

# Leveraging Business Process and Rule Modeling for Developing Learning Design-based Systems

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Trying to provide an explicit notation that would enable the interoperability and reusability of instructional knowledge on the level of systems, the e-learning community has adopted the IMS Learning Design specification. However, there are some issues regarding the IMS LD specification. There is no way to formally discover and verify some potential conflicts that may appear in learning designs before they are actually deployed into educational environments. This consequently may lead to a number of run-time issues when learning designs are deployed and used. We propose the use of the Business Process Modeling Notation as a modeling language for representing learning systems in this poster. Our solution goes a step forward and supports extending BPMN with concepts for modeling rules. The main benefit of this approach is that formally defined access policies and service models can be analyzed by using reasoning engines.

## IMS Learning Design

IMS Learning Design is a specification of methods and techniques which aims to provide a common notational method to define any instructional design in a formal way. As the specification is based on the notion of a learning design as an application of a pedagogical model for a specific learning objective, target group, and a specific context or knowledge domain, a large variety of pedagogical models can be described.

As an example of contradicting issues which could not be discovered at the design-time in IMS Learning Design Specification, consider a case when a learning design is not aware of access policies that regulate the access to learning objects or services. This may later cause that the learners not to be able to successfully complete the requested learning activity.

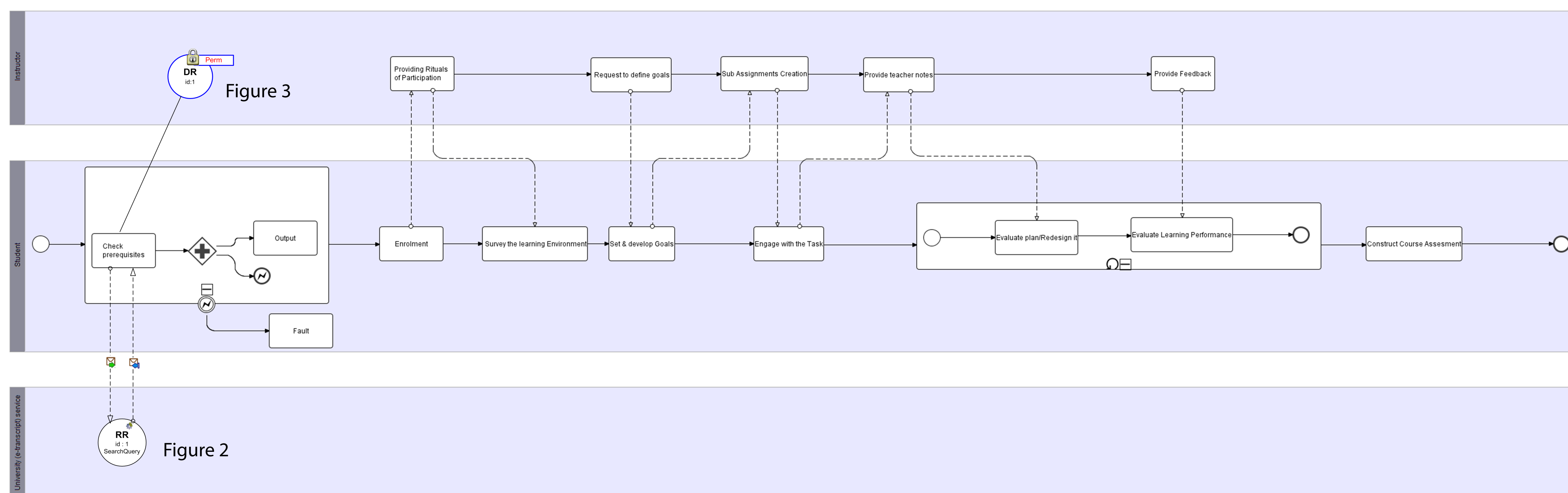


Figure 1- BPMN representation of IMS Learning Design based on the "self regulated learning" approach

## Business Process Modeling Notation of Learning Design

To address the above problems, we apply the Business Process Modeling Notation as a modeling language for representing learning systems, in that, the BPM Notation is also extended with the concepts for modeling rules (named rBPMN). In particular, our rule language supports modeling event-driven situations by means of reaction rules. Moreover, to able to consistently model the access policies and pedagogical constraints related to the learning designs, we exploit General Policy Modeling Language (GPML).

