Specification of learning management system-centered graphical instructional design languages

A DSM experimentation about the Moodle platform

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Université du Maine

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PÔLE DE RECHERCHE ET D'ENSEIGNEMENT SUPÉRIEUR

graphiT
Graphical VIDLs 4 Teachers

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Research context

✗ Laboratoire d'Informatique de l'Université du Maine (Le Mans, France)

✗ TEL engineering team

✗ 6-month explorative research work

✗ GraphiT project

➔ Funded by French research agency (ANR)

➔ Study expressiveness possibilities of operationalizable designing language

➔ Learning scenarios automatically deployed on LMS
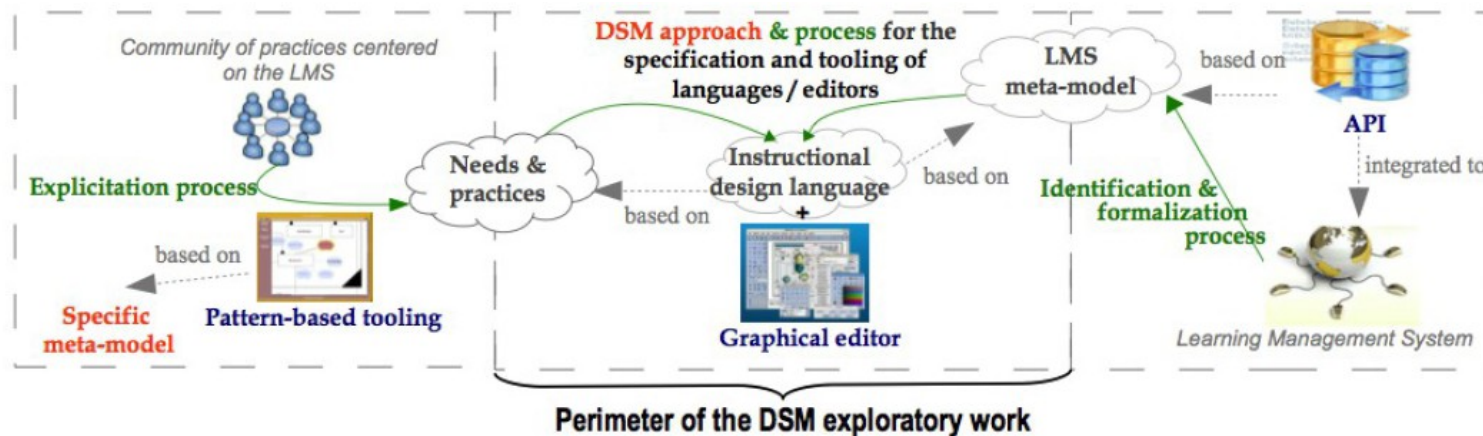
Assumptions and objectives

✗ Assumptions:

➔ Institutions provide LMS to teachers and students

➔ Teachers are taught how to use functionnalities

➔ Not how to design learning situations on LMS

➔ We can make explicit LMS embeded ID paradigm

✗ Objectives :

➔ Provide teachers with graphical learning design languages

➔ Use DSM to specify instructional design language and develop tools

➔ Encourage individual reflection about learning design

➔ Improve use of existing LMS

Visual Instructional Design Language

✗ To design learning scenarios

✗ Support creative thinking and human communication

✗ Do not systematically provind binding

➜ Or through IMS-LD

✗ Classification according to L. Botturi et al.

	Stratification	Formalization	Elaboration	Perspective	Notation
E²ML	Flat	Semi-formal	Conceptual	Multiple	Visual
PCeL	Layered	Semi-formal	Conceptual	Single	Visual
AUTC	Flat	Informal	Specification	Single	Visual
IMS LD	Layered	Formal	Specification	Single	Textual
POEML	Layered	Formal	Implementation	Multiple	Visual
UML	Layered	Formal	Conceptual / Specification	Multiple	Visual

A Classification Framework for Educational Modeling Languages in Instructional Design
L. Botturi M. Derntl E. Boot K. Figl

Targeted instructional design language

✗ Graphical : visual formalism

✗ Operationalizable

➜ Formal

✗ Platform specific

✗ Implementation : LMS-centered design

✗ Specification : including teachers practices

Stratification	Formalisation	Elaboration	Perspective	Notation
Flat	Formal	Specification / Implementation	Single	Visual

Scope

✗ One platform : Moodle

 ➔ Open-source , modular: easy to extend, customize

 ➔ Large community of users

✗ Domain Specific Modeling approach

✗ LMS meta-model already defined (Abedmouleh A.)

✗ Functional operationalization API

✗ Goal :

