OSS 2008
Milan, September 7-10 2008
The 4th International Conference on Open Source Systems
IFIP WCC 2008
WORLD COMPUTER CONGRESS
Milano

A framework to abstract the design practices of e-learning system projects

Alain Corbière
IUT de Laval (France)
LIUM Université du Maine (France)

Why I chose the OpenUSS project ?

- Open Source System : OpenUSS (Open University Support System)
  - E-learning system project ;
  - Project exists since 2001 ;
  - Project uses the advanced oriented object technology on this process development :
    - 2001 – 2006 : OpenUSS-revo used EJB and Barracuda technologies ;
    - 2006 – 2008 : OpenUSS-plexus uses Hibernate and JSF technologies.
  - Open Source Community has always aimed to communicate your design practices and to collaborate with new members.

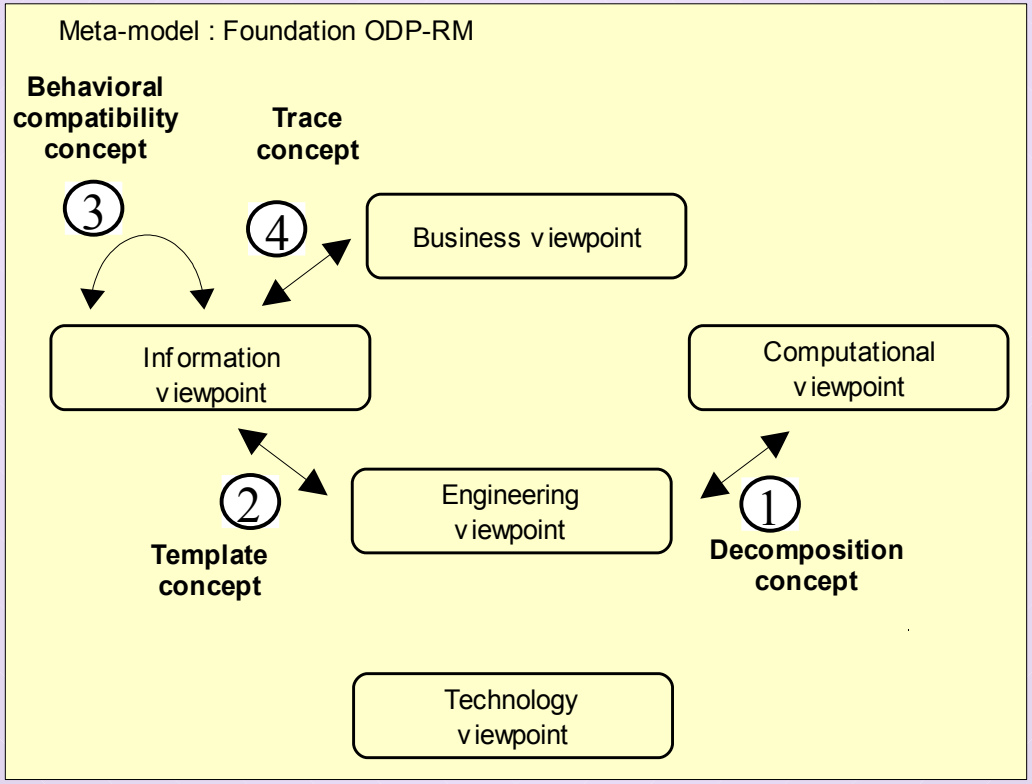
Why I chose the RM-ODP framework?

- RM-ODP (Reference Model Open Distributed Process) framework :
  - Meta-standard on the distributed processing.
    - Reference Model : It's an ISO standard ;
    - Open : Each specification produced by this framework can be represented in a variety of ways for different audiences ;
    - Distributed Process : A set of concepts describes the complexity of distributed processing.
  - How ?
    - RM-ODP defines a set of concepts and an architecture of viewpoints and guides the specification of the coherence between these viewpoints.

