



Ontology-aware Course Management for Curriculum Evolution Process in Higher Education

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Outline

- Background and Goal
- Proposed Solution
 - Requirements of multi-stakeholders
 - A Scenario
- Evolutionary Process of Curriculum
 - The Conceptual Model
 - Development of On2C system
 - The Scenario (cont'd)
- Conclusion and Future Works

Background

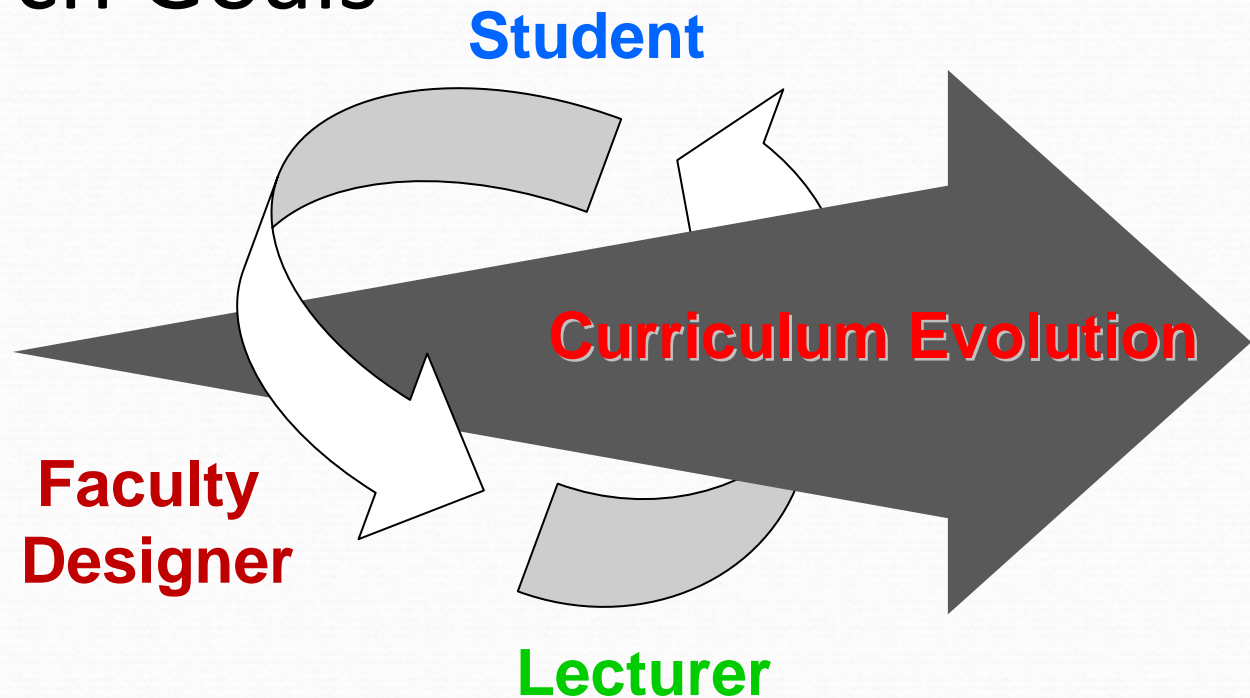
- Curriculum changes over time. In practice, however, it is not easy to keep curricular system updated and to provide students with trustworthy course services that reflect and correspond to the evolutions of curriculum:
- The information related to curriculum design and organization may be lost or interpreted in different ways due to the *distribution of time and space* in communication among different stakeholders;

Background (cont'd)

- The lack of the shared vocabulary about domain knowledge for different stakeholders to communicate about the curriculum;
- The majority of current strategies need time-consuming and labor-intensive works.

Two Research Goals

It is necessary to balance social needs and different concerns of multi-stakeholders in order to make curriculum evolution smooth.



GOALS

- To establish a conceptual framework for explicitly and fluently share each concern and understanding among multiple stakeholders, and effectively tracking the history of curriculum change;
- To implement an ontology-aware course consulting system to meet the requirements of stakeholders involved in curriculum evolution.

Proposed Solution

- A conceptual model of evolutionary process reflects essential structure of curriculum and provides

common ontology with

- Curriculum

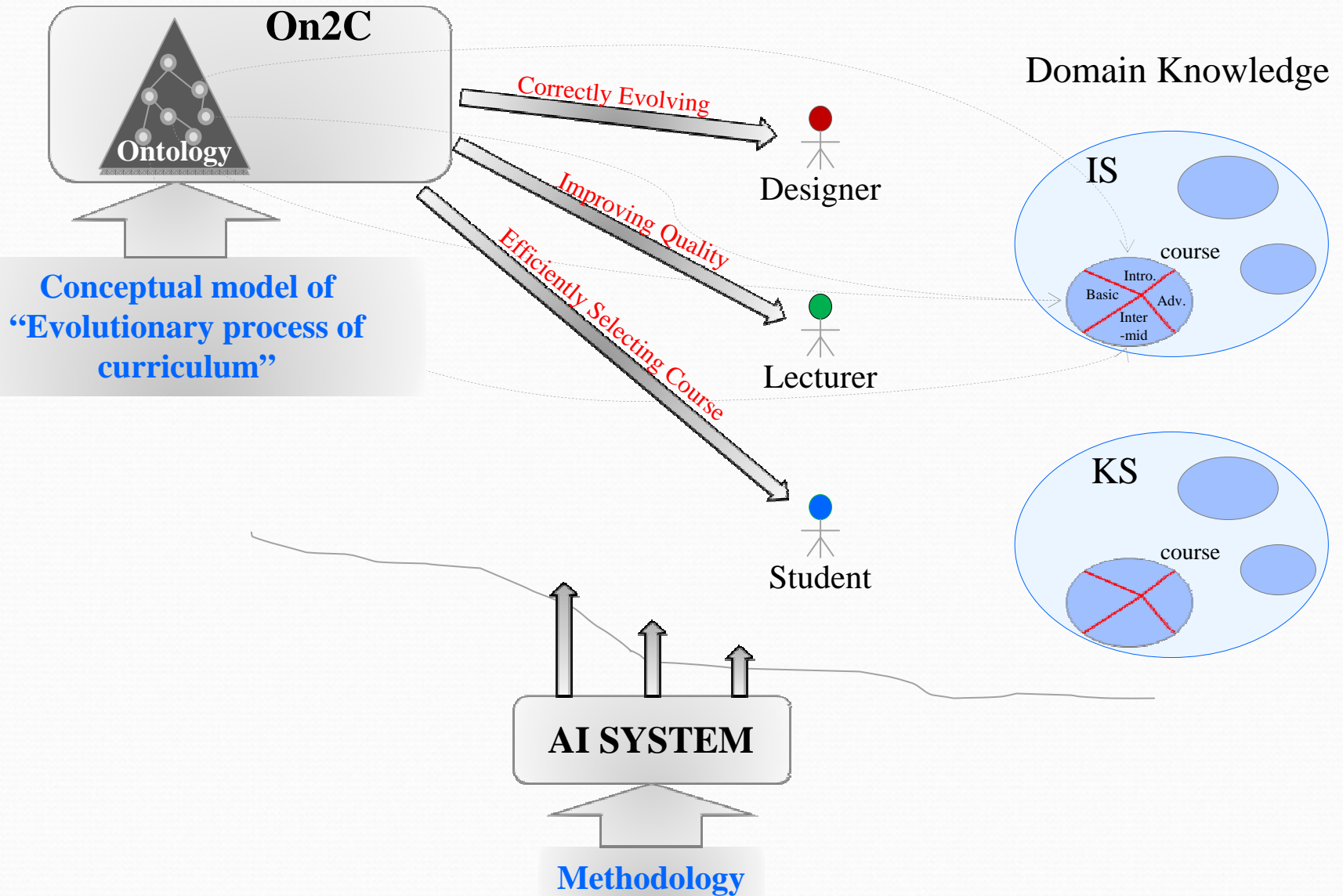
Our research aims to demonstrate a possible solution for smoothness of evolutionary curriculum *step by step* with ontological engineering approach.

