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Using the TEI framework as a possible serialization for LMF

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Executive summary

- Issue: identifying an “appropriate” serialization for LMF
 - Serialization: mapping a lexical model onto a concrete (computer) representation (field based, XML, etc.)
 - Wide consensus, maintenance, flexibility, cohesion with other standardization activities
- The TEI is an ideal basis for defining standardized XML formats for lexical data
 - TEI as an infrastructure
 - Customization facilities: ODD, classes, pointing mechanisms, etc.
 - TEI as a reference vocabulary
 - Print dictionary chapter (PD)
 - TEI as an application of LMF
- Workplan proposal
 - Defining the ideal LMF compliant subset of the TEI PD chapter
 - Suggesting extensions to the PD chapter
- Convergence...
 - Contribution to making ISO and TEI work closer together

The TEI at a glance

- Started in 1987
- Organized as a consortium: 5 hosts, board, council
- Edition P5 of the guidelines: more than 500 elements covering various text genres and structures
 - Genericity: header, text structure, pointing mechanisms, paragraph level elements, surface entities
 - Precise and flexible documentation
 - Maintenance: 2 releases per year
- Wide community of users: default format for most text-based projects worldwide
 - Cf. papers from Przepiorkowski, or Erjavec at LREC
- And yes, it is XML based... e.g. preconfigured in Oxygen

Intermezzo — an XML tutorial

- XML is about awful angle brackets (serialization)

```
<gramGrp>  
<gen>f</gen>  
<num>p</num>  
</gramGrp>
```

- XML is about beautiful trees (model)
- Issues
 - Specifying structures
 - Providing semantics

Basic concepts of the TEI technical platforms

- A specification language ODD (One Document Does it all)
 - Literate programming (Knuth)
 - Generation of both schemas and documentation
 - DTD, RelaxNG, W3C scemas
 - HTML, pdf, ePub, docx
 - Provides extended customization facilities
 - `<equiv>`
 - Natural link with ISOCat
- Modules
 - Each schema specification is a combination of internal or external modules
 - E.g. ISO-TEI Feature-Structure module
- Classes (sharedbehavioursorsemanantics)
 - Model classes
 - Attribute classes

From ODD to documentation

<gen> (gender) identifies the morphological gender of a lexical item, as given in the dictionary. 9.3.1 Information on Written and Spoken Forms	
Module	dictionaries — 9 Dictionaries
Attributes	att.lexicographic (@expand, @norm, @split, @value, @orig, @location, @mergedIn, @opt)
Used by	model.entryPart model.morphLike
Declaration	<div style="text-align: right;">Compact to XML format</div> <pre>element gen { att.global.attributes, att.lexicographic.attributes, macro.paraContent }</pre>
Example	<pre><entry> <form> <orth>pamplemousse</orth> </form> <gramGrp> <pos>noun</pos> <gen>masculine</gen> </gramGrp> </entry></pre>

TEI and “dictionaries”

- The TEI Print Dictionary (PD) chapter
 - Initially designed by N. Ide and J. Veronis
 - Accounts for both presentational and editorial (“content”) issues
 - Cf. <entry>, <entryFree>, ... and <dictScrap>
 - Based on a hierarchical abstract model (cristals)
 - <form>: for characterising the orthographic or phonetic form of the word
 - <orth>, <pron>, etc.
 - <gramGrp>: grammatical features
 - May characterize an entry, a specific form or a specific sense
 - <pos>, <gen>, generic <gram> feature
 - <sense>: iterative and recursive
 - May contains definitions, examples, etymological information, translations, etc.
- Main characteristic (drawback?): +very+ flexible

Examples

```
<entry>  
<form>一乘顯性教</form>  
<sense>One of the five divisions made by 圭峰 Guifeng of the Huayan 華嚴 or Avataṃsaka  
School; v. 五教.</sense>  
</entry>
```

```
<entry>  
<form>眾生不可思議</form>  
<sense>  
<usg type="dom">術語</usg>  
<def>四事不可思議之一。見不可思議條。</def>  
<xr>不可思議</xr>  
</sense>  
</entry>
```

