Content Modeling for eLearning

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What is ‘educational content’?

- Educational material developed to be consumed in computer based learning using on-line web environments
- Educational material has embedded pedagogical & instructional information
- Complex specifications and a variety of description standards
- Complex authoring process and difficult to maintain

Educational Content: Current problems

- **Interoperability** → It is not possible to re-assemble content
- **Maintainability** → Difficulty to update content, authoring not independent from VLE
- **Reusability** → Content embedded in VLE and nor searchable or retrievable
- **Durability** → Do not recover from a deep change in the delivery format or content format

Lack of an abstraction level

Educational Content:
Abstraction Level

Technical issues

HTML tree, *.asp, form, GET/POST, ...

→

Pedagógical/Instructional

Module, Task, Sequence, Prerequisite, Assignment, Exercise, Simulation, ...

Learning Content Specification

Lack of an appropriate abstraction level

→

- Provide specifications with associated operational semantic. Not related with delivery formats
- Provide pedagogical design elements
- Authoring tools should not be in VLE's but as standalone applications
- Make LO's interoperable and reusable

Learning Objects

- Interoperable educative content components labeled with Metadata
- Context independent → reusable
- Aggregation of LO's according to its aggregation level
- Repositories of LO's
  - ARIADNE (1997) → Development of LOM
  - Other projects: OASIS, CELEBRATE (IST E.U.)
- Authoring process based on selection and aggregation

Collection of LO's

- Repositories of LO's
  - Metadata + Search → CELEBRATE, ARIADNE..
  - Ontology-based model + Semantic Search → Conceptual Maps (PALO, others…)
- Aggregation levels (Complexity)
  - Simple Content (De-contextualized)
  - Complex content (Parsing needed ➔NOT in final delivery format

Drawbacks

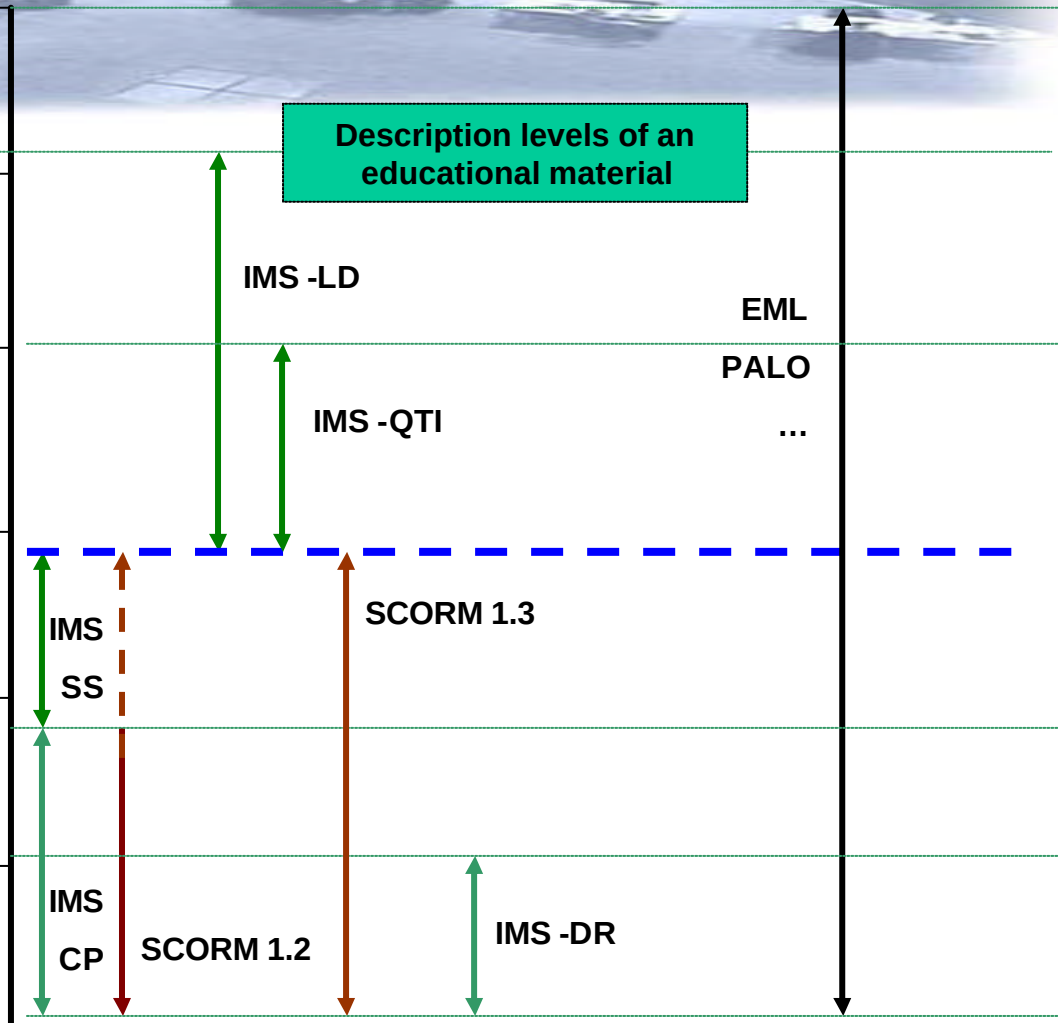
- De-contextualized learning
  - Reusability vs. Aggregation level
  - Context vs. Interchangeability
- Lack of personalization
  - No adaptability to students
- Complex business model
  - Copyright restrictions
  - Known problems of distribution (KaZaA, ...)

