A Meta-Model to Acquire Relevant Knowledge for Interactive Learning Environments Personalization

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PERSONALIZATION OF PEDAGOGICAL ACTIVITIES

- A topical issue in research in educational technologies
- Adaptation of the individuality of each learner
- A complex and time-consuming task
  - Diversity of learners
  - Variety of study situations
  - Variety of study subjects
- Lack of adequate tools

⇒ Teachers do not efficiently personalize pedagogical activities

⇒ Need to develop software to assist them in the personalization task

PERSONALIZATION OF LEARNING ACTIVITIES

- Multi-faceted research question
  - Paper and pencil activities
  - Interactive Learning Environments (ILEs)
  - Interactions between teachers / interactive environments and students
  - Etc.

- Learner profiles (Jean-Daubias et al. 2005)
  - Elements characterizing knowledge, skills, perceptions, and/or behaviour
  - Collected or deduced from pedagogical activities which can be computerized or not

- Personalization of ILEs
  - Unified approach
  - Process and meta-model
  - ILEs assisting a situation of individual learning

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(Jean-Daubias et al. 2005). An environment helping teachers to track students' competencies. Workshop LEMORE, AIED'2005, Pays-Bas.

OUTLINE

- Difficulties of an unified approach
- Our approach
  - Principles of Adapte
  - EPROFILEA environment
- A survey of existing systems and standards
  - Describing an ILE for Personalization
  - Describing an ILE Using Metadata
- The AKEPI meta-model
- Conclusion

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Difficulties of an unified approach
Heterogeneity of ILE

- Concerns : environment + content of the environment

- Form
  - Intelligent tutor, microworld, simulator, hypertext document...
- Mode of use
  - Free or guided curriculum
- Content
  - Sequence of predefined activities, manipulated objects...
- Variety of educational goals
  - Acquisition of a method, acquisition of a set of knowledge, acquisition of practice...

DIFFICULTIES OF AN UNIFIED APPROACH
Heterogeneity of educational situations

- Learning situation
  - Individual, collective, collaborative
- Various actors
  - Learner, teacher, tutor…
- Role of the teacher
  - Designer or tutor

$\Rightarrow$ Double heterogeneity : the teacher must be able
  - $\Rightarrow$ To configure ILE in order to satisfy his own pedagogical goals
  - $\Rightarrow$ To build different types of profiles enabling him to manage personalized educational situations for learners

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Principles of Adapte

- Adapte
  - A tool dedicated to personalization of pedagogical activities
  - ILE activities or paper and pencil worksheets
  - Personalization based on
    - Learners profiles
    - Pedagogical goals of teachers

- EPROFILEA environment (Jean-Daubias et al. 2005)
  - Manipulation of existing profiles
  - Two main steps: integration of profiles and reuse of these profiles

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A SURVEY OF EXISTING SYSTEMS AND STANDARDS
Describing an ILE for Personalization

- Personalization of an ILE may cover five targets
  - Activities
  - Organization of these activities
  - Functionalities
  - Feedback
  - Interface
- Parameters acting on these targets
  - Configuration files
  - Configuration interface
- Each of these parameters
  - Can be described using a common formalism
  - Must be accompanied by pedagogical competences

- ⇒ In order to personalize an ILE in outsourced way
  - ⇒ The parameters impacting on the setting of the software
  - ⇒ The competences associated with changing these parameters
  - ⇒ A technical description on how to modify the configuration files

A SURVEY OF EXISTING SYSTEMS AND STANDARDS
Describing an ILE Using Metadata

- Description of content
  - General : Dublin Core
  - Educational resources : LOM, SORM
- ⇒ Not metadata on technical appearance

