

# Methods and Tools for Management Information Systems

## Lecture 6

19. Januar 2009



## Topic Maps

- ISO standard for an implementation-independent representation of knowledge about resources, their subjects and interrelationships
- Topic maps consist of *topics* (concepts), *associations* (relationships) and *occurrences* (relevant information resources)
- As opposed to RDF that aims at machine-processable metadata, topic maps are used to structure knowledge for *human readers*, with an emphasis on the *findability* of information



- Provide powerful new ways of navigating large and interconnected information sources (“the GPS of the information universe”)
- Stem from glossaries, classification systems and thesauri, but provide more expressiveness
- Can be used to develop ontologies which may be even mapped to RDF, but are not part of the *Semantic Web* effort of the W3C



## ■ Fundamental concepts:

<i>Topic</i>	⇒	Fundamental entity in the context of the modeled knowledge domain
<i>Topic Name</i>	⇒	Topic identifier ( <i>Base Name</i> , <i>Display Name</i> und <i>Sort Name</i> )
<i>Topic Occurrence</i>	⇒	Instances and roles ( <i>Occurrence Role Type</i> )
<i>Public Subject Descriptor</i>	⇒	Unique topic descriptor
<i>Associations</i>	⇒	Relationships between topics and their roles ( <i>association role</i> )

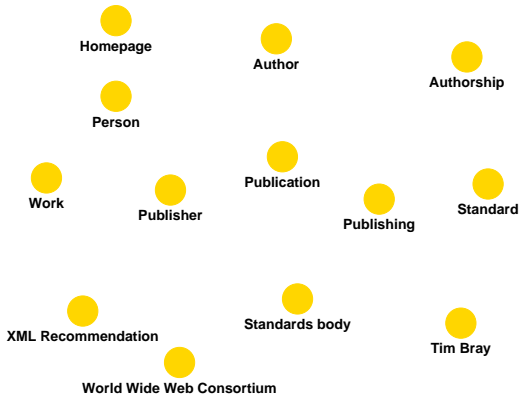


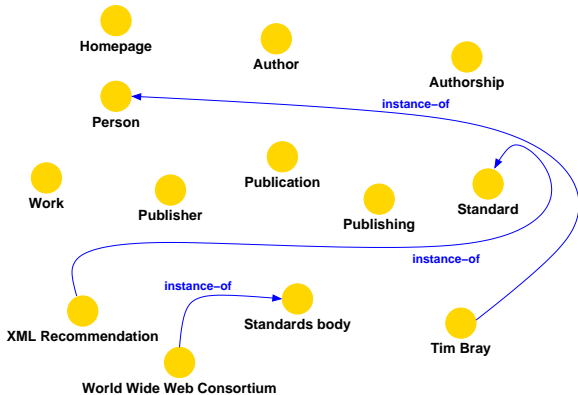
## ■ Fundamental concepts (cont'd):

