The RFP Writer's

Guide to Standards

for Library Systems

Cynthia Hodgson

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By Cynthia Hodgson

Patricia R. Harris
Executive Director

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Dear friends,

The following Guide is one of a number of NISO Press publications and standards you receive at no charge from the National Information Standards Organization. We hope that using this Guide will make it easier for you to incorporate standards into your systems planning. And, that it will help you understand the important role that standards play in the design and implementation of integrated information systems.

The research that went into the RFP Guide and its production were made possible by NISO's Voting Members and the supporters of NISO's Library Standards Alliance.

To keep up this good work NISO needs strong support from its community of users—that's you! As a NISO member you can shape the next-generation of information standards by:

- reviewing and commenting on draft standards,

- being an early implementor, testing standards still on the drawing board, and

- participating as a member of a NISO standards committee.

I encourage you to support NISO as a Voting Member or as a member of the Library Standards Alliance and get involved!

Sincerely,

Patricia R. Harris

Patricia R. Harris

Standards for the Changing Information Environment

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About the Author

Cynthia Hodgson is an independent information consultant and writer with over 20 years of experience as a corporate librarian, library manager, and information technology manager at Westinghouse Electric Corp. and Alcoa, Inc. She has taught graduate level courses in the Schools of Library and Information Science at the University of Pittsburgh and the University of South Carolina, has held local and national offices in the Special Libraries Association, and chaired the Industrial Technical Information Managers Group. She has previously published articles in Database, EContent, CD-ROM Professional, Library Management Quarterly, and numerous special library newsletters. She is currently located in Pittsburgh, PA and can be reached by email at hodgson@nb.net.

Acknowledgements

I. Introduction

Librarians have recognized and supported, long before the dawn of computers, the need for standards to aid in collection management, share resources with other libraries, and improve access for library patrons. The widespread use of Integrated Library Systems (ILS), global communications via the Internet, and growing numbers of digital library initiatives have made the need for compliance with standards more critical than ever. Implementing information products and systems that support standards can ensure that libraries will be able to:

- integrate electronic content products from multiple vendors;

- resource share on a wider geographic scale, even globally;

- participate in more cooperative programs with other organizations, including ones outside the library community;

- speed up the "time to market" of library materials, i.e. the time to acquire, catalog, process, and circulate an item;

- provide remote access to library services;

- reduce the need for user training;

- operate successfully with their parent organization's computing infrastructure;

- migrate cost effectively to newer systems; and

- more easily adopt new technologies.

But which standards are important when considering a library system? And how can one determine if a vendor's product really complies with a standard? *The RFP Writer's Guide to Standards for Library Systems* was created to answer these questions. It is intended for those who are writing Request for Proposals (RFPs) for library systems or evaluating RFP responses and software products.

Standards compliance needs to be considered from the very start of planning for an information system—during the needs assessment. This guide identifies the current U.S. national and international standards that are most important for all types of libraries. Once the standards have been identified, conformance requirements specific to the library system need to be clearly stated in the RFP that is sent to potential vendors. The guide assists in this effort by providing sample language for inclusion in the RFP. When evaluating systems, it is not enough to accept a general statement from the vendor that the product "complies" with a particular standard. In many cases, there are different approaches that can be taken in implementing a standard or the product may support some parts of a standard and not others. This guide will discuss known issues regarding compliance with a standard as it applies to library systems and suggest questions to be asked or tests to be performed to validate a product's conformance.

The guide is organized by major functional areas, e.g. Bibliographic Format, Record Structure, Information Retrieval, Serials, etc. Within each function, the relevant standards are identified, the applicability to libraries is described, sample RFP language is provided,

compliance assessment issues are discussed, and additional resources for information about the standard are listed. A summary table of all the standards discussed, organized by standard designator, is included as an appendix for quick reference. Standards' availability information and current status are included in this table.

The guide contains many hyperlinks to relevant websites, which are indicated by blue underlined text within the symbols < >. In the electronic version, these links are active; double clicking on them will launch a Web browser and connect to the site. The guide also contains internal hyperlinks to related sections of the document. These links are also blue underlined but do not have the bracketed symbols around the links.

Since existing standards are often evolving and new standards continue to be developed and approved, NISO intends to review this guide annually and issue revisions as needed. If there is information you believe should be added or corrected, please contact NISO by email at nisohq@niso.org or telephone at 301-654-2512. This guide is available in print from NISO Press and as a downloadable electronic file from the NISO website <http://www.niso.org/>.

For more information

There are many functional requirements that libraries will want to include in an RFP that are not directly standards related, and thus not discussed in this guide. Check these references for general information on library automation, integrated library systems, and RFPs for library systems:

Integrated Library System Reports – Sample RFPs
<http://www.ilsr.com/sample.htm>

Richard W. Boss, *A Model RFP For An Automated Library System*, Library Technology Reports, 35:6, Nov.-Dec. 1999 pp. 717-820. [An update to this model RFP is scheduled for the July/August 2003, 39:4 issue of Library Technology Reports.]

Library Technology Guides
<http://www.librarytechnology.org/>

Digital Library Standards
<http://sunsite.berkeley.edu/Info/standards.html>

II. Bibliographic Formats

MARC 21 Formats

The Machine Readable Cataloging format (MARC) was originally developed by the Library of Congress to automate the production of catalog cards. Over time, MARC has become widely used internationally and expanded to support advances in technology and library practices. The USMARC formats have evolved into the MARC 21 specifications, becoming the defacto standard for bibliographic formats in library computer applications.

The MARC 21 formats specify three content designators:

- Tags – A 3 digit number that uniquely identifies all the possible "fields" of the cataloging record, such as title, author, series, etc.

- Subfield codes – A lower case letter or digit, preceded by a delimiter, used to further differentiate the data within a field.

- Indicators – Two one-character positions for single digit numbers whose use or meaning varies depending on which field tag the indicator follows.

The specifications address the format encoding necessary for representation and exchange of bibliographic data between systems. Display formats and database storage technologies are not included in the specification and are determined by the design of the particular information system product.

There are five MARC 21 format or content specifications, each addressing a specific type of data:

- *The MARC 21 Format for Bibliographic Data*

- *The MARC 21 Format for Holdings Data*

- *The MARC 21 Format for Authority Data*

- *The MARC 21 Format for Classification Data*

- *The MARC 21 Format for Community Information*

All of these except the *Format for Classification Data* are discussed in more detail below. At this time the only system using MARC 21 classification data is the centralized database of Library of Congress Classification records maintained at the Library of Congress. Other libraries would not reference the classification data standard in their RFPs.

The Library of Congress is the official Maintenance Agency for the MARC 21 specification.

For more information

Library of Congress MARC website:
<http://www.loc.gov/marc/>.

Betty Furrie, in conjunction with the Data Base Development Department of The Follett Software Company, *Understanding MARC Bibliographic: Machine-Readable Cataloging,* 5th edition, 2000 <http://lcweb.loc.gov/marc/umb/>

MARC 21 Format for Bibliographic Data

Bibliographic data is the core component of an automated library system. It forms the basis of all online catalogs and shared cataloging processes. All the functional modules of an integrated library system utilize or interact with the bibliographic data in some way. In earlier versions of MARC, each type of material (book, photograph, map, computer file, etc.) had a separate format defined. In the 1990s, however, the concept of "format integration" was implemented—now all material types are addressed with one format and all MARC 21 fields may be used with any material type.

Sample RFP language

The following are examples of language that could be included in an RFP to address MARC 21 bibliographic format compliance:

- The system must encode all bibliographic records in *MARC 21 Format for Bibliographic Data* without limitation on record length. Describe how the system supports this format. Discuss any limitations on the use of 9XX or X9X locally defined tags and fields.

- The system must be capable of importing and exporting bibliographic records in *MARC 21 Format for Bibliographic Data* without vendor intervention and with full preservation of all content designators. Discuss how import and export is handled. Address whether 9XX locally defined fields are included in import and export.

- The system must provide for display of all MARC content designators (field tags, subfield codes, indicators) on the cataloging workstation and suppress display of codes on all patron access workstations. Describe how record display is handled for each of the following clients: librarian/cataloger workstation, OPAC, Z39.50 client, and Web browser.

Assessing compliance

A library will want a system that supports the full MARC 21 bibliographic format, allowing use of the complete spectrum of content designators, even when it is not intended to use all of them. It is desirable that the system has some validation mechanisms for content designators and selected controlled values (e.g. language codes or country codes). Additionally, the system should accurately import and export records with all content designator tags intact. The system should preserve the order of MARC fields as created or imported, so as not to lose context of related data.

The many data elements contained in MARC can result in a powerful search system; the evaluation team should assess how effectively the system uses the wealth of data in the record. The system should support all functionality expressed through indicator values. For example, if an indicator is defined as meaning a display constant should be supplied or a certain number of characters are non-filing, then the system should provide that functionality.

Format changes to MARC 21 are issued annually and the vendor should discuss how the system is kept current with these changes. If the system uses a vendor-supplied tag table, ask about the update frequency of these tables by the vendor and the lag time from when tag changes are issued by the Library of Congress and incorporated into the vendor's tables.

Since record display is not specified in MARC 21, demonstrations of display on different types of workstations for different types of users—cataloging workstations, OPAC terminals, Z39.50 clients, and Web browsers—should be performed to determine how each display might differ.

For more information

MARC 21 Format for Bibliographic Data (Concise Version)
<http://www.loc.gov/marc/bibliographic/ecbdhome.html>

MARC 21 Format for Authority Data

Authority data acts like an online thesaurus, allowing for control of authorized names and subjects used in designated fields of bibliographic records. These records may also generate cross references from unused to preferred terms and interrelationships between authority entries.

The *MARC 21 Format for Authority Data* identifies seven kinds of authority records—established heading, reference, subdivision, established heading and subdivision, reference and subdivision, node label—and defines how each type is to be encoded.

Sample RFP language

The following are examples of language that could be included in an RFP to address MARC 21 authority data format compliance:

- The system must support *MARC 21 Format for Authority Data* and allow all relevant bibliographic fields to be authority controlled. Describe how the system implements this format and identify which fields can be authority controlled. Describe the default authority control policies and the ability to customize these policies.

- The system must generate SEE and SEE ALSO references from authority records and display them in the OPAC. Discuss how the system creates, manages, and displays cross-references.

- The system must be capable of importing and exporting authority records in *MARC 21 Format for Authority Data* without vendor intervention.

- The system must be capable of editing authority records individually and globally and allow easy access to authority records editing from within the bibliographic module.

Assessing compliance

The system should be evaluated for the ability of authority records to interact with bibliographic records in generating references and validating entries. Compliance issues generally relate to the implementation of cross references—specifically how and when the system displays simple and complex cross references from the tracings information. Additionally, authority records have import and export requirements that differ from those of bibliographic records and thus should be tested separately. Libraries that import authority control lists from more than one source should determine if and how these lists are merged and how overwriting is prevented.

MARC 21 Concise Format for Authority Data
<<u>http://www.loc.gov/marc/authority/ecadhome.html</u>>

MARC 21 Format for Community Information

Many libraries, especially public ones, identified a need for storing and making accessible to patrons local information about their organization and community that cannot be described by the traditional bibliographic record. The *MARC 21 Format for Community Information* was the answer to that need. It identifies five types of community information records— individual, organization, program or service, event, and other—and defines how each type is to be encoded.

Sample RFP language

The following are examples of language that could be included in an RFP to address MARC 21 community information format compliance:

- The system must support *MARC 21 Format for Community Information*. Describe how the system implements this format.

- The system must be capable of importing and exporting Community Information in MARC 21 format without vendor intervention.

- The system must be able to limit searches to the community file only. Describe how this is accomplished.

- It is desirable for the system to provide linkages to an authority file. Describe how authority records for Community Information are handled.

Assessing compliance

There are minimal requirements for community information format compared to the other formats. Support for all the identified data elements, import and export capability, and the validation routines should be verified. If authority control is desired for community information, determine if a separate authority file is available (or required).

For more information

MARC 21 Concise Format for Community Information
<<u>http://www.loc.gov/marc/community/eccihome.html</u>>

MARC 21 Format for Holdings Data

The holdings data describes the particular items and copies in the library's collection that are associated with a bibliographic record. Proper holdings format and coding is critical to the operation of circulation related functions, serials check-in, and integrated acquisitions.

The *MARC 21 Format for Holdings Data* specifies data fields and tags for three types of holdings—single-part items, multi-part items, and serial items—as well as rules for embedding holdings in or linking holdings to the bibliographic record. The current version

of the standard has incorporated the required holdings elements specified in ANSI/NISO Z39.71 (discussed below) and includes a chart mapping MARC data elements to those in Z39.71. An encoding level tag has been added to identify the specificity of the holdings statement at 5 defined levels.

Sample RFP language

The following are examples of language that could be included in an RFP to address MARC 21 holdings format compliance:

- The system must support *MARC 21 Format for Holdings Data* at both summary and detailed levels, and as either embedded or linked records. Describe how the system supports this format. Discuss the ability of the system to automatically generate summary holdings. Discuss how the system is kept current with modifications to the holdings format.

- The system must be capable of importing and exporting holding records in *MARC 21 Format for Holdings Data* without vendor intervention and with full preservation of all tags.

- The system must provide for display of all MARC 21 holdings tags on the librarian workstation and suppress display of codes on all patron access workstations. Describe how record display is handled for each of the following clients: librarian/cataloger workstation, OPAC, Z39.50 client, and Web browser.

- The system's serials check-in system should automatically update the MARC 21 holdings record including all content related to the 85X/86X paired fields. Describe how the system serials check-in module integrates with the MARC holdings records.

[See also the section on ANSI/NISO Z39.71, *Holdings Statements for Bibliographic Items* for additional RFP language related to holdings.]

Assessing compliance

Full compliance to the *MARC 21 Format for Holdings Data* is not as widespread in current library systems as is compliance with the bibliographic format. Libraries frequently differ in their interpretation of what constitutes a "copy"; the evaluation team should determine whether the system will support their local definitions and handling. Identify any limitations on the number of holdings records that can be linked to a bibliographic record.

Serials holdings can be especially complex due to the "pattern" variety of issues, irregular issues, and special extra issues. The integration between the serials check-in functions and the holding records should be discussed. Ideally, the pattern information in the 853 field should match the pattern used for serials check-in and the 863 field should update automatically as an issue is checked in.

Import capability is important when migrating from one system to another. Export capability in either detailed or summary format should be reviewed if there is any expectation of contributing to a union catalog or listing.

Tests of holdings data should include embedded and linked holdings records, summary and detail holdings, and how the different types of holdings are displayed. Import and export of a sample of the libraries holding data should be tested to ensure that field codes are intact.

