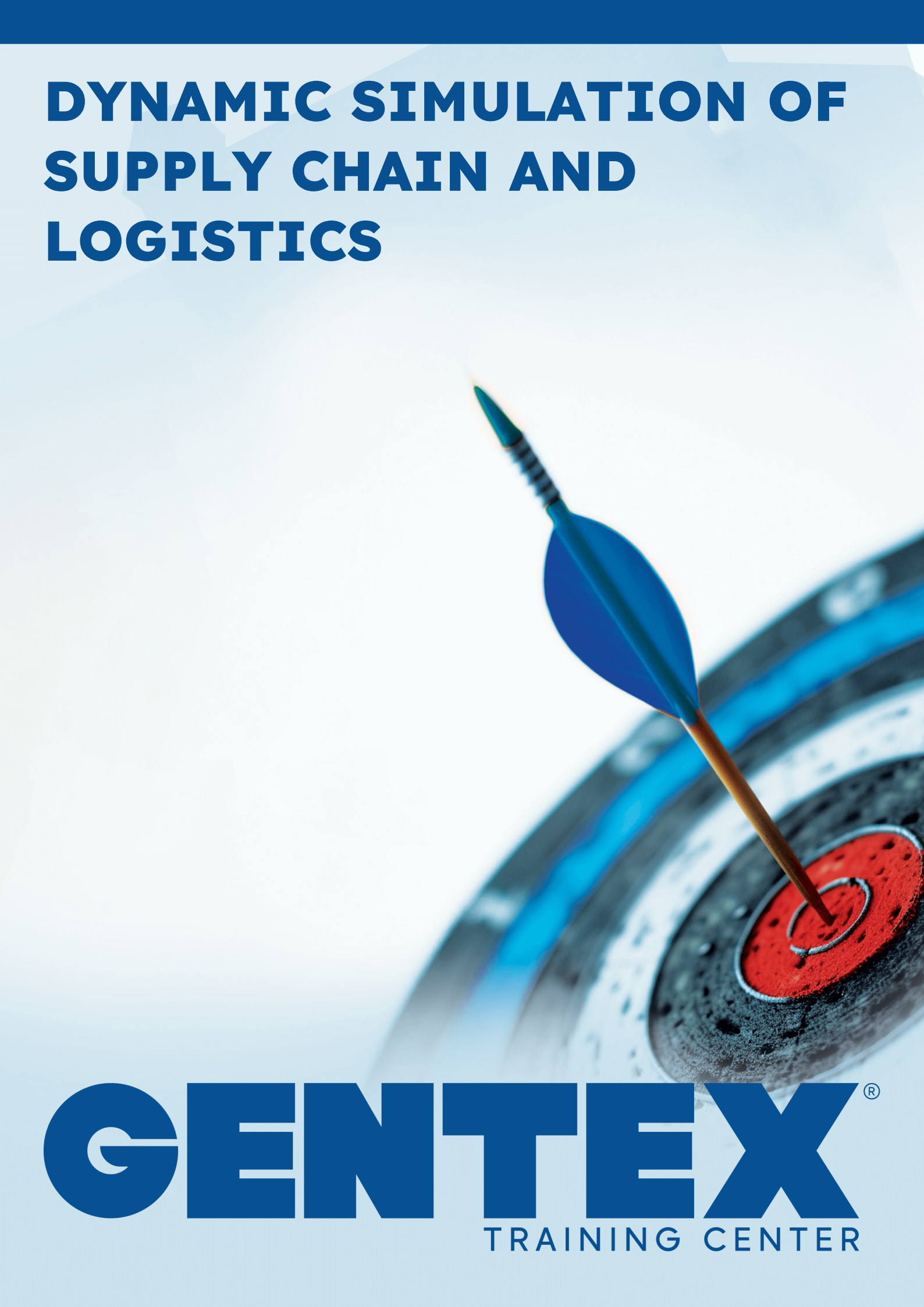
DYNAMIC SIMULATION OF SUPPLY CHAIN AND LOGISTICS



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Introduction

Supply chains behave as dynamic systems, where a decision in one part produces an effect somewhere else, often later and larger than expected. Order batching creates demand amplification, a small lead time change triggers stockouts upstream, and a policy that looks sound on a spreadsheet fails under real variability. This Dynamic Simulation of Supply Chain and Logistics Training Course gives supply chain analysts, planners, and operations professionals a practical method for modelling those dynamics. Participants learn system dynamics and discrete-event simulation, model structure and validation, bullwhip and inventory dynamics, policy experimentation, and how to communicate results. Furthermore, the course links simulated scenarios to real planning and investment decisions.

Dynamic Simulation of Supply Chain and Logistics Course Objectives

- Apply system dynamics and discrete-event simulation concepts correctly.
- Choose a modelling approach that fits the decision under study.
- Build stock-and-flow models representing inventory, capacity, and flow.
- Model demand variability, lead time variation, and capacity constraints.
- Reproduce and explain the bullwhip effect in a simulated chain.
- Validate models against historical data before drawing conclusions.
- Test inventory policies and replenishment rules through scenario runs.
- Evaluate network, transport, and capacity decisions before committing.
- Interpret simulation output and communicate results to decision makers.
- Use simulation to support risk assessment and contingency planning.

