Topic Maps – Data Model, XTM Syntax

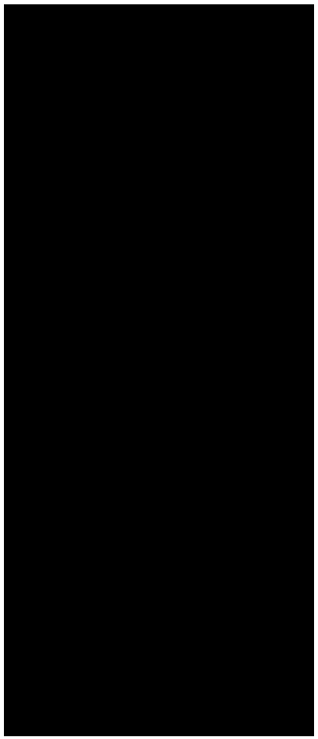
Washington DC, November 12, 2004

Resolution of final issues

Agenda for the day

- **Markup in occurrences and variants**
  - proposal for how to represent this
- **Discussion of remaining issues**

Markup in topic maps



Previous agreements
How to get it in there
Consequences

xml-data-representation

- **Amsterdam decisions**
  - XML markup is not allowed in base names
  - it *is* allowed in variants and internal occurrences
- **No decisions were made regarding representation**

How to specify this in TMDM/XTM

- **XTM describes a mapping from the XML Infoset to TMDM**
- **So the contents of <resourceData> elements are already represented as an XML Infoset to begin with**
  - the only difference is that now we allow elements in here
- **The XTM specification will say that the contents are to be turned into a string, following Canonical XML**
  - this will give us a string preserving the original XML fragment
  - including all namespace information etc
  - it also ensures that lexically different XML fragments will be equal inside the topic map
- **The result is stored in the existing [value] property**
  - variant.[value]
  - occurrence.[value]
- **Note: we explain it this way in the spec, but it doesn't have to be *implemented* this way**

So how do we know that this is XML?

- **Given that [value] already exists and contains a string, how can we distinguish the two cases below?**
  - <resourceData>this is not XML</resourceData>
  - <resourceData>this is XML</resourceData>
- **Proposal: we add a [type] property, with the following possible values**
  - XML
  - string
  - (list to be left open, so other types can be added)
- **XTM deserialization will set the [type] property correctly**

Ok, but how do we identify types?

- **We use PSIs, of course**
- **The [type] property contains a locator**
  - xsd:any XML
  - xsd:string string

Yeah, but aren't locators also a type?

- **Well, yes, they are**
- **So we could unify [resource] and [value]**
- **This would mean that**
  - occurrence.[resource] and variant.[resource] are removed
  - another type is added to the list: tmdm:locator
  - XTM deserialization deals with this
- **Again, implementations do *not* have to represent it this way, but it does simplify the explanation of topic maps**
- **Equality rule:**
  - [type] and [value] must both be equal
- **Problem:**
  - occurrence.[value] and variant.[value] can now hold either a string or a locator item
  - this makes the typing of this property pretty awkward

Uh, why do we have locators, anyway?

- **Good question**
- **Originally: to be able to support Hytime locators from HyTM**
- **However, now there is no standard syntax supporting anything but URIs**
  - nor is TMQL and TMCL likely to support it
  - nor does any known software support it
  - nor does any known user want it
- **In short, why don't we ditch the locators item entirely?**
  - the locator item type goes
  - locator notations go
  - all properties that hold locators become string properties
  - the PSI for the locator type becomes xsd:anyUri, instead of tmdm:locator
  - typing of *.[value] becomes uniformly “string”
  - XTM can now represent any TMDM instance (which it couldn't before)
  - TMDM becomes significantly shorter

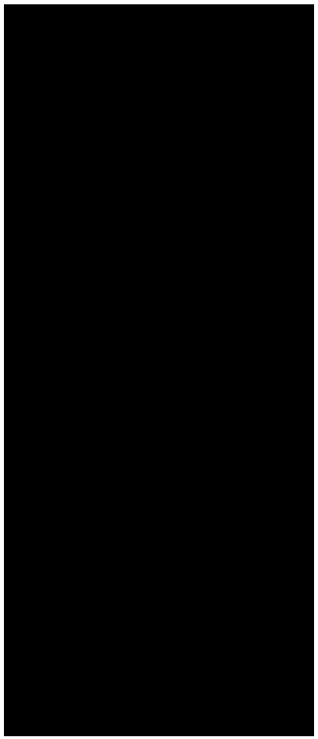
Decisions

- **Change [type] in the proposal to [datatype]**
  - "type" is overloaded in TMDM, also more specific
- **Otherwise: this is fine**
- **Canonical XML processing**
  - make sure it supports multiple elements without a wrapper parent
  - strip out comments and PIs
  - make sure all namespace declarations *inside resourceData* are preserved
- **foo prefix is defined *and* used for an element (preserved)**
  - <resourceData><foo:address ...>...</foo:address></resourceData>
  - <resourceData><bar:address ...>...</bar:address></resourceData>
- **foo prefix is defined *outside resourceData* and *not* used for an element or attribute name (not preserved)**
  - <topicMap xmlns:foo="...">....<resourceData><bar>foo:something

Using <resourceData> as a wrapper?

