An ATL Example

The BibTeXML to DocBook Transformation

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http://www.sciences.univ-nantes.fr/lina/atl/

Context of this work
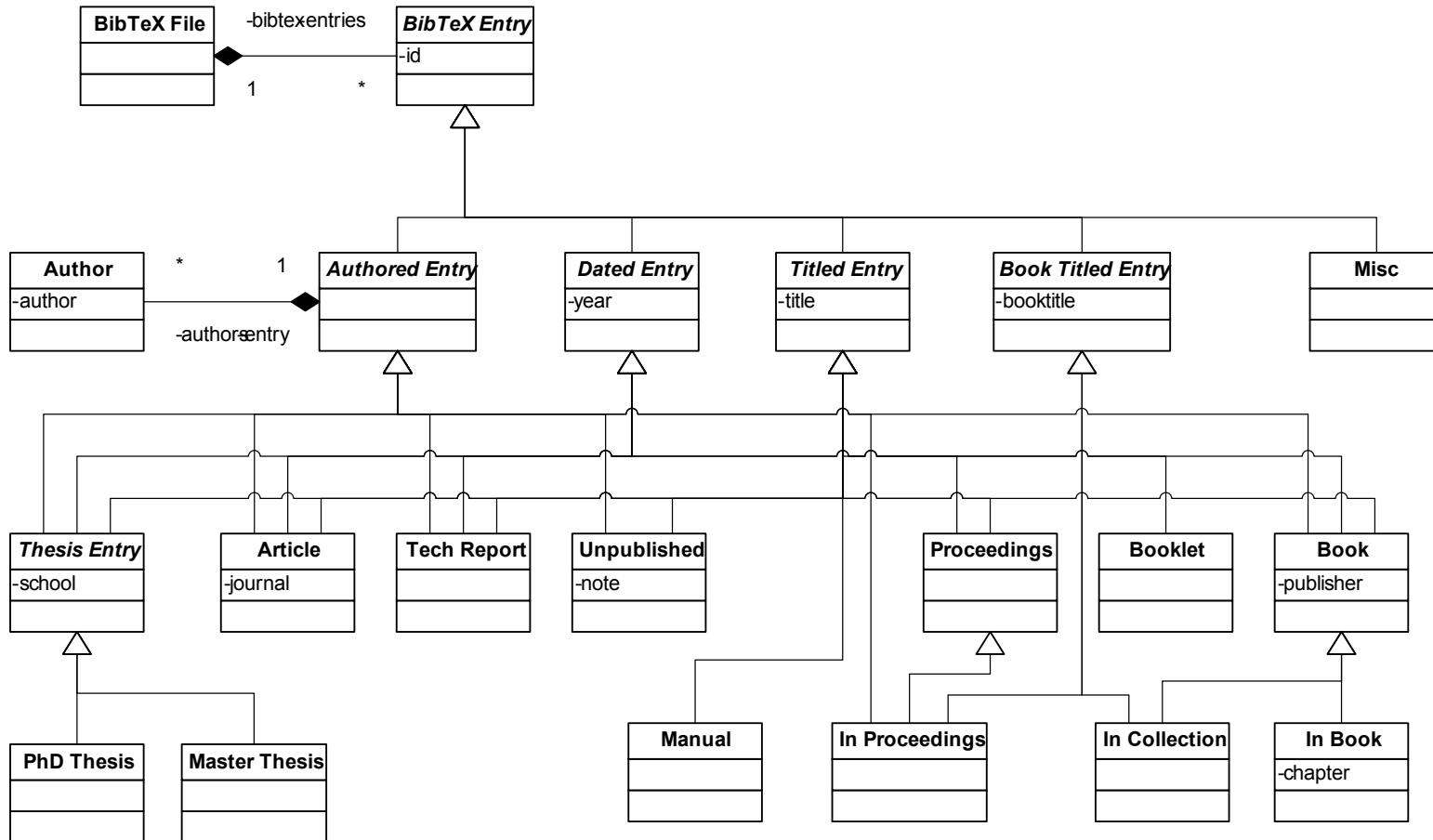
- The present courseware has been elaborated in the context of the MODELWARE European IST FP6 project (http://www.modelware-ist.org/).