 ➔ Study DSM tools and techniques to specify a simple, yet useful, instructional design language
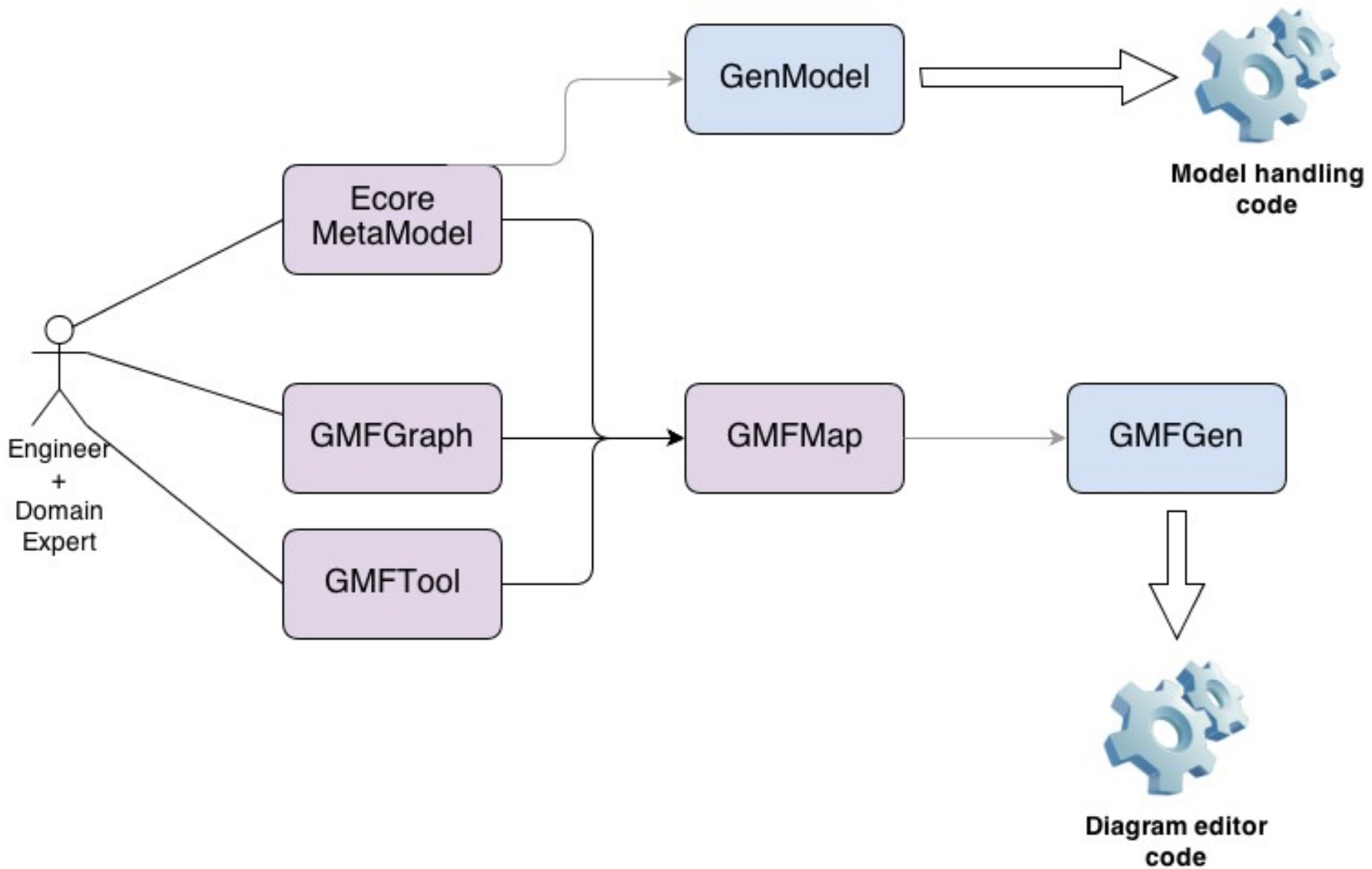
Methodology
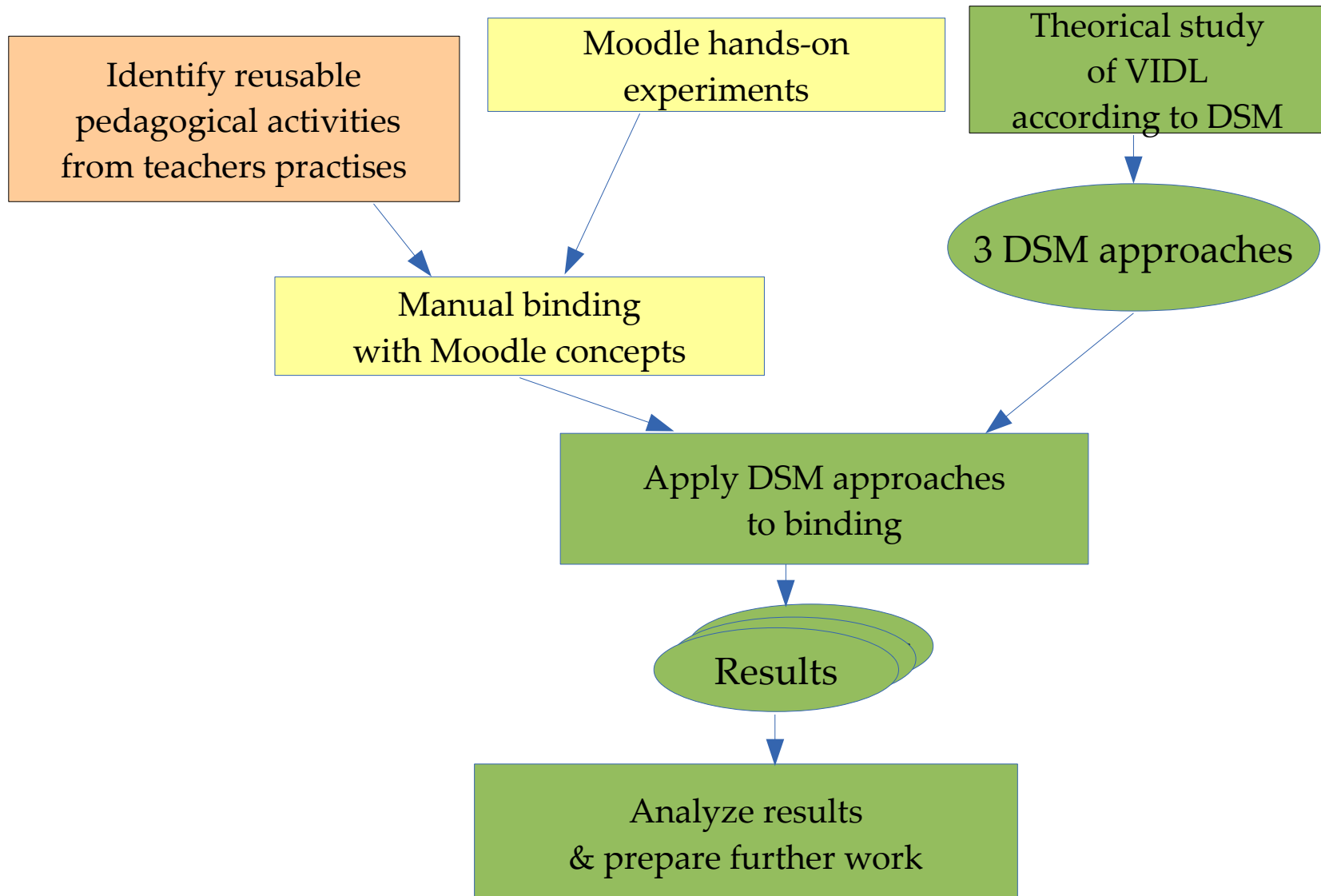
Domain Specific Modeling
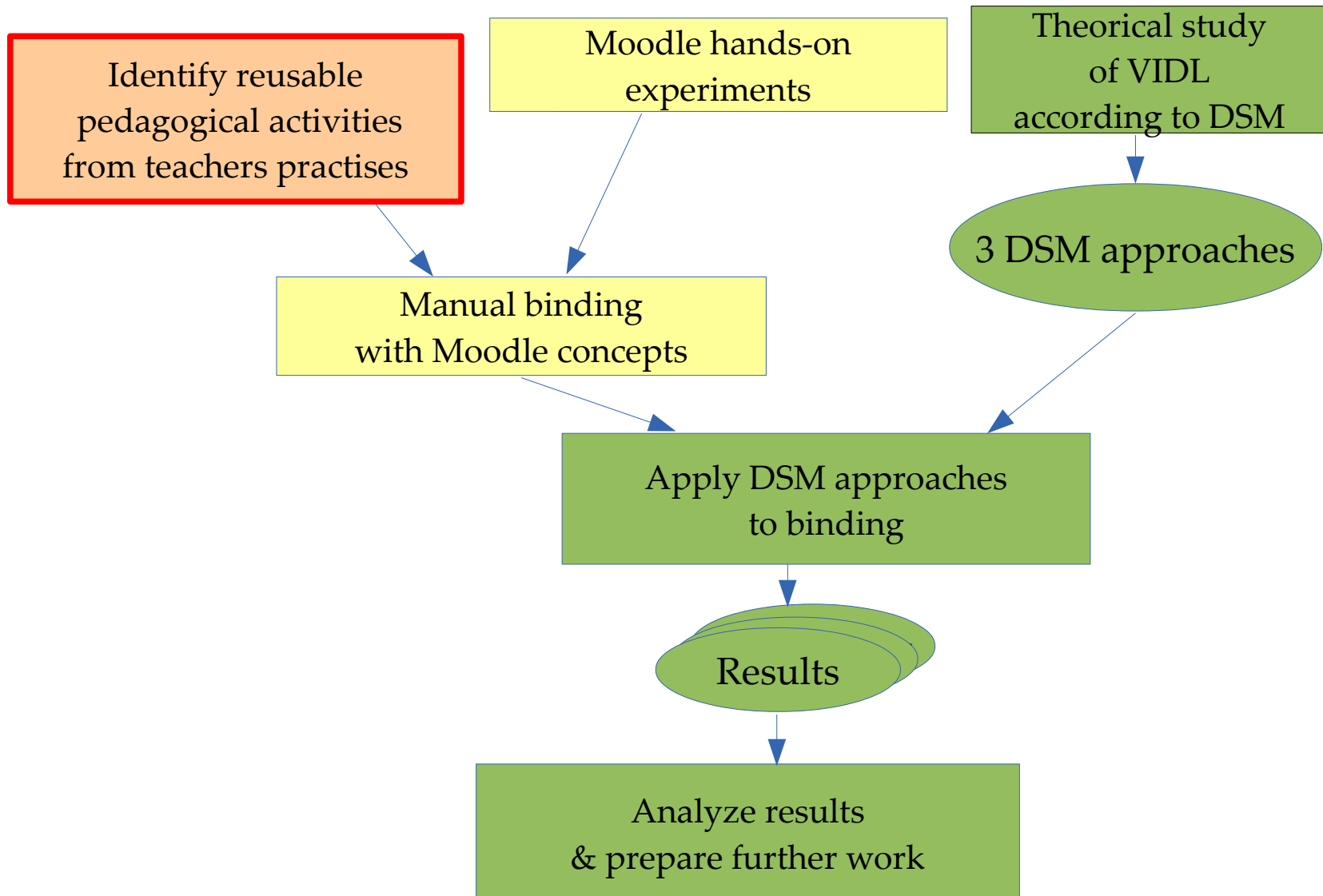
✗ Software development methodology

