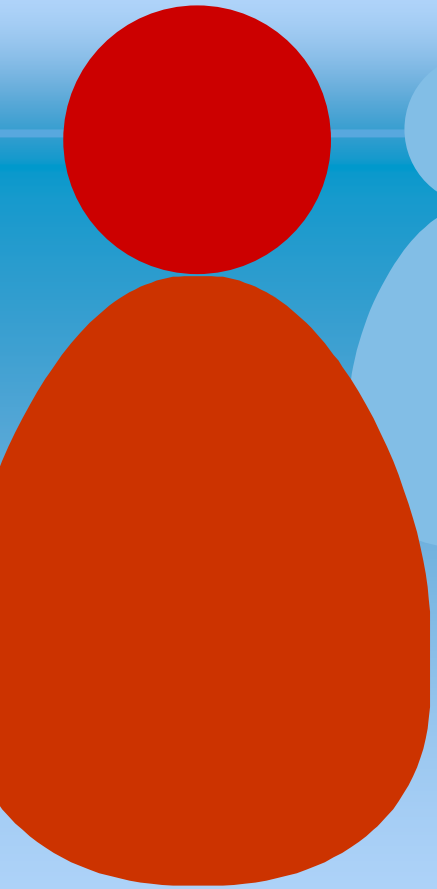

Just-in-time Generation of Pedagogically Sound, Context Sensitive Personalized Learning Experiences

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Overview

- Personalized eLearning
  - The Multi-model, Metadata Driven Approach
  - Personalization in iClass
- Personalized Learning Paths
  - Selector Service
    - Pedagogical Strategies
- Personalized Learning Objects
  - LO Generator Service
    - Pedagogical Scenarios
- Selector and LO Generator cooperating to produce Personalized Learning Experiences
- Interactions with other iClass Services
  - Presenter, Teacher's Preference Tool, Tracker, Monitor and Profiler

Personalized eLearning

- Personalized eLearning is the promise of eLearning tailored to the learner's needs and preferences
  - The challenge is to integrate these experiences within existing curricula and classroom activities
  - Should be pedagogically appropriate
  - Must cater for teacher's preferences
  - Should leverage existing standards to facilitate reusability

- The fulfilment of this promise involves the strategic reconciliation of many different models
  - Strategies of Personalization
    - Pedagogically driven
  - Models of Learners, Teachers, Concept Domains, Learning Objects, Context etc.

Multi-model, Metadata Driven Approach

- This approach advocates the –
  - Separation of Adaptive Logic (also called Narrative) from Adaptive Models
  - Discrete and Separate Modelling of each Model
  - Conceptual Abstraction between Narrative and Models