Expressivity of contents

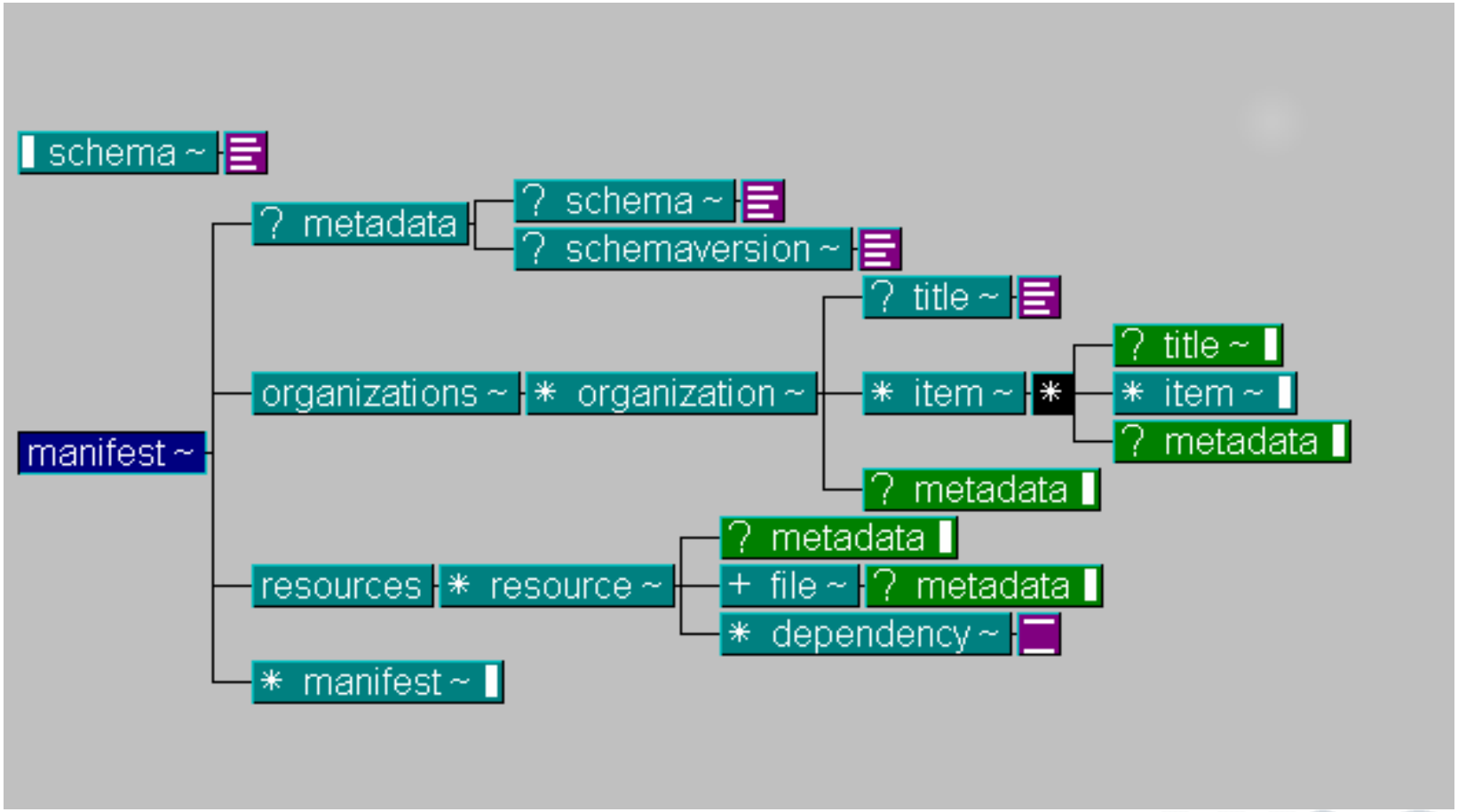
- Need of semantics associated to specifications
- Grouping of elements in semantic layers
- Meaningful elements for rest of layers
- Different specifications in different levels
- Classification of specifications depending on the covered levels

Educational Content

Management	Interoperability parameters with LMS
Pedagogical/Instructional	Pedagogical Information
Activity/Task	Educative processes y activities. Collaborative tasks and activities
Secuencing	Sequencing, prerrequisites, deadlines, dependencies
Structure	Navigational model
Content	Small LO's, assets and formatted content



Content Packaging: XML



IMS Content Package (Ex.)