✗ Specific modeling language

✗ Code generation

✗ We use it to :

➔ Design the language

➔ Develop the tools

✗ Benefits :

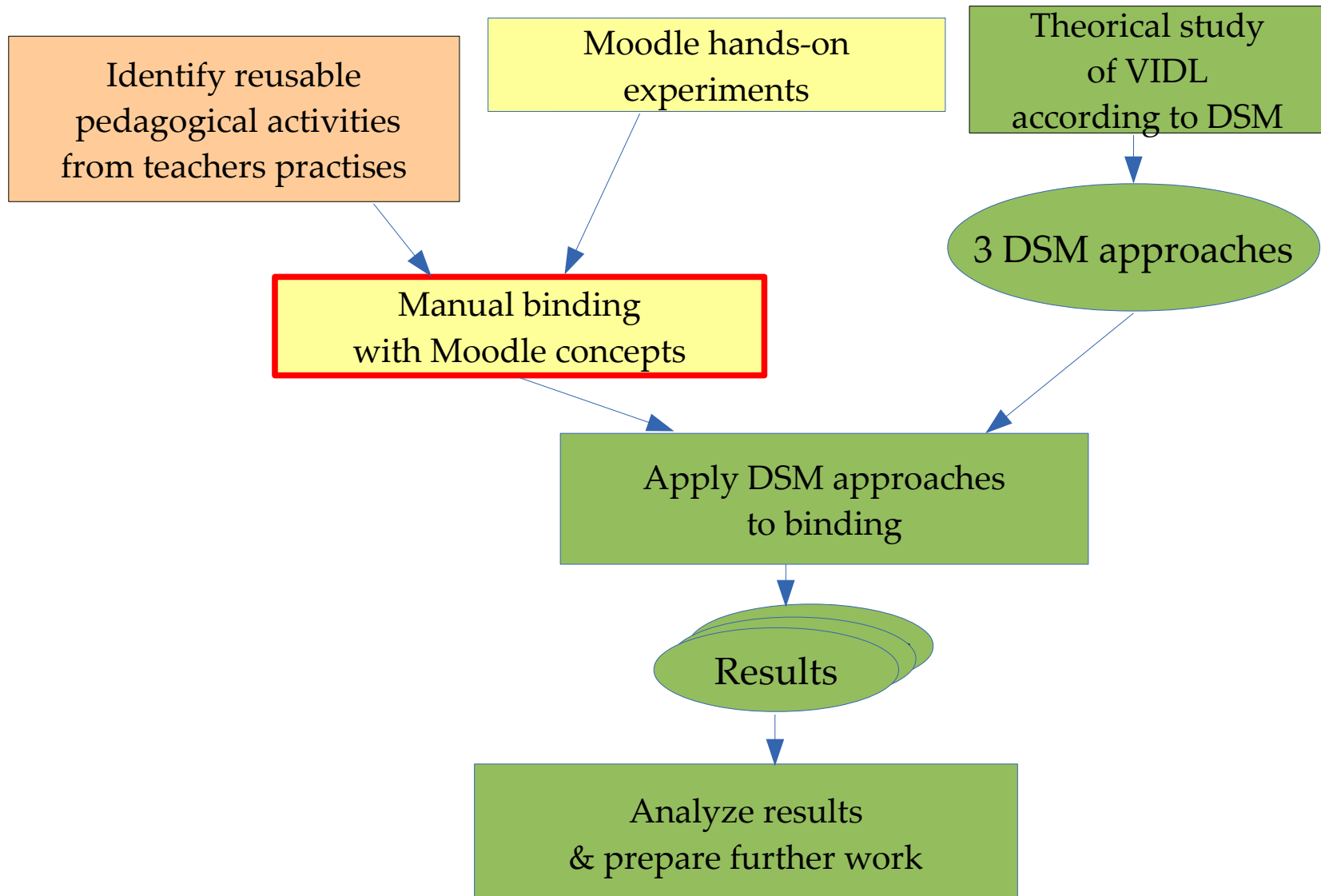➔ Cost reduction

➔ Easy to learn

DSM tooling: Eclipse EMF/GMF

Methodology

Teachers needs and practises

✗ Pedagogical engineering team: Pôle Ressources Numériques (PRN)

