The 15th IEEE International Conference on Advanced Learning Technologies - ICALT2015
July 6-9, 2015
Hualien, Taiwan

Formalization of recurrent uses of e-learning tools

as reusable pedagogical activities

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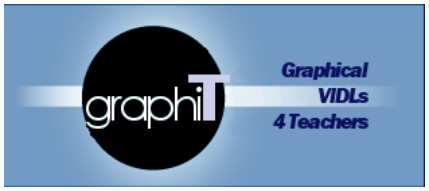
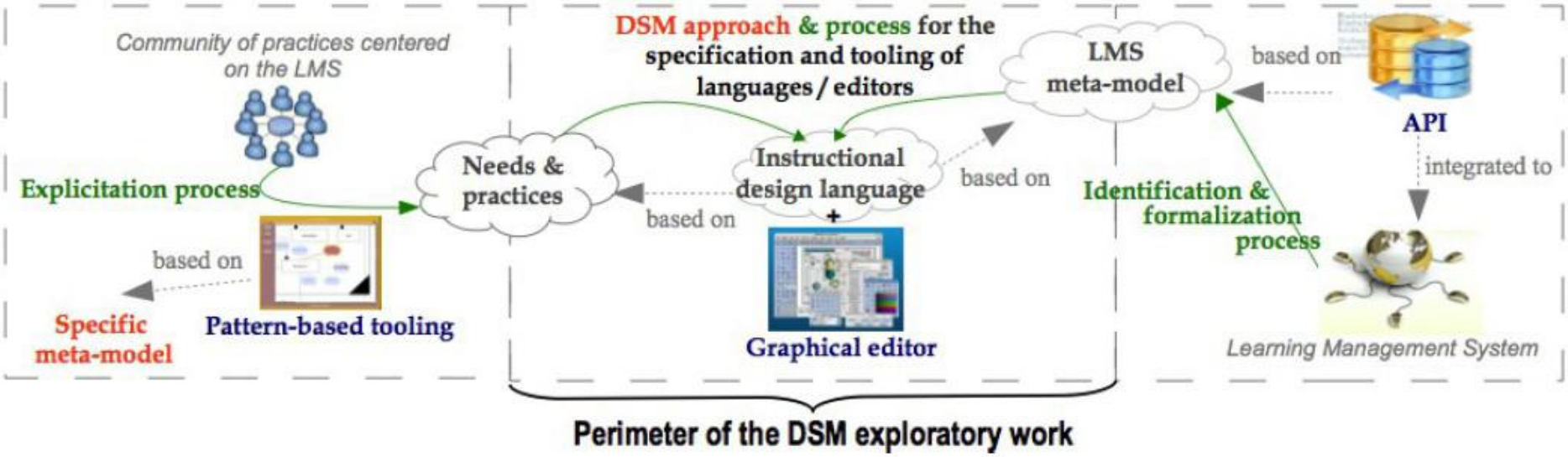
Research context

- LIUM: Computer Science Lab (Le Mans, France)
  - TEL systems engineering team
- GraphiT project
  - Funded by the French research agency (ANR)
  - http://www-lium.univ-lemans.fr/~laforcad/graphit/



The GraphiT Project



Visual Instructional Design Language

- A modeling language
- To design learning scenarios
- Define a visual representation of pedagogical concepts
- Support creative thinking and human communication
- Do not systematically provide binding mecanisms to popular LMS