*Scope* ⇒ Specifies the extent of the validity

*Facet* ⇒ Attribute-value-pair that describes a topic in more detail

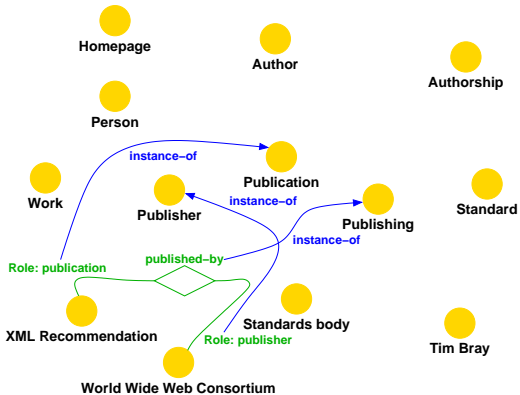


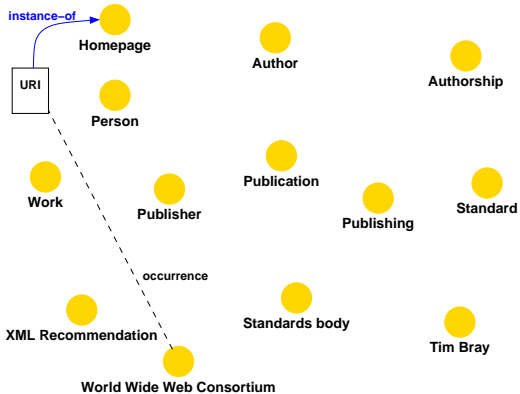


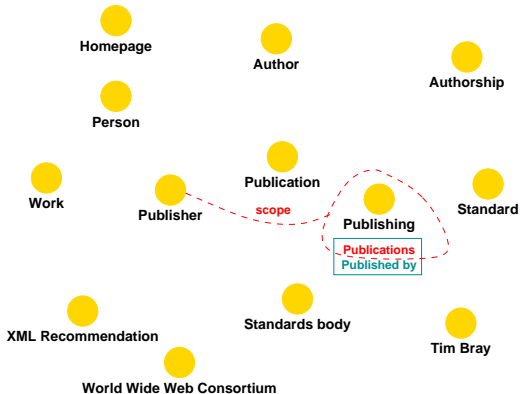


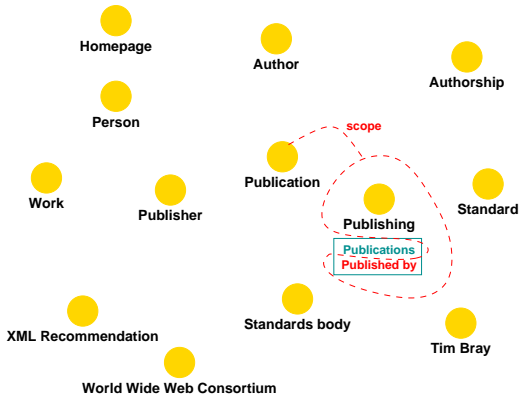


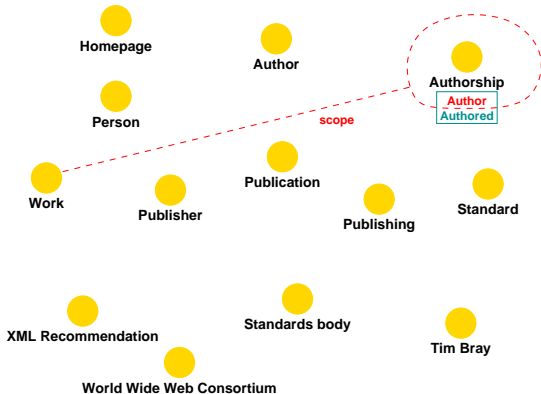


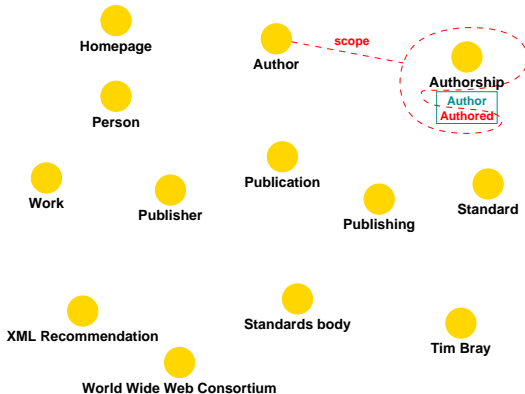












## XML Topic Maps (XTM)

- Abstract model and XML grammar for the exchange of Web-based topic maps created by the *TopicMaps.Org Authoring Group* (2001)
- XTM specification is based on the following standards:
  - XML 1.0 (<http://www.w3.org/TR/REC-xml>)
  - XLink 1.0 (<http://www.w3.org/TR/xlink>)
  - XML Base (<http://www.w3.org/TR/xmlbase>)
  - IETF URI specification (RFC 2396, as updated by RFC 2732)



- Design goals:

- Ease of use
- Support for a wide range of applications
- Standards compatible
- Ideally no optional features
- Short and concise specification
- XTM documents shall be easy to create, read and understand





## ■ XTM Specification Overview: *Concepts*

### ■ Topics

#### ■ *Subject* $\Rightarrow$ *Reification* $\Rightarrow$ *Topic*

*"[...] a subject is anything whatsoever, regardless of whether it exists or has any other specific characteristics, about which anything whatsoever may be asserted by any means whatsoever."*