➔ Maintain University moodle platform

➔ Teachers training

➔ Manual deployment of scenarios

➔ Strong skills in instructional design and Moodle use

✗ Online courses analysis

✗ Teaching materials analysis

✗ Need to asbtract from Moodle specific features

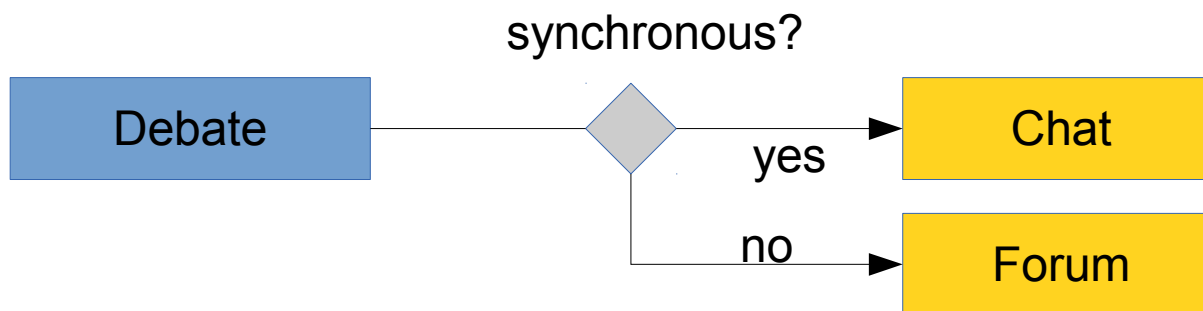➔ Use of pedagogical activities as building blocks

Methodology

Example binding

Pedagogical activity

Moodle feature

Self-assessment

Summative assessment

Quiz
Adaptative : true
Adptative : false

synchronous?

Debate

yes

no

Chat

Forum
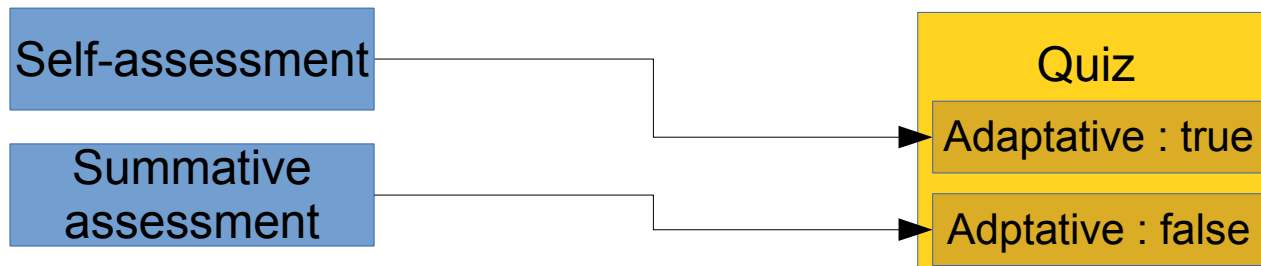
Methodology
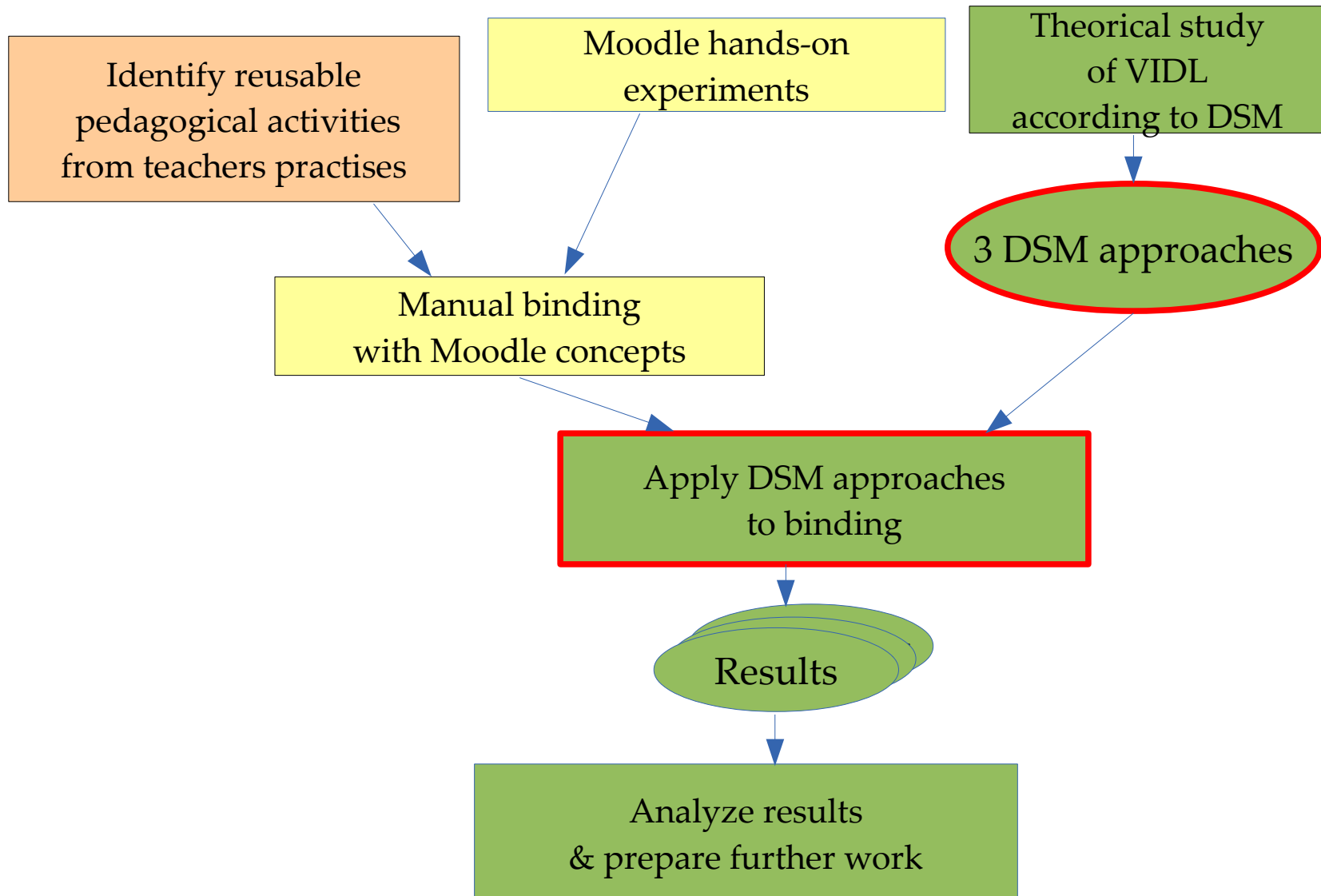
First DSM Approach