Examples – cont.

```
<entry>
<form type="lemma">
<orth>chat</orth>
</form>
<gramGrp>
<pos>noun</pos>
<gen>masculine</gen>
</gramGrp>
<form type="inflected">
<orth>chat</orth>
<gramGrp>
<number>singular</number>
</gramGrp>
</form>
<form type="inflected">
<orth>chats</orth>
<gramGrp>
<number>plural</number>
</gramGrp>
</form>
</entry>
```

Customizing an entry

```
<entry>
<form>
<orth>table</orth>
</form>
<gramGrp>
<pos>n.</pos>
<gen>f.</gen>
</gramGrp>
<def>Pièce de mobilier...</def>
<cit>
<quote>Une table de cuisine</quote>
</cit>
</entry>
```

Selecting content
e.g.: <pos>, <gen>, <num>, <tense>

Constraining content
e.g.: f., f, fem, féminin, feminine,...

Adding content
e.g.: <transitivity>

Illustrating classes: `tei.gramInfo`

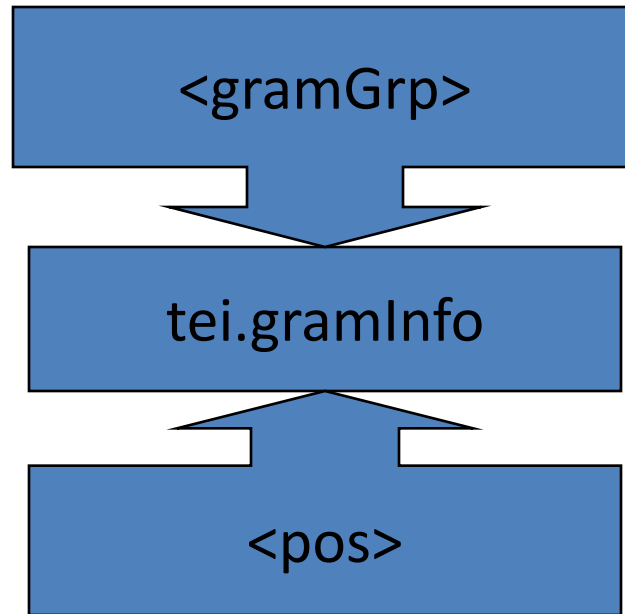
- Grammatical information in a dictionary entry

- E.g.:

```
<entry>  
<form>  
<orth>luire</orth>  
</form>  
<gramGrp>  
<pos>verb</pos>  
<subc>intransitive</subc>  
</gramGrp>  
</entry>
```

- Rather homogeneous set of elements
 - `<pos>`, `<gen>`, `<number>`, `<case>`, etc.
 - May also appear in `<form>`

Overall picture



Declaring the class: `tei.gramInfo`

```
<classSpec xmlns="http://www.tei-c.org/ns/1.0" module="dictionaries-decl"
  id="GRAMINFO" type="model" ident="tei.gramInfo">
  <gloss>grammatical information</gloss>
  <desc>groups those elements allowed within a <gi>gramGrp</gi> element in a
    dictionary.</desc>
</classSpec>
```

<pos> belongs to tei.gramInfo

```
<elementSpec module="dictionaries" id="POS" ident="pos">  
<gloss>part of speech</gloss>  
<desc>indicates the part of speech assigned to a dictionary headword (noun, verb,  
    adjective, etc.)</desc>  
<classes>  
<memberOf key="tei.dictionaryParts"/>  
<memberOf key="tei.gramInfo"/>  
<memberOf key="tei.dictionaries"/>  
</classes>  
<content> ... </content>  
<exemplum> ... </exemplum>  
</elementSpec>
```

