

New standards for resource delivery: bridging the gap between discovery and delivery

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Abstract

Resource discovery is nowadays dispersed, as metadata about resources is available in multiple locations: it is no longer just to be found in a library's OPAC, but also in internet search engines such as Google Scholar and Yahoo, collective repositories and emerging freely accessible public interfaces of union catalogues, such as WorldCat, Libraries Australia, SUDOC, TEL, GBV, Danbib just to name a few. Increasingly, all data is not held in any one place; resource description is more widely dispersed than detailed holdings information and is often held remotely in web pages and services that do not have accompanying supply mechanisms. Therefore there is a need for a request to be transferred from one system to another that can go about resolving the request and facilitating delivery or access.

This paper discusses the new Request Transfer Message that is expressed as a set of OpenURL schemas. The Request Transfer Message is designed to convey whatever known information there is about the requester, the wanted item and the requested service that can be transferred to a delivery system. It also discusses the new standard ISO Holdings (ISO 20775) that is used within the Request Transfer Message and the role of this holdings standard along side others.

Introduction

Increasingly, metadata about information and cultural resources is available in multiple locations due to the widespread volition of their owning institutions for maximum exposure and increasing use of data harvesting and search protocols. A typical case is *The ships of Abel Tasman* by Ab Hoving published in the Netherlands in 2000 by Uitgeverij Verloren B.V. and held, among other libraries, by the Koninklijke Bibliotheek (KB), the National Library of the Netherlands. The same copy of the work in the same location is retrievable by any potential user in all of the following web sites:

- The online catalogue of the KB <http://opc4.kb.nl/>
- PiCarta, the national union catalogue of the Netherlands www.picarta.nl
- TEL, the European Library representing 44 national libraries of Europe <http://www.theeuropeanlibrary.org>
- worldcat.org – OCLC's global catalogue of library resources www.worldcat.org

- ViaLibri: resources for bibliophiles http://www.vialibri.net/library_search.php (and numerous portals that access one of the sites above via Z39.50 or other protocol)
- Google Book Search (which points to Worldcat.org) <http://books.google.com/>
- multiple web sites, many of which are blogs which have installed the worldcat.org search box

As discovery of metadata has become widespread, so the discovery process has become increasingly separated from the delivery process. Thus a simple means of conveying a delivery request from a discovery system or service to a delivery system or service is necessary. Existing standards are not appropriate. ISO 10161 Interlibrary loan application protocol specification [6] is an aging standard that is not simple to implement and is not based on a current internet/world wide web platform. It is a complex standard which automates an entire process, mediating between two systems that both need to follow the progress of requests. For a simple transfer of an end user's request to a system that will handle it, where the forwarding system has no need to follow the request, the standard is inappropriate. Similarly, the NCIP standard [2] is inappropriate, though more modern in its architecture, as it is focussed on transacting on a known item with a known identifier.

OpenURL version 0.1 [14] was released in 2000. This started as a standard that only sent information about a wanted item and the system originating the request within a URL. OpenURL resolvers such as SFX, ArticleLinker, 1Cate, LinkSource and Tour [9] employ the OpenURL for facilitating direct online access to online digital resources with user identification and authentication provided independently from the URL or within a private data section. It was simple and quickly understood and adopted. The standard was subsequently re-modelled by a committee of NISO and made more generic, incorporating information on entities other than the wanted item (referent), particularly the requester and service type required. XML schemas can now be registered for the entities and incorporated into community profiles. Because of its simplicity, flexibility and success, OpenURL [1, 3] was considered an ideal vehicle for the Request Transfer Message.

This paper also looks at resource delivery on a broader scale and changing requirements for standardisation. The character of resource delivery has changed, from a focus on mediated inter-library loan to one of unmediated user requesting with multiple delivery options; not just loan and copy but also digital copy, reference look-up, purchase and online access. In addition, multiple systems performing different functions must now inter-operate so the need is now for standards that sit on the same platforms as e-commerce and e-learning.