TOC 1	
Lesson 1	lesson1.html
Introduction	intro1.html
Content	content1.htm
Summary	summary1.htm
Lesson 2	…
Introduction	
Content	
Summary	

IMS Manifest (XML)

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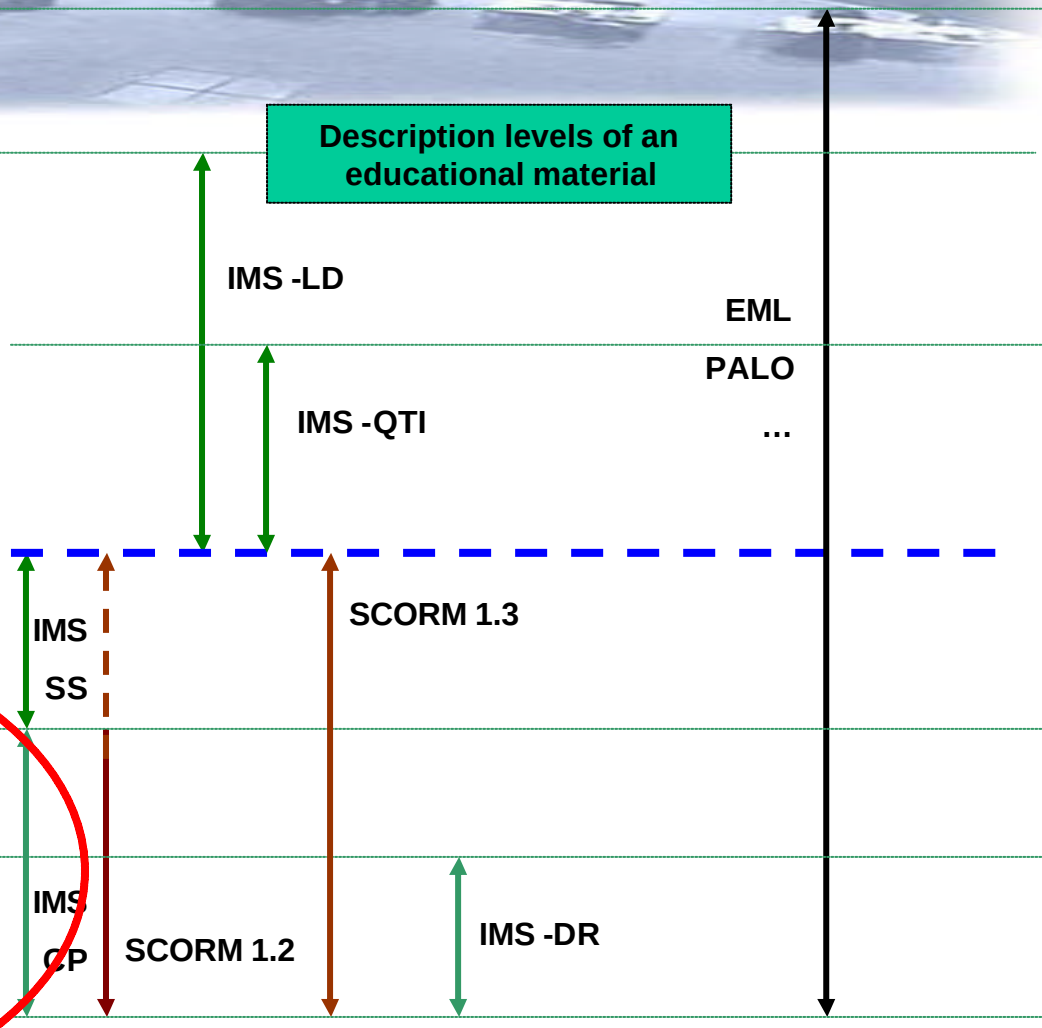
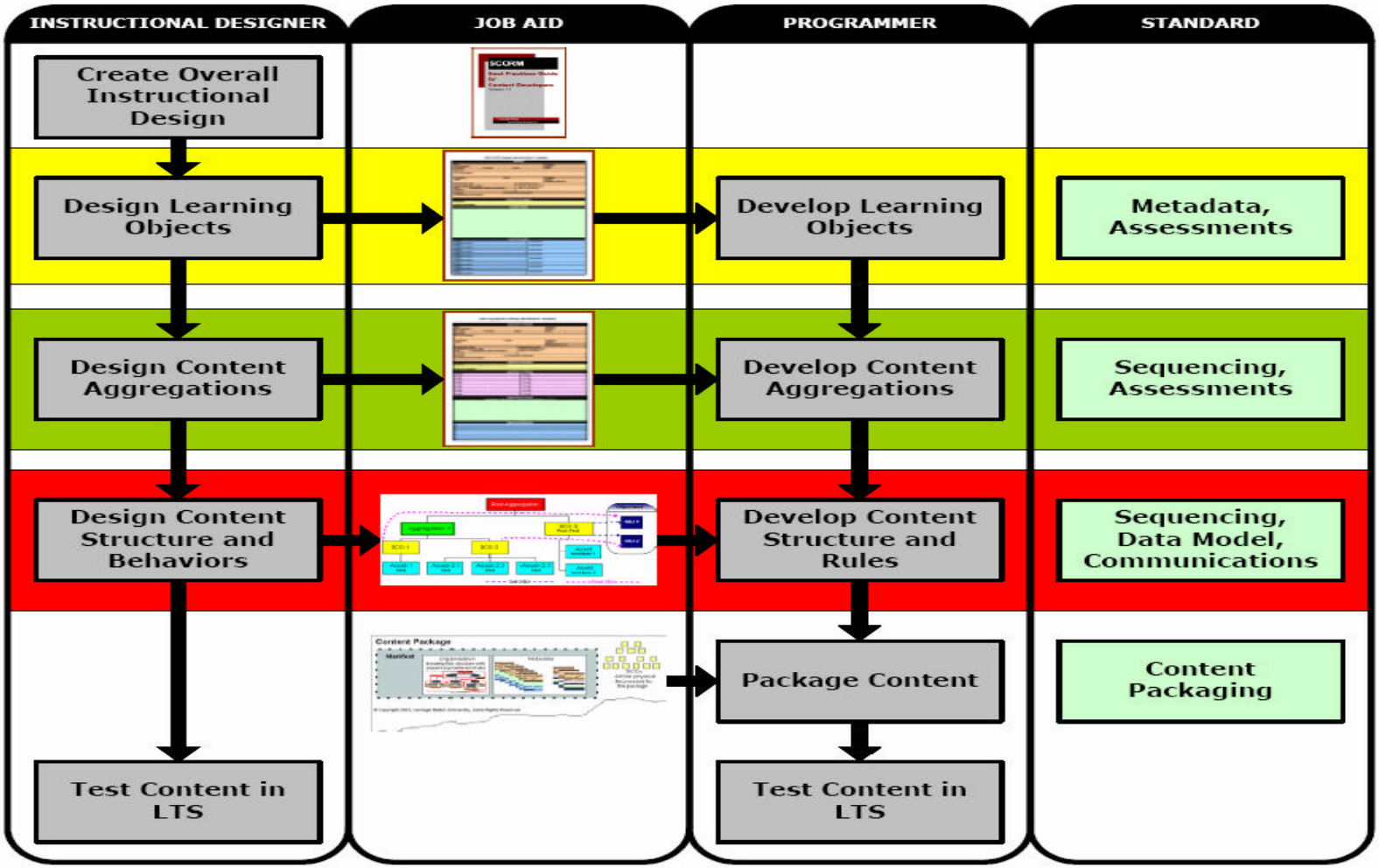