Course Methodology

- Facilitated sessions built on real supply chain data and planning scenarios.

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- Model-building labs using stock-and-flow and process-flow diagrams.
- Case workshops on bullwhip, capacity constraints, and policy failures.
- Scenario experimentation on inventory, lead time, and network decisions.
- Group exercise on a simulated decision case with a results presentation.

Who Should Take This Course

- Supply chain analysts and planners.
- Operations research and modelling practitioners.
- Continuous improvement and process design officers.
- Inventory and distribution managers.
- Logistics and network planners.
- Consultants and analysts working on supply chain projects.

Dynamic Simulation of Supply Chain and Logistics Course Outlines

Day 1: Simulation Concepts and Modelling Approaches

- Why supply chains behave dynamically rather than linearly.
- System dynamics: stocks, flows, feedback loops, and delays.
- Discrete-event simulation: entities, queues, resources, and events.
- Agent-based modelling and when it adds value.
- Selecting the right approach for the decision at hand.
- Data required to build a credible model.
- Model boundary setting and assumption documentation.

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Day 2: Building Stock-and-Flow Models

- Stock-and-flow notation and causal loop diagrams.
- Modelling inventory, backlog, and order flow.
- Representing lead times, delays, and transport times.
- Capacity, throughput, and resource constraints.
- Feedback between demand, supply, and pricing decisions.
- Parameter estimation from operational data.
- Model calibration and sensitivity checks.

Day 3: Demand Variability, Bullwhip, and Inventory Dynamics

- Demand amplification and its causes in a supply chain.
- Order batching, forecasting, and rationing effects.
- Simulating the bullwhip effect and measuring its magnitude.
- Information sharing and its effect on amplification.
- Inventory policy testing: reorder point, order-up-to, and periodic review.
- Safety stock behaviour under demand and lead time variability.
- Policy stabilisation and damping techniques.

Day 4: Logistics, Network, and Capacity Simulation

- Modelling transport lanes, transit times, and reliability.
- Warehouse and terminal capacity simulation with queues.
- Distribution network design comparison through simulation.
- Load planning, vehicle utilisation, and turnaround modelling.

- Disruption scenarios: port closure, supplier failure, and demand shock.
- Contingency policy testing and buffer strategy evaluation.
- Cost modelling alongside service performance.

Day 5: Validation, Interpretation, and Communication

- Verification and validation practice for simulation models.
- Comparing model output with historical performance.
- Interpreting output: averages, distributions, and confidence.
- Presenting scenario results to management clearly.
- Limits of simulation and the assumptions that matter most.
- Integrating simulation into planning and investment decisions.
- Building a simulation capability roadmap.

Conclusion

By successfully completing the Dynamic Simulation of Supply Chain and Logistics Training Course, participants will have acquired a solid working knowledge of system dynamics and discrete-event simulation, stock-and-flow model building, bullwhip and inventory dynamics, logistics and network simulation, validation practice, and results communication. They will leave able to test supply chain policies before committing money to them, explain dynamic behaviour that a static spreadsheet hides, and support decisions with evidence. Gentex Training Center delivers this programme with supply chain and modelling practitioners who apply simulation in live operations.

LEARN BOLD. **LEAD BEYOND**
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FAQs for the Dynamic Simulation of Supply Chain and Logistics course

Q1 What is the "Dynamic Simulation of Supply Chain and Logistics" course about?

It is a five-day programme on modelling supply chain behaviour over time to test decisions before implementing them. It covers system dynamics and discrete-event simulation, stock-and-flow modelling, the bullwhip effect, logistics and network simulation, validation, and results communication.

Q2 What are the key benefits of the "Dynamic Simulation of Supply Chain and Logistics" course?

Participants test inventory, capacity, and network policies before spending money on them, see dynamic effects that a static calculation hides, and avoid decisions that look good on a spreadsheet but fail under variability. They also gain the ability to explain complex behaviour to management with credible evidence.

Q3 What skills will I gain from the "Dynamic Simulation of Supply Chain and Logistics" course?

You will gain simulation approach selection and model design, stock-and-flow and process model construction, bullwhip, inventory, and logistics scenario testing, and model validation, output interpretation, and decision communication.

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Q4 What tools, methods, or standards are covered in the "Dynamic Simulation of Supply Chain and Logistics" course?

The course works with system dynamics stock-and-flow notation and causal loop diagrams, discrete-event simulation structures of entities, queues, resources and events, agent-based modelling concepts, model boundary and assumption documentation, parameter estimation from operational data, calibration and sensitivity testing, bullwhip measurement, information sharing experiments, inventory policy testing across reorder point, order-up-to and periodic review systems, safety stock behaviour under variability, transport lane and transit reliability modelling, warehouse queue and capacity simulation, disruption scenarios including port closure and supplier failure, cost and service modelling, and verification and validation practice.

Q5 How is the "Dynamic Simulation of Supply Chain and Logistics" course applied in real-world practice?

Teams apply it when testing a new reorder policy before rolling it out, evaluating a distribution network change, assessing the effect of a lead time reduction, planning buffer strategy for a disruption risk, and presenting a scenario comparison to management before an investment decision.