- **[value] if we use a wrapper *and* preserve all namespaces in scope**
  - <resourceData xmlns="http://www.topicmaps.org/xtm/1.0/" xmlns:xlink="http://www.w3.org/1999/xlnink"><a/></resourceData>
  - <resourceData xmlns="http://www.topicmaps.org/xtm/1.0/" xmlns:xlink="http://www.w3.org/1999/xlnink" xmlns:foo="http://www.example.org/foo"><foo:address>...</foo:address></resourceData>
- **[value] if don't use a wrapper, and we don't preserve unused decls**
  - <a/>
  - <foo:address xmlns:foo="http://www.example.org/foo">...</foo:address>
- **We try the second approach in the first draft**
  - this will be reviewed to see if it's acceptable

Remaining issues



,

Add a *datatype* attribute on <resourceData>?

- **This would let us put other types of data into topic maps besides just strings**
- **1. Should we add the attribute?**
  - yes, and this means we adopt a “type follows value” policy
- **2. Should it be required?**
  - it can't be, because that would be incompatible with XTM 1.0
  - default type is xsd:string
- **3. What happens if you leave it out and use XML markup?**
  - it's an error, because default is string, and anyway it's useful to know before you start parsing that the content is complex XML
- **4. Can we then lose <resourceRef/>?**
  - no, that would mean that XTM 1.0 documents are not valid 1.1 documents
  - this is the recommended representation
- **5. What happens if you put <resourceData datatype=xsd:anyUri>...?**
  - it's equivalent to <resourceRef/>, and we consider <resourceRef/> a shorthand in the same way that <instanceOf> is a shorthand for an association

More fun with datatypes

- **6. What happens if you put datatype=xsd:number and “five”?**
  - it is an error
- **7. What happens if you put datatype=foo:complexNumber?**
  - the type information is preserved in TMDM
  - validation of the string representation at the XTM level is not *required*
  - XTM processors can support plug-in type validators, but we do not standardize how these work, only how the types are identified
- **8. How do we keep the XTM representation manageable?**
  - that is, how do we keep the syntax for datatyping concise?
  - this cannot be delegated to TMCL; it has to be an XTM concept
  - we want it to be purely syntactic, and *not* represented in TMDM, only the result should be in TMDM, not the mechanism itself
  - we need to avoid risk of future merging changing interpretation of the data or causing conflicts

One alternative short syntax for datatyping

- **Tie the data type to the occurrence type**
  - <topicMap><occurrenceDataType datatype=”xsd:date”><topicRef xlink:href=”#birthdate”/></occurrenceDataType>
  - <topic ...>...<occurrence><instanceOf><topicRef xlink:href=”#birthdate”/></instanceOf><resourceData>...</>
- **Considerations**
  - topic identification is complex, so the occurrence may use a different identifier from the declaration, and we may only discover that they are the same *after* we have read the occurrence
    - we can work around this by saying that unless the occurrence uses *exactly* the same topic identification the datatyping behaviour does not kick in
    - however, this means <topicRef> behaves differently here from elsewhere
  - easy to ensure datatyping of occurrences is consistent
  - will lead to arguments of the form “why isn't this part of TMCL?”, but the answer is that this is just a shorthand

Another alternative short syntax for datatyping

- **Define elements for the data types**
  - <topicMap><dataTypeElement datatype=”xsd:date”>xsd:date</dataTypeElement>
  - <topic ...>...<occurrence><instanceOf><topicRef xlink:href=”#birthdate”/></instanceOf><xsd:date>...
- **Considerations**
  - avoids the topic identification issue
  - is obviously just syntactical
  - namespace issues
    - if no prefix is used the element will default to the XTM namespace
    - requires processors to know what namespaces are in effect
  - looks a lot like RDF/XML
  - one alternative is to not declare the element, but just use namespace information to resolve the PSI of the datatype
    - loses some validation of the XML input
  - another alternative is to define that a particular namespace is a datatype namespace (dataTypeNamespace instead of dataTypeElement)

Conclusion to question #8

- **We don't like any of our proposals so far**
- **Not convinced that we really need to do this**
- **However, don't want to close the door to further proposals**
- **The next draft will *not* have a shorthand syntax in it**

Even more fun with datatypes

- **9. How is the string value validated against the declared type?**
  - for the XTM-recognized data types the string value *must* match the lexical representation of that data type
  - for other data types this is not required, but we allow XTM processors to be extended with validation for other data types (via undefined means)
  - **note:** we *could* let the type default to the datatype in which the string is a legal lexical representation, but we concluded that this may lead to data integrity problems
- **10. What are the allowed lexical representations of date types?**
  - specs say CCYY-MM-DD, and if you don't like this that's your problem, but you *can* choose to use a different data type that has the representation you like