Request Transfer Message

The implementer's group of the ISO ILL protocol, the IPIG, first identified the need for a simple message that could be forwarded from a discovery site. The Request Submission Message was created in 2001 as an XML schema. In 2004 it was decided to re-model it into OpenURL but the work stalled; on the one hand because the NISO OpenURL standard Z39.88 was not ratified until 2005 and the maintenance agency not appointed until 2006 and at the same time the IPIG fell dormant. Encouraged by the maintenance agency, the work was resumed in 2006. As there had been no known implementations of the Request Submission Message, either of the original XML or of the 2004 OpenURL version, the opportunity was taken to re-model the schema, adding some data elements that had subsequently been identified as exchangeable and removing some that were considered

unlikely to be needed. More importantly, the re-model allowed incorporation of existing schemas in the areas of bibliographic description, holdings and rights management description.

The Request Transfer Message [10] includes XML schema definitions for Referent [16], Requester [15] and Service Type [18]. The key value pair option (the only option in version 0.1 of OpenURL) was not used because, especially in requester, key value pairs are not able to express the complex hierarchy with repeating groups of elements. Hence, the Request Transfer Message only uses HTTP Post for transporting the message. The message may be transported with HTTP or HTTPS and it may be either “By-Value”, that is containing the XML or “By-Reference”, that is containing a URL pointer to the XML.

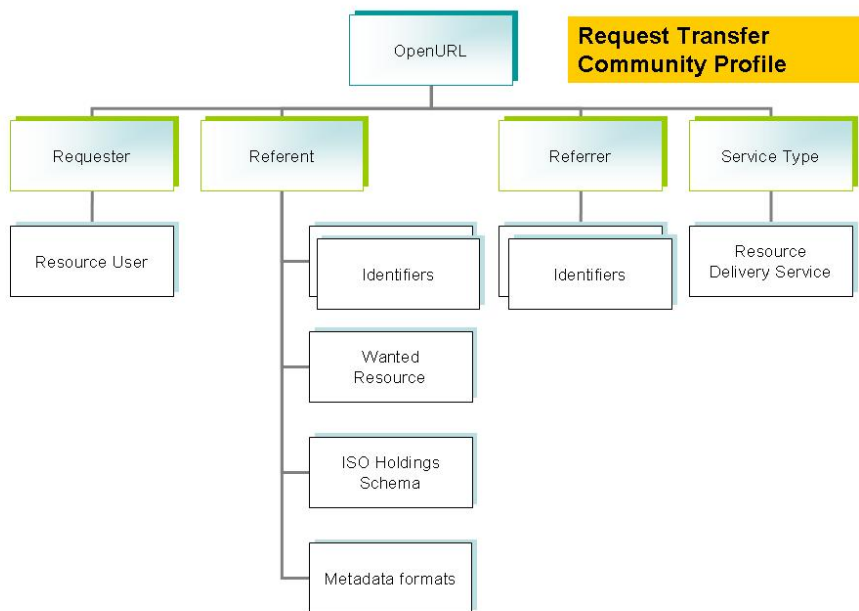


Figure 1: The Request Transfer Community Profile

Wanted item; the Referent

The Request Transfer Message allows the use of existing XML schemas registered for the referent, namely journals, books, patents, dissertations, ONIX for book trade orders, MARCXML, MODS, Dublin and MARCvChange. Thus any of these schemas can be used to include the bibliographic description. It also allows the use of the ISO holdings schema (ISO 20775) [17] to give possible locations, information that is especially needed in the case of transferring from a union catalogue. An extra schema was defined for the Request Transfer Community Profile that includes anything known about general availability status such as copyright, in print and rareness (number of known copies). These factors are important contextual information that can indicate the impact of refusal of a request and can help determine whether alternative delivery options are indicated. For example if a book is rare and out of copyright, digitisation may be an acceptable delivery option or reference lookup. The schema also includes verification source that is typically conveyed to disambiguate a request where necessary or to solve an incorrect citation.