Why/How I applied this framework and I abstracted the design practices

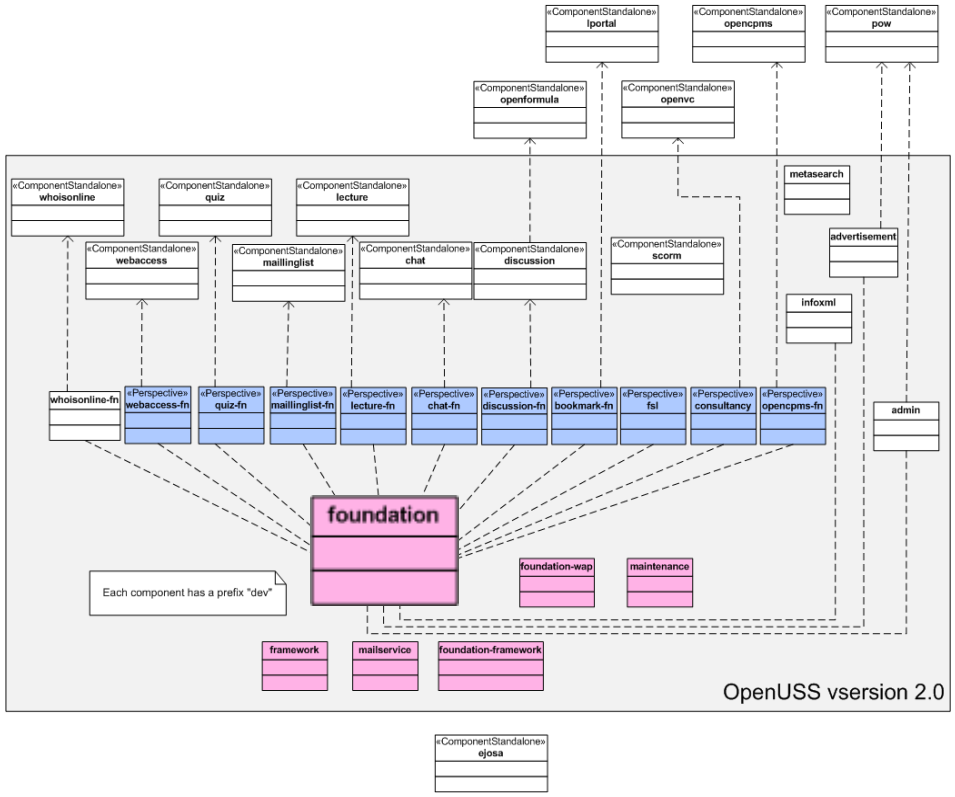
- To hightlight the design practices of this project ;
- To bind the informational model provided by the learning technology consortium ;
- To identify new perspectives of advanced learning technology engineering.

Why/How I applied this framework and I abstracted the design practices



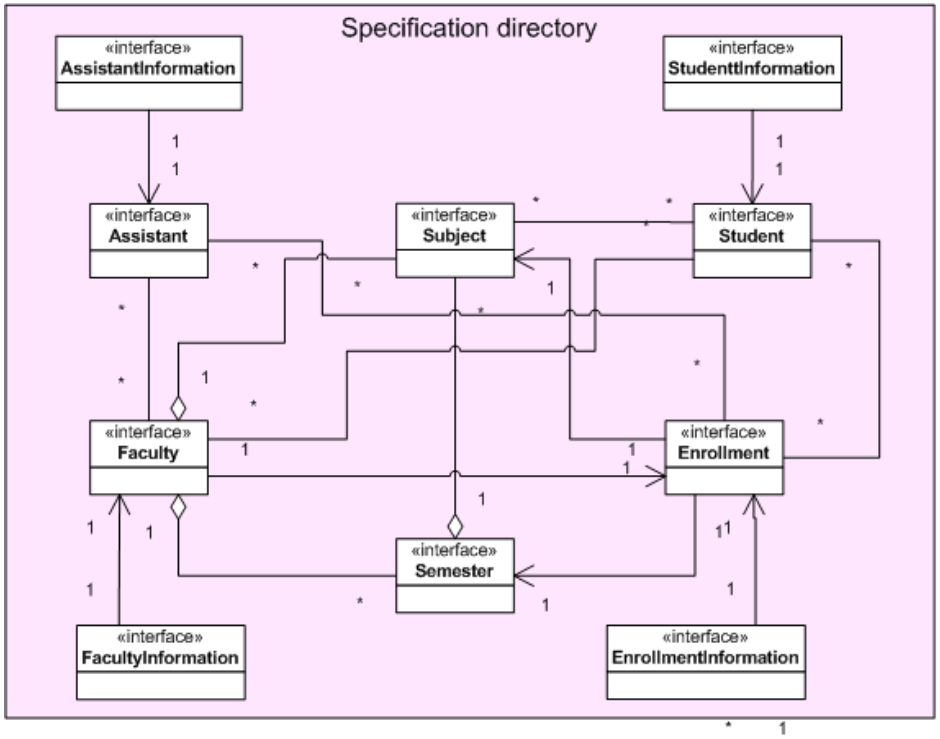
Using the decomposition concept to specify the computational entities

