



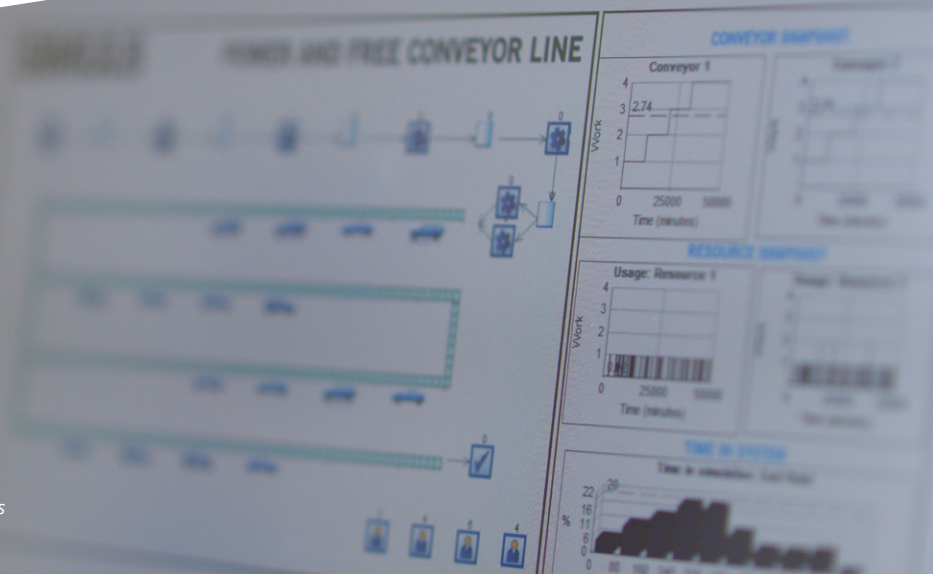
# Why is simulation better than spreadsheets for process modeling?

For process improvement analysis, discrete event simulation software offers an extensive range of benefits in comparison to spreadsheet-based methods.

Learn more about how simulation can enhance the accuracy of your analysis, build stakeholder engagement and improve decision making across your organization.

## Advantages of using simulation over spreadsheets:

- ▶ Incorporate dynamic behavior
- ▶ Reflect realistic variability
- ▶ Identify resource constraints
- ▶ Create a visual representation of any system
- ▶ Integrate pathway dependency
- ▶ Communicate and engage with stakeholders



# Simulations or spreadsheets - which is right for your project?

With growing levels of global competition and consumer choice, remaining competitive is a priority for organizations in every industry. This has led to more focus on optimizing operational efficiency, resources and costs to build and maintain a competitive edge.

Ahead of implementing any process improvement project, most organizations will assess the proposed solution to avoid the risk of costly or time-exhaustive approaches being implemented.

But how do organizations undertake this analysis? Enter a host of potential tools, techniques and applications designed to facilitate decision making and scenario analysis. With so much choice available, the natural reaction for many organizations can be stick to what you know best: **spreadsheets**.

Spreadsheets, having evolved from accounting applications and basic information databases, are an established tool in business and are utilized in almost all organizations at all levels. This familiarity has led to the use of spreadsheets to solve problems which they were never designed, such as **process improvement analysis**. While spreadsheets are useful for small analysis, they don't possess the sophistication needed to model and analyze the complex and dynamic systems found in most business and supply chain processes.

As a result, many organizations have turned to powerful and flexible **discrete event simulation software tools like SIMUL8** to improve the speed and accuracy of process improvement analysis.

## Watch SIMUL8's 'Simulation vs. Spreadsheets' overview video



*Simulation expert Sander Vermeulen outlines the difference between simulation and spreadsheets and provides insight into how you can utilize these methods within your own process improvement projects.*

# What are the advantages of using simulation over spreadsheets?

## Incorporate dynamic behavior

The real-world, as well as the processes operating within it, is a dynamic system: it is in constant motion and changes as it evolves.

A dynamic system needs a dynamic model to be able to understand the variations of that system and the Key Performance Indicators (KPIs) used to measure it. Spreadsheet-based analysis employs automated calculations that do not operate in a dynamic manner. As they are static models, they can only take into account fixed, pre-set time periods.

For example, consider a shop inventory that is only counted at midnight each day. This daily count will miss the variation in the inventory that occurs throughout the day as deliveries and product sales happen. This is similar to the difference between a dynamic model and a static model, and is a difference that becomes a crucial distinction when trying to understand the full nature of your system.



## Reflect realistic variability

Another limitation of the autonomous calculations in spreadsheet-based analysis is the inability to account for the variability of parameters within the system.

This includes variability in the rate of arrival of entities (or work items) into the system, the process times of those entities, as well as the availability of resources required to process them.

Without the ability to incorporate variability, a model performs in a deterministic manner whereby the outcome of the model has already been determined based on the inputs of the model.

By applying properly defined probability distributions, the stochastic nature of simulation enables it to reflect the randomness that occurs in real-world systems.

The classic traits of a system struggling to cope with variability are blockages (or queues) of work items upstream and starvation of work items downstream. Without this random element, spreadsheet models could miss issues within the system entirely and appear as if nothing is wrong, even when the real-life system is displaying these recognisable traits.