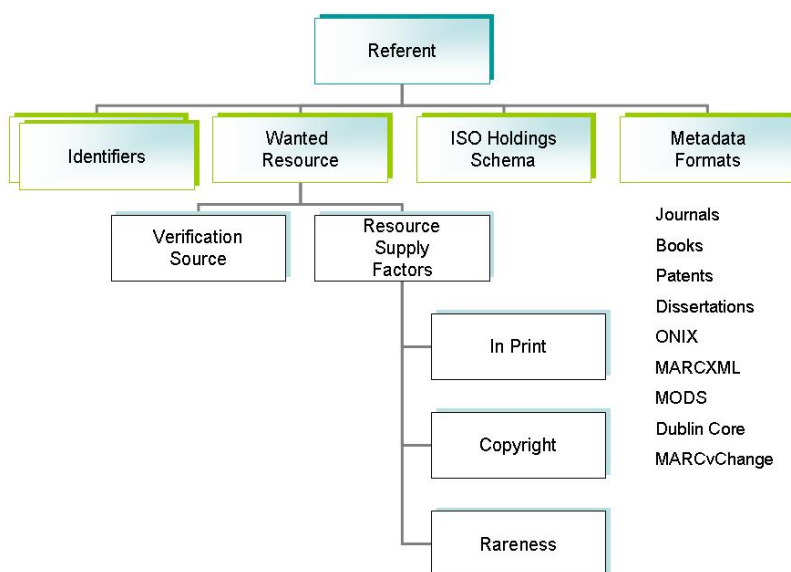


Figure 2: The Referent

Requester

The Request Transfer's requester schema is the first schema to be registered for this entity. It enables a referring system to pass on information to minimize the number of times a user is challenged for authentication and authorisation and to minimize subsequent information gathering by the receiving system in relation to identification, affiliation and address information.

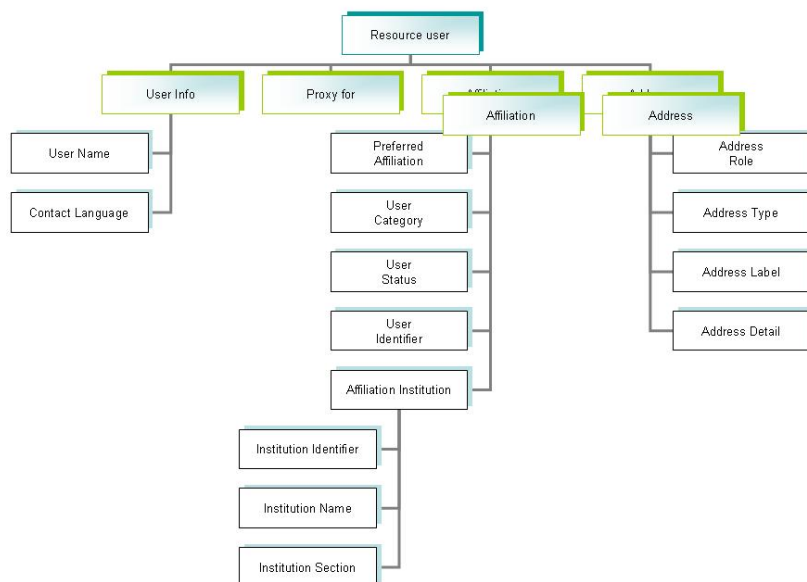


Figure 3: The Requester

Service Type

Only one other service type is currently registered with the OpenURL agency, namely scholarly information. The definition for the Request Transfer Message is detailed, including information to identify and allow tracking of the request and specification of particular requirements in relation to the requested service including delivery date, material format, edition and language. The requested service may be one of these defined types: loan, physical copy, digital copy, online access, reference look-up, or other. The schema also includes payment information that is either authorised or self payment and rights information. It is assumed that a transferring system may be able to pass on information about payment authorisation with its limits and expiry, or alternatively an indication that the requester has stated a preferred payment method and maximum amount. Elements that were in the IPIG Request Submission Message concerning credit card details were not carried over as it was considered highly unlikely that a transferring system would have them for transfer. If a user had pre-paid a requesting institution, then payment authorisation from that institution would be used. A rights information structure has also been included to allow the request to carry information such as a copyright declaration or any pre-negotiated access rights. It can also contain information about rights holders and the nature and time window of their rights. Alternatively an external XML definition can be inherited, such as XACML [11].

