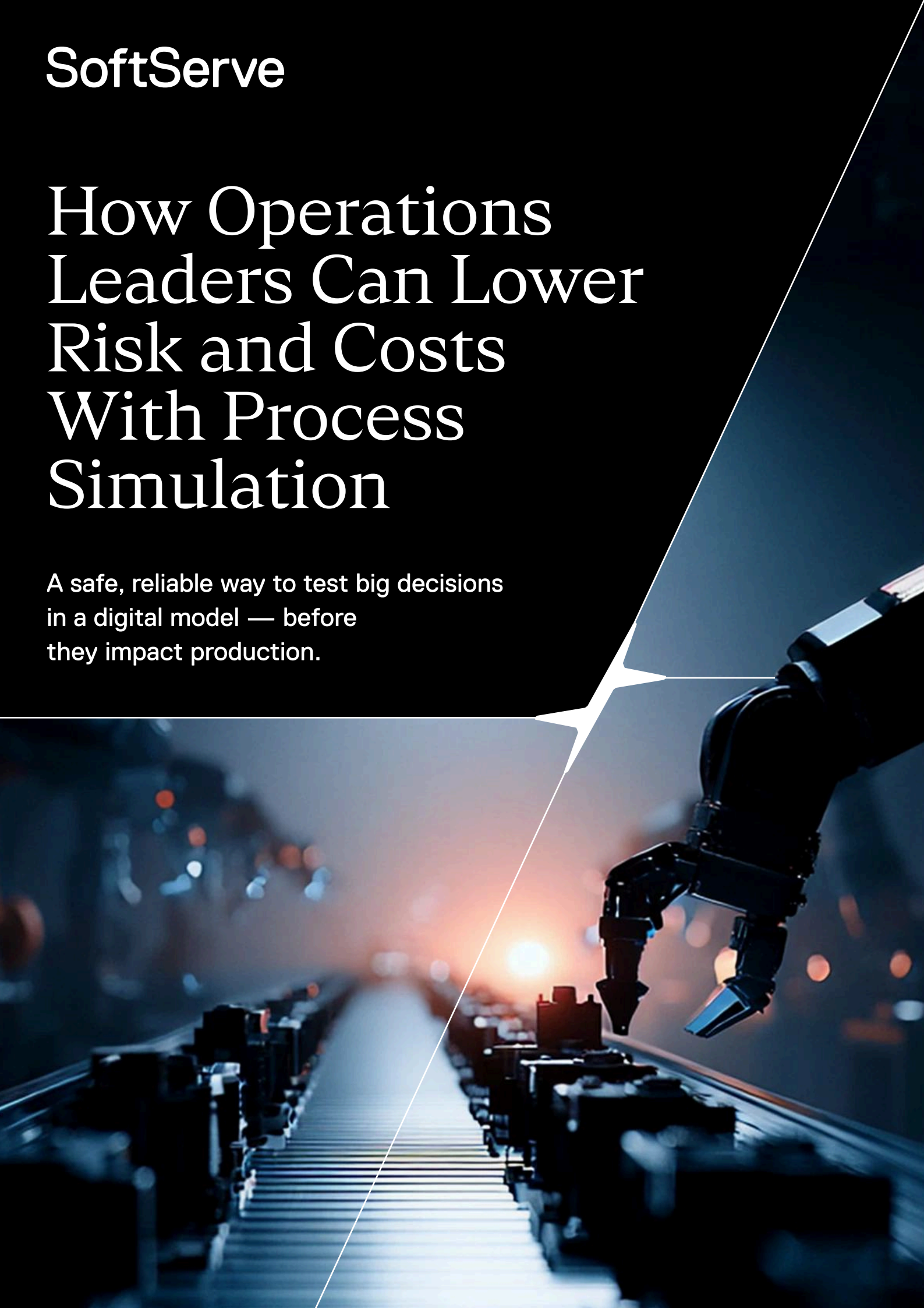
SoftServe

How Operations Leaders Can Lower Risk and Costs With Process Simulation

A safe, reliable way to test big decisions in a digital model — before they impact production.