- Co-funded by the European Commission, the MODELWARE project involves 19 partners from 8 European countries. MODELWARE aims to improve software productivity by capitalizing on techniques known as Model-Driven Development (MDD).

- To achieve the goal of large-scale adoption of these MDD techniques, MODELWARE promotes the idea of a collaborative development of courseware dedicated to this domain.

- The MDD courseware provided here with the status of open source software is produced under the EPL 1.0 license.

Description of the transformation

- Input: a BibTeXML file

- Output: a DocBook file containing
  - An Article of four sections
    1. The list of entries
    2. The list of distinct authors
    3. The list of distinct titles
    4. The list of distinct journals (in Article entries)

The BibTeXML metamodel

The BibTeXML metamodel in KM3
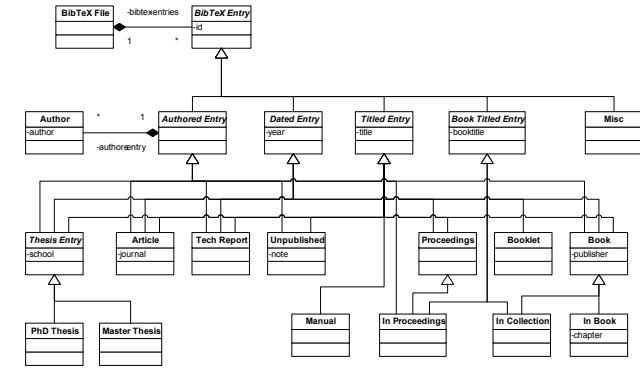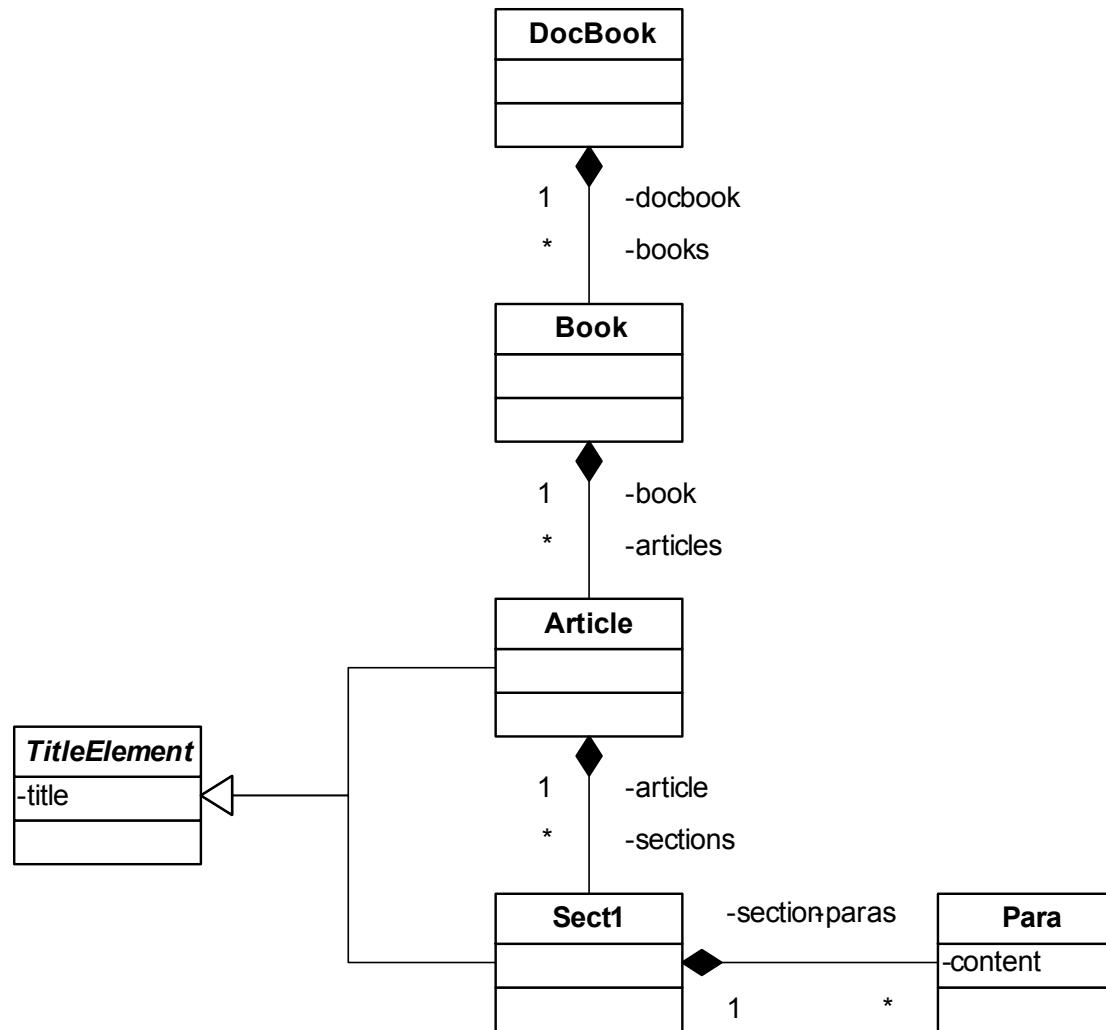
```
package BibTeX {

  class BibTeXFile {
    reference entries[*] container : BibTeXEntry;
  }
  class Author {
    attribute author : String;
  }
  abstract class BibTeXEntry {
    attribute id : String;
  }
  abstract class AuthoredEntry extends BibTeXEntry {
    reference authors[1-*] container : Author;
  }
  abstract class DatedEntry extends BibTeXEntry {
    attribute year : String;
  }
  abstract class TitledEntry extends BibTeXEntry {
    attribute title : String;
  }
  ...
  class Article extends AuthoredEntry, DatedEntry, TitledEntry {
