

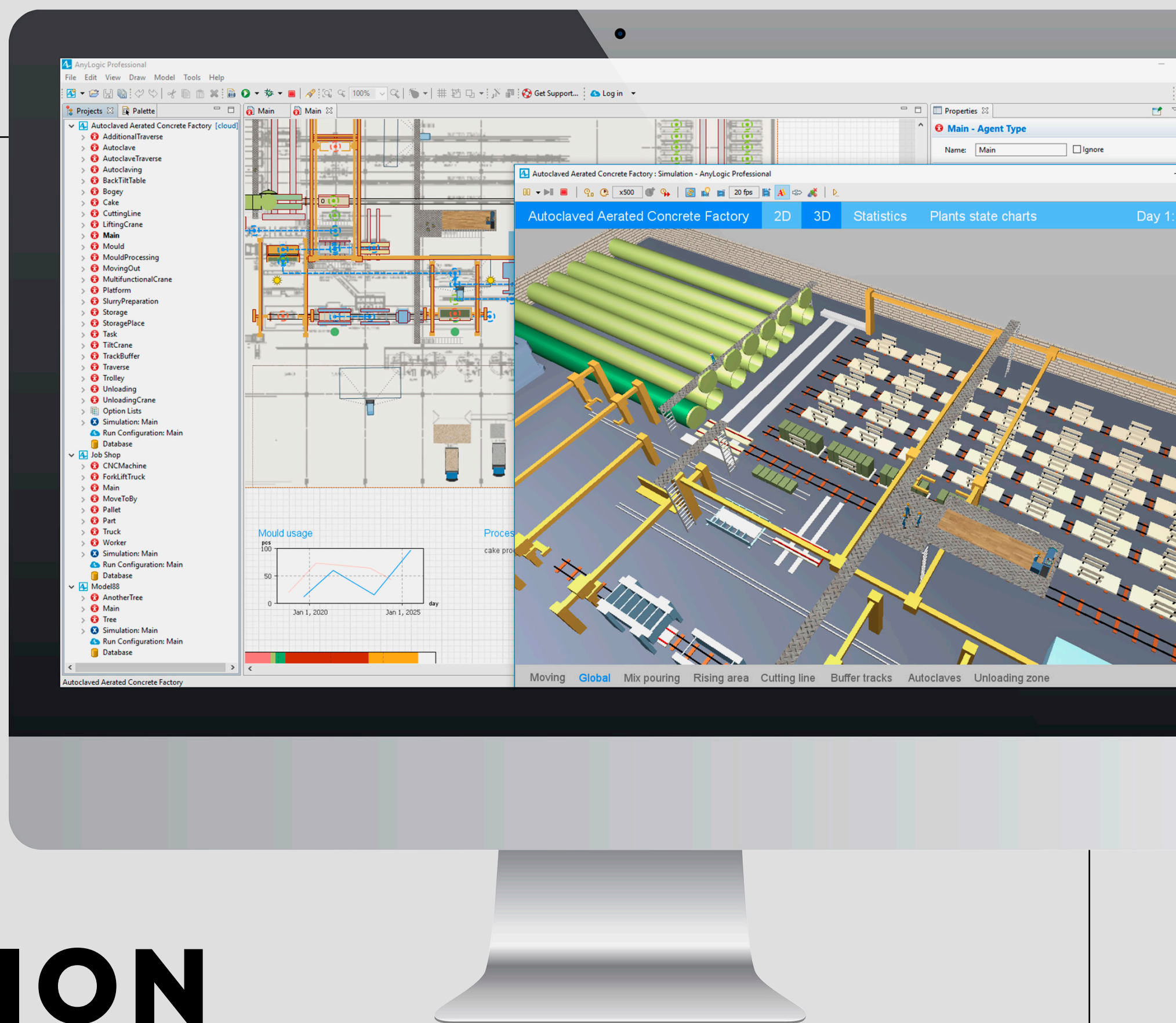


SIMULATION SOFTWARE COMPARISON

- 1 VENDOR AND APPLICATION
- 2 TECHNICAL COMPATIBILITY
- 3 MODEL BUILDING
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THIS WHITEPAPER IS BASED ON [THE BIENNIAL SURVEY](#), BROUGHT OUT IN OCTOBER 2017
ISSUE OF THE OR/MS TODAY MAGAZINE



SIMULATION SOFTWARE COMPARISON

Simulation sets standards in business performance optimization. Representing complete digital footprints of the existing systems, simulation models allow managers to experience the consequences and benefits of their decisions in a risk-free environment. Once created, a model can help detect various issues sooner, solve them faster, predict aftermaths to a much higher degree of accuracy, design and build better products, and, ultimately, better serve customers.