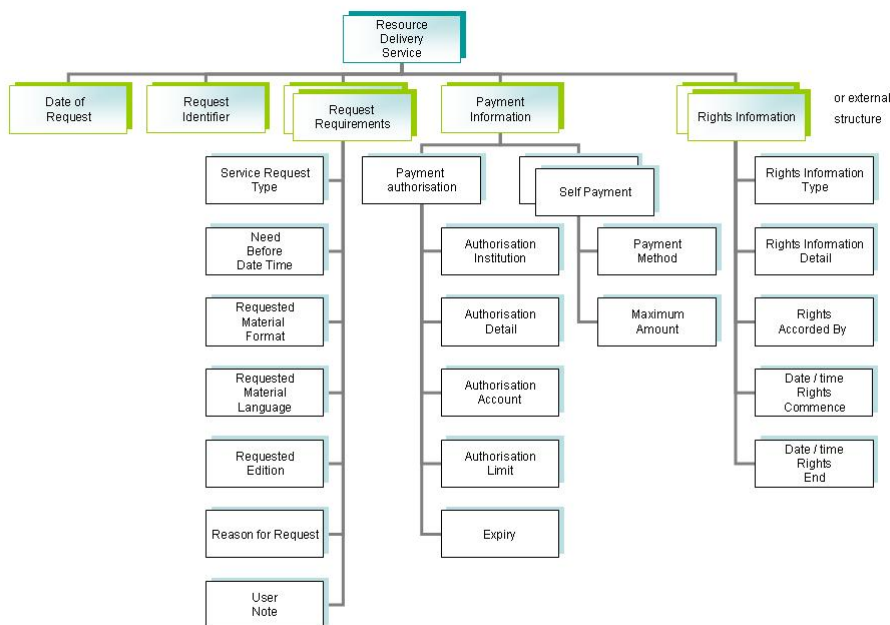


Figure 4: The Service Type

Example scenarios

When a user clicks a link or button on an HTML page, information about a wanted resource, about the requester and about the requested service are transported to a linking server. The transportation message is based on HTTP(S) POST and is referred to as “an OpenURL”. The following possible scenarios indicate how it is envisaged that the message will be employed.

- a request is placed in Google Scholar by a user associated with the University of Amsterdam that is sent by Google to the national Dutch delivery service (NCC).
- a request is placed in worldcat.org for a resource that is owned by several institutions in North America and Europe by a user associated with the University of Sydney. The request is sent by worldcat.org to the national Australian delivery service (Libraries Australia) as the service profiled to accept the request.
- a request is placed in Libraries Australia by a user associated with the University of Amsterdam that is sent by Libraries Australia to the national Dutch delivery service (NCC).

Current Status

As at 31st July 2007, the Request Transfer Message Community Profile has passed review by the OpenURL maintenance agency. It is currently being reviewed by the OpenURL

review panel and a team of domain experts. It is expected that the profile and schemas will go to trial public use in September 2007. All potential implementers are encouraged to test the XML schemas and provide feedback.

ISO Holdings Schema

The ISO holdings schema [17] is included as one optional structure within the referent. Where a request is being transferred from a union catalogue to a delivery service, the holdings schema allows the request to convey possible suppliers with availability and status, as known. The holdings schema is also important to resource delivery systems as it has been designed specifically to be used in enquiry responses. Of only marginal relevance to resource delivery is the sub structure for responding to queries concerning holdings history. This information is useful for collection management decisions such as re-location, storage, weeding and acquisitions but also is useful in ranking and re-sorting result sets.

Most existing holdings schemas are designed for bulk reporting of relatively stable information about the holdings of one institution, for example to a union catalogue, for example MODS, MARC21 Holdings, COPAC and ONIX. These schemas do not handle the reporting from a union catalogue of all or a selection of the institutional holdings for a resource. They also do not include dynamic information indicating whether or not a copy is actually available and under what terms. Until now, there had not been a satisfactory schema for this role. There are two schemas registered for use with Z39.50, the OPAC schema [20] and the Z39.50 Holdings Schema [19]. The OPAC schema is scanty and includes obscure ill defined elements. As a consequence, the Z39.50 Implementers' Group (ZIG) developed the Z39.50 holdings schema which is highly complex, little understood and except for two known partial implementations, not implemented at all.

The ISO Holdings schema focuses on interactive exchange rather than batch reporting and thus includes a combination of stable and dynamic status and policy information. Summary information capable of being immediately displayed is given, for example "15 copies held, all are on loan, first one expected back on <date>". Summary information can be given for a group of copies, defined by the user's request as being interchangeable. That is the user may only want one particular physical piece in which case summary information is not relevant. More typically, a user is interested at the work or work / expression level; that is any available copy of any edition but perhaps excluding foreign language versions. Sometimes the request can be at a result set level, meaning that any copy of a group of related works is interchangeable. Summary information can also be given for all copies, physical and digital of fully cited serial articles. Where such summary information is possible, then the structure "holdingSimple" is used.