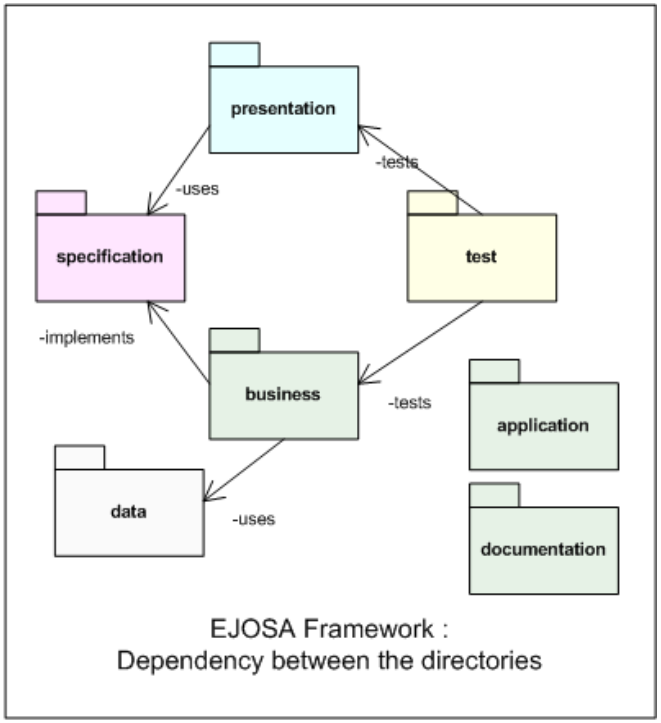
Decomposition: “to specify objects and behaviours which constitute an object or a behaviour”



Using the template concept to specify the engineering choices

Template : “The specification of the common features of a collection of entities in sufficient detail that an entity can be instantiated using it”

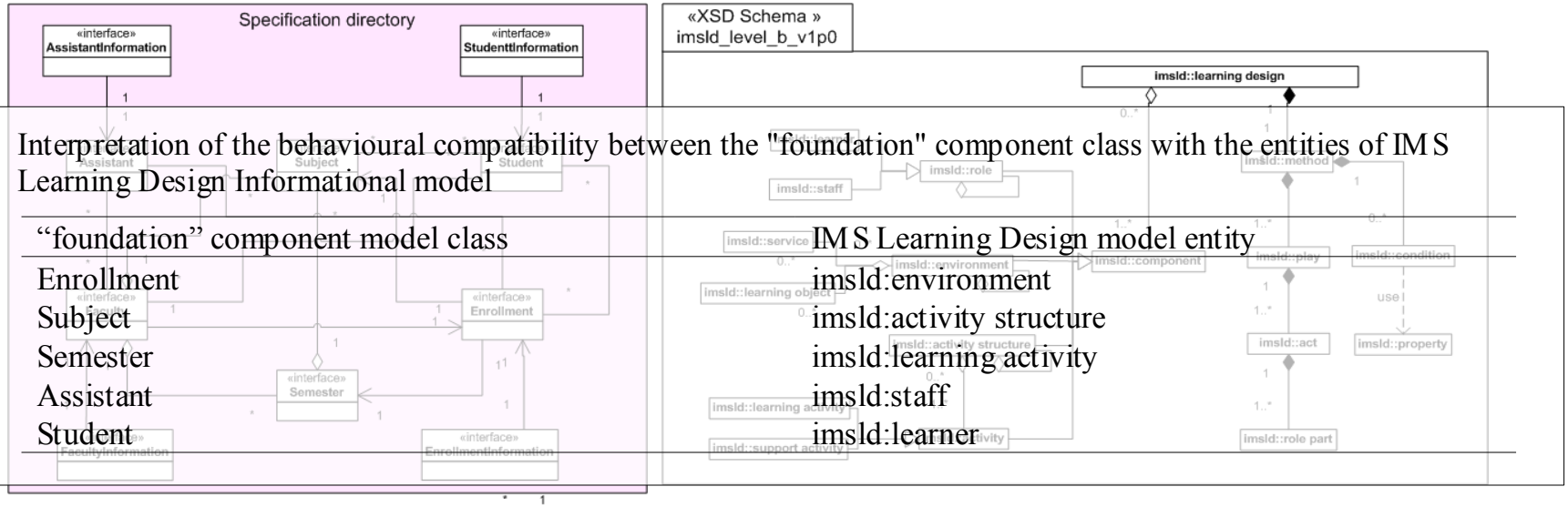




Using the behavioural compatibility concept to specify the conformance points

Behavioural compatibility :

"An object is behaviourally compatible with a second object with respect to a set of criteria"