Current Authoring model using LO's



Celebrate Demo Portal

- Celebrate created a Demo Portal to illustrate Search, retrieval and use of LO's
- More than 1.500 LO's currently available
- Mainly focused on schools, not for higher education
- Currently launching LIFE initiative to continue Celebrate (European School net, EUN)
- http://life.eun.org

Celebrate Demo Portal

Celebrate - Microsoft Internet Explorer

Archivo Edición Ver Favoritos Herramientas Ayuda

Atrás Búsqueda Favoritos Multimedia

Dirección http://demoportal.eun.org/celebrate_dp/index.cfm

Google Buscar en la Web PageRank 63 bloqueado(s) Opciones

Celebrate Home sv | en | fr | fi | no | it | hu | he Search Help Logout

CELEBRATE: Learning Objects for Schools Welcome Victor Adamson My Profile

search

Search for Learning Objects

search

Advanced Search for Learning Objects and Assets

use

Your Basket
Go to your learning resources

Go to your Authoring Area
Create new lessons

Go to the Virtual Classroom
Manage your courses

create / contribute

Add a Learning Resource
Upload your own items to the portal

Edit Metadata
Edit the metadata of your learning resources

feedback

Evaluate a Learning Object
Evaluate Learning Objects you use

Evaluate the portal

Using Learning Object
Tell us how you use them in your classroom

browse by subject

Art(82)	Cross-curricular education (35)	Chemistry(61)
Biology(144)	Environmental education (93)	Geography(46)
Physics(289)	History(31)	Language and literature (140)
Mathematics(198)	Music(20)	Natural sciences(577)
Religion(8)	Informatics/ICT(11)	Philosophy(1)

Overview

General Overview
CELEBRATE is a large-scale demonstration project co-ordinated by European Schoolnet and supported by the European Commission's Information Society Technologies Programme (IST). Its aim is to examine how new, more flexible forms of digital content called Learning Objects (LOs) can enhance teaching and learning in schools across Europe... More

News

intel

New Learning Objects
Take a look at the skoool Learning Objects in Science and Maths developed by Intel in association with key partners ...

Celebrate 2.0

New Release
The Demo Portal 2.0 has been released.. More

Advice

If you do not know where to start, take a look at the scenarios!

- Project FAQ
- Learning Objects: an introduction
- Glossary: explanation of terms
- What you need to run Learning Objects
- CELEBRATE metadata
- Pedagogic Library
- Useful Links

Community

Om du är lärare eller elev i en finländsk pilotskola, klicka här.
Jos olet suomalaisesta pilottioppilaitoksesta, klikkaa tästä.
Si vous êtes un enseignant de France, merci de cliquer ici
Ha magyarországi tanár vagy, please kattints ide
Hvis du er lærer fra Norge, vennligst klikk her
If you are a teacher from the UK click here
If you are a teacher from Israel click here

Inicio 25 Internet ... Extensions CBUC -- BARC... 2 Microsoft ... 2 Netscape Adobe Reader... 3 Microsoft ... XML Spy - [Un... 2:02

LO Examples

- Components of inner ear
- Process of destillation
- Change of State – Water

Concept of educational modeling language

- Content representation in a variety of levels
- Description of learning tasks: Modelization of activities and instructional processes
- Compatible with LO model
  - Stored in repositories as another LO's
  - Use of ontology and conceptual maps to retrieve "low granularity" LO's

