Tutorial:
Topic Maps for Library and Information Scientists

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topic maps

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Presentation Outline

- Representing DCMI Metadata Terms in Topic Maps
- Topic Maps-Driven Semantic Services for National Library of Korea
  - Representing MARC21 as FRBR in Topic Maps
- Topic Maps & Subject Classification Systems
  - SKOS
- The role of Topic Maps in Digital Libraries

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Representing DCMI Metadata Terms in Topic Maps

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Presentation Outline

- Dublin Core Metadata Initiative
- Dublin Core in Topic Maps
  - Timeline
  - Rationale
  - Proposed approach
  - Issues
- Conclusion
  - The Subject-Centric Advantage

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Dublin Core Metadata Initiative

- A widely used metadata standard for Web documents
  - *The Dublin Core Metadata Initiative is an open organization engaged in the development of interoperable online metadata standards that support a broad range of purposes and business models.*
- Defines sets of abstract metadata "elements"
  - Supports multiple concrete representations
  - HTML/XHTML, RDF/XML, XML

DC Approved Element Sets

- The Dublin Core Metadata Element Set
- Other Elements and Element Refinements
- Encoding Schemes
- The DCMI Type Vocabulary

DC Namespace Policy

- 15 original element namespace:
  - http://purl.org/dc/elements/1.1/
  - http://purl.org/dc/terms/
- Element refinement, new term, and encoding scheme namespace:
  - http://purl.org/dc/terms/
- DCMI type vocabulary namespace:
  - http://purl.org/dc/dcmitype/

http://purl.org/dc/elements/1.1/

1. Title URI: http://purl.org/dc/elements/1.1/title
2. Creator URI: http://purl.org/dc/elements/1.1/creator
3. Subject URI: http://purl.org/dc/elements/1.1/subject
4. Publisher URI: http://purl.org/dc/elements/1.1/publisher
5. Description URI: http://purl.org/dc/elements/1.1/description
6. Contributor URI: http://purl.org/dc/elements/1.1/contributor
7. Date URI: http://purl.org/dc/elements/1.1/date
8. Source URI: http://purl.org/dc/elements/1.1/source
9. Identifier URI: http://purl.org/dc/elements/1.1/identifier
10. Coverage URI: http://purl.org/dc/elements/1.1/coverage
11. Rights URI: http://purl.org/dc/elements/1.1/rights
12. Language URI: http://purl.org/dc/elements/1.1/language
13. Format URI: http://purl.org/dc/elements/1.1/format
14. Type URI: http://purl.org/dc/elements/1.1/type
15. Relation URI: http://purl.org/dc/elements/1.1/relation

http://purl.org/dc/terms/

1. Titel URI: http://purl.org/dc/terms/title
2. Creator URI: http://purl.org/dc/terms/creator
3. Subject URI: http://purl.org/dc/terms/subject
4. Publisher URI: http://purl.org/dc/terms/publisher
5. Description URI: http://purl.org/dc/terms/description
6. Contributor URI: http://purl.org/dc/terms/contributor
7. Date URI: http://purl.org/dc/terms/date
8. Source URI: http://purl.org/dc/terms/source
9. Identifier URI: http://purl.org/dc/terms/identifier
10. Coverage URI: http://purl.org/dc/terms/coverage
11. Rights URI: http://purl.org/dc/terms/rights
12. Language URI: http://purl.org/dc/terms/language
13. Format URI: http://purl.org/dc/terms/format
14. Type URI: http://purl.org/dc/terms/type
15. Relation URI: http://purl.org/dc/terms/relation
16. Audience URI: http://purl.org/dc/terms/relation

http://purl.org/dc/terms/

- Title Refinement
  - http://purl.org/dc/terms/alternative
- Description Refinements
  - http://purl.org/dc/terms/tableOfContents
  - http://purl.org/dc/terms/abastract
- Format Refinements
  - http://purl.org/dc/terms/extent
  - http://purl.org/dc/terms/medium
- Coverage Refinements
  - http://purl.org/dc/terms/spatial
  - http://purl.org/dc/terms/temporal
- Rights Refinement
  - http://purl.org/dc/terms/rightsAccess
- Audience Refinements
  - http://purl.org/dc/terms/educationLevel
  - http://purl.org/dc/terms/mediator

http://purl.org/dc/terms/

- Date Refinements
  - http://purl.org/dc/terms/created
  - http://purl.org/dc/terms/valid
  - http://purl.org/dc/terms/available
  - http://purl.org/dc/terms/issued
  - http://purl.org/dc/terms/mdodified
  - http://purl.org/dc/terms/dateAccepted
  - http://purl.org/dc/terms/dateCopyrighted
  - http://purl.org/dc/terms/dateSubmitted
- Identifier Refinement
  - http://purl.org/dc/terms/bibliographicCitation
- Relation Refinements
  - http://purl.org/dc/terms/isPartOf | http://purl.org/dc/terms/hasPart
  - http://purl.org/dc/terms/isVersionOf | http://purl.org/dc/terms/hasVersion
  - http://purl.org/dc/terms/isFormatOf | http://purl.org/dc/terms/hasFormat
  - http://purl.org/dc/terms/isReferencedBy | http://purl.org/dc/terms/references
  - http://purl.org/dc/terms/isRequiredBy | http://purl.org/dc/terms/requires
  - http://purl.org/dc/terms/isReplacedBy | http://purl.org/dc/terms/replaces
  - http://purl.org/dc/terms/conformsTo

http://purl.org/dc/terms/

- **Encoding Schemes**
  - Source, Identifier and Relation
    - http://purl.org/dc/terms/URI
  - Subject
    - http://purl.org/dc/terms/DDC
    - http://purl.org/dc/terms/LCC
    - http://purl.org/dc/terms/LCSH
    - http://purl.org/dc/terms/MeSH
    - http://purl.org/dc/terms/UDC
  - Format and Medium
    - http://purl.org/dc/terms/IMT
  - Type
    - http://purl.org/dc/terms/DCMIType
  - Spatial
    - http://purl.org/dc/terms/TGN
    - http://purl.org/dc/terms/ISO3166
    - http://purl.org/dc/terms/Box
    - http://purl.org/dc/terms/Point
  - Temporal
    - http://purl.org/dc/terms/Period
    - http://purl.org/dc/terms/W3CDTF
  - Language
    - http://purl.org/dc/terms/ISO639-2
    - http://purl.org/dc/terms/RFC3066

http://purl.org/dc/dcmitype/

- http://purl.org/dc/dcmitype/Collection
- http://purl.org/dc/dcmitype/Dataset
- http://purl.org/dc/dcmitype/Event
- http://purl.org/dc/dcmitype/Image
- http://purl.org/dc/dcmitype/InteractiveResource
- http://purl.org/dc/dcmitype/MovingImage
- http://purl.org/dc/dcmitype/PhysicalObject
- http://purl.org/dc/dcmitype/Service
- http://purl.org/dc/dcmitype/Software
- http://purl.org/dc/dcmitype/Sound
- http://purl.org/dc/dcmitype/StillImage
- http://purl.org/dc/dcmitype/Text

Dublin Core in Topic Maps

- A work item in SC34 / WG3 for a Technical Report
- Timeline
  - Initial draft already available
    - ISO/IEC DTR 29111, 2007 (see references)
  - CD balloting already underway

DC inTM – The Rationale

1. In order to add (standard) metadata to topic maps
2. In order to enable Topic Maps-based collation of Dublin Core information
   - Dublin Core description sets have limited usefulness unless they can be aggregated based on meaning
   - Topic Maps makes such aggregation possible
3. In order to combine DC data with other and non-DC data