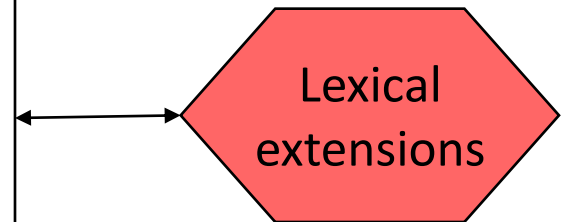
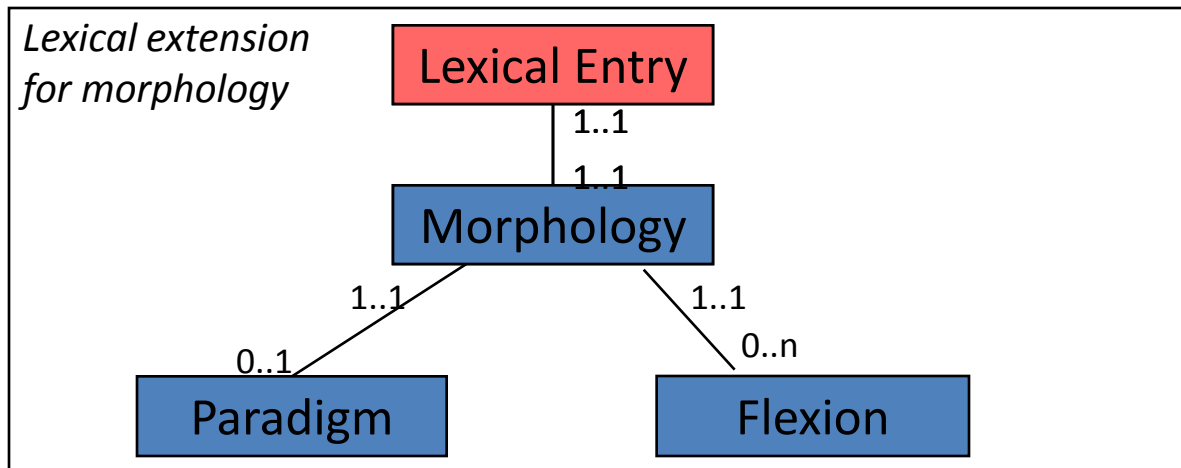
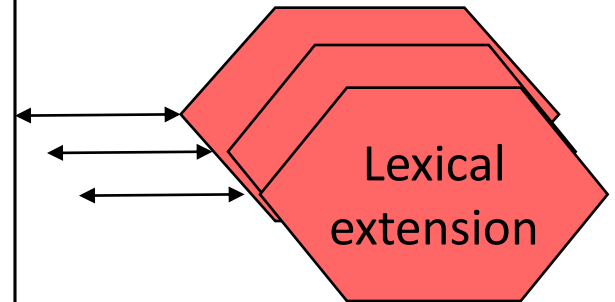
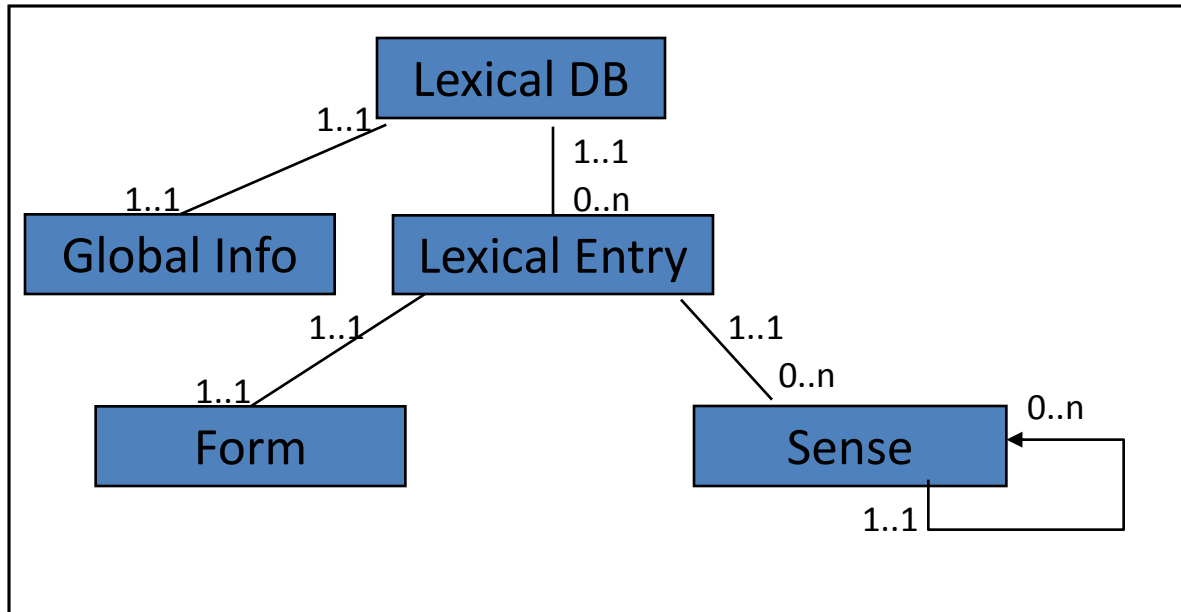
Content model for <gramGrp>

```
<elementSpec module="dictionaries" id="GRAMGRP" ident="gramGrp">
  <gloss>grammatical information group</gloss>
  <content>
    <rng:zeroOrMore
      xmlns:rng="http://relaxng.org/ns/structure/1.0">
      <rng:choice>
        <rng:text/>
        <rng:ref name="tei.phrase"/>
        <rng:ref name="tei.inter"/>
        <rng:ref name="tei.gramInfo"/>
        <rng:ref name="tei.Incl"/>
      </rng:choice>
    </rng:zeroOrMore>
  </content>
  ...
</elementSpec>
```