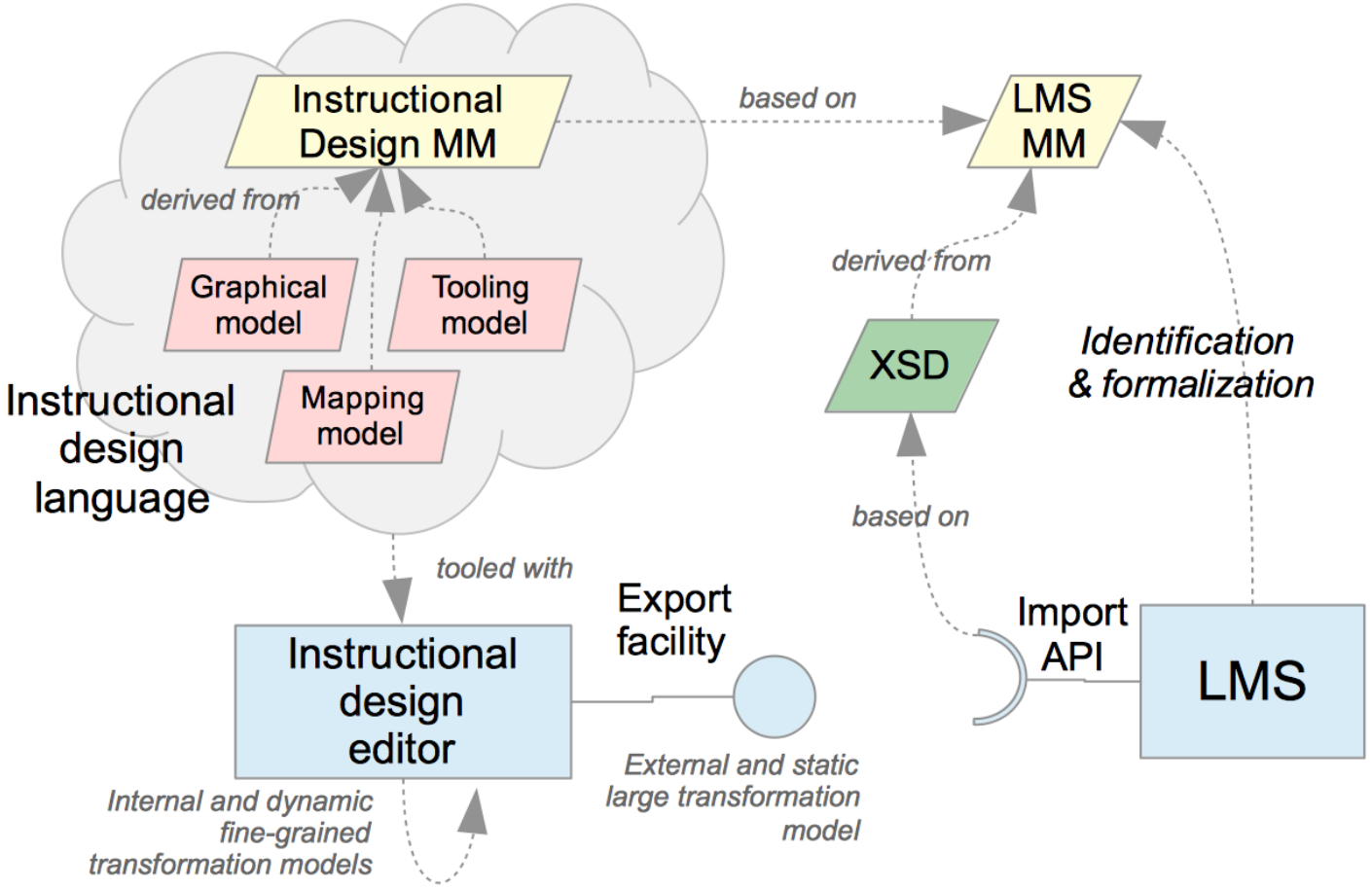
Issues

- Institutions impose a specific LMS to teachers
- Teachers are (sometimes) trained on how to use it
  - Not how to design learning situations on the LMS
- No “out-of-the-box” Binding between LD standard and LMS
  - Direct “on-the-fly” design on the LMS
  - Depending on the teacher skills about the LMS

Objectives

- Provide teachers with graphical learning design language
  - "compatible" with LMS
- Help to focus on the pedagogical aspect of the scenario
  - Instead of setting-up complex tools
- Foster individual reflection about learning design
- Improve uses of the existent LMS

Overall architecture



Survey & Interviews

- Open and spread through french-speaking higher educations institutions
- Up to 21 questions
  - Learning design skills
  - LMS skills
  - LMS user experience
- 208 complete answers
- Interviews conducted with 20 selected people who answered the survey