DC inTM – The Proposed Approach

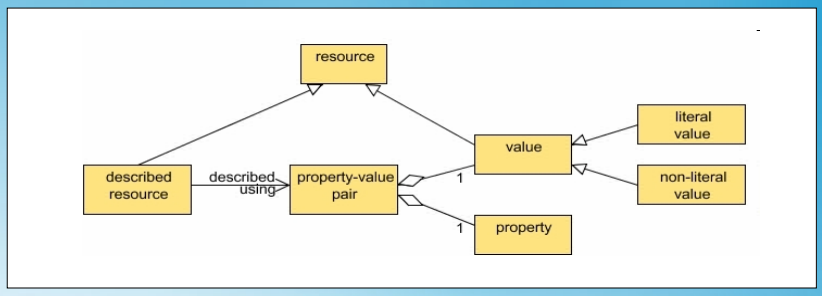
- Basic Principles
  - Start from the Dublin Core Abstract Model (DCAM)
  - Map to the Topic Maps Data Model (TMDM)
  - Reuse the DC identifiers
  - Use minimum additional vocabulary
  - Only map what's really there: don't infer stuff
  - Topic Maps representation should be as natural as possible
  - Take a subject-centric approach

DC inTM – The Proposed Approach

- **Proposed Synthesis**
  1. Regard Dublin Core resources as subjects.
  2. Use statements to assign DC properties.
  3. For each property, specify which kind of statement to use.
  4. Recommend the use of associations for all elements except —
     - elements that are naming properties and thus more naturally represented as topic names (e.g. title); and
     - elements whose values consist of descriptive text or structured data types and are thus more naturally represented as occurrences (e.g. description, date).
     - For each property, specify which kind of statement to use.
  5. Reuse existing identifiers.

The Dublin Core Abstract Model

- In short:
  - Resources are described by property-value pairs in which the value may be a literal or non-literal:



Basic DCAM to TMDM Mapping

Dublin Core (DCAM)		Topic Maps (TMDM)
described resource	→	subject / topic
property-value pair	→	statement
		name, association, or occurrence
property	→	statement type
		name type, association type, or occurrence type
property URI	→	subject identifier of typing topic
literal value[S]	→	string (name or occurrence)
non-literal value[S]		*Either*
	→	topic (when association)
	→	URI (when occurrence)

Minimum of Additional Vocabulary

- The solution reuses the DC vocabulary
  - Property URIs become the subject identifiers of association types, etc.
  - There is no unnecessary duplication of identifiers
- However, TMs require role types in addition to name, occurrence and association types
  - Vocabulary extensions handle this:
    `http://psi.topicmaps.org/iso29111/resource`
    `http://psi.topicmaps.org/iso29111/value`

Dublin Core Metadata Element Set

- DCMES: A set of 15 core elements:
  - contributor, coverage, creator, date, description, format, identifier, language, publisher, relation, rights, source, subject, title, type
- Each element has 7 properties
  - URI, Label, Definition, Comment, Type of Term, Status, Date Issued
- The URI is an identifier, e.g.
  - http://purl.org/dc/elements/1.1/contributor (dc:contributor)

Mappings (DCMES)

- The 15 core DCMES elements map to:

A. *Names:* **title**
   - because it is clearly a naming property

B. *Occurrences:* **date**, **description**, **identifier**, **rights**
   - because their values consist of descriptive text or structured data types

C. *Associations:* **contributor**, **coverage**, **creator**, **format**, **language**, **publisher**, **relation**, **source**, **subject**, **type**
   - because associations are the default...

DC inTM – CTM example

```
#prefix and template declarations omitted
*myTM    # named wildcard creates reference-able item identifier
N →- title: "Norwegian Opera"
A →creator: Huchu
O →date: 2007-07-25
O →description: "A topic map about Norwegia
   created as a term assignment for the Uni
   MUS2420."
O →identifier: http://www.ontopedia.net/huc
A →language: English
O →rights: "Copyright (c) 2007, Ontopedia"
A →subject: Norwegian_Opera
A →type: topic_map
```

Topic Map Metadata

- **Creator:** Huchu
- **Date:** 2007-07-25
- **Description:** A topic map about Norwegian opera, originally created as a term assignment for the University of Oslo course MUS2420.
- **Language:** English
- **Rights:** Copyright (c) 2007, Ontopedia
- **Subject:** English
- **Type:** Topic map

Elements and Element Refinements

- A set of 40 additional **elements** and refinements
  - abstract, accessRights, **accrualMethod**, **accrualPeriodicity**, **accrualPolicy**, alternative, **audience**, available, bibliographicCitation, conformsTo, created, dateAccepted, dateCopyrighted, dateSubmitted, educationLevel, extent, hasFormat, hasPart, hasVersion, **instructionalMethod**, isFormatOf, isPartOf, isReferencedBy, isReplacedBy, isRequiredBy, issued, isVersionOf, license, mediator, medium, modified, **provenance**, references, replaces, requires, **rightsHolder**, spatial, tableOfContents, temporal, valid
- Each element has up to 8 properties
  - URI, Label, Definition, Comment, Type of Term, Refines, Status, Date Issued
- The URI is an identifier, e.g.
  - http://purl.org/dc/terms/abstract (dct:abstract)

Mappings (Other Elements, etc.)

- The 40 elements map to
  A. *Names:* **alternative**
     - because it is clearly a naming property
  B. *Occurrences:* abstract, accessRights, available, bibliographicCitation, created, dateAccepted, dateCopyrighted, dateSubmitted, educationLevel, extent, instructionalMethod, issued, license, medium, modified, provenance, tableOfContents, valid
     - because their values consist of descriptive text or structured data types
  C. *Associations:* accrualMethod, accrualPeriodicity, accrualPolicy, audience, conformsTo, hasFormat, hasPart, hasVersion, isFormatOf, isPartOf, isReferencedBy, isReplacedBy, isRequiredBy, isVersionOf, mediator, references, replaces, requires, rightsHolder, spatial, temporal
     - because associations are the default...

Encoding Schemes

- A set of 18 encoding schemes:
  - Box, DCMIType, DDC, IMT, ISO3166, ISO639-2, LCC, LCSH, MESH, NLM, Period, Point, RFC1766, RFC3066, TGN, UDC, URI, W3CDTF
- Each term has up to 8 properties
  - URI, Label, Definition, See, Type of Term, Qualifies, Status, Date Issued
  - See property references documentation
  - Qualifies property specifies which property (or properties) the encoding scheme is intended to be used with
- The URI is an identifier, e.g.
  - http://purl.org/dc/terms/box (dct:box)

Mappings (Encoding Schemes)

- Each encoding scheme is represented by a topic
- Qualifiers for occurrence properties:
  - DCMI Period, W3C-DTF (Date), URI (Identifier)
    - ► Datatype of the occurrence value
- Qualifiers for association properties:
  - DCMI Box (Spatial), DCMI Period (Temporal), DCMI Point (Spatial), DCMI Type Vocabulary (Type), DDC (Subject), IMT (Format), ISO 3166 (Spatial), ISO 639-2 (Language), LCC (Subject), LCSH (Subject), MeSH (Subject), NLM (Subject), RFC 1766 (Language), RFC 3066 (Language), TGN (Spatial), UDC (Subject), URI (Relation, Source), W3C-DTF (Temporal)
  - ► ***belongs_to*** association between the "value" and the encoding scheme

The DCMI Type Vocabulary

- A set of 12 media types:
  - Collection, Dataset, Event, Image, InteractiveResource, MovingImage, PhysicalObject, Service, Software, Sound, StillImage, Text
- Each term has up to 9 properties
  - Broader Than, Comment, Date Issued, Definition, Label, Narrower Than, Status, Type of Term, URI
  - Broader Than & Narrower Than properties apply to Image, MovingImage and StillImage

Mappings (Type Vocabulary)

- Each type is represented as a topic
- These topics are candidates for the “value” role in **dc:type** associations

Issues

- Identifiers
- Simplicity vs. naturalness
- Strict vs. loose

The Issue of Identifiers

- Note that **dc:identifier** is represented as an occurrence
  - Subject identifiers or subject locators would actually be more "topic-mappish"
  - But how would we know when to use which?
  - Dublin Core (like RDF) does not make the distinction between direct and indirect addressing
  - The only solution is to use occurrences as the default and allow either a subject identifier or a subject locator to be specified in addition, if the nature of the resource in question is known.