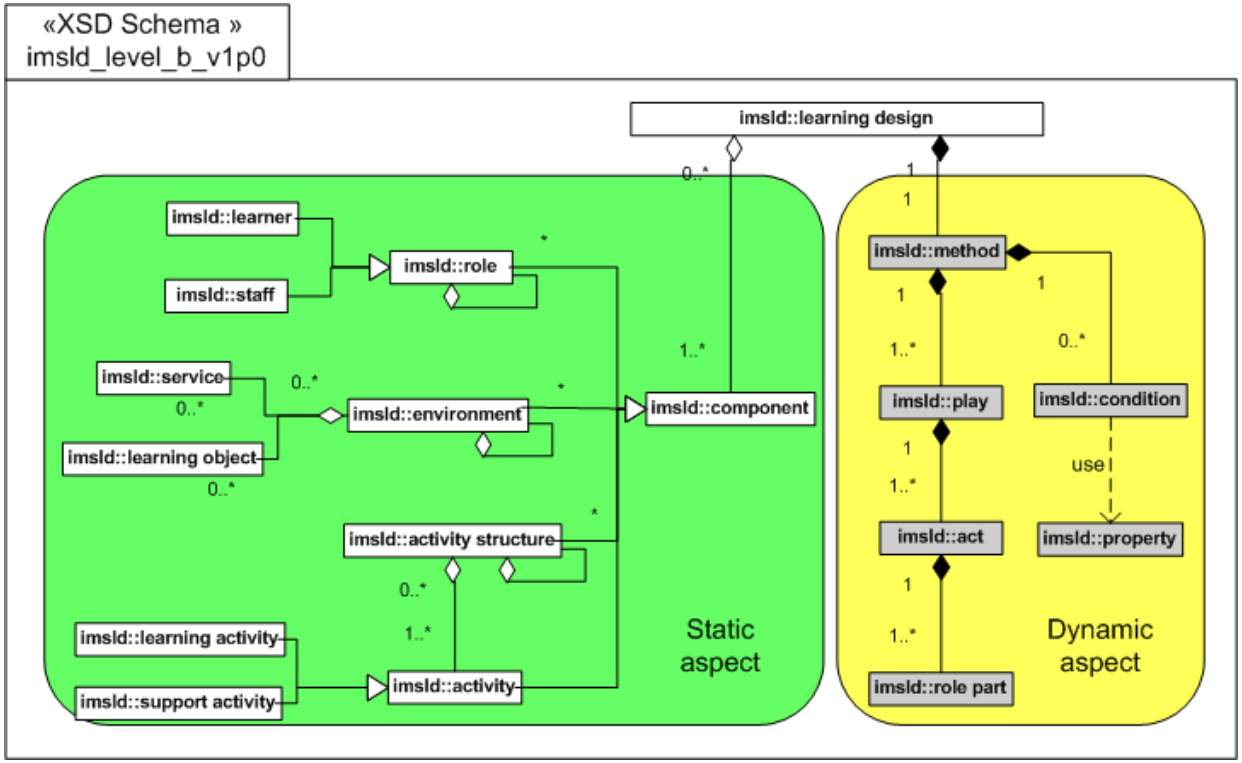


Interpretation of the behavioural compatibility between the "foundation" component class with the entities of IMS Learning Design Informational model

"foundation" component model class	IMS Learning Design model entity
Enrollment	imsld:environment
Subject	imsld:activity structure
Semester	imsld:learning activity
Assistant	imsld:staff
Student	imsld:learner

Using the trace concept to specify the conformance tests

Trace : “A record of an object's interactions, from its initial state to some other state”



Using the trace concept to specify the conformance tests

Trace : “A record of an object's interactions, from its initial state to some other state”

```
...
<imsld:method>
   <imsld:play identifier="PLAY-intro">
      <imsld:act identifier="ACT-intro">
         <imsld:role-part identifier="RP-intro">
            <imsld:role-ref ref="1082988145588"/>
            <imsld:activities-structure-ref ref="1082988145705"/>
         </imsld:role-part>
      </imsld:act>
   </imsld:play>
   <imsld:conditions>
      <imsld:if>
         <imsld:and>
            <imsld:is>
                  <imsld:property-ref ref="id-dateTrack"/>
                  <!-- date et heure au format ISO 8601 -->
                  <imsld:property-value>
                        2005-12-07T12:45:30
                  </imsld:property-value>
            </imsld:is>
            <imsld:is>
                  <imsld:property-ref ref="id-methodeTrack"/>
                  <imsld:property-value>
                        setFunctionality
                  </imsld:property-value>
            </imsld:is>
            <imsld:is>
                  <imsld:property-ref ref="id-function"/>
                  <imsld:property-value>
                        LECTURE_MATERIALS
                  </imsld:property-value>
            </imsld:is>
         </imsld:and>
      </imsld:if>
      <imsld:then>
         <imsld:show>
            <imsld:environment-ref ref="1032988145101"/>
         </imsld:show>
      </imsld:then>
   </imsld:conditions>
</imsld:method>
...
```

Identifier of "**Student**" object on OpenUSS

Identifier of "**Subject**" object on OpenUSS

The name of the method of the object "Enrollment" ant the date of its call are described in a conditionnal rule

Identifier of "**Enrollment**" object on OpenUSS

What are the new perspectives of the Advanced Learning Technologies ?

- On educational re-engineering ;
- On software based component engineering ;
- On service engineering ;
- On model driven engineering.

A framework to abstract the design practices of e-learning system projects