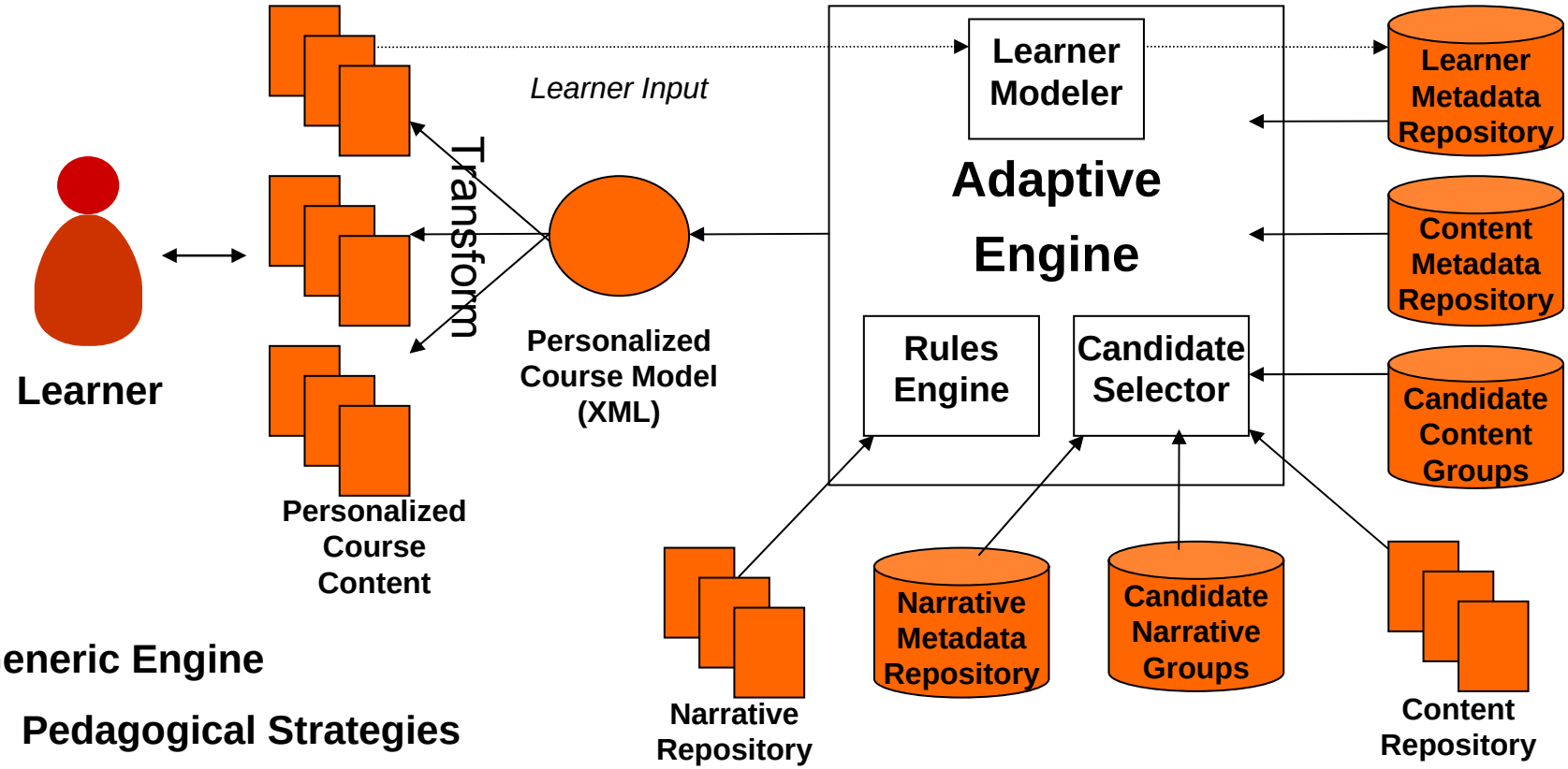
- APeLS (Adaptive Personalized eLearning Service) is an embodiment of this approach [Conlan et. al., Adaptive Hypermedia 2002]
  - Pre-existing Adaptive eLearning System by TCD
    - Initially developed as part of the EASEL IST Project
  - Used to produce personalized courses in TCD
    - Used by ~1000 students so far
  - Evaluated successfully [Conlan & Wade, Adaptive Hypermedia 2004]

Multi-model, Metadata Driven Approach

Key Features

- Discrete models (XML) –
  - Narrative
  - Learner
  - Content
  - Etc.
- Multiple (possibly nested) Narratives
- Runtime reconciliation of Models (Metadata)
- Abstraction Architecture
- Candidacy Architecture
  - Narratives
  - Content
- Multiple output streams (XML)
- Transformation capabilities