Simplicity vs. Naturalness

- We could have chosen a simpler route
  - "Just use occurrences for everything"
- Why didn't we?
  - Partly because we wanted to leverage the built-in semantics of the Topic Maps model
    - distinction between names, occurrences, and associations
    - this is more "topic mappish" and more intuitive
  - Mostly because we want to encourage the adoption of a subject-centric approach wherever possible
    - This means using associations, not occurrences, wherever it makes sense

Strict vs. Loose

- This is also why we chose the more draconian approach:
  - "Thou SHALT NOT use occurrences"
- We could have given the choice:
  - *Either* an association
    - creator: huchu
  - *or* an occurrence
    - creator: "Huchu"
- But we didn't. The final short example will hopefully explain why.

A Blog Entry (2 legs)

```
*e21 isa: entry
  - title: "About Dublin Core in Topic Maps"
  date: 2007-08-07
  subject: "Subject-centric computing"
  subject: "Dublin Core"
  creator: "Steve Pepper"
  contributor: "Dmitry Bogachev"
  description: "Topic Maps definitely needs
  Dublin
  Core, but the reverse also holds..."
```

A Blog Entry (4 legs)

```
*e41 isa: entry
  - title: "About Dublin Core in Topic Maps"
  date: 2007-08-07
  subject:  Subject-centric_computing
  subject:  Dublin_Core
  creator:  Steve_Pepper
  contributor:  Dmitry_Bogachev
  description: "Topic Maps definitely needs
  Dublin
  Core, but the reverse also holds..."
```


The Subject Centric Advantage

- Explicit identification of subjects
  - Enables collation of information based on what it is about
- This is what end-users (mostly) want
  - They are interested in a subject and want to find out more about it
  - If they could go to one place and find “everything” there is to know, the problem of infoglut would be under control
- This is the goal
  - It is the central message of subject centric computing

Topic Maps-Driven Semantic Services for National Library of Korea

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Presentation Outline

- Research Objectives and Scope
- Understanding FRBR Model
- Converting MARC to FRBR
- Converting FRBR to Topic Maps
- Implementing a TM Prototype Enabling FRBR Model

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Research Objectives & Scope

- Establishing resource description structure based on international standard
- Making resource management smart and systematic
- Towards semantic DL service via user participation

FRBR Model

- *The FRBR model is revolutionary. The (computer) catalogue is not seen as a sequence of bibliographic records and a replica of the traditional card catalogue, but rather as a network of connected data, enabling the user to perform seamlessly all the necessary functions.* (Dr. Maja Žumer. National and University Library, Ljubljana, Slovenia)

- FRBR = Functional Requirements for Bibliographic Records
  - Developed by cataloging experts working under the auspices of IFLA (International Federation of Library Associations and Institutions)
- FRBR is a conceptual model (not a standard!)
  - FRBR systematically models the bibliographic universe

Value of FRBR

- FRBR study process and report:
  - Fresh look at what functions bibliographic records perform
  - FRBR systematically models the bibliographic universe
- Helps us answer important questions:
  - What information is of the most value to users of the catalog?
  - How can that most valuable information be used more effectively?
- Promises to inspire next generation catalogs and DL systems.
  - Illuminates user tasks
  - Clarifies how catalogs and DLs should function

FRBR Study

Primary objectives of the FRBR study:

- Provide a clearly defined, structured framework for relating bibliographic data to user needs
- Recommend a basic level of functionality for records created by national bibliographic agencies

Modeling the bibliographic universe:

- Utilizes an entity-relationship framework:
  - Entities (a class of things)
  - Relationships (associations among entities)
  - Attributes (characteristics of the entities)

What FRBR says USERS do:

Four User Tasks:

- Find **entities that match the search criteria**
- Identify **entities (confirm that the user has found what they were looking for)**
- Select **an entity that matches the user's criteria**
- Obtain **access to the entity through purchase, loan, or through electronic remote access**

And, maybe a fifth:

- Navigate

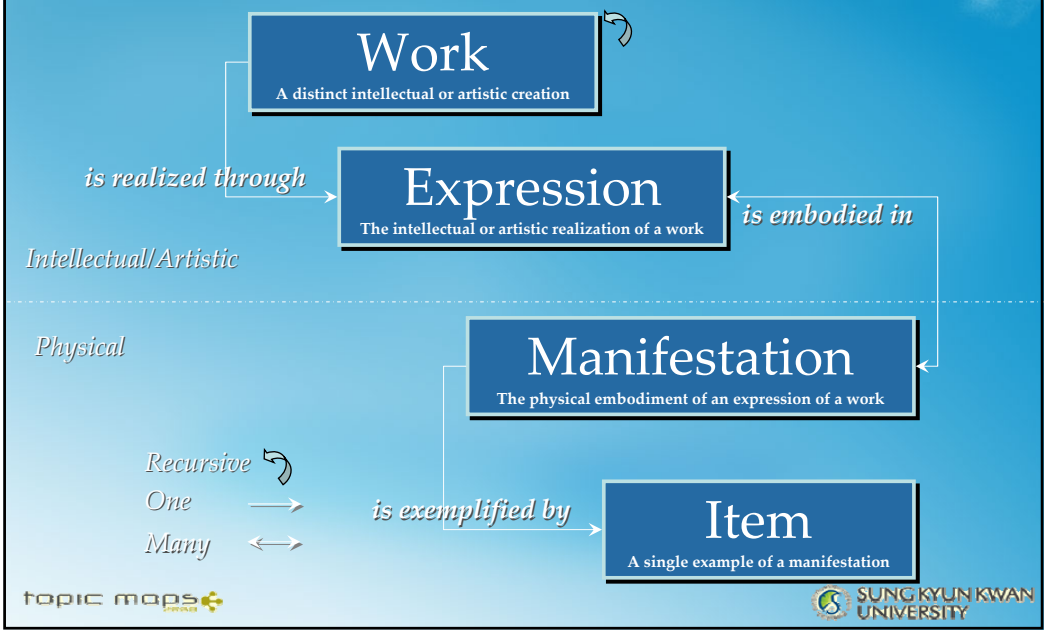
FRBR 3 Groups of Entities

- Group 1
  - products of intellectual or artistic endeavor that are named of described in bibliographic records
    - work, expression, manifestation, item
- Group 2
  - entities responsible for the intellectual or artistic content, the physical production and dissemination, or the custodianship of such products
    - person, corporate body
- Group 3
  - entities that serve as the subjects of intellectual or artistic endeavor
    - concept, object, event, place

FRBR Group 1

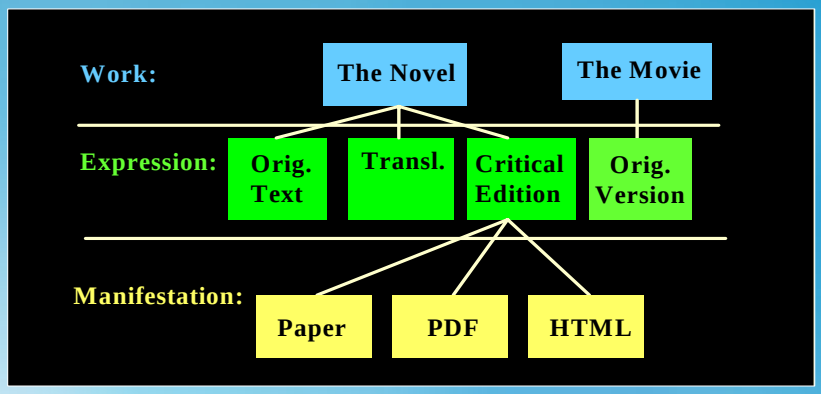
- Work
  - A distinct intellectual or artistic creation
- Expression
  - The intellectual or artistic realization of a work
- Manifestation
  - The physical embodiment of an expression of a work
- Item
  - A single example of a manifestation

FRBR Group 1...



