CPM: a UML Profile to design Cooperative PBL situations at didactical level
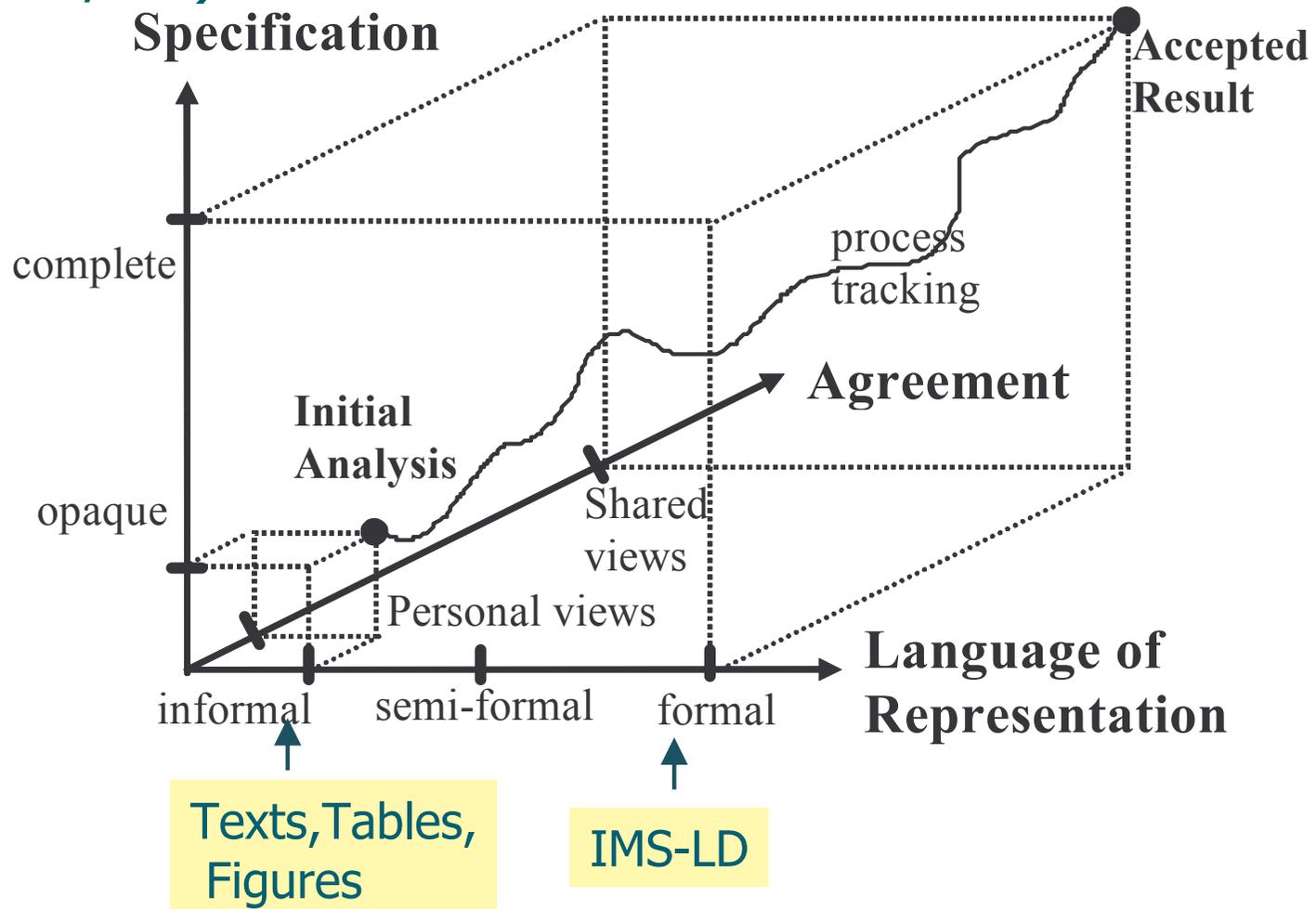
Thierry Nodenot

IUT de Bayonne
Laboratoire LIUPPA

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✓ cf (Pohl, 94)