Results

- Settings screens too complex
  - Mixing pedagogical and technical parameters
- Time consuming when elaborating complex learning situations
- Teachers don't have a common set of design practices
- But all use a mix of LMS tools and pedagogical concepts

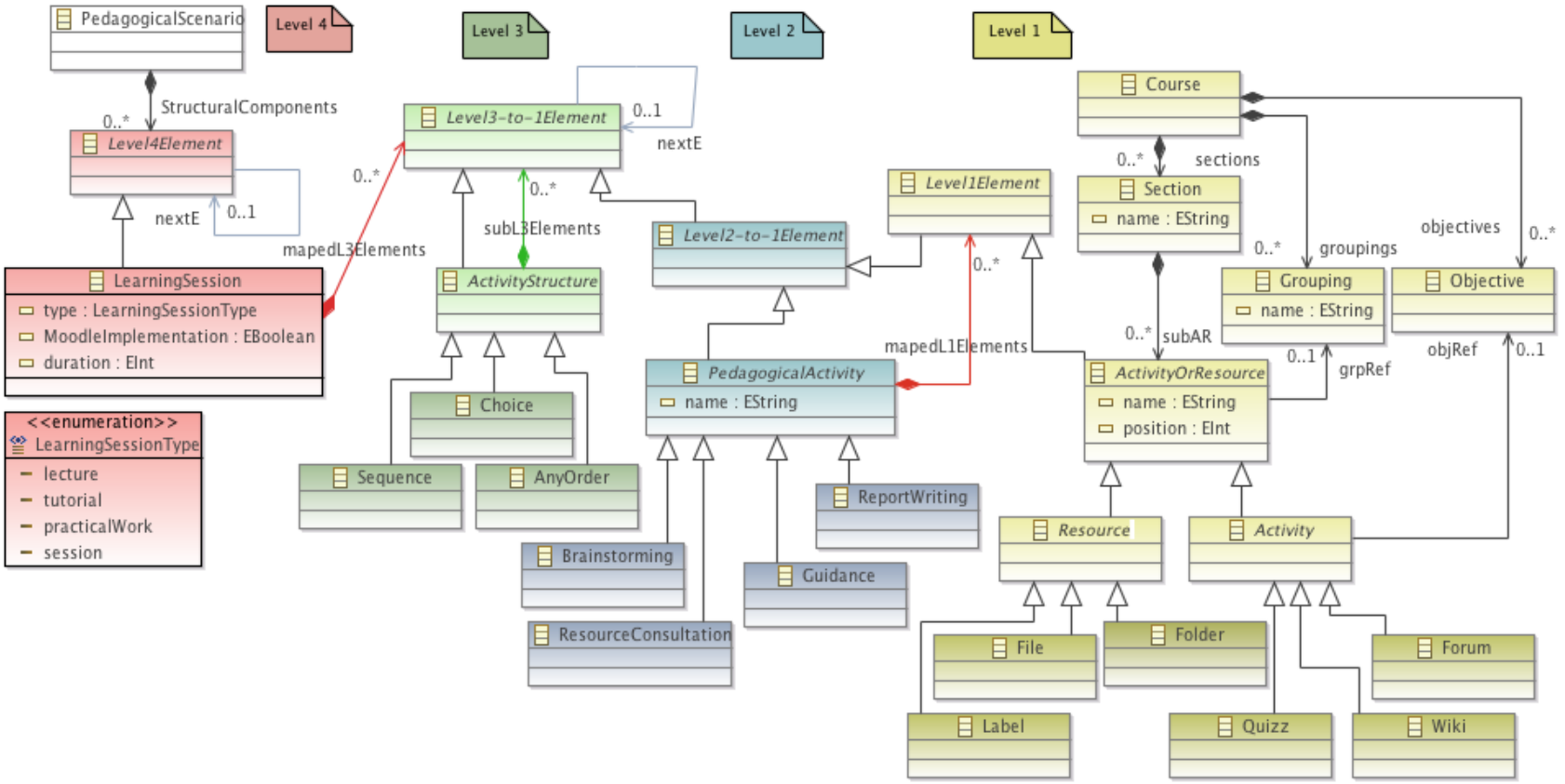
Requirements

- Graphical notation
- High level pedagogical blocks
- Mixing LMS and abstracted semantics
- Editable default implementation (mapping)
- Non-visible information
- Activity structures

