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Simulation and Business Process Change

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To model a process, one creates a description or diagram of the process that focuses on the key characteristics of the process. One simplifies to obtain an overview of the process. If the model is well done, it captures all of the key features and relationships of the original process and can provide users with important insights into how the original process works. Most process models are static and picture the process at a point in time. They show all the major steps, but provide no information regarding the variations that might occur when the process is actually being executed. For example, imagine a group of five claims processing stations. At the start of business, a clerk walks in and deposits a pile of claims to be evaluated on clerk A's desk. Initially, clerk A is the only one who has any work to do. As clerk A processes claim forms and passes them to other clerks, they too have work. Imagine that clerk A passes standard claims to clerk B, while exceptional claims are passed to clerk C. Both B and C pass approved forms to clerk D, who generates advice letters and then passes them to clerk E who files the paperwork. On some days, clerks A, B, D, and E are busy, and exceptions clerk C sits idle. On other days, work accumulates on exception clerk C's desk and D and E wait for C to finish so they can do their work, and so forth. This kind of variation isn't captured in the simple diagram that shows five boxes with some arrows between them. Instead, the dynamics of processes are better captured in simulation systems. In essence, a simulation system makes some assumptions about what goes on within each activity box and then determines the state of the process at successive moments in time. Statistical techniques are used to model the flow of claims forms from one activity desk to another over the course of some period of time.

Business Process Simulation is one of those activities that lots of people talk about, but few implement. Teams start out to analyze a process and run into problems. Redesign takes longer than expected. And then the rush is on to implement the new process. Somewhere along the way, the plan to simulate the original and the revised processes falls by the wayside, a victim of too little time.

Most business process modeling tools have simulation capabilities, either as a part of the tool or available as an add-on module. Talks with vendors, however, suggest that simulation is used by, at most, five percent of their clients. It's easy to understand why this is the case. Simulation is difficult. To use simulation, you need first to specify what happens in quite a bit of detail. Exactly how many people are going to perform activity A, how much is each paid, and what is the cost of the space they occupy? Exactly how many parts are likely to be damaged, and how do you account for the damaged goods? If you consider a process with 100 activities, the data required to simulate the process can seem overwhelming. Worse,

once you get all the data, you need to figure out how to characterize each of the process flows. A typical statistical tool will offer from 20 to 100 formulas that can be used to describe the characteristics of the movement of data from Activity A to Activity B. You aren't just talking about moving one item, after all, you are trying to characterize the way a changing set of items move over the course of a period of time. To do that, you need to know a bit about statistical description. Anyone who isn't familiar with simulation can be excused if they look through the documentation provided with the typical simulation tool and decide that simulation would require more time and effort than they have available.

While we are sympathetic to these objections to simulation, we have had enough experience with the results of simulation to know that, in many cases, it is worth the effort. We observed a large manufacturer where a team spent half a year revising processes. At virtually the last minute, they called in a team to run some simulations and found that some very counter-intuitive bottlenecks would develop the minute they started running the redesigned process. The simulations led to redesigns that saved tens if not hundreds of thousands of dollars that would have been wasted had they gone ahead and implemented the new process and experienced the downtime and customer dissatisfaction resulting from the unanticipated bottlenecks.

Talking with those experienced in simulation, we routinely hear that people lacking experience with simulation techniques, routinely attempt to simulate too much. In essence, they define overly detailed models with too many activities and too many relationships. With experience, they learn that they only have to simulate key elements in the flow to get good results. Unfortunately, learning how to design good simulations takes time. Similarly, choosing the right way to characterize complex process flows requires experience. Thus, for most business process groups, hiring a consultant to help with a simulation is probably the best alternative. If you are already using a tool that supports simulation and have already created a process description, having someone come in to help with the simulation of the process shouldn't be too costly. It could save serious money, as well as avoiding the embarrassment of launching a new process that has some flaw that becomes glaringly obvious once you run a few thousand units through the system.

We see a growing interest in simulation and we'd like to encourage business process analysts to consider simulation. The new tools make it easier and the results of not doing simulations, at least on complex projects, can be costly and embarrassing.

One area where we expect to see a growing interest in simulation is in process monitoring systems, increasingly referred to as BAM (Business Activity Monitoring) systems. There are, of course, different ways of using dashboards to support managers. The obvious thing to do is simply monitor discrete events. In this case, the dashboard has dials or gages that tell the manager when units arrive at receiving, when units are passed from pre-assembly to assembly, and when they are completed. It's useful information, to be sure, but it relies on the manager to identify problems and analyze patterns that might

suggest changes. Some have argued that data from Business Intelligence (BI) can be used to analyze patterns and make suggestions to managers using dashboards. Others have suggested that rule based systems can analyze the data being fed to the manager's dashboard and suggest changes. All are possibilities. A more interesting possibility, however, might be to simultaneously feed the data into a simulation engine that could determine future consequences of continuing to run the process as is. Of the alternatives, simulation would probably be the most powerful approach, especially for complex processes.

Simulation is a very powerful tool. It takes time to set up, but once it is established, it can be used to considerable advantage, often avoiding problems or leading to breakthroughs in the improvement of processes. Process analysts need to learn more about how to use simulation and simulation vendors need to figure out how to build simulation capabilities into frameworks or vertical industry applications to make it easier for managers lacking a statistical background to use this powerful aid to process improvement.

Til' next time,

Paul Harmon