For more information

MARC 21 Concise Format for Holdings Data
<http://www.loc.gov/marc/holdings/echdhome.html>

Frieda Rosenberg, *Introduction To The Marc Format For Holdings Data, The Future of Serials Control*, LITA Preconference Institute, June 15, 2001.
<http://www.loc.gov/acq/conser/litapres-fr/ppframe.htm>

Holdings Statements for Bibliographic Items

ANSI/NISO Z39.71*, Holdings Statements for Bibliographic Items*
<http://www.niso.org/standards/resources/Z39-71.pdf>

[International equivalent*:* ISO 10324, *Information and documentation – Holdings statements—Summary level]*

Z39.71, supporting the concept of format integration, supersedes and merges two previous holdings standards, Z39.44 for serials and Z39.57 for non-serials. The NISO standard was based on the international standard, ISO 10324 *Information and documentation – Holdings statements—Summary level,* but goes further in defining holdings at a detail level. Use of the specified display formats provides consistency in the communication and exchange of holdings information among libraries and between disparate information systems. Z39.71 works in conjunction with the *MARC 21 Format for Holdings Data;* MARC defines the structure and encoding for implementing holdings data while Z39.71 addresses the content and display of those holdings. The standard defines four levels of specificity of holdings, mandatory and optional data elements for each level, punctuation / format to be used for the data content, and display options.

Sample RFP language

The following are examples of language that could be included in an RFP to address Z39.71 holdings statement compliance:

- The system must support holdings statements of both serial and non-serial multi-part items as defined in *ANSI/NISO Z39.71 Holdings Statements for Bibliographic Items,* including summary and detailed holdings, mixed level holdings, itemized and compressed formats, and enumeration and chronology displays. Describe the system's support for all mandatory data elements at all four levels and discuss how optional elements can be utilized.

- The system must support holdings display as defined in *ANSI/NISO Z39.71 Holdings Statements for Bibliographic Items,* with respect to formats, punctuation, and order of data. Describe how holdings statement display is handled for each of the following clients: librarian/cataloger workstation, OPAC, Z39.50 client, and Web browser.

- The system must support export of holdings data, with full retention of content formats as defined in *ANSI/NISO Z39.71 Holdings Statements for Bibliographic Items,* to allow participation in union lists or library data exchanges.

- Describe how the system links holdings data and bibliographic data.

[**Note:** See also the section above on *MARC 21 Format for Holdings Data* for additional language related to holdings information.]

Assessing compliance

Full support of holdings data at any of the four levels defined in the standard is the main compliance issue. The system should accept the newly defined option of having an open-ended holding in an OPAC display. Available display options (compressed, itemized, line-by-line itemization, etc.) should be verified and tested on all types of clients that the library intends to use. Linkages between holdings data and bibliographic data should use an item identifier. While not specified in the standard, limitations, if any, on number of holdings linked to a given bibliographic item or holdings record length should be determined. Z39.71 accommodates the use of holdings data created under the earlier standards. Libraries that plan to migrate data using older formats and use the new standard requirements for future holdings should understand how the system will handle and display both the old and the new formats.

For more information

Rebecca Guenther, *Current Holdings Standards and MARC Format Considerations*, The Future of Serials Control, LITA Preconference Institute, June 15, 2001. <http://www.loc.gov/acq/conser/litapres-rg/sld001.htm>

III. Record Structure, Character Sets, and Exchange Media

MARC 21 Specifications for Record Structure, Character Sets, and Exchange Media
<http://www.loc.gov/marc/specifications/spechome.html>

In addition to the MARC 21 format specifications, discussed in Section I, there are also specifications that relate to the more technical structure, coding, and labeling of data that is needed for the exchange of information between computer systems. The *MARC 21 Specifications for Record Structure, Character Sets, and Exchange Media* define the standards for ensuring that all the bibliographic formatted information is retained, understood, and translated correctly.

MARC 21 – Record Structure

The record structure is the key for the computer's understanding all of the MARC bibliographic formatted data and is an integral reference in all the format specifications. The MARC 21 record structure specification is an implementation of ANSI/NISO Z39.2, *Information Interchange Format*, and ISO 2709, *Format for Information Exchange*. It defines how bibliographic and related records (e.g., authority, holdings, etc.) should be structured so that any compliant computer software can translate the codes and data into understandable, editable, and searchable information.

The specification details three parts of the record:

- The **leader** tells the computer how to process the subsequent record by defining the length and type of the record and kinds of coding being used.

- The **directory** provides an index to the record by identifying the field tags that are used in the record and their length and start position.

- **Variable fields** are all the control and data fields that make up the actual record.

Sample RFP language

The following are examples of language that could be included in an RFP to address MARC 21 record structure compliance:

- The system must comply with the record structure specified in *MARC 21 Specifications for Record Structure, Character Sets, and Exchange Media*. Discuss how the system has been tested to validate this compliance and provide copies of relevant test documentation.

- The system must be capable of importing and exporting all types of MARC 21 formatted records without vendor intervention and with full preservation of all tags. The system must be able to import and export individual records as well as the entire database in MARC 21 format.

- Describe the system's capability of importing and exporting bibliographic utilities' versions of MARC records, e.g. OCLC-MARC and RLIN-MARC.

Assessing compliance

The system should accurately import and export records of all MARC 21 format types with all structure and content designator tags intact. The system should provide all the tools and utilities needed to do imports and exports without additional programming or services from the vendor. Some bibliographic utilities, such as OCLC and RLIN, have subtle differences in their implementation of the Z39.2 standard, usually in the leader format and how records are blocked on tape. The library evaluation team should determine if import and export of MARC records from the bibliographic utility they use has been implemented and tested.

Since record indexing and storage are not specified in MARC 21and could vary greatly from one system to another, the evaluation team should ask for a full explanation of the underlying database structure and indexing routines.

For more information

MARC 21 Record Structure
<<http://www.loc.gov/marc/specifications/specrecstruc.html>>

MARC 21 – Character Sets

All computerized characters (letters, numbers, symbols, etc.) have to be encoded at the binary level. While early automation systems used the EBCDIC character set, since the 1970's ASCII has been the most commonly used code across all types of computer applications. But ASCII, which has only 256 possible combinations, falls short when a single application, such as the typical library catalog, utilizes multiple languages, transliterations, and diacritics (e.g., accent, tilde, umlaut).

The MARC 21 specification defines two character set formats:

- **MARC-8**, an 8-bit coding system which utilizes the ASCII set from ANSI X3.4 and its international counterpart ISO/IEC 646 (IRV), the ANSEL extended Latin character set (ANSI/NISO Z39.47), the *East Asian Character Code* (ANSI/NISO Z39.64), as well as a number of other sets specific to particular languages and symbols. (The Summary Table of Standards cross-references the various character set standards that are implemented in MARC 21.)

- UCS/Unicode **UTF-8**, a variable 8/16-bit coding system based on the Unicode and UCS (ISO/IEC 10646) standards. Unicode defines a single character set that encompasses most written languages. The MARC standard does not currently define the full Unicode character set. The supported MARC-8 character codes have been mapped to Unicode with the intent of enabling transition from 8 bit to 16 bit systems and round trip movement of data (MARC-8 → UCS/Unicode → MARC-8 and UCS/Unicode → MARC-8 → UCS/Unicode) without loss of information.

The character sets supported in an automated library system will determine how bibliographic text is input, stored, and displayed. To accurately import records in electronic format, the library system must either natively support the records' character set or have a reliable conversion program.

While all types of libraries may encounter character set issues, libraries with diverse multilingual collections will need to be most concerned with how a potential system implements character sets.

Sample RFP language

The following are examples of language that could be included in an RFP to address MARC 21 character set standards compliance:

- The system must support the importing, inputting, editing, displaying, printing, storing, and exporting of all characters defined in the character sets of *MARC 21 Specifications for Record Structure, Character Sets, and Exchange Media*. Identify any character sets specified in MARC 21 that are not fully supported by the system for importing, inputting, editing, displaying, printing, storing, and exporting. Explicitly describe the areas of non-support.

- The system must support the MARC 21 character sets utilizing standard hardware peripherals for input, display, and printing. Describe any specific requirements for peripheral hardware to ensure this support.

- Describe how non-Roman alphabets, Latin script characters, and specialized symbols are handled with a standard Web browser client.

[**Note:** Libraries that do not need all of the character sets in MARC 21 to be supported may want to be more specific, e.g. "The system must support all the Latin script characters, diacritics, and special characters as documented in Code Tables 1-4 of the *MARC 21 Specifications for Record Structure, Character Sets, and Exchange Media*."]

Assessing compliance

Each character set that the library plans to use should be tested separately in the proposed system. After testing input on a cataloging workstation, the display and printing of the characters should be tested on the different types of peripherals the library expects to use. Display should also be checked using a Web browser.

Sample records utilizing the different character sets should be imported and checked for editing, display, and printing. Record exporting options should also be tested and round trip export / imports should be tried.

For more information

MARC 21 Character Sets
<http://www.loc.gov/marc/specifications/speccharintro.html>

Diffuse Guide to Character Sets
<http://www.diffuse.org/charguide.html>

Unicode: From Chinese to Cherokee; from Kana to Klingon
<http://www.pla.org/publications/technotes/technotes_unicode.html>

The Unicode Standard: A Technical Introduction.
<http://www.unicode.org/unicode/standard/principles.html>

MARC 21 - Exchange Media

The MARC 21 Exchange Media specifies media format and labeling for mechanisms that may be utilized to exchange MARC 21 encoded records between computer systems. The requirements for labeling, volume, organization, and sequence of data are defined for three types of exchanges: electronic file transfer, microcomputer diskettes, and magnetic tape. Magnetic tape interchanges are based on three related ANSI standards: ANSI X3.27, ANSI X3.39, and ANSI X3.54.

Sample RFP language

The following are examples of language that could be included in an RFP to address MARC 21 exchange media compliance:

- The system must support the *MARC 21 Specifications for Exchange Media* with the capability to import and export, without vendor intervention, by FTP electronic transfer, disk, and tape.
  [**Note:** Libraries may want to be more specific about disk and tape types that are utilized locally.]

- Describe all tools and utilities that come with the system, or are available as separate modules, which are utilized to import or export MARC formatted records.

- Describe all tools and utilities that come with the system, or are available as separate modules, which are utilized to import MARC records from bibliographic utilities (e.g. OCLC, RLIN).
  [**Note:** Libraries may want to specify the particular bibliographic utilities or vendor products that they plan to utilize.]

Assessing compliance

Adherence to media format and labeling specifications is essential for successful exchange of MARC 21 records. Vendors should be asked for documented test results or demonstrations for the type of transfers the library requires. Electronic file transfers utilizing Internet File Transfer Protocol (FTP) can be easily tested using the library's own data or sample data files.

Magnetic tape transfer specifications were changed in 1977 to support record spanning across media. Libraries should verify that the vendor supports the new tape specifications.

For more information

MARC 21 Exchange Media
<http://www.loc.gov/marc/specifications/specexchintro.html>

IV. Serials

Serial Item and Contribution Identifier (SICI)

ANSI/NISO Z39.56, *Serial Item and Contribution Identifier (SICI)*
<http://www.niso.org/standards/resources/Z39-56.pdf>

The SICI standard defines a coding structure to assign unique identifiers to serials (called Serial Items) and articles within them (called Contributions). The code builds on the International Standard Serial Number (ISSN) for the serial item portion of the identifier. The SICI code is derived algorithmically from bibliographic information about the serial and/or article and may be generated by the creator/publisher of the items and contributions, by a third party vendor such as a document delivery supplier or abstracting and indexing service, or by the library which acquires and holds the materials.

Use of the SICI code in a computer system allows the items and contributions to be uniquely identified in many library automated transactions including ordering, claiming, bibliographic database linking, ILL and document delivery, check-in, reserve room, and rights management and royalty collection. The code was designed to be compact enough to be easily converted to a barcode (although as of this writing a barcode format has only been defined for Version 1 of the SICI and not yet for the 1996 Version 2 format). SICI has also been assigned a use value in the Z39.50 bib-1 attribute set. (See discussion of Z39.50 below.) This assignment allows the SICI to be used as a qualifier in a Z39.50 information retrieval search. SICI also could be used as the identifier in conjunction with an ILL Protocol request, EDI order, or a GEDI electronic document transmission. (See the discussions of ILL Protocol, EDI, and GEDI below.)

Sample RFP language

The following are examples of language that could be included in an RFP to address SICI compliance:

- The system must support the use of the *Serial Item and Contribution Identifier* as specified in ANSI/NISO Z39.56. Describe how your system implements SICI for both serials and contributions. Discuss how the SICI is stored, indexed, and searchable.

- Discuss how your system does SICI code matching and validation.

Assessing compliance

It is more likely, currently, to find support of SICI at the Serials Item level than the Contribution level in a library system. However, the use of the Contribution Identifier through the entire ILL or document delivery cycle (from patron search and identification through item receipt) is becoming more crucial. Even libraries that do no currently identify items at the contribution level should look for a system that allows the code's use.

Since the standard allows that some data elements can be omitted when creating a SICI, the algorithms a system uses to match or validate SICI codes can be complex. Demonstrations and tests of this functionality should be requested from the vendor.

The 1996 version of the standard changed the rules for Title Code, clarified the distinction between serial items and contribution identifiers, added a method for indicating the medium of the material, and better delineated the segments of the identifier. Libraries should confirm that the system supports the changes in this version.

For more information

Serials Industry Systems Advisory Committee, *Serial Item Identifier: Bar Code Symbol Implementation Guidelines*, Book Industry Study Group, New York, NY.
(ISBN 0-940016-36-2) Info at: <http://www.bisg.org/pubs_description.htm#14>

Steve Probets, *SICI Generator* <http://www.ep.cs.nott.ac.uk/~sgp/sicisend.html>

Data Elements for Binding Library Materials

ANSI/NISO Z39.76, *Data Elements for Binding Library Materials*
<http://www.niso.org/standards/resources/Z39-76.pdf>

Z39.76 identifies and defines common data elements used to process and track library materials for binding when information about the material is exchanged between a library management software system and a binding preparation software system. Use of the specified data elements in an automated library system can reduce duplicate data entry when preparing binding orders, improve accuracy and consistency of binding labels, and allow for more automation of binding processes.

The standard incorporates other identifying codes and standard numbering systems such as ISBN, ISSN, and SICI. Holdings information fields are based on the *MARC 21 Format for Holdings Data*. The standard does not define any of the communications protocols required for the information exchange, but the expectation is that EDI is utilized for the transfer of data. [See section on EDI below.]

Sample RFP language

The following are examples of language that could be included in an RFP to address Z39.76 binding data elements compliance:

- The system must support *ANSI/NISO Z39.76 Data Elements for Binding Library Materials*. Define which binding element fields are included by default in the system and discuss how optional elements are handled.

- Describe how binding element information is input and how it is linked to the bibliographic and holdings record information to ensure consistency.

- Describe the process for generating binding information from the system to send electronically to a vendor. Describe the methods and formats for exporting binding information to a file.
  [**Note:** If the library plans to use a specific binding preparation software package, the software package should be identified and any additional data elements or exporting requirements of the software should be included in the RFP.]

• Identify which communications protocols can be used to transmit binding information.

