

September 16, 2002

Simulation Today

Simulation Modeling Services (877) 474-6858

Special Interest Articles:

- Lean Manufacturing
- Distribution Functions
- Dealing with Scope Creep

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Newsletter Inaugural Issue

Simulation Modeling Services introduces a quarterly newsletter of topics applicable to the ever-growing simulation industry. Our intent is to provide an un-biased view of issues confronting the simulationist today. Whether you're a seasoned veteran or just discovering the benefits of simulation in the design, evaluation, and improvement of systems and processes, we hope you'll find something of interest in each issue.

We'll cover simulation basics, current events, upcoming conferences,

"call for paper" due dates, and highlight how simulation is being used in a variety of industries. *Simulation Today* will also include a listing of discrete event and continuous simulation tools along with website links, versions and planned updates.

Simulation Today can be downloaded from the Simulation Modeling Services [website](#) and you can also opt-in to receive an [email](#) message announcing the release of the latest newsletter.

If you don't have Internet access, contact us via the

address on the last page and we'll mail you newsletters as they are released.

Your comments are appreciated and will be used to improve this publication. Please [send](#) them to Simulation Modeling Services. We would also like your ideas for topics in upcoming issues.



Rainer Dronzek

Principal Simulationist
Simulation Modeling Services

Lean Manufacturing

Simulation modeling can be an effective tool in supporting the implementation of lean manufacturing. Here are some ideas:

Use it in the classroom

Develop a simulation to teach students how lean principles can affect a process. Visualization is often the most effective way to explain a new concept. Better yet, build the simulation with a

simple spreadsheet user interface and let the students run the simulation themselves.

Validate lean concepts

Not all lean techniques may work in all environments. Use simulation to test implementation scenarios to ensure their positive effect on the overall system. In many cases, lean manufacturing concepts are counter-

intuitive. This is especially true in non-manufacturing industries such as healthcare, where lean concepts are a relatively new trend and often must be tailored to meet unique process, customer, and government requirements. An ineffective process change in this environment can have serious consequences – more than money may be at stake!

Distribution Functions

Simulation tools use probability distribution functions to model variation that occurs in processes. For example, let's say we're modeling the time a customer spends at a walk-up order window. We would probably do a time study of the actual process, which might involve direct observations of customers for several hours, or we might download data from the order entry system. In the simulation, rather than using a single value for the order time (e.g. five minutes) it would be better to draw from a distribution that represents the actual population of order times.

Most simulation applications include an integrated or stand alone data analysis tool to calculate the probability distribution function from a set of data points. The resultant function (e.g. a lognormal function of $3 + \text{LOGN}(3.01, 1.1)$) is then entered into the simulation model at the appropriate step in the logic.

Every time a simulated customer incurs a delay due to the order step, the simulation generates a random number that is used to draw an order time from the probability distribution. The model then delays for this unique amount of time. The next simulated customer would initiate the same process, resulting in another order time that is unique yet

statistically valid since it is drawn from the same distribution function.

Certain distributions are better than others in representing particular processes or actions. Here are a few frequently used distributions and their common uses:

Exponential

Used for inter-arrivals and time between failures. The exponential function is often the default for arrival cycles, such as when patients enter an emergency department.

Triangular

When historical or observational data is absent or suspected to be inaccurate, the triangular distribution is often used as a best guess. Process owners can usually estimate the longest, shortest and most common times.

Uniform

All values are equally likely to occur. This is another function used when observational or historical data is limited, suspect or not available.

Erlang

Often used for the time to complete a process step or a task. A very flexible function due to its shape parameters.

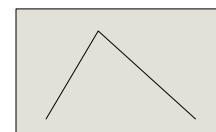
Other distribution types include Gamma, Poisson, Discrete (or One Of), Lognormal, and Normal.

For further information, a good source is the Probability Distributions Appendix in *Simulation with Arena* (Kelton, Sadowski & Sadowski, 1998, WCB McGraw-Hill). Even though the book targets the Arena user, it has many excellent chapters on universal simulation concepts.

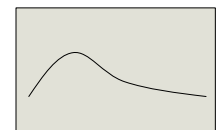
Exercise caution when using reference materials since simulation tools and their respective languages can differ in syntax. For example, for the uniform distribution, Arena uses the form (min, max) and ProModel and AutoMod use (mean, $\frac{1}{2}$ range).