Educational modelling languages : stakes, perspectives and agenda

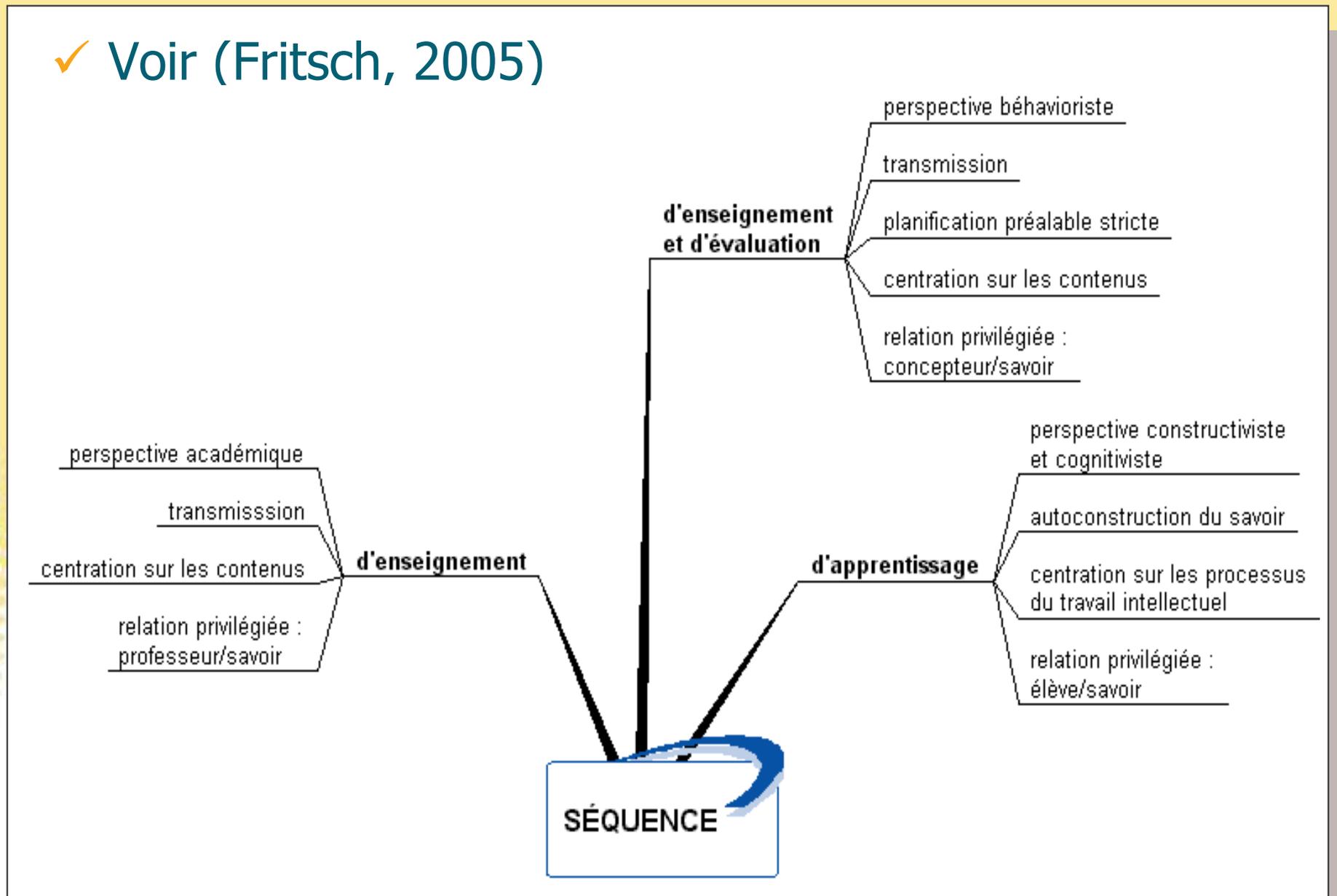**Specification**

Accepted Result

complete

process tracking

Agreement

Initial Analysis

opaque

Shared views

Personal views

informal   semi-formal   formal   **Language of Representation**

Texts, Tables, Figures

IMS-LD

➡ *Teacher Agreement ?*

Educational modelling languages : stakes, perspectives and agenda

✓ Voir (Fritsch, 2005)

d'enseignement et d'évaluation
- perspective béhavioriste
- transmission
- planification préalable stricte
- centration sur les contenus
- relation privilégiée : concepteur/savoir

d'enseignement
- perspective académique
- transmisssion
- centration sur les contenus
- relation privilégiée : professeur/savoir

d'apprentissage
- perspective constructiviste et cognitiviste
- autoconstruction du savoir
- centration sur les processus du travail intellectuel
- relation privilégiée : élève/savoir

SÉQUENCE

Educational modelling languages : stakes, perspectives and agenda

IMS-LD Editor

IMS-LD Scenario

Moteur d'exécution

education-centered modeling of the learning situation

modeling of the context

Context-free educational models

Fusion stage : merging of the educational models with their context of use

An abstract model describing part of the context

computational models focusing the implementation of the learning situation

Educational modelling languages : stakes, perspectives and agenda

✓ Dedicated to the specification of Cooperative Problem-Based Learning Situations

✓ Focusing on the modeling of didactical choices (predictive approach -> model = theory)