FRBR Entity Levels

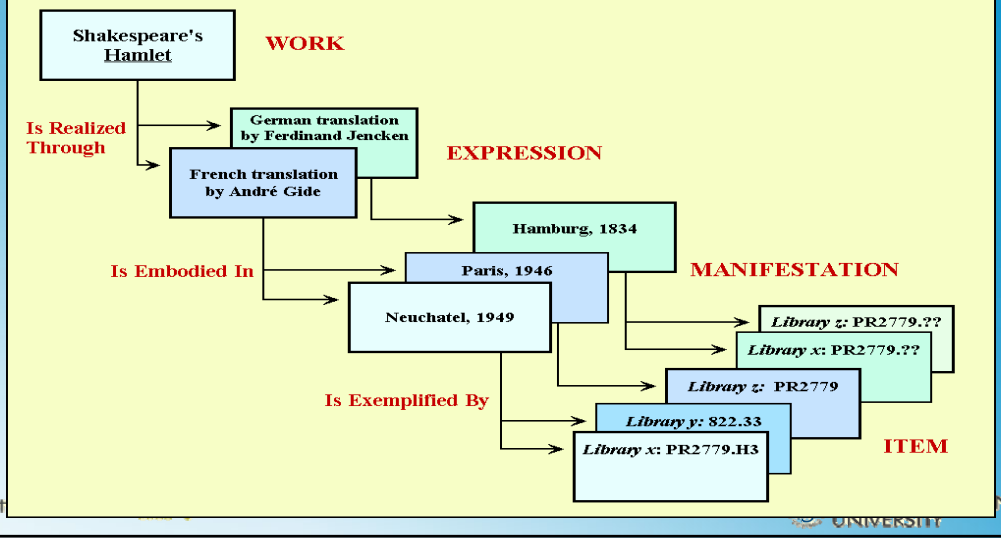
Group 1



From: Tillett, Barbara "AACR2's Strategic Plan and IFLA Work towards an International Cataloguing Code" (2002)

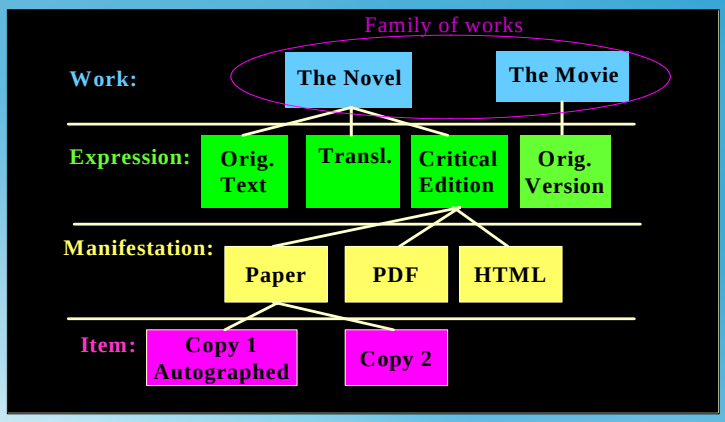
FRBR Entity Levels

4-level FRBR Model



FRBR Entity Levels

Group 1



From: Tillett, Barbara "AACR2's Strategic Plan and IFLA Work towards an International Cataloguing Code" (2002)

Group 1 Attributes

- Work
  - Work title, form or genre, date, performance medium, intended audience
- Expression
  - Expression title, form of the expression, language of the expression, type of score, scale of a map
- Manifestation
  - Manifestation title, publisher, date of publication, form of carrier, dimensions, manifestation identifier (e.g. ISBN), terms of availability
- Item
  - Location or call number, barcode, provenance, condition, access restrictions on an item

Group 2 – Responsible Entities

- **Entities responsible for the intellectual or artistic content, the physical production and dissemination, or the custodianship of such products**

Group 2 entities:

- **Person**
- **Corporate Body**

And perhaps a third …

- **Family**

Group 2 Attributes

- Person
  - Names, dates, titles or other designations
- Corporate body
  - Name, number, place, date, other designation

Group 3 - Subject Entities

- Entities that serve as the subjects of intellectual or artistic endeavor

Group 3 entities:

- Concept: **topical subject heading**
- Object: **name for an object**
- Event: **name for an event**
- Place: **name for a place**
- Plus the Group 1 and 2 Entities:
  - Works about Works/Expressions/Manifestations/Items
  - Works about Persons and/or Corporate Entities

Relationships

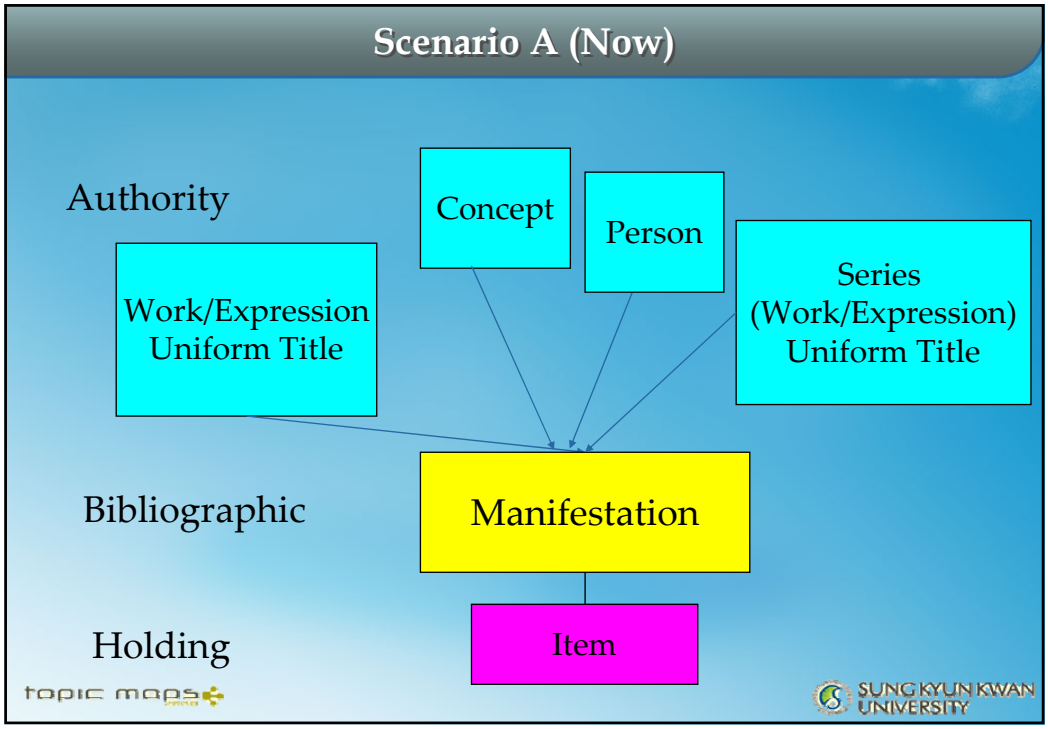
- Link entities to one another
  - Entities of different groups (person and work)
  - Entities of the same group (work and expression)
- Collocation and navigation