APeLS Architecture



1. Generic Engine
2. Pedagogical Strategies
3. Repositories
4. Learning Content
5. Personalized Experience

Personalization in iClass

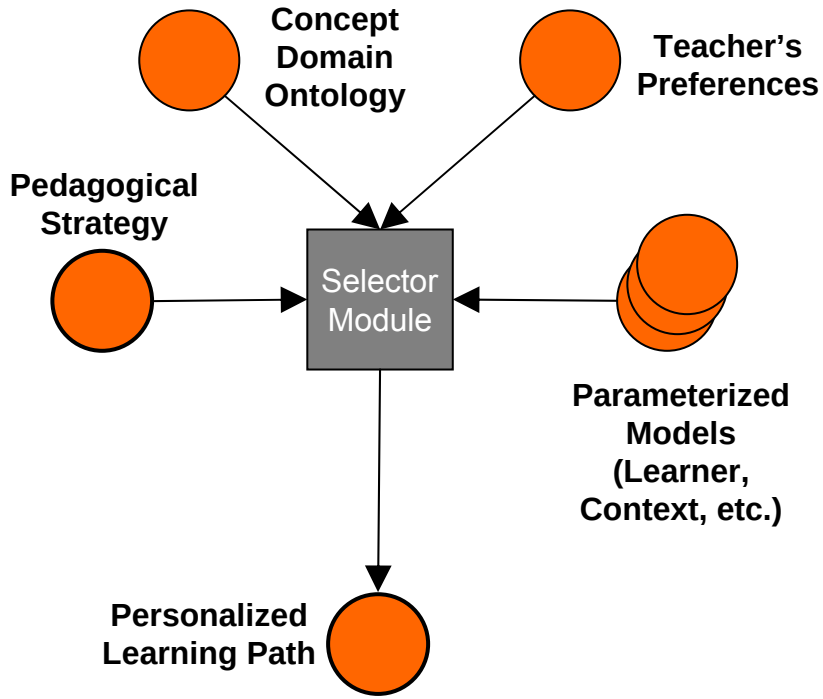
- Separate the ideas in APeLS into discrete, extensible and reusable (web) services

- What do we want to separate?
  - APeLS has a single strategy for adding concepts/activities to a course and adding the appropriate content
  - APeLS performs all of its own (explicit) Learner modelling
  - APeLS handles all course navigation and presentation

- Introducing the separate Services –
  - Selector → select the most appropriate concepts and activities
  - LO Generator → create personalized learning objects
  - Presenter → display the navigation and present LOs
  - Tracker → capture events that may be useful in implicit modelling
  - Monitor → Evaluate the learner's Knowledge State
  - Profiler → Profile pedagogical elements of the learner

Selector Service

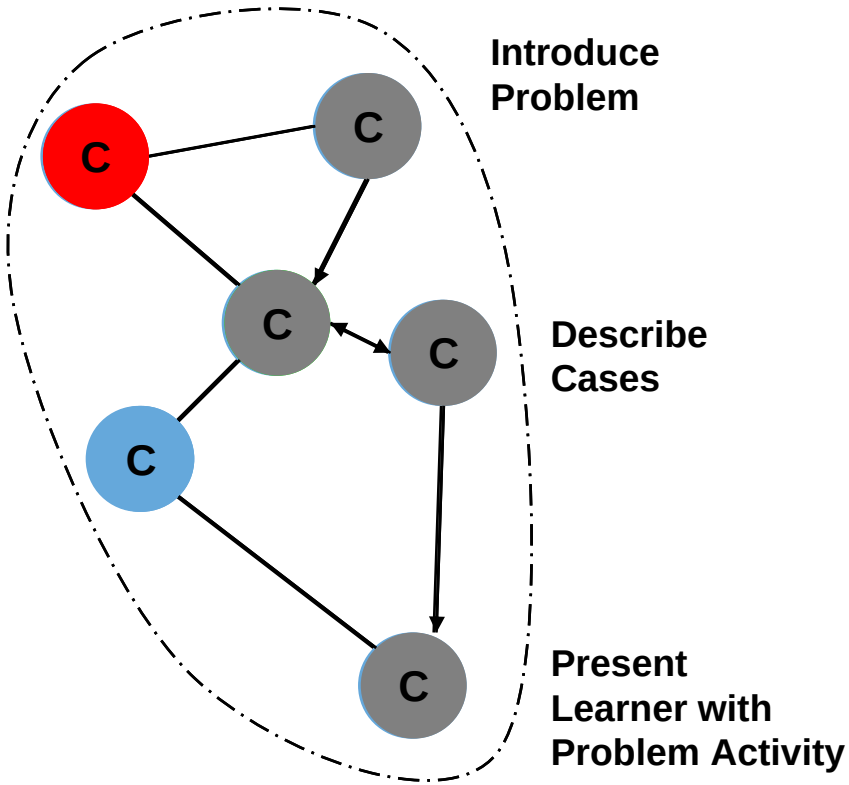
Creating Personalized Learning Paths



- The Selector adaptively selects appropriate concepts and activities to produce a Personalized Learning Path (PLP)
- Teacher's Preferences act as a set of guidelines for the personalisation
- Adaptivity is based on Pedagogical Preferences (Strategy selection), Prior Knowledge and Learning Objectives
  - To be extended
- Pedagogical Strategy is a high level strategy that adaptively sequences concepts, activities and types
- Adaptivity based on Learner Model, Context Model, etc.
- May be runtime or design time.
- PLP is expressed in IMS LD