Creating a bridge between the physical and digital worlds, simulation models are applied in most business areas, including manufacturing and material handling, transportation, warehouse operations, asset management, and business processes. When simulating complex business systems, a multi-purpose simulation tool is needed. It helps incorporate various business processes in one model, better represents their interconnections, and optimizes them in a transparent manner.

This paper provides a comparison of simulation software, as well as a general gauge of the products' capabilities, special features, and usage. It is based on [the biennial survey](#), from the October 2017 issue of

OR/MS Today magazine. The magazine is published in conjunction with The Institute for Operations Research and the Management Sciences (INFORMS), which also holds INFORMS Analytics and WinterSim conferences, as well as provides certification, career, and networking opportunities.

We selected the most popular tools and most relevant parameters, and then compiled the information in this whitepaper. Use this comparison to analyze and contrast simulation software, and then choose the product that will solve your challenge and drive your business results.

**FOR SIMULATING
COMPLEX BUSINESS
SYSTEMS, A MULTI-
PURPOSE SIMULATION
TOOL IS NEEDED**

ANYLOGIC



VENDOR



TYPICAL APPLICATIONS



PRIMARY MARKETS



VENDOR'S OTHER SOFTWARE

AnyLogic North America

Multimethod general-purpose simulation tool. Discrete event, agent-based, and system dynamics modeling.

- Supply Chains
- Transportation
- Warehouse operations
- Rail logistics
- Mining
- Oil and gas
- Road traffic
- Passenger flows
- Manufacturing and material handling
- Healthcare
- Business processes
- Asset management
- Marketing
- Social processes
- Defense

anyLogistix — supply chain simulation and optimization software.

AnyLogic Cloud – web service that allows AnyLogic users run and access models from a web browser on any device, compare results, create custom dashboards, and perform various experiments

ARENA

Rockwell Automation

Used for simulating and analyzing existing and proposed systems as well as operational analysis.

- Manufacturing
- Supply chains
- Government
- Healthcare
- Logistics
- Food and Beverage
- Packaging
- Mining
- Call Centers

N/A

ENTERPRISE DYNAMICS

INCONTROL Simulation Solutions

Manufacturing, logistics, and material handling simulation

- Warehouses
- Distribution centers
- Airports and harbors
- Healthcare and pharmaceuticals
- FMCG

Pedestrian Dynamics — a crowd simulation software application, designed for the creation and execution of large pedestrian simulation models in complex infrastructures.

EXTENDSIM PRO

Imagine That Inc

Professional level tool for modeling and analyzing complex discrete rate, continuous, agent-based, and hybrid systems.

- Consumer products
- Healthcare
- Energy
- Petro-chem
- Pulp/Paper
- Transportation
- Pharmaceuticals
- Semiconductors
- Military and Government
- Mining

ExtendSim DE — entry-level general-purpose, discrete event and continuous simulation tool.

FLEXSIM

FlexSim Software Products, Inc.

Simulation and modeling of any process, with the purpose of analyzing, understanding, and optimizing that process.

- Manufacturing
- Packaging
- Warehousing
- Material handling
- Supply chain
- Logistics
- Healthcare
- Factory
- Aerospace
- Mining

FlexSim Healthcare — simulation and modeling to analyze, optimize, and better understand healthcare systems.

PROMODEL
OPTIMIZATION
SUITE



VENDOR



TYPICAL
APPLICATIONS



PRIMARY
MARKETS



VENDOR'S OTHER
SOFTWARE

ProModel Corporation

Process optimization and Improvement, Resource utilization, System capacity and throughput, Constraint analysis, LSS

- DoD and Government
- Manufacturing
- Pharmaceutical
- Logistics
- Warehouse and DC

Enterprise Portfolio Simulator — web-based simulation analysis of multiple, simultaneous project plans

FutureFlow Rx — ADT Decisioning, Patient Flow and Bed Management

MedModel — a dynamic, animated computer simulation of clinical environment

Process Simulator — flowcharts and process diagrams simulator

SAS SIMULATION
STUDIO

SAS

Discrete-event simulation: supply chains, resource management, capacity planning, workflow analysis, and cost analysis.