#### ■ *Subject Identity*

#### ■ *Subject Indicator*

#### ■ *Topic Characteristics (Name, Occurrence, Role)*

#### ■ *Scope*



- Name

- *Base Name*

- *Variant Name* ⇒ *Display* or *Sort Name*

- *Parameters* ⇒ Processing context for variant names

- Occurrence

- Association

- *Member*

- *Role*

- *Class-Instance*

- *Superclass-Subclass*



## ■ Topic Map

- *Topic Map Node*
- *Consistent Topic Map*
  - ⇒ Exactly one topic per subject
  - ⇒ No further opportunities for merging or duplicate suppression
- *Topic Map Document*
- *XTM Document*



- XTM Specification Overview: *Published Subjects*
  - *XTM Mandatory Published Subject Indicators*
    - *topic*
    - *association*
    - *occurrence*
    - *class-instance relationship*
    - *class*
    - *instance*
    - *superclass-subclass relationship*
    - *superclass*
    - *subclass*
    - *suitability for sorting*
    - *suitability for display*



## XTM Specification Overview: *Merging*

- Two cases:

- 1 Merging two topics:

- Union of the characteristics of the original topics, i. e., any duplicates are removed

- 2 Merging two topic maps:

- Any topics determined to have the same subject are merged
    - Any duplicate associations are removed

- Two topics have the same subject if:

- they have one or more subject indicators in common,
  - they reify the same addressable subject, or
  - they have the same base name in the same scope



## ■ *XTM Syntax Overview:*

- `topicRef`: Reference to a Topic element
- `subjectIndicatorRef`: Reference to a Subject Indicator
- `scope`: Reference to Topic(s) that comprise the Scope
- `instanceOf`: Points to a Topic representing a class
- `topicMap`: Topic Map document element
- `topic`: Topic element
- `subjectIdentity`: Subject reified by Topic
- `baseName`: Base Name of a Topic
- `baseNameString`: Base Name String container
- `variant`: Alternate forms of Base Name
- `variantName`: Container for Variant Name
- `parameters`: Processing context for Variant



## ■ *XTM Syntax Overview (cont'd):*

- `association`: Topic Association
- `member`: Member in Topic Association
- `roleSpec`: Points to a Topic serving as an Association Role
- `occurrence`: Resources regarded as an Occurrence
- `resourceRef`: Reference to a Resource
- `resourceData`: Container for Resource data
- `mergeMap`: Merge with another Topic Map



## topicRef

- *Synopsis:*

The <topicRef> element provides a URI reference to a topic. The target of a <topicRef> link must resolve to a <topic> element child of a <topicMap> document that conforms to this XTM specification. The target <topic> need not be in the document entity of origin.

- *Content Model:*

```
<!ELEMENT topicRef EMPTY>
```





## ■ *Attributes:*

```
<!ATTLIST topicRef
  id          ID          #IMPLIED
  xlink:type  NMTOKEN    #FIXED 'simple'
  xlink:href  CDATA      #REQUIRED>
```

## ■ Example:

```
<topicRef
  xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"/>

<topicRef xlink:href="#play"/>
```



## subjectIndicatorRef

- *Synopsis:*

The <subjectIndicatorRef> element provides a URI reference to a resource that acts as a subject indicator.

- *Content Model:*

<!ELEMENT subjectIndicatorRef EMPTY>



## ■ *Attributes:*

```
<!ATTLIST subjectIndicatorRef
  id          ID          #IMPLIED
  xlink:type  NMTOKEN    #FIXED 'simple'
  xlink:href  CDATA      #REQUIRED>
```

## ■ Example:

```
<subjectIndicatorRef
  xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"/>
```

```
<subjectIndicatorRef
  xlink:href="http://www.shakespeare.org/plays.html#hamlet"/>
```



## scope

- *Synopsis:*

The <scope> element consists of one or more <topicRef>, <resourceRef>, or <subjectIndicatorRef> elements. The union of the subjects corresponding to these elements specifies the context in which the assignment of the topic characteristic is considered to be valid.