Selector Service

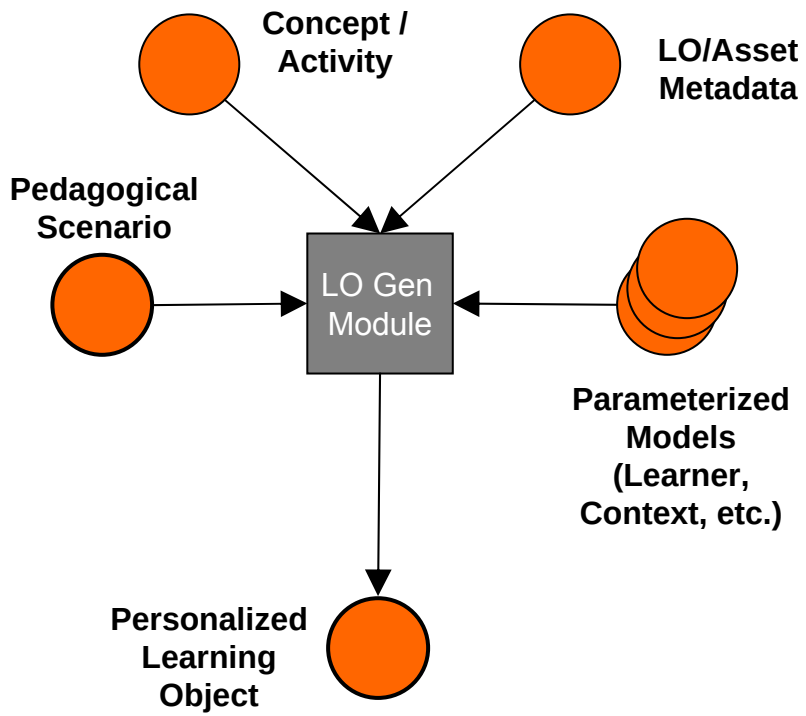
Example Execution



1. Concept Domain is overlayed with Teacher's Concept Preferences (required concepts, undesired concepts, concept boundary)
2. Pedagogical Strategy is chosen based on Learner Preference and Teacher Preference (e.g. Case-based approach)
3. Pedagogical Strategy is applied to Concept Domain (pedagogical types are introduced). Validated using LO Generator
4. PLP is produced as an IMS LD