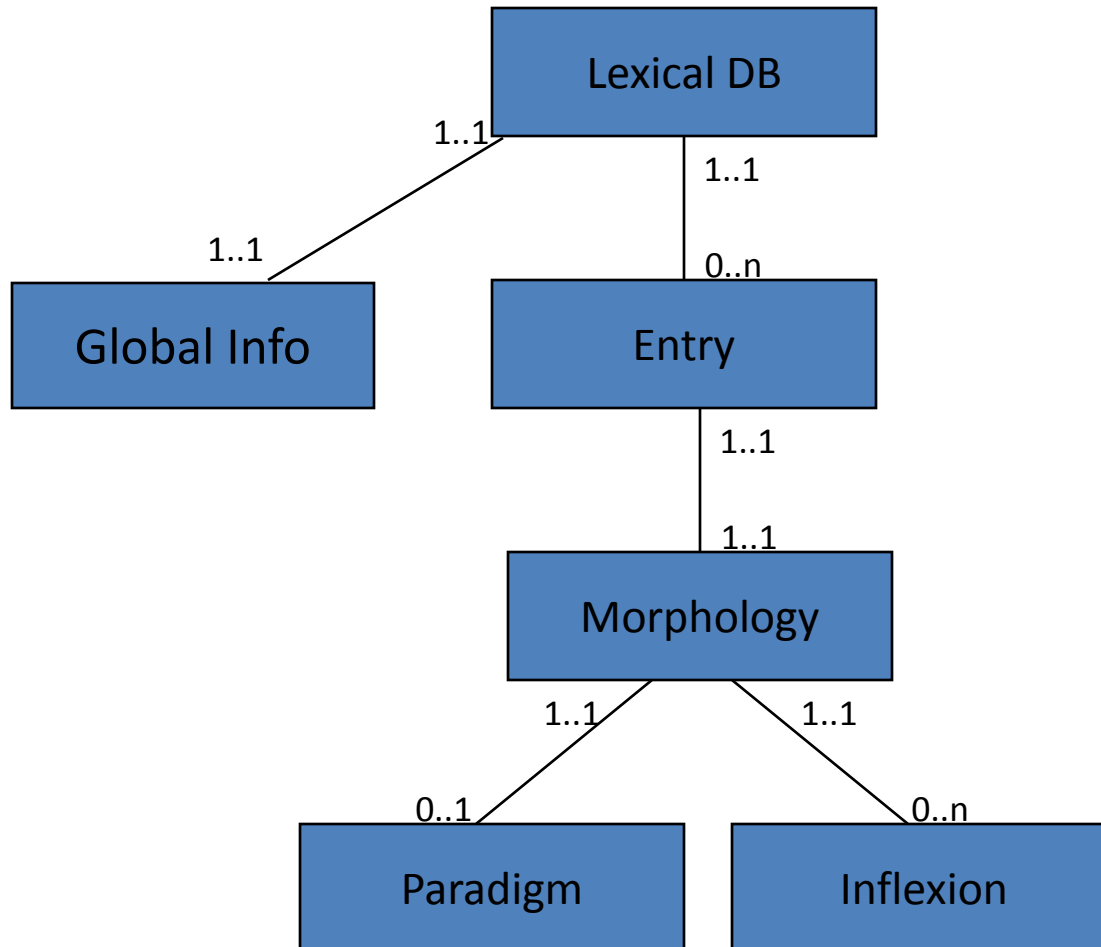

LMF at a glance

- LMF – Lexical Markup Framework
 - ISO standard 24613 (published Oct. 2008)
 - Edited within ISO committee TC 37/SC 4
- Technical content
 - Focus on provided a core meta-model with extensions
 - Potentially agnostic with regards serialisation
 - Isomorphism => interoperability
 - Default syntax to exemplify its possible use, room for improvement...
- Can the TEI be seen as a conformant implementation of LMF?

