Initiating Management Dialog with a Summary Presentation that Integrates Findings from Multiple SD Analytical Tools

James L. Ritchie-Dunham

SDSG, L.L.C. (dba The Strategic Decision Simulation Group).

jimrd@sdsg.com

http://www.sdsg.com/

Introduction

Understanding the dynamic complexity inherent in causal loop diagrams (CLD) containing multiple feedback loops is cognitively difficult, at best. The following paper demonstrates a method that: (1) summarizes the findings from multiple CLD analytical tools, and (2) checks the CLD's rigor, strengthening management confidence in the results. This tool set has provided many management teams with unique insight into the strategies needed to change specific variables in desired directions within an organization-wide, dynamic viewpoint. This strategic viewpoint brings to light dialog points with which to initiate management thinking, especially in the area of quick wins, opening the path for more strategic changes and sustainable actions.

Summary Analysis

The methodology (Figure 1) integrates cross-impact matrix multiplication (MICMAC - Godet, 1987) analysis, trend analysis, archetype analysis, and organizational systemic perception map analysis of the causal diagram into one analytical tool, significantly increasing the insight each provides to policy-level decision makers about the system's structure and behavior. By bringing the analysis resulting from all five tools together onto one page (Figure 2), the SD practitioner has a unique view of the role each variable plays in the overall system.

A full description of each analytical tool and its precedence is described in the virtual paper (http://www.sdsg.com/sdsg/papers/sd97crunch.html). Due to limited space, only the summary page, an example and related readings are presented.
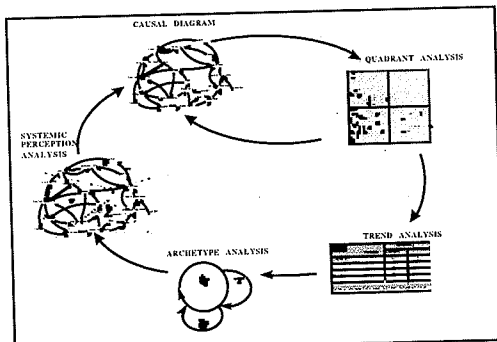
Figure 1: Causal analysis process.

Example

CLDs capture and integrate multiple expert mental models into a single, multi-loop map. Many analytical tools such as quadrant, trends, archetypes, and systemic perception provide further insight into how variable leverage and loop dominance over time affect management's ability to generate the desired behavior in a system.

To demonstrate an example of the insight possible, four variables are extracted from the CDL and used with each of the analytical tools, as shown in miniature in Figure 2.
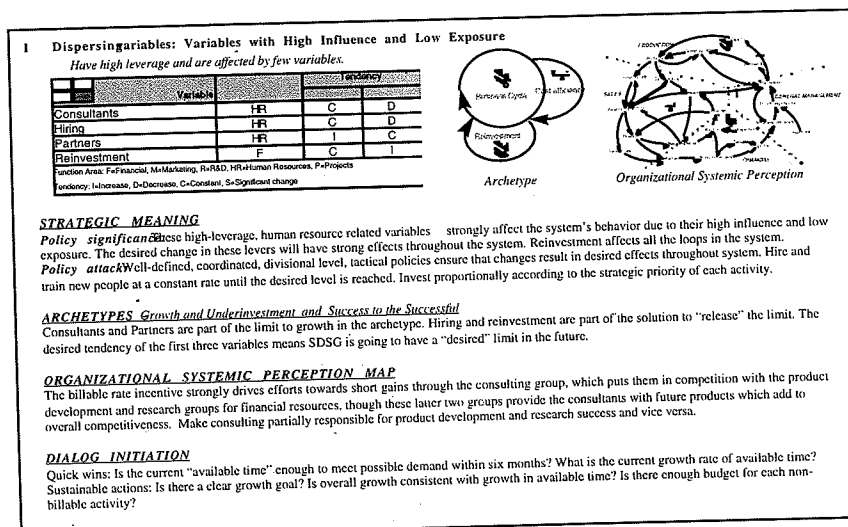