# What are the advantages of using simulation over spreadsheets?

## Identify resource constraints

Most processes are constrained by resources, such as the availability of equipment or people. In most circumstances organizations do not have enough of these to prevent the demand for a single resource being required from more than one work item at any point.

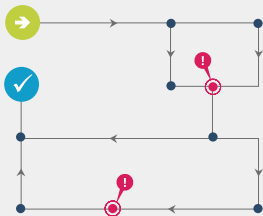
The demand for this resource can cause knock-on effects throughout the system which would not be accounted for by a spreadsheet model. Simulation can

even factor in employee skill levels or shift patterns, as well as one-off events such as the breakdown of equipment.

Events like this use variability that spreadsheet models can only approximate in a deterministic manner. For example, a spreadsheet model might say that every fifth day a machine will break down, which on average might be true, but in real life is not how the machine performs.



## Create a visual representation of any system



One of the major benefits to using simulation-based analysis is the ability to quickly build a highly visual and animated representation of a system in action.

In comparison, another restriction of the static nature of the spreadsheet model is the reliance on non-dynamic tables, charts and graphs. These are simple snapshots of the time series data portrayed in the only means possible to spreadsheet-based analysis.

The visual analysis capabilities of simulation is more engaging than spreadsheets, enabling project stakeholders to

understand systems in action by watching the entities and resources reacting to each other as they travel through the processes of the simulation.

This facilitates validation of the model and can not only bring about insight previously unconsidered, but also help start discussion and buy-in from stakeholders who may not possess the technical knowledge to build the model themselves.

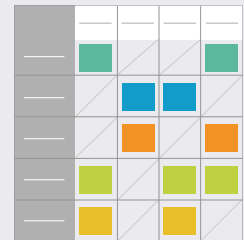
# What are the advantages of using simulation over spreadsheets?

## Integrate pathway dependency

Pathway dependency is another factor of complex modeling that simulation tackles with ease but can't easily be accomplished within a spreadsheet model.

In a system, different products will go through differing steps within the same process, as well as taking a different amount of time to complete those steps.

This additional degree of modeling prowess allows simulation-based analysis to again offer a higher level of accuracy compared to spreadsheet modeling, which in turn allows you to make better decisions for your organization.



## Communicate and engage with stakeholders



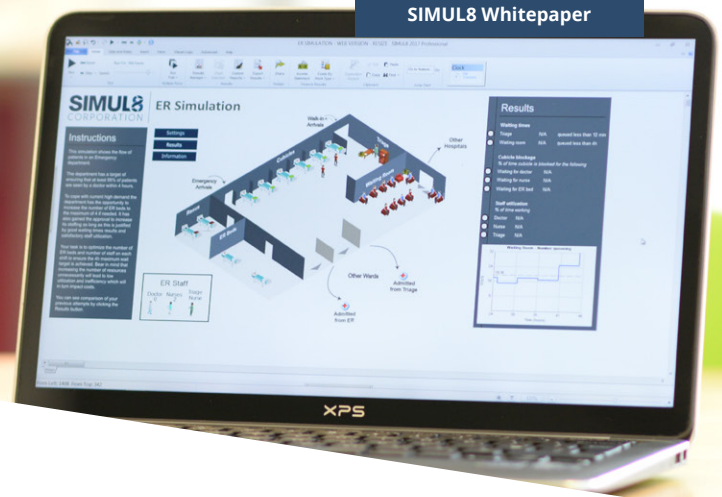
The bit matrix design and formula contained within the cells of spreadsheets are not transparent and can be difficult to explain, debug or validate.

By using simulation, the future state of the system can be used to communicate change much more effectively throughout the organization; creating stakeholder buy-in before making any real changes or investment in the actual system has been made. When stakeholders recognize the benefits of simulation modeling and are able to relate to the visual representation of the process,

this can be very powerful for generating discussion and buy-in for a project.

While spreadsheet software is widely used in business, allowing you to easily share your data with other, simulation software is less commonly owned which can sometimes make sharing your ideas more difficult. SIMUL8 simulation software includes access to SIMUL8 Studio, an online platform where you can easily share simulations privately, without the need to install additional software.





# Getting started with simulation

The functionality of modern spreadsheet packages is powerful enough to accomplish the representation of simulation-based analysis, but in reality, the knowledge required is out of reach to all but the most advanced users.

They require not only an in-depth knowledge of mathematics, statistics, simulation and queuing theory, but also an expert ability to use the spreadsheet in question.

Although spreadsheets hold many valid purposes, discrete event simulation software can utilize most of the same functionality through the use of internal applications or by easily setting up connections to external spreadsheet programs.

This allows the user to tackle modeling of complex and dynamic systems within the simulation software and store any data entries or output results using the spreadsheet functionality. The transition from a spreadsheet model to a simulation model doesn't need

to be a big step. Any data available in spreadsheet format can be reused and imported into the simulation to cut down on simulation development time.

When balanced against the costs associated with time spent creating, debugging and modifying attempts at complex spreadsheet models, as well as on poor decisions made based on flawed representations of systems, simulation offers a far more powerful and flexible tool for process analysis.

***Make fast, confident decisions  
with simulation***

Learn more about using simulation for process analysis on our website or contact the SIMUL8 team to discuss how simulation could benefit your organization.

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