Title	Mathematical Literature Application Profile
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Date Issued	
Identifier	URI for this document - to be assigned
Document Status	draft--last modified 2005-04-13
Description	The beginnings of a possible application profile that defines the use of Dublin Core terms for sharing metadata describing mathematical literature available on-line. It is principally intended to define qualified Dublin Core elements for use in OAI metadata harvesting.

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1. Namespaces and Format of Entries

The Mathematical Literature Application Profile uses terms from the following namespaces:

- DCMI Metadata Terms: http://dublincore.org/documents/dcmi-terms/
- others

Format of Entries

Name of Term	**A unique token assigned to the term**
Term URI	A Uniform Resource Identifier used to identify the term.
Label	A human-readable label assigned to the term.
Defined By	An identifier of a namespace, pointer to a schema, or bibliographic reference for a document within which the term is defined.
Source Definition	The definition of the term in the namespace in which the term was orginated.
Local Definition	The definition of the terms when the term orginates locally. (remove this if no locally defined terms.)
Source Comments	Additional information about the term and its application, from the namespace in which the term orginated.
Local Comments	Additional information about terms defined locally. (remove this if no locally defined terms, or change to Constraints, if we want local constraints on externally defined terms.)
Type Of Term	The grammatical category of the term (e.g. "Element", "Element Refinement", or "Encoding Scheme").
Refines	The described term semantically refines the referenced term. A refinement makes the meaning of the element narrower or more specific. It will share the meaning of the unrefined element but with a more restricted scope.
Refined By	The described term is semantically refined by the referenced term.
Encoding Scheme For	The described term, an encoding scheme, qualifies the referenced term. Using an encoding scheme will aid in the interpretation of an element value. These schemes include controlled vocabularies and formal notations or parsing rules. A value expressed using an encoding scheme will thus be a token selected from a controlled vocabulary (e.g., a term from a classification system or set of subject headings) or a string formatted in accordance with a formal notation (e.g., "2000-01-01" as the standard expression of a date). If an encoding scheme is not understood by a client or agent, the value may still be useful to a human reader. (taken from DC-Lib. Modify)
Has Encoding Scheme	The described term is qualified by the referenced encoding scheme.
Obligation	Indicates whether the element is required to always or sometimes be present. In this application profile the obligation can be: mandatory (M), mandatory if applicable (MA), strongly recommended (R) or optional (O). Mandatory ensures that some of the elements are always supported and mandatory if applicable means that this element must be supported if the information is available. An element with a mandatory obligation must have a value. The strongly recommended and the optional elements should be filled with a value if the information is appropriate to the given resource but if not, they may be omitted. (taken from DC-Lib. Modify)
Occurence	Indicates any limit to the repeatability of the element.
Notes	A temporary attribute, for development purposes.

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2. Terms

Elements and element refinements

Name of Term	**title**
Term URI	http://purl.org/dc/elements/1.1/title
Label	Title
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	A name given to the resource.
Local Definition	--
Source Comments	Typically, a title will be a name by which the resource is formally known.
Local Comments	
Type Of Term	Element
Refines	
Refined By	alternative

Has Encoding Scheme	
Obligation	M
Occurence	
Notes	To be defined: Translations: are these parallel titles, and thus a "main" title (repeating Title element? Transliterations: are these parallel titles, and thus a "main" title (repeating Title element? The relevance or irrelevance of order of multiple Titles. The relationship to an Alternative title Best practice for encoding mathematical expressions.

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Name of Term	**alternative**
Term URI	http://purl.org/dc/terms/alternative
Label	Alternative
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	Any form of the title used as a substitute or alternative to the formal title of the resource.
Local Definition	--
Source Comments	This qualifier can include Title abbreviations as well as translations.
Local Comments	
Type Of Term	Element Refinement
Refines	title
Refined By	
Has Encoding Scheme	
Obligation	R
Occurence	
Notes	See notes under Title.

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Name of Term	**creator**
Term URI	http://purl.org/dc/elements/1.1/creator
Label	Creator
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	An entity primarily responsible for making the content of the resource.
Local Definition	--
Source Comments	Examples of a Creator include a person, an organisation, or a service. Typically, the name of a Creator should be used to indicate the entity.
Local Comments	If Creator is used within this profile as a refinement of Contributor, note that here.
Type Of Term	Element
Refines	
Refined By	
Has Encoding Scheme	
Obligation	MA? or O (if a refinement)?
Occurence	
Notes	To be decided: Encourage (how strongly?) use of Contributor, along with MARC relator terms? This could essentially conflate Creator and Contributor, with Creator as a refinement of Contributor. Best practice for formatting names (inverted?, non-inverted?, etc.)?

