Systems Thinking in ACTION

System Dynamics in Dispute Resolution

By Henry Birdseye Weil and Rayford L. Etherton, Jr.

Major business-related legal disputes usually arise from a combination of frustration, desperation, and anger. Frustration because the other party "refuses to listen to reason," desperation because financial consequences are becoming backbreaking, and anger because proud, strong-willed managers "refuse to be intimidated."

Using a computer model in the resolution process alters the character of the adversarial exchange. A system dynamics model can provide an objective, "transparent" view of a complex, emotional situation. Instead of posturing, bluffing, and attempting to intimidate each other, the disputing parties find themselves challenging, debating, and even agreeing on the model's assumptions. By making the exchange less emotional and more objective, models substantially increase the likelihood of productive negotiations and equitable settlement of disputes.

Simulations can show what would have happened if certain events or conditions had not occurred. For example, how much better would the cost and schedule performance of a project have been if the customer had not ordered certain design changes? This "would have" capability is invaluable for isolating the impacts of the factors which are the subject of the dispute.

Also essential for quick and fair dispute resolution (and for dispute avoidance) is the capability to compute the full impacts of events and conditions, including so-called indirect or "ripple" effects. A system dynamics model can represent the complex network of cause-and-effect relationship through which such effects propagate. Further, the model can fully quantify the costs of indirect effects, tracing the impacts back to specific events and conditions. It is therefore possible to isolate the effect of each event and condition and show their cumulative impacts.

What if...?

A key aspect of contract claims and many other business-related disputes is evaluating the performance of management. The "what if...?" capabilities of a system dynamics model facilitates this process. For example, simulations can compare the performance of a design and construction program based on the decisions management actually made versus the results if management had made certain decisions differently. Would costs have been lower if management had slipped the schedule earlier? What if management had expanded the workforce instead of relying on overtime?

These "what if...?" analyses can be forward-looking, too. In many disputes, resolution is facilitated by showing ways in which the parties can work together to improve what otherwise would happen in the future. For instance, by agreeing to certain changes in how a program is structured and managed, significant cost savings may be realized. Such analyses show that the future is not "cast in concrete"—that the disputing parties can improve the future outlook and that continuing the dispute will forfeit the opportunity to do so. These are powerful incentives to achieve resolution.

One successful example of system dynamics modeling in dispute resolution was the Halter Marine dispute, a bitter legal battle that spanned half a decade and cost millions of dollars.

Models aid dispute resolution by:

- Structuring complex situations so they are more readily understood.
- Substituting explicit, objective hypotheses of cause and effect for vague, often self-serving views.
- Providing a framework within which alternative positions and theories can be evaluated.
- Stimulating the disputing parties to take a broader, longer-term perspective on their interests.

The Halter Marine Dispute

In 1979 Halter Marine, a highly respected Gulf Coast shipbuilder agreed to build a unique (and somewhat experimental) vessel called a "Catug" for Amerada Hess Corporation, one of the world's major oil empires. The vessel consisted of a tug and a barge joined with a ridged connecting device. Halter was responsible for building the tug portion according to plans drawn up by outside architects and delivering it to Maryland to be joined with the barge.

Problems surfaced almost immediately. As construction moved forward, Halter discovered many errors and omissions in contract plans and specifications. Scheduling difficulties also arose, causing disputes between the companies. In addition, changes in the scope of the work rendered Halter's original production, planning, and scheduling obsolete resulting in a significant decrease in overall productivity on the project. Halter management likened efforts to predict the total scope of the project to "shooting at a moving target."

The last straw was the issue of delivering the vessels. Seaworthiness tests and trial voyages suggested that transporting the tug for delivery would create unreasonable risk to the lives of the crew as well as the physical safety of the tug. Halter decided that it was commercially impractical to transport the tug. When Hess refused to tow the barge to Alabama to join the tug there, Halter filed a lawsuit seeking damages and issued a declaratory judgement that it had no obligation to attempt a delivery voyage. Halter contended that the man-hour overruns and the delays were caused by owner-imposed changes, regulatory body reinterpretations, rework resulting from defects in the plans, and the owner's failure to perform other obligations required by the contract plans and specifications.

Amerada Hess, denying these allegations, took the position that Halter's problems resulted from its own incompetency, poor management, bad planning and scheduling, and generally "getting in over its head" in a major construction project for which it was not adequately equipped. It counterclaimed for damages in excess of those claimed by Halter. The stage was set for a major—and expensive—legal confrontation.

Far-Reaching Impacts

As Halter management began the task of quantifying the impacts on the Catug project of owner-imposed changes, they realized that tracking these impacts would be difficult, if not impossible. The difficulty was partly due to Halter's accounting system which made it difficult to pinpoint the impacts on an item-by-item basis. But immediate, direct results were only the tip of the iceberg. There seemed to be far larger, indirect consequences that would be even more difficult to quantify. They resulted from changes and delays rippling through the project, producing inefficiencies and rework that were separated in space and time from their original causes. Halter management sensed that there were substantial "ripple effects" from the Catug project, but they were having great difficulty pinning them down.

Against this backdrop, Halter contacted Pugh-Roberts Associates, a consulting firm, about the potential use of System Dynamics modeling to estimate the indirect impacts attributable to the owner's conduct. Pugh-Roberts built a computer model of the Catug project based on data obtained from Halter, interviews with Halter managers (including their quantifications of how they typically responded to the needs and conditions of projects), and relationships derived from Pugh-Roberts previous shipbuilding models. By the time the model was finished, the once-skeptical Halter attorneys had learned enough about the methodology to respect and trust the integrity of system dynamics. The methodology's uncannily accurate performance, without midcourse manipulations, in simulating a series of complicated and interrelated phenomena convinced them of its validity.

The "base simulation" of the model correctly and accurately recreated the actual history of the Catug project. Pugh-Roberts then altered the inputs to the model to create a simulation of *what would have occurred* but for the changes, delays, and other owner actions cited in Halter's claim. The only differences between the "would have" simulation and the base case were the specific inputs describing Amerada Hess's actions. In every other respect, the model was the same.

The "would have" simulation was compared to the base simulation in terms of such factors as man-hours expended and vessel completion dates to gauge the impacts of the owner-responsible events and conditions. The differences computed from the two simulations were then "dollarized" and formed the basis of the claim against Amerada Hess submitted by Halter to the court.

The Litigation Process

During the pretrial process, all aspects of Halter's claim—including the model—were subjected to strenuous examination. Repeated attempts by Hess' attorneys to discredit the model were not successful. At this point, Halter's lawyers felt that the groundwork had been laid to argue during the trial that the model should be viewed as the "objective source of correct information." In other words, the model would be used as more than a way to estimate damages. It could be used to show how something happened which resulted in a situation far different than expected at the outset by the parties.

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In a subtle but significant way, the tide had turned. All of the parties increasingly were using the vocabulary and concepts of the model to express their views—including the judge and his influential clerk. Conclusions from the model significantly influenced the final pre-trial conference. The result was that, on the eve of trial, Halter received a highly favorable settlement.

Lawyers and the legal system increasingly are turning to alternative ways to resolve disputes. System dynamics modeling can play a key role in that process. Lessons learned from using modeling in negotiation may show ways of mitigating the costs of the dispute, and perhaps most importantly, avoiding comparable disputes in the future.

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