Relationships Between FRBR Groups

- Work ⇔ Person
  - Created by
- Expression ⇔ Person
  - Translated by
- Manifestation ⇔ Corporate body
  - Produced by
- Item ⇔ Corporate body
  - Owned by
- Concept ⇔ Work
  - Is subject of

Relationships within a group

- Work to work
  - Successor
  - Supplement
  - Complement
  - Summarization
  - Adaptation
  - Transformation
  - Imitation
  - Whole/part


Scenario A (Now)
Authority
Concept
Person
Work/Expression Uniform Title
Series (Work/Expression) Uniform Title
Bibliographic
Manifestation
Holding
Item
topic maps
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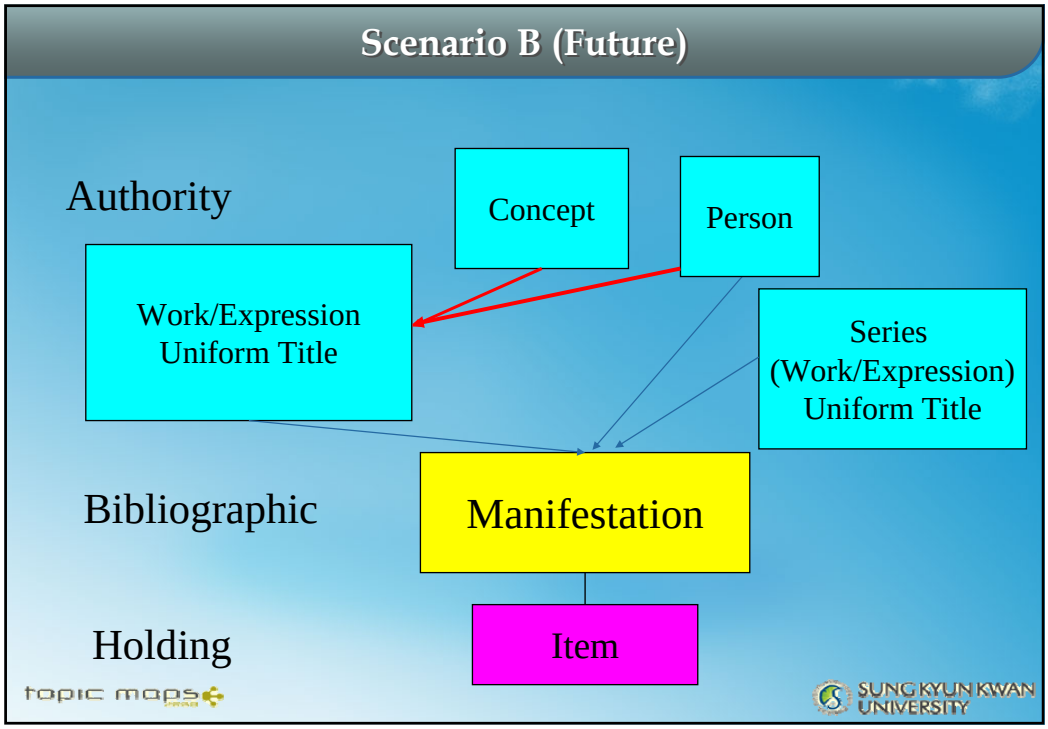
Scenario B (Future)
Authority
Concept
Person
Work/Expression Uniform Title
Series (Work/Expression) Uniform Title
Bibliographic
Manifestation
Holding
Item
topic maps
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Applying FRBR in services

- Incorporating the concepts of the FRBR model in systems:
  - Superior presentation of search results
    - Esp. in large files – more intuitive clustering
  - May help streamline library cataloging
    - Reduces repeated keying of work-related info
  - Bibliographic & management intelligence
    - New insights into works (e.g., OCLC's 1000 list)
    - Libraries can operate at workset level (e.g., ILL)

Show & tell

- OCLC Research:
  - Top 1000 titles http://www.oclc.org/research/top1000
  - xISBN http://www.oclc.org/research/researchworks/xisbn/
  - Fiction Finder http://fictionfinder.oclc.org/
  - Curiouser http://www.oclc.org/research/projects/curiouser
- OCLC production services
  - Open WorldCat http://www.oclc.org/worldcat/open
  - FRBR-inspired FirstSearch WorldCat (coming soon)

Converting MARC to FRBR

Mapping Between FRBR Attributes & MARC21 Elements

Entities	Attributes	MARC21 Elements	MARC21 Description
Work	created by	100/110/111 700/710/711 $t,$n,$p,$d,$f,$k,$s,$m,$r,$l,$o,$h	person/corporate body
	Title of work	130 $a,$n,$p 240/243/245 $a,$n,$p	Uniform title Collective uniform title Title statement
	Date of work	130 $d 240/243 $d 245 $g	Date of treaty signing
	Form of work	130 $k 240/243/245 $k	Form subheading
	Medium of performance	130 $m 240/243 $m	Medium of performance for music
	Key	130 $r 240/243 $r	Key of music
	Coordinates	255 $c	Statement of coordinates

Converting MARC to FRBR

Mapping Between FRBR Attributes & MARC21 Elements

Entities	Attributes	MARC21 Elements	MARC21 Description
Expression	Form of expression	leader/06	Type of record
	Language of expression	130 $l 240/243 $l 008/35-37	Language of a work language
	Other distinguishing characteristic	130 $o 240/243 $o 245 $s	Arranged statement for music Revision
	Type of score	254 $a Music 008/20	Musical presentation statement Format of music
	Scale	255 $a 034 $b,$c,$h	Statement of scale

Converting MARC to FRBR

Mapping Between FRBR Attributes & MARC21 Elements

Entity	Attribute	MARC21 Elements	MARC21 Description
Manifestation	Title of manifestation	245 $a,$n,$p 242 $a,$n,$p	Title Number of part Name of part
	Statement of responsibility	245 $c 242 $c	Statement of responsibility
	Edition/issue designation	250 $a,$b	Edition statement Remainder of edition statement
	Numbering	362 $a	Dates of publication and sequential designation
	Publisher/distributor	260 $b 533 $c	Name of publisher, distributor Agency responsible for reproduction
	Date of publication/distribution	260 $c 533 $d	Date of publication, distribution Date of reproduction

Converting MARC to FRBR

Mapping Between FRBR Attributes & MARC21 Elements

Entity	Attribute	MARC21 Elements	MARC21 Description
Manifestation	Form of carrier, extent of carrier	300 $a 533 $e	Extent Physical description of reproduction
	Dimensions of carrier	300 $c 533 $e	Dimensions Physical description of reproduction
	Physical medium, capture mode, playing speed, groove width, kind of cutting, tape configuration, kind of sound, special reproduction characteristics, color, polarity, presentation format, file characteristics	300 $b	Other physical details
	Reduction ratio	340 $f 533 $e(?)	Production rate/ratio Physical description of reproduction
	Manifestation identifier	BK:020,027,074 SE:022,030,074 Other:024,028,074	ISBN,STRN:BK, ISSN, Coden:SE Other standard identifier, publisher number:other, Form of musical composition code:074t

Advantages of Topic Maps in Providing Semantic Services

- Provides excellent collocation capability – Katz's second purpose of cataloging
- TM implementation is relatively easy compared with RDF/OWL so one can expect a better return on investment.
- Excellent candidate in modeling FRBR-based data and provides great interoperability with other semantic data.
- You can easily change your ontology schema without modifying applications, which offers excellent advantage in terms of management cost.
- Provides flexible ways to model ontology.
- Provides flexible ways to convert any structured data, which makes it easy to utilize legacy data.
- Integrating TM with Web 2.0 technology is relatively easy and natural.