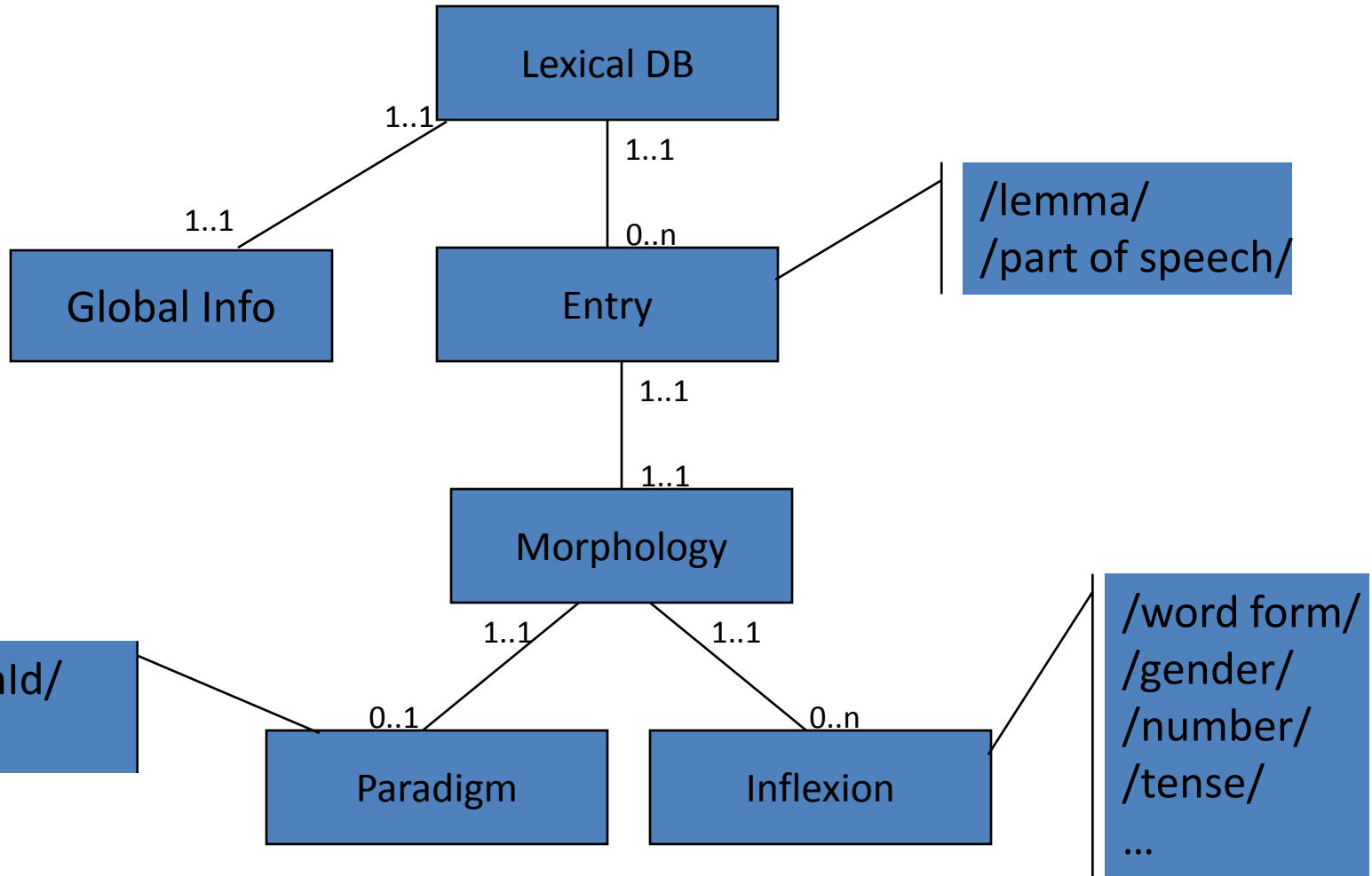
LMF architecture — playing Lego



Example: designing a full-form lexicon



Decorating the model



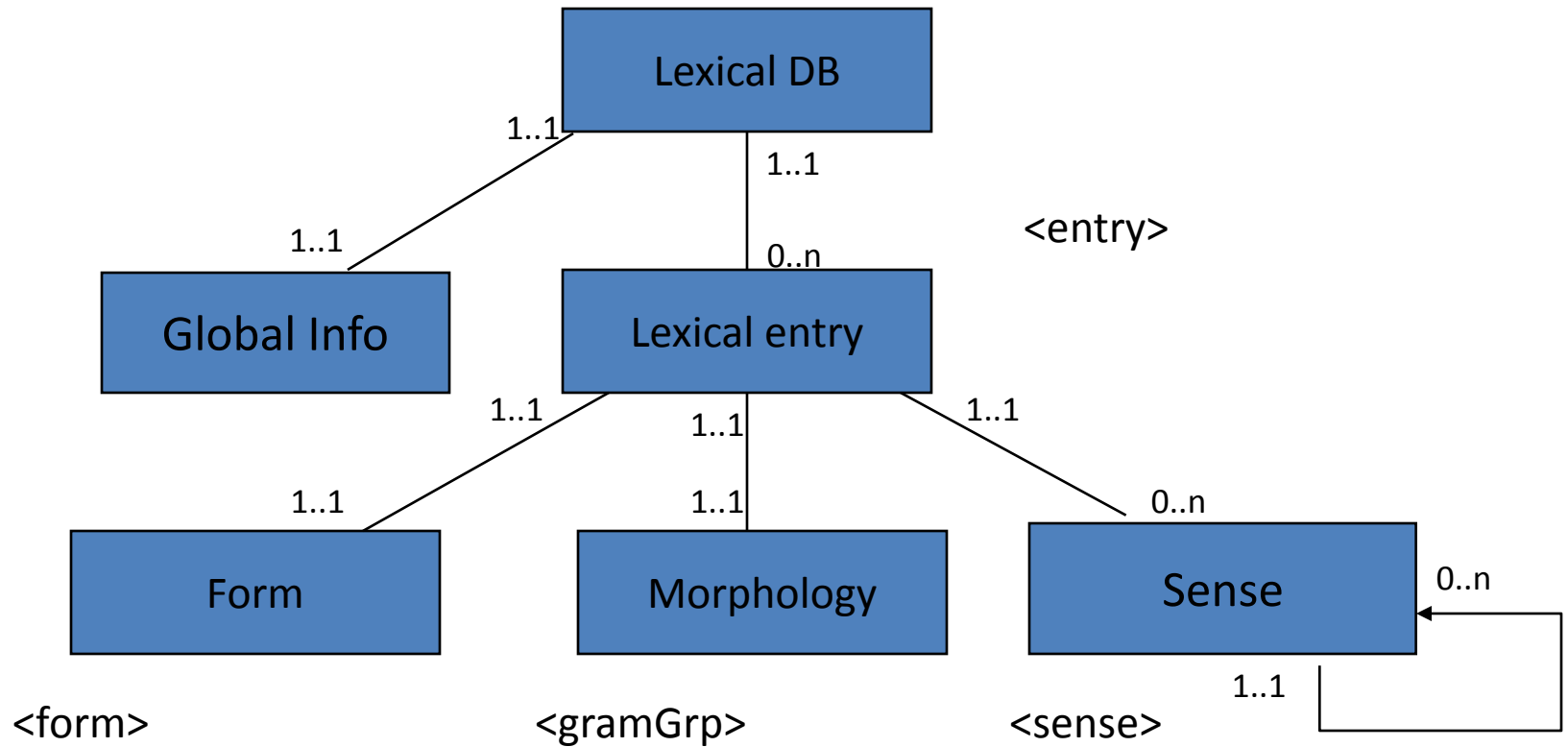
Why is the TEI a good idea for serialising LMF?

- Basic structure already defined
- Provision of additional tags
 - Surface annotation (e.g. names, dates, abbreviations, alternatives)
 - Cf<equiv> equivalences to ISOCat when needed
- Integration of lexical data in a textual macro-structure
 - Creating an edited version of a lexica
 - Grammar books, teaching material, scientific papers
- Interoperability with other lexical sources
 - Community of users: sharing a common culture of TEI tags rather than constantly worrying about mappings
 - Sharing tools: e.g. stylesheets, editors, etc. (cf. Roma)
 - Note: continuity between dictionary and lexical sources