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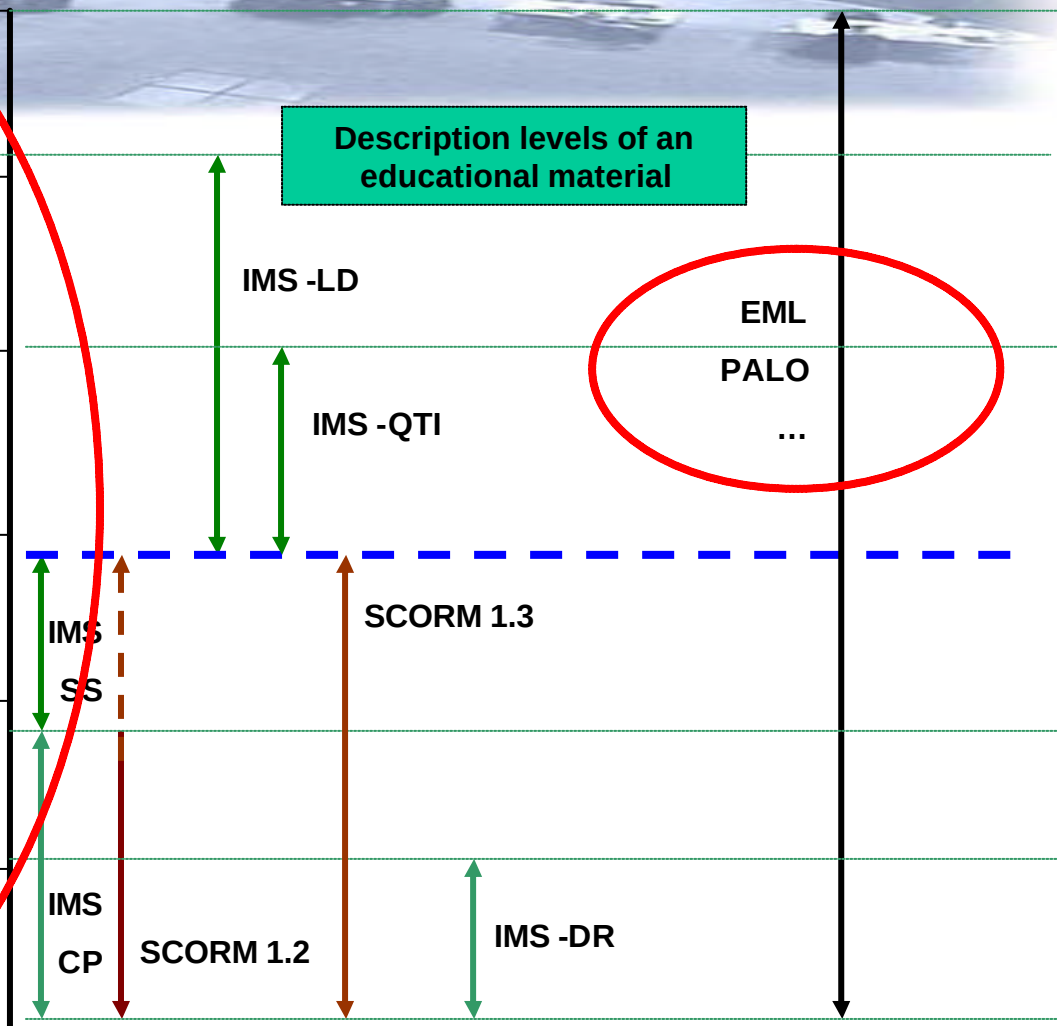


Evolution of Educational Modeling Languages

CEN/ISSS Meeting in Torino (Oct 2001)

→ Introduction of:

- EML (UONL)
- PALO (UNED)
- Targeteam (German Mil. Forces Lab)
- Others

See "Europe Focuses on EML" S. Wilson (CETIS) in http://www.cetis.ac.uk/content/20011015103421

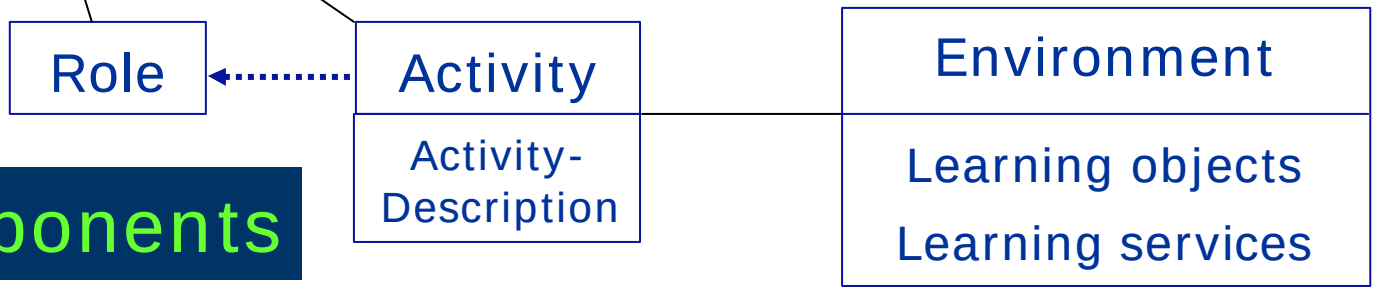
→ Survey of Educational Modeling Languages

