



# HEALTHCARE SIMULATION

SIMULATION IS USED BY HEALTH CARE AND HUMAN SERVICE ORGANIZATIONS ACROSS THE WORLD TO IMPROVE THEIR SYSTEMS OF CARE AND REDUCE COSTS.

**SIMULATION OFFERS EVIDENCE BASED, RISK FREE DECISION MAKING**

“TRIALS HAVE SHOWN THAT  
MODELING AND SIMULATION COULD  
REDUCE MEDICAL ERROR COSTS BY  
UP TO \$17 BILLION ACROSS THE  
COUNTRY“

*Congressman J.  
Randy Forbes*

## WHAT IS SIMULATION?

Simulation is using a computer to emulate a real world situation. But there are lots of variations of simulation. Here we are talking about process, or to be official, discrete event simulation.

In process simulation you take a flow of events that happen over time in the real world and put them into your computer simulation. For example, the planning of O.R. Utilization, managing Emergency Departments, or the staff assignment and daily resource requirements of a hospital.

The simulation is time based, and takes into account all the resources and constraints involved, as well as the way these things interact with each other as time passes.

Most importantly, process simulation also builds in the randomness you would see in real life. For example, it doesn't always take exactly 5 minutes for a patient to be seen, and outpatients don't arrive at the clinic every 15 minutes.

This means that the simulation really can match reality, so when you make changes to the simulation it will demonstrate exactly how the system would behave in real life.

### **A uniquely powerful approach to decision making**

Simulation is a powerful technique that allows you to make bold, confident decisions because it gives you the evidence to be sure of your choices.

It's all based on complicated sophisticated mathematic algorithms but you don't need to know anything about these. Simulation software takes care of all the complicated statistics. You just need to focus on the decision making.

“ALTHOUGH IT IS A RARE OCCURRENCE,  
PILOTS REGULARLY REHEARSE ENGINE  
FAILURE IN SIMULATORS, SO THAT  
WHEN FACED WITH A REAL SITUATION  
HABIT TAKES OVER. SIMULATION  
ENABLES PEOPLE TO TRAIN FOR RARE  
EVENTS THAT DO NOT OCCUR OFTEN, IN  
REAL LIFE”

*Sir Liam Dondaldson,  
Chief Medical Officer*

# WHY USE SIMULATION IN HEALTHCARE

Simulation software can be used to simulate common problems faced by healthcare organizations across the world. These are just a few examples of how it is being used right now.

- **Reach E.R. Waiting Times Targets with Simulation**  
Simulation of patient and clinician interactions has been used for over a decade by health services to reduce waiting times and improve patient care.
- **Resource Capacity and Planning**  
From bed management decisions to planning staff schedules, simulation helps identify opportunities for improving patient flow through better resource utilization and staff capacity.
- **Changing Patient Care Pathways**  
Planning for the outcome of implementing new services is a difficult task. Simulation allows you to see the impact of change before action.
- **Managing Out-Patient Flow**  
Simulation can be used to test methods to improve patient visit efficiency without affecting the daily running of a clinic.
- **Winter Pressures and System Resilience**  
Simulation is used to visually test demand during peak seasons and emergency situations, such as a Flu pandemic, to forecast requirements and manage resources.
- **Design of Healthcare Facilities**  
Balance the needs of budget constraints with clinicians' visions by planning beds, staffing and more in advance with simulation to ensure new health facilities function efficiently and safely.
- **Pharmaceutical Industry**  
From the pharmaceutical manufacturing process, to clinical trial through to drug adoption, simulation is used throughout the Pharmaceutical industry.
- **Whole System Strategic Planning**  
SIMUL8 has the only whole healthcare system planning tool, allowing you to simulate the entire system and see affects throughout.

“THIS KIND OF SOFTWARE REALLY  
COMES INTO ITS OWN AS  
HEALTHCARE ORGANIZATIONS TEST  
OUT NEW WAYS OF MEETING NEW  
CHALLENGES”

*Dr. Nick Gaunt,  
NHS Institute  
for Innovation*

# HOW DOES SIMULATION WORK?

## Draw your process

Creating a simulation is just like drawing a flowchart. Then you add timing information, when work arrives (resources, patients, paper work etc.) and the time tasks take to complete. Add in some rules about where work goes and you've built your simulation.