- It

predict the generic components of curriculum so it can be reused in situation-dependent curriculum system.

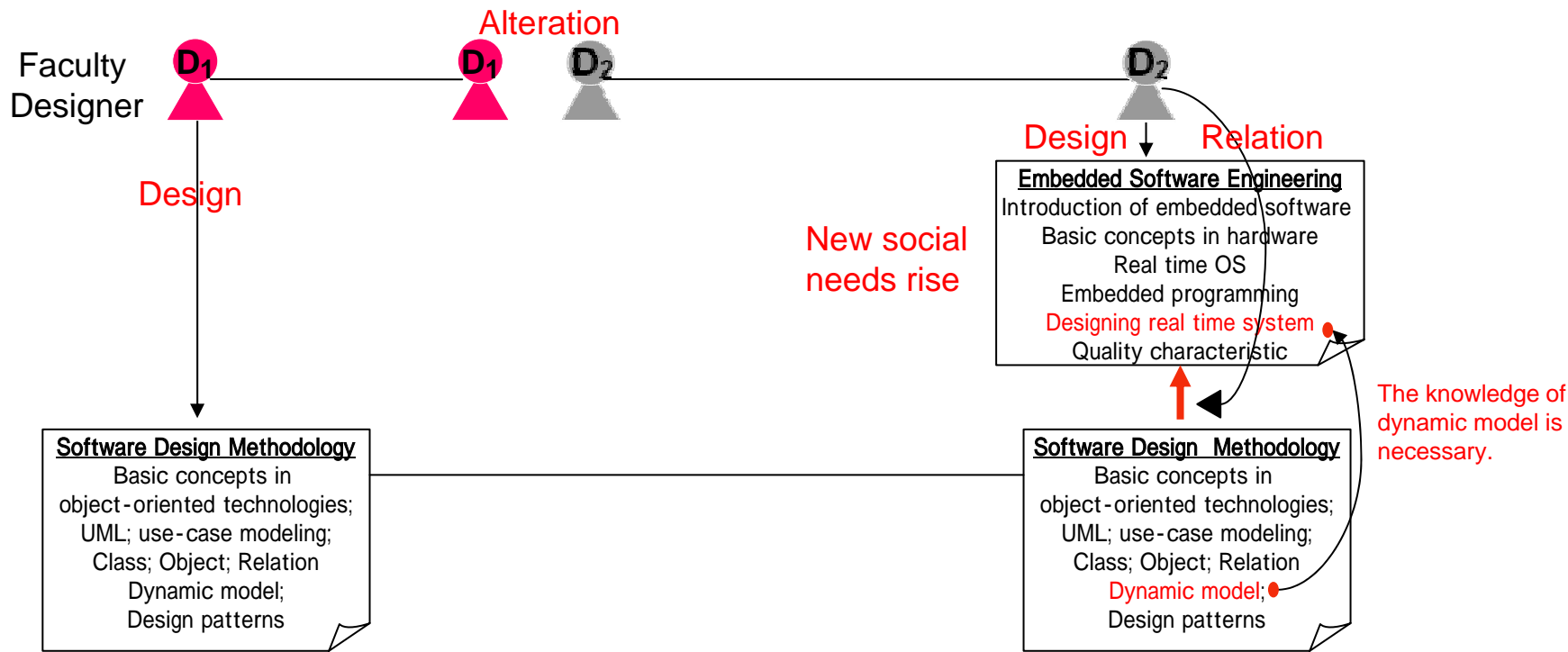
- Ontology-aware Course Consulting system (On2C)

