

System Engineering Modeling and Design

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BOOKs AUTHORED

- *Unix Programming- The First Drive*, published by Wiley Publication, India as a sole author.
- *Systems Analysis and Design for Advanced Modeling Methods: Best Practices* coauthored and published by IGI Publications, USA, released in May, 2009.
- *Systems Engineering and Modeling*, by Wiley Publications as First Author to be released by Dec 2009.

Why This Tutorial?

You might be a developer, modeler, thinker, analyst, architect or researcher already experienced with system facts. You might be interested in System Theory and Thinking, Modeling, Simulation, Knowledge management, System Analysis and Design, System Forecasting and different types of real world modeling techniques and Techno-Socio-Economic Modeling. You might want to combine forecasts of different technologies based on system simulation rather combining the forecasts of the same technology as technologies may interact or be interrelated in some fashion.

You might be a developer making the transition from a conventional coding technical professional to system thinker or modeler or architect. You might already be familiar with the general principles of writing good software, but you need to know the specific techniques in system simulation and modeling use to interact with the system and with each other. And you want to make sure system engineering concepts fit naturally into the real world system and behave as users expect them to.

Approach

This tutorial addresses the core issues of System Engineering, Simulation and Modeling of real world objects. It tells you everything you need to know to be a successful system thinker, modeler, Technical manager and forecaster. The tutorial focuses on: the real-world goals for, services provided by, and constraints on systems; the precise specification of system structure and behaviour, and the implementation of specifications; the activities required in order to develop an assurance that the specifications and real-world goals have been met; the evolution of systems over time and across system families. It is also concerned with the processes, methods and tools for the development of systems in an economic and timely manner.

System Theories have been deployed within every corporate function and within a broad section of businesses and markets. Systems thinking involve changing paradigms about the way the world works, the way corporations function, and the human role in each. In systems thinking we look for interrelationships among the elements of a system. The tutorial reflects the core insights of system modeling.

This widespread acceptance and deployment of system theories means System engineering and modeling are now more on the critical path than ever before. In the financial community as well as other market segments, even a relatively small system failure or outage can result in significant financial impact or have other far-reaching implications.

This tutorial will give you the knowledge of important sections from the scratch, step-by-step procedures, and the skills necessary to effectively system thinker, modeler, Analyst, Technical and Solution Architect. It is meant to be very practical in nature, and focuses on only the more important elements to System Engineering, simulation and Modeling, not esoteric subjects that have little relevance to the important issues faced by today's Systems Modelers.

Audience(Potential attendee profile)

This tutorial should be an interesting source of information both for people who want to experiment with their thinking and simulating the real world who face the need to deal with the inner levels of system engineering concepts. We hope this tutorial is useful as a starting point for people who want to become system analyst and architect but don't know where to start.

On the technical side, this text should offer a hands-on approach to understanding the System Theory and Thinking, Modeling, Simulation, Knowledge management, System Analysis and Design, System Forecasting and different types of real world modeling techniques and Techno-Socio-Economic Modeling and some of the design choices made by the System developers for auditing and output designs from scratch.

Organization of the Tutorial

The first part of the tutorial deals with System Engineering, Theories and thinking concepts. This part visualizes an interdisciplinary approach and means to enable the realization of successful systems. It focuses on defining customer needs and required functionality early in the development cycle, documenting requirements, and then proceeding with design synthesis and system validation while considering the complete problem.

Second part works with the System Modeling concepts and its types. It reflects that computer model, as used in modeling and simulation science, is a mathematical representation of something—a person, a building, a vehicle, a tree—any object and a model also can be a representation of a process. This chapter gives the framework of system or framework for managing the organizational processes that create, store and distribute knowledge, as defined by its collective data, information and body of experience.

Third part will give exclusively in depth knowledge for simulating the real world objects. And highlight that Simulations (and models, too) are abstractions of reality. Often they deliberately emphasize one part of reality at the expense of other parts. Whereas models are mathematical, logical, or some other structured representation of reality, simulations are the specific application of models to arrive at some outcome. It will give the inputs to understand the dynamics of the system. This chapter is based on System dynamics that is a computer-based simulation modeling methodology tool for managers to analyze complex problems. Using system dynamics simulations allows us to see not just events, but also patterns of behaviour over time. The behaviour of a system often arises out of the structure of the system itself, and behaviour usually changes over time.

The System enthusiast should find in this tutorial enough food for their mind to start playing with the System simulation, engineering, Modeling, analysis and design and should be able to join the group of system modelers that is continuously working on new capabilities and performance enhancements.

Therefore, it makes a good introduction to Systems definition, analysis to simulation, engineering, Modeling in general. System Engineering is still a work in progress, and there's always a place for new thinkers to jump into the game. This tutorial is not intended to be a comprehensive guide or reference to all aspects of modeling. Instead, I'll take a case study approach, introducing the most important concepts and techniques, and giving examples of how to use them.

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