Design Phase

Natural Language	UML	IMS-LD EML Educational Ontologies Meta-Data	Implementation Phase	
Initial requirements	Analysis and Design	Detailed Design		
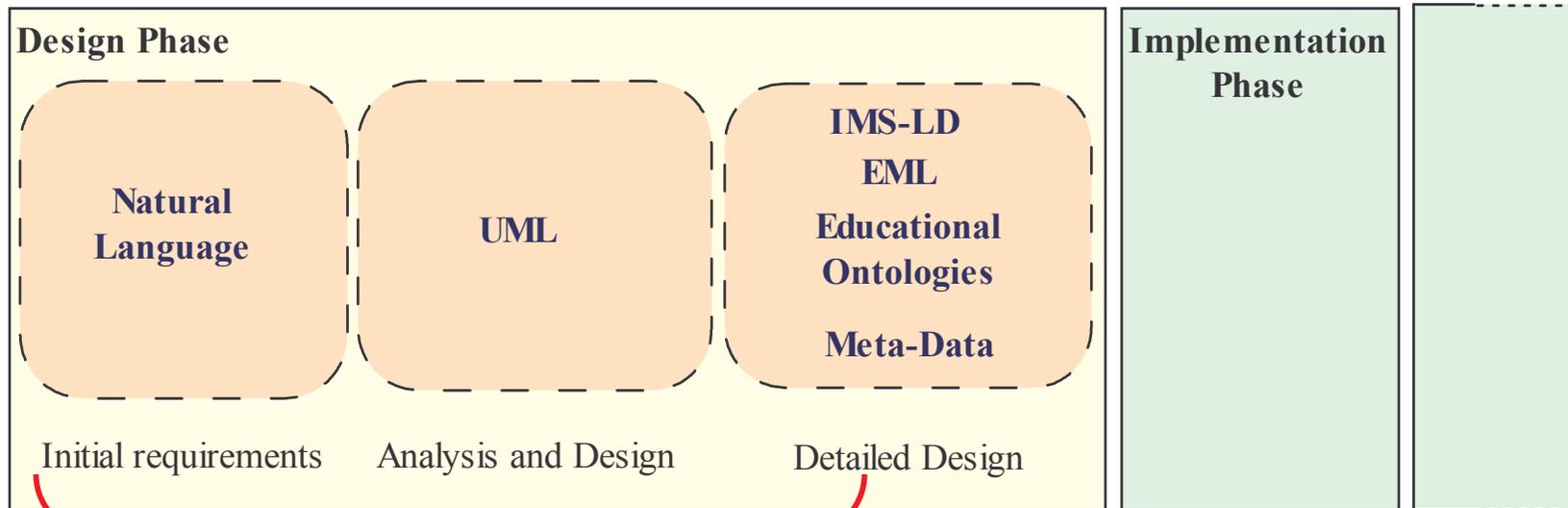
Position of the CPM language

Educational modelling languages : stakes, perspectives and agenda

- ✓ CPM aims at modeling didactical scenarios, particularly the relations between :
  - ■ The predictive learning scenario
  - ■ Its context :
    - ● Aims of the scenario / activities (learning goals in relation with the knowledge to be taught)
    - ● Situated roles, knowledge embedded in resources and knowledge to be taught
    - ● Activities embedding details that can be specified in terms of learning steps, of raised pedagogical events / of tool functionality

- ✓ With CPM, roles are situated / activities are white-boxes / resources (documents, tools) are contextualised

- ✓ With CPM, a scenario is not executable after design. It constraints the implementation phase.
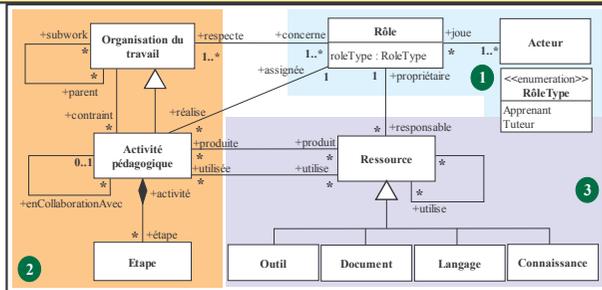
Educational modelling languages : stakes, perspectives and agenda

✓ A CPM specification = a set complementary models including :

- Static views
- Dynamic views

✓ CPM is built on top of the UML Language (a UML profile dedicated to the specification of cooperative PBL situations) :

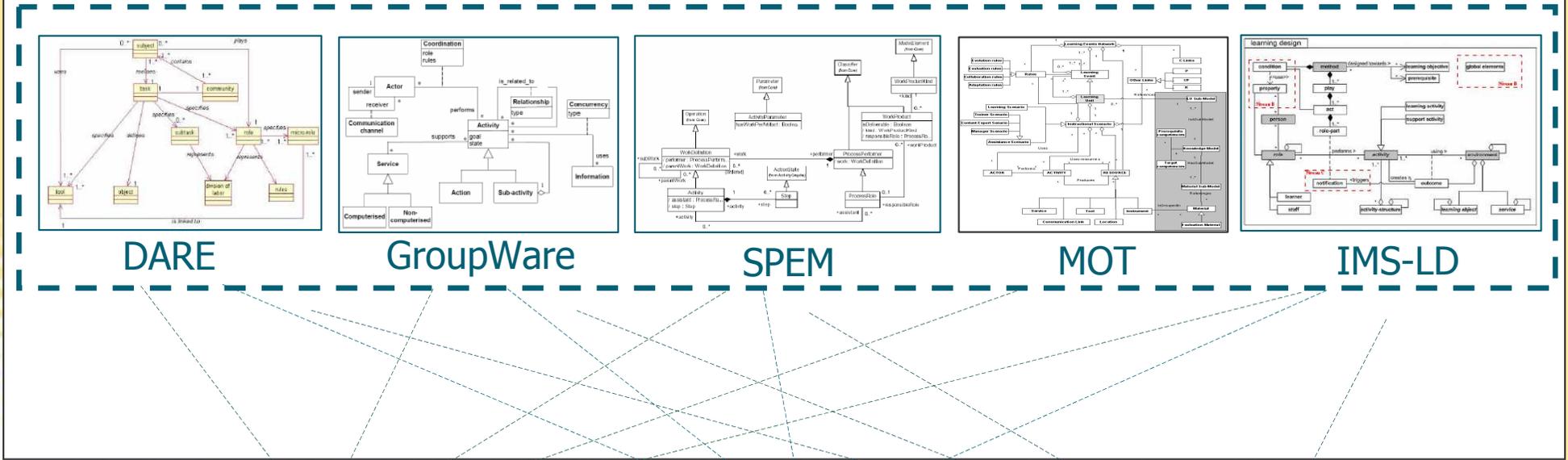- The CPM metamodel
- The CPM profile
- The toolset