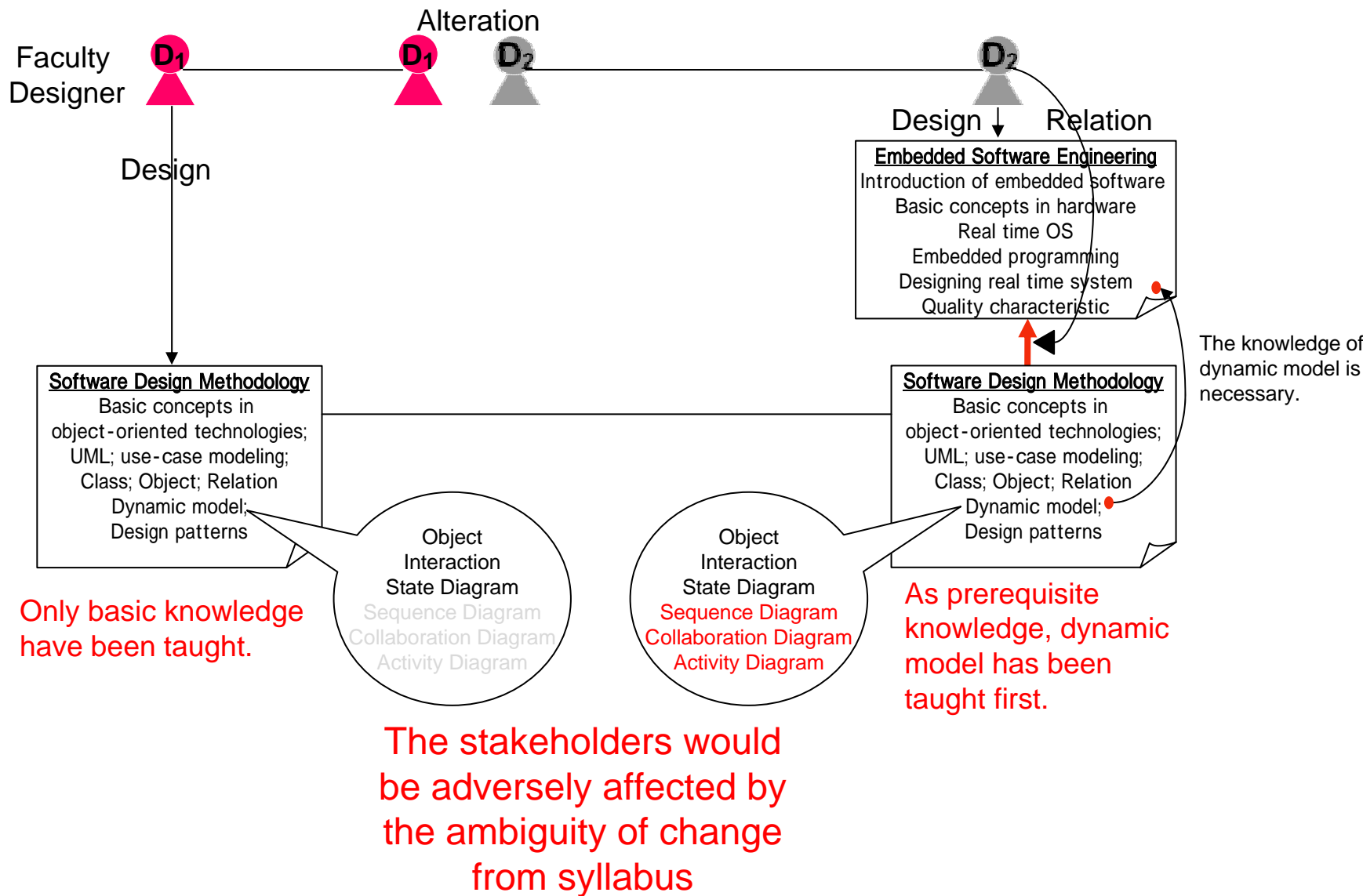
Diagram

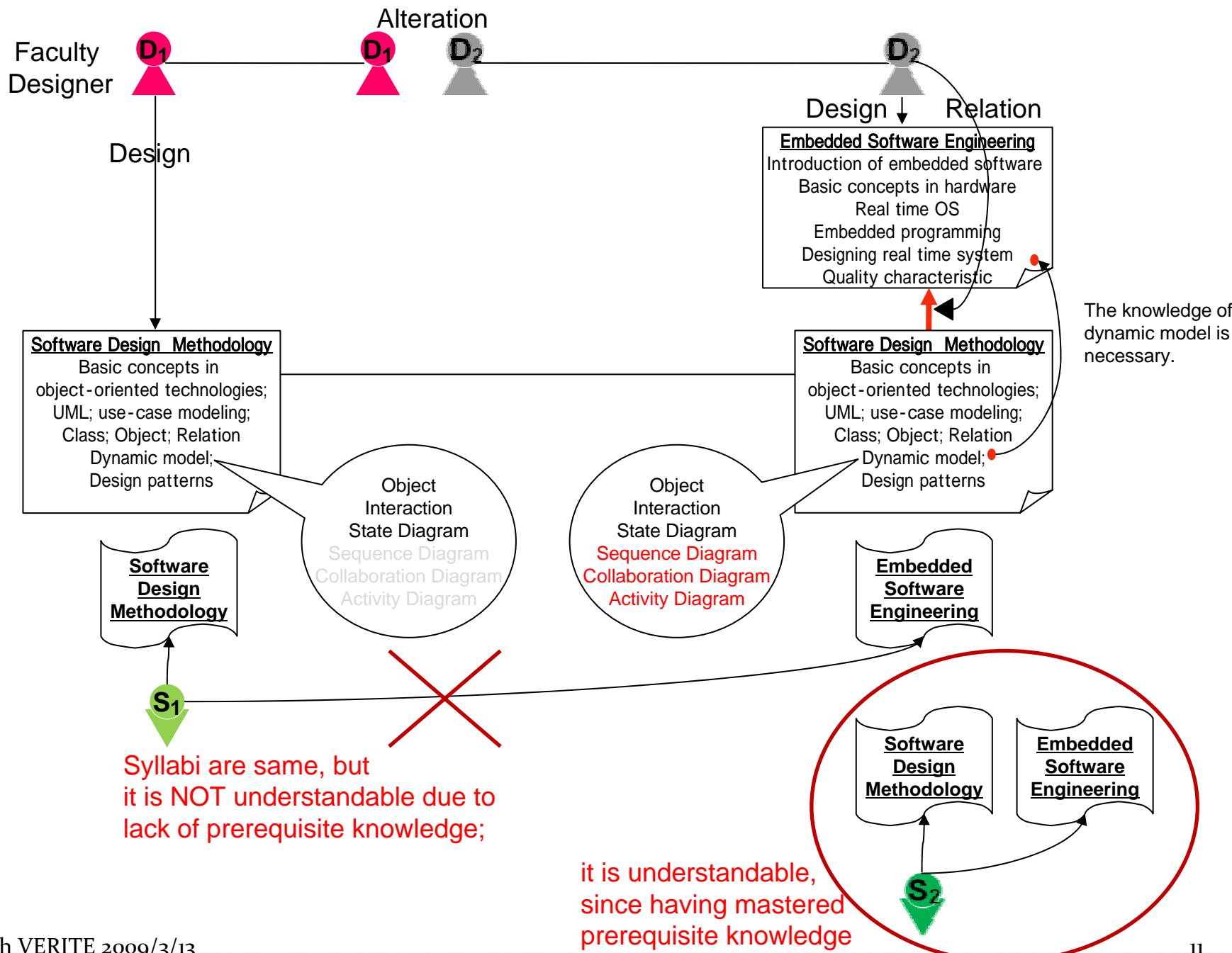


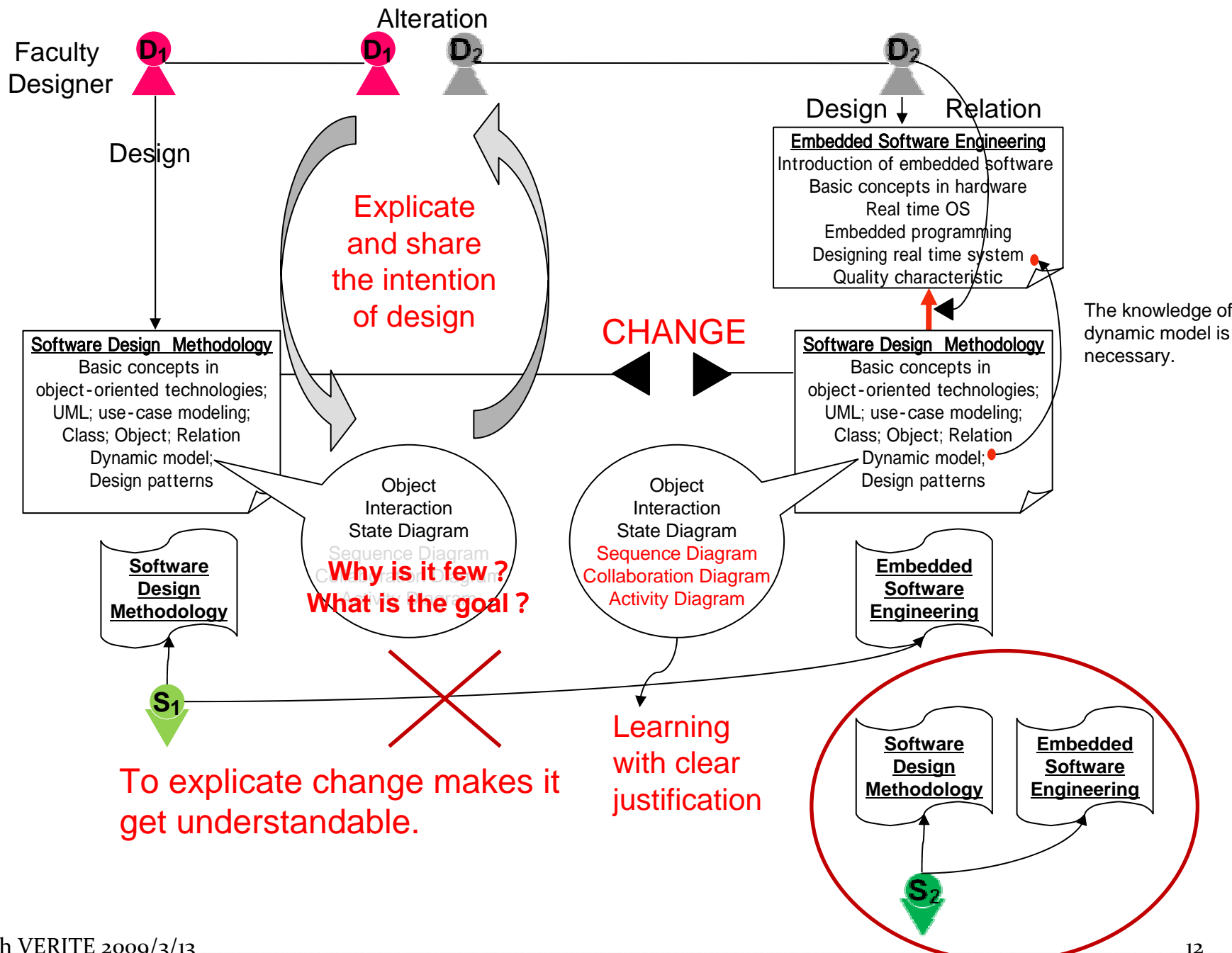
Requirements of multi-stakeholders

- Requirements of faculty designer and lecturer
 - The evolutionary change of curricula should be divided into manageable, more familiar steps. Both faculty designer and lecturer want to familiarize themselves with the changes by taking small steps first.
 - It is necessary to adopt instruction design approach and include one quality circle composing planning and evaluation.
 - Have a clear rationale for change that is grounded in pedagogical practices, which is considered as background knowledge for reflection, such as during practicing evaluation of course process.
- Requirements of student
 - Study plan maintenance