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Name of Term	contributor
Term URI	http://purl.org/dc/elements/1.1/contributor
Label	Contributor
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	An entity responsible for making contributions to the content of the resource.
Local Definition	--
Source Comments	Examples of a Contributor include a person, an organisation, or a service. Typically, the name of a Contributor should be used to indicate the entity.
Local Comments	
Type Of Term	Element
Refines	
Refined By	
Has Encoding Scheme	Role refinements from Library of Congress list of Relators?
Obligation	O? or MA (if conflated with Creator)?
Occurence	
Notes	See notes under Creator.

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Name of Term	publisher
Term URI	http://purl.org/dc/elements/1.1/publisher
Label	Publisher
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	An entity responsible for making the resource available.
Local Definition	--
Source Comments	Examples of a Publisher include a person, an organisation, or a service. Typically, the name of a Publisher should be used to indicate the entity.
Local Comments	
Type Of Term	Element
Refines	
Refined By	
Has Encoding Scheme	
Obligation	O (or MA?)
Notes	Use of LOC Relator terms?

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Name of Term	**subject**
Term URI	http://purl.org/dc/elements/1.1/subject
Label	Subject
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	The topic of the content of the resource.
Local Definition	--
Source Comments	Typically, a Subject will be expressed as keywords, key phrases or classification codes that describe a topic of the resource. Recommended best practice is to select a value from a controlled vocabulary or formal classification scheme.
Local Comments	
Type Of Term	Element
Refines	
Refined By	
Has Encoding Scheme	MSC
Obligation	MA (or R?)
Occurence	
Notes	Need to sort out issues of MSC namespace. Need to define use of unqualified element (i.e., non-MSC terms).

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Name of Term	**description**
Term URI	http://purl.org/dc/elements/1.1/description
Label	Description
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	An account of the content of the resource.
Local Definition	--
Source Comments	Description may include but is not limited to: an abstract, table of contents, reference to a graphical representation of content or a free-text account of the content.
Local Comments	
Type Of Term	Element
Refines	
Refined By	abstract
Has Encoding Scheme	DC-Lib allows a URI qualifier, to point to remote description. Should we support this?
Obligation	R
Occurence	
Notes	Should use of this element and Abstract be made explicit? Needs best practice guidelines for encoding mathematical expressions.

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Name of Term	**abstract**
Term URI	http://purl.org/dc/terms/abstract
Label	Abstract
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	An account of the content of the resource.
Local Definition	--
Source Comments	
Local Comments	

Type Of Term	Element Refinement
Refines	description
Refined By	
Has Encoding Scheme	
Obligation	R
Occurence	
Notes	See note under Description. This needs guidelines for encoding of mathematical expressions.

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Name of Term	**date**
Term URI	http://purl.org/dc/elements/1.1/date
Label	Date
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	A date associated with an event in the life cycle of the resource.
Local Definition	--
Source Comments	Typically, date will be associated with the creation or availability of the resource. Recommended best practice for encoding the date value is defined in a profile of ISO 8601 [W3CDTF] and follows the YYYY-MM-DD format.
Local Comments	
Type Of Term	Element
Refines	
Refined By	issued
Has Encoding Scheme	ISO8601(without hyphens) - http://purl.org/dc/terms/ISO8601 W3CDTF (with hyphens) - http://purl.org/dc/terms/W3CDTF
Obligation	O
Occurence	
Notes	Questions: What's the use of Date mean, in this profile? Should it be discouraged (or even allowed) in favor of a refined date? Is 8601 necessary? I.e., is it possible to go with W3CDTF only? [do we need to support interval dates?] I've not included these Date refinements, from DC-Lib: created, valid, available, modified, dateCopyrighted, dateSubmitted, dateAccepted, dateCaptured

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Name of Term	**issued**
Term URI	http://purl.org/dc/terms/issued
Label	Issued
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	Date of formal issurance (e.g. publication) of the resource.
Local Definition	--
Source Comments	
Local Comments	
Type Of Term	Element Refinement
Refines	date
Refined By	
Has Encoding Scheme	ISO8601(without hyphens) - http://purl.org/dc/terms/ISO8601 W3CDTF (with hyphens) - http://purl.org/dc/terms/W3CDTF
Obligation	MA
Occurence	
Notes	See notes under Date. To be defined: Is "publication" date problematic for us? Use of unqualified Issued? Assumed to be presentation format ("April 2003")?