- *Content Model:*

```
<!ELEMENT scope (topicRef | resourceRef | subjectIndicatorRe
```



## ■ *Attributes:*

```
<!ATTLIST scope
    id ID #IMPLIED>
```

## ■ Example:

```
<scope>
  <subjectIndicatorRef
    xlink:href="http://www.topicmaps.org/xtm/1.0/language.xtm#en"/>
</scope>
<scope>
  <topicRef xlink:href="#tragedy"/>
  <topicRef xlink:href="#theatre"/>
</scope>
```



## instanceOf

- *Synopsis:*

The <instanceOf> element specifies the class to which its parent belongs, via a <topicRef> or <subjectIndicatorRef> child element.

- *Content Model:*

```
<!ELEMENT instanceOf (topicRef | subjectIndicatorRef) >
```



- *Attributes:*

```
<!ATTLIST instanceOf  
    id ID #IMPLIED>
```

- *Example:*

```
<topic id="hamlet">  
    <instanceOf>  
        <subjectIndicatorRef  
            xlink:href="http://www.shakespeare.org/plays.html"/>  
        </instanceOf>  
    </topic>
```



## topicMap

- *Synopsis:*

The <topicMap> element is the parent of all <topic>, <association>, and <mergeMap> elements in the topic map document.

- *Content Model:*

```
<!ELEMENT topicMap  
    (topic | association | mergeMap)*>
```





## ■ *Attributes:*

```
<!ATTLIST topicMap
  id          ID          #IMPLIED
  xmlns      CDATA      #FIXED 'http://www.topicmaps.org/xtm/1.0/'
  xmlns:xlink CDATA      #FIXED 'http://www.w3.org/1999/xlink'
  xml:base   CDATA      #IMPLIED>
```



## ■ Example:

```
<?xml version="1.0"?>

<!DOCTYPE topicMap
  PUBLIC "-//TopicMaps.Org//DTD XML Topic Map (XTM) 1.0//EN"
  "file:///usr/local/home/gromit/xml/xtm/xtm1.dtd">

<topicMap xmlns='http://www.topicmaps.org/xtm/1.0/'
  xmlns:xlink='http://www.w3.org/1999/xlink'
  xml:base='http://www.shakespeare.org/hamlet/'>

  <!-- topics, associations, and merge map directives go here -->

</topicMap>
```



## topic

- *Synopsis:*

The <topic> element specifies the name and occurrence characteristics of a single topic.

- *Content Model:*

```
<!ELEMENT topic  
  (instanceOf*, subjectIdentity?, (baseName | occurrence)*)>
```



- *Attributes:*

```
<!ATTLIST topic
  id ID #REQUIRED>
```

- Example:

```
<topic id="hamlet">
  <instanceOf>
    <topicRef xlink:href="#play"/>
  </instanceOf>
  <!-- base names and occurrences go here -->
</topic>
```



## subjectIdentity

- *Synopsis:*

The <subjectIdentity> element specifies the subject that is reified by a topic, via <resourceRef>, <subjectIndicatorRef>, and/or <topicRef> child elements.

- *Content Model:*

```
<!ELEMENT subjectIdentity  
    (resourceRef?, (topicRef | subjectIndicatorRef)*)>
```



- *Attributes:*

```
<!ATTLIST subjectIdentity  
  id ID #IMPLIED>
```

- *Example:*

```
<topic id="dk">  
  <subjectIdentity>  
    <subjectIndicatorRef  
      xlink:href="http://www.topicmaps.org/xtm/1.0/country  
    </subjectIdentity>  
</topic>
```



## baseName

- *Synopsis:*

The <baseName> element specifies a topic name in form of a <baseNameString> child element.

- *Content Model:*

```
<!ELEMENT baseName (scope?, baseNameString, variant*)>
```



- *Attributes:*

```
<!ATTLIST baseName  
    id ID #IMPLIED>
```

- Example:

```
<topic id="shakespeare">  
    <baseName>  
        <baseNameString>William Shakespeare</baseNameString>  
    </baseName>  
</topic>
```





## baseNameString

- *Synopsis:*

The <baseNameString> element is a string that represents the base name of its ancestor <topic> parent.