Abstractions

- Moodle-specific
- Pedagogical activity
  - Tool or resource based
  - Focus on one pedagogical use
  - Hide implementation parameters
  - Has specific properties
- Activity structure
  - To implement structural strategies
  - Common in VIDLs

MetaModel


PedagogicalScenario
Level 4
Level 3
Level 2
Level 1
StructuralComponents
0..*
Level4Element
nextE
0..1
mapedL3Elements
LearningSession
type : LearningSessionType
MoodleImplementation : EBoolean
duration : EInt
<<enumeration>>
LearningSessionType
lecture
tutorial
practicalWork
session
Level3-to-1Element
0..1
nextE
0..*
subL3Elements
ActivityStructure
Choice
Sequence
AnyOrder
Level2-to-1Element
PedagogicalActivity
name : EString
Brainstorming
ResourceConsultation
Guidance
ReportWriting
Level1Element
0..*
mapedL1Elements
Course
0..*
sections
Section
name : EString
0..*
subAR
ActivityOrResource
name : EString
position : EInt
0..*
groupings
Grouping
name : EString
0..1
grpRef
objectives
0..*
Objective
objRef
0..1
Resource
Activity
File
Folder
Label
Quizz
Forum
Wiki

Identification method

1. Analysis of reccurent uses of a specific Moodle tool
2. Identification of tools offering common uses
3. Specification of discriminating criteria

Identification method

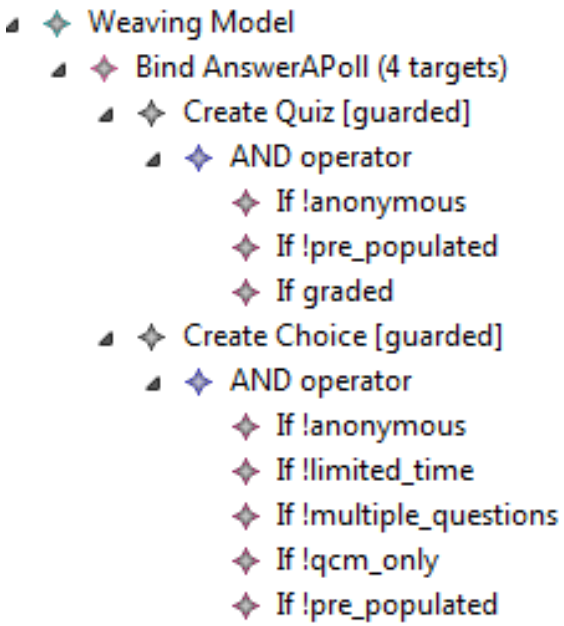
- **R1** The pedagogical activity name is only from a teacher perspective if no students are concerned
- **R2** Tools participating to the realization of the activity are the elements A12...A1n.
- **R3** Discriminating criteria are the elements A21...Am1.
- **R4** Discriminating criteria are expressed as much as possible as a pedagogical question designers have to answer by Yes or No.
- **R5** Cells intersecting a discriminating criterion and a tool must embed all answers that can implied to choose this tool (Yes/No are both possible if the tool can support both pedagogical cases).
- **R6** A valid discriminating criterion must cause at least one different answers for one tool.
- **R7** The matrix is terminated if there is no similar combination of answers for two tools.

