An introduction to ODD and ODD Chaining

Lou Burnard

Taming the TEI Tiger: an ODD story

Customising the TEI is a way of adapting its powerful general purpose architecture to the more constrained and limited objectives of a specific project.

- TEI customizations are expressed (of course) in TEI ...
- ... using a special TEI customization which we call *ODD*

Why might you need an ODD?

- You are planning to produce valid XML resources ...
- so you will need to define an XML schema to describe them
- You need to provide documentation about
  - the semantics of your XML schema
  - constraints, usage notes, examples
- You need to keep the schema and the documentation in step
- You want to share the results
  - with others
  - with yourself, long term
- you don’t want to reinvent the wheel

This applies whether or not you are using the TEI!

ODD : the basic notion

One Document Does it all

A special XML vocabulary (defined by the TEI) for specifying....

- schemas
- XML element types independent of a particular schema language
- public or private groupings of such elements
- patterns (macros)
- classes (and subclasses) of element
- data constraints

And also for specifying references which can pull into a schema

- named components from the above list
- objects from other namespaces

All closely integrated with a set of traditional document markup elements

Basic ODD components for schema definition

<schemaSpec> Defines and identifies a schema

<elementSpec> Provides some or all of an element specification, new or existing

<elementRef> References an existing element specification

<classSpec>, <classRef> Likewise, for classes

<attDef>, <attRef> Likewise, for attributes

<moduleRef> References an existing ‘module’ i.e. a group of predefined elements and attributes, entirely or partially

A simple example

Our markup uses a <book> element, which contains a mixture of <para>s and <picture>s. We have never heard of the TEI and we don’t want to use it. Likewise namespaces.

```
<schemaSpec ns="" ident="bookSchema"
  start="book">
  <elementSpec ident="book">
    <desc>Root element for a very simple schema</desc>
    <content>
      <alternate maxOccurs="unbounded">
        <elementRef key="para"/>
        <elementRef key="picture"/>
      </alternate>
    </content>
  </elementSpec>
<!-- ... continues on next slide -->
</schemaSpec>
```

A simple example, contd.

```
<!-- ... contd --><elementSpec ident="para">
  <desc>paragraph of running text</desc>
  <content>
    <textNode/>
  </content>
</elementSpec>
<elementSpec ident="picture">
  <desc>empty element pointing to a graphic file</desc>
  <content>
    <empty/>
  </content>
  <attList>
    <attDef ident="href">
      <desc>supplies the URI of the object pointed at</desc>
      <datatype>
        <rng:data type="anyURI"/>
      </datatype>
    </attDef>
  </attList>
</elementSpec>
```

So what?

- We have all the information needed to build a schema in RELAX NG, W3C schema, or DTD language by a simple XSLT transformation
- We can also extract documentary fragments (e.g. the descriptions of elements and attributes)

TEI provides a special element for the latter purpose:

```
<specList>
  <specDesc  key="para"/>
  <specDesc  key="picture"/>
</specList>
```

which would generate something like

<para>	paragraph of running text
<picture>	empty element pointing to a graphic file

inside our running text

Defining a model class

In the real world, the elements that can appear inside a <book> are likely to be many and various. It's convenient therefore to have a way of talking about all of them: in ODD, we say that all such elements are members of a *model class*.

We use the <classes> element to record an element's membership in a class:

```
<elementSpec ident="para">
<!-- ... -->
  <classes>
    <memberOf key="bookPart"/>
  </classes>
<!-- ... -->
</elementSpec>
```

And for completeness, here's a definition for the bookPart class.

```
<classSpec ident="bookPart"
  type="model">
  <desc>the elements of this class all represent top-level parts of a
book</desc>
</classSpec>
```

Using a model class

Rather than say that a <book> contains <para> elements (and other things), we can now say that it contains members of the bookPart class.

```
<elementSpec ident="book">
 <desc>Root element for a very simple schema</desc>
 <content>
  <classRef key="bookPart"
   minOccurs="1" maxOccurs="unbounded"/>
 </content>
</elementSpec>
```

(When we realise that books can also contain <list>s this will save time!)