- *Content Model:*

```
<!ELEMENT baseNameString (#PCDATA)>
```



## ■ *Attributes:*

```
<!ATTLIST baseNameString
    id ID #IMPLIED>
```

## ■ Example:

```
<topic id="written-by">
  <baseName>
    <baseNameString>written by</baseNameString>
  </baseName>
  <baseName>
    <scope><topicRef xlink:href="#author"/></scope>
    <baseNameString>author of</baseNameString>
  </baseName>
</topic>
```



## variant

- *Synopsis:*

The <variant> element is an alternate form of a topic's base name appropriate for a processing context specified by the variant's <parameters> child element. Among these contexts may be sorting and display.

- *Content Model:*

```
<!ELEMENT variant  
  (parameters, variantName?, variant*)>
```



## ■ *Attributes:*

```
<!ATTLIST variant
    id ID #IMPLIED>
```

## ■ *Example:*

```
<topic id="shakespeare">
  <baseName>
    <baseNameString>William Shakespeare</baseNameString>
    <!-- form for sorting (sort name) -->
  <variant>
    <parameters><topicRef xlink:href="#sort"/></parameters>
    <variantName>
      <resourceData>shakespeare,william</resourceData>
    </variantName></variant></baseName></topic>
```



## variantName

- *Synopsis:*

The <variantName> element provides the resource to be used as a variant of a base name.

- *Content Model:*

```
<!ELEMENT variantName (resourceRef | resourceData)>
```

- *Attributes:*

```
<!ATTLIST variantName id ID #IMPLIED>
```



## parameters

- *Synopsis:*

The `<parameters>` element consists of one or more `<topicRef>` or `<subjectIndicatorRef>` elements. The union of the subjects corresponding to these elements specifies an additional processing context in which variant names in the variant's subtree are considered to be appropriate.

- *Content Model:*

```
<!ELEMENT parameters  
    (topicRef | subjectIndicatorRef)+>
```



## ■ *Attributes:*

```
<!ATTLIST parameters
    id ID #IMPLIED>
```

## ■ Example:

```
<topic id="shakespeare">
  <baseName>
    <baseNameString>William Shakespeare</baseNameString>
    <!-- form for sorting (sort name) -->
    <variant>
      <parameters><topicRef xlink:href="#sort"/></parameters>
      <variantName>
        <resourceData>shakespeare,william</resourceData>
      </variantName></variant></baseName></topic>
```



## association

- *Synopsis:*

The <association> element asserts a relationship among topics that play roles as members of the association.

- *Content Model:*

```
<!ELEMENT association  
    (instanceOf?, scope?, member+)>
```

- *Attributes:*

```
<!ATTLIST association    id    ID    #IMPLIED>
```





## ■ Example:

```
<association id="will-wrote-hamlet">
  <instanceOf>
    <topicRef xlink:href="#written-by"/>
  </instanceOf>
  <member>
    <roleSpec>
      <topicRef xlink:href="#author"/></roleSpec>
      <topicRef xlink:href="#shakespeare"/>
    </member>
  <member>
    <roleSpec>
      <topicRef xlink:href="#work"/></roleSpec>
      <topicRef xlink:href="#hamlet"/>
    </member>
</association>
```



## member

- *Synopsis:*

The <member> element specifies all topics that play a given role in an association. The <roleSpec> element specifies the role played by these topics.

- *Content Model:*

```
<!ELEMENT member  
    (roleSpec?, (topicRef | resourceRef | subjectIndicatorRef)+)>
```

- *Attributes:*

```
<!ATTLIST member    id    ID    #IMPLIED>
```



## roleSpec

- *Synopsis:*

The <roleSpec> element specifies the role played by a member in an association.

- *Content Model:*

```
<!ELEMENT roleSpec (topicRef | subjectIndicatorRef)>
```

- *Attributes:*

```
<!ATTLIST roleSpec  
  id ID #IMPLIED>
```



## occurrence

- *Synopsis:*

The <occurrence> element specifies a resource supplying information relevant to a topic.