Where the responder has multiple copies of multiple components and is not sure that they are interchangeable in the eyes of the requester, then the structure "holdingStructured" is used which breaks the holdings down into sets and components and no summary is given, assuming that a subsequent selection will be made.

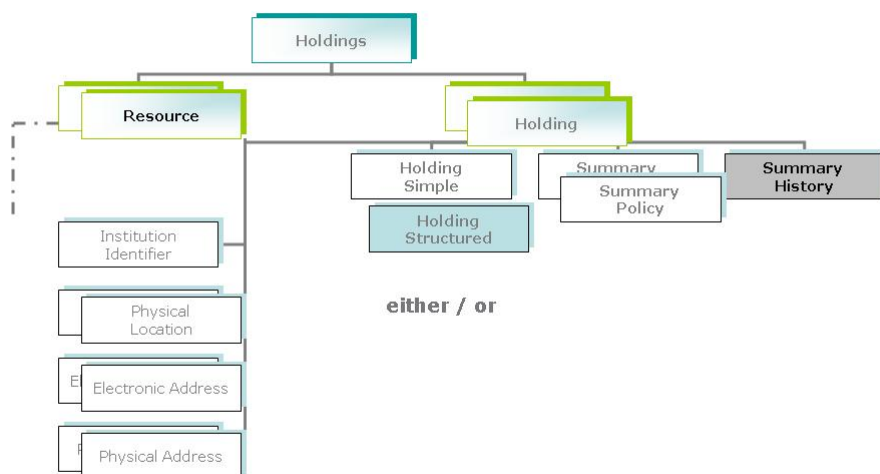


Figure 5: The ISO Holdings Schema

Current Status

As at 31st July 2007, the ISO Schema for Holdings Information (ISO 20775) is currently out to vote as a draft international standard (DIS). It is anticipated that the standard will achieve official IS status in the first quarter of 2008. All potential implementers are encouraged to test the XML schema and provide feedback.

Completing the Picture: Other standards requirements

It is necessary to reconsider standards and inter-operability in the light of the changing character of resource delivery and its broader operating environment. User unmediated online discovery is naturally accompanied by user unmediated online requesting. At the same time, as systems are becoming more Internet based, they are also becoming more dependent on other systems for performing discrete functions. A delivery system may need to interface with many different systems in the course of request management such as an institutional authentication system, an external payment system like PayPal, an institutional registry for determining policies and generic resolver for receiving and relaying requests.

The trend today is away from monolithic standards that control an entire work flow over an extended time period towards smaller, more easily implemented individual tasks with systems firmly in control of the work flow. Because of the need to interoperate with commercial and educational environments, general industry independent standards should be used as the base for any domain specific standard. Initiatives to define architectures for joining standards pieces together for applications are emerging such as the Digital Library

Federation's Digital Library Architectures Program [5] and the joint Australian, UK, New Zealand and Netherlands' eFramework [4]. The eFramework defines "sums" (service usage models) which collate services required to achieve applications.

The Request Transfer Message is the first step in creating a modern, simple to implement resource delivery framework. It successfully handles requests for online digital materials where the results are displayed immediately, possibly in conjunction with additional services like authentication, authorisation, payment and granting rights to copy. Where the results are not immediately displayed, it handles request placement but no further monitoring of a request. Interested parties need to be notified of the progress of a request, particularly one involving physical delivery, and there is a need to be able to enquire on a request at any stage in its progress. One step further forward may be to define a notification mechanism and a request enquiry mechanism. The request enquiry could be handled by existing generic search and retrieve standards such as SRU [12] by defining a context set for query elements and an XML schema for the response. The notification could be a message that is pushed via HTTP POST, perhaps cast as an ebXML message [8], or a web feed mechanism such as Atom [7] or a "push" update mechanism such as SRU update [13] or the SMTP email protocol.

A generic notification schema could be an XML record that is sent between responding and requesting systems and intermediary resolvers and systems and between responding systems and requesters (end users) using appropriate transports. Its top level data elements would be:

- Request identification
- Date of dispatch of message
- Request details (requester, referent, service type)
- From + role + reply address
- To + role + address (e.g. roles are requester, requester's service, responder, intermediary)
- Requested action: (e.g. not applicable, confirm supply conditions, provide payment evidence, cancel, renew, recall... plus details)
- Action taken: (e.g. not applicable sent, cancelled, not cancelled, renewed, not renewed, received, reported lost or damaged...plus details)
- Current status
- Request history – sequenced by date of dispatch and request identification.