Assessing compliance

A small subset of the data elements defined in the standard is considered mandatory; these elements should be supported in the selected system. Many of the optional fields are defined as such only because they would not be utilized with <u>every</u> binding order thus it is likely that many of the optional fields would be desirable to have. Additionally, some libraries may be using a binding preparation software package that might require some of the standard's optional data fields. The evaluation team should review all the optional elements and identify the additional fields that would be "mandatory" to their library's binding process. Determine how the desired optional data elements are supported and how easily additional data elements can be added at a later time. Ask if there are any limitations on the number of binding related fields which the system can support. Determine that the system supports both serial and non-serial materials in the binding processes and that the binding module can access needed data from the serials and acquisition modules.

Have the vendor create a test file of binding data from the system as it would look when transmitted and verify that the information is compiled and reported correctly. If the library's binding vendor accepts electronic transmissions, a test transmission to that vendor and the vendor's verification of how the data was received would be useful.

Clarify with the vendor which communication protocols are supported for binding information. If the system supports EDI transmission for acquisition and claiming activities, can it also be used for the binding transmission? If the binding data is exported to a file, determine what file formats are available and if these are compatible with what the library and the binding vendor use.

For more information

Library Binding Institute (LBI) website:
<<u>www.lbibinders.org</u>>

V. Circulation

NISO Circulation Interchange Protocol (NCIP)

ANSI/NISO Z39.83, *NISO Circulation Interchange Protocol (NCIP)*
<http://www.niso.org/standards/resources/z3983pt1.pdf>
<http://www.niso.org/standards/resources/z3983pt2.pdf>

The NISO Circulation Interchange Protocol (NCIP) defines and specifies the objects, services, messages, and data elements needed to facilitate interoperability between dissimilar circulation systems. Three applications are addressed: direct consortial borrowing, circulation/interlibrary loan interaction, and self-service circulation. Functions that permit a circulation system to manage controlled access to electronic materials, such as e-books and music files, are also included in the protocol.

Currently, many libraries have to record an interlibrary loan in both their circulation system—to track the patron's check-out (if a borrowed item) or the item's nonavailability status (if a loaned item)—and in the shared ILL system—to track the loan or outstanding loan request. Use of the NCIP will allow disparate circulation systems and ILL systems to communicate, exchange information about users and items, and update status automatically—eliminating duplicate data entry, lessening manual interventions, and ensuring consistency in loan information and updates. Library consortiums where individual libraries are using different library systems can utilize NCIP to turn consortial loans into circulation transactions. Self-service circulation transactions can be improved and expanded beyond the patron's home library.

The NCIP standard separates the specification of services and data objects from implementation details to allow the protocol to be deployed using different encoding and transport methods, as well as permit the use of future technologies without rewriting the entire standard. Implementation specifics are handled through Implementation Profiles, which specify methods for message exchange using particular technologies, and Application Profiles, which describe the particular service requirements needed to support typical circulation applications. Templates and rules for developing these profiles are provided in the standard. A basic Implementation Profile, utilizing current Web and XML technology, is included as part 2 of the standard. Eight Application Profiles associated with Implementation Profile 1 have been defined and are available on the NISO NCIP website along with the schemas referenced in the Implementation Profile.

Sample RFP language

The following are examples of language that could be included in an RFP to address NCIP compliance:

- The system must support the *NISO Circulation Interchange Protocol (NCIP)*, ANSI/NISO Z39.83. Describe any successful demonstrations of NCIP implementation between: 1) the system's circulation module and other ILL systems, and 2) the system's ILL module and other circulation systems.

- The system must support *NCIP Implementation Profile 1,* ANSI/NISO Z39.83, Pt. 2. Describe how the system implements this profile.

- Identify the specific *NCIP Application Profiles* which the system supports.

[**Note:** As additional Implementation and Application Profiles for NCIP are developed, libraries may want to add or substitute other profiles in their RFP.]

Assessing compliance

NCIP Implementation Profiles and Application Profiles include conformance requirements, specifically, which of the services, messages, and data structures are required as well as the rules defining behavior for conformance. Implementation Profile 1, provided with the standard, defines two levels of conformance: strictly conformant and conformant, each of which is further explained in the profile. This particular Implementation Profile requires the use of XML for message encoding, DTD to encapsulate the structure, Unicode UTF-8 for character encoding, and one of three transport protocols—HTTP, HTTPS, or TCP/IP. Current implementations of NCIP should demonstrate compliance with these protocols and schemas. [See section on XML below. Unicode is discussed above in MARC 21 Character Sets.]

Libraries should determine which of the eight application profiles are relevant to their environment. The event tables in the application profile can be used as a kind of checklist to determine if the system being evaluated supports the services needed in the desired application environment(s).

NCIP was approved in mid-2002 and a newly formed implementors group plans began meeting in October 2002. It is expected that this group will develop further guidelines on conformance interoperability.

For more information

NISO NCIP website:
<http://www.niso.org/standards/resources/NCIP_Resource_Page.html>

Mark Needleman, *The NISO Circulation Interchange Protocol: An Overview and Status Report*, Serials Review, v. 26, no. 4, 2000, pp. 42-45.

Pat Stevens, *NCIP—The Invisible Stitches*, ALA Midwinter, January 21, 2002
<http://www.niso.org/committees/at_jan_02/index.htm>

Barcodes

A barcode is an optically readable array of black and white "bars" of varying widths where a fixed pattern of bars and spaces represents a particular machine-readable character. An optical scanning device "reads" the barcode and sends the information to a decoder which converts the scan to its correct machine-readable characters. The ratio of the bar widths, the print density and quality of the label, the accuracy of the scanning device, and the capability of the decoder all play a part in whether the right information is ultimately fed into the computer system.

Libraries typically use barcodes to uniquely identify a physical library collection item and link the physical item to a bibliographic and holding record. Barcodes are also used on library patron identification and link to the patron's database record. During a circulation transaction, the barcodes of the library item and the patron are scanned resulting in a faster and more accurate circulation transaction.

An accurate and effective barcode scan is dependent on the interaction of the barcode label, the barcode reader (pen, wand, gun, etc.), the decoder (usually part of the reader), and the library system software interface. Readers and especially the labels are often purchased from different vendors than the library system supplier, which makes standards conformance of all the vendors critical.

There are over 200 barcode symbol "languages" in existence worldwide. Each "language" specifies rules for how data is encoded (i.e. which letters, numbers, punctuation are used and what they mean if in certain positions) into the "bars," label printing requirements, decoding rules, and error checking. Only a fraction of the bar code specifications are in wide use. The two bar code standards most in use by libraries are Code 39 and Codabar.

Code 39

ANSI/AIM BC1, *Uniform Symbology Specification—Code 39*

ISO/IEC 16388, *Information technology—Automatic identification and data capture techniques—Bar code symbology specifications—Code 39*

Code 39 is a general barcode standard utilized in many industries. It is sometimes called the "3 of 9 code" as it uses 9 bars, 3 of which are wider than the others, to define a character. An alphanumeric system is used which can have up to 43 characters with 1 start/stop code pattern. Code 39 is considered one of the easiest codes to use because of its self-checking capability.

Codabar

ANSI/AIM BC3, *Uniform Symbology Specification—Codabar*

Codabar is a library specific barcode that utilizes a 14 character-numeric label broken down as follows:

Digit Position	Description
1	Type of barcode. A "2" signifies a patron label. A "3" signifies a title label.
2 – 5	Four digit library identifier
6 – 13	Consecutive number
14	Check digit

Codabar is strictly numerical and is considered to have one of the highest resolutions of all bar codes.

Sample RFP language

The following are examples of language that could be included in an RFP to address barcode compliance:

- The system must support the use of both Codabar and Code 39 barcodes for bibliographic items and patron IDs, with the ability to interpret a minimum of 14 digits.
  [**Note:** Libraries that are currently using other barcode formats should include an RFP statement listing all of the needed barcode formats.]

- The system must accept input from third party suppliers' barcodes and readers, or another library system barcodes, that comply with Codabar or Code 39 standards. Describe any limitations on support of these standards or standard-compliant third party products.

- Barcode numbers on items or patron IDs should be able to be scanned or manually entered into the system.

- The system must be able to create output that can be used by a vendor to create Code 39 or Codabar standard barcodes.

- Barcode numbers should be entered into MARC field 949 or an appropriate 8XX field of the record.

Assessing compliance

Bar code technology and readers supporting both Code 39 and Codabar are fairly commonplace. Their commodity nature has caused libraries to shop around to find the best prices. As a result, it is not unusual for different vendors to supply the barcodes, the readers, and the system software. Thus it is important that tests be performed using the proposed products from all vendors involved to ensure accurate interoperability. In particular, test check digit computation, readability, and reliability should be verified.

For more information

Code 39 Specification [about]
<http://www.barcodeman.com/info/c39_1.php3>

Codabar Barcode Specification [about]
<http://www.barcodeman.com/info/codabar.php>

Barcode Technology
<http://www.aimglobal.org/technologies/barcode/>

VI. Resource Sharing and Interlibrary Loan

ILL Protocol

ISO 10160, *Information and documentation—Open Systems Interconnection—Interlibrary Loan Application Service Definition*

ISO 10161-1, *Information and documentation—Open Systems Interconnection— Interlibrary Loan Application Protocol Specification—Part 1: Protocol specification*

ISO 10161-2, *Information and documentation—Open Systems Interconnection— Interlibrary Loan Application Protocol Specification—Part 2: Protocol implementation conformance statement (PICS) proforma*

The ISO ILL Protocol standardizes the exchange of interlibrary loan information between computer systems. Currently, most automated ILL systems or consortia require the borrowing and loaning libraries to access a common database and system. Loans are generally available only from those libraries participating in the common system. Loans outside of the common system usually have to fall back on paper ILL requests that are mailed or Faxed. The ISO ILL Protocol takes a distributed view to handling automated ILL transactions. Borrowing and lending libraries, whose systems are compliant with the standard, would enter information into their own systems which would then send messages in the standard protocol format directly to each other or through an intermediary. In addition to allowing the library to use the ILL system of its choice or the ILL module in its own integrated library system, use of the ISO protocol approach widens the resource sharing base—potentially to anywhere in the world where the protocol is being used—an increasingly important capability in today's global society.

The ILL Protocol breaks transactions down into separate activities or tasks, each of which is defined as a "service." These services have defined specific data elements and "messages" that get transmitted during the ILL transaction in a specified sequence. Three standards make up the full protocol:

- ISO 10160 defines the ILL roles, models the different role combination interactions, and defines the various ILL services, messages, status states, and sequencing rules.

- ISO 10161-1 is the "meat" of the protocol, specifying the "ILL Protocol Machine's" behavior requirements and the procedural rules to support the services defined in ISO 10160.

- ISO 10161-2 details the requirements for completing a conformance statement.

Three roles—requester, responder, and intermediary—are defined along with their respective events, actions, and procedural rules. Services supported by the protocol include ILL requests (loans or photocopies), renewals, recalls, tracking, and overdue notification. Provision is made for the *identification* of the delivery mechanism and the item medium / format; however the standard does not prescribe the actual delivery mechanisms or telecommunication transport protocols.

The National Library of Canada is the official Maintenance Agency for the ISO ILL Protocol standards.

Sample RFP language

The following are examples of language that could be included in an RFP to address ISO ILL Protocol compliance:

- The system must support the *ISO ILL Protocol* standards, ISO 10160 and 10161-1. Describe how the system enables input and output of ISO ILL Protocol requests. Discuss any implementation decisions related to optional protocol requirements.

- The system must conform to the Interlibrary Loan Protocol Implementors Group (IPIG) Profile. Vendors should submit a copy of their completed *IPIG Profile Conformance Statement Requirements List*.

- Identify which communications protocols can be used by the system to transmit ISO 10160 and 10161-1 compliant ILL protocols.

- Describe how the system's ISO-compliant ILL Protocol Machine application interacts with the other modules of the library system, particularly circulation and finance applications.

Assessing compliance

Section 10 of ISO 10161-1 describes the standard's conformance requirements. A system can be compliant with the protocols for one or any combination of the three roles and only the simple transaction functions are mandatory. In order to effectively evaluate a system's compliance, the library needs to be clear about which role(s) it intends to perform and which optional services and parameters are needed for its particular ILL operations.

The Interlibrary Loan Protocol Implementors Group (IPIG) was established by the North American Interlibrary Loan and Document Delivery Project to facilitate implementation of the protocol. To address the complexity of understanding and implementing conformance with the protocol, IPIG created the *ILL Protocol Implementors Group (IPIG) Profile for the ISO ILL Protocol* reflecting a common set of decisions, options, and values for implementation. The *IPIG Profile* imposes some additional constraints on implementation, beyond those specified in the base application standards. A claim of conformance to this *IPIG Profile* is a claim that all requirements in the relevant base standards are satisfied and that all the requirements of the *Profile* are satisfied. Annex A of the *Profile* contains a detailed conformance form, similar in purpose to the ISO 10161-2 PICS proforma, for the vendor to complete to indicate levels of compliance with the specified roles, services, and parameters.

The library evaluation team should go through Annex A of the *IPIG Profile* and identify which optional parameters are important to their specific library situation. The library's requirements can then be compared to the completed forms submitted by the vendors. For those features which are designated as having conditional support (as opposed to mandatory or optional), the evaluation team should determine whether the identified conditions would be relevant in their implementation.

A separate publication, *IPIG Guidelines for ILL Application Developers*, provides advice for understanding and achieving conformance with the ILL standard and IPIG profile. Although created for developers of ILL computer systems, the guidelines can also be useful to the

library evaluation team in understanding the standard, developing their own requirements, and interpreting the vendor's conformance statement and implementation approach.

The ILL Protocol Maintenance Agency website includes resources on how to conduct system tests including a list of participating testbed sites. The ILL Protocol Implementor Group website includes updated information on the status of system testing by IPIG members.

For more information

Interlibrary Loan Application Standards Maintenance Agency (ILL ASMA) website:
<http://www.nlc-bnc.ca/iso/ill/>

ILL Protocol Implementors Group (IPIG) website:
<http://www.arl.org/access/naildd/ipig/ipig.shtml>

IPIG Profile and Guideline Documentation
<http://www.nlc-bnc.ca/iso/ill/ipigprfl.htm>

Barbara Shuh, et al *Tutorial on the ISO Interlibrary Loan Protocol*
<http://www.nlc-bnc.ca/iso/ill/readtut1.htm>

Generic Electronic Document Interchange (GEDI)

ISO 17933, *Generic Electronic Document Interchange (GEDI)*

The Generic Electronic Document Interchange (GEDI) standard defines the formats and protocols for exchanging electronic documents. It was created to avoid the development of disparate non-standard automated systems as electronic document delivery continues to grow in availability. A standard set of formats and transport mechanisms will encourage the use of electronic document delivery, allow the use of automated systems to increase speed and lower delivery costs, and utilize the same networking technology for ordering and delivering documents.