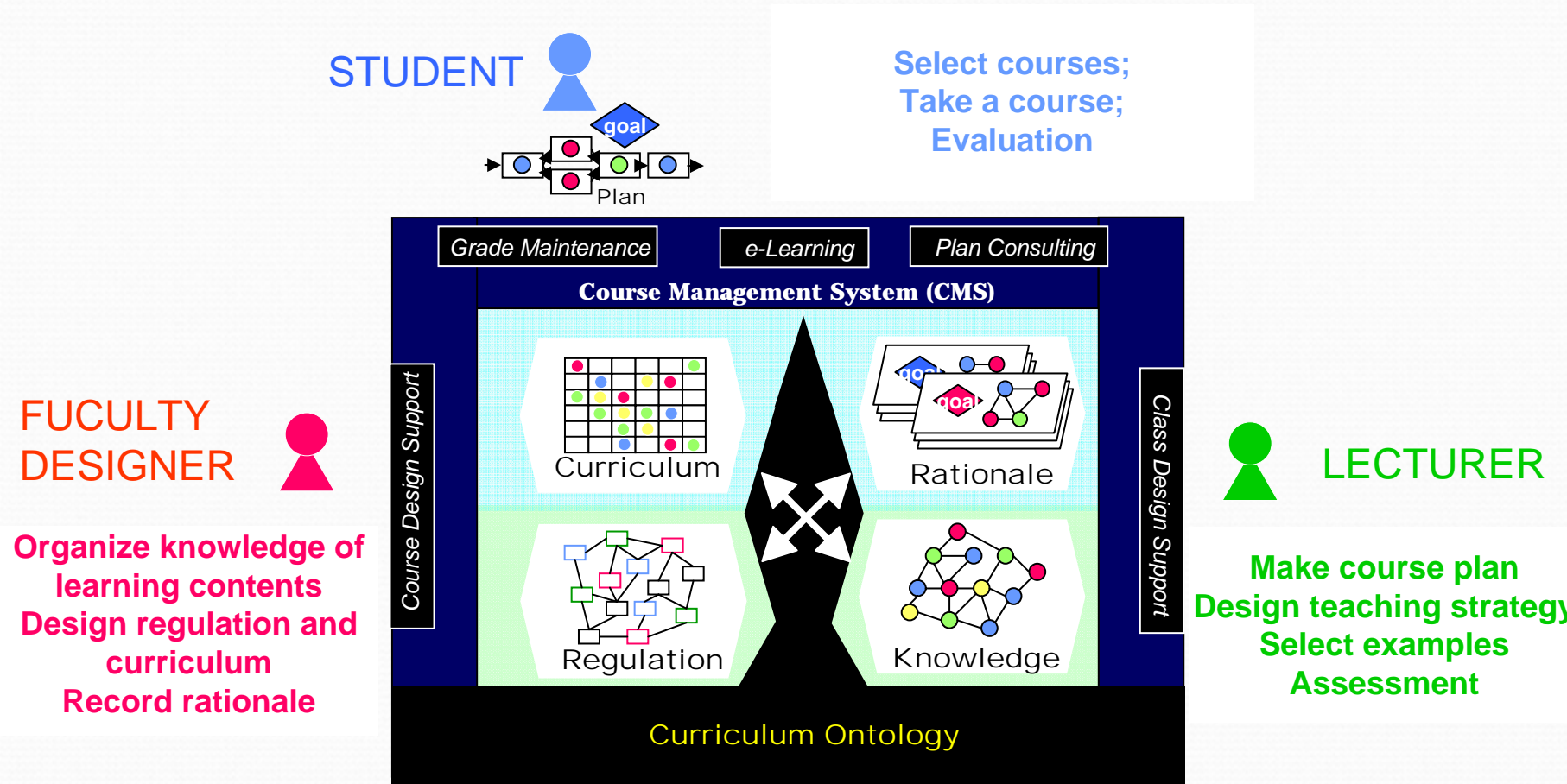








The architecture of On2C system :