CPM Metamodel (LIUPPA)

Study of different metamodels dedicated to the modelling/design of activities

Educational modelling languages : stakes, perspectives and agenda

DARE   GroupWare   SPEM   MOT   IMS-LD

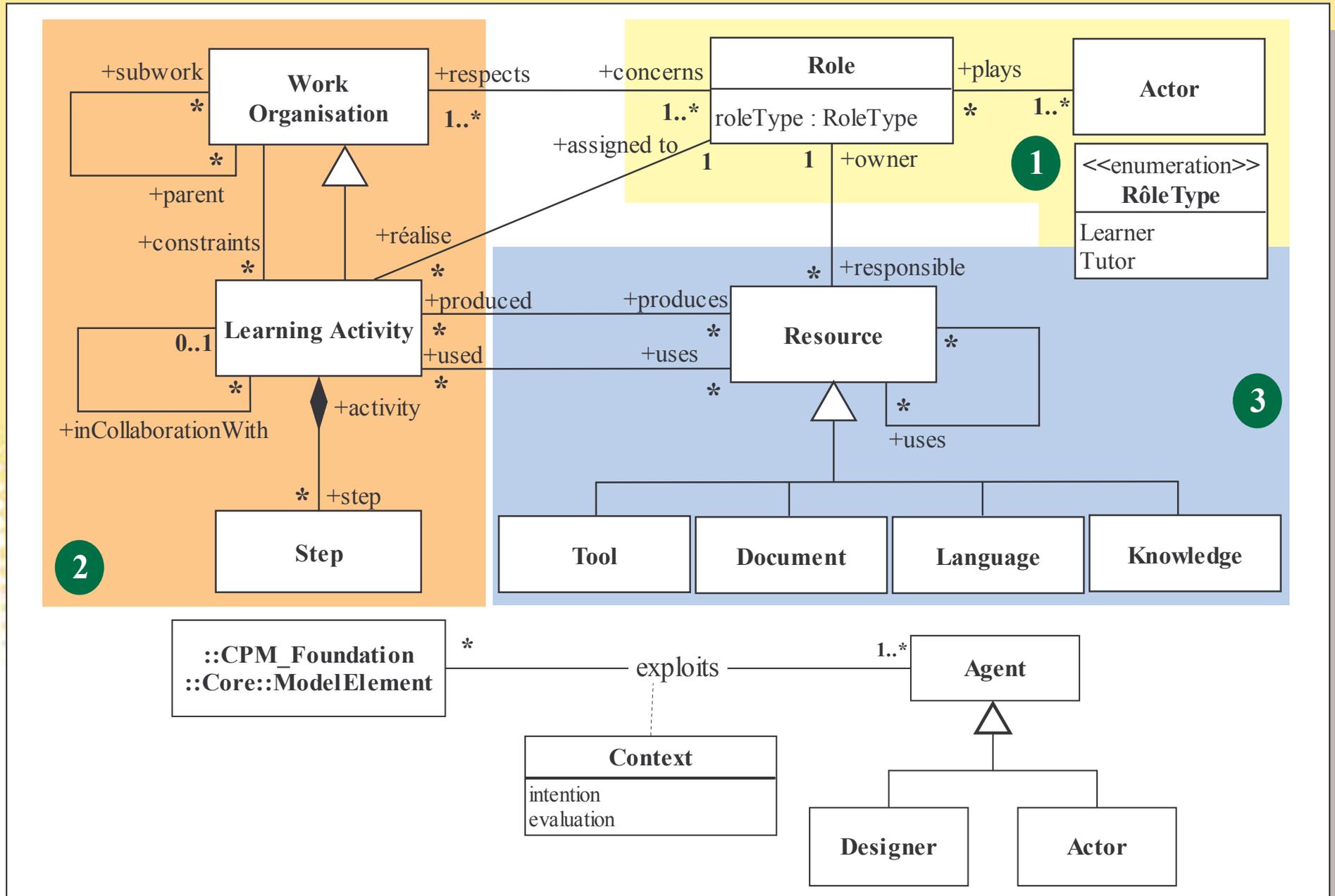Structural aspects

Social aspects

Pedagogical aspects

Structural decomposition
Activity structures / steps

Roles/activities
Collaboration
User rights/tools

Activities / Knowledge
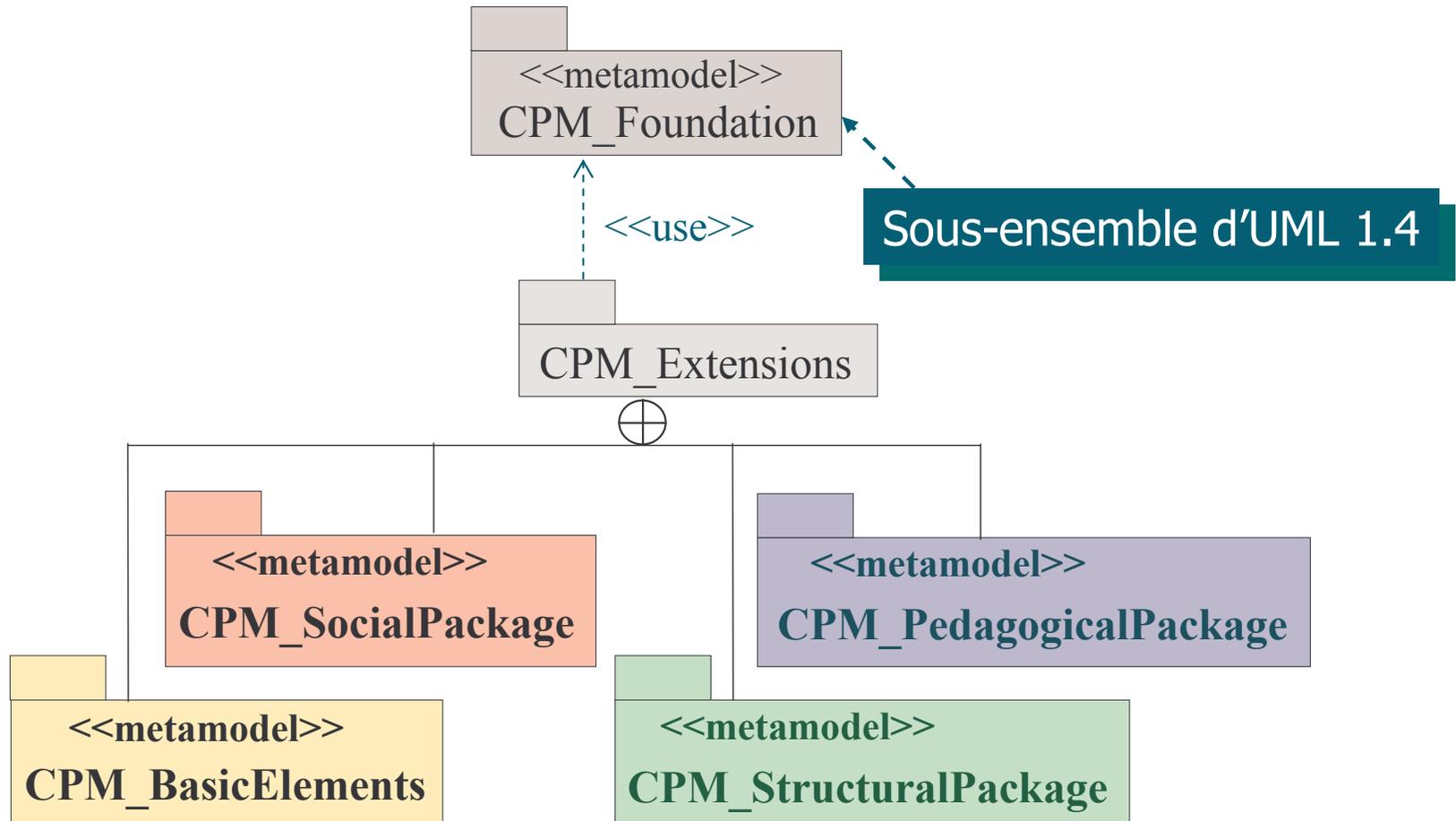Pre-requisites/objectives
Resources/services/tools

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Educational modelling languages : stakes, perspectives and agenda

Educational modelling languages : stakes, perspectives and agenda

<<metamodel>>
CPM_Foundation

<<use>>

Sous-ensemble d'UML 1.4

CPM_Extensions

<<metamodel>>
CPM_SocialPackage

<<metamodel>>
CPM_PedagogicalPackage

<<metamodel>>
CPM_BasicElements

<<metamodel>>
CPM_StructuralPackage

The CPM Profile (1)