    attribute journal : String;
  }
  ...

}
```
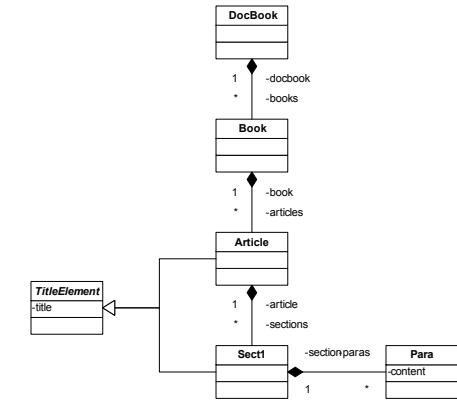
The considered DocBook metamodel
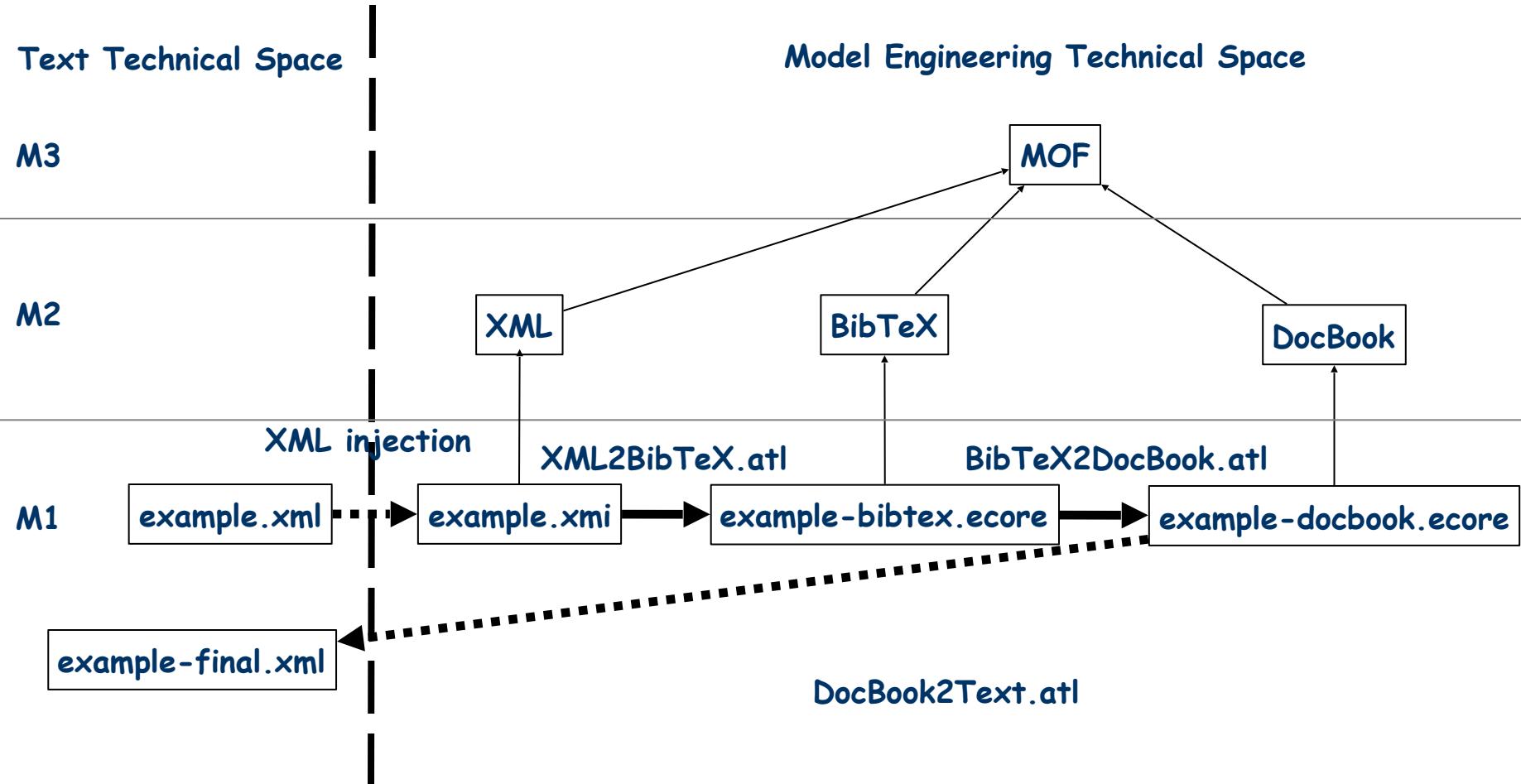
The DocBook metamodel in KM3

```
package DocBook {

    class DocBook {
        reference books [1-*] ordered container: Book;
    }
    class Book {
        reference articles [1-*] ordered container: Article;
    }
    abstract class TitledElement {
        attribute title : String;
    }
    class Article extends TitledElement {
        reference sections_1 [1-*] ordered container : Sect1;
    }
    class Sect1 extends TitledElement {
        reference paras [1-*] ordered container: Para;
    }
    class Para {
        attribute content : String;
    }

}
```