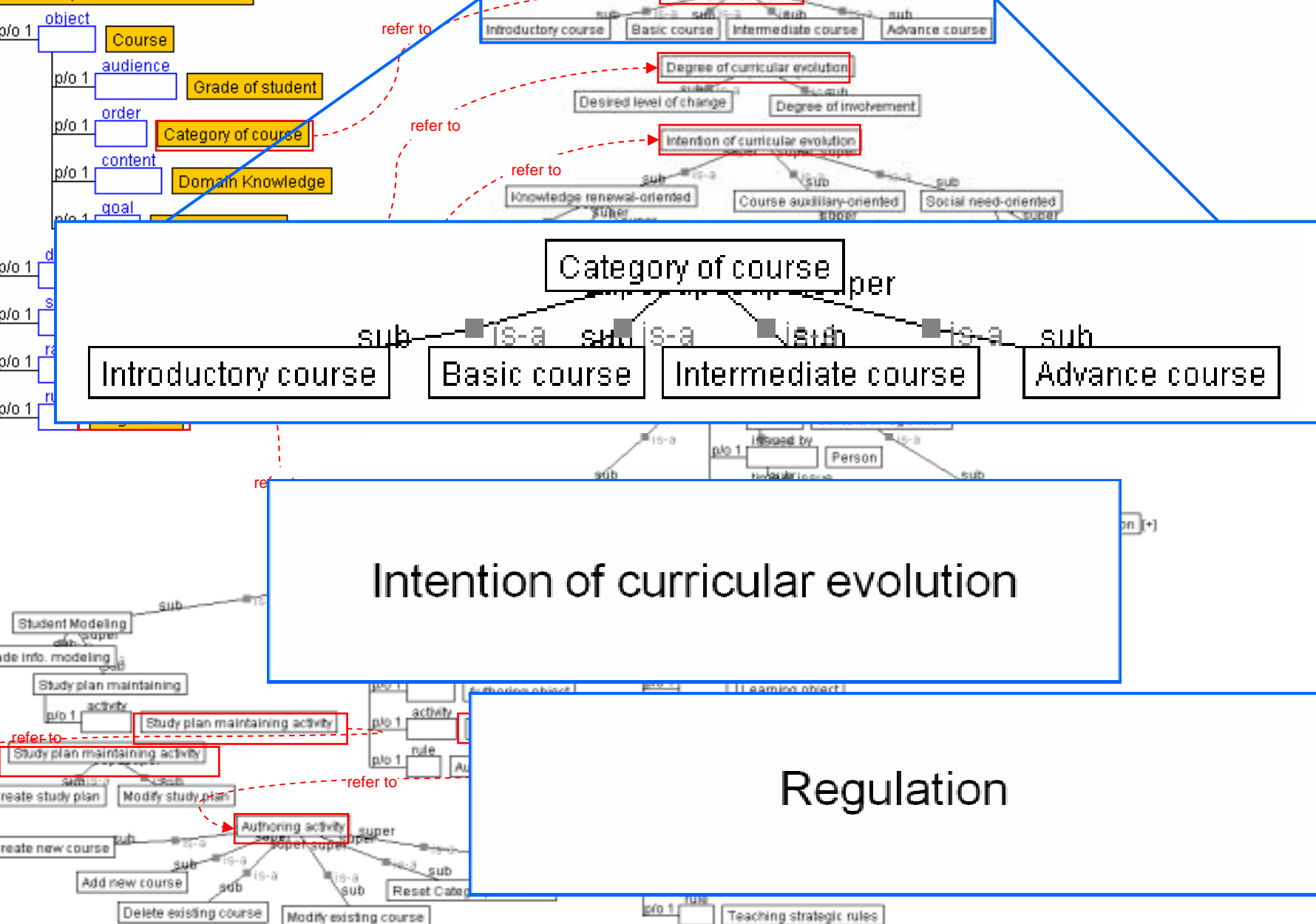


On2C includes **CMS** and **Curriculum Ontology** for coping with the requirements from different stakeholders

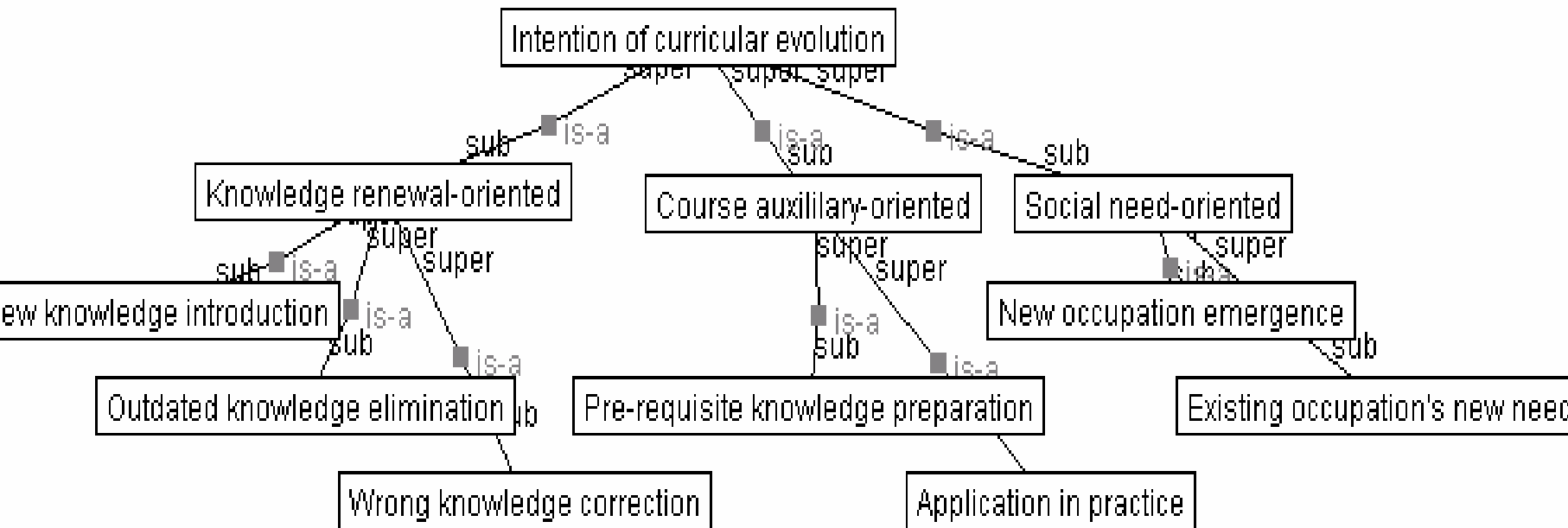
Description of Evolutionary Process of Curriculum-- Curriculum Ontology

- “Evolutionary process of curriculum” indicates two aspects of curriculum in higher education:
 - (1) a designed sequence of changes and development of properties or attributes of curriculum;
 - (2) intention behind the designing, which initiate a series of intentional behaviors of people involved in such process.

Evolutionary Process of Curriculum



Intention of curricular evolution



“Regulation” in Curriculum Evolutionary Process

- *Regulation* is considered as a sort of **social rules**, which plays a crucial role in curriculum evolutionary process:
 - it is the **rule of curriculum** to control
 - the way curriculum is designed, revised, and evaluated
OR
 - the way stakeholders behave;
 - it should be always **INSPIRED** by or **MEET** with “*Intention of curricular evolution*”.

Four Spaces of Relationship during Course Change:

	Single Course	Contextual Courses
Intra-Term	1st Component Relationship <ul style="list-style-type: none"> •Realized by •Goal of •Guaranteed by •Consist with 	2nd Sequence Relationship <ul style="list-style-type: none"> •Pre-requisite •Co-requisite
Inter-Terms	3rd History Relationship <ul style="list-style-type: none"> •Extend from •Narrow down •Adapt to •Accessorize with •Facility-equip with 	4th Effect Relationship <ul style="list-style-type: none"> •Cause effect •Influence effect •Initialize effect •Finalize effect

