INTRODUCTION TO AGENT-BASED SIMULATION AND SYSTEM DYNAMICS MINITRACK

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If our goal is to create robust, market-driven strategic level simulations, there are three major technologies which one might consider: discrete event simulation, system dynamics (SD), and agent-based simulation. Discrete event simulation has been a staple in the operations research toolkit for decades now, as well as a driver of object-oriented technology. System dynamics, developed at MIT by Jay Forrester, also has a rich history, and is characterized principally by its focus on feedback loops. Agent-based simulation has emerged from the research on complexity at Santa Fe Institute, as well as earlier work in experimental economics. Agent-based and system dynamics simulation models have a capacity to deliver overlapping and complementary insights when applied to market-oriented problems. Discrete event simulation with its more conventional top down approach to modeling may be less amenable to modeling market dynamics. The objective of this Minitrack is to examine where these overlaps and complementarities exist, and to identify opportunities for fruitful synergy between the agent-based and SD disciplines, using discrete event simulation as an historical backdrop.

The second paper, by McGrath and Campbell, Implementing Recommendations as a Result of a System Dynamics Intervention, describes a detailed system dynamics group modeling exercise done to examine poor performance within an organization’s core information system.

The third paper, by W.S. Geerlings, A. Verbraeck, R.P.T. deGroot, G. Damen, Manpower Forecasting – A Discrete-Event Object-Oriented Simulation Approach, provides a valuable perspective of the standard discrete event paradigm. They discuss the application of this simulation approach to the dynamics of organizational human resource management, specifically in the context of manpower forecasting.

The fourth paper, by Henk A. Akkermans, Emergent Supply Networks: System Dynamics Simulation of Adaptive Supply Agents, analyzes under what circumstances and to what extent supply chains of independent firms reach stability while such complex networks emerge.

The fifth paper, by Eliot Rich and Peter Duchessi, Seminal Models for Understanding the Dynamics of Organizational Knowledge in Consulting Firms, discusses pressing knowledge management issues in knowledge-based firms from a systems perspective looking at internal and external forces that affect these.

The sixth paper, by Vedat G. Diker and Hans J. (Jochen) Scholl, The Art of Leveraging, assesses the prospects of the collaborative Open Source Software (OSS) movement such as GNU and Linux in highly (Microsoft) monopolized technology markets on the basis of a system dynamics model and comes to the conclusion that OSS has the capacity to shatter the existing market monopoly.