LO Generator Service

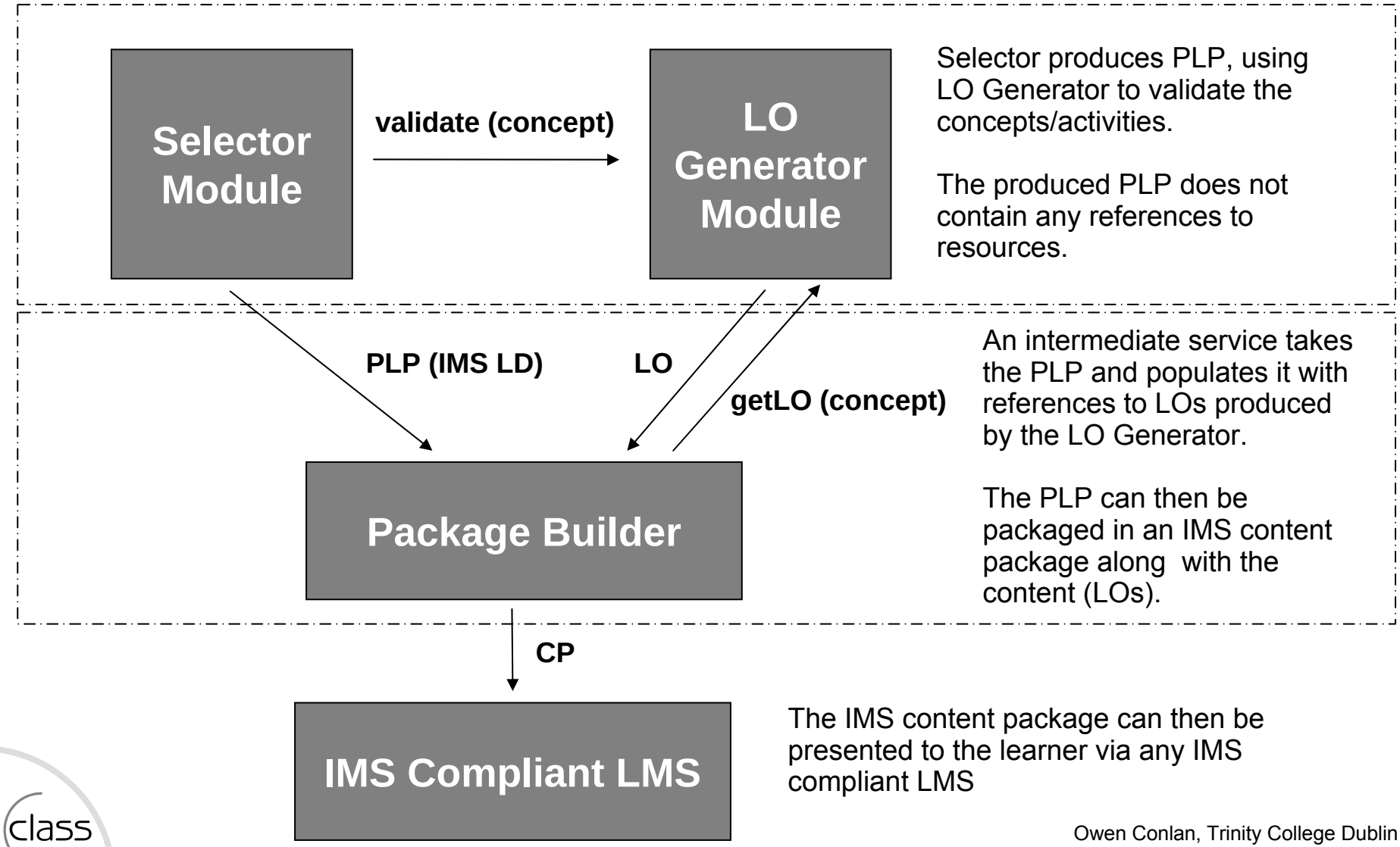
Creating Personalized Learning Objects



- The LO Generator –
  - Adaptively selects an appropriate (pre-existing) LO to deliver
  - Adaptively creates a new LO by combining assets
- Pedagogical Scenario describes the methodology applied in this process
  - Using 8LEM from University of Liege
  - Combining Learning Resources and Learning Events
- Metadata is of key importance in the reconciliation process