The GEDI format consists of two parts: the header or cover information and the electronic document itself. To facilitate use of GEDI with the ISO ILL Protocol, the header tags have been mapped to equivalent data elements defined in *ISO 10161-1, Interlibrary Loan Application Protocol Specification*. Document formats currently supported are TIFF, PDF, and JPEG, however the standard is designed to accommodate registration of additional formats as they become widely accepted. While the standard is designed to allow utilization of any transfer protocol agreed upon by the involved parties, it defines profiles for FTP (the preferred transport) and MIME email transmission. Three roles of participating organizations are defined—Supplier, Consumer, and Relay—the latter being an intermediary store-and-forward facility.

Sample RFP language

The following are examples of language that could be included in an RFP to address GEDI compliance:

- The system must support the transfer of electronic documents in compliance with *ISO 17933*, *Generic Electronic Document Interchange (GEDI)*. Describe how the system provides these capabilities. Identify which document formats and transfer protocols are supported.

- Describe how the system integrates ISO ILL Protocol (ISO 10160 and 10161) functionality with GEDI functionality.

Assessing compliance

The GEDI standard specifies the conformance requirements based on the role being performed—Supplier, Customer, or Relay. An information system at the highest level of compliance would have to both send and receive in all the listed formats and transfer protocols, receive and interpret all header data elements, and even accept and ignore non-standard header elements. Libraries should identify which role(s) they intend to perform and identify which formats and transfer protocols are needed to perform those roles in their environment.

Except for mapping of the header data elements, the standard does not specify the integration functionality with the ISO ILL Protocol or a library system's ILL transaction module. Discussions with the vendor will be necessary to determine if this integration exists and how it was implemented.

For more information

Andrew Braid, *Standardisation in Electronic Document Delivery*, 1996 IATUL Conference on Networks, Networking and Implications for Digital Libraries, University of California, Irvine, California, USA, 24th - 28th June, 1996.
<http://educate.lib.chalmers.se/IATUL/proceedcontents/paperirvine/braid.html>

Jan Corthouts, et. al., *Electronic Document Delivery and GEDI*, in Project VirLib (CN/XX/A06) - Deliverable Report T02: Research into Existing Standards, VirLib, 1996.
<http://143.169.20.1/MAN/T02/t51.html>

VII. Electronic Data Interchange (EDI)

ANSI X12, *Electronic Data Interchange* (series of standards)

ISO 9735, *Electronic data interchange for administration, commerce and transport (EDIFACT)—Application level syntax rules* [plus 10 additional parts]

EDI, the electronic exchange of information to conduct business transactions is commonplace today in many industries, especially for purchasing and invoicing. Both the customer and supplier can benefit by the use of EDI through reduced data entry time, improved accuracy of data (no rekeying errors), and faster speed of response and transaction fulfillment. Many publishers and book / serial agents are set up to utilize EDI with libraries for orders, invoices, claims, claim responses, and shipping notices.

EDI implementation requires the use of a highly structured format. Two major standards: ANSI X12 and EDIFACT (ISO 9735) are the specifications utilized most widely, X12 in the U.S. and EDIFACT internationally, especially in Europe. Each standard defines (very differently) the EDI messaging structure, syntax, codes, transaction sets, directory of elements, and rules of behavior.

Both of these standards are quite complex; in fact, each is actually a series of standards. Additionally, neither X12 nor EDIFACT are static standards; new versions and interim releases are scheduled periodically to address technology and industry changes. Different releases are not always fully compatible with one another. To ensure interoperability, the two communicating systems must be supporting the same version and release level for transaction sets, segments, and data elements. Like many standards, there are numerous elements designated as optional, further complicating implementation.

To address the complexity and options of the standard, many industry groups have developed guidelines "translating" the standards to specific recommendations for their industry's applications and specifying particular transaction sets (in the case of X12) or subsets (in the case of EDIFACT). Several organizations in the publishing and library community have created such guidelines.

BASIC (Book and Serial Industry Communications), a standards group formed through the merger of BISAC (Book Industry Standards Advisory Committee) and SISAC (Serials Industry Standards Advisory Committee), has developed formats for EDI for the publishing community based on ANSI X12. ICEDIS (International Committee for EDI for Serials) has published formats for subscription orders based on X12. Basically, the BASIC and ICEDIS guidelines identify selected X12 transaction sets and map them to book and serial related activities.

The X12 transaction sets that are typically used in library applications include:

- 810 Invoice (e.g. serials renewal invoice)
- 850 Order
- 855 Order acknowledgement
- 997 Functional acknowledgement (by receiving system of the transaction set)
- 869 Order status inquiry/ Claim

- 870 Order status response / Claim response

Both BASIC and ICEDIS are migrating their guidelines to EANCOM, a widely used subset of EDIFACT developed by EAN International (a standards development organization for global supply chain management). EDItEUR (the international group for electronic commerce in the book and serials sectors) has already taken the X12 guidelines for serials developed by SISAC and created EDIFACT versions.

Sample RFP language

The following are examples of language that could be included in an RFP to address EDI compliance:

- The system must support Electronic Data Interchange (EDI), in conformance with ANSI X12 standards, for ordering, claiming, canceling, invoicing, and reporting for both monographic and serial materials. Describe how the system implements EDI. Discuss how the system verifies EDI data elements and provides error alerts. [**Note:** Libraries that order directly from non-U.S. vendors will want to substitute EDIFACT for X12. Some libraries may want to specify both standards. Libraries not specifying EDIFACT will want to include the next RFP statement.]

- Describe your plans and timeframe for EDIFACT support for EDI transactions.

- The system must support all of the X12 transaction sets [and/or EDIFACT subsets] as specified in the BASIC (BISAC/SISAC) Guidelines [and/or ICEDIS guidelines and/or EDItEUR guidelines if specifying EDIFACT]. Describe any deviations from the guidelines.

- Describe how data sent and received in EDI transactions is integrated with the different modules of the library system, particularly bibliographic, serials, acquisitions, and finance.

- Describe to what extent and how EDI related transactions can be completely automated, e.g., claims sent without operator initiation.

- Identify which telecommunications protocols can be used for EDI transmission.

Assessing compliance

The critical compliance issues for EDI relate to both the handling of the needed transaction sets and the methods in which the library system creates and receives this transaction information. Many systems have a software module that "translates" the relevant information in the library system to and from an EDI formatted message. The library evaluation team will want to understand which data fields are extracted for sending transmissions and in which fields received data is loaded. In particular, support of the (often large and complex) subscription renewal invoice from a serials agent can be more problematic than dealing with individual book orders or new subscriptions.

The timing of the EDI transmission data extracts / loads and the amount of operator intervention needed can also be issues. There are both pros and cons to real-time vs. batch functioning as well as totally automated vs. operator-initiated actions. The library team

needs to consider how these choices fit in with their processes and which options are available within the system.

Earlier implementations of EDI transmission generally required the use of a Value-added Network (VAN) communications supplier, which can add to the costs of using EDI. Some implementations now support transmission over the Internet. The various transmission options should be discussed along with their costs and available security controls.

Most library system vendors and major book / serial agents have experience in EDI interchanges between their respective systems. The library evaluation team should discuss with the library system vendor which book / serial agents they have worked with directly and ask for documented tests of interoperability. Likewise, the current book and serial agent used by the library should be consulted for input on their experiences with different library systems and any issues the library will need to address with a particular system, if chosen.

For more information

The Accredited Standards Committee (ASC) X12 website:
http://www.x12.org/

BASIC Implementation Guidelines for X12-3060 Transactions, v3.0. Available on CD-ROM from the Book Industry Study Group <http://www.bisg.org/>

BASIC (merger of BISAC / SISAC) website:
<http://www.bisg.org/basic.htm>

UN/EDIFACT Directories and Guidelines
<http://www.unece.org/trade/untdid/welcome.htm>

EAN International website: [EANCOM information listed under "The EAN-UCC System"]
<http://www.ean-int.org/>

EDItEUR website:
<http://www.editeur.org/>

International Committee on EDI for Serials (ICEDIS) website:
<http://www.icedis.org/>

VIII. Information Retrieval

Z39.50

ANSI/NISO Z39.50, *Information Retrieval—Application Service Definition and Protocol Specification* <http://www.niso.org/standards/resources/Z39-50.pdf>

ISO 23950, *Information and documentation—Information retrieval (Z39.50)*
[**Note:** As of this writing, these two standards are the same.]

Z39.50 defines a standard protocol for two computer systems to communicate for the purpose of information retrieval. Based on client/server architecture, the protocol standardizes the messages that clients and servers use, regardless of the underlying software, systems, or platforms. A client system that implements the Z39.50 protocol (called a Z-client) allows communication with diverse servers, and a server system that implements the protocol (called a Z-server) is searchable by clients developed by different vendors. The protocol is independent of the underlying transport mechanism, however most current implementations are done using TCP/IP over the Internet.

Originally Z39.50 was designed to help with searching library bibliographic catalogs utilizing different library system software. Today Z39.50 is used to access a wide range of databases in many disciplines across a variety of organization types. A library implementing Z-client technology can provide their users access to any Z-server compliant database without the user having to know that system's native search interface. A library implementing Z-server technology can open up their catalog to other libraries' or organizations' users without individual customized set-ups. Z39.50 has a "broadcast search" capability that allows a user to simultaneously search multiple databases from different providers. Libraries can adopt a single standardized Z39.50 interface for their patrons to concurrently access the library's catalog, purchased CD-ROMs, subscriptions to online databases, and Internet resources. And data from a variety of sources can be extracted, using the protocol, to a common format for offline use or import into a local database.

The Z39.50 standard identifies a number of "facilities," e.g. Initialization, Search, Retrieval, etc. Each facility contains one or more "services" which are the specified protocols to perform a particular task within the facility, e.g. Sort. Queries are qualified by various "attributes" which are grouped into types. A "Use" type of attribute indicates the query access points, such as title or author. A "Relation" type of attribute qualifies the relationship of two query values to one another, e.g. less than, greater than, or equal to. Other attributes that control queries include truncation or omitting of characters in search terms and the structure of the query itself. Attribute types and values are clustered into related sets. An example of an "attribute set" is "bib-1", which specifies the attributes that could be used in a typical bibliographic query.

The specification for "extended services" in version 3 allows libraries to go beyond catalog searching and utilize Z39.50 protocols for many other library processes such as finding and importing cataloging records, creating "virtual" union catalogs, making ILL requests, saving and running Selective Dissemination of Information (SDI) profiles, and updating databases.

Additionally, the Z39.50 standard is becoming accepted as a solution to the challenge of retrieving multimedia information including text, images, and digitized documents.

The Library of Congress is the designated Z39.50 Maintenance Agency. A voluntary group, the Z39.50 Implementors Group (ZIG), meets regularly to discuss implementation issues and recommend improvements to the protocol.

Sample RFP language

The following are examples of language that could be included in an RFP to address Z39.50 compliance:

- The system must include a Z39.50 client and server that are compliant with ANSI/NISO Z39.50 version 3. Describe how the system has implemented Z-client and Z-server, and indicate how compliance has been tested and verified. Discuss how new Z-connections are set-up for both client and server, how customizable the set-up configuration is, and the skill set required to create and maintain set-ups.

- Identify and describe any Z39.50 optional facilities, services, or extended services that have been implemented.

- The system's Z-server must be accessible over a TCP/IP connection by at least two different remote Z-clients that are not the vendor's own products. Vendors will be required to demonstrate this capability or provide test documentation.

- The system must provide a Z39.50 version 3 client interface integrated with the system's patron Web client or has the same "look and feel." Vendors must be able to demonstrate that searches via their Z39.50 client and the native search interface return the same records.

- The system must include bibliographic data, holdings, circulation status, and user-understandable diagnostic messages in Z39.50 result displays. Identify the holdings schema that is utilized.

- It is desirable that the system include a Z39.50 cataloging client which supports import / capture of MARC bibliographic and authority records from any Z39.50 compliant server. Describe the system's Z39.50 support of the MARC records structure and identify any other record syntaxes that are supported.

- The system must have the ability to enable broadcast searches of Z39.50 servers. Describe how multiple Z39.50 connections and simultaneous searches are handled and how retrieval sets are merged, sorted, and displayed.

- Describe how the system will support seamless Z39.50 search and display interface with non-MARC internal or external databases (CD-ROM or online) that support the Z39.50 protocol. Identify any particular systems or databases which have been pre-configured for Z39.50 access from the library system.

Assessing compliance

Libraries should first determine if they need both the Z-client and Z-server functionality. If only database searching of other Z39.50-compliant systems is envisioned, then the Z-client functionality may be all that is required.

Z39.50 implementations can vary depending on which version of the standard is supported. Section 4.4 of the Z39.50 standard defines conformance, requiring at minimum that version 2 be supported. Generally, libraries will want a system that complies with version 3, which adds more powerful Boolean and proximity searching; greater security, authentication, and resource controls; and a number of "extended services" that provide mechanisms for Z39.50-enabling systems. Many of the added features in version 3, especially the extended services, are optional. A system could be in conformance with version 3, but not provide many features that the library might want. It is important that the library evaluation team understands the various options in the standard and identifies those facilities and services which are needed or desirable for their application. Examples of some enhanced version 3 features libraries might want are Scan, which allows index browsing; Explain, which allows users to obtain information about the target system; and Persistent Query and Periodic Query, which allow the saving and re-running of searches. The following section discusses Z39.50 Profiles, which can be helpful in identifying which Z39.50 features to require in the RFP.

When evaluating the system's Z39.50 broadcast search capability, the evaluation team should determine any limits (or ability to set them) on the number of targets or result set sizes, how result sets are sorted and merged, and if preliminary results from one target can be displayed while others are still being searched.

Even if a library implements version 3 compliant protocols, there may still be interoperability issues with other target systems that have implemented earlier versions or chosen different optional features. The University of North Texas is conducting a Z39.50 Interoperability Testbed Study whose goal is "to develop rigorous methodologies, test procedures, and measures to assess interoperability between systems using the Z39.50 standard protocol for information retrieval." The results of this project should help both libraries and vendors in understanding and improving interoperability. A *Z39.50 Register of Implementors* is available on the Maintenance Agency's website.

To further aid in both the selection of optional features and the interoperability issues, profiles have been developed that further define conformance requirements in specific application areas. The next section discusses three profiles that should be of particular interest to libraries.

For more information

Library of Congress Z39.50 Maintenance Agency website:
<http://lcweb.loc.gov/z3950/agency/>

NISO Z39.50 Resource Web page:
<http://www.niso.org/standards/resources/Z3950_Resources.html>

Z39.50 Implementors Group (ZIG) website:
< http://lcweb.loc.gov/z3950/agency/zig/>

Z-Interop: A Z39.50 Interoperability Testbed Study website:
<http://www.unt.edu/zinterop/>

Z39.50 Profiles

As discussed in the previous section, ensuring that separate Z39.50 implementations interoperate can be challenging due to the different options that can be chosen. To address these challenges, many organizations and user groups have developed "profiles" which detail a subset of Z39.50 features and functions that an implementation conforming to that particular profile will support. When all the databases being searched support the same profile, search results should be more consistent and accurate. Some 25 profiles have been registered with the Z39.50 Maintenance Agency, crossing numerous organization types, geographic areas, and subject disciplines, including geospatial data, museum information, and thesaurus navigation. There are three profiles of particular interest to most U.S. libraries: the Bath Profile, the U.S. National Profile, and the GILS Profile, which are further discussed below. Other library related profiles exist or are in development that may be of interest in other geographic regions or particular subject disciplines. Consult the Library of Congress Z39.50 Maintenance Agency site for a list of these profiles.

