Simulation Modernization

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Evaluation of simulation development methodologies and environments brought us a new challenge: simulations modernization. This seminar presents Simulation Knowledge Discovery Metamodel (SKDM) that extends Object Management Group’s Knowledge Discovery Metamodel (KDM) by adding a Simulation Model package for enabling architecture-driven simulation modernization.

While there are some efforts that propose integration methods for legacy simulations, modernization has not been yet deeply investigated. Architecture-Driven Modernization (ADM) has been introduced as a process of comprehending and transforming existing software assets. It advocates a model based approach to software modernization. The knowledge extracted from software assets are captured in models that conforms to a particular metamodel, namely KDM. It specifies an ontology of software assets. Model transformations are then recommended as means of modernization of legacy assets. But diversity in methodologies and approaches to specify simulation modeling assets prohibits KDM from providing adequate meta definitions to capture knowledge in simulations.

System Entity Structure (SES) has long been used for knowledge representation by simulation community. It provides formalism for composition, taxonomy and coupling relations. Hence SES will be presented as an intermediate metamodel to capture the meta-constructs and their relations. It has been made available to define particular metamodels for particular simulation modeling methodologies or approaches. Promoted methodology will be exemplified with samples. Metamodel segments will be presented for knowledge discovery for Discrete Event Systems Specification (DEVS) and Modelica simulation programming language. A complete metamodel will then be introduced for the real time distributed simulation domain model of German Aerospace Center (DLR) Institute of Flight System. Finally this metamodel will be employed to introduce discovery artifacts.