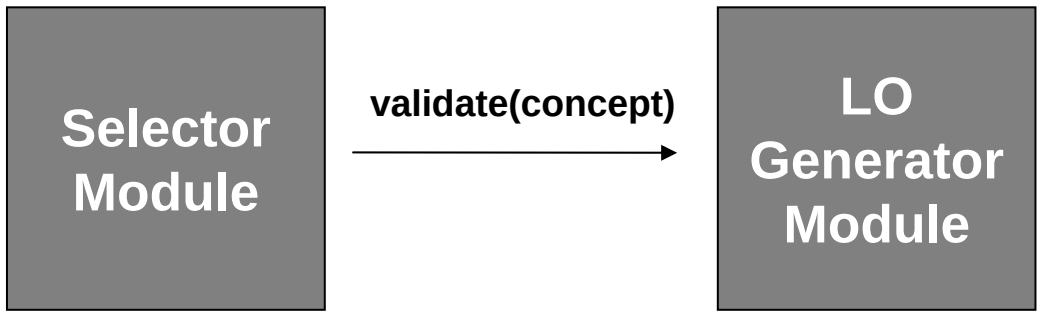
Selector and LO Generator Cooperation

Methodology 1 – Building a Content Package



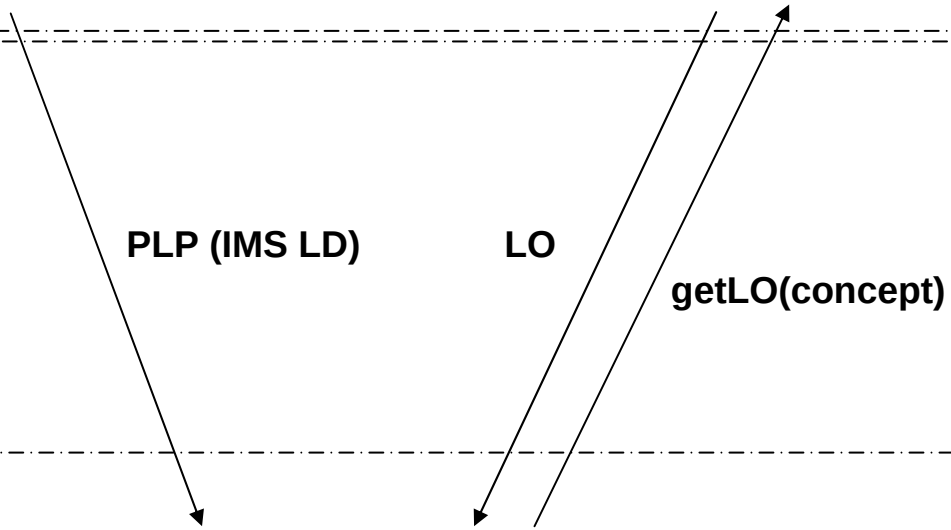
Selector and LO Generator Cooperation

Methodology 2 – Dynamic Navigation and Presentation



Selector produces PLP, using LO Generator to validate the concepts/activities.

The produced PLP does not contain any references to resources.



For every required LO, the Presenter requests an LO from the LO Generator (or some other service).

The Presenter requests LOs from any service referenced in the PLP.

Presenter facilitates navigation of the PLP and requests the LO Generator creates an appropriate LO for any concept the learner selects.