Fun, fun, fun

- **11. Do we normalize the string representation of non-string values?**
  - ie, does “05” turn into “5”?
  - important for merging/duplicate suppression
  - XML Schema, part 2, does not specify normalized representations
  - implementations which represent numbers as numbers (ie optimized) *will* normalize, and they cannot avoid it except by keeping the string around
  - there are three choices for each data type
    - normalization is required (now: string, XML)
    - normalization not required, but allowed (now: URIs)
    - normalization forbidden
  - we know most implementations will not normalize strings, so we remove the string normalization requirement
  - we are not really normalizing XML, just turning it into a string in a defined way, which we need to do anyway
  - we *stop* saying that URIs may be normalized, and don't specify any normalization for them
  - so effectively we choose “normalization forbidden” for all three types
    - normalization is allowed, but it is considered authoring, and not part of normal deserialization

Fun, part 12

- **12. What's the list of datatypes defined in TMDM?**
  - xsd:string, xsd:any (XML), xsd:anyUri, at least
  - what the reason to include a data type in this list?
    - it gives validation for values of this type
    - comparison, operations, etc all belong in TMQL, and so are not reasons
  - conclusion: only the three basic types (because they have to be there, and this keeps complexity of implementation down)

Not really all that fun any more

- **13. Is there a mechanism for typing external resources?**
  - at present: no
  - what's needed to do this is a set of PSIs for resource types plus for making the assertion that a particular resource is of a particular resource type
  - applications will want to consider the same resource to belong to different resource types in different circumstances
  - such a mechanism does not belong in ISO 13250 because
    - you can create it yourself,
    - it's way too complicated to build into the standard
- **14. What is the datatype extensibility mechanism?**
  - the ability to use values in the *datatype* attribute in XTM other than the three predefined types
  - we do not provide any mechanism whatsoever for making statements about the datatypes used
    - the reason is that there is nothing to say about the type, since we don't have any operations on them other than string equality testing

Note on TMCL and TMQL

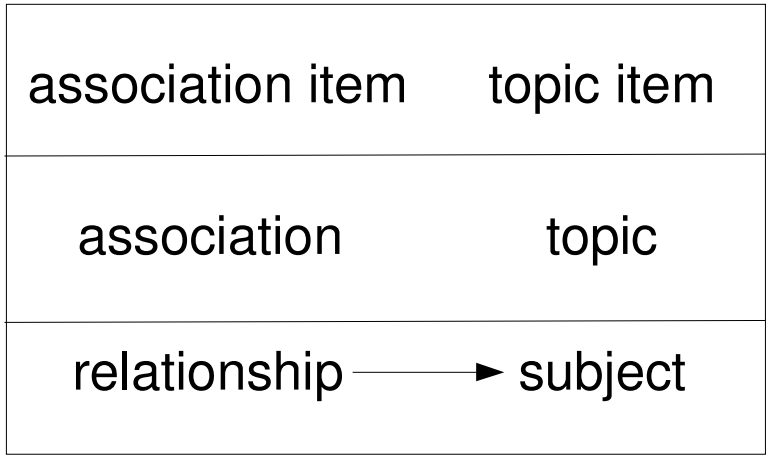
- **TMCL can be used to verify that**
  - values are valid according to their declare data types, and that
  - their declared data types conform to the TMCL schema declarations
- **TMCL does *not* modify the topic map in any way, such as by changing the data types of values based on the schema**
  - ie, nothing like the XML Schema post-validation infoset
- **TMCL may require support for certain datatypes**
- **TMQL will for certain datatypes support**
  - ordering and comparison of values of this type, and
  - operations on values of this type (such as addition)

Example of datatyped occurrence data

```
<!-- note: this is the only allowed way; there is no shorthand -->
<topicMap xmlns:xsd=”http://something...”>
  <topic id=”tosca”>
    <occurrence>
      <instanceOf><topicRef xlink:href=”#premiere-date”/></instanceOf>
      <resourceData datatype=”xsd:date”>1900-01-14</resourceData>
    </occurrence>
  </topic>
</topicMap>
```

The term “reification”

- **There are two cases**
  - the general topic-subject relationship
  - the relationship between a topic and a topic map construct whose subject is being represented by the topic
- **Agreed solution: we add a NOTE explaining that the use of the term “reification” in TMDM is not to be confused with the use of the in philosophy**



Two remaining XTM issues

- **xtm-pubid**
  - XTM 1.0 uses `"-//TopicMaps.Org//DTD XML Topic Map (XTM) 1.0//EN"`
  - we want one, primarily because it would look odd not to have one, and we will use the standard syntax for FPIs defined in ISO standards
  - within that constraint we try to make it as similar to the previous one as possible (but changing “XML Topic Map” to “XML Topic Maps”)
- **xtm-topicref-xtmwrap**
  - we solve this by removing support for embedding <topicMap> elements in other XML vocabularies
  - the text in the draft supporting this will be removed

Instructions

- **Authors are being instructed to prepare a new draft for ballot as FCD**

XML Schema for XTM 1.1

- **Ann's proposal**