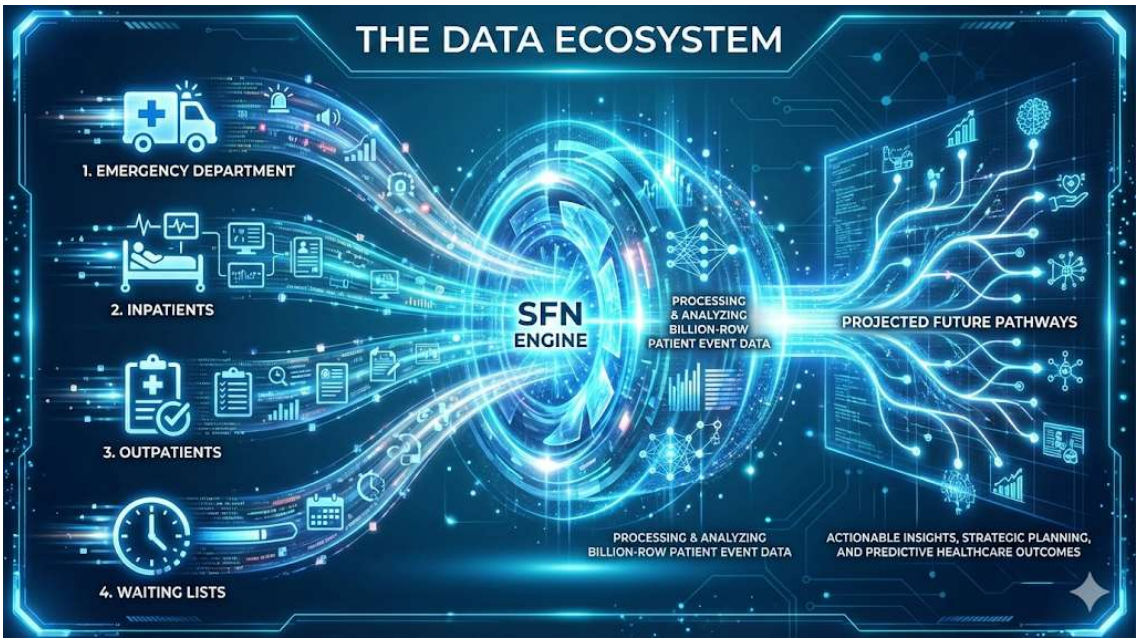
Discrete Event Simulation

Built into *sfn*. Powered by reality.

In a financially constrained health system operational decisions must be based on more than good intentions. With limited headroom for error and every bed under pressure, the ability to safely model change before implementation is no longer a luxury, it's a necessity.

Lightfoot has now embedded **discrete event simulation (DES)** directly within *sfn*. This transforms *sfn* from a retrospective analytics tool into a dynamic engine for forecasting, experimentation and planning without the need to leave the platform.