→ Development of **IMS-LD** based on EML (OU of the Nederlands)

EML: simple yet powerful

- People engage in Activities, for which they use Resources
  - People: one or many, learner or staff roles
  - Activities: description, structured
  - Resources: learning objects & services (chat, etc.)
- Many roles, activities and resources need co-ordination in a workflow: learning flow
- An instructional design/pedagogy/learning design essentially is a learning flow.

method



components

Example: Course creation in EML

1. **Roles**: Definition of roles (ex. Student, staff member) and definition of the workspaces of each one of the roles, and also types of outcome
2. **Activities:** Definition of content by mean of ona or more activities
3. **Methods**: Definition of sequences of activities defining
   - **Activity structure**
   - **Play per role**
   - **Conditions**

XML File (Example)

- **Components:** tools

Activity structure

AS-boeing-simplified

- **AS-introduction**
  - **LA-fuel-valve-lesson-intro**
  - **LA-fuel-valve-theory**
- **AS-lessons-and-procedure** + **E-interactive-electronic-training-manual**
  - **AS-fuel-valve-lessons**
    - **LA-lesson-hazards** OR
    - **LA-lesson-components**
  - **AS-fuel-valve-removal-procedure**
- **AS-tests** + **E-interactive-electronic-training-manual**
  - **LA-knowledge-test-hazards**
  - **LA-knowledge-test-components**
  - **LA-performance-test**

Authoring process and use

- Requires a RTE to play the course (Edubox, Coppercore, etc.)
- Manage activities independently from LO's and other static resources
- Manage static resources independently from activities defined in the course
- **Reuse ALL: Resources, Activities, Course templates** → !!This is it!!

More approaches to LO creation

- PALO Educational Modeling Language
  - Developed at UNED University
  - Presented in CEN/ISSS EML Workshop in Torino (2001)

Features

  - Uses of **domain ontologies** rather than metadata labeled LO's
  - Simple tasks (no roles) and sequencing