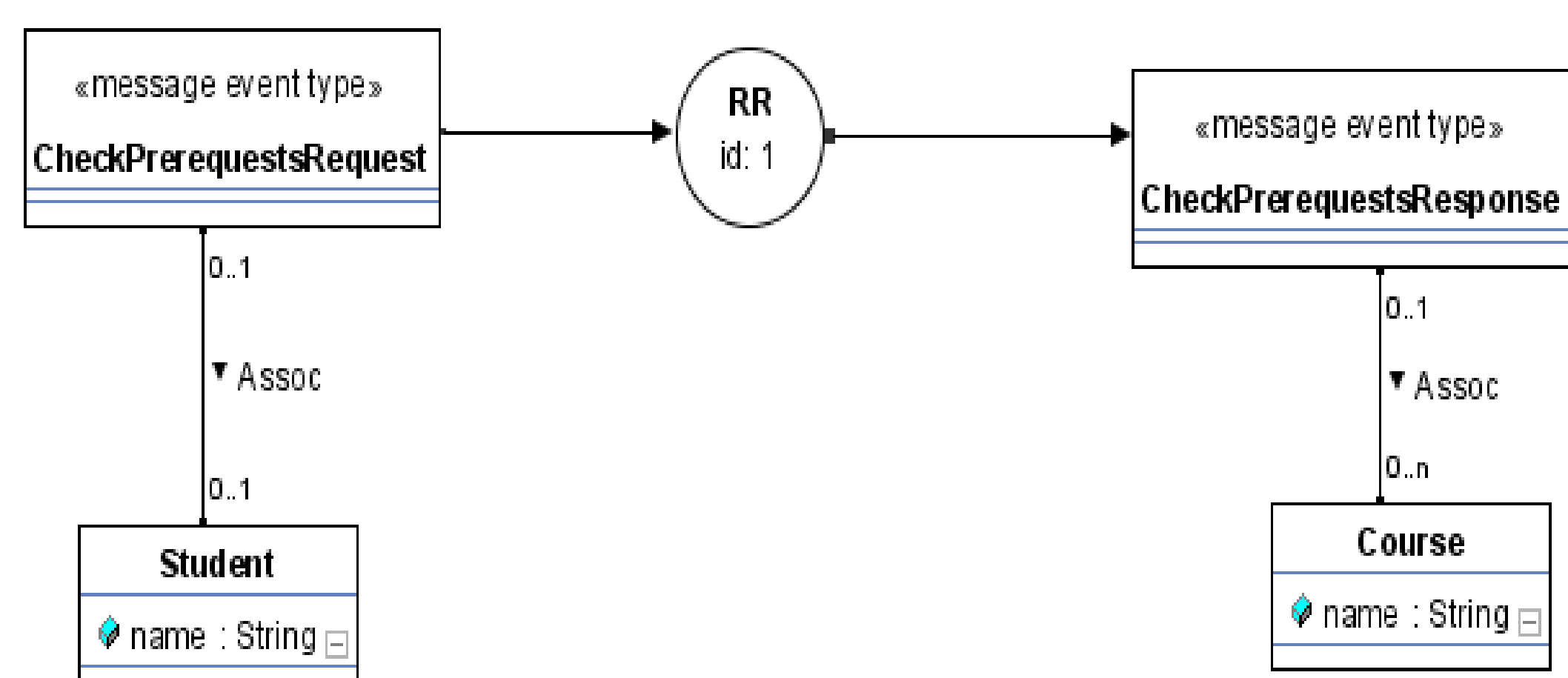


Figure 2- Sample of an event-driven situation occurred in the system  
 Design-time discovery of regulating access policies/ pedagogical constraints