✗ High priority : operationnalization

✗ Keep the Moodle Meta-Model

✗ Abstraction by visual notation

➔ No dynamic binding

➔ Numerous tools

Domain concepts

Visual label

| Chat | ← mapping → | Synchronous debate |
| Forum | ← mapping → | Asynchronous debate |
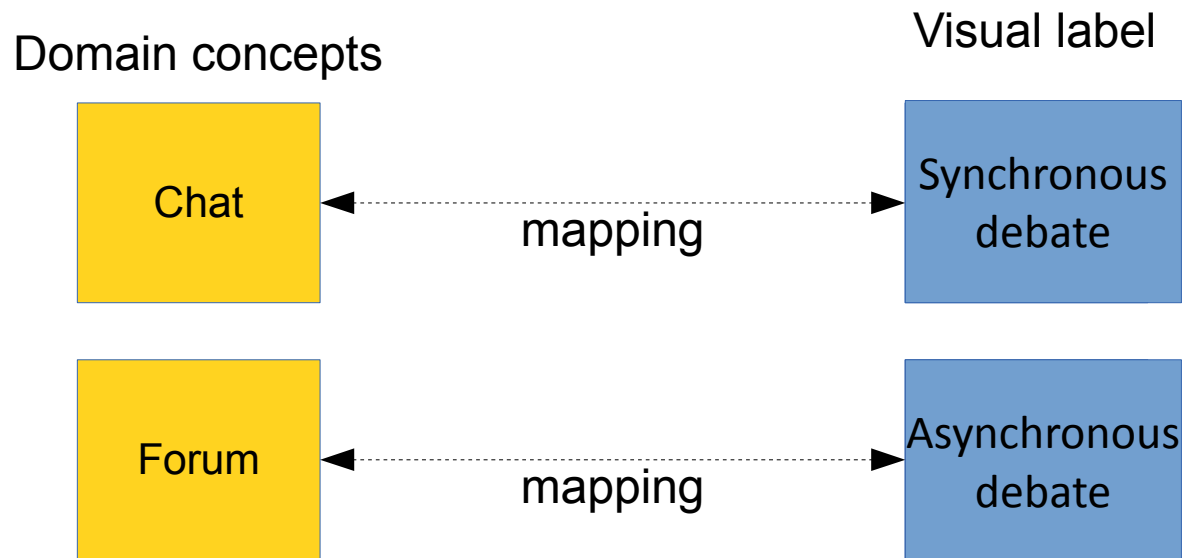
Second approach

✗ Extend Moodle Meta-Model

➔ With new pedagogical activities

✗ Generate non conform models

➔ Loss of compatibility with import API

✗ Code modification workaround
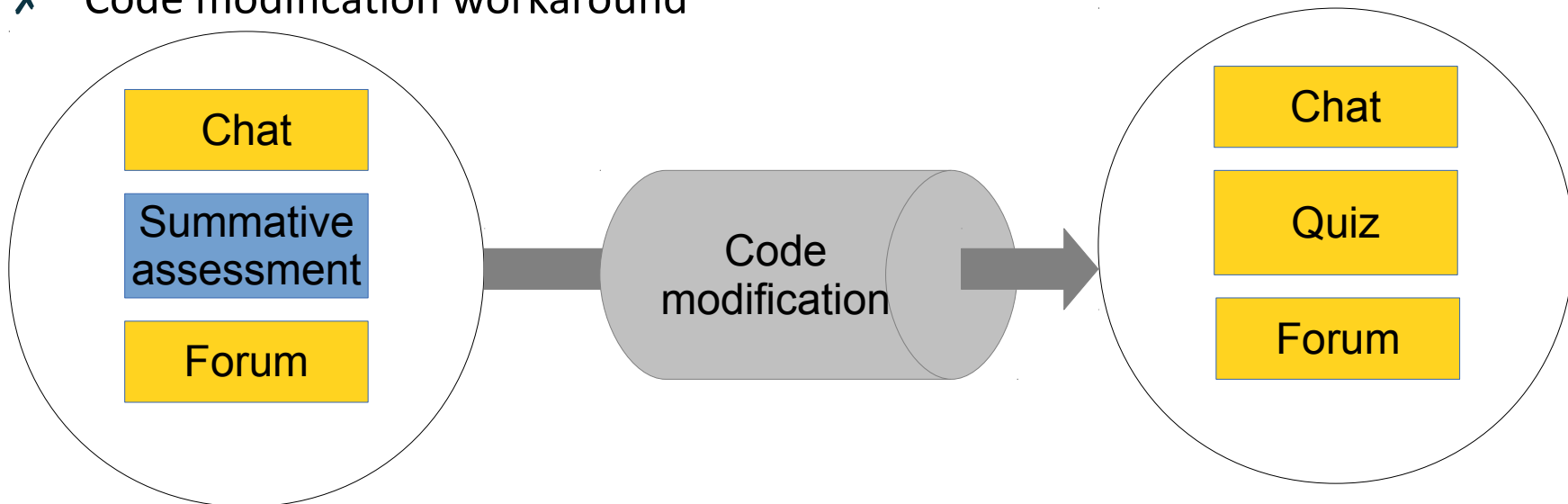
Third approach

✗ Focus on teachers designing practises

✗ Platform independant metamodel

✗ Non conform models

➜ Use of model transformation (ATL)