- Manufacturing
- Banking
- Pharmaceuticals and healthcare
- Energy
- Government agencies
- Retail
- Education
- Transportation

N/A

SIMUL8
PROFESSIONAL

SIMUL8 Corporation

Assembly Line, Line Balancing Strategic planning, Operations, Healthcare Systems, BPMN, Lean, Shared Services, Capacity Plan

- Manufacturing
- Healthcare
- Education
- Engineering
- Supply chains
- Logistics
- Government
- BPMN
- Lean
- Automotive
- Call centers

N/A

SIMIO
ENTERPRISE
EDITION

Simio LLC

Ideal product for professional modelers and researchers. Powerful object-oriented modeling and integrated 3D animation for rapid model

- Academic
- Aerospace & defense
- Airports
- Healthcare
- Manufacturing
- Mining
- Military
- Oil and gas
- Supply chains
- Transportation

N/A

PLANT
SIMULATION

Siemens Product Lifecycle Management Software Inc.

Discrete-event simulation, visualization, analysis and optimization of production throughput, material flow, and logistics

- Automotive OEM and supplier
- Aerospace and defense
- Consumer products
- Logistics
- Electronics
- Machinery
- Healthcare
- Consulting

N/A

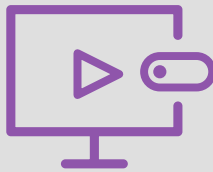
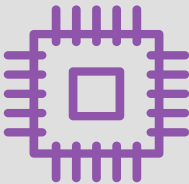
WITNESS

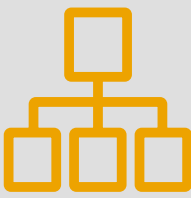
Lanner

Fast, productive predictive simulation desktop software for professional modelling and application development.

- Business planning
- Process optimization
- Decision making

N/A

	 SUPPORTED OPERATING SYSTEMS	 COMPATIBLE SOFTWARE TO PERFORM SPECIALIZED FUNCTIONS	 BEING CONTROLLED OR RUN BY AN EXTERNAL PROGRAM	 MULTIPROCESSOR CPU SUPPORT
ANYLOGIC	Windows, Mac, Linux	• Excel, Access, and any database • OptQuest • Stat::Fit • Any Java / DLL library e.g. for bayesian or neural networks.	AnyLogic models can be exported as standalone Java applications that can be run from/by any other application. They could be also run online via AnyLogic Cloud web service.	YES
ARENA	Windows	OptQuest	Visual Studio for the purpose of automation as well as VB	
ENTERPRISE DYNAMICS	Windows	N/A	N/A	
EXTENDSIM PRO	Windows, Mac	• Excel, Oracle, Access, SQL Server, MySQL • Stat::Fit • JMP • Minitab • any custom DLL	Any Windows application that can be configured as an Automation controller, such as Excel or Access, can control and communicate with ExtendSim as a COM Automation Server.	
FLEXSIM	Windows	• Excel and other database software • C++ applications	OLE and ActiveX	
PROMODEL OPTIMIZATION SUITE	Windows	• Excel and Access • Stat:Fit • MiniTab	• Excel and Access, • C# • VB and VBA	
SAS SIMULATION STUDIO	Windows, Linux	SAS and JMP software, either run externally or embedded via SAS Program block.	Any program that can launch a Java application.	
SIMIO ENTERPRISE EDITION	Windows	• Microsoft Azure • Wonderware • OptQuest • .Net Programs (over 60 languages supported) • Excel, Access, SQL Server, MySQL	• Wonderware • OptQuest • .Net Programs (over 60 languages supported)	
SIMUL8 PROFESSIONAL	Windows	• Excel • Stat::Fit, • OptQuest • SQL Databases	Microsoft Excel and any COM enabled IDE	
PLANT SIMULATION	Windows	• Matlab • Excel • SAP • Simatic IT • Teamcenter • Autocad • Microstation	• Parameterizing from MS Excel • Siemens PLCSIM Advanced • OPC, OPC UA, ODBC • MS Windows • Oracle	
WITNESS	Windows	N/A	N/A	