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Name of Term	**type**
Term URI	http://purl.org/dc/elements/1.1/type
Label	Resource Type
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	The nature or genre of the content of the resource.
Local Definition	--
Source Comments	Type includes terms describing general categories, functions, genres, or aggregation levels for content. Recommended best practice is to select a value from a controlled vocabulary (for example, the list of DCMI Types). To describe the physical or digital manifestation of the resource, use the Format element.
Local Comments	
Type Of Term	Element
Refines	
Refined By	
Has Encoding Scheme	DCMIType - http://purl.org/dc/dcmitype/
Obligation	O
Occurence	Type may be repeated for each encoding scheme used.
Notes	Do we want our own Type vocabulary, to indicate something like article/monograph/etc.? Should this have an obligation of MA?

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Name of Term	**format**
Term URI	http://purl.org/dc/elements/1.1/format
Label	Format
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	The physical or digital manifestation of the resource.
Local Definition	--

Source Comments	Typically, Format may include the media-type or dimensions of the resource. Format may be used to determine the software, hardware or other equipment needed to display or operate the resource. Examples of dimensions include size and duration. Recommended best practice is to select a value from a controlled vocabulary (for example, the list of Internet Media Types [MIME] defining computer media formats).
Local Comments	
Type Of Term	Element
Refines	
Refined By	extent
Has Encoding Scheme	IMT - http://purl.org/dc/terms/IMT
Obligation	R
Occurence	
Notes	I've not included the DC-Lib refinement medium. Extent is a question also (see below).

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Name of Term	**extent**
Term URI	http://purl.org/dc/terms/extent
Label	Extent
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	The size or duration of the resource.
Local Definition	--
Source Comments	
Local Comments	If restricted to page range or page total, note that here.
Type Of Term	Element Refinement
Refines	format
Refined By	
Has Encoding Scheme	
Obligation	O
Occurence	
Notes	This element seems potentially useful, if restricted to page count. Is this valuable to have, separate from what might be available in bibliographicCitation? Should restrictions be placed on its use?

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Name of Term	**identifier**
Term URI	http://purl.org/dc/elements/1.1/identifier
Label	Identifier
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	An unambiguous reference to the resource within a given context.
Local Definition	--
Source Comments	Recommended best practice is to identify the resource by means of a string or number conforming to a formal identification system. Example of formal identification systems include the Uniform Resource Identifier (URI) (including the Uniform Resource Locator (URL)), the Digital Object Identifier (DOI) and the International Standard Book Number (ISBN).
Local Comments	
Type Of Term	Element
Refines	
Refined By	bibliographicCitation

Has Encoding Scheme	URI - http://purl.org/dc/terms/URI DOI (Digital Object Identifier) ISBN (International Standard Book Number) ISSN (International Standard Serial Number) SICI (Serial Item and Contribution Identifier)
Obligation	MA
Occurence	
Notes	

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Name of Term	**bibliographicCitation**
Term URI	http://purl.org/dc/terms/bibliographicCitation
Label	Bibliographic Citation
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	A bibliographic reference for the resource.
Local Definition	--
Source Comments	Recommended practice is to include sufficient bibliographic detail to identify the resource as unambiguously as possible, whether or not the citation is in a standard form.
Local Comments	See "Guidelines for encoding bibliographic citations in Dublin Core metadata," at http://epub.mimas.ac.uk/DC/dc-citation-guidelines/
Type Of Term	Element Refinement
Refines	identifier
Refined By	Some method of rendering machine readable citations?
Has Encoding Scheme	
Obligation	MA
Occurence	
Notes	DC-Lib has optional; I'm thinking this should be MA for articles. Potentially, this could be refined by an element containing the OpenURL elements, encoded as a URI, or separate elements.