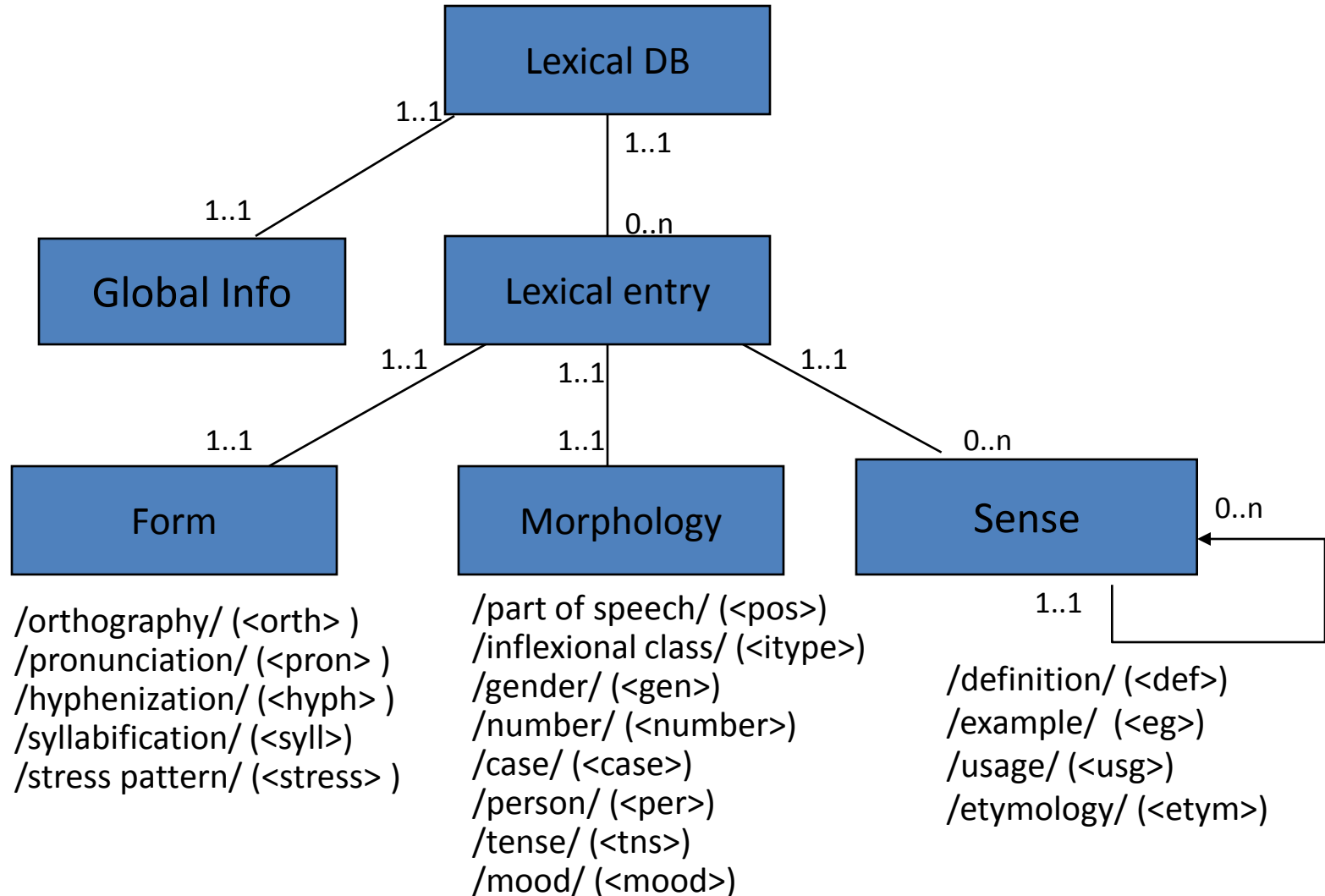
A typical entry

```
<entry>
<form>
<orth>demigod</orth>
<pron>...</pron>
</form>
<gramGrp
<pos>n</pos>
</gramGrp>
<sense n='1'>
<sense n='a'>
<def>a being who is part mortal, part god</def>
</sense>
<sense n='b'>
<def>a lesser deity</def>
</sense>
</sense>
<sense n='2'>
<def>a godlike person</def>
</sense>
</entry>
```

Identifying the meta-model components



Data categories



Customizing the TEI lexical model

- Constraining the TEI model
 - Sub-setting the TEI default dictionary module
 - Providing additional rules (XSLT, Schematron)
 - Constraining possible values
- Complementing the TEI model
 - Defining additional data categories
 - Defining missing LMF extensions as TEI components
 - Make use of the class mechanisms
 - A natural implementation of the LMF extension mechanisms

Towards a joint ISO-TEI activity

- Contributing to convergence, with a pragmatic perspective
- Benefiting from advantages of both sides
 - TEI reactivity and community support
 - ISO stability and international validation
- LMF serialization seen as
 - A subset of the TEI when equivalent construct exist
 - An extension of the TEI for missing constructs (e.g. syntax)
- Some concrete work on the table...
 - Aside activities: specifying LL-LIF in ODD
- Reference
 - L. Romary, “Standardization of the formal representation of lexical information for NLP”
 - <http://hal.archives-ouvertes.fr/hal-00436328/fr/>