	 INPUT DISTRIBUTION FITTING	 GRAPHICAL MODEL CONSTRUCTION	 OUTPUT ANALYSIS SUPPORT	 CODE REUSE
ANYLOGIC	31 predefined distributions and custom distributions. Stat::Fit, ExpertFit, and other software for distribution fitting.	YES	• Reports • Model execution logs • Charts • Output to the built-in database or any external data storage (databases, spreadsheets, text files)	YES
ARENA	Arena Input Analyzer to fit distributions		Arena Output Analyzer and Process Analyzer to review results and users may use external products as well	
ENTERPRISE DYNAMICS	Autofit — an internal feature		Experiment Wizard — an internal feature	
EXTENDSIM PRO	35 predefined distributions. Stat::Fit software for distribution fitting.		• Output to charts & reports • Integrated Scenario Manager with dialog or database factors and responses, sensitivity analysis, confidence intervals, Gantt charts, and quantile and interval statistical analysis. • Export to external analysis applications is also available.	
FLEXSIM	Integrated with ExpertFit		A full suite of charts and graphs in the Dashboard, as well as extensive Excel output options.	
PROMODEL OPTIMIZATION SUITE	16 statistical distributions available. Integrated with Stat::Fit.		• Output Viewer • Minitab • Excel	
SAS SIMULATION STUDIO	Via JMP and SAS software integration.		Output analysis via SAS software products. Steady state analysis included.	
SIMIO ENTERPRISE EDITION	Works with ExpertFit and Stat::Fit. Supports table driven input sampling.		SMORE Plots for risk analysis, sensitivity analysis, custom dashboards, comprehensive data in pivot tables, export summary or details to external packages	
SIMUL8 PROFESSIONAL	Custom options within the software and Stat::Fit.		N/A	
PLANT SIMULATION	22 predefined distributions		• Datafit • Charts • Sankey • Bottleneck analyzer • Energy Analyzer • Neural networks	
WITNESS	N/A		N/A	

	 OPTIMIZATION	 RUN TIME DEBUG	 SUPPORT OF MODEL PACKAGING	 IS THIS FEATURE FREE?
ANYLOGIC	OptQuest is included, additionally users can employ any custom optimization algorithms.	YES	Models can be exported as standalone Java applications or shared online via AnyLogic Cloud web service.	YES
ARENA	OptQuest for Arena		Arena Runtime	N/A
ENTERPRISE DYNAMICS	By providing support for various third party optimizers		By providing a free Viewer License of the software	YES
EXTENDSIM PRO	Evolutionary Optimizer is included in all versions of ExtendSim.		Trial version runs any model built in ExtendSim. Analysis RunTime version allows for further model analysis.	FREE AND PAID OPTIONS AVAILABLE
FLEXSIM	An optimization engine, powered by OptQuest, is available as an add-on.		The free trial version of FlexSim is capable of running any simulation model built with FlexSim.	YES
PROMODEL OPTIMIZATION SUITE	SimRunner		N/A	N/A
SAS SIMULATION STUDIO	Via data transfer to SAS/OR software; can be embedded in a simulation model via SAS Program block.			
SIMIO ENTERPRISE EDITION	OptQuest (option) takes full advantage of all processors. Featuring Multi-Objective and Pattern Frontier optimization		Requires Team Edition or above to package model	YES
SIMUL8 PROFESSIONAL	OptQuest		SIMUL8 Studio and SIMUL8 Web Technology	FREE AND PAID OPTIONS AVAILABLE
PLANT SIMULATION	Genetic Algorithm, Layout Optimizer, Neural networks, Hill Climbing, Dynamic Programming, Branch and Bound		Built-in Pack and Go functionality	YES
WITNESS	N/A		Cloud Deployment, Experimentation, Optimisation	NO

	 MODEL BUILDING USING PROGRAMMING / ACCESS TO PROGRAMMED MODULES	 BATCH RUN / EXPERIMENTAL DESIGN	 COST ALLOCATION/ COSTING	 MIXED DISCRETE/ CONTINUOUS MODELING (LEVELS, FLOWS, ETC.)
ANYLOGIC	YES	Flexible user interface to create the following experiments: Parameter Variation, Compare Runs, Monte Carlo, Sensitivity Analysis, Calibration, and custom.	YES	
ARENA		Process Analyzer to run a series of different model runs in a batch		
ENTERPRISE DYNAMICS		By providing Experiment Wizard and Scenario Manager		
EXTENDSIM PRO		Users choose to store run results in the internal database or export to an external application. DOE includes manual, full factorial, and two options each for JMP custom design and Minitab optimal design.		
FLEXSIM		An experimentation engine is built into the software.		
PROMODEL OPTIMIZATION SUITE	N/A	Scenario Manager	YES	NO
SAS SIMULATION STUDIO		Experimental design; manual in the Simulation Studio interface or automated (with interactive modifications) via JMP or SAS software integration.		
SIMIO ENTERPRISE EDITION		Run manual scenarios with multiple replications. Concurrent full use of all processors. Built-in ranking and selection		
SIMUL8 PROFESSIONAL	YES	Multiple replications and scenario management	YES	YES
PLANT SIMULATION		Experiment Manager supporting distributed simulation		
WITNESS		N/A		