Cognitive Design Process

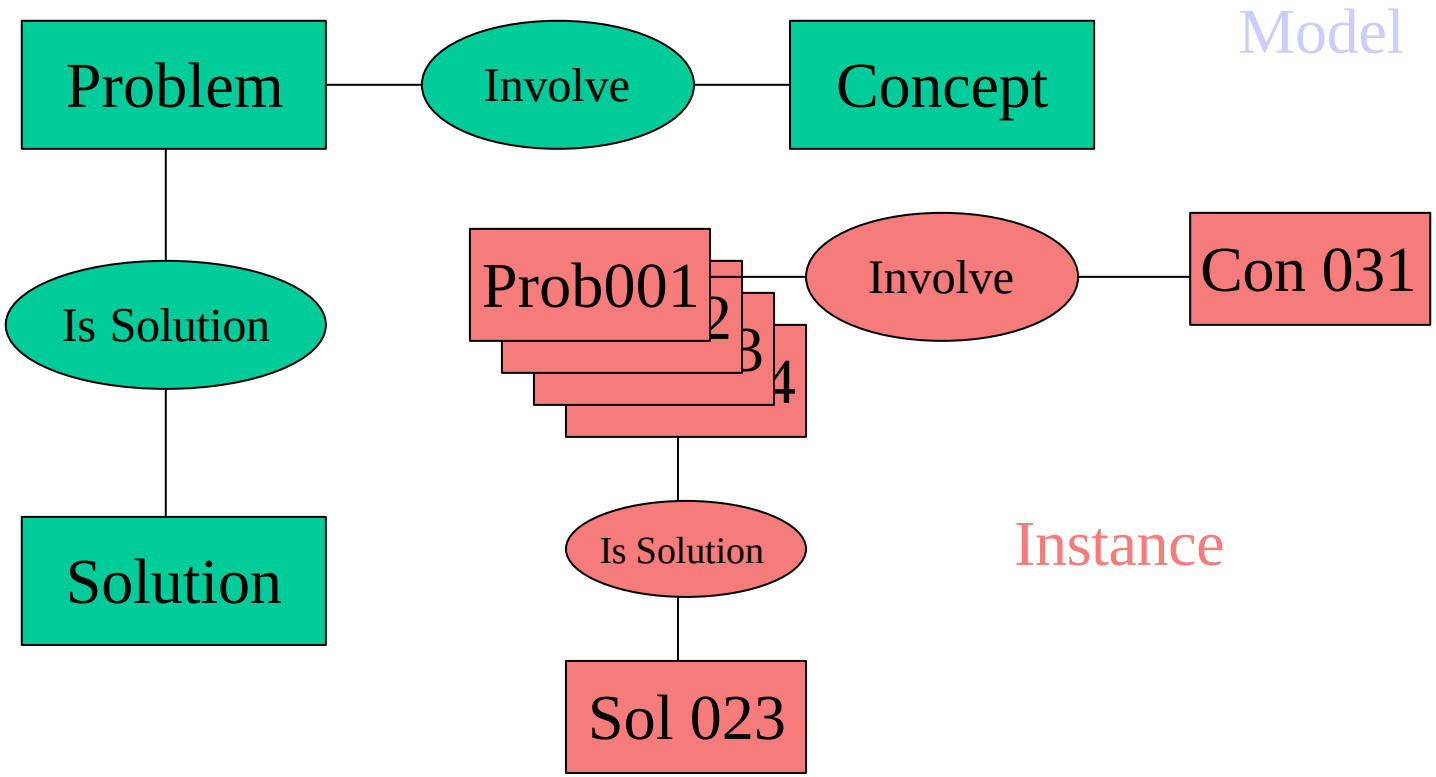
Conceptualisation Phase

Creation of a **generic domain** to describe content matter = ONTOLOGY

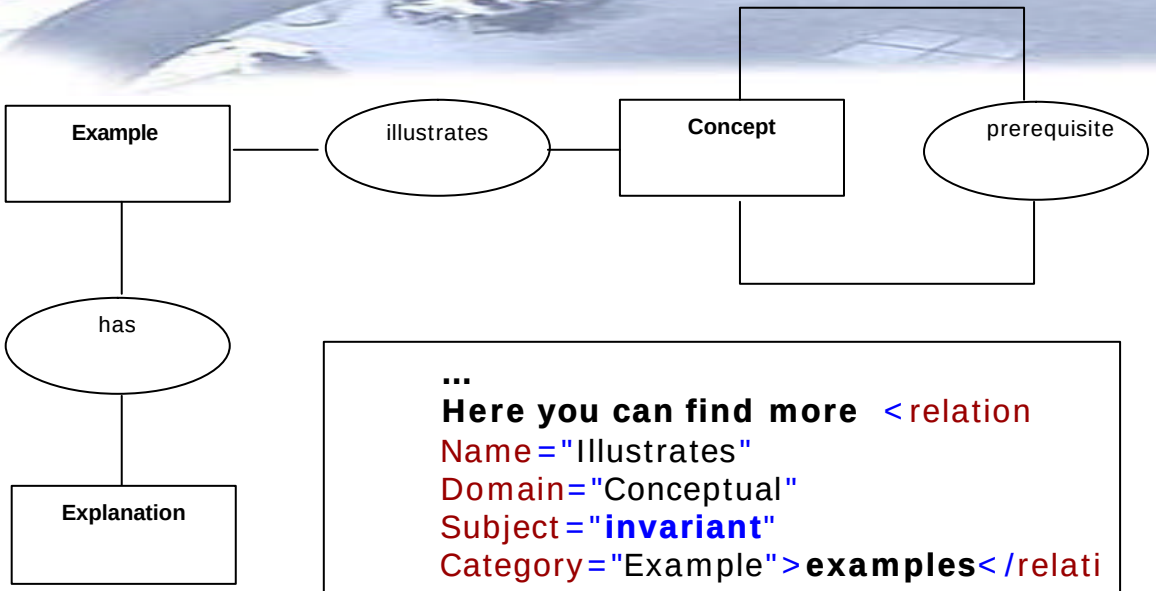
Instantiation Phase

Creation of one or more **instances** for a particular domain matter

An example: Models and Meta-Models

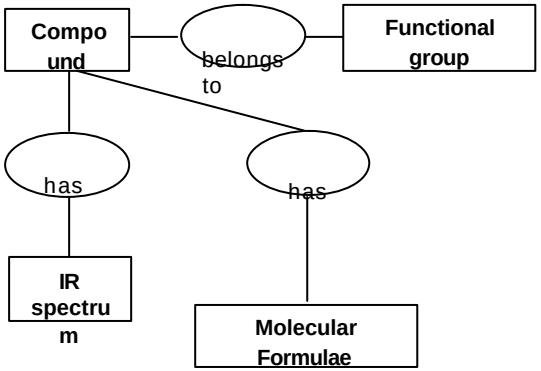


Use of ontologies of LO's



...
Here you can find more <relation
Name="Illustrates"
Domain="Conceptual"
Subject="**invariant**"
Category="Example"> **examples** </relation>
of the concept invariant.
...

XML Example



Learning Scenario (EXAMPLE)