Defining an attribute class

In the real world, it’s also likely that several elements will have the same attributes. It’s convenient therefore to define them once only: in ODD we say all elements with some attributes in common are members of an *attribute class*, which we define like this:

```
<classSpec ident="pointing"
 type="atts">
 <desc>elements of this class all have an href
attribute</desc>
 <attList>
  <attDef ident="href">
   <desc>supplies a URI for the object pointed at</desc>
   <datatype>
    <rng:data type="anyURI"/>
   </datatype>
  </attDef>
 </attList>
</classSpec>
```

Controlling attribute values

- Attribute values can be constrained just by referring to an externally defined datatype such as `anyURI` or `ID` (these are W3C defined standards)
- We can also supply and document our own list of required or recommended values using the <valList> element

For example...

```
<classSpec ident="bookAtts"
  type="atts">
  <desc>this class defines the attributes that can appear on any element
inside a book</desc>
  <attList>
    <attDef ident="xml:id">
      <desc>provides a unique identifier for an element</desc>
      <datatype>
        <rng:data type="ID"/>
      </datatype>
    </attDef>
    <attDef ident="status">
      <desc>indicates the correction status of this element </desc>
      <valList>
        <valItem ident="red"/>
        <valItem ident="green"/>
        <valItem ident="unknown"/>
      </valList>
    </attDef>
  </attList>
</classSpec>
```

What else might you want to say about your elements?

- Additional glosses and descriptions, perhaps in different languages
- Usage examples
- More sophisticated constraints
  - complex content models
  - contextual dependencies

Plus other documentary features : versioning, cross references, ontological mappings ...

Alternative descriptions and glosses

```
<elementSpec ident="para">
 <gloss>paragraph</gloss>
 <desc>marks paragraphs in prose.</desc>
 <desc xml:lang="zh-tw">標記散文的段落。</desc>
 <desc xml:lang="ja"> 散文の段落を示す． </desc>
 <desc xml:lang="fr">marque les paragraphes dans un texte
en prose.</desc>
 <desc xml:lang="es">marca párrafos en prosa.</desc>
 <desc xml:lang="it">indica i paragrafi in prosa</desc>
<!-- ... -->
</elementSpec>
```

Usage examples

Documenting an XML schema requires the inclusion of examples in XML. If your documentation is also in XML, you need to be a little devious. There are three possible approaches:

- hide everything within a CDATA marked section
- Escape everything using entity references
- Use a different name space

The last has the great advantage that you can validate your examples against an XML schema

Examples

```
<eg><![CDATA[<p>A paragraph</p> ]]></eg>
```

```
<eg>
 <code lang="XML">&lt;p>A paragraph&lt;/p></code>
</eg>
```

```
 <egXML
xmlns="http://www.tei-c.org/ns/Examples">
<p>A paragraph</p> </egXML>
```

Defining a content model

The <content> element can contain

- Nothing at all <empty/>
- References to other elements <elementRef>
- References to classes of element <classRef>
- Alternations of the foregoing <alternate>
- Sequences of the foregoing <sequence>

Attributes *@minOccurs* and *@maxOccurs* can be used to control repetition

For example:

```
<content>
 <alternate>
  <elementRef key="para" minOccurs="2"
   maxOccurs="unbounded"/>
  <elementRef key="bob"
   maxOccurs="unbounded"/>
 </alternate>
</content>
```

Is your journey really necessary ?

The TEI defines elements very like yours. Why not use the TEI?

```
<schemaSpec source="http://www.tei-c.org/release/xml/tei/odd/p5sub
 start="div" ident="teiBook">
 <elementRef key="div"/>
 <elementRef key="p"/>
 <elementRef key="graphic"/>
 <elementRef key="figure"/>
 <moduleRef key="tei"/>
</schemaSpec>
```

The <moduleRef> here provides definitions for the TEI infrastructure, notably the classes and datatypes used throughout every TEI schema. Apart from that we just need to specify the TEI elements we want to use, by means of an <elementRef>.