Exponential



Triangular



Erlang



Uniform

Careful!

Curve fitting tools and simulation applications can differ in syntax. For example, the format for the uniform distribution:

Arena

UNIF(min, max)

ProModel, AutoMod

U(mean, $\frac{1}{2}$ range)

Delmia North American User Conference
September 16 - 18, 2002
Troy, MI
www.delmia.com

AutoSim
Lanner Group Limited
September 18, 2002
Coventry, England
www.autosim2002.co.uk

Flexsimposium
Flexsim Software Products, Inc.
September 18 - 20
Park City, Utah
www.flexsim.com

Facilities America 2002
Association of Facilities Engineers (AFE)
September 21 - 25, 2002
New Orleans, Louisiana
www.afe.org

Lean Management Solutions Conference
Institute of Industrial Engineers (IIE)
September 22 - 26, 2002
Seattle, Washington
www.iienet.org

ManuCon 2002
September 23 - 26, 2002
Brussels, Belgium
www.wbresearch.com/manucon

Delmia European User Conference
September 25 & 26, 2002
Fellbach, Germany
www.delmia.com

Seminar: Introduction to Simulation
Modeling
Institute of Industrial Engineers (IIE)
October 10 & 11, 2002
Atlanta, Georgia
www.iienet.org

2002 Huntsville Simulation Conference
The Society for Modeling and Simulation
International (SCS)
October 9 & 10, 2002
Huntsville, Alabama
www.scs.org

International Conference on Applied
Modelling and Simulation
International Association of Science and
Technology for Development (IASTED)
November 4 - 6, 2002
Cambridge, Massachusetts
www.iasted.org

Michigan Simulation User Group (MSUG)
Annual Conference
November 6, 2002
Troy, Michigan
www.m-sug.org

2002 Winter Simulation Conference
(WSC)
December 8 - 11, 2002
San Diego, California
www.wintersim.org

Eighth INFORMS Computing Society
Conference
January 8 -10, 2003
Chandler, Arizona
www.faculty.gsm.ucdavis.edu/ics/ics.html

2003 Western Multiconference
The Society for Modeling and Simulation
International (SCS)
January 19 - 23, 2003
Orlando, Florida
www.scs.org

Society for Health Systems (SHS)
Management Engineering Forum 2003
February 7 & 8, 2003
San Diego, California
www.shs.iienet.org

Healthcare Information Management
Systems Society (HIMSS)
Annual Conference
February 9 - 13, 2003
San Diego, California
www.himss.org

Modelling and Simulation 2003
February 24 - 26, 2003
International Association of Science and
Technology for Development (IASTED)
Palm Springs, California
www.iasted.org

Upcoming Events

*42.7 percent of all
statistics are made up
on the spot*

*The early bird may get
the worm, but the
second mouse gets the
cheese*

*Change is inevitable,
except from vending
machines*

Call For Paper or Presentation Due Dates

Due October 11, 2002
Simulation Solutions 2003 Conference
Institute of Industrial Engineers (IIE)
March 31 – April 2, 2003
Las Vegas, Nevada
www.simsol.org

Due October 15, 2002
36th Annual Simulation Symposium
The Society for Modeling and Simulation
International (SCS)
March 30 – April 2, 2003
Orlando, Florida
www.home.cs.utwente.nl/~slingerl/CFP/

Due October 15, 2002
Modelling and Simulation 2003
February 24-26, 2003
International Association of Science and
Technology for Development (IASTED)
Palm Springs, California
www.iasted.org

Due October 17, 2002
Institute of Industrial Engineers (IIE)
Annual Conference
May 18 – 21, 2003
Portland, Oregon
www.iienet.org

Share your success stories, techniques and tips. Consider presenting at a simulation conference

Project Management – Dealing With Scope Creep

How do you know if your simulation project is on track? Managers commonly use schedule and budget compliance to assess the health of a project. These indicators can help identify projects that are experiencing “scope creep”, in other words, growing beyond the size of the originally envisioned project.