Identification method

Answer a poll	Quiz	Choice	Feedback	Survey
2+ questions ?	Yes/No	No	Yes/No	Yes
Multiple choices ?	Yes/No	No	Yes/No	Yes
Pre-populated	No	No	No	Yes
Time-limit	Yes/No	No	No	No
Anonymous	No	No	Yes/No	No
Graded	Yes	No	No	No
Feedback after submission	Yes	No	Yes	No

Mapping Implementation

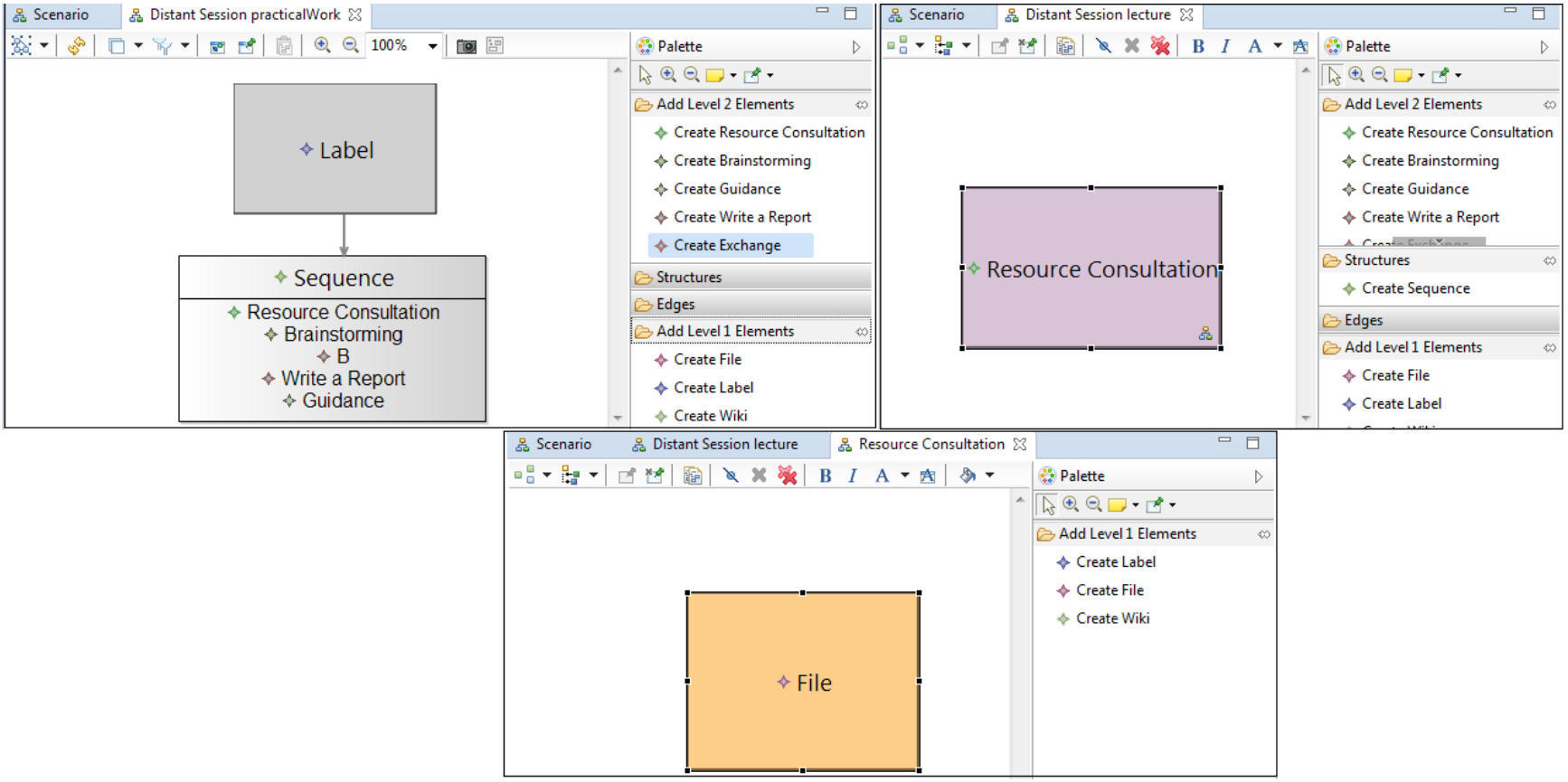
- Using model transformations at run-time
  - Generated through High Order Transformation
- Modifiable through generic weaving model editor