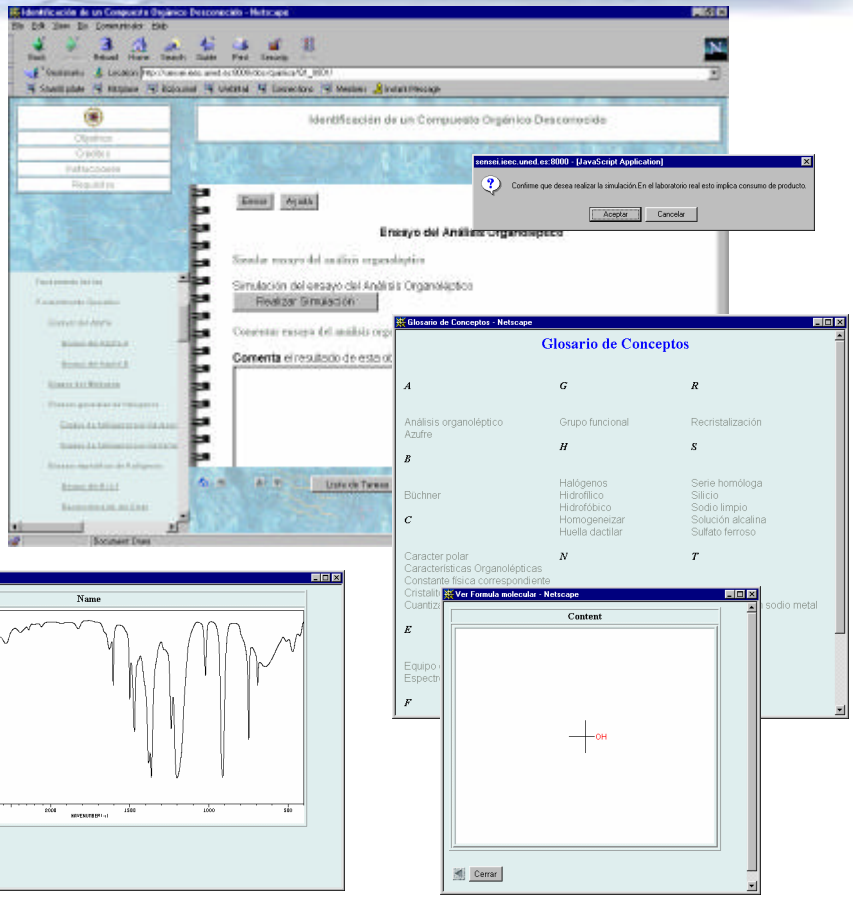
PALO production cycle

ALO Template (DTD)

PALO File (XML)

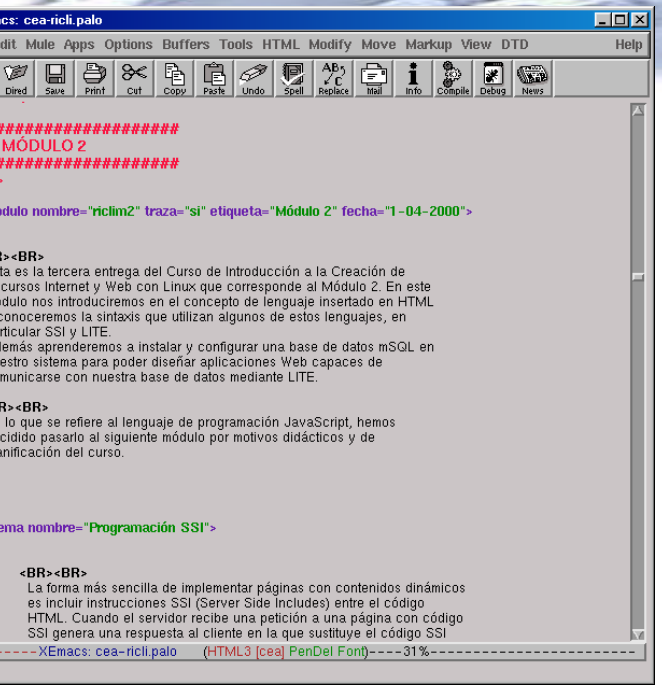
PARSER

Domain Knowledge Base

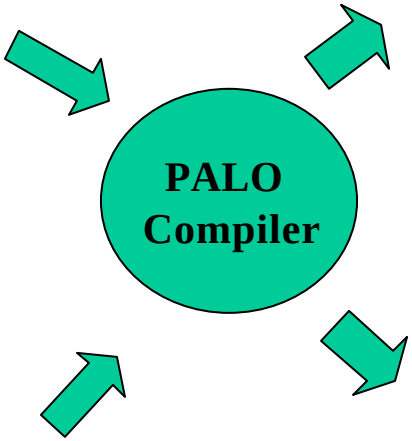


Editing Proces

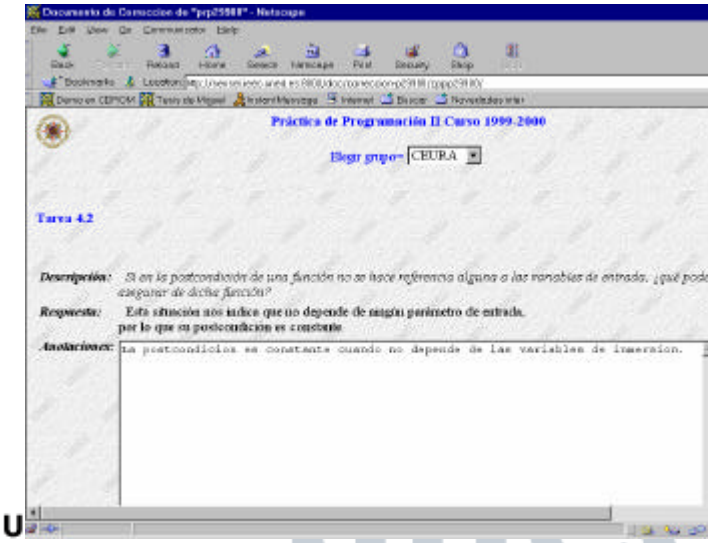
Student Scenario



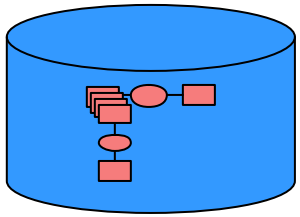
PALO
Document



Tutor Scenario



Domain
Model



Thanks!

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