- LSCM : software component description pattern [Rebaï et al. 08]
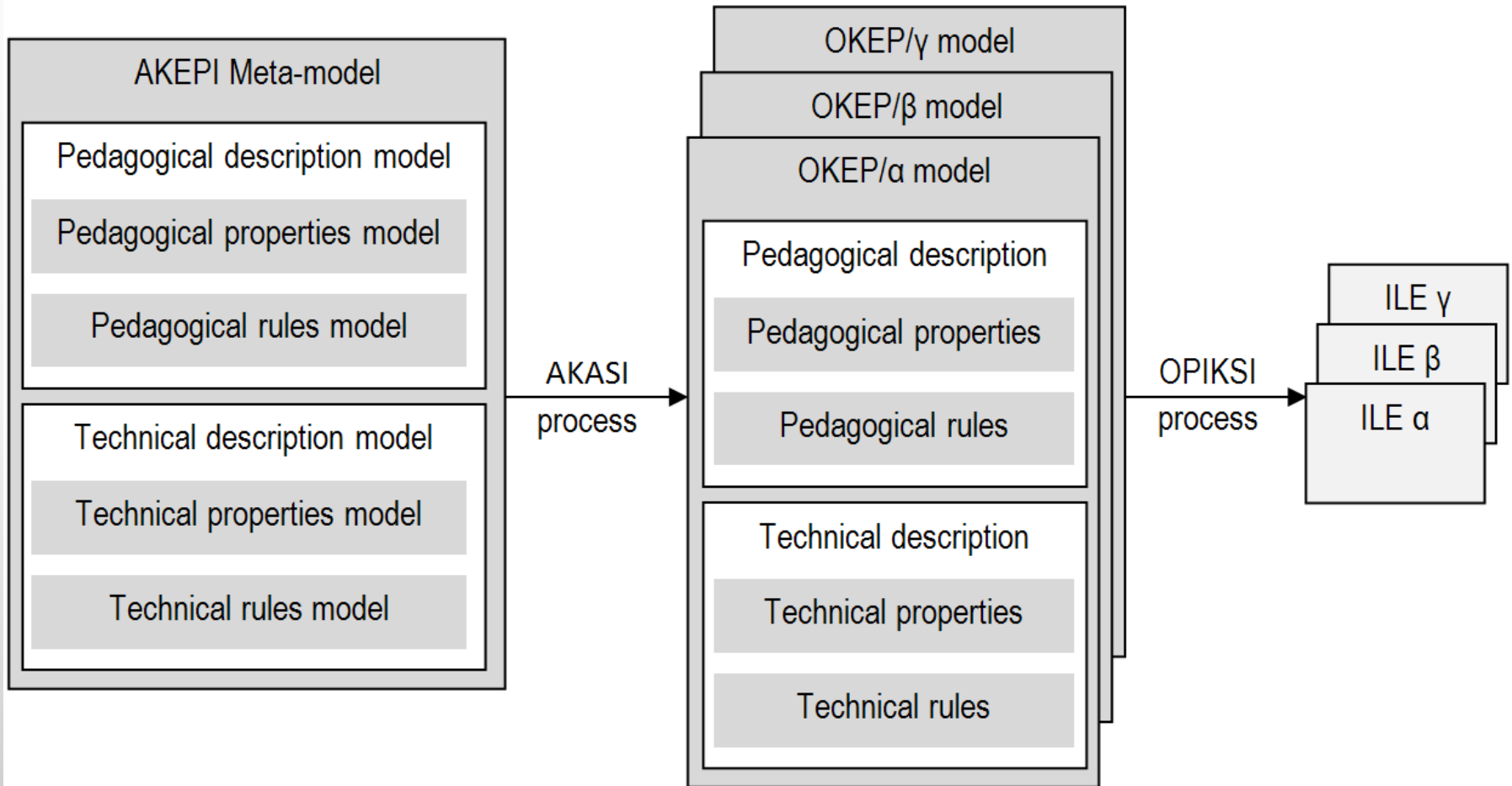- ⇒ To describe ILEs for reuse, but not for personalization