The *@source* attribute indicates where the referenced specifications are to be found

Schematron constraints

- An element spec may also include one or more <constraintSpec> elements, which contain additional constraints of any kind, expressed in the ISO Schematron language
- In TEI we use these to express additional semantic or co-occurrence constraints that cannot be expressed in any schema language
- Not all XML processing systems take notice of these (but oXygen does).

```
<elementSpec  ident="div"
 module="teistructure"  mode="change">
 <constraintSpec  ident="div"
  scheme="isoschematron">
  <constraint>
   <s:assert  test="@type='prose' and .//tei:p">
         a prose div should contain at least one paragraph</s:assert>
  </constraint>
 </constraintSpec>
</elementSpec>
```

ODD Compilation

A single ODD may contain two types of object:

- an explicit specification (e.g. an <elementDecl>), partial or complete
- a reference to such a specification

A single ODD may combine two or more partial specifications for a given object.

In a *compiled ODD*,

- all references have been resolved, and replaced by the declarations concerned
- all partial declarations for the same object have been resolved

The @*source* attribute always indicates a compiled ODD

Using a compiled ODD

A compiled ODD can serve as the basis for further modifications.

Starting with a compiled version of the TEI-bare schema...

...we could suppress the <head> element:

```
<schemaSpec ident="Bare-minus"
 source="tei_bare.compiled.odd" start="TEI">
 <moduleRef key="tei"/>
 <moduleRef key="header"/>
 <moduleRef key="core" except="head"/>
 <moduleRef key="textstructure"/>
</schemaSpec>
```

... or we could add the contents of the module gaiji

```
<schemaSpec ident="Bare-plus"
 source="tei_bare.compiled.odd" start="TEI">
 <moduleRef key="gaiji"
  source="http://www.tei-c.org/release/xml/tei/odd/p5subset.xml"/>
 <moduleRef key="tei"/>
 <moduleRef key="header"/>
 <moduleRef key="textstructure"/>
</schemaSpec>
```

Note that we can only suppress or add items already supplied by the compiled ODD specified in the *@source* attribute.

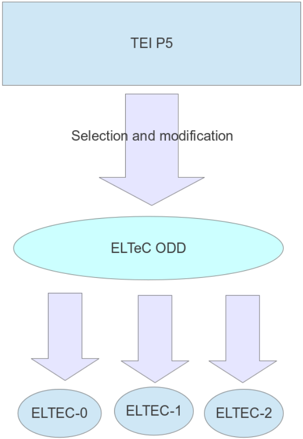
ODD Chaining use case

For the ELTeC we need to maintain two or three different schemas:

- A very constrained version of the TEI Header, common to each level
- Basic markup at level 0, and nothing else
- Markup at level 1, which is a superset of level 0
- Markup at level 2, which is also (currently) a superset of level 1

ODD chaining is the answer

ODD chaining



See `https://github.com/COST-ELTeC/Schemas/tree/master/ODD`

- we define a base ELTeC ODD which declares everything required for the union of each of the three schemas, and supplies some general constraints
- we compile this base ODD to create a TEI library, analogous to the ”p5subset” supplied with TEI P5
- each ELTeC level is then defined by a separate ODD, which selects a subset from that library

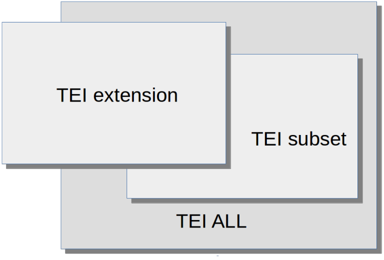
Advantages of this approach

- A single set of definitions, documented in one place, in one way, and accessible to all
- At the same time, any number of specialised and tightly constrained subsets, appropriate to particular environments or applications

