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THE FACILITATOR sm

Issue 29 - Fall 2000

# Facilitating process modeling

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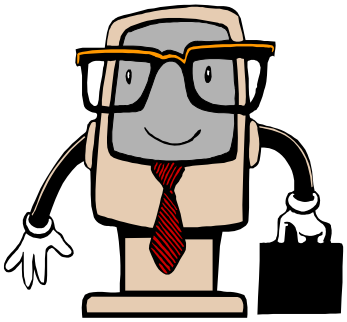
One of the advantages of being a facilitator is the opportunity to work with all types of issues and processes. In the course of your work as a facilitator, you may encounter groups using computer-based simulators to experiment with process or organizational changes. Done well, this can be a very effective way of testing new strategies or processes without committing to organizational change. Once the simulation model shows promise, the actual implementation may proceed with less risk.

Even within the highly technical world of modeling and simulation, facilitators play a vital role. In "Teamwork in group model building" (*System Dynamics Review*, Vol. 11, No. 2, pp. 113-137, Summer 1995), George Richardson and David Andersen claim that there are five roles needed in group model building: facilitator, modeler/reflector (the technical modeling expert), process coach, recorder, and gatekeeper (the link to the client organization). Sometimes these roles are combined, and other writers may categorize the roles differently. In any event, it's good to have the modeling and the facilitation work done by different people when you can—either one is complex enough to keep one person busy.

There are a wide variety of approaches to modeling and simulation. Unless you have experience with the technology behind these tools, you'll likely be working with an experienced modeler, so this article will help you understand what's going on, not make you a professional modeler. I'll introduce approaches and tools organized in the order I might approach such a problem.



I often start with a high level review of the process to assess the organizational problem and to check out the likely effects of your proposed strategic alternatives. I've seen cases where fixing one sub-process had no noticeable positive effect on the overall system and may have made things worse.

### Systems Dynamics

My preferred high-level approach is system dynamics. It addresses the dynamics of processes over time, focusing on the effects of feedback loops that control a system's operation. System dynamics' key features are the accumulation of stocks and the feedback of information to control flows into and out of those stocks. For example, the amount of money in a bank account is a stock; the stream of checks that withdraw money from the account is a flow; and the policies or decision rules that determine whether checks get written ("Do I have enough money to last until payday if I buy this item?") are part of the feedback. Check out http://facilitatedsystems.com/expmgmnt.pdf for a brief introduction into system dynamics in the course of addressing a typical business problem.

When I've used system dynamics, I've found it effective in developing a solution that works over time, avoiding unintended consequences of my ideas.

There are at least three popular system dynamics simulation tools: iThink, Powersim, and Vensim (see sidebar).

Often system dynamics can give you enough information to design the overall flow of your processes. In many cases, that's all your client will need to proceed.

### Process Modeling

Sometimes, once you've got a good understanding that you're on the right path, you may want a tool to address process issues over a shorter time horizon, one short enough so that the feedback loops you investigated in the system dynamics work don't affect the outcome.

When you have to model processes over a shorter time horizon than reacted to by those information feedback loops, the feedback is essentially non-existent. For example, you may want to determine how long it takes to process a sales order as a function of the number of employees. A process modeling simulation tool (see sidebar) can be used to describe and then simulate that process. A system dynamics model might very well also incorporate feedback about the process performance and have the ability to model the hiring of more employees to respond to increasing workload.

### A manual option

While this article is largely about software, I've also had experience with manual methods. I once took a course that taught process improvement through simulation in a contest between teams. We were given a process description to follow, but we could improve it between runs of the process. There were two rules:

- You had to document the changed process.
- You had to give experimental evidence to the trainer that your proposed change was an improvement before you could incorporate the change.

That got teams in the habit of keeping their processes well, if concisely, documented. The "evidence" consisted of the results from timing an experiment the team had run showing that the proposed changes were faster. For example, we'd set up a part of the process, get the team to simulate it, and record the time. We'd then set up the revision and repeat the exercise. If the new time was shorter, then we'd be allowed to use it.