Refining MARC-Ontology Using Topic Maps

- Topic Types
  - Among FRBR entities from group 1,2,3 and MARC metadata elements, select the elements that can create "useful" collocation, assign them as topic types.
  - Map FRBR model entities into MARC metadata elements and establish them as topic types.
- Association Types
  - Establish association types between topic types.
  - Apply FRBR relationships as TM associations between topics and also establish associations between metadata elements.
- Occurrence Types
  - Except for MARC metadata elements that were converted as topic types, the remaining MARC elements will be defined as TM occurrence types.
  - Classify occurrence types based on element values of FRBR model and assign them to appropriate topic types.
  - Since MARC records are usually based on manifestation, most MARC metadata elements and other occurrence types are assigned to manifestation.

Defining Topic Types

Topic Types	FRBR Group & MARC Element
Work/Expression Manifestation/Item	FRBR Group 1, MARC Title
Person / Corporate Body	FRBR Group 2, MARC Personal name, Corporate Name
Object / Event / Place	FRBR Group 3
Country / Genre	MARC Subject (KORMARC 650tag)
Type	MARC leader's type of record (Expression Criterion)
Format	MARC Medium (245 $h, Manifestation Criterion)
Language	MARC Language statement (Expression Criterion)
Classification	MARC KDC classification number
Context	FRBR Model의 개체 속성정보
Publisher, Date	MARC publication
Audience	MARC Target audience / User tagging info
Subject	User subject tagging info

KORMARC Elements and TM Occurrence Types

KORMARC Elements	Topic Maps Occurrence Types
Title and related fields (1XX/24X/4XX/7XX)	Other words associated with a name, Remainder of title, Parallel title, Original title, series statement, uniform title
Publication (26X)	Edition statement, Place of publication, Frequency, Regularity
Physical description (3XX)	Extent, Other physical details, Dimensions, Accompanying materials, size of unit
Note (5XX), Subject(653)	Contents note, Restrictions on access, Immediate source of acquisition, keyword
Non-book bibliographic Note(5XX)	System details note, Music format, Participant or performer note, Exhibitions note, Date/time and place of an event note, Creation/production credits note, scale note
Control field (0XX)	DDC, KDC, ISBN, Price, Korean National Library call number, identifier number, language note
Other service Note	URL, book review, status of book circulation, abstract, image of title

Occurrence Types by Topic Types

Topic Type	Occurrence Types
Work	uniform title
Expression	Original title, language note, Frequency, Regularity, Restrictions on access
Manifestation	Contents note, Immediate source of acquisition, Extent, Other physical details, Dimensions, Accompanying materials, size of unit, Edition statement, System details note, Music format, Participant or performer note, Exhibitions note, Date/time and place of an event note, Creation/production credits note, scale note, Other words associated with a name, Remainder of title, Parallel title, DDC, KDC, ISBN, Price,
Item	Korean National Library call number, identifier number
Publisher	Place of publication,
Classification	KDC, DDC
인물	Dates associated with a name?
Subject	keyword

Defining Association Types

Topic Type	Association Type	Topic Type
Work	Work form	Genre
	Realized Through	Expression
	Created by	Person/ Corporate Body
	Context for	Context
	Work classified	Classification

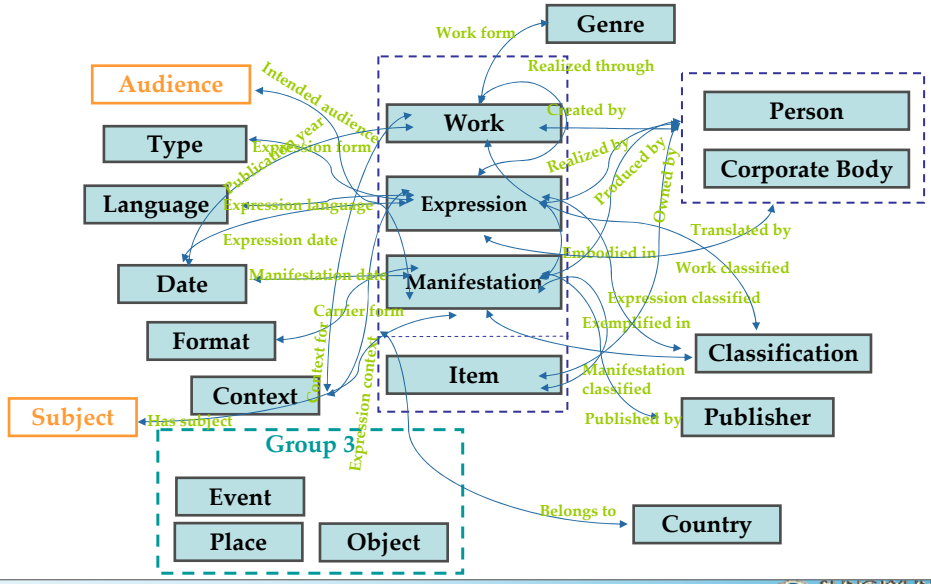
Defining Association Types

Topic Type	Association Type	Topic Type
Expression	Embodied in	Manifestation
	Realized by	Person/ Corporate Body
	Expression form	Type
	Expression language	Language
	Expression classified	Classification
	Expression context	Context
	Expression date	Publication Date
	Translated by	Person/ Corporate Body

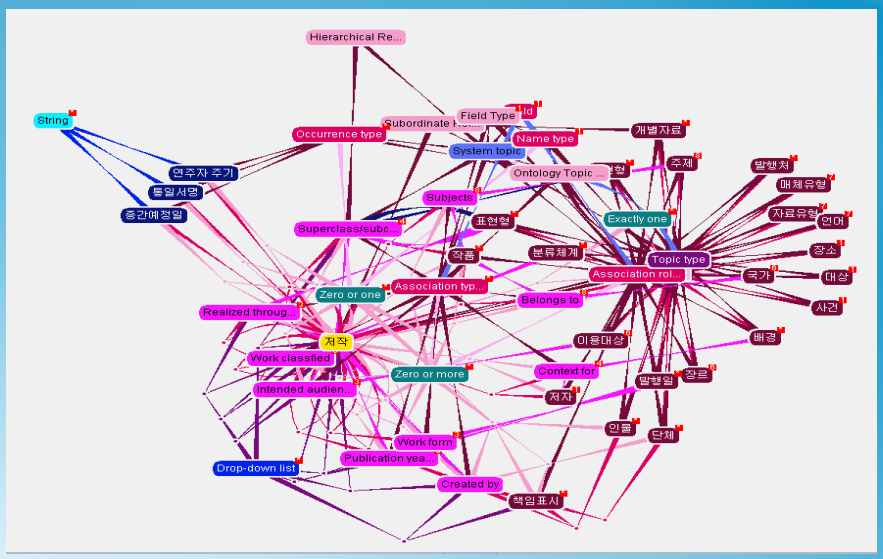
Defining Association Types

Topic Type	Association Type	Topic Type
Manifestation	Exemplified in	Item
	Produced by	Person/ Corporate Body
	Carrier form	Format
	Published by	Publisher
	Manifestation classified	Classification
	Intended audience	Audience
	Manifestation date	Publication Date
Subject	Has subject	Work Expression Manifestation
Country	Belongs to	