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Name of Term	**language**
Term URI	http://purl.org/dc/elements/1.1/language
Label	Language
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	A language of the intellectual content of the resource.
Local Definition	--
Source Comments	Recommended best practice is to use RFC 3066 [RFC3066], which, in conjunction with ISO 639 [ISO639], defines two- and three-letter primary language tags with optional subtags. Examples include "en" or "eng" for English, "akk" for Akkadian, and "en-GB" for English used in the United Kingdom.
Local Comments	
Type Of Term	Element
Refines	
Refined By	
Has Encoding Scheme	ISO639-2 - http://purl.org/dc/terms/ISO639-2 RFC3066?
Obligation	
Occurence	

| Notes | I think DC-Lib is dicouraging use of two-letter codes, from ISO 639-1, in favor of three-letter codes of ISO 639-2. How important is it to follow this practice?
Do we also accept DC-Lib's allowance of RFC 3066? |

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Name of Term	relation
Term URI	http://purl.org/dc/elements/1.1/relation
Label	Relation
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	A reference to a related resource.
Local Definition	--
Source Comments	Recommended best practice is to reference the resource by means of a string or number conforming to a formal identification system.
Local Comments	
Type Of Term	Element
Refines	
Refined By	isPartOf, hasPart, isReferencedBy, references
Has Encoding Scheme	URI - http://purl.org/dc/terms/URI DOI (Digital Object Identifier) ISBN (International Standard Book Number) ISSN (International Standard Serial Number) SICI (Serial Item and Contribution Identifier)
Obligation	O
Occurence	
Notes	Which refinements to include? isPartOf and hasPart will be needed if this AP includes monographic literature.

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Name of Term	isPartOf
Term URI	http://purl.org/dc/terms/isPartOf
Label	Is Part Of
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	The described resource is a physical or logical part of the referenced resource.
Local Definition	--
Source Comments	
Local Comments	
Type Of Term	Element Refinement
Refines	relation
Refined By	
Has Encoding Scheme	URI - http://purl.org/dc/terms/URI DOI (Digital Object Identifier) ISBN (International Standard Book Number) ISSN (International Standard Serial Number) SICI (Serial Item and Contribution Identifier)
Obligation	R
Occurence	
Notes	

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Name of Term	hasPart
Term URI	http://purl.org/dc/terms/hasPart
Label	Has Part
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	The described resource includes the referenced resource either physically or logically.
Local Definition	--
Source Comments	
Local Comments	
Type Of Term	Element Refinement
Refines	relation
Refined By	
Has Encoding Scheme	URI - http://purl.org/dc/terms/URI DOI (Digital Object Identifier) ISBN (International Standard Book Number) ISSN (International Standard Serial Number) SICI (Serial Item and Contribution Identifier)
Obligation	O
Occurence	
Notes	

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Name of Term	isReferencedBy
Term URI	http://purl.org/dc/terms/isReferencedBy
Label	Is Referenced By
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	The described resource is referenced, cited, or otherwise pointed to by the referenced resource.
Local Definition	--
Source Comments	
Local Comments	
Type Of Term	Element Refinement
Refines	relation
Refined By	
Has Encoding Scheme	URI - http://purl.org/dc/terms/URI DOI (Digital Object Identifier) ISBN (International Standard Book Number) ISSN (International Standard Serial Number) SICI (Serial Item and Contribution Identifier) MR (Mathematical Reviews Number) - needs to be registered ZBL (Zentralblatt MATH Number) - needs to be registered
Obligation	O
Occurence	
Notes	I believe this is how we would reference MR and ZBL reviews.

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Name of Term	references
Term URI	http://purl.org/dc/terms/references
Label	References
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	The described resource references, cites, or otherwise points to the referenced resource.

Local Definition	--
Source Comments	
Local Comments	
Type Of Term	Element Refinement
Refines	relation
Refined By	
Has Encoding Scheme	URI - http://purl.org/dc/terms/URI DOI (Digital Object Identifier) ISBN (International Standard Book Number) ISSN (International Standard Serial Number) SICI (Serial Item and Contribution Identifier)
Obligation	O
Occurence	
Notes	Do we really want this? DC-Lib says it is not appropriate to use this to include entire reference section of a work.