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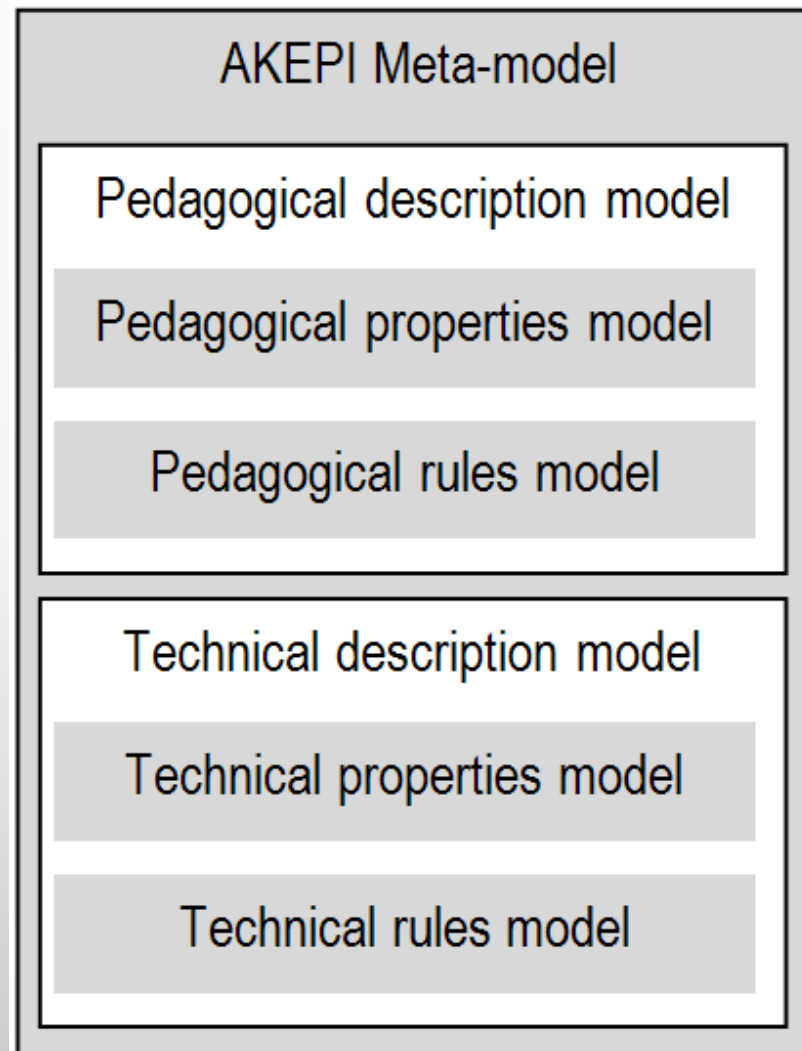 - Describing an ILE Using Metadata
