Time & Location: November 10, 2015 at 4:30 PM in Eng II 312
Title: Agent Based and System Dynamics Hybrid Modeling and Simulation Approach Using Systems Modeling Language

Agent based (AB) and system dynamics (SD) modeling and simulation techniques have been studied and used by various research fields. After the new hybrid modeling field emerged, the combination of these techniques started getting attention by the late nineties. Even though the majority of the studies demonstrated the benefits to modeling and simulation domain, the issues arising from their differences in their basic modeling notions have also been pointed out.

This dissertation presents contributions to the methods of agent based and system dynamics hybrid modeling and simulation technique. We propose a methodology that extends model-based system engineering approach for agent based and system dynamics hybrid modeling and describe the approach through hypothetical population, movie theater and real-life training management scenarios on a Systems Modeling Language (SysML) platform using Rational Rhapsody. In this setting, we propose methods for independent behavior and system structure modeling. We explain methods for two step validations suggested for agent based and system dynamics modeling techniques. Finally, we propose methods for probabilistic behavior modeling and time synchronization.

Described method provides techniques for creating dynamic two-way communication between agent based and system dynamics models. It allows parallel modeling efforts to run simultaneously and creates independent generic behavior models that can be reused in different case studies.

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Approved for distribution by Waldemar Karwowski, Committee Chair, on November 10, 2015.

The public is welcome to attend.