BMDIGITALS

Digital Twin & Scenario Simulation

Reference Architecture

This brief outlines a reusable reference pattern for discovery, architecture, implementation, and operational rollout.

Problem

Capacity, demand, labor, machine availability, warehouse limits, and logistics constraints interact in ways that are hard to evaluate manually.

A digital twin lets teams compare operational scenarios before committing to changes.

Typical Architecture

Physical operations feed sensors and operational systems, state models, simulation engines, optimization logic, and decision support interfaces.

Components

State model, scenario inputs, simulation engine, constraint rules, outputs, scenario comparison, optimization hints, and decision log.

Security Considerations

Protect operational assumptions, segregate synthetic scenarios from production data, and govern who can publish or reuse scenario outputs.

Integration Pattern

Use read-only operational data snapshots first, then add controlled data refreshes and approved writeback only if the operating model requires it.

Implementation Approach

Define the operating question, model the minimum useful state, validate outputs with subject experts, then expand scenario dimensions over time.

Operational KPIs

Throughput, utilization, queue length, delay, energy, operating cost, constraint frequency, and decision adoption rate.

Deployment Model

A secure simulation application backed by scenario storage, versioned assumptions, scheduled data refreshes, and role-based decision views.

BMDigitals Engagement Model

Scenario discovery, operational modeling, simulation build, validation workshops, decision support rollout, and ongoing model improvement.

Reference architecture. Final implementation depends on the client's operational and technical environment.