- *Content Model:*

```
<!ELEMENT occurrence  
  (instanceOf?, scope?, (resourceRef | resourceData))>
```



## ■ *Attributes:*

```
<!ATTLIST occurrence
    id ID #IMPLIED>
```

## ■ Example:

```
<topic id="hamlet">
  <occurrence id="hamlet-in-xml">
    <instanceOf>
      <topicRef xlink:href="#xml-version"/>
    </instanceOf>
    <resourceRef
      xlink:href="http://www.uwaterloo.ca/relander/XML/hamlet.xml"/>
    </occurrence>
  </topic>
```



## resourceRef

- *Synopsis:*

The <resourceRef> element provides a URI reference to a resource:

- 1 as occurrences of topics (in <occurrence> elements)
- 2 as addressable subjects (in <member>, <mergeMap>, <scope>, and <subjectIdentity> elements)
- 3 as variant names of topics (in <variantName> elements)

- *Content Model:*

<!ELEMENT resourceRef EMPTY>



## ■ *Attributes:*

```
<!ATTLIST resourceRef
  id          ID          #IMPLIED
  xlink:type  NMTOKEN    #FIXED 'simple'
  xlink:href  CDATA      #REQUIRED>
```

## ■ Example:

```
<occurrence id="hamlet-in-xml">
  <instanceOf>
    <topicRef xlink:href="#xml-version"/>
  </instanceOf>
  <resourceRef
    xlink:href="http://www.uwaterloo.ca/relander/XML/hamlet.xml"/>
</occurrence>
```



## resourceData

- *Synopsis:*

The <resourceData> element contains information in the form of character data that may be

- 1 an occurrence of a topic, or
- 2 a variant form of a base name.

- *Content Model:*

```
<!ELEMENT resourceData (#PCDATA)>
```





- *Attributes:*

```
<!ATTLIST resourceData id ID #IMPLIED>
```

- Example:

```
<topic id="hamlet">  
  <occurrence>  
    <instanceOf>  
      <topicRef xlink:href="#date-of-composition"/>  
    </instanceOf>  
    <resourceData>1600-01</resourceData>  
  </occurrence>  
</topic>
```



## mergeMap

- *Synopsis:*

A `<mergeMap>` element references an external `<topicMap>` element through an `xlink:href` attribute containing a URI. It is a directive to merge the containing topic map and the referenced topic map.

- *Content Model:*

```
<!ELEMENT mergeMap (topicRef | resourceRef | subjectIndicatorRef)*>
```



## ■ *Attributes:*

```
<!ATTLIST mergeMap
  id          ID          #IMPLIED
  xlink:type  NMTOKEN    #FIXED 'simple'
  xlink:href  CDATA      #REQUIRED>
```