					
	ANIMATION	ANIMATION EXPORT	REAL-TIME VIEWING	3D ANIMATION	CAD DRAWINGS IMPORT
ANYLOGIC	YES	YES	YES		
ARENA					
ENTERPRISE DYNAMICS					
EXTENDSIM PRO		N/A		YES	YES
FLEXSIM		YES		N/A	N/A
PROMODEL OPTIMIZATION SUITE		N/A			
SAS SIMULATION STUDIO		N/A			
SIMIO ENTERPRISE EDITION		YES			
SIMUL8 PROFESSIONAL		N/A		YES	YES
PLANT SIMULATION		YES			
WITNESS					

SUPPORT/TRAINING						
		CONSULTING AVAILABLE	USER SUPPORT/HOTLINE	USER GROUP OR DISCUSSION AREA	TRAINING COURSES	ON-SITE TRAINING
	ANYLOGIC	PROVIDED BY COMPANY'S PARTNERS				
	ARENA					
	ENTERPRISE DYNAMICS					
	EXTENDSIM PRO					
	FLEXSIM					
	PROMODEL OPTIMIZATION SUITE	YES	YES	YES	YES	YES
	SAS SIMULATION STUDIO					
	SIMIO ENTERPRISE EDITION					
	SIMUL8 PROFESSIONAL					
	PLANT SIMULATION					
	WITNESS					

	 STUDENT VERSION	 MAJOR NEW FEATURES (SINCE 2015)	 VENDOR COMMENTS
ANYLOGIC	Free AnyLogic Personal Learning Edition	- AnyLogic Cloud, a web service for sharing models and running them online on any device. - The Road Traffic Library for detailed modeling of vehicle movement on roads. - The Material Handling Library for the simulation of manufacturing systems and operations	The only simulation tool that supports combining Discrete Event, Agent-Based, and System Dynamics simulations in one model.
ARENA	Free version available	N/A	N/A
ENTERPRISE DYNAMICS	Free version available	- Improved Support for BIM, CAD - Improved animation and debugger, etc.	N/A
EXTENDSIM PRO	\$25 download for ExtendSim Adopters; \$50 for other students. Research grants are available to use the full version of ExtendSim in research projects for advanced degrees.	- App overhaul plus new UI, charts & reports - Advanced Resource Mgmt - Improved source editing environment - New import/export capabilities.	Unified modeling architecture with powerful internal relational DB & flexible framework to represent widely different systems
FLEXSIM	Free to \$ 100	- A new graphical tool for process definition (Process Flow) - Support for virtual reality (Oculus Rift, HTC Vive)	FlexSim is committed to help answer questions relating to any process in the most intuitive, easy-to-use interface possible.
PROMODEL OPTIMIZATION SUITE	\$ 30	- Resource distance traveled statistics - Identify captured resource units - In-process resource utilization statistics - Programmatic export of statistics - UI enhancements	N/A
SAS SIMULATION STUDIO	N/A	- Linux support - Enhanced controls on order of execution for blocks and block ports - Extended queueing controls.	Included with SAS/OR. Integrated with SAS and JMP analytical capabilities. Models can incorporate any SAS or JMP code.
SIMIO ENTERPRISE EDITION	Free and a \$25-versions are available	N/A	Patented innovations, designed by the Dr. C. Dennis Pegden team, takes Flexibility and Rapid Modeling to new levels.
SIMUL8 PROFESSIONAL	\$ 1995	- SIMUL8 Studio - Power & Free Conveyors - Work Item tracking - Create custom interfaces, Overtime - Financial Input Summary	N/A
PLANT SIMULATION	Free version available	- Enhanced worker, robot, mixer, motion paths and visualization - New Simtalk, OPC UA and Siemens PLCSIM Advanced connections	N/A
WITNESS	Free version available	N/A	N/A



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