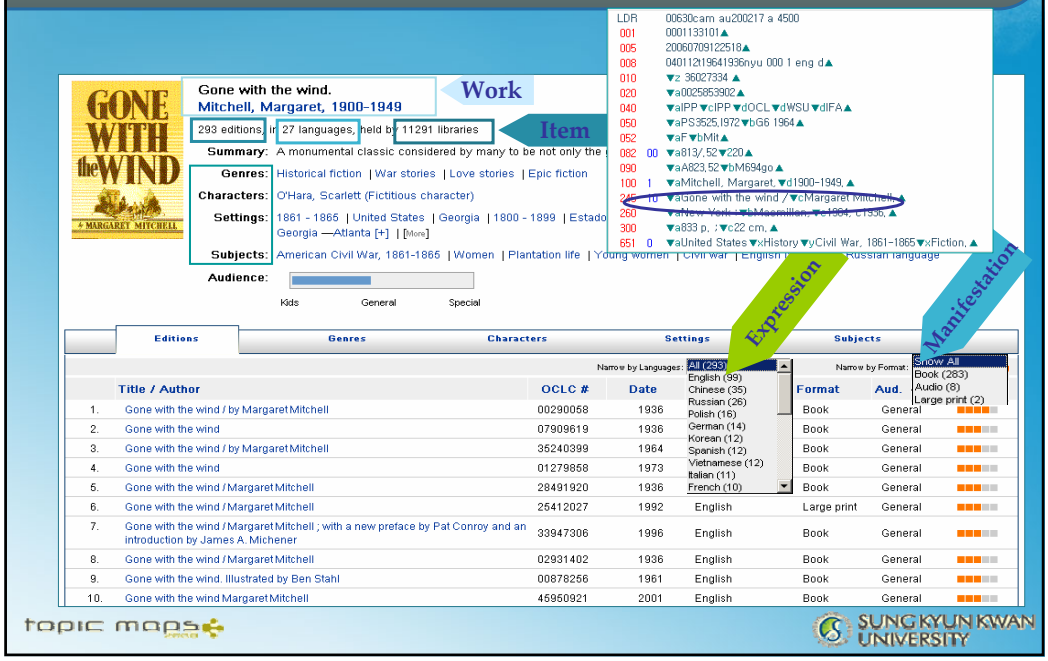
Topic Map Modeling of FRBR



Graphical TM View of MARC



OCLC Fiction Finder



topic maps

SUNG KYUN KWAN UNIVERSITY

NLK Prototype System: Main Screen

topic maps

SUNG KYUN KWAN UNIVERSITY

NLK Prototype System: Display of Literary Works

topic maps

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NLK Prototype System: Display of Authors

topic maps

SUNG KYUN KWAN UNIVERSITY

NLK Prototype System: Detailed Display of Literary Works

topic maps

SUNG KYUN KWAN UNIVERSITY

NLK Prototype System: Display of Genre

topic maps

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Introduction to SKOS
(Simple Knowledge Organization Systems)

topic maps

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The Goal of SKOS Core

- To provide a simple, machine-understandable, representation framework for Knowledge Organization Systems (KOS)

topic maps

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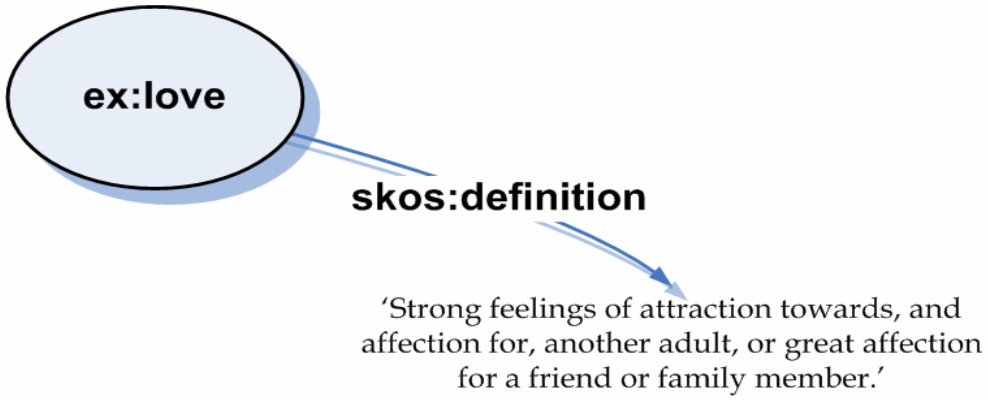
The Scope of SKOS Core

- In scope…
  - **Controlled Vocabularies**
  - **Thesauri**
  - **Taxonomies**
  - **Classification Schemes**
  - **Subject Heading Systems**

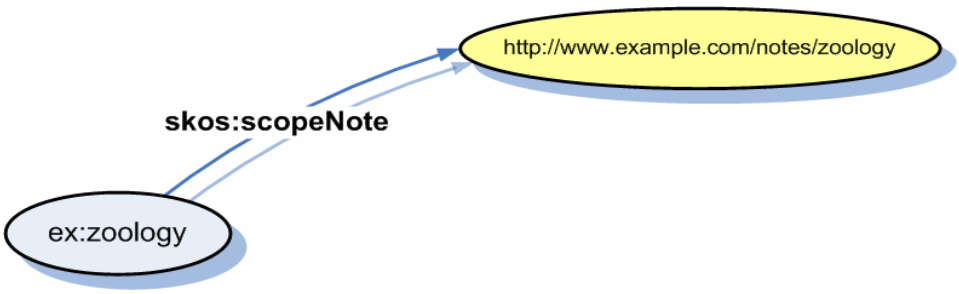
Traditional Thesaurus to SKOS Mapping

- Concept gets a URI, not a name
- Lexical Labeling = names (not new concepts)
  - skos:prefLabel
  - skos:altLabel (Used For)
- Relationship Labeling between Concepts
  - skos:broader
  - skos:narrower
  - skos:related
- Documentation such as Scope notes
  - skos:scopeNote
  - skos:definition