EXECUTIVE SUMMARY

Operational decisions are rarely straightforward. Each choice ripples through costs, production timelines, and daily workflows, often in unexpected ways. For example, a minor adjustment to staffing levels reduces costs but inadvertently creates bottlenecks, while a layout change might improve flow but disrupt service levels. Leaders need capabilities that provide clarity and confidence — like process simulation to test decisions in a risk-free digital environment before they impact real-world operations.

Based on our process modeling, simulations make business decisions **15-20% better and faster.** Case in point, SoftServe ran a Discrete Event Simulation (DES) for a client's warehouse operation using detailed data from the company. The team processed 2.55% more pallets with 20% fewer FTEs, cut pallet dwell time by 15.81%, reduced trailer dwell by 3.13%, and halved operator idle time (–51.35%).

This white paper shows how simulation solves long lead times, layout configurations, and resource allocation. It also covers:

- How to use a digital model to test "what-if" ideas before you change your operation
- Where Discrete Event Simulations (DES) fits
- Which KPIs to track
- How to trust the results
- A short case study
- What's next for process simulation

WHY IS PROCESS SIMULATION IMPORTANT TODAY?

Modern companies face rapidly changing markets, growing operational complexity, and increasing pressure to make smarter, faster decisions. Processes involve more systems, people, and constraints. Even small changes to workflows, layouts, or schedules will impact performance and costs.

Operational complexity makes it essential for organizations to use tools that help them understand their operations, anticipate risks, and make confident decisions — especially in situations where traditional intuition or static analysis falls short.

DIGITAL MODELING

A digital representation of a system or process used for analysis or simulation.

PROCESS SIMULATION

A dynamic model that analyzes how a process behaves over time, providing data-driven insights.

DISCRETE EVENT SIMULATION (DES)

A type of process simulation that models operations as a sequence of time-stamped events.

VIRTUAL PROTOTYPING

Using a digital model and simulation to test changes before implementation.

WHAT OPERATIONAL PROBLEMS DOES SIMULATION SOLVE?

Consider a typical scenario where operational complexity makes even simple process changes difficult to navigate. A global manufacturer recently faced persistent delays on a key production line. Every team had a different theory — add labor, move equipment, change shift structure — however, no one could predict the ripple effects. Running live experiments meant shutting down lines and risking service levels. Leadership needed clarity, but the complexity of the system made even “obvious” decisions risky. This is the reality many organizations face today — and where process simulation delivers the insight traditional analysis can’t.

OUR APPROACH

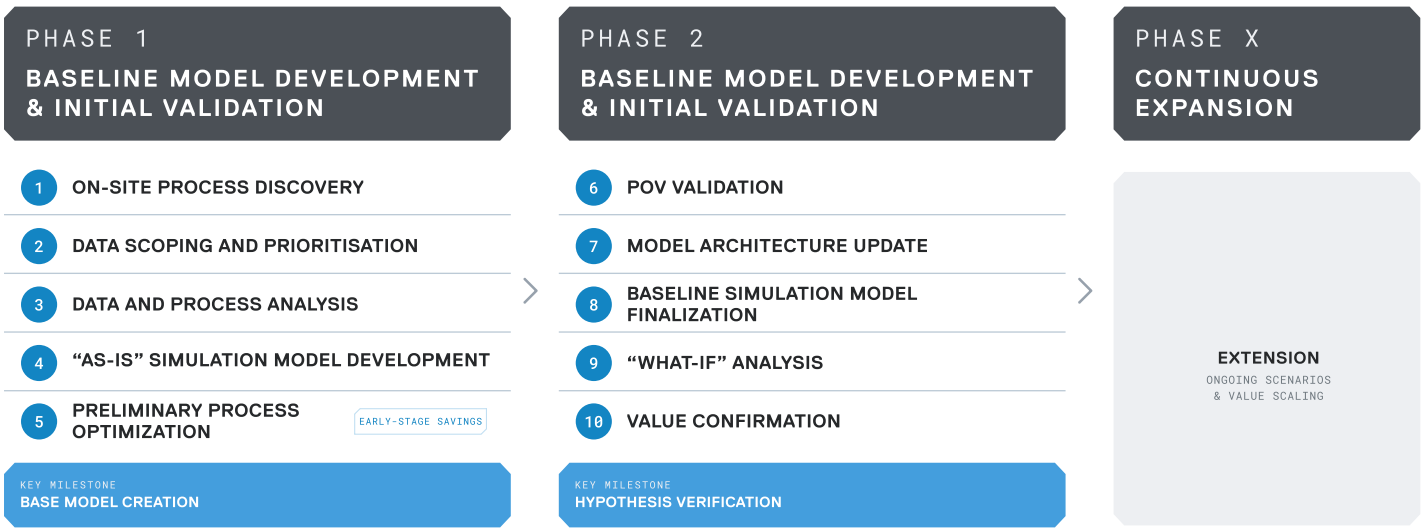
Real operations rarely fail for the reason people guess. Simulation cuts through assumptions and reveals the truth leaders need to make informed decisions.