I'm not suggesting you avoid software, particularly at the system dynamics level. But at the second level I mentioned, you may make good progress by getting work teams in the habit of testing process changes with manual simulation experiments. That can work wonders in giving people the ability to control their own workplace. œ

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# Simulation tools

### Systems Dynamics Simulation Tools

Three popular tools:

**iThink**: http://www.hps-inc.com/ (they have a free demo you can try, and they have excellent books introducing various uses of system dynamics)

**Powersim**: http://www.powersim.no/ (they have a free demo, as well)

**Vensim**: http://www.vensim.com/ (they have a free "Personal Learning Edition" at http://www.vensim.com/venple.html; there's a small fee if you want to use it professionally—see their license agreement)

http://www.vensim.com/sdmail/sdsoft.html gives a good overview of each of these plus Dynamo, a powerful, text-based tool. There's a "mega link list" on system dynamics at http://www.uni-klu.ac.at/~gossimit/links/bookmksd.htm that references many online resources. There's also a mailing list; see http://www.vensim.com/sdmail/sdmail.html.

### Process Modeling Simulation Tools

**Optima!** (http://www.advanedge.com/) is a process modeling and simulation tool that uses a diagramming approach very much like Rummler and Brache's process maps from their *Improving Performance: How to Manage the White Space on the Organization Chart* (Jossey-Bass Publishers, 1995). That type of notation is easy for most people to work with, as it resembles flow charting with the addition of the specification of the roles people play in the process.

For a more flexible approach, there are **Petri Nets** (and their grown-up cousins **Colored Petri Nets** [CPNs]). They also require more expertise. One place to start learning about them is at http://www.daimi.aau.dk/CPnets/. Kurt Jensen wrote a comprehensive, three volume description called *Coloured Petri Nets: Basic Concepts, Analysis Methods, and Practical Use* (Springer Verlag, 1995-1997). Design/CPN is a very powerful CPN tool that happens to have a free license; see http://www.daimi.aau.dk/designCPN/.

There are at least two methods based on Petri Nets but with more process orientation**. Role Activity Diagrams** (RADs), developed by A. W. Holt and automated in the Raditor, seem like a good approach, perhaps more flexible than Optima! and more process focused than Petri Nets. Martyn Ould introduces RADs in *Business Processes: Modelling and Analysis for Re-Engineering and Improvement* (John Wiley, 1995).

Similar to RADs, **Role Interaction Networks** (RINs) have been developed by Baldev Singh and others at MCC (http://www.mcc.com/). You can learn more from *Role Interaction Nets (RINs): A Process Description Formalism* by Baldev Singh and Gail L. Rein (MCC Technical Report Number CT-083-92, July, 1992) and *Organization Design Viewed as a Group Process Using Coordination Technology* by Gail L. Rein (MCC Technical Report Number CT-039-92, February, 1992; also available as Gail Rein's Ph.D. dissertation from the University of Texas at Austin). Both RADs and RINs are based on an underlying Petri Net formalism.

**IDEF0** is used in some areas such as the US military. The 626K long IDEF0 specification is available at http://www.sdct.itl.nist.gov/~ftp/idef/idef0.rtf. You can view IDEF0 as a high-level model that can evolve into a CPN diagram (see pp. 213 ff. of Jensen's Vol. 1). There is also an IDEF1 and an IDEF2.

### The author's experience

- I've used Optima! and, to some degree, Petri Nets for discrete event work.
- The tool, Optima!, like Role Activity Diagrams (RADs) and Role Interaction Networks (RINs), incorporates the notion of the 'roles' people play, which clarifies the process description. I find it harder to look at the long-term consequences of decisions that way, though.
- I've used RINs as a process description tool. If your audience understands the notation, it's much more powerful than Optima! diagrams in representing what happens in the workplace.
- I've also found that groups may relate more easily to Optima!'s process maps, perhaps because they look so much like flowcharts.
- The **Theory of Constraints** (see http://www.rogo.com/cac/) has proven to be a useful set of guiding principles in conjunction with either family of tools. In particular, the notion of intentionally designing the location of *the* system constraint helps in redesigning modeled systems. œ