## Run your simulation

When you click run, every individual action is simulated. Every significant event that happens in your process, all the clashes for resources (like people) and delays (queues caused by things not taking the same time every time) is simulated. The clock in the corner of the screen tells you what the equivalent time would be in the real world.

## Visualize

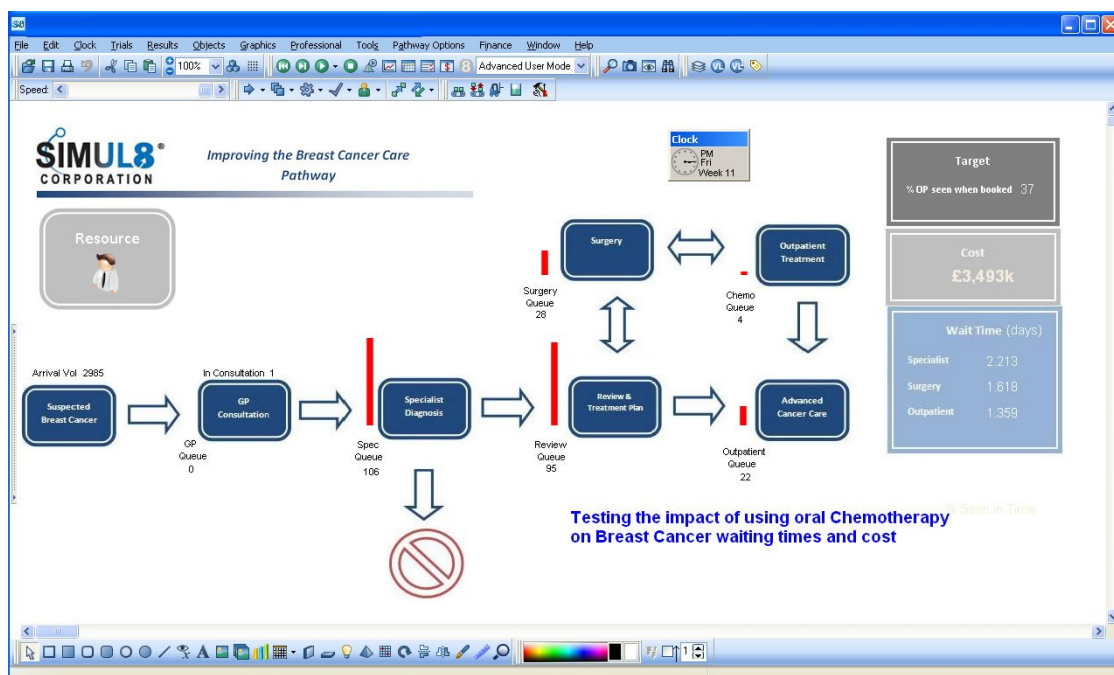
Simulation is animated. You can run the simulation at full speed to quickly get results. Or run it slowly and watch every piece of work flow through your system. This enables visualization of your process. You can see where queues build up, where resources are over-utilized and where the system is under resourced.

## See the impact

The software automatically collects performance measures as the simulation runs so that you can not only see visually what will happen, you also get accurate numerical results about every part of your process.

## Optimize your process

Now you can ask "what if". Make a change, run the simulation again and see the impact of that change. Each scenario you run, taking you a step closer to optimizing your process.







## **\$24m SAVINGS AND BETTER PATIENT OUTCOMES**

**One UK PCT simulated the introduction of the BNP blood test to diagnose heart failure and predicted \$24m savings across the country.**

**By working to the NICE guidelines, the team also predicted improved patient outcomes through the new treatment.**

Learn how public and private healthcare organizations have used simulation to cut costs and improve their service:

**[www.SIMUL8.com/healthcare](http://www.SIMUL8.com/healthcare)**



# 8 SIMULATION SUCCESS STORIES

Simulation consistently delivers significant value – strategic to operational, top-line to bottom-line – to the organizations and staff who use it.