On2C system Development

- Interface of On2C system

A) Domain knowledge viewer

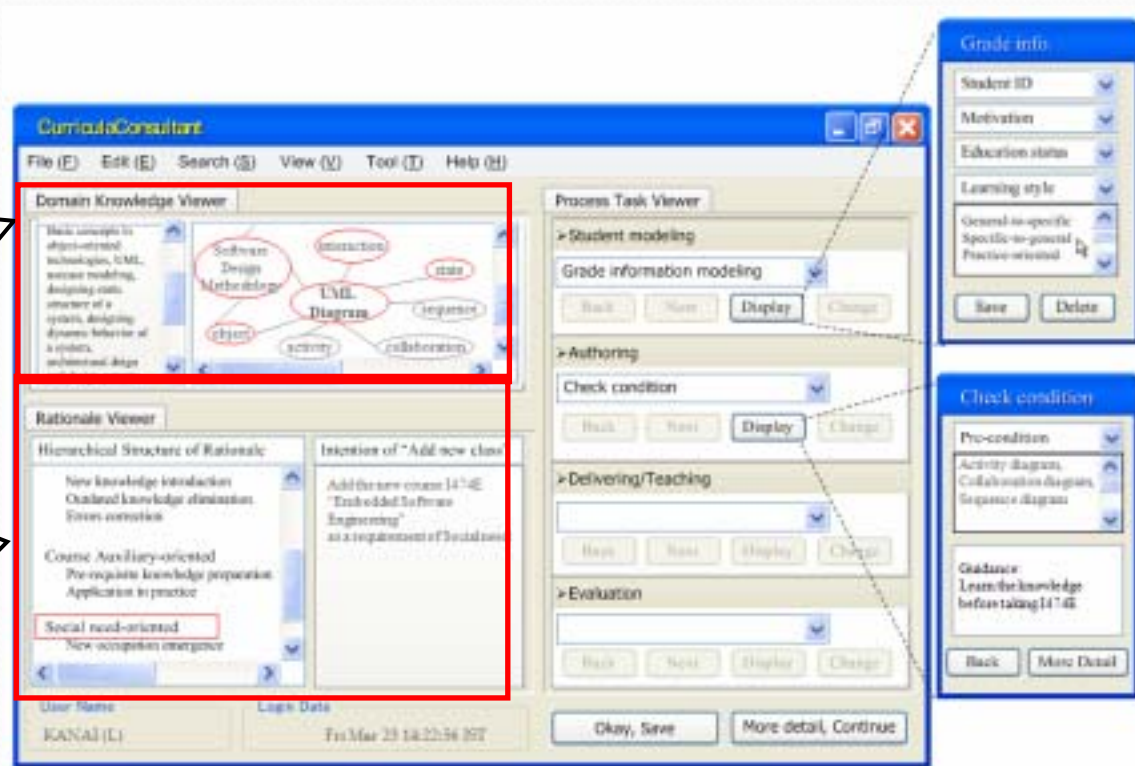
Tree list of domain knowledge in each discipline

To provide lecturer and student with domain contents and structure

B) Rationale viewer

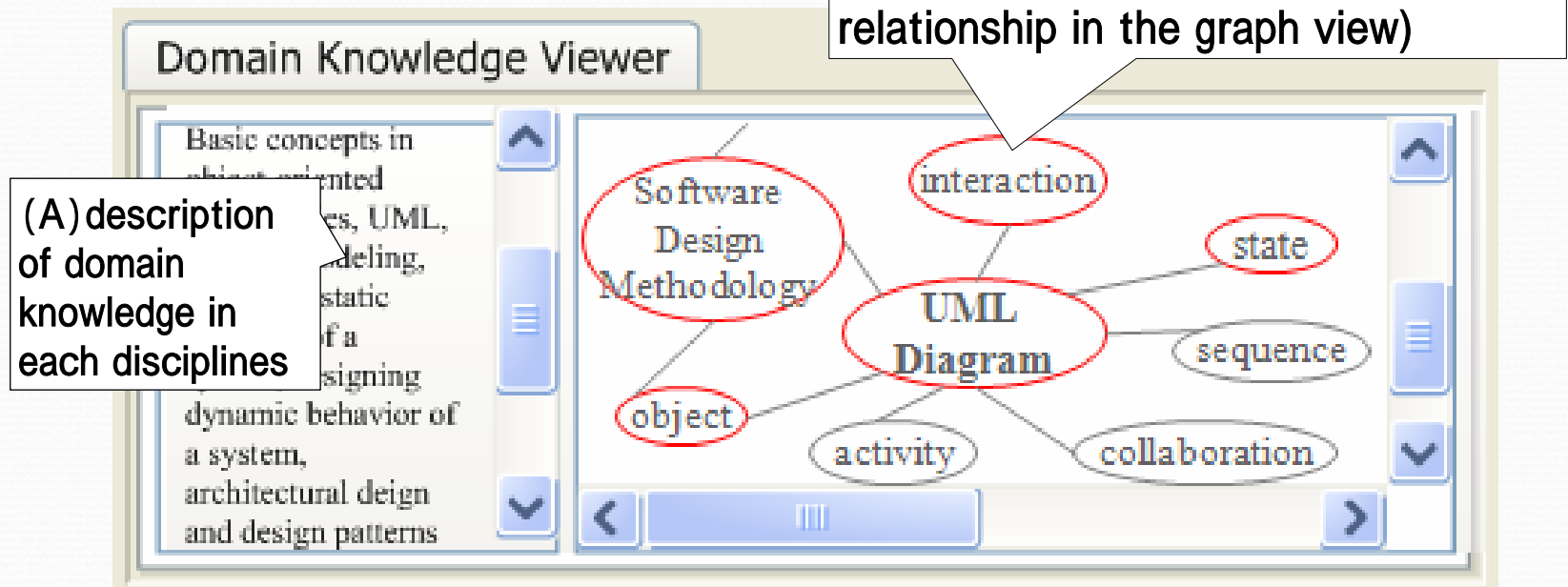
To explicate the basic information and intention of curriculum design

Well-structured concepts related to the intention of curriculum design, and relationship between them