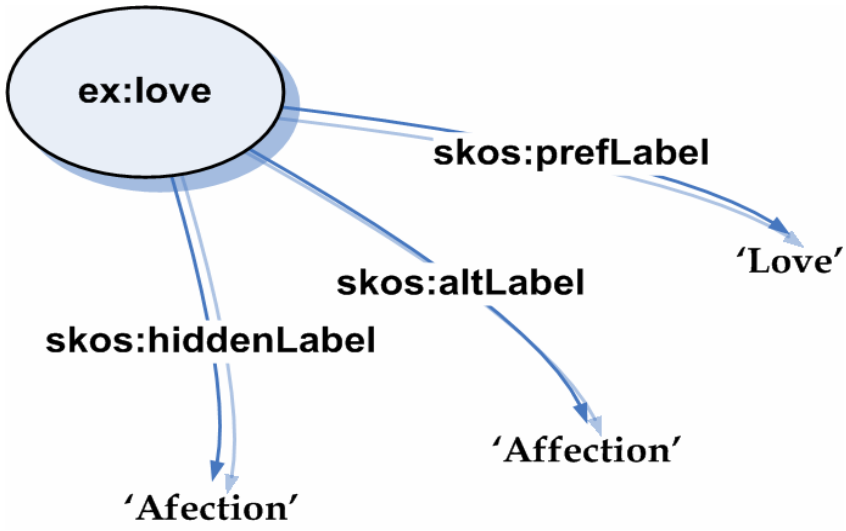
RDF Literal



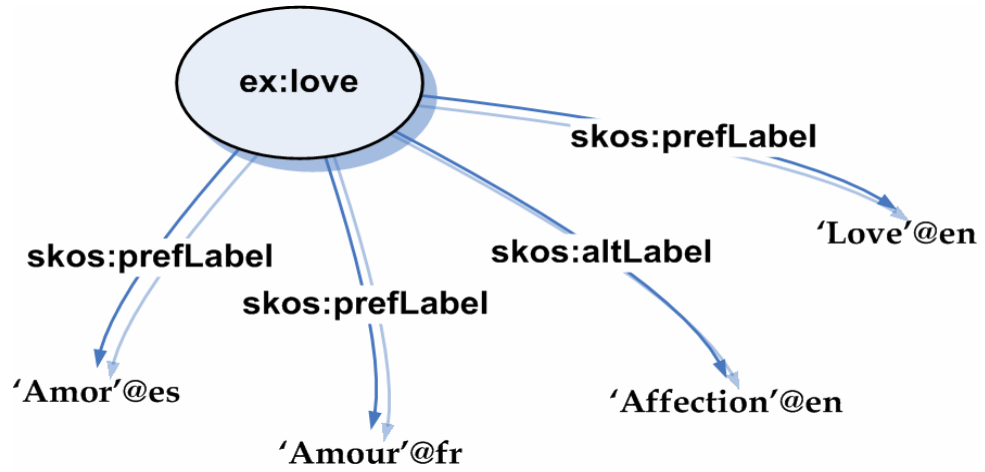
Document Reference



Lexical Labels

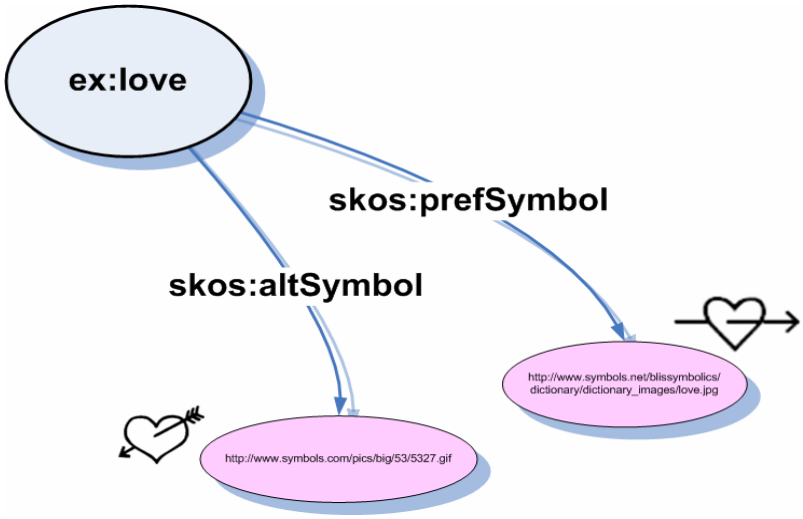


Multilingual Labels



N.B. No more than one **skos:prefLabel** per language

Symbolic Labels



Thesaurus (BT/NT)

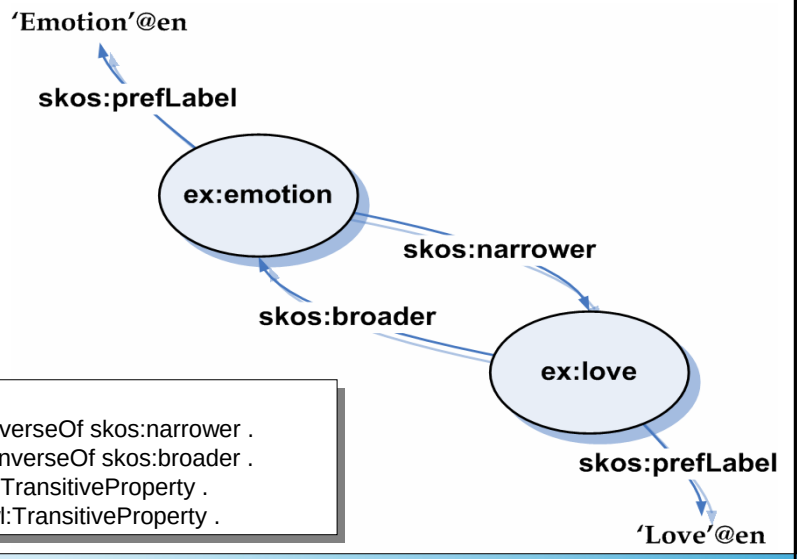
Love

- BT Emotion

Emotion

- NT Love
- NT Awe
- NT Joy

Broader/Narrower



N.B.
skos:broader owl:inverseOf skos:narrower .
skos:narrower owl:inverseOf skos:broader .
skos:broader a owl:TransitiveProperty .
skos:narrower a owl:TransitiveProperty .

Thesaurus (RT)

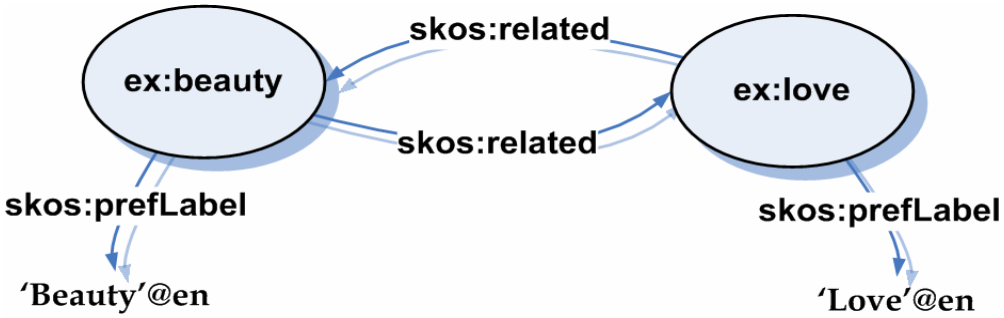
Love

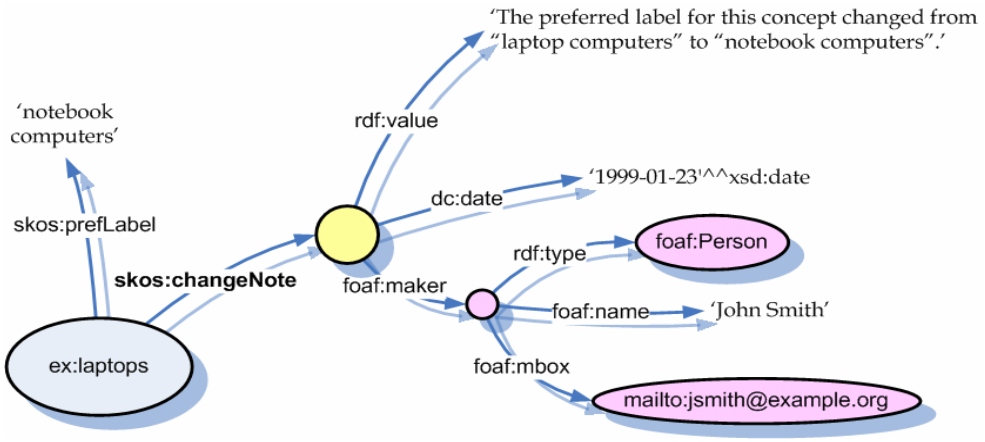
RT Beauty

Beauty

RT Love

Related



N.B.
skos:related a owl:SymmetricProperty .

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