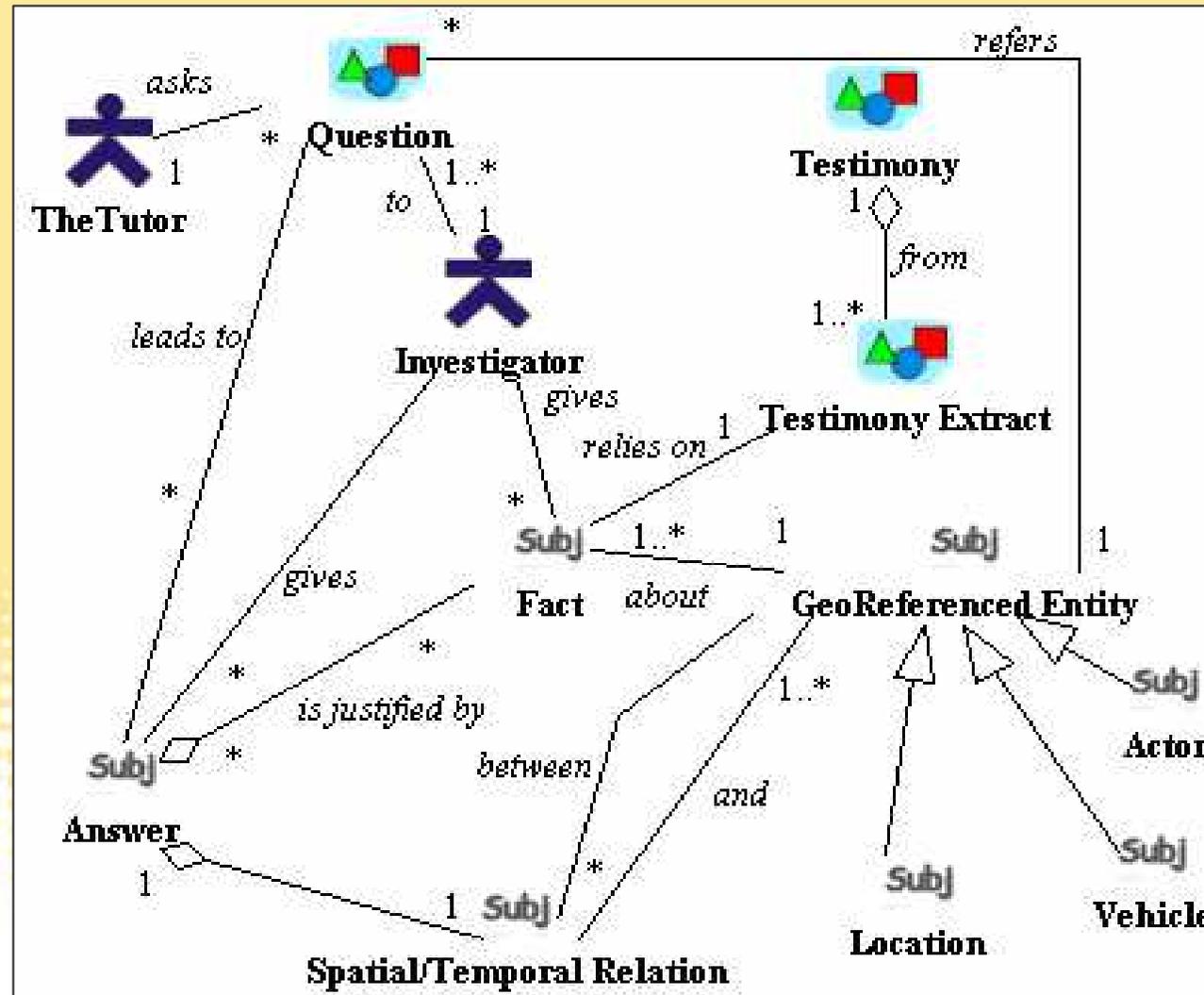| Stéréotype	Méta-classe	Contrainte	Icône
LearningPhase	**Core::Operation** ActivityGraphs::ActionState ActivityGraphs::SubactivityState UseCases::UseCase Core::Classifier		
Activity	**Core::Operation** ActivityGraphs::ActionState ActivityGraphs::SubactivityState UseCases::UseCase Core::Classifier	oui	
Role	**UseCases::Actor** ActivityGraphs::Partition	oui	