Bath Profile

The Bath Profile: An International Z39.50 Specification for Library Applications and Resource Discovery <http://www.nlc-bnc.ca/bath/bp-current.htm>

The Bath Profile (so named because the initial developers' meeting was held in Bath, U.K.) was developed to improve interoperability of Z39.50 accessible library catalogs. It was designed to be international in scope with the expectation that it would be incorporated into more detailed national, regional, or provincial profiles. Release 1.1 of the Profile has been endorsed as an ISO Internationally Recognized Profile (IRP). Release 2 is expected to be issued in late 2002.

Three functional areas are addressed in the current release: 1) Basic bibliographic search and retrieval with primary focus on library catalogs, 2) Bibliographic holdings search and retrieval, and 3) Cross-domain search and retrieval. For each area, three levels of conformance are defined, with each higher level inheriting the requirements of the lower level(s). Conformance Level 0 has limited requirements as it was intended to encompass as many existing Z39.50 products as possible. Conformance Level 1 adds requirements to improve searching and interoperability; libraries specifying new or enhanced Z39.50 systems should require adherence to at least this level. Conformance Level 2 defines a number of enhanced functions that may not yet be widely available in existing implementations. Level 2 requirements are not detailed in the current release of the specification but are included in the forthcoming Release 2. The profile also defines a core set of typical library user searches and how to express those searches using Z39.50 "vocabulary."

The National Library of Canada is the Maintenance Agency for the Bath Profile.

U.S. National Profile

NISO Z39.89, *The U.S. National Z39.50 Profile for Library Applications*
<http://www.niso.org/standards/resources/Z39-89.pdf>

The soon-to-be issued *U.S. National Z39.50 Profile for Library Applications* (often referred to as the NISO Profile) is a compatible superset of the Bath Profile. It includes additional specifications and requirements than the Bath Profile to address national requirements for U.S. and Canadian libraries.

The first version of the U.S. National Profile focuses on two areas 1) Bibliographic search and retrieval from library catalogs, and 2) Bibliographic holdings retrieval. It follows the same modular structure as the Bath Profile, using functional areas and conformance levels, but has some different requirements and criteria for each level. The U.S. Profile also specifies exact Z39.50 attribute combinations for expressing a set of typical library catalog searches. The Holdings functional area currently focuses on presenting holdings information related to bibliographic records retrieved from a search. Searching of holdings will be addressed in a later release of the profile.

GILS (Global Information Locator Service)

FIPS 192-1a, *Application Profile for the Government Information Locator Service (GILS)*
<http://www.gils.net/prof_v2.html>

[**Note:** This profile was originally called the *Government* (rather than Global) *Information Locator Service*. The name change has not been made pervasively or consistently and both names will be found in use.]

The Global Information Locator Service (GILS) is a Z39.50 profile developed to provide a uniform search and retrieval method for accessing U.S. federal government information. The U.S. Government's information runs the gamut of disciplines from the arts to sciences, social sciences, and legislative information; the complexity of both the government's information and its management bureaucracy makes it difficult to prescribe any standard formats for its vast array of resources. GILS seeks instead to specify a common set of access points and a search and retrieval gateway to the information regardless of where it is located as long as the server is GILS-compliant.

The GILS Profile specifies a "GILS Core" utilizing Z39.50 requirements and, in addition, provides specifications relating to other aspects of GILS conformant servers that are outside the scope of Z39.50. Servers compliant with the ISO 23950 *Geospatial Profile* (GEO) or the *Catalog Interoperability Profile* (CIP) are also compliant with the GILS standard.

Although developed for federal information, GILS is widely used for state information and many state libraries have implemented GILS. Government libraries, libraries doing cooperative ventures with government agencies, or libraries in government contractor organizations will want to seriously consider including GILS conformance in their RFP specification. Any libraries that want to make government information more accessible to their patrons will want to have GILS interoperability at least at the Z-client level. To assist libraries in implementing GILS, Annex B of the profile maps the GILS Core Elements to MARC formats.

Sample RFP language

The following are examples of language that could be included in an RFP to address Z39.50 profile compliance:

[**Note:** Libraries may want to specify profiles that relate to their particular region, organizational affiliation, or subject disciplines in addition to or instead of the three profiles listed here.]

- The Z39.50 client and server functionality provided with the system must comply with Conformance Level 1 of the *Bath Profile* for all Functional Areas defined. Describe any deviations from this conformance and indicate how compliance has been tested and verified.

- The Z39.50 client and server functionality provided with the system must comply with Conformance Level 1 of the *U.S. National Profile* for all Functional Areas defined. Describe any deviations from this conformance and indicate how compliance has been tested and verified.

- Identify and describe any Z39.50 client or server functionality that conforms to Level 2 of the *Bath* or *U.S. National Profiles*. Where Level 2 functionality does not currently exist, describe any plans for adding this conformance.
  [**Note:** Level 2 functionality is not defined in the current releases of these profiles, but is expected for both in the near future. This RFP item will not be needed until new releases of the profiles are issued with Level 2 details.]

- The Z39.50 client and server functionality provided with the system must support the *GILS* profile specification. Describe any deviations from this conformance and indicate how compliance has been tested and verified.
  [**Note:** Some libraries may want to specify only client support of GILS.]

Assessing compliance

Z39.50 profile-specific compliance issues relate to whether specific features from the standard have been implemented as specified in the profile. Ideally, the system will be pre-configured to support the desired profile, however, since these profiles are relatively new and still evolving, their support may not be widely implemented yet. The profiles will also have changing and/or added requirements as new releases are issued. Vendors should be asked which release they have implemented and if not the current one, what the timeframe is for supporting the latest release.

If the profile is not supported "out-of-the-box," the library evaluation team will first need to determine if the profile can be supported at all. If the native system, as well as the default Z39.50 implementation, doesn't include a service or facility that is identified in the desired profile, no amount of configuration will make the system profile-compliant. If the features are available, then the library will want to know if the vendor will do the configuration as part of the local installation (and at what cost) or if and how the library can do the configuration itself. The configuration tools or process to match a desired profile should be fully understood, including the required skill set needed by someone doing such a configuration.

Another issue to consider is that local database indexing choices can impact a library's ability to conform to any of the Z39.50 profiles regardless of the information system's conformance level. For example, a library may have chosen not to index a particular field that is identified in the profile, or may have indexed a field in a way that would not support features like truncation or proximity searching. Full compliance with any of the Z39.50 profiles may require a library to change their indexing policy and reindex their database. Guidelines have been developed as part of the Z39.50 Interoperability Testbed Study to assist libraries in making indexing choices to best support Z39.50 profiles.

For more information

Z39.50 Profiles – Z39.50 International Standard Maintenance Agency (Library of Congress)
<http://lcweb.loc.gov/z3950/agency/profiles/profiles.html>

Bath Profile Maintenance Agency – National Library of Canada website:
<http://www.nlc-bnc.ca/bath/>

NSIO U.S. National Profile Committee website:
<http://www.unt.edu/zprofile/>

William E. Moen, *Indexing Guidelines to Support Z39.50 Profile Searches*
<http://www.unt.edu/zinterop/ZinteropNew/Documents/IndexingGuidelines1Feb2002.doc>

Global Information Locator Service (GILS) website:
<http://www.gils.net/>

Command searching

ISO 8777, *Commands for interactive text searching*

[The American version, ANSI/NISO Z39.58 *Common Command Language for Online Interactive Information Retrieval* was withdrawn in favor of the ISO version.]

ISO 8777 names and defines 30 search and retrieve commands, eight symbols or punctuation used to qualify the commands, and the expected system response to each command. The goal is to provide a common language for conducting searches in a command mode.

With the widespread use of browser-based graphical user interfaces, command searching is not utilized as much in library systems, particularly in the patron access modules. However, it may still be useful to have commands as an alternate search method for those who are familiar with and like Boolean searching. Command searching can be very useful for library technical staff to find and retrieve records for administrative, maintenance, data clean-up, and reporting purposes. A number of Integrated Library Systems offer "CCL" searches as an "Expert Search" or "Command Search" option because of the power of such a search and the speed of entering the search criteria.

Both ISO 8777 and Z39.58 search types are supported as query types in the Z39.50 standard (discussed in a previous section of this document).

Sample RFP language

The following are examples of language that could be included in an RFP to address command searching compliance:

- The system must support command level searching utilizing the standard commands as defined in *ISO 8777, Commands for interactive text searching.* Describe any deviations from this standard.

- Describe any additional search command functions or languages, different from those defined in ISO 8777, that are available with the system.

- Describe any database records and system functions or modules that cannot be accessed with a command level search.

Assessing compliance

Section 4.2 of the standard defines an information retrieval system as being in conformance "when it recognizes and responds to every command specified by this International Standard." The commands and qualifiers listed in the standard are fairly basic, thus missing any of them would definitely limit the retrieval capabilities with a command method. It is likely that a library would want more retrieval commands and functions than the standard defines. If that is the case, the RFP should state any additional requirements.

A system may utilize a proprietary search language, however the vendor should be able to map the commands and functionality in their proprietary system to those in the standard. Where the commands perform the same function, it is desirable that the proprietary system would use the standard's command name.

IX. Metadata

Metadata is typically defined as "data about data." Many libraries are looking to non-MARC/AACR2 schemes for cataloging certain types of materials, including but not limited to Web-accessible electronic resources and items in locally digitized collections. Metadata schemas are rapidly being developed as a solution not only for libraries but also for many other organizations that collect or develop information resources and want to make them more accessible.

The use of metadata to "catalog" information resources can:

- improve accessibility and retrievability;

- provide more effective relevance ranking of search results;

- act as a surrogate for a resource such as a large file that could be time-consuming to download or view, raw data that requires an explanation to understand, or even a resource not available in electronic form; and

- aid in legal issues of intellectual property rights identification, tracking, and management.

The kinds of metadata associated with an information resource can address different aspects. *Descriptive metadata* identifies the resource and provides data about its content. *Administrative metadata* is used to help manage the resource; version numbering is an example. *Technical metadata* provides system related information about the resource such as the file type or format or resolution level of an image. *Use metadata* can keep track of usage and users. Metadata may be added manually, created through the use of an automated process like an indexing algorithm, or computer generated "on the fly" (such as the number of times a resource has been retrieved).

Most Integrated Library Systems are still bibliographic / reference based—they were not designed for the storage and retrieval of full text and multimedia. However, because of the increased demand for systems to support digital libraries, some ILS vendors have created add-on modules; others are providing integration "hooks" for third party products or tools that can be used to add access to full text documents or images. These modules and tools increasingly include support for the creation, maintenance, search, and display of non-MARC metadata schemes.

Numerous metadata standardization projects exist. Many are detailed schemas that build on a more general one; some are discipline or data type specific; most can be mapped to other metadata schemas to create interoperability. ISO, ANSI, and the World Wide Web Consortium (W3C) all have committees working on metadata-related standards and registries of metadata schemas. Three metadata standards of particular interest to libraries are the Dublin Core, the VRA Core, and the Encoded Archival Description (EAD). Each of these is discussed in more detail below. Following discussion of these schemas, a protocol for harvesting metadata information that libraries should be aware of is described.

For more information

Gail Hodge, *Metadata Made Simpler*, NISO Press, 2001
<http://www.niso.org/news/Metadata_simpler.pdf>

Jessica Milstead and Susan Feldman, *Metadata: Cataloging by Any Other Name*, Online, Jan/Feb 1999, p24–31. <http://www.onlinemag.net/OL1999/milstead1.html>

Metadata Schemas

Dublin Core

ANSI/NISO Z39.85, *The Dublin Core Metadata Element Set*
<http://www.niso.org/standards/resources/Z39-85.pdf>

The Dublin Core Metadata Initiative began at a 1995 workshop (in Dublin, Ohio—thus the name) to improve discovery for networked information resources. Since then, the Dublin Core has developed into an official ANSI/NISO standard and today is probably the most well-known and referenced metadata standard.

Dublin Core's strength lies in its simplicity. Fifteen elements are defined for describing any type of resource: Title, Creator, Subject, Description, Publisher, Contributor, Date, Type, Format, Identifier, Source, Language, Relation, Coverage, and Rights. Each element is optional and may be repeated as needed within the set. Most elements also have a limited set of recommended qualifiers which can be optionally utilized to further refine an element's content or to indicate the encoding scheme used in recording the element's value. Information systems can conform to the standard without supporting qualifiers—such implementation of the standard is known as Dublin Core Simple.

Dublin Core is ideally represented in XML (eXtensible Markup Language) syntax. [See section on XML below.] However, Dublin Core Simple can also be represented in HTML (using "DC" elements in the "meta" tags) or even in a generic format (using Element="value").

Communities are encouraged to build on the Dublin Core to develop their own more specialized metadata element sets and many have done so. In theory, if a metadata scheme is based on the Dublin Core, cross-domain searches of the core descriptive information could be done more effectively while still providing specialized access points within a domain.

Dublin Core has been given official standing with the World Wide Web Consortium (W3C) and Z39.50 standards initiatives. Dublin Core Simple is specified for the schema for the Z39.50 Bath Profile cross-domain searching conformance. It has also been mapped to the MARC format to simplify development of automated methods for interchanging Dublin Core and MARC data.

The Dublin Core Metadata Initiative (DCMI) is the Maintenance Agency for the standard. DCMI has several working groups including one for libraries which is developing a *Library Application Profile* to clarify the use of the Dublin Core Metadata Element Set in libraries and library-related applications.

For more information

Dublin Core Metadata Initiative website:
<<http://www.dublincore.org/>>

VRA Core

VRA Core Categories, Visual Resources Association <<http://www.vraweb.org/vracore3.htm>>

The Visual Resources Association (VRA) has developed a metadata set of 28 elements, called the VRA Core, designed to describe works of art, architecture, artifacts, and comparable cultural objects. A visual resources collection frequently needs two or more records for a given item: one record to describe the physical object (the "Work"), and one record to describe each surrogate of the object which is created for viewing on or offline (the "Image"). The VRA Core includes a Record Type element used to clearly distinguish whether a record applies to a Work or an Image.

All category elements are optional and repeatable. The specification provides for the use of qualifiers to clarify a category's content and allows the addition of local use categories. Controlled vocabularies are recommended for many of the categories. A guide to good practices for cataloging visual works using VRA Core is in development.

It is assumed that most Work records will be linked to one or more related Image records but the specification does not define how record linking is to be done—that is left as a local database implementation decision.

VRA categories have been mapped to Dublin Core and MARC format as well as to several other related visual art cataloging schemas.