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Name of Term	**rights**
Term URI	http://purl.org/dc/elements/1.1/rights
Label	Rights
Defined By	http://dublincore.org/documents/dcmi-terms/
Source Definition	Information about rights held in and over the resource.
Local Definition	--
Source Comments	Typically, a Rights element will contain a rights management statement for the resource, or reference a service providing such information. Rights information often encompasses Intellectual Property Rights (IPR), Copyright, and various Property Rights. If the Rights element is absent, no assumptions can be made about the status of these and other rights with respect to the resource.
Local Comments	
Type Of Term	Element
Refines	
Refined By	
Has Encoding Scheme	URI - http://purl.org/dc/terms/URI
Obligation	R
Occurence	
Notes	

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Encoding Schemes

Name of Term	DCMIType
Term URI	http://purl.org/dc/dcmitype/
Label	DCMI Type Vocabulary
Defined By	http://purl.org/dc/terms/
Definition	A list of types used to categorize the nature or genre of the content of the resource.
Comments	
See Also	http://dublincore.org/documents/dcmi-type-vocabulary/
Type Of Term	Encoding Scheme
Encoding Scheme For	type
Notes	

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Name of Term	DOI
Term URI	URI will be provided when available
Label	DOI
Defined By	
Definition	Digital Object Identifier
Comments	
See Also	http://www.doi.org/
Type Of Term	Encoding Scheme
Encoding Scheme For	identifier, relation, isPartOf, hasPart, isReferencedBy, references
Notes	

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Name of Term	IMT
Term URI	http://purl.org/dc/terms/IMT
Label	IMT
Defined By	http://purl.org/dc/terms/
Definition	The Internet media type of the resource.
Comments	
See Also	http://www.isi.edu/in-notes/iana/assignments/media-types/media-types
Type Of Term	Encoding Scheme
Encoding Scheme For	format
Notes	

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Name of Term	ISBN
Term URI	URI will be provided when available
Label	ISBN
Defined By	
Definition	International Standard Book Number
Comments	
See Also	http://www.isbn.org/standards/home/isbn/international/index.asp
Type Of Term	Encoding Scheme
Encoding Scheme For	identifier, relation, isPartOf, hasPart, isReferencedBy, references
Notes	

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Name of Term	ISO639-2
Term URI	http://purl.org/dc/terms/ISO639-2
Label	ISO 639-2
Defined By	http://purl.org/dc/terms/
Definition	ISO 639-2: Codes for the representation of names of languages
Comments	
See Also	http://www.loc.gov/standards/iso639-2/
Type Of Term	Encoding Scheme
Encoding Scheme For	language
Notes	With RFC3066, we perhaps don't need this. Is 639-2 subsumed within RFC3066?

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Name of Term	ISO8601
Term URI	http://purl.org/dc/terms/ISO8601
Label	ISO 8601
Defined By	http://purl.org/dc/terms/
Definition	
Comments	
See Also	
Type Of Term	Encoding Scheme
Encoding Scheme For	date, issued
Notes	use this, or W3CDTF, or both? Seems like we'll need both.

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Name of Term	ISSN
Term URI	URI will be provided when available
Label	ISSN
Defined By	
Definition	International Standard Serial Number
Comments	
See Also	http://www.issn.org:8080/pub/
Type Of Term	Encoding Scheme
Encoding Scheme For	identifier, relation, isPartOf, hasPart, isReferencedBy, references
Notes	

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Name of Term	MR
Term URI	URI will be provided when available
Label	MR
Defined By	?
Definition	Mathematical Reviews Number
Comments	
See Also	
Type Of Term	Encoding Scheme
Encoding Scheme For	relation?, isReferencedBy
Notes	this should be registered (how?) as an encoding scheme

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Name of Term	MSC
Term URI	URI will be provided when available
Label	MSC
Defined By	?
Definition	Mathematical Subject Classification Code
Comments	
See Also	
Type Of Term	Encoding Scheme
Encoding Scheme For	subject
Notes	this should be registered (how?) as an encoding scheme

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Name of Term	RFC3066
Term URI	http://purl.org/dc/terms/RFC3066
Label	RFC 3066
Defined By	http://purl.org/dc/terms/
Definition	Internet RFC 3066 'Tags for the Identification of Languages' specifies a primary subtag which is a two-letter code taken from ISO 639 part 1 or a three-letter code taken from ISO 639 part 2, followed optionally by a two-letter country code taken from ISO 3166. When a language in ISO 639 has both a two-letter and three-letter code, use the two-letter code; when it has only a three-letter code, use the three-letter code. This RFC replaces RFC 1766.
Comments	

See Also	http://www.ietf.org/rfc/rfc3066.txt
Type Of Term	Encoding Scheme
Encoding Scheme For	language
Notes	