Learning scenario editor

- Sirius based diagram editor
- 3 levels of diagram
  - Learning sessions
  - Pedagogical activities and structures
  - Moodle tools and resources
- Sequencing elements through node connections

Learning scenario editor (wip)



Conclusion & Perspectives

Contributions:

- Platform specific VIDL
- Abstraction of LMS tools based on specific usage and parameters
- Automatic mapping through model weaving
- Diagram based editor

Perspectives:

- More complete visual notation
- Adding groups and pedagogical objective
- More user-friendly editors
- Final model transformation for export feature

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Thank you!

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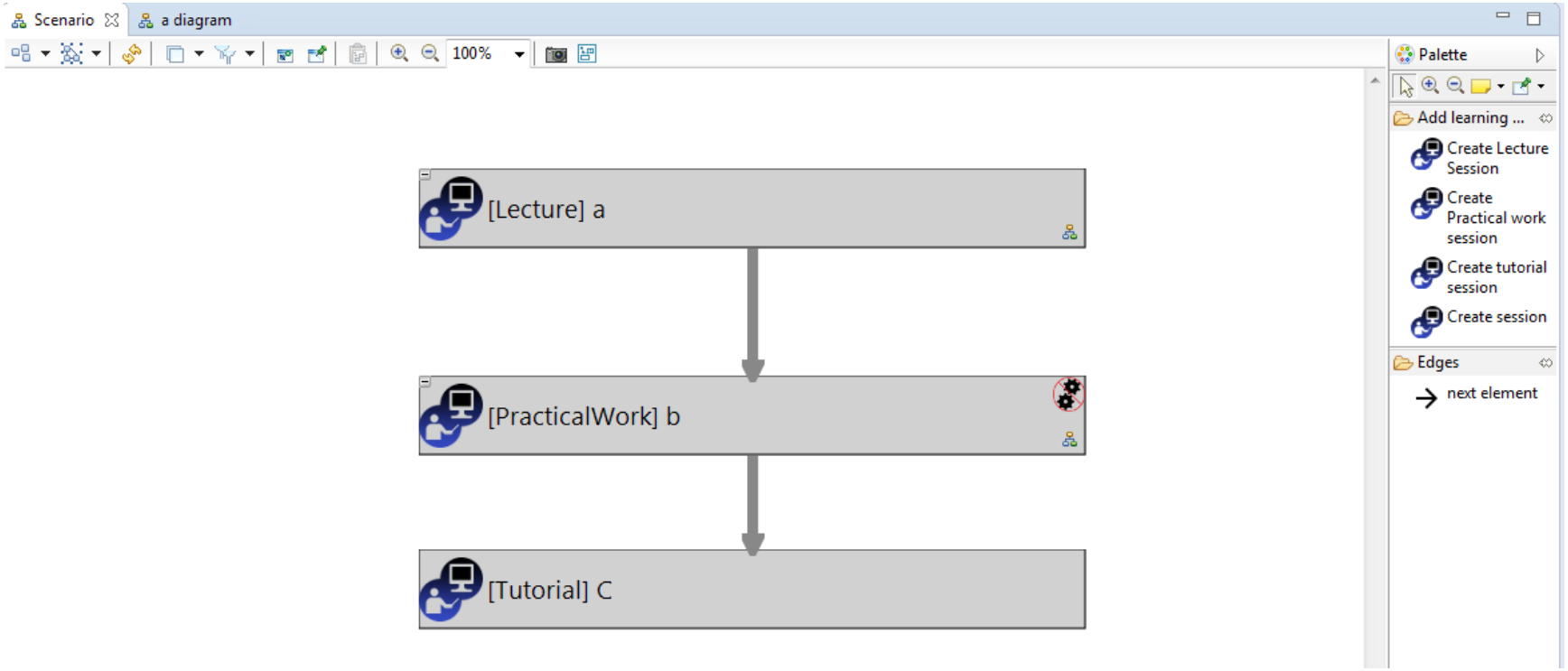

Learning scenario editor (wip)