

Demonstration Guide – USC CSSE Convocation 2006

Name: System Dynamics Models

Presenter: Ray Madachy

Objective: System dynamics simulation models are used to quantitatively reason about, evaluate and optimize processes for developing complex software-intensive systems. Decision makers can be better informed about the dynamic consequences of their decisions.

Rationale: The evaluation of process strategies for the architecting and engineering of complex software-intensive systems involves many interrelated factors. Effective systems and software engineering requires a balanced view of technology, business or mission goals, and people. System dynamics is a rich and integrative simulation framework used to quantify the complex interactions, feedback effects and strategy tradeoffs between cost, schedule, quality and risk. Traditional static approaches cannot capture dynamic feedback loops and interacting phenomena that cause real-world complexity (e.g. increasingly rapid change, development methods, process improvement initiatives, new product demands, project volatility, resource contention, schedule pressure, slippages, communication overhead, task underestimation, motivation and other people factors, etc.)

Target Users: Professionals and students in systems and software engineering who are interested in understanding the dynamics of software development, or in assessing and optimizing process strategies.

Scope: Cost, schedule, quality, business value and risk tradeoffs.

Project Type: Multi-year USC-CSSE research project.

Runs On: Windows, Macintosh.

IPR Status: These are public domain models. They are free for affiliates to use and modify.

Technical Approach: System dynamics is a simulation methodology where quantities are expressed as levels, rates and information links representing feedback loops. Complex and interacting process effects are modeled using continuous flows interconnected in loops of information feedback and circular causality

Developer: Ray Madachy

Future Directions: Elaborate models and strengthen their empirical bases.