HOW DOES PROCESS SIMULATION TECHNOLOGY WORK?

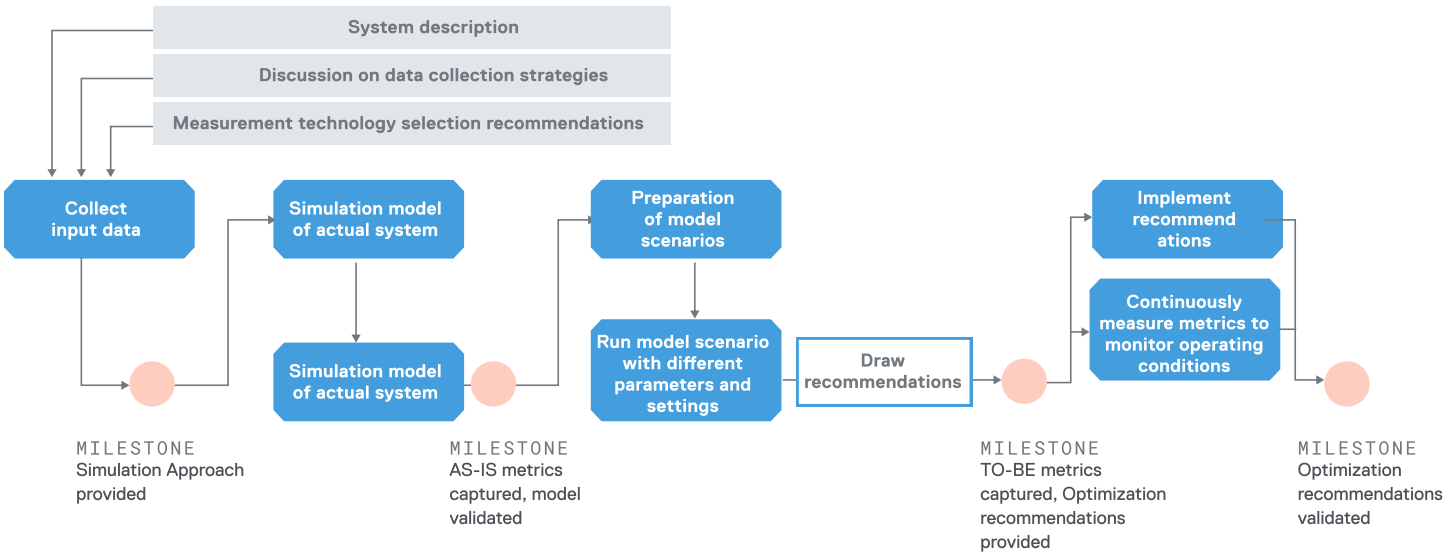
Leaders won't change decisions without trusting a simulation. In our experience, the quality of a simulation depends on the quality of its inputs. That's why we take a disciplined approach to data—identifying what's needed, preparing it with statistical rigor, and ensuring the data points are traceable back to its source.

Our teams design data collection strategies, prepare simulation-ready datasets, and establish clean pipelines into the model. Simulation engineers and data scientists work side-by-side so the model reflects the real dynamics of the operation, not just assumptions.

This disciplined data foundation anchors the entire simulation roadmap, including model development, verification, validation, scenario testing, and final handover, as illustrated in the diagram below.