Editors overview
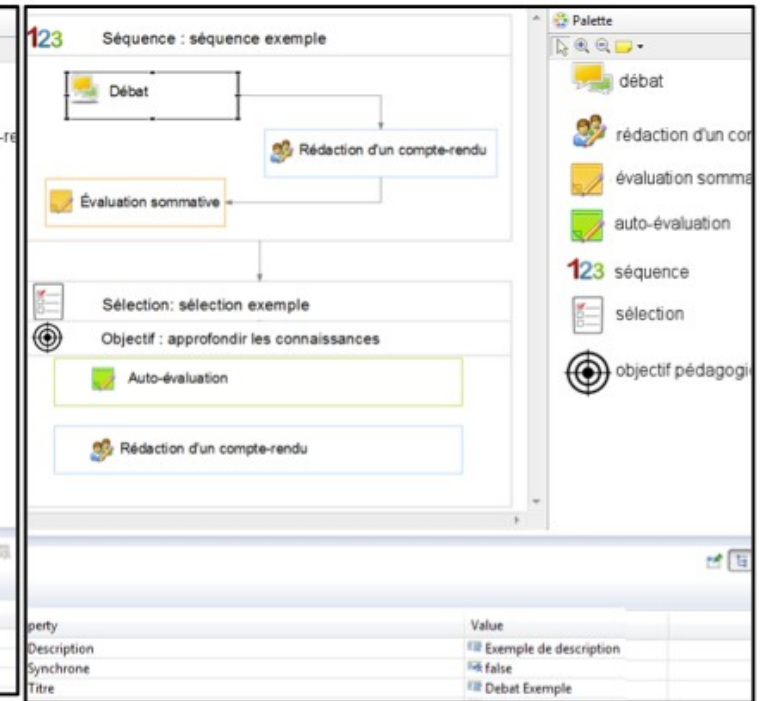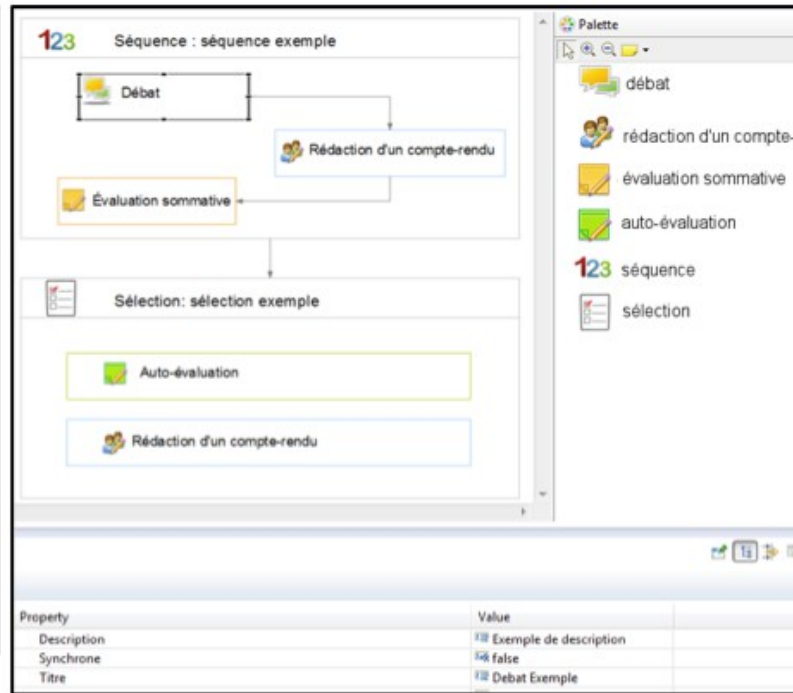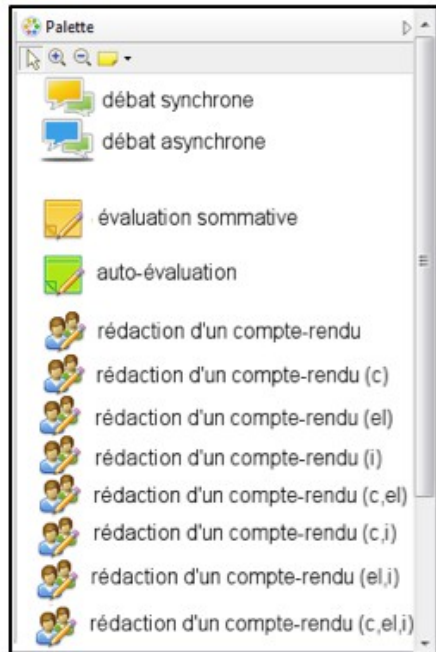
Approach 1