A request schema suitable for enquiry response would be based on the above outline.

A combination of request, enquiry and notification could encompass all existing messages within the ISO ILL and NCIP standards.

Conclusion

The Request Transfer Message and ISO Holdings Schema are important new components facilitating bridging the "discovery / delivery gap" in today's environment where the resources of library and cultural institutions are widely exposed but the links between discovery environments and delivery systems are only embryonic and ad hoc.



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Further effort is needed, however, to effectively create the necessary level of interoperability of diverse systems and services. The next steps could include the development of generic schemas for request notification and request enquiry and a context set for request enquiry.

Glossary

Abbreviation	Full Description	URL address (accessed 31.07.2007)
COPAC	COPAC Academic and National Library catalogue, U.K.	http://copac.ac.uk/
DanBib	Danish Union Catalogue	http://www.danbib.dk/index.php?doc=english
Dublin Core	Dublin Core Metadata Initiative	http://dublincore.org/groups/standards/
GBV	GBV Common Library Network of the German States Bremen, Hamburg, Mecklenburg-Vorpommern, Niedersachsen, Sachsen-Anhalt, Schleswig-Holstein, Thüringen and the Foundation of Prussian Cultural Heritage.	http://www.gbv.de/en/
IPIG	ILL Protocol implementors' group	http://www.collectionscanada.ca/iso/ill/implement.htm
HTTP	Hypertext transfer Protocol	http://tools.ietf.org/html/rfc2616
HTTPS	https is not a separate protocol, but refers to the combination of a normal HTTP interaction over an encrypted Secure Sockets Layer (SSL) or Transport Layer Security (TLS) connection.	
Libraries Australia	National union catalogue of Australian libraries	http://librariesaustralia.nla.gov.au/
MARC21 Holdings	MARC 21 Concise format for Holdings Data, Library of Congress	http://www.loc.gov/marc/holdings/
MARCxChange	MarcXchange: The general XML Schema for MARC formatted records	http://www.bs.dk/standards/MarcXchange.xsd
MARXML	MARC21 in an XML format	http://www.loc.gov/standards/marxml/
MODS	Metadata Object Description Schema, Library of Congress	http://www.loc.gov/standards/mods/
NCC	Nederlandse Centrale Catalogus – National Union catalogue of Dutch libraries	http://picarta.pica.nl/DB=2.4/LNG=EN/
NCIP	ANSI/NISO Z39.83 -2002 Circulation Interchange Part 1: Protocol	http://www.niso.org/standards/standard_d



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Abbreviation	Full Description	URL address (accessed 31.07.2007)
	(NCIP)	etail.cfm?std_id=728
ONIX	ONIX for Books Product Information Message ONIX for serials in development	http://www.editeur.org/onix.html
OPAC	Online public access catalogue. A generic term used by libraries and makers of computer software for libraries	
SRU	SRU: Search Retrieve via URL, Library of Congress	http://www.loc.gov/standards/sru/
Paypal	An e-commerce business allowing payments and money transfers to be made through the Internet.	https://www.paypal.com/
SMTP	Simple mail transfer protocol	http://tools.ietf.org/html/rfc2821
SUDOC	Système universitaire de documentation, ABES (Agence bibliographique de l'enseignement supérieur), France	http://www.sudoc.abes.fr/LNG=EN/
TEL	The European Library – union catalogue of European national libraries	http://www.theeuropeanlibrary.org/portal/index.html
URL	Uniform resource locator. A form of URI – Uniform resource identifier	http://tools.ietf.org/html/rfc3986
XACML	eXtensible Access Control Markup Language, OASIS standards organisation	http://xml.coverpages.org/xacml.html
XML	Extensible Markup Language, W3C World Wide Web Consortium	http://www.w3.org/TR/2006/REC-xml11-20060816/
WorldCat	World network of library content and services, OCLC, Online Computer Library Center, Inc.	http://www.worldcat.org/

Bibliography (APA style)