PROJECT ROADMAP



HOW SIMULATION OPERATES IN MODEL DEVELOPMENT

In the modeling phase, a system is represented as a physical or mathematical model. Physical models are scaled-down or simplified versions of the real system and are useful when teams need to assess practical feasibility, ergonomics, or tangible design aspects that are hard to analyze theoretically. Mathematical models are preferred for large-scale, complex, or stochastic systems where flexibility and easy modification are essential.

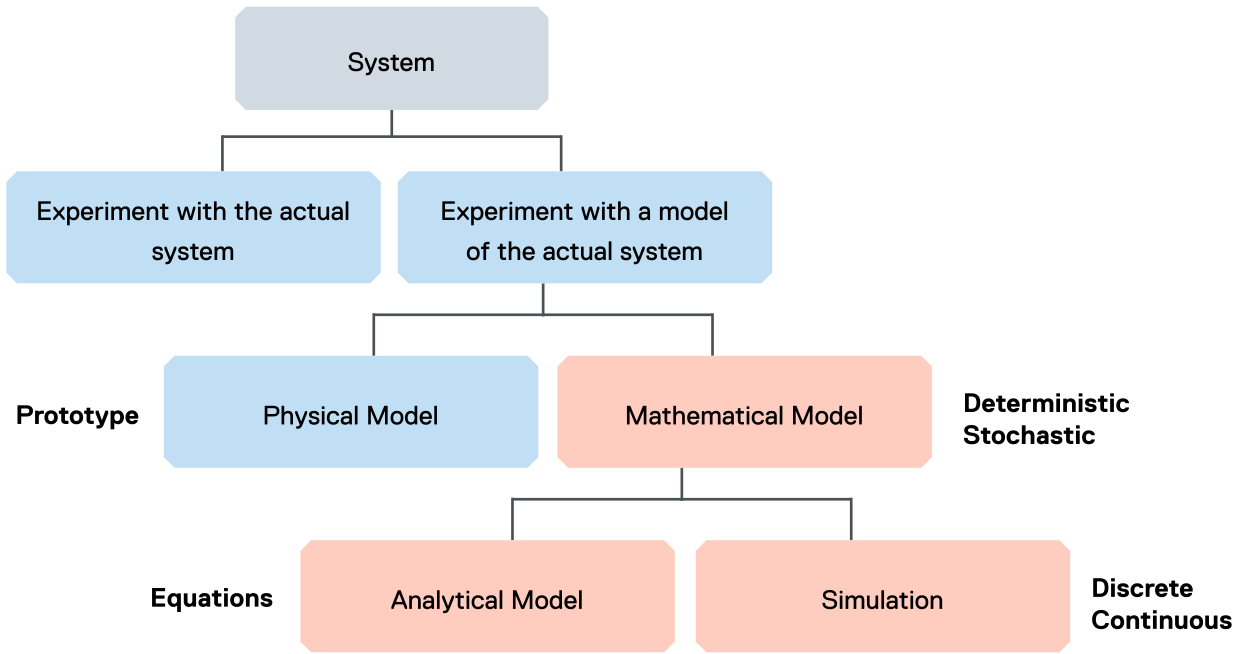
OUR APPROACH

For most business operations, a mathematical model provides the right balance of accuracy, speed, and adaptability.

Once the approach is selected, we encode system dynamics in the model, parameterize it with real inputs, and implement it in simulation software. This supports time-based or event-driven analysis of complex processes, making it easier to analyze, verify, and visualize behavior. The software environment also allows the model to be extended and refined over time. This lets teams adjust assumptions, test alternative scenarios, and compare outcomes without disrupting live operations.

OUR APPROACH

A good model should explain today's performance and make tomorrow's trade-offs clear.



How simulation operates in model development. (Law, Averill M. Simulation Modeling and Analysis. 5th International ed, Mcgraw-Hill, 2015)

WHY IS DES BETTER FOR BUSINESS OPERATIONS?

Discrete-model simulation (DES) is a bottleneck finding engine — your secret weapon to avoid costly mistakes.

Discrete-event simulation (DES) models a system as a sequence of discrete events in time. Each event occurs at a specific instant and changes the system's state. The system remains unchanged between events, so simulation time advances directly to the next event.

- Saves money
- Prevents waste
- Reveals hidden failures
- Gives leaders confidence
- Beats spreadsheets
- Is essential, not optional

OUR APPROACH

For business operations, DES matches how work happens — arrivals, processing, waits, moves, and completions — making it the most practical way to analyze timing, queues, and variability.