For more information

Visual Resources Association website:
<<http://www.vraweb.org/>>

EAD (Encoded Archival Description)

Encoded Archival Description SGML DTD <<http://lcweb.loc.gov/ead/>>
Encoded Archival Description Tag Library <<http://lcweb.loc.gov/ead/tglib/tlhome.html>>
EAD Application Guidelines for Version 1.0 <<http://lcweb.loc.gov/ead/ag/aghome.html>>

The Encoded Archival Description is an encoding scheme for archival and manuscript collection finding aids, which provides access to other information by describing, often in detail, an archive's holdings. The specification currently accommodates registers and inventories of any length. Currently, MARC records for archives are usually at more of a summary level than an individual finding aid. The EAD standard supports the interrelationship between the data content of catalog records and finding aids by providing a MARC equivalency attribute, matching MARC field numbers, for related finding aid elements.

The scheme can be represented as either an SGML (ISO 8879, *Standard Generalized Markup Language*) or an XML DTD (document type definition). [See section on XML below.] There are three parts to the specification: the SGML compliant DTD, a tag library with definitions of the standard elements and attributes, and an application guideline with extensive examples. The defined elements address both information about the finding aid itself and information about the archival materials covered by the finding aid. Attributes can be used to designate, for example, that a particular controlled vocabulary was used for a particular element's content. Use of controlled vocabularies or authority lists is not required.

The Library of Congress, Network Development and MARC Standards Office is the Maintenance Agency for EAD, in partnership with the Society of American Archivists.

For more information

The Encoded Archival Description Official WebSite
<http://www.loc.gov/ead/>

SAA EAD Roundtable's website:
<http://jefferson.village.virginia.edu/ead/>

RLG, *RLG Best Practice Guidelines for Encoded Archival Description*, August 2002
<http://www.rlg.org/rlgead/bpg.pdf>

Sample RFP language for metadata schemas

The following are examples of language that could be included in an RFP to address metadata schemas:

- The system must support the use of *Dublin Core (ANSI/NISO Z39.85)* metadata for digital information resources. Describe any built-in functionality or add-on modules that provide support of metadata for cataloging and/or search and retrieval including customizable templates for data entry and edit, user-readable display of metadata, and validation of data against authority lists.
  [**Note:** Dublin Core was included here as an example. Libraries should substitute or add other metadata schemas that are required for their situation.]

- Identify any metadata schemas, other than *Dublin Core* that are supported and describe how they are implemented. Describe any conversion tools or utilities that will translate from one metadata schema to another.

- Describe how search and retrieval of non-MARC metadata records and MARC bibliographic records are integrated.

- Discuss if the system's Z39.50 server allows both MARC data and non-MARC metadata to be searched. Describe if and how Z39.50 broadcast searches can be combined with metadata searches.

- Describe any tools within the system or available as separate modules that can be utilized to create, encode, and modify metadata records. Describe whether the metadata record can be embedded within the digital object, must be separate, or if

either is supported. Describe to what level these tools can be customized. Define the skill sets that are needed to use these encoding tools.

- Describe how metadata records can be linked to one another within the information system's database. Identify whether one-to-one, one-to-many, or many-to-many linkages are available.

- Describe any data import / export functionality between MARC record cataloging and metadata encoding that would reduce duplicate cataloging effort and ensure consistency.

Assessing compliance

Currently, integration of library bibliographic systems and metadata encoding / searching is in the embryonic stage. Often, libraries use systems from multiple vendors to address both traditional and digital library system implementations. This results in the traditional library catalog and the digital library being totally separate with perhaps a low level of integration by providing a link within the MARC record that will take the user to the corresponding full-text or image. This situation is changing, but varies significantly from one system to another in what is supported, how it is implemented, and how transparently the two types of data are accessible.

Two main areas of concern in assessing metadata support are in the input / creation of metadata and in search and retrieval. On the input side, the library evaluation team will want to determine what kind of input tools are available to support metadata creation, which metadata schemas have built-in templates, and how user-friendly and customizable the tools and templates are. Ideally the metadata input templates should be similar in look and feel to the templates used for MARC record cataloging. To reduce duplication of effort in cataloging, the tools should allow data fields from a MARC record to be easily transported to a metadata record and vice versa. Many of the metadata schemas have tools available to validate whether a particular record complies with the standard; these should be used to test sample metadata records created through the system's input tools and through any conversion tools from MARC to metadata or one metadata schema to another.

On the search and retrieval side, the system would ideally allow a single user interface to simultaneously search the library's MARC records and metadata records and present a single list to the user with associated records linked. A Z39.50 broadcast search combined with a metadata search of collections and resources outside of the library would also be desirable. If third party tools for search and retrieval are being considered, then the configuration requirements of both the library system and the third party tool need to be carefully assessed to ensure interoperability.

Protocol for Metadata Harvesting

Open Archives Initiative, *Protocol for Metadata Harvesting*
<http://www.openarchives.org/OAI/openarchivesprotocol.htm>

The Open Archives Initiative (OAI) *Protocol for Metadata Harvesting* (PMH) was initially developed to support federated searching of metadata for distributed electronic archives of scholarly papers. The concept was deemed to have wider applicability and has since grown

to encompass a standard harvesting protocol for multiple forms of metadata in any type of information repository.

PMH defines a mechanism for a designated "data provider" to expose its metadata to one or more "service providers." Designated service providers could use the protocol to harvest metadata and to offer value-added services, such as a metadata search engine. This architecture differs markedly from the Z39.50 model of distributed search and retrieval. [See previous section on Z39.50.] While lacking in some of the advanced functionality of Z39.50, PMH has a simpler implementation and shifts the operational responsibility and processing away from the data providers to the service provider. It is considered particularly useful for collections of locally digitized or born-digital materials, which can now be included in the databases of large search engines.

Currently, the protocol requires all data repositories to be able to export their metadata for harvesting in an XML schema. [See section on XML below.] All repositories must also support export in the Dublin Core Simple metadata set to ensure a common baseline. However, the protocol does support the concept of multiple types of metadata sets and data providers may offer their metadata in additional schemas as well. The protocol also requires repositories to datestamp all records at time of creation or modification to allow service providers to do selected harvesting within a specified date range. OAI maintains a registry of PMH compliant data providers, but registration is optional so it is expected that more providers are using the protocol than have registered.

The protocol and its related documentation do not currently provide guidelines related to issues of intellectual property protection and acceptable use of exposed metadata. Libraries that become PMH data providers need to consider what their policies for these issues will be and how they will address enforcement of those policies by service providers who harvest their data.

Sample RFP language

The following are examples of language that could be included in an RFP to address OAI Metadata Harvesting compliance:

- Describe how the system supports the *OAI Protocol for Metadata Harvesting (PMH)* for a data provider, including any optional features that have been implemented. Discuss in particular how selected metadata records can be restricted from harvesting and how datestamping is handled.

- Identify any metadata schemas other than Dublin Core which are supported for exposure to the *OAI Protocol for Metadata Harvesting (PMH)*.

Assessing compliance

Many of the data providers' compliance issues for the OAI PMH specification relate to how the metadata gets created and encoded, which was discussed above in the *Metadata Schemas* section. Some additional questions which the library evaluation team will want to explore include how the metadata gets XML-encoded (if not natively in that format), how the system assigns the required unique identifiers, how datestamping is done to allow for accurate incremental harvesting, and how access controls are applied to restrict selected metadata

records from being harvested. Metadata and protocol harvesting support may not be provided as an out-of-the-box implementation, but instead be supported through the availability of toolkits. In such cases, the flexibility, ease of use, and learning curve for the toolkit will be a key factor.

For more information

Open Archives Initiative website:
<http://www.openarchives.org/>

X. Web Access

Web Accessibility Initiative

W3C Recommendation, *Web Content Accessibility Guidelines*
<http://www.w3.org/TR/WCAG10/>

W3C Recommendation, *Authoring Tool Accessibility Guidelines*
<http://www.w3.org/TR/ATAG10/>

W3C Working Draft, *User Agent Accessibility Guidelines*
<http://www.w3.org/TR/UAAG10/>

The Web Accessibility Initiative (WAI) is an activity of the World Wide Web Consortium (W3C) to make Web content accessible to people with disabilities. The guidelines do not discourage the use of multimedia in Web content, but rather they explain how to make such content more widely accessible. Many libraries have an interest in making their information more accessible to disabled people and some have already incorporated the accessibility guidelines into the inhouse development of their Web pages. This same accessibility should be required of the Web interface to the library system.

There are three different guidelines, each directed to a different participant in the provision of Web content. Each specification details the guidelines, associated checkpoints, priority (i.e. criticality) levels for each checkpoint, and conformance level requirements. The *Web Content Accessibility Guidelines* are directed to Web content developers. The *Authoring Tool Accessibility Guidelines* are directed to developers of Web page creation and editing tools or Web site management tools. The *User Agent Accessibility Guidelines* are directed to developers of Web browsers or other user interfaces to Web content.

Separate supporting documents for each guideline provide information on implementing the checkpoints and testing and validation of the content or Web software products.

Sample RFP language

The following are examples of language that could be included in an RFP to address Web accessibility compliance:

- All Web-based interfaces in the system must comply with the Web Accessibility Initiative *Web Accessibility Guidelines* (WAG) or supply alternative versions of Web pages that comply with the guidelines. Describe how your system addresses Web accessibility support and identify the level of conformance with each of the WAG guidelines. Indicate how compliance has been tested and verified.

- Describe any Web page development and editing tools, available with the system or as add-ons, and discuss how the tools support creation of Web pages that comply with Web Accessibility Initiative *Web Accessibility Guidelines* (WAG).

Assessing compliance

There are a number of tools available to verify that a Web page meets WAI guidelines; these are listed on WAI's website. Even if the system's default Web pages have been tested by the vendor using one of these tools, there is usually some level of customization to the Web pages and interfaces during implementation. Therefore, the library evaluation team will need to retest the final design of their Web pages. Since Web page interfaces used with the library system will typically be modified and customized inhouse on some periodic (possibly even frequent) basis, the library should include a requirement of running a WAI compliance test as part of their ongoing Web page development and modification process.

For more information

Web Accessibility Initiative website:
<<http://www.w3.org/WAI/>>

Open URL

OpenURL Syntax Description
<<http://library.caltech.edu/openurl/Record_Documents/OpenURL_Version_0.1.mht>>

NISO Z39.88, *Open URL: A Transport Mechanism for ContextObjects* (draft)

The OpenURL standard was designed to allow a library user who has retrieved an information resource citation to obtain access to the most "appropriate" copy of the full resource. The standard defines a mechanism for attaching an OpenURL link to a reference, usually a bibliographic citation. When the OpenURL is clicked, the user is presented with an option to request the full-text. When the user selects the option, it is fulfilled with the given the user's and organization's preferences related to cost, contractual and license agreements in place with suppliers, access rights, etc.

Consider the scenario of three users in three different libraries accessing the same vendor's database product and wanting to retrieve the full-text of a particular article found in a search. If the database product were OpenURL encoded and the three libraries had implemented OpenURL services, then UserA could have the article retrieved from an inhouse collection of electronic journals, UserB could have the article retrieved from a publisher's Web-based journal database which the library had licensed, and UserC could have the article automatically requested from a document delivery supplier under the library's volume purchase agreement. All of the decisions, routing, and licensing necessary to make this happen would be transparent to the users.

An OpenURL differs from a standard Web URL (Uniform Resource Locator) in two ways:

- It delivers *metadata* as well as identifiers that can be used to initiate action requests beyond linking to a referred site.

- It is *context sensitive*, in that the request is processed differently based on the context of the user initiating the request.

When the OpenURL is clicked, the associated metadata stored with the URL is sent to an OpenURL-compliant link server where the "rules" about target link preferences for the particular user base are stored. The link server presents the user with the available extended

services for that user, such as electronic full-text, and fulfills the requested service on demand using the method determined by the stored rules.

While electronic delivery of full-text articles was the initial impetus of OpenURL, the standard can be applied to the provision of other services such as ordering of full-text from document delivery suppliers, searches of selected library's holdings for ownership of a referenced title, citation searches of a referenced article, links to book reviews, author searches for additional works, links to author biographies and personal websites, Web searches for related information on the same topic, etc.

A NISO version of OpenURL (NISO Z39.88) is currently in draft and expected to be issued for trial use in early 2003. However, the first version of the specification has existed for several years and has been implemented by a number of library and information suppliers. The forthcoming NISO version is expected to generalize and add to the defined syntax to better address extended services beyond scholarly journal articles.

Sample RFP language

The following are examples of language that could be included in an RFP to address Open URL standards compliance:

- Describe any built-in or add-on capability to support a locally managed OpenURL-compliant link server. Discuss how this server interoperates with the various library system modules.

- Describe any capabilities of the system to integrate with a third party supplier of an OpenURL-compliant link server system or service. Discuss how this third party system would interoperate with the various library system modules.
  [**Note:** Libraries that are using or plan to use a specific third party system or service should identify the vendor / product in the RFP.]

- The system must support input and editing of OpenURL links as part of its cataloging / editing modules for both bibliographic MARC records and metadata records. Describe how the system supports OpenURL link input and discuss options for handling OpenURL identifiers.

Assessing compliance

The standard focuses on the syntax for the OpenURL but does not address or specify software design for link server management or technologies to manage the user identification, which is where many of the difficult implementation issues reside. These technologies would generally be supplied through some type of add-on modules or through a third party product or service. Thorough testing of all the technologies and interfaces with the library system will be needed, as this is not currently a plug-and-play type of implementation. Similar to the situation with many library's digital resource collection, current implementations of the OpenURL and link server technology are often separate from the integrated library system.

If the OpenURL related functionality is integrated with the library system, the main compliance issues will be with the creation and management of OpenURL links, how the system handles the links in their Web interface, and how the system and its Web interface would interoperate with a link server.

Many library systems allow the storing of a URL in a MARC 856 field and present it as a live hyperlink in the Web interface. This type of implementation should be tested to ensure that it can support the input and storage of an OpenURL (which is both longer and more complex than a standard URL) and pass the entire OpenURL intact to the Web interface. Other questions for the evaluation team to ask the library system vendor are: How does the library system recognize an OpenURL vs. a standard URL and how are they handled and displayed differently? When an OpenURL link is clicked in the library system's Web interface, does the system recognize it as an OpenURL and pass it correctly to the designated link server? How is the user's identity and preferences handled so that they are included or referenced correctly when the OpenURL is sent to the link server?

If the library system is using a common Z39.50 interface to access additional resources beyond the library's catalog, such as an abstracting and indexing service database, how are OpenURL links embedded in those resources handled? Can the common search interface correctly display and act on an OpenURL link of a retrieved citation from another Z39.50 compliant product?