Figure 2: Example summary analysis

Within the multitude of variables comprising the CLD, attention should be focused on those variables that provide the most leverage (Archimedes principle). The first tool used, quadrant analysis, uses cross-impact matrix multiplication (MICMAC) to classify the leverage of the variables in a CLD by their relative exposure and influence in the system (Georgantzas *et al*, 1995). As an example, in Figure 3, quadrant #1 variables such as *Reinvestment* and *Hiring* have relatively high influence and low exposure, or high leverage. This high-leverage indicates they are "means" variables -- they move with relative ease

and affect the behavior of a great part of the system over time. Conversely, quadrant #3 variables such as *Recognition in Market* and *R&D* have relatively low influence and high exposure, being difficult to move and exposed to the whole system over time. These "ends" variables require top-level coordination to achieve their desired behavior.
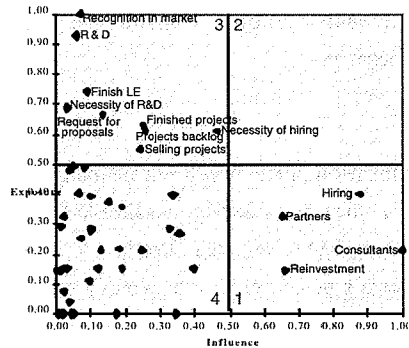

Figure 3: Quadrant Analysis

Checking a variable's relative influence and exposure, as indicated by the quadrant analysis, against expert mental models provides preliminary validation of the causal model. Quadrant analysis often results in non-intuitive behavior that may indicate either (1) faulty causal diagram structure or emphasis, or (2) new insights. The first leads to revisiting the CLD and the second proves the exercise's value.

Combining quadrant analysis with trend, archetype and organizational systemic perception analyses strengthens the insight gained. Trend analysis identifies the degree and direction of change management expects in each variable. Following the previous example, in Figure 2, management stated that it expected *Reinvestment* and *Recognition in Market* to increase, substantial changes from the current "constant" tendency.

Archetype analysis applies well-studied archetypal structures to the problem being modeled. In the example, the "growth and under-investment" and "success to the successful" archetypes best explained the causal loop structure. Integrating quadrant analysis with trend, and archetype analysis (see Figure 2) shows management how to achieve the desired magnitude and direction of change for a variable, given its relative leverage and structural position in a system. To affect significant changes in the high-leverage variable *Reinvestment*, which lies at the crux of the success to the successful archetype, requires coordinated effort among multiple organizational areas for all to succeed. Conversely to yield an increase in quadrant #3 *Recognition in Market*, the key system performance indicator in the growth and underinvestment archetype, requires well-coordinated top management effort.

Mapping an organization's functions or processes and their corresponding perceptions of the system over the CLD indicates how the different functional or procedural areas each view how others affect their shared resources. This analysis brings to light behavior implicit in the organization's incentive structure. Traditional business performance indicators typically fall in quadrant #3 of the MICMAC analysis,

indicating that they are highly influenced, but have little leverage. Causal diagramming provides both additional insight into the key factors which effect departmental performance and thus a basis for reconfiguring departmental performance indicators. For example, *Recognition in Market* is tied to the firm's overall ability to carry out multiple value-adding functions, yet this conflicts with the firm's implicit incentives to horde reinvestment funds for "successful" functions. This understanding has helped managers design predictive performance indicators and incentive programs that reduce unproductive infighting and promote desired, overall system behavior.

Linking Causal Diagrams to Policy Recommendations

The above exercise generates a series of questions or dialog initiation points which enable managers to discuss how different policies can provide quick wins to assist them in achieving sustainable actions.. The CLD and causal analysis provide the dynamic framework managers can use to test how pulling or pushing on different strategic levers will affect the overall system's behavior. For a two-day modeling exercise, the analysis usually takes less than one day – quick turn around for substantially further insight and initial CLD rigor testing.

Recommended Readings

Georgantzas, N.C. and W. Acar. 1995. *Scenario-Driven Planning: Learning to Manage Strategic Uncertainty*, London: Quorom Books.

Godet, M. 1987. *Scenarios and Strategic Management: Prospective et Planification Stratégique* (D. Green and A, Rodney, Trans.), London: Butterworths.