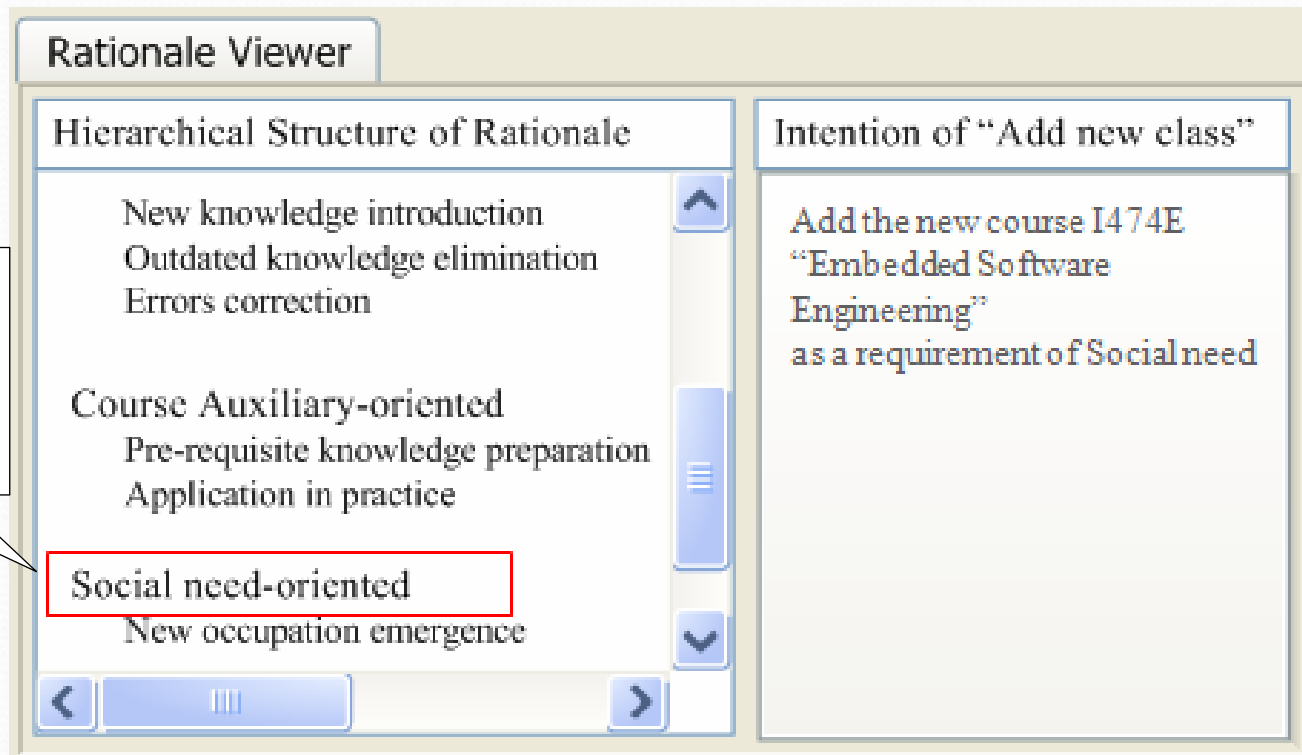
On2C system Development (*cont'd*)

- Domain knowledge viewer
 - (A) the details of the domain knowledge are displayed;
 - (B) the details of the domain knowledge are displayed in the graph view



On2C system Development (*cont'd*)

- Rationale viewer
 - (A) as a part of Curriculum Ontology, it offers the vocabularies to describe the intention of curricular evolution

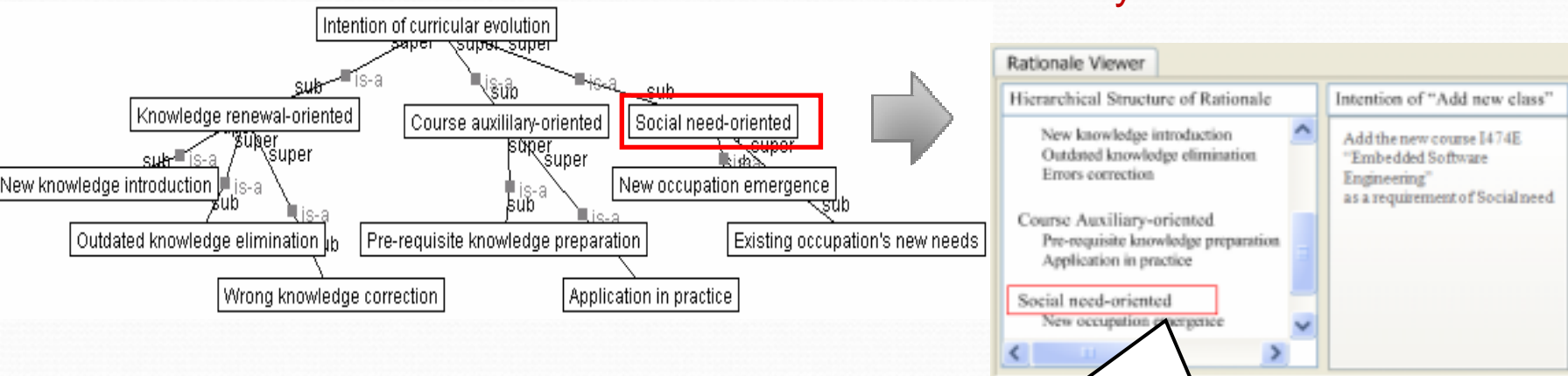


(A) to show
the intention of
curricular
evolution

On2C system Development (cont'd)

- Conceptualized “intention” in Curriculum Ontology

to offer the vocabulary



To explicit that the intention of add the new course of "Embedded Software Engineer" is for the new social need.

Organizing guidance knowledge of design to make evolution smooth

Intention & Activity of Faculty designer

IF In order to meet with the change of social needs

Intention

to add new course

Activity

AND

In order to master prerequisite knowledge of the new course

Intention

to add the necessary new learning items in related existing course

Activity

THEN (student who has taken the related existing course will be suggested to learn new learning items

try to eliminate adverse effects

Organizing guidance knowledge of design to make evolution smooth

Intention & Activity of Faculty designer

In order to **meet with** the **change** of **social needs**

Intention

to **add**

Embedded Software Engineering

Activity

AND

In order to **master** **prerequisite knowledge** of the

Intention

Embedded Software Engineering

to **add** the necessary

Sequence Diagram, Collaboration Diagram, Activity Diagram

in **Software Design Methodology**

Activity

THEN **student** who has taken the

Software Design Methodology

will be **suggested** to **learn**

Sequence Diagram, Collaboration Diagram, Activity Diagram

try to eliminate adverse effects

Conclusion and future work

- In this work we propose the model of evolutionary process which reflects essential structure of curriculum for offering a better ways to tracking the history of curriculum change;
- Curriculum ontology we developed serves as a fixed conceptual system to fully predict the generic components of curriculum so it can be reused in situation-dependent curriculum system.
- Next step is refinements of the evolutionary curricula model for ontology support to intelligent curriculum authoring and consulting. We are mainly interested in exploring which further functionalities are needed and wanted by different stakeholders.