Approach 2

Approach 3

Methodology
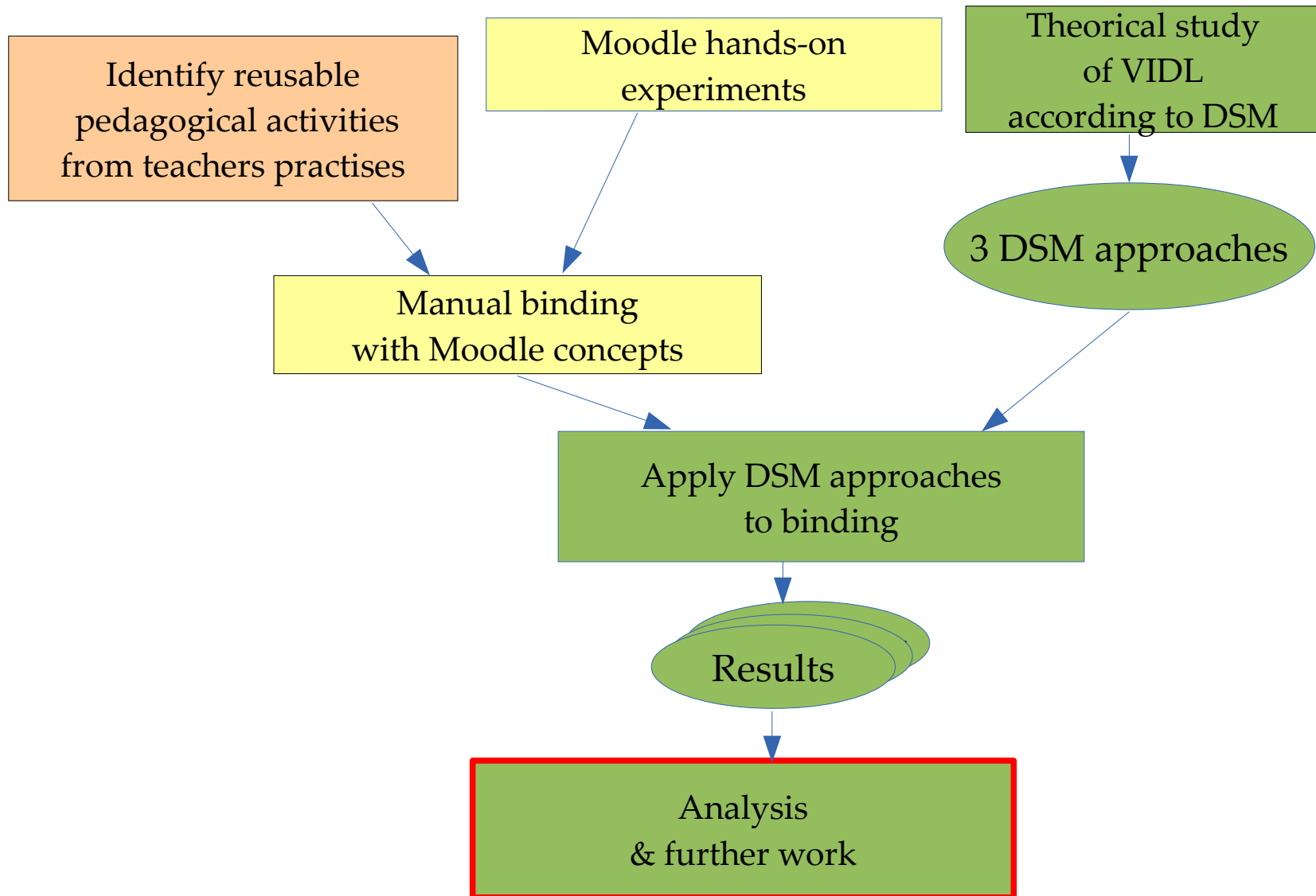
Analysis / comparison

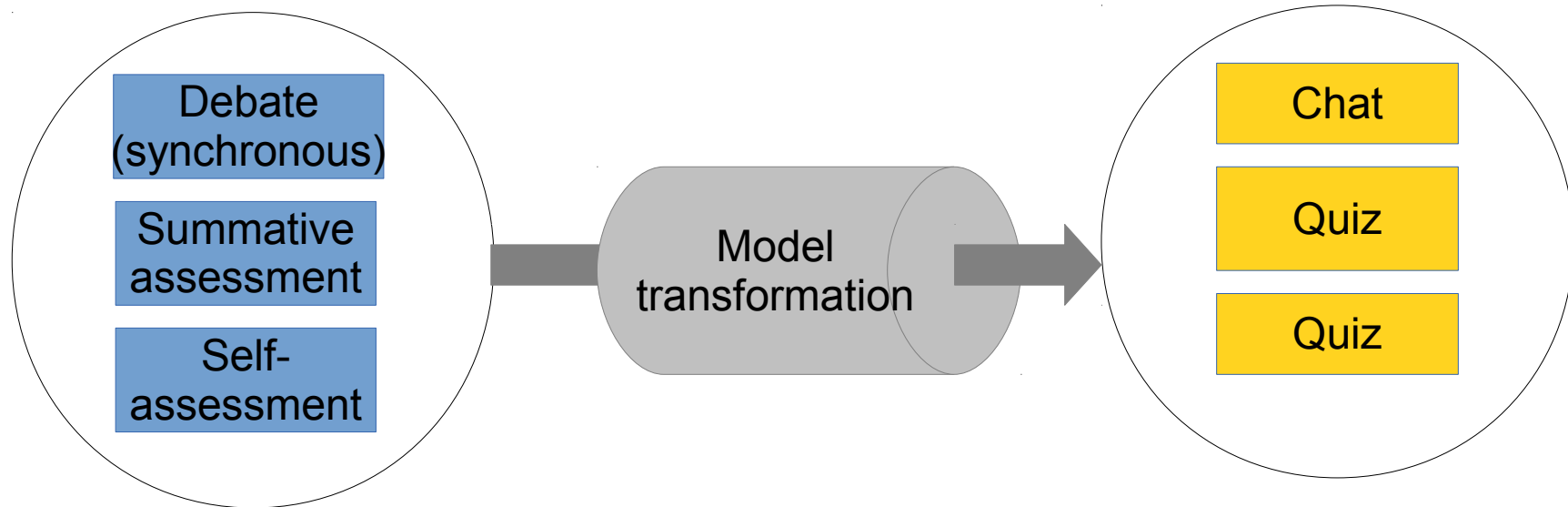| Criteria	Approach 1	Approach 2	Approach 3
Visual expressiveness	Too many elements (-)	Elements provided are coherent with teachers' needs but constraint (/)	Elements provided are coherent with teachers' needs (+)
Abstract expressiveness	Limited to the LMS one (-)	Limited to a close perimeter of the LMS one (/)	Non limited (+)
LMS Metamodel conformance	Direct (+)	Requires technical fine-grained adjustments at design time (/)	Requires complex coarse-grained transformations after design time (-)
Scenario semantics after import on LMS	Preserved (+)	Preserved but constraint (/)	Equivalent course / scenario can be inconsistent / incomplete (-)

Conclusion

✗ We specified a limited language, but useful :

➔ Tackle a first need of abstraction

➔ Raises the next issues

✗ 3 DSM approaches

➔ Approche 1 too limited

➔ Approche 2 costly and difficult to maintain

➔ Approche 3 complex to write, not effective

Further work

✗ Study and experiment on model composition

➔ Model merging : Epsilon Merging Language

➔ Model weaving : Atlas Model Weaver

✗ Other levels of abstraction

➔ Layered languages

✗ Include new Moodle features

➔ Conditional activities

Thank you for your attention

Questions ?

Practises analysis

Master IFUNO (EAD)
- Teachers courses
- Student courses

PRN
- PRN courses
- Teachers courses

GAPP
- Meetings in Laval
- Meetings in Le Mans

IUT Laval
- Teachers interviews

Worldwide communities
- LMS users
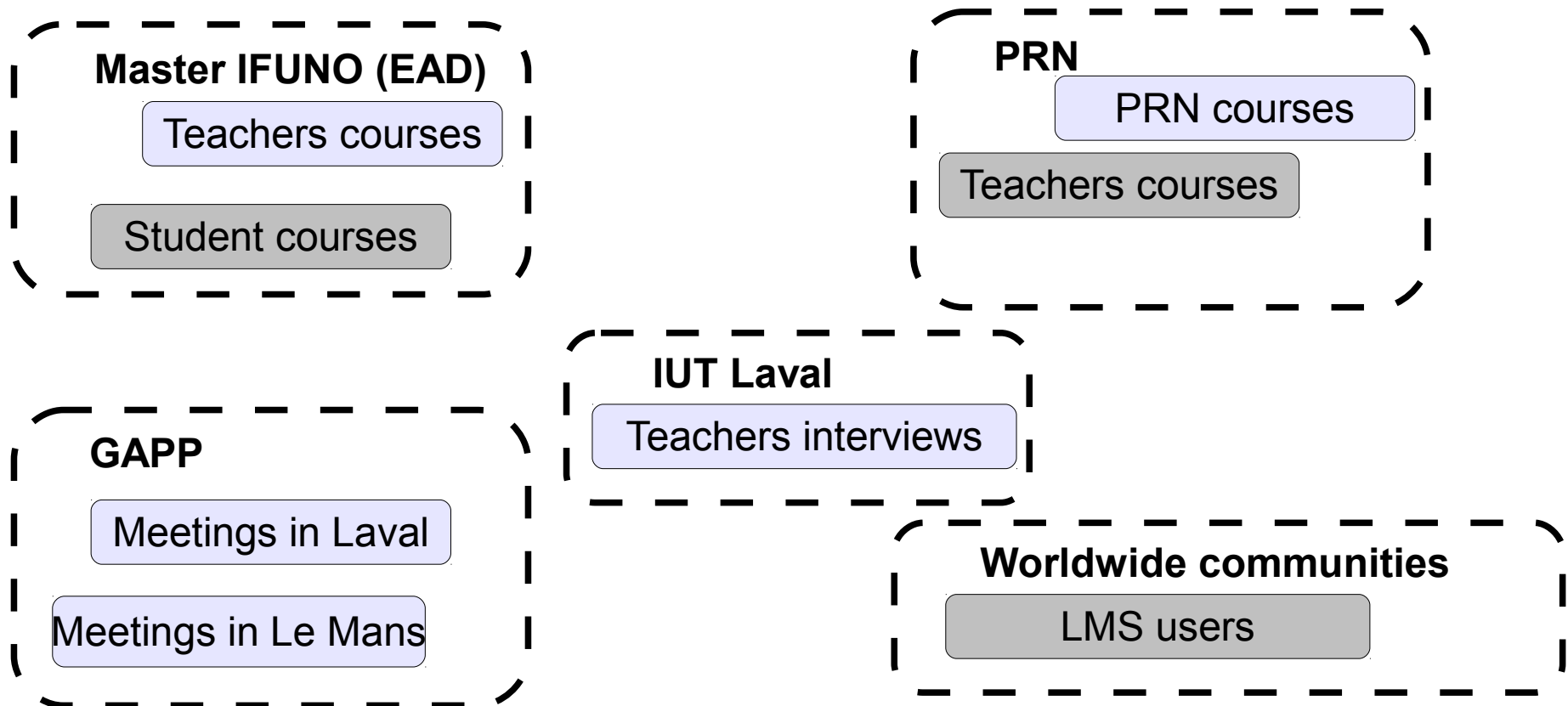
Positionnement du projet

e-learning

| initiation | **conception** | gestion | diffusion | évaluation |

- Aspects institutionnels
- Réflexions initiales sur besoins du cours ...