For more information

NISO OpenURL Committee website:
<<http://library.caltech.edu/openurl/>>

OpenURL Overview & Resources
<<http://www.sfxit.com/open/index.html>>

Herbert Van de Sompel and Oren Beit-Arie, *Generalizing the OpenURL Framework beyond References to Scholarly Works: The Bison-Fute Model*, D-Lib Magazine v. 7 no. 7/8, (July/August 2001). <<http://www.dlib.org/dlib/july01/vandesompel/07vandesompel.html>>

XML

W3C Recommendation, *Extensible Markup Language (XML)* 1.0 (Second Edition) 6 October 2000 http://www.w3.org/TR/REC-xml

The *eXtensible Markup Language (XML)*, one of the latest incarnations of "markup" languages, is quickly becoming the universal format for structured documents and data on the Web. While HTML, also a markup language, addresses the presentation and look of information, XML defines the structure of the information and describes the role of its structured components. XML is a subset of SGML, the international *Standard Generalized Markup Language* defined in ISO 8879, which was developed for technical documentation before the Web existed. XML kept the best, most functional features of SGML and dropped many of the optional, complex aspects to make a markup language suitable for the Web environment.

Some key components of XML that make it such a powerful tool are:

- **Open system approach –** XML is non-proprietary and utilizes ASCII, making XML data machine-independent and accessible across computing platforms.

- **Separation of Content and Display** – XML coding focuses on the structure of the document with the intent that it can then be re-used and customized for different purposes. Separate stylesheets can be created using eXtensible Style Language (XSL) (or other tools) to define particular display or print formats. This separation grows in importance with the widespread use of different sizes and types devices to read Web content, from PCs to PDAs to cell phones and whatever new device gets invented tomorrow.

- **Extensibility** – XML is called extensible because it allows the creation of customized markup tags and applications. The customized tags and rules to be used are defined in a Document Type Definition (DTD)—a name inherited from SGML—which is the collection of tags defined for a particular application. This allows groups of people or organizations to create their own customized XML applications for exchanging information in their domain, however they choose to define that domain.

- **Internationalization** – XML utilizes Unicode, a single comprehensive character set that encompasses virtually all of the world's written languages.

- **Database interoperability** – XML uses the concept of a document composed of a series of entities, which can contain one or more elements. This component nature of XML accommodates interfacing with a database, since XML tags can be mapped to database fields, and makes it very suitable for storing the XML in a database, as whole documents or in components for greater repurposing capability.

- **Extended linking** – XML's linking capabilities go beyond the simple HTML one-way hyperlinking from point A to point B. X-links can be to multiple targets, activate automatically, embed or replace information, or be defined "out of line" in a separate document. Not many tools have implemented extended linking features yet, but the possibilities are there.

- **Metadata support** – The metadata describing a document can be explicitly tagged with XML, making the data much more useable and searchable than HTML's meta-tags allow.

XML offers many opportunities for library applications:

- **MARC** – The Library of Congress Network Development and MARC Standards Office is developing a framework for working with MARC data in an XML environment, including DTD schemas, stylesheets, and software tools. This would allow MARC data to be fully converted to XML format or to be selectively output to XML for publication or use in another application or schema. There is even some controversial discussion about whether XML should completely replace MARC.

- **Integrated library system interfaces** – By using XML as the common input/output format, the traditional library system could be more easily integrated with Web technology and other proprietary systems. Newly developed tools or systems would not require separate special interfaces to be written. A totally XML-based integrated library system is likely in future years.

- **A&I Databases** – Output from abstracting and indexing databases could be offered in XML format which allows the record to be more easily re-used in applications such as interlibrary loan.

- **Domain specific metadata searching** – Organizations with common interests can define an XML-compliant schema for "cataloging" their data or tagging multimedia documents, then create virtual databases of the combined data or export the data for harvesting by a search engine. (See the section on Metadata for more information and examples of these implementations.)

- **Digital publishing** – XML is tailor-made for digital publishing and can provide a common format for e-books and other electronic documents   The Open eBook Forum <http://www.openebook.org/> has developed a standard for encoding e-books in XML that would allow them to be read in a variety of reading devices.

XML is in its early development phases and its use in library applications is just beginning. Supporting tools and new applications are rapidly growing and it is clear that XML will have a significant role in electronic information management and delivery. A number of the standards discussed in this guide are already being implemented using XML and more XML implementation approaches are planned or expected in the future. RFP language is not included here as the RFP requirements need to be specific to the particular application which is using XML, e.g. EAD, or Dublin Core, or MARC-XML.

For more information:

MARC 21 XML Schema Official Website:
http://www.loc.gov/standards/marcxml/

Dick R. Miller, *Adding Luster to Librarianship: XML as an Enabling Technology,* MLGSCA/NCNMLG Joint Meeting, Scottsdale, AZ, January 31, 2002.
http://elane.stanford.edu/laneauth/Luster.html

Jon Bosak and Tim Bray, *XML and the Second-Generation Web*, Scientific American, May 1999, p89-93.

XML4Lib Electronic Discussion
http://sunsite.berkeley.edu/XML4Lib/

Summary Table of Standards

All of the standards discussed or referenced in this guide are summarized below. The table is sorted by the standard designation. The standard designator or the relevant cross-reference is hyperlinked to the main section in the document that discusses the standard.

Where a standard is available for free online, the URL is provided in the Availability column. Complete contact information for the print and CD/ROM publishers listed in the availability column can be found in the next section, *Standards Availability – Contact Information*. The contact section also lists several commercial suppliers that can be used to obtain copies of standards in both print and electronic format.

The status column lists the current version of the standard at the time this guide was written (November 2002). Additional information about forthcoming releases or sources for obtaining ongoing status information is provided where available.

Designation Title	Availability	Status
ANSI X3.4 *Code for Information Interchange (ASCII)*	See MARC 21 Character Sets and MARC 21 Record Structure	
ANSI X3.27 *Magnetic Tape Labels and File Structure for Information Interchange*	See MARC 21 Exchange Media	
ANSI X3.39 *Recorded Magnetic Tape for Information Interchange (1600 CPI)*	See MARC 21 Exchange Media	
ANSI X3.41 *Code Extension Techniques for Use with 7-bit and 8-bit Character Sets*	See MARC 21 Character Sets	
ANSI X3.54 *Recorded Magnetic Tape for Information Interchange (6250 CPI, Group-Coded Recording)*	See MARC 21 Exchange Media	
ANSI X12 *Electronic Data Interchange (series)*	In print or CD-ROM from DISA.	Annual Release issued every December. Subreleases are issued twice a year. See ANSI ASC X12 website for status: <http://www.x12.org/>
ANSI/AIM BC1 *Uniform Symbology Specification— Code 39*	AIM or ANSI	Current version is 1995.

Designation Title	Availability	Status
ANSI/AIM BC3 *Uniform Symbology Specification –* *Codabar*	AIM or ANSI	Current version is 1995.
ANSI/NISO Z39.2 *Information Interchange Format*	See MARC 21 Record Structure	
ANSI/NISO Z39.44 *Serial Holdings Statements*	Superseded by ANSI/NISO Z39.71	
ANSI/NISO Z39.47 *Extended Latin Alphabet Coded* *Character Set for Bibliographic Use* *(ANSEL)*	See MARC 21 Character Sets	
ANSI/NISO Z39.50 *Information Retrieval—Application* *Service Definition and Protocol* *Specification*	Free download from NISO website. In print from NISO and ANSI.	Current version is 1995. A 2002 maintenance revision is in balloting.
ANSI/NISO Z39.56 *Serial Item and Contribution* *Identifier (SICI)*	Free download from NISO website. In print from NISO and ANSI.	Current version is 1996, reaffirmed in 2002.
ANSI/NISO Z39.57 *Holdings Statements for Non-Serial* *Items*	Superseded by ANSI/NISO Z39.71	
ANSI/NISO Z39.58 *Common Command Language for* *Online Interactive Information* *Retrieval*	Withdrawn – see ISO 8777	
ANSI/NISO Z39.64 *East Asian Character Code for* *Bibliographic Use (EACC)*	See MARC 21 Character Sets	
ANSI/NISO Z39.71 *Holdings Statements for* *Bibliographic Items*	Free download from NISO website. In print from NISO and ANSI.	Current version is 1999.
ANSI/NISO Z39.76 *Data Elements for Binding Library* *Materials*	Free download from NISO website. In print from NISO and ANSI.	Current version is 1996, reaffirmed in 2002.
ANSI/NISO Z39.83 *NISO Circulation Interchange* *Protocol (NCIP)*	Free download from NISO website. In print from NISO.	Current version is 2002.

Designation Title	Availability	Status
ANSI/NISO Z39.85 *The Dublin Core Metadata Element Set*	Free download from NISO website. In print from NISO and ANSI.	Current version is 2002.
Bath Profile *The Bath Profile: An international Z39.50 specification for library applications and resource discovery*	Online from National Library of Canada at: <http://www.nlc-bnc.ca/bath/bp-current.htm>	Current release is 1.1 June 2000 with minor clarification, February 2001. A draft 2.0 release is in process. For status, see: <http://www.nlc-bnc.ca/bath/>
EAD *Encoded Archival Description SGML DTD* *Encoded Archival Description Tag Library* *EAD Application Guidelines for Version 1.0*	For downloading instructions for the DTD, <http://lcweb.loc.gov/ead/eadv1ann.html#whattodo>. Also available on diskette from Library of Congress NDMSO. Tag library available online <http://lcweb.loc.gov/ead/tglib/tlhome.html> or in print from Society of American Archivists. Application guidelines online at <http://lcweb.loc.gov/ead/ag/aghome.html> or in print from Society of American Archivists.	Current version is 1.0.
FIPS Pub 192-1a *Application Profile for the Government Information Locator Service (GILS)*	Available online at: <http://www.gils.net/prof_v2.html>	Current version is 2.0 dated August 1, 1997.
GILS	See FIPS Pub 192-1a	
ISO 2709 *Format for Information Exchange*	See MARC 21 Record Structure	
ISO 5427 *Extension of the Cyrillic Alphabet Coded Character Set for Bibliographic Information Interchange*	See MARC 21 Character Sets	

Designation Title	Availability	Status
ISO 5428 *Greek Alphabet Coded Character Set for Bibliographic Information Interchange*	See MARC 21 Character Sets	
ISO 8777 *Commands for interactive text searching*	ISO	Current version is 1993.
ISO 8879 *Information processing -- Text and office systems -- Standard Generalized Markup Language (SGML)*	ISO	Current version is 1996 as amended in 1998.
ISO 8957 *Hebrew Alphabet Coded Character Set for Bibliographic Information Interchange*	See MARC 21 Character Sets	
ISO 9036 *Coded Arabic Character Set for Information Interchange*	See MARC 21 Character Sets **Note:** The MARC 21 set contains 5 more characters than this standard and the Arabic digits 0-9.	
ISO 9735 *Electronic data interchange for administration, commerce and transport (EDIFACT)—Application level syntax rules*	ISO	Consult the ISO TC154-UN / CEFACT Joint Syntax Working Group (JSWG) website <http://www.gefeg.com/jswg/> for current status and release history.
ISO 10160 *Information and documentation—Open Systems Interconnection—Interlibrary Loan Application Service Definition*	ISO	Current version is 1997.
ISO 10161-1 *Information and documentation—Open Systems Interconnection—Interlibrary Loan Application Protocol Specification—Part 1: Protocol specification*	ISO	Current version is 1997.

Designation Title	Availability	Status
ISO 10161-2 *Information and documentation—Open Systems Interconnection—Interlibrary Loan Application Protocol Specification—Part 2: Protocol implementation conformance statement (PICS) proforma*	ISO	Current version is 1997.
ISO 10324 *Information and documentation--Holdings statements—Summary level*	See ANSI/NISO Z39.71	
ISO 11822 *Extension of the Arabic Alphabet Coded Character Set for Bibliographic Information Interchange*	See MARC 21 Character Sets	
ISO 17933 *Generic Electronic Document Interchange (GEDI)*	ISO	Current version is 2000.
ISO 23950 *Information and documentation—Information retrieval (Z39.50)*	ISO	Current version is 1998.
ISO/IEC 646 *ISO 7-bit coded character set for information interchange (IRV)*	See MARC 21 Character Sets	
ISO/IEC 2022 *Character code structure and extension techniques*	See MARC 21 Character Sets	
ISO/IEC 10646 *Universal Multiple-Octet Coded Character Set (UCS)*	See MARC 21 Character Sets	
ISO/IEC 16388 *Information technology—Automatic identification and data capture techniques—Bar code symbology specifications—Code 39*	ISO	Current version is 1999.

Designation Title	Availability	Status
MARC 21 Formats *MARC 21 Concise Formats* *MARC 21 Format for Authority Data* *MARC 21 Format for Bibliographic Data* *MARC 21 Format for Classification Data* *MARC 21 Format for Community Information* *MARC 21 Format for Holdings Data*	In print or CD-ROM from Library of Congress Cataloguing Distribution Service. Concise versions available online at: <http://www.loc.gov/marc/>	Status of all MARC 21 standards documentation can be found at the LC website: <http://lcweb.loc.gov/marc/status.html>
MARC 21 Record Structure, Character Sets, and Exchange Media *MARC 21 Specifications for Record Structure, Character Sets, and Exchange Media*	In print or CD-ROM from Library of Congress Cataloguing Distribution Service. Abbreviated versions available online at: <http://www.loc.gov/marc/specifications/>	Status of all MARC 21 standards documentation can be found at the LC website: <http://lcweb.loc.gov/marc/status.html>
NISO Z39.88 *The U.S. National Z39.50 Profile for Library Applications*	Free download from NISO website. In print from NISO.	Expected to be in balloting shortly and approved for publication in early 2003.
NISO Z39.89 *OpenURL: A Transport Mechanism for ContextObjects*		In draft. Anticipated to be available for trial use in 2003. See committee website for status. <http://library.caltech.edu/openurl/>
OpenURL *OpenURL Syntax Description*	Available online at: <http://library.caltech.edu/openurl/Record_Documents/OpenURL_Version_0.1.mht>	Current version is 1.0. A new version is in development at NISO and anticipated to be available for trial use in 2003.
PMH *Open Archives Initiative Protocol for Metadata Harvesting*	Online from OAI at: <http://www.openarchives.org/OAI/openarchivesprotocol.htm>	Current version is 2.0 of June 14, 2002.