## ■ Example:

```
<mergeMap xlink:href="http://www.shakespeare.org/plays.xtm">
  <topicRef xlink:href="#shakespeare"/>
  <topicRef xlink:href="#drama"/>
</mergeMap>
<mergeMap xlink:href="http://www.shakespeare.org/biography.xtm">
  <resourceRef
    xlink:href="http://www.shakespeare.org/biography.xtm"/>
</mergeMap>
```





```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE topicMap PUBLIC
    "-//TopicMaps.Org//DTD XML Topic Map (XTM) 1.0//EN"
    "http://www.topicmaps.org/xtm/1.0/xtm1.dtd">
<topicMap xmlns="http://www.topicmaps.org/xtm/1.0/"
    xmlns:xlink="http://www.w3.org/1999/xlink">
  <topic id="person">
    <baseName>
      <baseNameString>Person</baseNameString>
    </baseName>
  </topic>
  <topic id="standards-body">
    <baseName>
      <baseNameString>Standards body</baseNameString>
    </baseName>
  </topic>
</topicMap>
```



```
<topic id="standard">
  <baseName>
    <baseNameString>Standard</baseNameString>
  </baseName>
</topic>
<topic id="xml-rec">
  <instanceOf>
    <topicRef xlink:href="#standard"/>
  </instanceOf>
  <baseName>
    <baseNameString>
      The XML Recommendation
    </baseNameString>
  </baseName>
</topic>
```



```
<topic id="tim-bray">
  <instanceOf>
    <topicRef xlink:href="#person"/>
  </instanceOf>
  <baseName>
    <baseNameString>Tim Bray</baseNameString>
  </baseName>
</topic>
<topic id="homepage">
  <baseName>
    <baseNameString>Homepage</baseNameString>
  </baseName>
</topic>
```



```
<topic id="w3c">
  <instanceOf>
    <topicRef xlink:href="#standards-body"/>
  </instanceOf>
  <baseName>
    <baseNameString>
      World Wide Web Consortium
    </baseNameString>
  </baseName>
  <occurrence>
    <instanceOf>
      <topicRef xlink:href="#homepage"/>
    </instanceOf>
    <resourceRef xlink:href="http://www.w3.org"/>
  </occurrence>
</topic>
```





```
<topic id="authorship">
  <baseName>
    <baseNameString>Authorship</baseNameString>
  </baseName>
  <baseName>
    <scope><topicRef xlink:href="#work"/></scope>
    <baseNameString>Author</baseNameString>
  </baseName>
  <baseName>
    <scope><topicRef xlink:href="#author"/></scope>
    <baseNameString>Authored</baseNameString>
  </baseName>
</topic>
```



```
<topic id="author">
  <baseName>
    <baseNameString>Author</baseNameString>
  </baseName>
</topic>
<topic id="work">
  <baseName>
    <baseNameString>Work</baseNameString>
  </baseName>
</topic>
<association>
  <instanceOf>
    <topicRef xlink:href="#authorship"/>
  </instanceOf>
</association>
```



```
<member>
  <roleSpec>
    <topicRef xlink:href="#author"/>
  </roleSpec>
  <topicRef xlink:href="#tim-bray"/>
</member>
<member>
  <roleSpec>
    <topicRef xlink:href="#work"/>
  </roleSpec>
  <topicRef xlink:href="#xml-rec"/>
</member>
</association>
```



```
<topic id="publishing">
  <baseName>
    <baseNameString>Publishing</baseNameString>
  </baseName>
  <baseName>
    <scope><topicRef xlink:href="#publisher"/></scope>
    <baseNameString>Publications</baseNameString>
  </baseName>
  <baseName>
    <scope><topicRef xlink:href="#publication"/></scope>
    <baseNameString>Published by</baseNameString>
  </baseName>
</topic>
```



```
<topic id="publisher">
  <baseName>
    <baseNameString>Publisher</baseNameString>
  </baseName>
</topic>
<topic id="publication">
  <baseName>
    <baseNameString>Publication</baseNameString>
  </baseName>
</topic>
<association>
  <instanceOf>
    <topicRef xlink:href="#publishing"/>
  </instanceOf>
</association>
```



```
<member>
  <roleSpec>
    <topicRef xlink:href="#publication"/>
  </roleSpec>
  <topicRef xlink:href="#xml-rec"/>
</member>
<member>
  <roleSpec>
    <topicRef xlink:href="#publisher"/>
  </roleSpec>
  <topicRef xlink:href="#w3c"/>
</member>
</association>
```



```
<topic id="publishing">
  <baseName>
    <baseNameString>Publishing</baseNameString>
  </baseName>
</topic>
</topicMap>
```



## Classification

- Process of assigning objects to categories or classes based on common properties, where the objects to be classified can be of any nature, e. g.:
  - Library classification
  - Scientific classification of organisms
  - Medical classification like ICD
- Application of a classification system on a set of objects
- Assignment may be done manually (categorizing, sorting, indexing) or automatically (machine learning  $\Rightarrow$  *supervised learning*)





- Representation in form of a decision tree, decision table, decision list, or as a set of decision rules
- Advantage is the assignment of an object to exactly one class (depending on the level chosen in the hierarchy and the method used)
- Drawbacks are the potential information loss and the strictly hierarchical structure of classifications



## *Systematics*

- Ordered representation of classes, categories or other concepts according to a specific taxonomic scheme
- Synonym for *classification system* and *taxonomy*
- Classes are usually derived by the process of classification
- Frequently hierarchical in structure based on common properties but may also refer to relationship schemes other than hierarchies, such as network structures



- Slightly less broad than ontologies
- Distinction of classification systems with respect to the resulting structure:
  - 1 Mono hierarchy:
    - *strong* hierarchy or hierarchy with single inheritance
    - each class has exactly one super class
    - tree structure
  - 2 Poly hierarchy:
    - *weak* hierarchy or hierarchy with multiple inheritance
    - a class may have more than one super class
    - acyclic graph structure