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AKEPI Meta-model
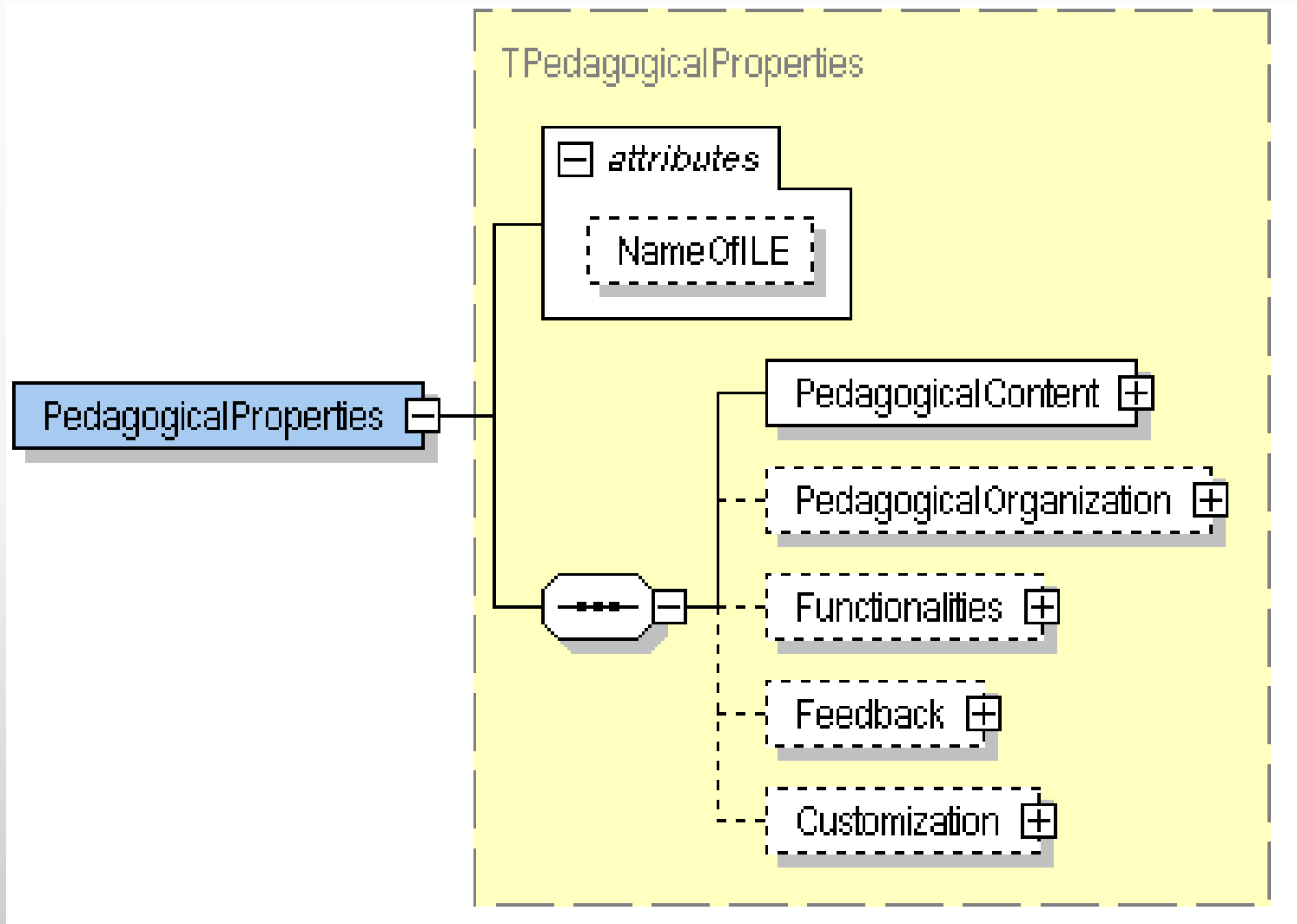## Acquisition of