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Name of Term	SICI
Term URI	URI will be provided when available
Label	SICI
Defined By	
Definition	Serial Item and Contributor Identifier
Comments	
See Also	http://sunsite.berkeley.edu/SICI/
Type Of Term	Encoding Scheme
Encoding Scheme For	identifier, relation, isPartOf, hasPart, isReferencedBy, references
Notes	

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Name of Term	URI
Term URI	http://purl.org/dc/terms/URI
Label	URI
Defined By	http://purl.org/dc/terms/
Definition	A URI uniform resource identifier.
Comments	
See Also	http://www.itef.org/rfc/rfc2396.txt
Type Of Term	Encoding Scheme
Encoding Scheme For	description?, abstract?, identifier, source?, relation, isPartOf, hasPart, isReferencedBy, references
Notes	

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Name of Term	W3CDTF
Term URI	http://purl.org/dc/terms/W3CDTF
Label	W3C-DTF
Defined By	http://purl.org/dc/terms/
Definition	W3C encoding rules for dates and times - a profile based on ISO 8601.
Comments	
See Also	http://www.w3c.org/TR/NOTE-datetime
Type Of Term	Encoding Scheme
Encoding Scheme For	xdate, issued
Notes	

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Name of Term	ZBL
Term URI	URI will be provided when available

Label	ZBL
Defined By	?
Definition	Zentralblatt MATH Number
Comments	
See Also	
Type Of Term	Encoding Scheme
Encoding Scheme For	relation?, isReferencedBy
Notes	this should be registered (how?) as an encoding scheme

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3. General notes and questions

1. Elements from DC simple and DC-Lib not included here:

- tableOfContents
- most of the date refinemenents
- medium
- many of the relation refinements
- coverage, spatial, temporal
- source
- audience
- edition (can be covered by bibliographicCitation?)
- location

2. How to include the bibliographicCitation in a machine processible format?
There appear to be a few possible approaches:

- Define an element set that works for us, such as in minidml.
- Use the Key/Encoded-Value format for the ContextObject defined by the OpenURL community.
  The emerging standard "OpenURL Framework for Context-Sensitive Services" (ANSI/NISO Z39.88-2004) defines a "ContextObject," the main use of which is to carry data about a referenced resource within an OpenURL, but it can exist as a data object on its own. In this context, it could be used to provide a machine readible form of the DC term bibliographicCitation.
  The ContextObject may contain different "entities." The "referent" entity contains data about the referenced resource and is required in a ContextObject. It contains data elements like journal title (or ISSN), volume number, issue number, start page.
  One way of encoding the ContextObject is via the KEV (Key/Encoded-Value) format. This is a key/value string with URL-encoding. It can easily be made into a URI, and thus could be included as a DC bibliographicCitation with type URI. An example would look like this:
- Use an XML encoding or the elements within the ContextObject, defined by the OpenURL community.
  I have not seen a published recommendation for encoding the ContextObject in XML, although one may exist. This is worth looking into further, since it's exactly what we need here. There would be obvious syntactic issues here--principally whether we build in hierarchy, or stick with the flat structure (see DC-Architecture recommendations).

3. How to indicate what minidml calls the "provider"--the service providing access to the described resource--such as NUMDAM, Project Euclid, etc.:

- Use MODS location element? I think this abuses the definition of the element.
- Use a data element from the ContextObject (see above). Besides the "referent" entity, the ContextObject may contain an entity called the "referrer," defined as the service that generated the ContextObject. Could be used to identify the service that is providing access to the referenced resource. I'm guessing this is not the way to go.
  Rely on the OAI about page: Identify request. This has the data element. The problem is that there is some argument for getting this element to the record level. We could say this is the responsibility of the harvester, leaving it up to them.

4. Regarding encoding schemes for identifiers and isReferencedBy, We need a better understanding of

the difference between encoding these as a URI (type="dct:URI") versus indicating the particular identifier type in the type attribute (type="xxx:DOI"). As I understand it, with the later, the encoding scheme needs it's own declared namespace, which may be a substantially more involved process. With the former, it needs to be in registered in some global (?) namespace, such as "info:". See http://info-uri.info/registry/OAIHandler?verb=ListRecords&metadataPrefix=oai_dc.

See Recommendation 7 of the "Guidelines for Encoding Bibliographic Citation Information in DC"

NSDL may become, shortly, a potential register of these sorts of things, providing a relatively quick way for communities to register schemas, encoding schemes, etc.