A few examples:

- 1** A UK Health Service used SIMUL8's Scenario Generator to test best practice stroke patient care and showed reductions in stroke deaths by up to 18% without cost impacts.
- 2** Simulation helped the UK NHS understand how they could save \$166 million by moving treatment of dermatology from hospital outpatient departments into the community.
- 3** Simulation of Geisinger's Healthcare Enabled Logistics Program (HELP) demonstrated how to reduce staffing levels for delivery by 25% and release 8% of nursing time back to direct patient care.
- 4** Wyeth Pharmaceutical used simulation on 2 projects, each of which took less than a month from start to finish, resulted in avoiding expansion costs of between \$1million to \$2million.
- 5** One UK hospital identified potential savings of \$3.4m and reduced 11,800 unnecessary patient transfers by simulating their outpatient treatment program .
- 6** Johns Hopkins Comprehensive Transplant Center simulated all the complex elements involved in a transplant case, from resources to time-commitments to establish where improvements could be made to reduce costs and improve quality of care.
- 7** The Mexican Foundation for Health used simulation to predict the future economic burden of obesity in children and determine the shape their health services will need to be to cope.
- 8** The National Blood Transfusion Service worked with SIMUL8 to model their blood transportation supply chain to reduce waste and improve efficiency

**For more simulation case studies, visit [www.SIMUL8.com/our\\_customers](http://www.SIMUL8.com/our_customers)**

# WHY SHOULD YOU USE SIMULATION?

## **Better decision making**

Using simulation all your decisions will be evidence based. You can compare multiple different scenarios to consider all possible angles. As a result you will know your process inside out and be confident in making bold decisions.

## **Test ideas in a risk free environment**

Experimenting in real life is costly. It's not only the capital expenditure of hiring new staff or purchasing new equipment, it's the cost of the ramifications of these decisions. What if you fire 3 staff and then find you can't cope with the workload and you can't meet demand? The only cost with simulation is the software and the time required to build the simulation.

## **You don't need to wait to see what will happen**

A simulation runs much faster than real life –so you can try many ideas in a few minutes. If you want to know whether hiring another 3 doctors will reduce patient waiting lists over the next 2 years you'll actually have to wait 2 years. With simulation you can run 2, 10 or even 100 years into the future in seconds. So you get the answer now instead of when it's too late to do anything about it.

## **Test different ideas under the exact same circumstances**

In real life it's impossible to repeat the exact circumstances again. You can't test different ideas under the exact same circumstances. How do you know which idea is the best? With simulation you can test the same system again and again with different inputs.

## **Helps you think and communicate**

Simulation provides a vehicle for discussion about all aspects of a process. The rule and data collection forces you to consider why elements work in a certain way, if they could work better. It also brings to the surface inconsistencies and inefficiencies especially between different parts of a process that work independently. Sometimes the simulation doesn't even have to be finished - the framework it has provided to think through the issues reveals the solution.

## **Visualization and animation**

Simulation is visual and animated. It lets you clearly describe your proposal to others. Its more convincing that just displaying the end results as people can't see where these came from. Simulation is so effective at communicating ideas that many companies now use it as a sales tool to sell their products.



## UK NHS REDUCES DEATHS BY 18%

**Simulation helped the UK NHS understand how to implement best practice in care of stroke victims.**

**They showed they could decrease deaths by 18% without significantly increasing costs.**

Learn how the NHS and others have used simulation to improve patient care and efficiency at

[www.SIMUL8.com/healthcare](http://www.SIMUL8.com/healthcare)

# 5 SIGNS YOU COULD BENEFIT FROM SIMULATION

## 1. You face complex decisions.

Are you faced with more decision factors than you can get your arms around? Do you need to make changes to your process but you can't risk it going wrong? As humans there are only so many variables we can hold in our heads at one time. A computer can easily and accurately process all the complicated interactions that happen in your process.

## 2. You're having problems with processes.

One or more of your processes is broken or needs to work a lot better. Many small, day-to-day decisions are not being made well, and it's having an impact on your performance.

## 3. You can't wait to see the impact.

If your decisions will have implications in months or years to come then it's impossible to put a change in place and see what the outcome will be. With simulation you can fast forward to see the impact of your choices.

## 4. Your service has variability or uncertainty.

If events in your service don't always take the exact same time, or you can't predict exactly when new demand will arrive then you have variability. If you use other techniques like spreadsheet modeling you'll have to rely on averages. Averages can never truly reflect the real world and when just a little real world variability is added the results can be wildly different. Simulation can be made to match your process exactly.

## 5. Your service doesn't exist yet.

You need to create a new service, but how can you know it will work. Will it be able to cope with demand? Simulation can help you design your process and validate your assumptions before waiting for the real system to be ready.

# MORE QUESTIONS ABOUT SIMUL8?

Visit [www.SIMUL8.com/healthcare](http://www.SIMUL8.com/healthcare)

Or contact SIMUL8 at 800-547-6024

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