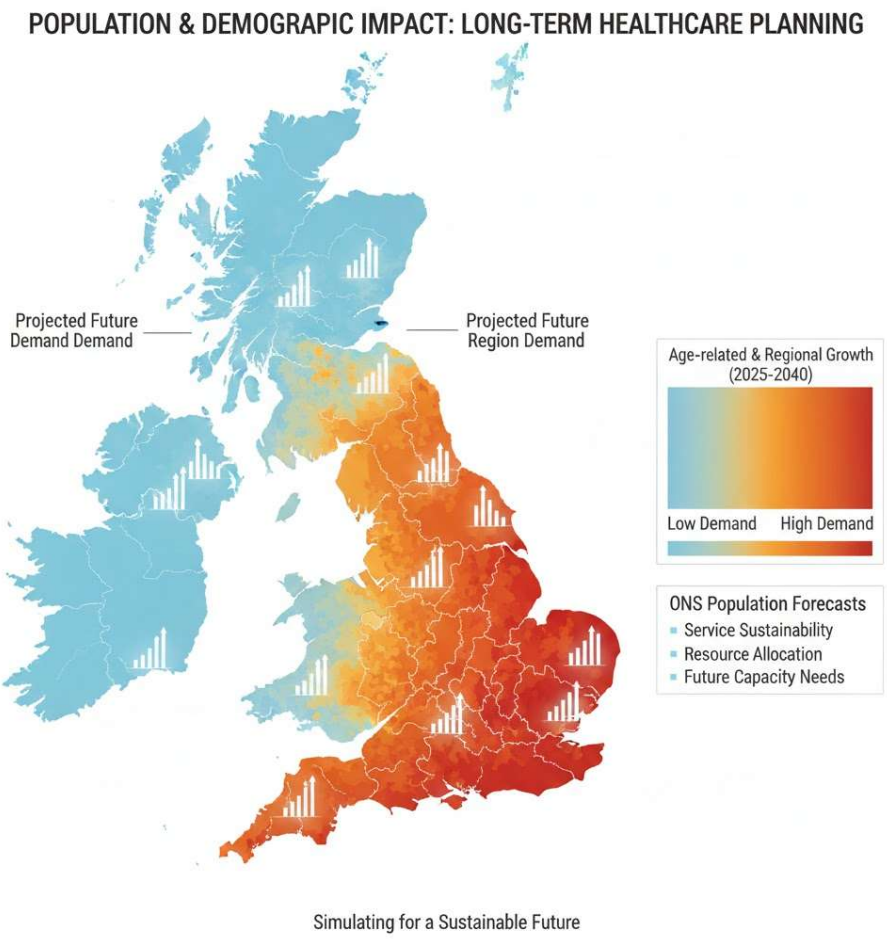


Real Data at Scale

Unlike traditional simulation tools, *sfn's* engine is powered by an existing billion-row patient event dataset, covering:

- Emergency department
- Inpatients
- Outpatients
- Waiting lists

Inputs and parameters are drawn directly from operational data. There is no need to rely on estimates, extrapolated values, or stand-in assumptions. The model reflects actual system behaviour, because it uses actual system data.



Compensate for Population and Demographic Changes

The simulation engine supports forward modelling using ONS population forecasts and demographic data**.** This makes it possible to -

- Project future demand
- Assess service sustainability
- Factor in age-related and regional growth

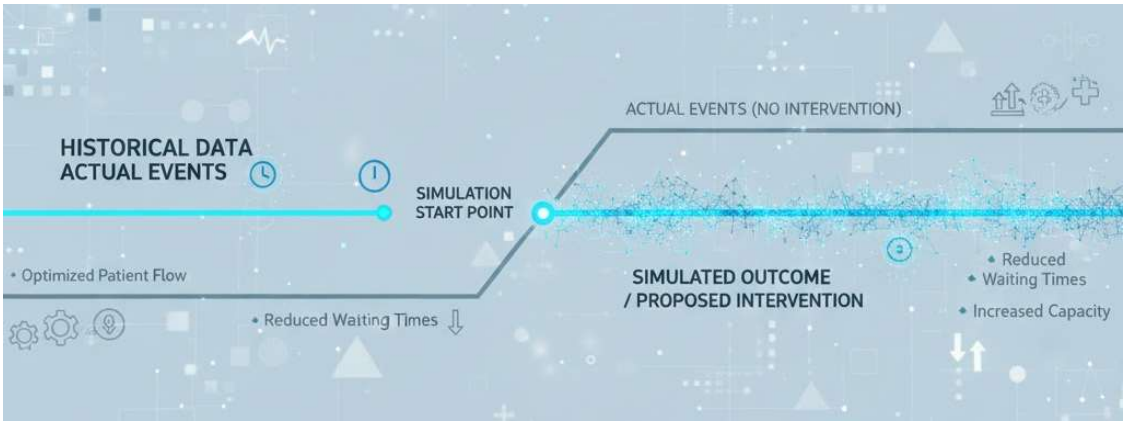
This brings long-term planning into alignment with real population trends - ensuring proposed changes are evaluated against the challenges the system is likely to face.

Instant Visualisation

Outputs from the simulation are rendered directly in *sfn* using Statistical Process Control (SPC) charts. These charts:

- Highlight variation and trends
- Surface bottlenecks and capacity pinch points
- Provide immediate feedback on simulated outcomes

No separate toolkits, dashboards or exports are required. The results are visualised alongside live performance measures, ready to support local decisions.



Counterfactual Modelling

One of the most powerful features is the ability to run counterfactuals.

Users can:

- Select a point in historical time
- Simulate forward from that baseline
- Compare projected outcomes to actual events

This allows teams to validate the model and evaluate whether proposed changes would have helped or hindered. It's a rigorous way to test interventions without operational risk.

Simulation for Safe Experimentation

In a system under pressure, even well-meaning change can lead to unintended consequences—longer delays, increased admissions, or strained resources.

Discrete event simulation enables:

- Safe scenario testing
- Transparent evidence for investment decisions
- Confidence in the likely impact of change

Designed for Health Systems

The DES engine is not an add-on. It's built into *sfn* and inherits the platform's strengths:

- In-memory processing for speed
- Parameterised models for flexibility
- Full traceability and audit for governance

This means teams can model, adapt, and repeat simulations without starting from scratch. It's fast enough for real-time decisions, and robust enough for board-level scrutiny.

Next Steps

Whether you're managing urgent care flow, refining discharge pathways or planning future service capacity, *sfn* now gives you a safe space to experiment - grounded in operational truth.