WHY IT'S PREFERRED FOR DECISION-MAKING

DES reflects the event-driven nature of real-world processes more accurately than time-averaged approaches. It offers intuitive interaction with models and clear "what-if" scenario exploration. With visual, animated representations, decision-makers, and their advisors will understand system behavior, compare alternatives, and assess impacts without deep technical expertise.

TYPICAL DES PLATFORMS

FlexSim, AnyLogic, TechnoMatic, Simul8, Arena, Plant Simulation (Siemens), Witness, Delmia, Visual Components, and libraries such as SimPy for Python builds.

WHAT TOOLS AUGMENT SIMULATION TODAY?

While simulation remains the core engine, these tools enhance speed, insight, and scalability:

OPTIMIZATION ENGINES

Identify best configurations using optimization techniques (e.g., linear programming).

AI / MACHINE LEARNING

ML detects patterns and predicts behavior; AI analyzes and prioritizes scenarios.

CLOUD OR ON-PREM

Run simulations where they fit best—cloud for scale, on-premises for data sensitivity.

MULTI-CORE COMPUTE

Accelerates large models and batch runs with modern processors.

DIGITAL SHADOW

Connects live data streams (IoT, ERP, sensors) to reflect current operating conditions.

VIRTUAL REALITY

Immersive visualization helps teams understand system behavior and design choices.

OUR APPROACH

These technologies extend sim. The value depends on the clarity of the problem, the quality of the model, and the decisions leaders need to make.

WHAT RESULTS DO DISCRETE PROCESS SIMULATION DELIVER?

Simulation offers six core business benefits. Each is mapped to a measurable KPI.

1

Higher throughput

Removes bottlenecks and improves flow, enabling teams to process more work without adding resources.

2

Faster cycle times

Test workflow and layout changes virtually to accelerate end-to-end process time and improve responsiveness.

3

Smarter resource utilization

Simulation models reveal optimal staffing, scheduling, and equipment use — reducing idle time and overload.

4

Reduced waiting and congestion

Identifies queue buildup and delays, helping reduce wait times and improve overall service experience.

5

More reliable service levels

Accounts for variability and downtime, helping teams maintain consistent performance and hit SLA targets.

6

Optimized inventory performance

Models stock behavior, reorder policies, and flow variability to reduce stockouts, lower holding costs, and support more resilient supply planning.

THROUGHPUT

Units, customers, or tasks completed in a set time.

CYCLE TIME

Time for an item or customer to complete a process.

RESOURCE UTILIZATION

Percentage of active working time for resources.

QUEUE LENGTH AND WAITING TIME

Items waiting at each step and their wait time.

SERVICE LEVEL (SLA)

Work completed within a defined time or performance target.

INVENTORY LEVELS

Stockouts, costs, reorder points, and inventory performance.

INDUSTRIES WHERE SIMULATION CREATES AN ADVANTAGE

Process simulation is widely used across manufacturing, warehousing & logistics, retail & customer service, airports & transport, public sector & emergency services, pharma & healthcare, banking & financial services, and energy & utilities.

WHY LEADERS TRUST THE RESULTS:

Unlike many AI systems, simulations are made reproducible. In most DES model solutions, you can fix the random seed (or use a defined random stream) to rerun the same stochastic scenario for apples-to-apples comparisons.
This is essential for:

VALIDATION

Confirming changes in outcomes come from model changes, not noise

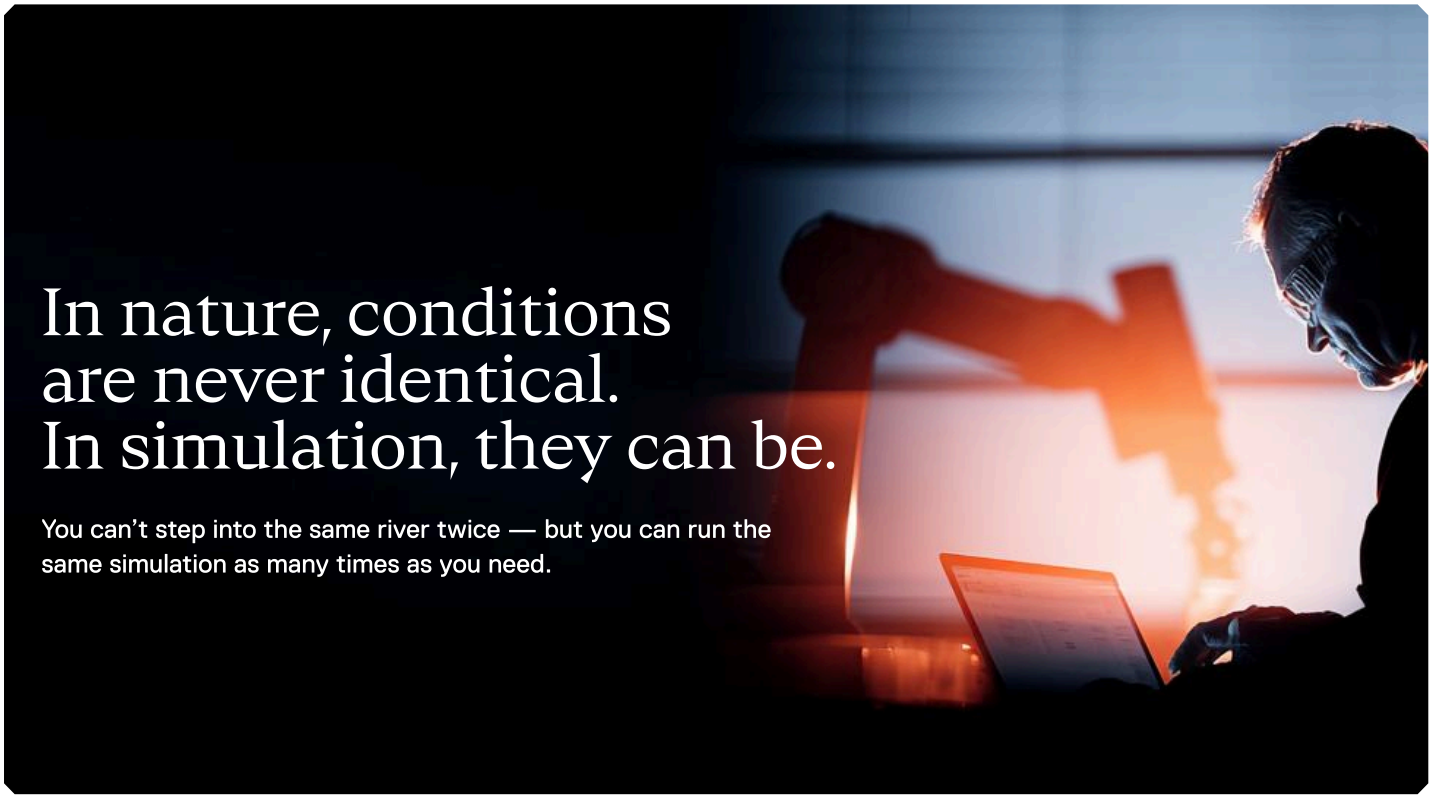
DEBUGGING

Replaying specific problem runs deterministically

SCENARIO COMPARISON

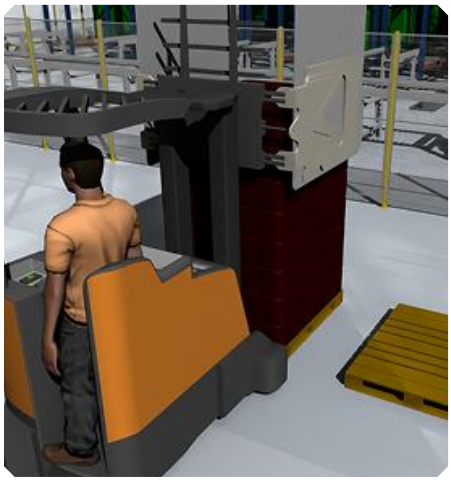
Fair A/B testing across policy alternatives

Bottom line: Controllable randomness builds confidence. When small logic or parameter changes shift performance, a fixed seed lets teams isolate the true effect.