Knowledge Enabling Personalization of ILEs
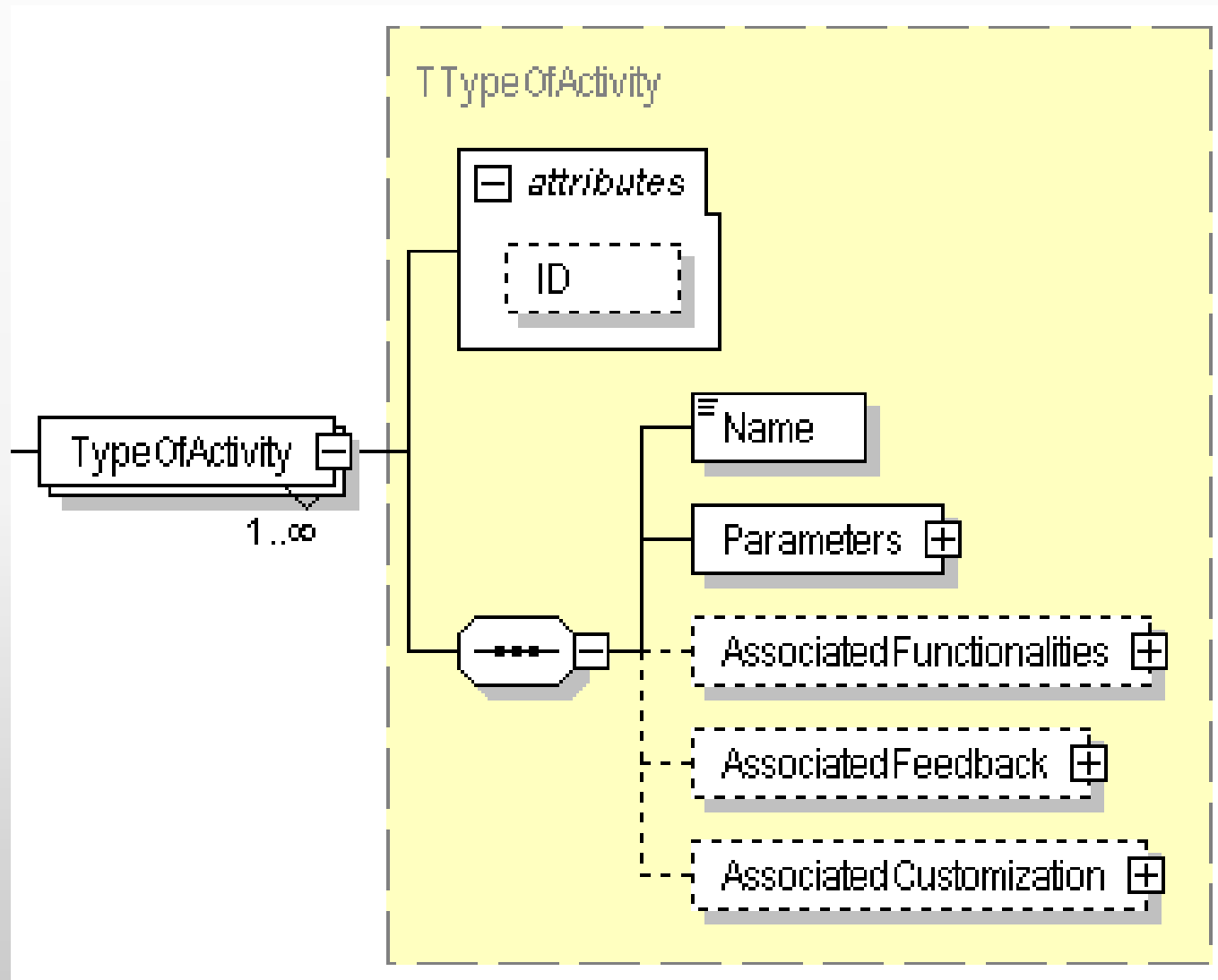
AKEPI Meta-model
Knowledge of the Meta-Model