Designation Title	Availability	Status
Unicode *The Unicode Consortium. The Unicode Standard, Version 3.2.0. Defined by: The Unicode Standard, Version 3.0, as amended by the Unicode Standard Annex #27: Unicode 3.1 and the Unicode Standard Annex #28: Unicode 3.2.* See also MARC 21 Character Sets.	Version 3.0 available in hardcover, with CD-ROM from Addison Wesley Longman, ISBN: 0-201-61633-5 or online at <http://www.unicode.org/unicode/uni2book/u2.html> 3.1 and 3.2 annexes online at: <http://www.unicode.org/reports/tr27/> <http://www.unicode.org/reports/tr28/>	For revision status see: <http://www.unicode.org/unicode/standard/versions/enumeratedversions.html>
VRA *VRA Core Categories*	Available online at: <http://www.vraweb.org/vracore3.htm>	Current version is 3.0.
WAI Web Accessibility Initiative: • *Web Content Accessibility Guidelines* • *Authoring Tool Accessibility Guidelines* • *User Agent Accessibility Guidelines*	Available online at: <http://www.w3.org/TR/>	Current versions are: Accessibility – 1.0, dated May 5, 1999. Authoring – 1.0, dated February 3, 2000. User Agent - 1.0 Working Draft, dated August 21, 2002. See WAI website for latest status: <http://www.w3.org/WAI/>
XML *Extensible Markup Language (XML)*	Available online at: <http://www.w3.org/TR/REC-xml>	Current version is 1.0, 2nd edition, dated October 6, 2000. For status see the W3C XML website: <http://www.w3.org/XML/>

Standards Availability – Contact Information

The standards publishers referenced in the Summary Table of Standards are listed below with their full contact information. Following the publishers are several commercial document delivery suppliers that can also be utilized to acquire standards.

AIM, Inc. – The Association for Automatic Identification and Data Capture Technologies
634 Alpha Drive
Pittsburgh, PA 15238
Tel: 412-963-8588
Fax: 412-963-8753
Email: info@aimglobal.org
Website: www.aimglobal.org/aimstore/
Standards can be purchased online and downloaded.

ANSI – American National Standards Institute
25 West 43rd Street, Fourth Floor
New York, N.Y. 10036
Tel: 212-642-49 00
Fax: 212-398-00 23
Email: info@ansi.org
Website: www.ansi.org
Selected standards can be purchased online and downloaded.

DISA – Data Interchange Standards Association
333 John Carlyle Street, Suite 600
Alexandria, VA 22314
Tel: 703-548-7005
Fax: 703-548-5738
Email: info@disa.org
Website: www.disa.org

NISO – National Information Standards Organization
4733 Bethesda Avenue, Suite 300
Bethesda, MD 20814
Tel: 301-654-2512
Fax: 301-654-1721
Email: nisohq@niso.org
Website: www.niso.org

ISO – International Organization for Standardization
1, rue de Varembé
CH-1211 Geneva 20, Switzerland
Tel: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: sales@iso.org
Website: www.iso.org
Most standards can be purchased online and downloaded.
In the U.S., mail orders for ISO standards can be made through ANSI.

Library of Congress, Cataloging Distribution Service
101 Independence Ave., S.E.
Washington, D.C. 20541-4912
Tel: 202-707-6100
Fax: 202-707-1334
Email: cdsinfo@loc.gov
Website: lcweb.loc.gov/cds/

Library of Congress, Network Development and MARC Standards Office
LS/OPS/NDMSO (4402)
Washington, DC 20540-4402
Email: ndmso@loc.gov
Website: lcweb.loc.gov/marc/ndmso.html

Society of American Archivists
527 S. Wells St., 5th Floor
Chicago, IL 60607-3922
Tel: 312-/922-0140
Fax: 312-347-1452
Email: info@archivists.org
Website: www.archivists.org/

Document Center, Inc.
111 Industrial Road, Suite 9
Belmont, CA 94002
Tel: 650-591-7600
Fax: 650-591-7617
Email: info@document-center.com
Website: www.document-center.com/

Global Engineering Documents
15 Inverness Way East
Englewood, CO 80112
Tel:: 800-624-3974 ext. 1950
Fax: 303-792-2192
Email: globalcustomerservice@ihs.com
Website: global.ihs.com/

ILI
610 Winters Avenue
Paramus, NJ 07652
Tel: 201-986-1131
Fax: 201-986-7886
Email: sales@ili-info.com
Website: www.ili-info.com/us/

TECHStreet
1327 Jones Dr.
Ann Arbor, MI, 48105
Tel: (800) 699-9277
Fax: (734) 302-7811
Email: service@techstreet.com
Website: www.techstreet.com/

Glossary

The following are generally accepted definitions for the listed terms in the context of this publication. In some standards, a term may have a slightly different meaning or be used in a very specialized way. Check the definition section of the individual standards to understand how a term is being used.

AACR2
Anglo-American Cataloguing Rules, 2nd Edition

AIM
Association for Automated Identification and Data Capture Technology

ANSEL
American National Standard for Extended Latin

ANSI
*American National Standards Institut*e

ASCII
American Standard Code for Information Interchange
An encoding scheme that assigns numeric values to characters to standardize data transmission among disparate hardware and software systems.

attribute
A characteristic of an element, component, or search term.

barcode
An optically readable array of black and white "bars" of varying widths where a fixed pattern of bars and spaces represents a particular machine-readable character

BASIC
Book and Serial Industry Committee
Formed through the merger of BISAC and SISAC.

bibliographic record
A discrete database record used to describe a bibliographic item, e.g. a book, serial, video, etc.

bibliographic utility
Membership organizations that provide cooperative services to libraries such as shared cataloging and interlibrary loan.

BISAC
Book Industry Standards Advisory Committee
Merged with SISAC into BASIC.

broadcast search
A search which is automatically performed on multiple databases concurrently or consecutively.

browser
Personal computer software that allows the viewing of HTML documents and related files and applications on the World Wide Web. Also called a Web browser or Web client.

CCL
Common Command Language

CEN
Comité Européen de Normalisation (European Committee for Standardization)

character set
An encoding scheme for groups of related characters, e.g. a particular written alphabet, that translates them into computer-readable bit combinations.

client
A single user computer software application, running on a PC or workstation, that can operate independently or in communication with a server.

client/server architecture
A computing network architecture in which computing tasks are divided between two types of computing systems—clients and servers.

Codabar
A library specific numerical barcode standard.

Code 39
A widely used cross-industry alphanumeric barcode standard.

Common Command Language (CCL)
A common language for conducting searches in a command mode.

conformance level
A set of requirements within a standard that must be met to be in conformance at that particular level. Higher levels generally inherit the requirements of the lower level(s).

cookie
A block of data that a server returns to a client and usually stores there for future use when the server is accessed again. The data typically contains information about the user and/or the user's computer. Frequently used by Web sites.

DCMI
Dublin Core Management Initiative

diagnostics
A computer application's error interpretation messages.

digital library
A collection of information resources in electronic format that can be accessed remotely. Also called "electronic library" and "virtual library."

Digital Object Identifier (DOI)
A permanent identifier for an item of intellectual property in digital format that will allow persistent location of the object on the Internet.

Document Type Definition (DTD)
A set of markup tags and their associated definitions, rules, and relationships forms a template for use in a specific application. Currently used with SGML and XML.

DOI
Digital Object Identifier

DTD
Document Type Definition

Dublin Core
A standard set of 15 core metadata elements that can be used to describe any information resource.

Dublin Core Metadata Initiative
The Maintenance Agency for the Dublin Core.

EAD
Encoded Archival Description

EAN International
A standards development organization for global supply chain management. The name is derived from European Article Number, a system for the barcode identification of products and services, the group's original initiative.

EANCOM
A widely used subset of the EDIFACT standard developed by EAN International.

EBCDIC
Extended Binary Coded Decimal Interchange Code
A standard character-to-number encoding system used primarily by IBM computer systems.

e-book
electronic book
A book published in electronic format.

EDI
Electronic Data Interchange

EDIFACT
EDI For Administrations, Commerce and Transport
The international EDI standard messaging syntax under the responsibility of the United Nations. Also known as UN-EDIFACT.

EDItEUR
An international group coordinating development of standards for electronic commerce in the book and serials industries.

Electronic Data Interchange (EDI)
A standard method for exchanging structured data, such as purchase orders and invoices, between computers to enable automated transactions.

element
A discrete component of data or metadata. Often used interchangeably with the term field.

Encoded Archival Description (EAD)
A standard SGML DTD developed for the description of archival finding aids.

eXtensible Markup Language (XML)
A standard markup language for structuring documents and data. Designed specifically for use with the World Wide Web.

facility
A logical group of Z39.50 services; in some cases, a single service.

field
A basic unit of identifiable and definable data in a database system.

File Transfer Protocol (FTP)
A method of transferring files between computers on a network using TCP/IP, such as the Internet.

finding aid
A descriptive tool, such as an inventory or register, used to describe a group of materials in an archive.

format integration
The concept of utilizing a single set of specifications for bibliographic records regardless of the type of material they represent.

FTP
File Transfer Protocol

GEDI
Generic Electronic Document Interchange

GILS
Global Information Locator Service
(Also called Government Information Locator Service)

Global Information Locator Service
A Z39.50 profile specification designed to aid in accessing government information.

harvesting
The automated extraction and collection of metadata from distributed data providers for loading into a single repository, usually some type of search engine.

holding record
A database record describing a specific physical unit held in a collection that is linked to its corresponding bibliographic record.

HTML
Hypertext Markup Language

HTTP
Hypertext Transfer Protocol

HTTPS
Hypertext Transfer Protocol Secure

Hypertext Markup Language (HTML)
A markup language used to create hypertext documents for the World Wide Web. Emphasizes design and appearance rather than document structure and data elements. Compare to SGML and XML.

Hypertext Transfer Protocol (HTTP)
Protocol used on the Internet to transfer HTML files between the server and the Web browser.

Hypertext Transfer Protocol Secure
An extension of HTTP that supports encrypted transmission of data for security purposes.

ICEDIS
International Committee for EDI for Serials

ILL
Interlibrary Loan

ILS
Integrated Library System

indicator
A one-character data element used in the MARC 21 specification that is associated with a data field and that supplies additional information about the field.

Integrated Library System (ILS)
An automated library system that utilizes shared data and files to provide interoperability of multiple library functions, e.g. cataloging, acquisition, circulation, serials, etc.

Interlibrary Loan
The process between two libraries of borrowing and lending a physical bibliographic item, or obtaining a copy of it..

International Standard Book Number
A unique standard number assigned to a monograph.

International Standard Serial Number
A unique standard number assigned to a serial title.

interoperability
The ability for two different computer systems to communicate and exchange information in a useful and meaningful manner.

IPIG
Interlibrary Loan Protocol Implementors Group

IRP
ISO Internationally Recognized Profile

ISBN
International Standard Book Number

ISO
International Organization for Standardization

ISSN
International Standard Serial Number

JPEG
Joint Photographics Expert Group
A standard file compression format for color and gray scale images that trades off compression against data loss.

link server
A server utilized in the OpenURL specification where the "rules" about target link preferences for the particular user base are stored.

Maintenance Agency
The organization designated to maintain documentation related to the development and ongoing maintenance of a particular standard, as well as information related to the standard's implementation and use.

mapping
A chart or table that relates the fields or data elements in one standard or schema to those in with similar function or mean in another standard or schema.

MARC
The MAchine-Readable Cataloging format, a set of standard data structures and formats used for the communication and exchange of bibliographic information between computer systems.

MARC 21
The current version of the MARC standard, representing a consolidation of USMARC and CAN/MARC, the two previous national MARC schemes.

markup language
A set of codes embedded into an electronic document or text file that convey information about the document's structure or the representation of the text for display or printing. For examples, see HTML, SGML, and XML.

metadata
Descriptive information about an information resource. Literally means "data about data."

MIME
Multipurpose Internet Mail Extensions

Multipurpose Internet Mail Extensions (MIME)
An extension to the Internet email protocol that provides support for transmission of binary data such as word processing documents, graphics, and multimedia.

NCIP
National Circulation Interchange Protocol

NISO
National Information Standards Organization

OAI
Open Accessibility Initiative

OCLC
A cooperative bibliographic utility which provides online cataloging, interlibrary loan, serials control, and other services to libraries worldwide.

Online Public Access Catalog
The interface to an automated library system that is intended for use by the library's patrons. The interface is designed to be "user friendly."

OPAC
Online Public Access Catalog

Open Systems Interconnection (OSI)
A suite of ISO standard protocols defining a layered computer network architecture.

OpenURL
A URL with stored metadata that is user context sensitive in what information or hypertext link is delivered.

OSI
Open Systems Interconnection

PDF
Portable Document Format
Adobe's proprietary document format for providing platform and device independent access to electronic information.

PICS
protocol implementation conformance statement
A statement made by the supplier of an OSI standard implementation that states the particular capabilities and options that have been implemented. An ISO OSI formalized version of a profile.

PMH
Protocol for Metadata Harvesting

profile
A document that identifies a set of agreed upon options and parameters relative to a particular standard (or group of standards) that have been defined to support a particular application, function, community, or class of information.

protocol
A standard procedure for the message formats and rules that two computer systems must follow to communicate with each other

qualifiers
Parameters or additional data used to refine, limit, modify, or provide more information about a given data element or field.

record
A data structure that is a collection of fields treated as a unit.

Request for Proposal
A request for bids from vendors to offer hardware or software solutions to specified needs and requirements.

RFP
Request for Proposal

RLIN
Research Libraries Information Network
A bibliographic utility for shared cataloging utilized by members of the Research Libraries Group.

schema
A set of rules for encoding information, usually associated with a particular encoding standard, that supports a specific application or community of users. Also called scheme.

scheme
See schema.

semantics
The meaning of a data element or computer instruction (as differentiated from the element's syntax).

server
A networked computer that responds to requests from and provides resources to client computers.

service
A specified operation or function that is provided by a computer system

SGML
Standard Generalized Markup Language

SICI
Serial Item and Contribution Identifier

Simple Dublin Core
The Dublin Core schema without the use of any qualifiers.

SISAC
Serials Industry Standards Advisory Committee
Merged with BISAC to form BASIC.

Standard Generalized Markup Language (SGML)
A standardized markup language for embedding codes in electronic documents that define the document's structure and representation in order to provide device-independent display and printing of the information.

syntax
The rules governing the structure and content of data elements or computer instructions.

tag
A label used to identify a particular data element / field.

TCP/IP
Transmission Control Protocol over Internet Protocol
A standardized suite of network protocols that enables computers to communicate over a network.

TIFF
Tagged-Image File Format
A standard file format used for graphic images.

transaction set
An EDI unit of transmission containing a specified set of data elements in a standard message format.

UCS
Universal Multiple-Octet Coded Character Set

Unicode
A 16-bit character set encoding system intended to accommodate all of the world's written languages.

Uniform Resource Locator (URL)
An address of an information resource on the Web that specifies the communication

protocol, server name, directory path, and file name of the resource.

URL
Uniform Resource Locator

Value-Added Network (VAN)
A privately owned communications network that offers specialized services for a fee that are not readily available on public networks.

VAN
Value-Added Network

VRA
Visual Resource Association

W3C
World Wide Web Consortium

WAI
Web Accessibility Initiative
An initiative of the W3C to promote usability of the Web for people with disabilities through the development of technology, guidelines, and tools.

Web browser
See browser

World Wide Web Consortium
A consortium of commercial and educational institutions that develops common protocols for the World Wide Web to promote its evolution and ensure its interoperability.

XML
eXtensible Markup Language

Z-client
A Z39.50-compliant client software program.

Z-server
A Z39.50-compliant server software program.

validation
The process of testing and verifying that a system meets the requirements of a standard / specification.

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Personal names, organization names, and publication titles are represented in *italics*.

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