As projects evolve and participants gather more details and knowledge of the system, it is difficult not to add more processes or fidelity to the simulation model. What started as a small project can end up being a behemoth that takes on a life and organization of its own. Advanced planning can help keep a project on track and lead to a success. Here are some

key points to keep in mind when planning your simulation project:

Define the objectives

What problem(s) are you trying to solve? As the project progresses, you will undoubtedly do some course corrections and be asked to add processes or scenarios. Are these additions still tied to the objectives? A written and commonly understood objective statement can ensure that everyone challenges each potential addition to make sure it is within scope of the project. If not, note the item in a logbook (often called a parking lot) as an idea for a second phase or follow-on simulation project.

Model hierarchically

Start with a high level model and add detail where needed. Not only will you get a working model and results to users sooner, but by drilling down into critical areas, you can also reduce project (and model) complexity in areas that are not high priorities.

Quantify Changes

Attaching a dollar amount or schedule impact to a proposed change is an excellent way to help people make a fact-based decision on whether or not to increase the scope of a project.

Adding additional items to a simulation project is often beneficial and/or necessary. The key is to manage the project, don't let it manage you.

“Manage the project, don't let it manage you.”

Simulation Software

(collected by Simulation Modeling Services)

<u>Tool</u>	<u>Website</u>	<u>Latest Version</u>	<u>Next Release</u>
AnyLogic	www.xjtek.com	4.1 Mar 7 '02	4.5 Oct 7 '02
Arena	www.rockwellsoftware.com	6.00.03	7.00 in fall '02
AutoMod	www.automod.com	10.0 Build 1600.94	11.0 in Oct or Nov '02
AweSim!	www.frontstep.com	3.0	tbd
Extend	www.imaginethatinc.com	5.04	5.05 in Oct '02
Factory Explorer	www.wwk.com	2.8.3	2.8.4 in Oct '02
FlexSim ED	www.flexsim.com	4.2	FlexSim 2.0 in Jan '03
GoldSim Pro	www.goldsim.com	7.4 SP-2	7.5 in Oct '02
iGrafx Process	www.igrafx.com	2003 9.0	French & German in Oct '02
MAST - Manufacturing Simulation Tool	www.cmres.com	7.2	8.0 in Jan '03
Micro Saint	www.maad.com	4.0 Build 30	4.1 in Oct '02
Powersim Studio	www.powersimsolutions.com	2002	2003 in Nov '02
ProcessModel	www.processmodel.com	4.2.7	v.5 in 1st Q '03
ProModel MedModel, ServiceModel	www.promodel.com	2002 (aka 5.2)	5.3 on 20 Oct '02
QUEST	www.delmia.com	D5 R9	D5 R10 Nov 25, '03
Sciforma Process	www.sciforma.com	4.0.5a	Mid '03
Supply Chain Builder Product Suite	www.simulationdynamics.com	5.0	6.0 in 4th Q '02 - 3rd Q '03
Silk/JAVA	www.threadtec.com	1.3	1.4 on 15 Jan '03
SimCAD Pro	www.createasoft.com	5.4	Nov 15, '02
SIMPROCESS Professional	www.caci.com	3.1	Early '03
SIMUL8	www.simul8.com	9.0.0.239	10.0 likely to be May '03
WebGPSS	webgpss.hk-r.se/eng/	1.6	1.7 in Jan '03
WITNESS	www.lanner.com	2002 1.00a	WITNESS 2003 in mid-'03

This information is provided by the simulation software vendors and is current as of 9/16/02. All trademarks are the property of their respective owners. Contact Simulation Modeling Services for corrections or additions.



simulation
modeling
services

TOLL FREE PHONE
(877) 474-6858

FAX
(509) 692-9495

E-MAIL
info@simulation-modeling.com

We're on the Web! See us at:
www.simulation-modeling.com

**SIMULATION MODELING
SERVICES**
7712 South 3rd Place
Broken Arrow, OK 74011

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Simulation Modeling Services is an independent consulting firm specializing in developing computer-based, process-flow simulation models for its clients. We work in a variety of industries including manufacturing, healthcare, material handling, transportation and services. We support many commercially available simulation software packages and work with our clients to select the tool that best fits their requirements. See our website for more details on projects and case studies.

We don't sell software, we sell solutions . . .

