesaurus also comes with its own instructions for use which should be consulted. It is the proper application of a controlled vocabulary that allows for appropriate, shareable metadata.

Describing your digital project

While metadata is essential to facilitate the use of the materials within your digital project, you should also consider the use of an overall description of your digital project. Primarily associated with the homepage to the project, the inclusion Project Dublin Core at that level will greatly facilitate the location and inclusion of your digital project in consortial and aggregated online resources. The NC ECHO Dublin Core Implementation Guidelines provides an appendix (http://www.ncecho.org/ncdc/ncdublincore2007.htm) that outlines the application of Dublin Core to a digital project as a whole. It is the creation of this metadata

that makes easy the inclusion of your digital project in NC ECHO's Catalog of Online Collections and Exhibits.

Conclusion

North Carolina's cultural institutions could scan their entire holdings. They could post on the Internet a digital image of every item sitting on their shelves and in storage cases. They could fill computer server after server with good information, but if it takes a researcher six weeks of scrolling through screens to find what he wants, all of that scanning will have been performed in vain. Metadata, information about information, **helps researchers find what they are looking for**. If institutions use standard systems of metadata and apply them in standardized ways, they provide their researchers with tools that will help them identify resources within their institutions and will lead to the ability to search across repositories.

Further Reading

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Zeng, Marcia Lei. "Metadata Elements for Object Description and Representation: A Case Report from a Historical Fashion Collection Project." *Journal of the American Society for Information Science* 50, no. 13 (1999): 1193-1208.

Selected Metadata Schemes

CDWA: Categories for the Description of Works of Art.
http://www.getty.edu/research/conducting_research/standards/cdwa/

Dublin Core.
http://www.dublincore.org/.

NC Dublin Core. http://www.ncecho.org/ncdc/index.htm

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

NCEAD. http://www.ncecho.org/ncead/

MARC
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Understanding MARC Authority: Machine-Readable Catalgoing, The Library of Congress, 2005. http://www.loc.gov/marc/uma/

METS
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METS: An Overview and Tutorial
http://www.loc.gov/standards/mets/METSOverview.html

TEI: Text Encoding Initiative
http://www.tei-c.org/

Teach Yourself TEI, http://www.tei-c.org/Tutorials/index.html

Seaman, David. *The Electronic Text Center Introduction to TEI and Guide to Document Preparation*. http://etext.lib.virginia.edu/tei/uvatei.html

VRACore
http://www.vraweb.org/vracore3.htm