Other use cases:

- crowdsourcing applications with progressive enrichment
- digitized manuscript collections combining edited transcriptions with rich metadata

Types of ODD (1)

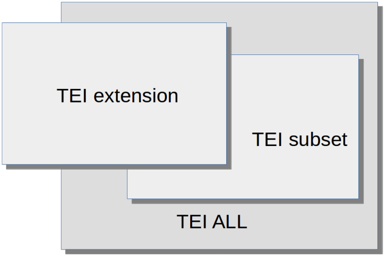


each box here represents :

- an ODD
- the schema derived from that ODD
- the set of documents considered valid by that schema

TEI All contains every element (etc) defined by the TEI.

Types of ODD (2)



- a ‘TEI subset’ provides only a (possibly restricted) subset of TEI All
- a ‘TEI extension’ provides some components which do not appear in TEI All

The $1000k question: is my TEI extension conformant?

The short answer

Yes, provided that...

- (in the case of a subset) : your modifications generate a more focussed schema, better adapted to your project, and documentation more meaningful to your envisaged community;
- your documents are also still valid according to TEI All and respect the semantics defined by the TEI conceptual model;
- (for an extension) : non-TEI components are explicitly signalled, for example by use of a different namespace, and documented in your ODD, for example by using TEI classes, the <equiv> element etc.

So what does it mean to be 'TEI conformant' ?

- be honest : XML elements declared within the TEI namespace must respect the existing TEI definitions for those elements (e.g. <l>)
- be explicit : an ODD is a very good way of keeping you honest. Producing one requires you to document and make evident all the changes you have made.

Validity of a document with respect to a TEI schema (TEI All, subset, or extension) is a good sign – but it does not guarantee conformance

The requirement to 'respect the TEI-defined semantics TEI' implies a test that cannot be readily automated.

The limits of modification

- Can you delete everything? you may not want <title> in your text, but it is mandatory in the header
- Can you add anything ? it may be convenient to add (e.g.) elements from the Dublin Core to your header, even though their semantics overlap with existing TEI elements

- The purpose of these conformance rules is to make 'blind interchange' simpler; but they don't guarantee it.
- Their goal is to allow a user to understand your encoding, but not necessarily to force them to follow your practice blindly

See also *What is TEI Conformance?* (`https://journals.openedition.org/jtei/1777`)

Useful links : Reference documentatio

For this talk (and others) visit my boasting page at `http://lb42.github.io`

For authoritative reference information, consult the Guidelines!

- « 22 : Documentation » in *TEI Guidelines*. https://tei-c.org/release/doc/tei-p5-doc/en/html/TD.html
- « 23 : Using the TEI » in *TEI Guidelines*. https://tei-c.org/release/doc/tei-p5-doc/en/html/USE.html

Useful links : Tutorial materials

- « Module 8: Customizing TEI » in *TEI By Example*
  https://teibyexample.org/tutorials/TBED08v00.htm
- «Customizing the TEI » *What is the Text Encoding Initiative ?*,
  http://books.openedition.org/oep/692.
- « One Document Does-it-all (ODD) » in *Balisage Symposium on Markup Vocabulary Customization*
  http://www.balisage.net/Proceedings/vol24/html/Viglianti01/Balisage
  Viglianti01.html
- « TEI Customization Primer » (Women Writers Project)
  https://www.wwp.neu.edu/outreach/resources/customization.html
- « ODD Chaining for Beginners »
  https://teic.github.io/TCW/howtoChain.html

Useful links: Background reading

- « RELAX NG with son of ODD » (eXtreme Programming Languages, 2004) https://ora.ox.ac.uk/objects/uuid:b337cb6d-9e7b-4bbc-aa71-f0b9d12bb8de
- « Reviewing the TEI ODD System » (ACM DocEng, 2013) http://dx.doi.org/10.1145/2494266.2494321