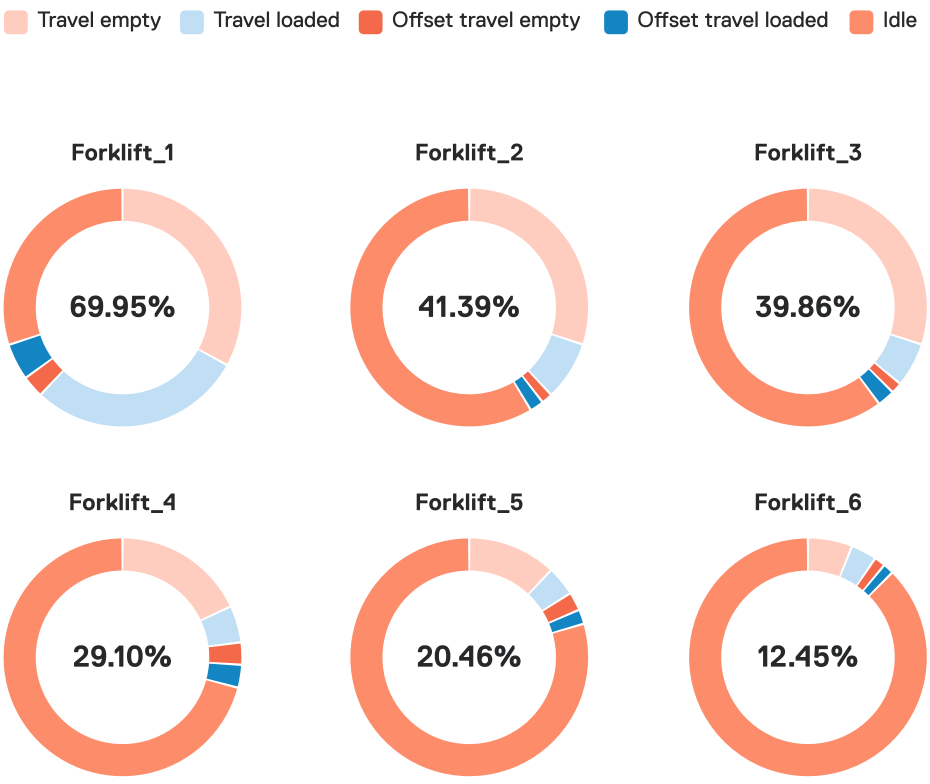


CASE STUDY

A SIMULATION-BASED OPTIMIZATION OF WAREHOUSE STAFFING



FORKLIFTS UTILIZATION



SoftServe ran a DES simulation for a client's warehouse to see if they could fine-tune their staffing model. The team tested alternative combinations of headcount and role assignments, using the client's detailed operational data.

KEY OUTCOMES FROM THE OPTIMIZED SCENARIO

Total FTE:

20%

Fewer workers were required to maintain service levels.

Inducted pallets:

+2.55%

Slight increase in total processed volume.

Pallet dwell time:

-15.81%

Pallets moved through the system significantly faster.

Trailer dwell time:

-3.13%

Reduction in wait times for dock activity.

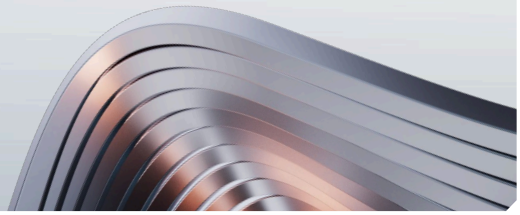
Operator idle time:

-51.35%

Far less time spent waiting with no tasks assigned.

RESULT

The model identified a leaner staffing configuration that maintained performance while reducing labor requirements and improving operational flow.



FAQ

1 **How fast do we get results?**
See a validated model in 3–6 weeks, then run scenario experiments the next week. Timeline varies by data access and scope.

1 **Which tools do you use?**
We work with FlexSim, AnyLogic, Siemens Plant Simulation, and Python (SimPy), based on fit, data, and licensing.

1 **Can we trust the outputs?**
Yes. We validate with your historical data, run sensitivity tests, and lock the random seed for repeatable runs before any decision.

WHAT'S NEXT FOR PROCESS SIMULATION?