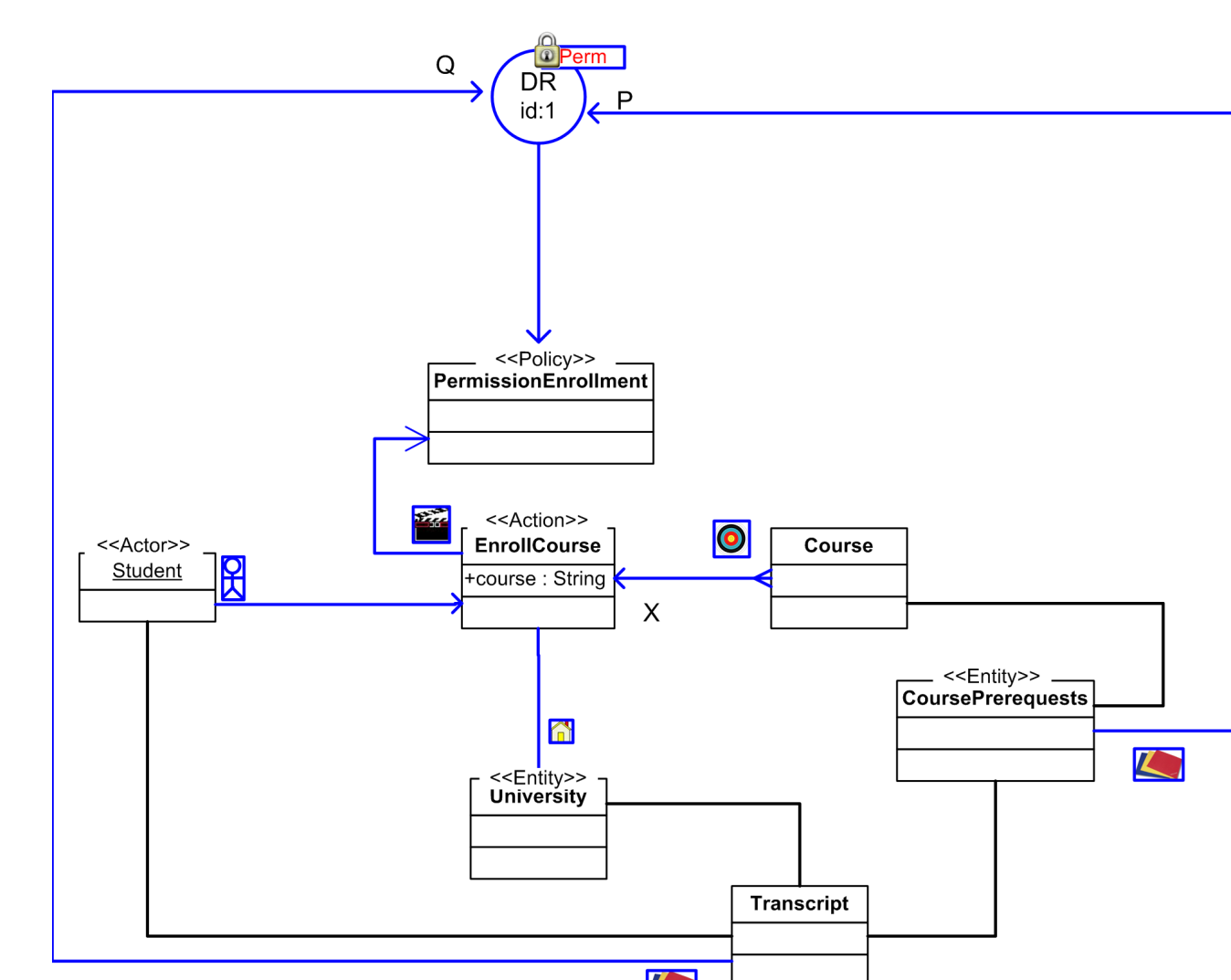


Figure 3- Access policy  
 Only students whose e-transcript from their previous universities indicate that the prerequisites of the course are passed, can enroll for this course