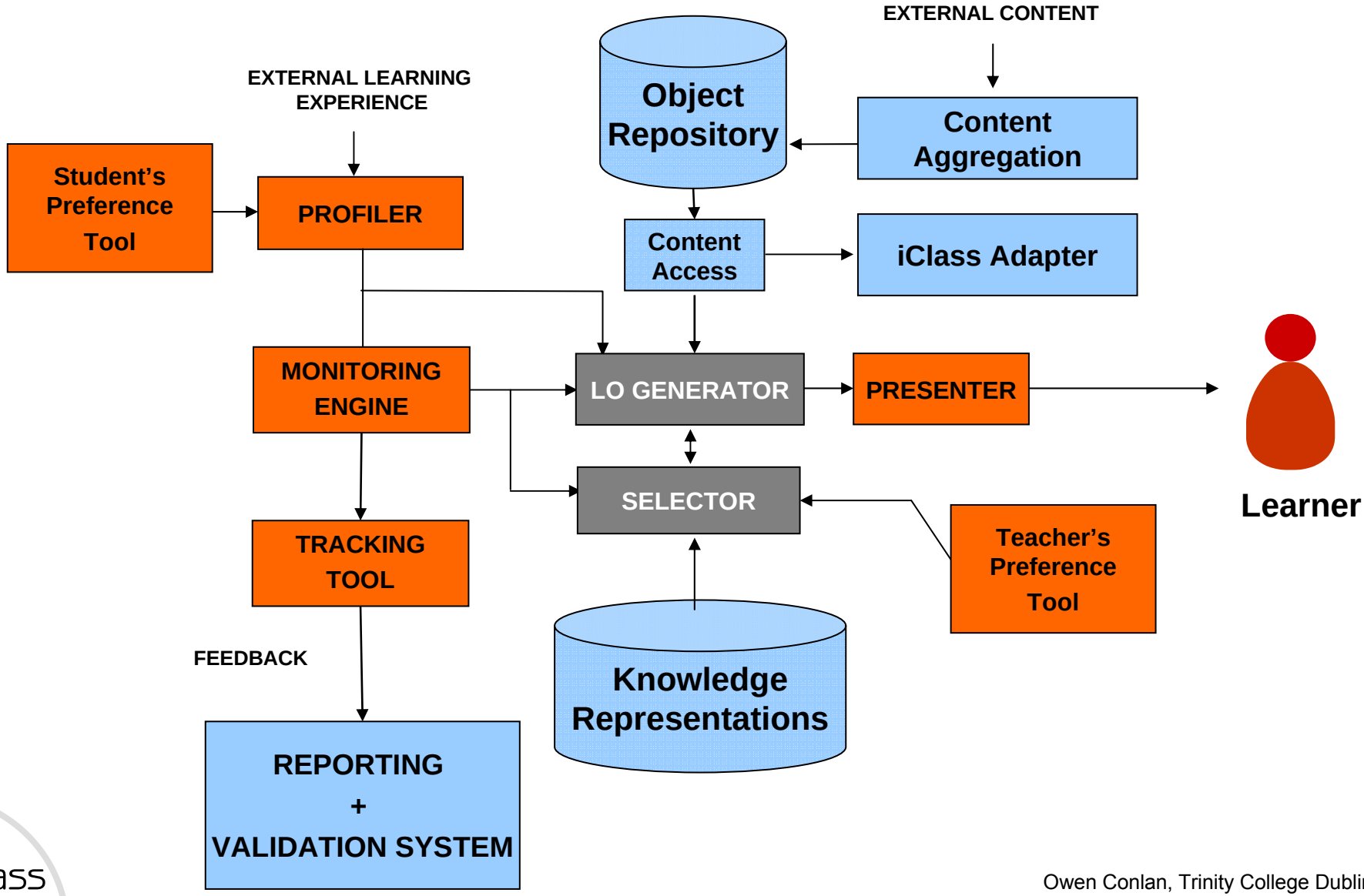
Selector and LO Generator Cooperation

Discussion

- Selector and LO Generator Modules implemented as services makes them flexible and scalable
- Methodology 1 (Content Package Creation) is not very dynamic, but produces a personalized learning experience that may be played in any IMS compliant LMS
- Methodology 2 (Dynamic Navigation and Presentation) is dynamic as LOs are created as needed using the most up-to-date information.
  - Granularity of PLPs and concepts impacts dynamism
- Other workflows possible

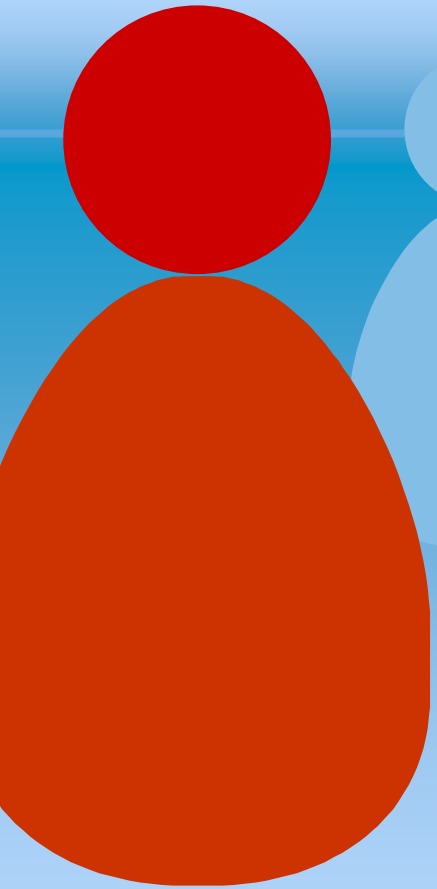
Interactions of iClass Services

Creating Personalized Experiences



Conclusion

- Selector and LO Generator Modules in iClass are implemented as discrete, extensible and reusable (web) services
  - Flexible
  - Scalable
- Separation of Personalization facilitates different levels of Pedagogical Strategy
- Can support different levels of adaptivity dynamism



Thank You!

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