- Inscription étudiants
- Répartition dans groupes

- Réalisation des activités par les apprenants, les tuteurs,

Conception pédagogique (*Instructioñal design*)

| Conception générale du dispositif | Spécification / **scénarisation pédagogique** | implémentation |

- Public-cible
- Objectifs pédagogiques
- Objectifs du dispositif
- Approche pédagogique (différentiée, active, etc.)
- Démarche du dispositif (autoformation, séances obligatoires...)
- ...

| Scénarisation générale | Spécification activités | Evaluation dispositif | opérationalisation | paramétrage |

Scénarisation générale
- Obj pédagogiques (d'apprentissage ou d'enseignement)
- Structure du cours en séquences
- Contenu didactique
- Type d'accompagnement
- Types d'évaluations (diagnostique, formative, sommative)
- ....

Spécification activités
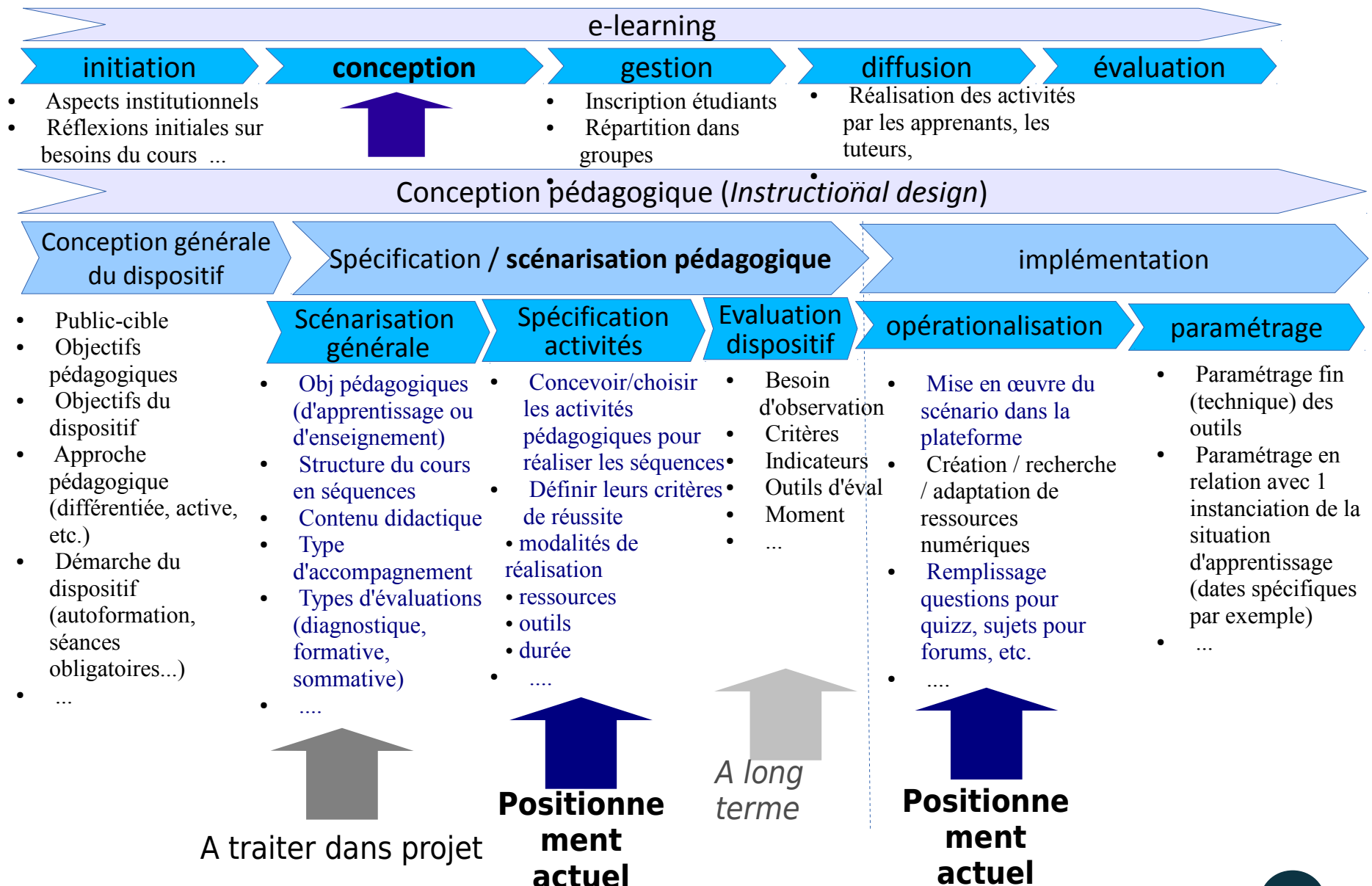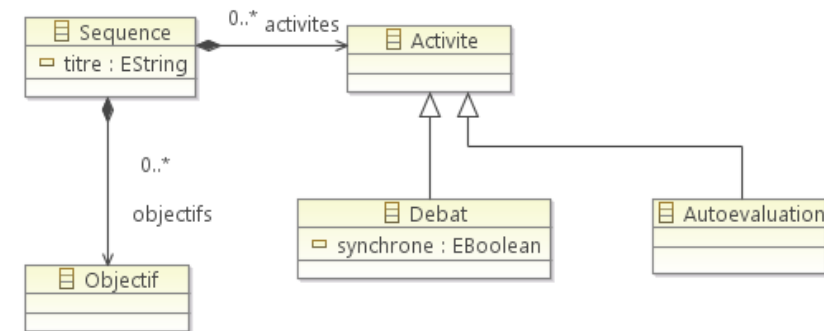- Concevoir/choisir les activités pédagogiques pour réaliser les séquences
- Définir leurs critères de réussite
- modalités de réalisation
- ressources
- outils
- durée
- ....

Evaluation dispositif
- Besoin d'observation
- Critères
- Indicateurs
- Outils d'éval
- Moment
- ...

opérationalisation
- Mise en œuvre du scénario dans la plateforme
- Création / recherche / adaptation de ressources numériques
- Remplissage questions pour quizz, sujets pour forums, etc.
- ....

paramétrage
- Paramétrage fin (technique) des outils
- Paramétrage en relation avec 1 instanciation de la situation d'apprentissage (dates spécifiques par exemple)
- ...

A traiter dans projet

Positionne ment actuel

A long terme

Positionne ment actuel

Problématique DSM

✗ Syntaxe abstraite : Méta-modèle

➔ Formalise le métier des praticiens

➔ Définit le format de persistance des modèles

➔ Garant de la compatibilité avec la plateforme

✗ Syntaxe concrète : Notation graphique

➔ Vue utilisateur final

➔ Représentation graphiques des concepts métiers