AKEPI Meta-model

- Pedagogical description model
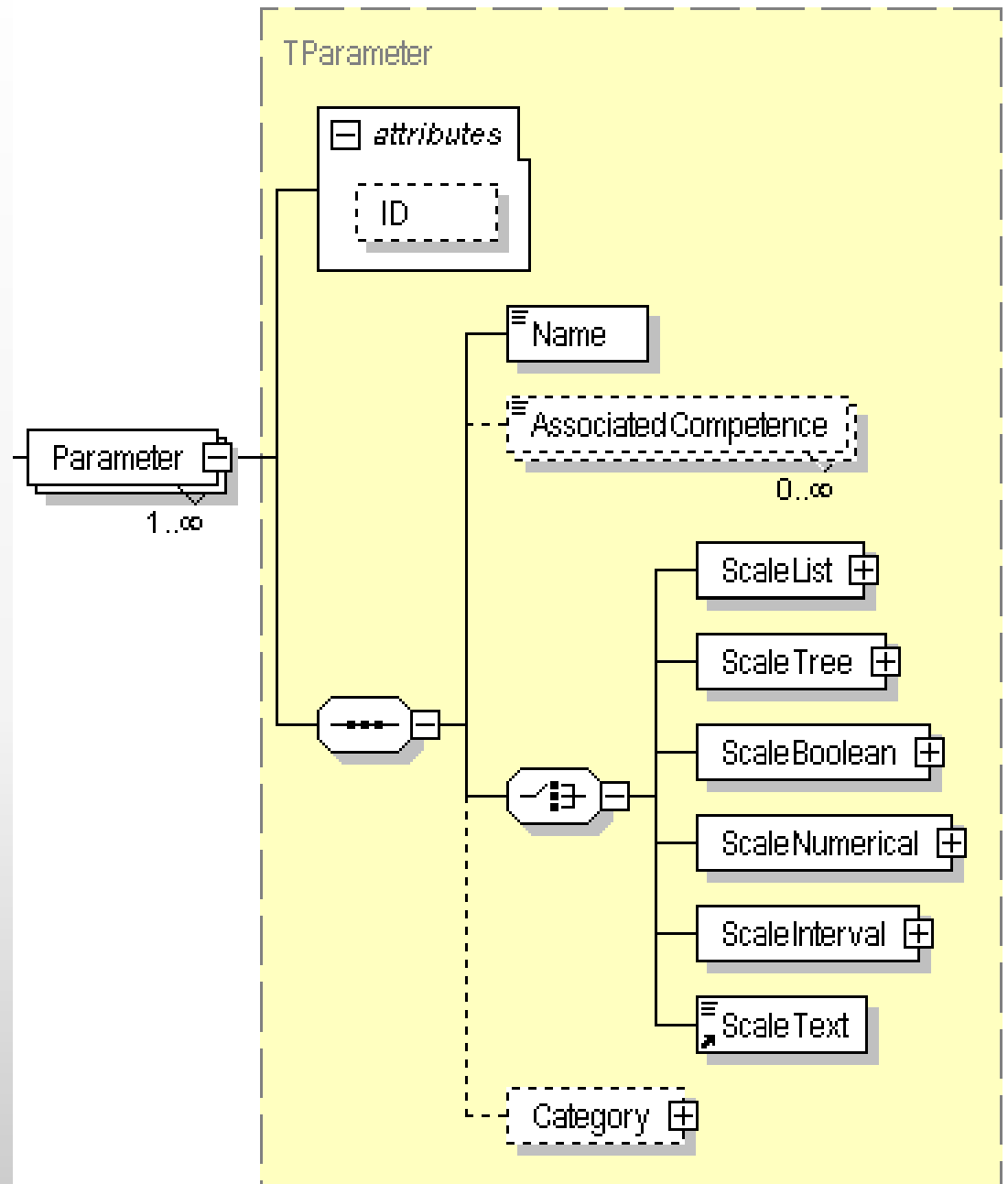 - Pedagogical properties model
  - Pedagogical rules model
- Technical description model
  - Technical properties model
  - Technical rules model

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AKEPI Meta-model
The Model of Pedagogical Properties

AKEPI Meta-model
The Pedagogical Content

AKEPI Meta-model
A Parameter

AKEPI Meta-model
The Model of Pedagogical Rules

IF Value(parameter i_1) = X_1	THEN Value(parameter j_1) = Y_1
IF Value(parameter i_1) ϵ {X_1 .. X_n}	THEN the parameter j_1 will be inaccessible
IF Value(parameter i_1) not defined	THEN ValueDomain (parameter j_1) = {Y_a .. Y_b} with a≥m and b≤n where m and n are the initial bound
IF C_1 and C_2 with C_i is a constraint on a value of a parameter	THEN C_1 and C_2 with C_i is a constraint on a value or domain of value of a parameter

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Conclusion

- Proposition
  - A meta-model for acquire knowledge of ILE personalization

- Validation
  - Allows the creation of personalization model
    - 30 ILEs from the initial corpus
    - 5 new ILEs

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