Alternative metaclass

Educational modelling languages : stakes, perspectives and agenda

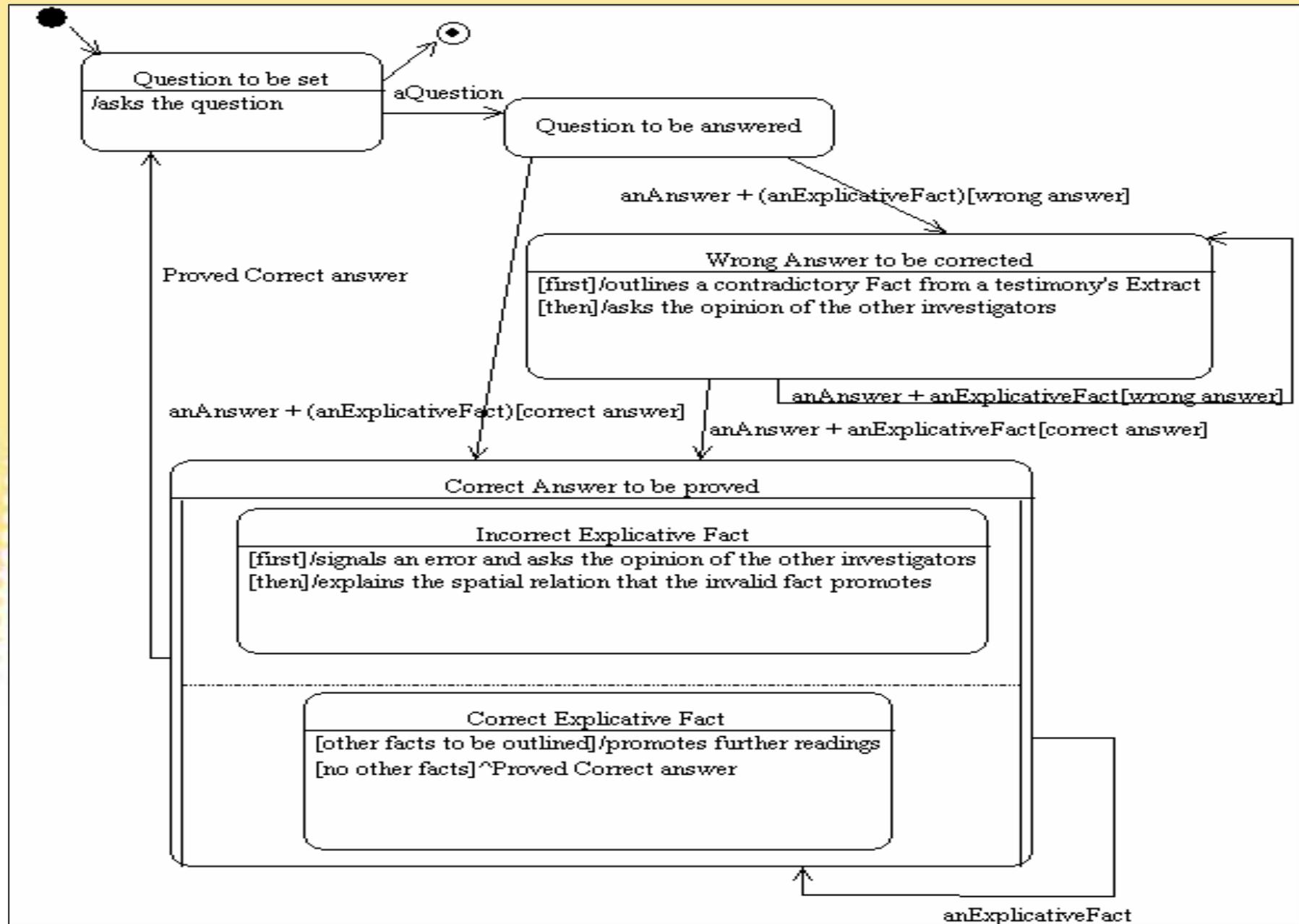Use cases et rôles de l'acte 2

<<performs>>

Analyse des témoignages

<<assists>>

RôleEnquêteurs 1 à 3

<<performs>>

<<performs>>

Transmission des témoignages aux enquêteurs

<<performs>>

RôleChefPolice

Production des rapports d'enquête

RôleEnquêteur 4

<<performs>>

Gestion du temps et des rendus de documents

<<performs>>

Rôle Gestion de Session

Production schéma de l'accident

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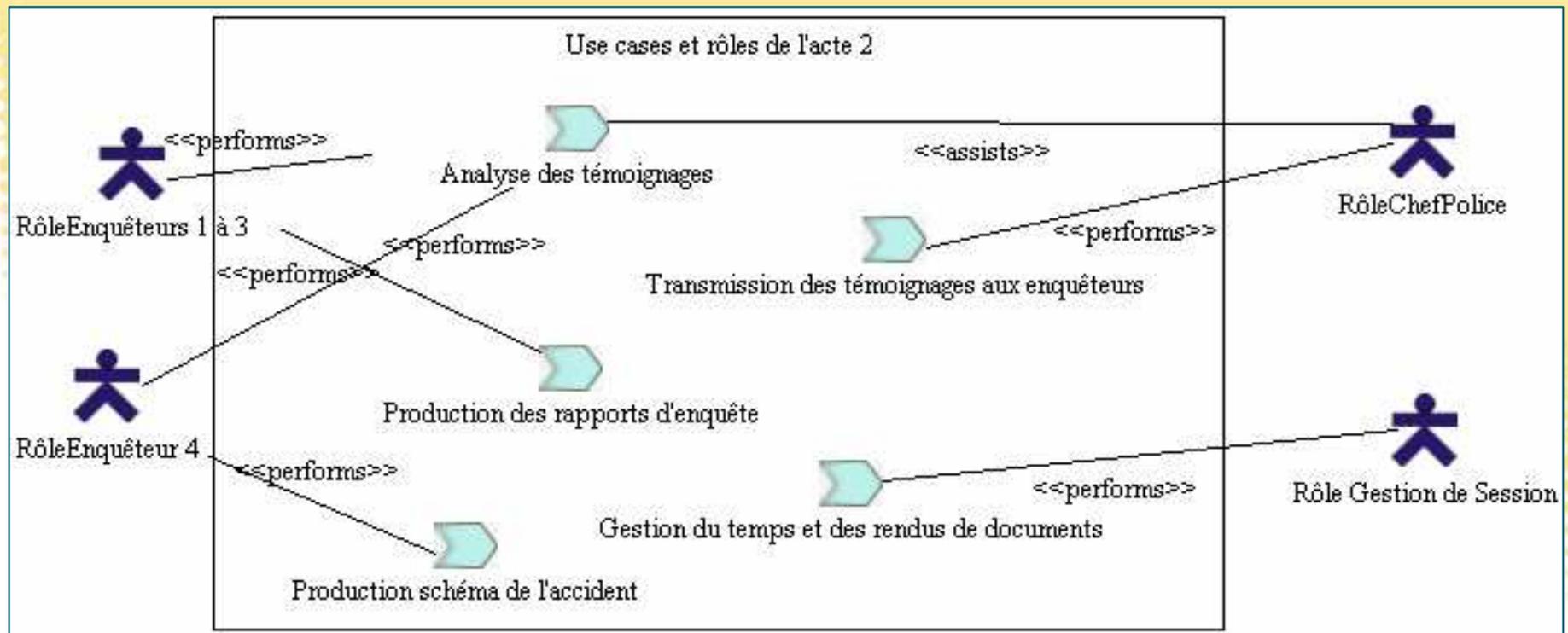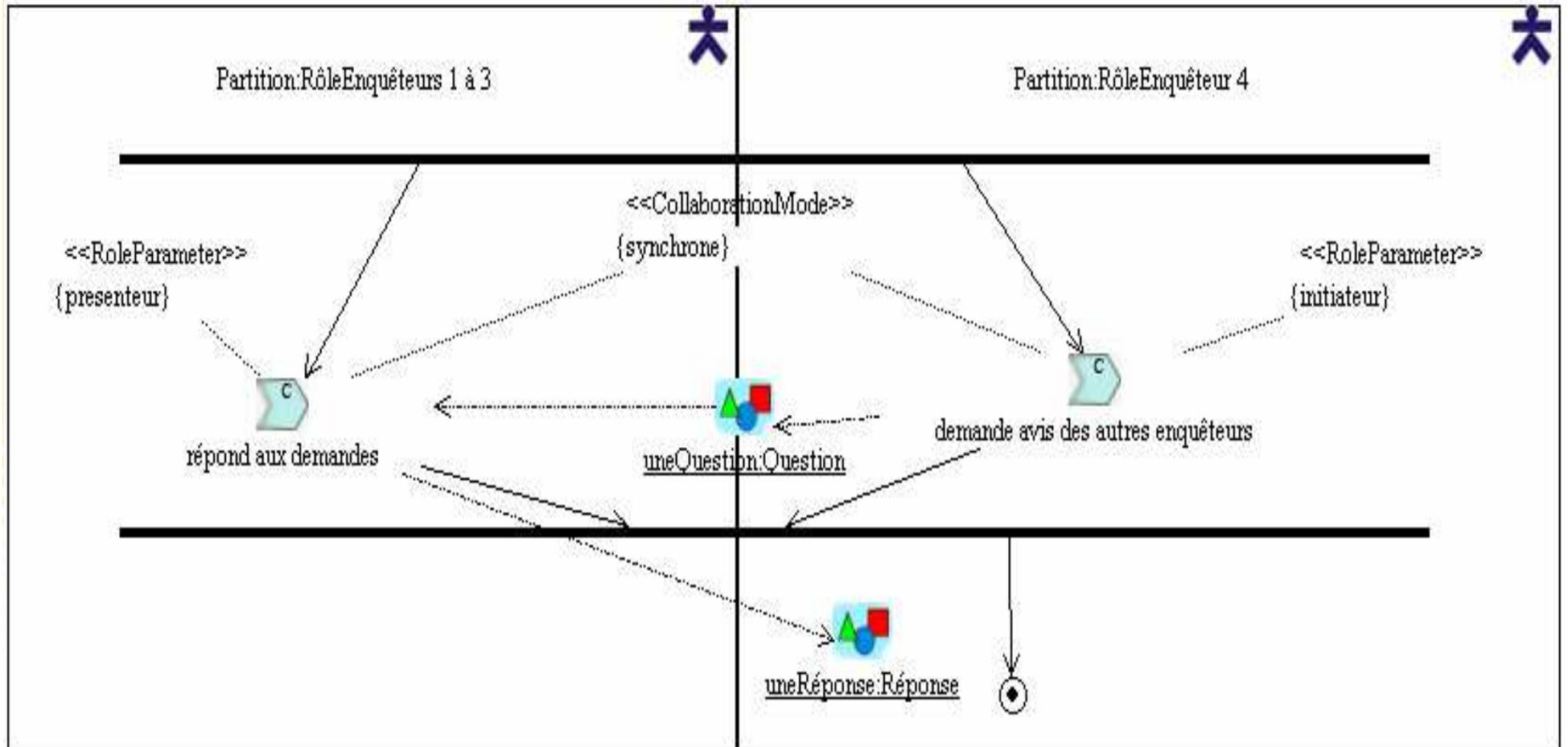
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The CPM Profile (4)

Use	Initial expression of requirements	Analysis	Design
Use Case Diagram	- Activity cut-out - Role identification		
State Machine Diagram			- Description of different states of each resource
Class Diagram	- Objective definition - Preliminary task definition - Obstacle definition - Success criterion definition - Role definition	- Detailed objectives - Representation of authentic situation knowledge - External analysis of activities	- Detailed specification of roles (global and local) - Detailed specification of resources
Activity Diagram	- Global task definition - Success criterion definition	- Individual or collective task sheets - Internal analysis of activities - Activity structure details	- Scenario specification: in level (acts, scenes, etc.); in activities by level - Specification of coordination activities and collaborative activities

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The CPM Toolset (1)

✓ Available for the Objecteering UML Case Tool

✓ Some Wizards :
   ■ To provide some methodological support
   ■ To generate IMS-LD compatible code (level A)

✓ Still a prototype
   ■ Smash PBL case Study
   ■ Planet Game Case-Study (ICALT2006)
   ■ Rando_Vignemale Case Study

✓ To be upgraded for UML 2.0 and Objecteering 6

The CPM Toolset (2)

✓ A building-block of an educational modelling bus ?

CPM Case Tool

P_OCL checker

Gendep

Genscen

IMS-LD

LDL