Process simulation is shifting from specialist engineering tools to everyday decision-making platforms. As AI, cloud, and real-time data converge, simulations are becoming faster, smarter, and easier for non-technical users to apply. Here are trends shaping what comes next:

Open-source integration:
Python ecosystems and open libraries broaden access, reduce lock-in, and accelerate model innovation.

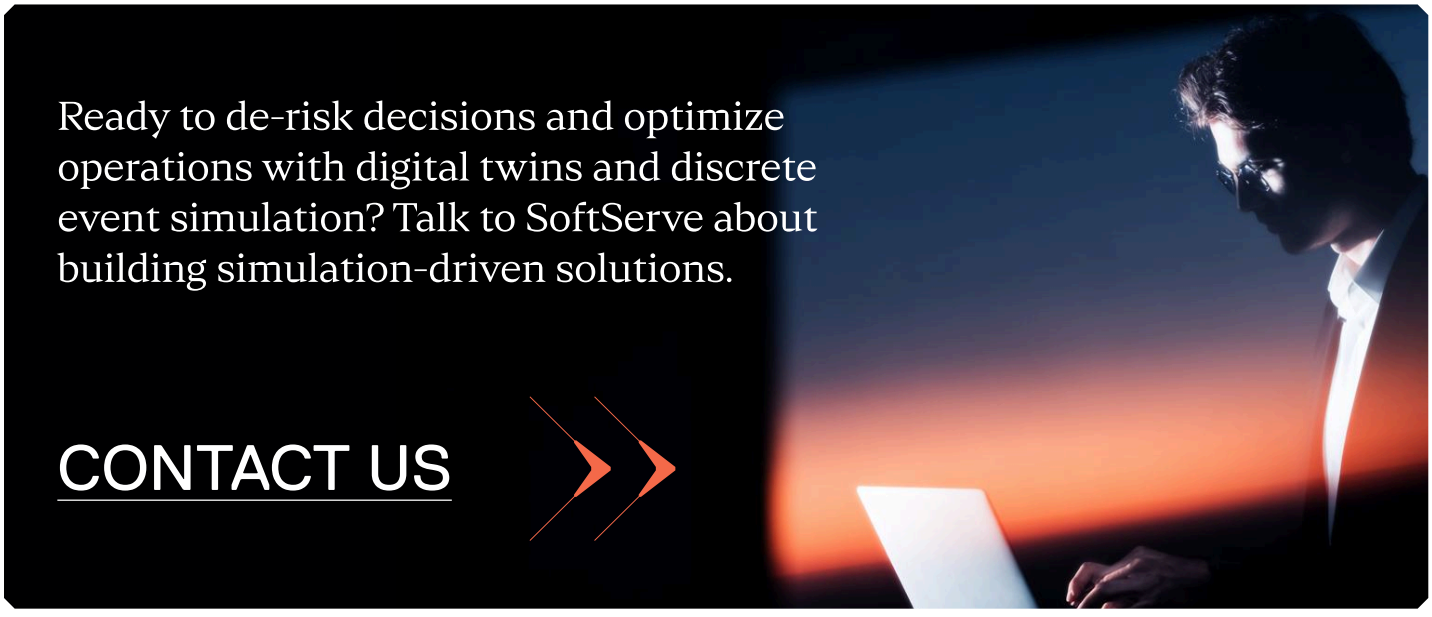
NVIDIA Omniverse ™+ immersive environments:
High-fidelity, real-time 3D collaboration help teams design, test, and visualize operations together

Simulation-as-a-Service:
Cloud-based platforms provide scalable compute, parallel experiments, and flexible access without heavy infrastructure

Autonomous Digital Twins:
Real-time, self-updating virtual systems that predict outcomes and optimize operations continuously

Low-code/no-code modeling:
Business users build and test simulations directly, speeding experimentation and digital transformation

Prescriptive intelligence:
Models move beyond describing what happened to recommending the best next action



SoftServe

About Us

SoftServe is a digital engineering and technology consulting company specializing in AI, data, and cloud solutions. We decode complexities and reveal technology's full potential to rapidly unlock new possibilities for businesses, industries, and the communities they serve. Our global expertise is anchored in local understanding. From strategy to execution, we elevate technology into a force for growth, progress, and lasting impact.

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