1. ANSI/NISO (2005) Z39.88-2004. The OpenURL Framework for Context-Sensitive Services. Retrieved July 31, 2007 from NISO National Standards Information Organization web page http://www.niso.org/standards/standard_detail.cfm?std_id=783
2. ANSI/NISO (2002) Z39.83 -2002 Circulation Interchange Part 1: Protocol (NCIP). Retrieved July 31, 2007 from http://www.niso.org/standards/standard_detail.cfm?std_id=728
3. Apps, A. and MacIntyre, R (May 2006). Why OpenURL. *D-Lib Magazine*. vol 12, no 5 Retrieved July 31 2007 from D-Lib Magazine web site <http://www.dlib.org/dlib/may06/apps/05apps.html> .
4. Australia. Department of Education, Science and Training (DEST) and UK Joint Information Systems Committee (JISC) (2007) e-Framework for Education and Research. Retrieved July 31, 2007 from <http://www.e-framework.org/>
5. Digital Library architectures. Retrieved July 31, 2007 from Digital Library Federation home page <http://www.diglib.org/architectures.htm>
6. *Information and documentation -- Open Systems Interconnection -- Interlibrary Loan Application Protocol Specification -- Part 1: Protocol specification*. Geneva, Switzerland, 1997.
7. Internet Engineering Task Force (IETF). The Atom syndication format (RFC 4287.) Retrieved July 31, 2007 from <http://tools.ietf.org/html/rfc4287>
8. OASIS ebXML Messaging Services Version 3.0: Part 1, Core Features (July 2007) Retrieved July 31, 2007 from http://docs.oasis-open.org/ebxml-msg/ebms/v3.0/core/cs02/ebms_core-3.0-spec-cs-02.html
9. OpenURL products and vendors. Retrieved July 31, 2007 form Library of Congress Portal Applications Issues Group web page <http://www.loc.gov/catdir/lcpaig/openurl.html>
10. Request Transfer Message Community Profile (2007). Retrieved July 31, 2007 from NISO Registry for the OpenURL Framework ANSI/NISO z39.88-2004 <http://www.openurl.info/registry/docs/pro/info:ofi/pro:rtm-2007>
11. OASIS eXtensible Access Control Markup Language (XACML). Retrieved July 31, 2007 from OASIS XACML Technical committee page http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=xacml#XACML20
12. SRU: Search / retrieve via URL. Retrieved July 31, 2007 from Library of Congress web site. <http://www.loc.gov/standards/sru/>

13. SRU: Record Update. Retrieved July 31, 2007 from Library of Congress web site.
<http://www.loc.gov/standards/sru/record-update/>
14. Van de Sompel, H., Hochstenbach, P. and Beit-Arie, O. (2000). OpenURL Syntax Description, Draft Version 0.1. Retrieved July 31, 2007 from NISO Registry for the OpenURL Framework ANSI/NISO z39.88-2004
<<http://www.openurl.info/registry/docs/pdf/openurl-01.pdf>>.
15. XML Metadata Format for Request Transfer Profile Requesters (2007) Retrieved July 31, 2007 from NISO Registry for the OpenURL Framework ANSI/NISO z39.88-2004 http://www.openurl.info/registry/docs/xsd/info:ofi/fmt:xml:xsd:rtm_req
16. XML Metadata Format for Request Transfer Profile Referents (2007) Retrieved July 31, 2007 from NISO Registry for the OpenURL Framework ANSI/NISO z39.88-2004
http://www.openurl.info/registry/docs/xsd/info:ofi/fmt:xml:xsd:rtm_rtf
17. XML Metadata Format for ISO Holdings Schema ISO 20775 Referent (2007) Retrieved July 31, 2007 from NISO Registry for the OpenURL Framework ANSI/NISO z39.88-2004
<http://www.openurl.info/registry/docs/xsd/info:ofi/fmt:xml:xsd:iso20775>
18. XML Metadata Format for Request Transfer Profile Service Types (2007) Retrieved July 31, 2007 from NISO Registry for the OpenURL Framework ANSI/NISO z39.88-2004
http://www.openurl.info/registry/docs/xsd/info:ofi/fmt:xml:xsd:rtm_svc
19. Z39.50 holdings schema. Retrieved July 31, 2007 from Z39.50 International Standard Maintenance Agency
<http://www.loc.gov/z3950/agency/asn1.html#RecordSyntax-opac>
20. Z39.50 OPAC schema. Retrieved July 31, 2007 from Z39.50 International Standard Maintenance Agency
<http://www.loc.gov/z3950/agency/asn1.html#RecordSyntax-opac>