- Distinction of classification systems with respect to coordination

- 1 Analytical classification

- based on pre-coordination
    - from the general case to the specific case

- 2 Synthetical classification

- based on post-coordination
    - from the specific case to the general case



## *Thesaurus*

- Systematically ordered, networked collection of terms (controlled vocabulary  $\Rightarrow$  list of terms with an unambiguous, non-redundant definition that have been enumerated explicitly), connected via associative and parent-child relationships
- Organized in a poly hierarchy (in general), i. e., multiple broader terms may be assigned to a single *narrower* term
- Used to describe/represent topics, for subject indexing and/or document retrieval



- Authoritative definition (for information and documentation purposes, freely translated from DIN 1463, part 1):

*A thesaurus is an ordered collection of terms and their notations (in natural language), which are used in documentation projects to index, store and retrieve documents.*

- International standards:
  - ISO2788 ⇒ for monolingual thesauri
  - ISO5964 ⇒ for multilingual thesauri



- A thesaurus is characterized as follows:
  - (a) mutual relation of terms and their notations is non-ambiguously (terminological control):
    - synonyms are captured as completely as possible
    - homonyms und polysems are indicated particularly
    - for each term a preferred notation is determined that acts as a non-ambiguous proxy
  - (b) named representation of associative relationships between terms



■ Fundamental concepts:

**Antonyms:** terms with opposite meaning

**Synonyms:** different terms with the same meaning

**Homonyms:** equal terms with different meaning

**Polysems:** equally spelled terms with different meaning and pronunciation

**Documentation language:** Set of phrases to describe documents applied according to specific rules for the purpose of storage and retrieval

**Descriptor:** preferred notation permitted to be used for indexing

**Non-descriptor:** notation not permitted to be used for indexing (and marked accordingly) to support the search for descriptors

**Vocabulary:** set of descriptors in a documentation language





**Pre-coordination:** descriptors that represent combinations of notations permitted

**Post-coordination:** representation of combinations of notations by multiple descriptors which are combined for retrieval



## ■ Types of relationships:

**1** Hierarchy relation  $\Rightarrow$  generalization/specialization between two terms

**1** Abstraction (generic relation): inferior term has the same set of attributes as the superior term, plus at least one *specifying* attribute

$\Rightarrow$  the concept represented by the superior term has less attributes (content definition)

$\Rightarrow$  the coverage of the concept represented by the superior term is greater, i. e., it comprises more objects (scale definition)

**2** Partitive relation: superior (broader) term represents the whole subject, inferior (narrower) term refers to a part of the subject



2 Equivalence relation: terms refer to the same concept, i. e., they have equal meaning:

- different spelling
- (quasi) synonyms
- abbreviations
- translations



- 3** Associative relation: important relation that is neither hierarchical nor equivalent, and facilitates indexing and/or retrieval
- Relation between determination term and specifying term, e. g. pet – pet food
  - Logical equivalence, i. e., terms have the same superior concept or common properties, e. g. diesel engine – petrol engine
  - spatial or ontological co-subordination, i. e., concepts are part of the same superior concept, e. g. Hessen – Rheinland-Pfalz
  - Antonyms, terms represent the opposite with respect to the concept expressed, e. g. heat – cold
  - Succession relation, one term succeeds the other chronologically, e. g. father – son



- Affinity, i. e., terms that belong to different categories are connected via a functional or causal relation, e. g. book – reading
- ...



- Support the search for adequate notations for the purpose of indexing
- Support the retrieval of documents by enriching the original query using synonyms, inferior terms, etc.
- Special types of thesauri:
  - Dictionaries  
⇒ consist of the vocabulary of an entire (natural) language
  - Linguistical thesauri or or dictionary of synonyms  
⇒ lexically/semantically organized reference book in which terms with similar or equal meaning are connected



## Catalogue

- Directory of objects built according to a specific principle of order (alphabetical, indexed terms, etc.)
- Provide an overview of collections of objects (books, paintings, etc.)
- Web portals
- *Data Dictionary*
- ...