Transformation from end to end

Text Technical Space

Model Engineering Technical Space

M3

```
MOF
```

M2

```
XML        BibTeX        DocBook
```

XML injection

XML2BibTeX.atl   BibTeX2DocBook.atl

M1

```
example.xml → example.xmi → example-bibtex.ecore → example-docbook.ecore
```

```
example-final.xml
```

DocBook2Text.atl

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Matchings (1/2)

- ## A BibTeX File corresponds to
  - A DocBook element
  - A Book within this DocBook
  - An Article within this Book
  - Four ordered sections within this Article
    1. The list of entries
    2. The list of author (without double)
    3. The list of titles (without double)
    4. The list of referenced journals (without double)

Matchings (2/2)

- ## An Author corresponds to
  - ### A paragraph (Para) in the 2nd section
    - Constraint: no double

- ## A BibTeX Entry corresponds to
  - ### An entry Para in 1st section
  - ### A title Para in the 3rd section
    - Constraints: titled entries only, no double
  - ### A journal Para in the 4th section
    - Constraints: article entries only, no double

The Article_Title_Journal rule (1/2)

- For each Article instance that belongs to
  - titledEntrySet (define a new title)
  - journalSet (define a new journal)

- … creation of
  - An entry paragraph (section 1)
  - A title paragraph (section 3)
  - A journal paragraph (section 4)

The Article_Title_Journal rule (2/2)

```
rule Article_Title_Journal {
    from
        e : BibTeX!Article (
                thisModule.titledEntrySet->includes(e) and
                thisModule.articleSet->includes(e)
        )
    to
        entry_para : DocBook!Para (
                content <- e.buildEntryPara()
        ),
        title_para : DocBook!Para (
                content <- e.title
        ),
        journal_para : DocBook!Para (
                content <- e.journal
        )
}
```

Building titledEntrySet

● Set of TitledEntry in which a title appears only once

helper def: titledEntrySet : Sequence(BibTeX!TitledEntry) =

BibTeX!TitledEntry.allInstances()->
       iterate(e; ret : Sequence(BibTeX!TitledEntry) =
       Sequence {} |
           if ret->collect(e | e.title)->includes(e.title)
                then ret
                else ret->including(e)
          endif
)->sortedBy(e | e.title);

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Other Article rules

- A given input element can be matched only once

- 4 rules are required to handle all Article inputs
  - Article_Title_Journal
  - Article_Title_NoJournal
  - Article_NoTitle_Journal
  - Article_NoTitle_NoJournal

Sample of a source model

```
<bibtex:file>
<bibtex:entry id="a">
 <bibtex:techreport>
    <bibtex:author>Touzet, D.</bibtex:author>
    <bibtex:author>Bézivin, J.</bibtex:author>
    <bibtex:title>The BibTeXML to DocBook transformation</bibtex:title>
    <bibtex:year>2005</bibtex:year>
  </bibtex:techreport>
</bibtex:entry>
<bibtex:entry id="b">
 <bibtex:manual>
    <bibtex:title>The BibTeXML to DocBook transformation</bibtex:title>
 </bibtex:manual>
</bibtex:entry>
<bibtex:entry id="c">
 <bibtex:article>
    <bibtex:author>Bézivin, J.</bibtex:author>
    <bibtex:title>Les évolutions récentes en ingénierie des modèles</bibtex:title>
    <bibtex:year>2004</bibtex:year>
    <bibtex:journal>IT Expert Journal</bibtex:journal>
 </bibtex:article>
</bibtex:entry>
</bibtex:file>
```

Resulting target model

```
<docbook><book><article>
  <title>BibTeXML to DocBook</title>

  <sect1>
    <title>References List</title>
    <para>[a] TechReport. Touzet, D. and Bézivin, J.,
            The BibTeXML to DocBook transformation, 2005.
    </para>
    <para>[b] Manual. The BibTeXML to DocBook transformation.</para>
    <para>[c] Article. Bézivin, J.,
            Les évolutions récentes en ingénierie des modèles, IT Expert Journal, 2004.
    </para>
  </sect1>
  <sect1>
    <title>Authors list</title>
    <para>Bézivin, J.</para>
    <para>Touzet, D.</para>
  </sect1>
  <sect1>
    <title>Titles List</title>
    <para>Les évolutions récentes en ingénierie des modèles</para>
    <para>The BibTeXML to DocBook transformation</para>
  </sect1>
  <sect1>
    <title>Journals List</title>
    <para>RSTI-L'Objet</para>
  </sect1>

</article></book></docbook>
```