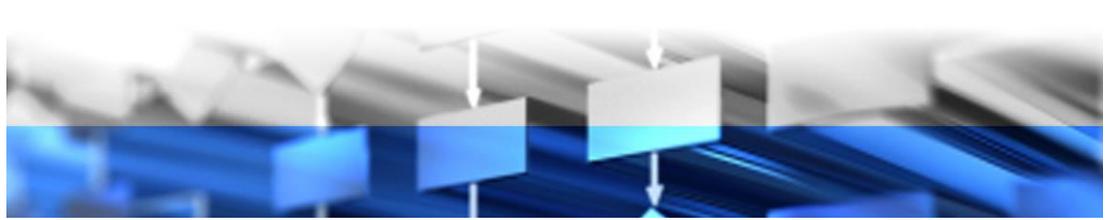


Little Questions = Big Answers

November 2014



Little Questions = Big Answers

This, the fourth article in the series highlights the basis for how Lone Star delivers the right answer when taken in tandem with the next article, “TruNavigator™: Answering the Questions that Cannot be Answered”. This article will show how using Lone Star’s tried and true process we can deliver the answer Big Questions by asking little questions.

Ultimately every manager and executive needs the answer to the Big Question like: How much throughput can we get out of operations, what price will win this program or what is the expected benefit of our new strategy? In many cases the answer seems to be unanswerable.

Decision Analysis (DA) is about predicting outcomes. Typically, when you hear of a prediction, the answer is given as a single deterministic value. But when dealing with future outcomes, this approach is fundamentally flawed and seriously misleading. Rather, predictions need to be thought of as clouds consisting of a range of probable outcomes. The ability to provide quantitative insight on the likelihood and consequences of each outcome makes Lone Star’s enhanced decision analysis (EDA) tool, TruNavigator™, useful, and is the core of what we do.

At the most basic level, Lone Star decomposes a customer’s decision or problem —the Big Question — into all the elements which influence it. Data is collected to describe each element. Using built-in Monte Carlo simulations, Bayesian mathematics and other proprietary calculations, TruNavigator predicts unknown elements based on related influences, tests customers’ decisions and identifies probable future outcomes.

Answering the Big Question accurately is difficult. What most people overlook is that big questions can be broken down into smaller questions that influence the big question. Six Sigma utilizes a technique called the “5 Whys” by repeatedly asking the question “Why” to peel away the layers of symptoms which can lead to the root cause of a problem. Very often the ostensible reason for a problem will lead to another question. Although the technique is called “5 Whys” users often find that there may be the need to ask the question fewer or more times than five before finding the issue related to a problem.

The 5 Whys

Much like the “5 Whys”, Lone Star works backward from the Big Question. The process is based on learning from domain experts at all levels within the customer’s organization. We ask a series of “Little Questions” about their outcome expectations for the events which make up the influences on the Big Question. This process is less intimidating than requiring an answer for the Big

Answering the Big Question accurately is difficult. What most people overlook is that big questions can be broken down into smaller questions that influence the big question.



Question and provides a deeper understanding of the interrelationships within the organization. We find that smaller questions typically may have even smaller questions to be answered, so by the time all of the questions have been answered, a clear influence diagram can be constructed.

In actuality, the answer to every little question helps us to move from ambiguity to clarity, points us towards the root causes, and helps us to develop high-level block diagrams that allow us to integrate the little questions into the model's influence diagram.

Five Point Representation or Distribution

Once the influence diagram has been constructed from the “Little Questions” the participants are asked to assign five values for each data input node. The five data points represented are:

1. Low (1 in 10 chance it could be this low)
2. Nominal (the most likely value)
3. High (1 in 10 chance it could be this high)
4. Absolute Low (it could not be any lower than this)
5. Absolute High (it could not be any higher than this)

It is important to note that Lone Star's five point representation approach enables effective simulations and is also designed to deal with scenarios when there is sparse data. To address the sparse data issue, the system is capable of incorporating many types of substitutes including subject matter expert (SME) inputs, survey information, Delphi group data, interview data, benchmarks from other systems, and many others. All these have the common theme of supporting future projections where empirical data does not exist.

In reality, answering each of the smaller questions with a range of estimates, as opposed to a single “deterministic” estimate, and then applying a Monte Carlo simulator, delivers the right answer to complex, big questions. This technique, if used appropriately, can generate answers that almost seem prophetic. Each node with the model can be easily converted from an influence form to a specific mathematical relationship within the model as well as support all required documentation.

TruCast™

Another important EDA tool is TruCast™. This electronic group voting tool is designed to support the elicitation of all types of information from subject matter experts (SMEs) and more specifically, the five point data representation process that enables effective simulation.



TruCast is a purpose built tool manages the process and prevents errors. It is self-contained, intuitive, easy to learn, and integrates with Lone Star's suite of modeling and simulation tools.

When TruCast is used on a localized basis, wireless tablets and a local wireless server are used to both ask questions and record results. A facilitator leads the group voting and data collection, and TruCast provides instant, error free results. It also has a web-based capability for remote voting.

The voting system is based on Lone Star's proven data elicitation and decision analysis processes and it increases efficiency and accuracy of group and subject matter expert data collection. While there are other systems for collecting data via surveys and SME sessions, TruCast is the only system that collects and processes the data compatible with the five point distribution. The collection, aggregation, and analysis of this information in real time it critical to ensuring that quality information is collected within SME sessions. SME's are both costly and typically have limited availability. Without a tool such as this, the likelihood of incomplete or inaccurate data increases.

Overall TruCast is highly compatible with stochastic variables, the human perception of stochastic variables, supports unbiased data collection on both a local and remote (web based) basis, and ensures efficient data collection from subject matter experts.

The TruCast system can also be integrated with Lone Star's Op/Cap tool, which is used to provide strategic planning support services to organizations. The process is also designed to capture meta-data including elements such as time of collection and pedigree of the information.

Monte Carlo Sets

The TruNavigator model uses the Monte Carlo Method to create any number of random samples for use to create required probability distributions. In actuality, a Monte Carlo simulator is nothing more than executing many "rolls of the dice" to create a probability for the numbers that have been input for each of the small questions. This is critically important when limited historical data exists and a simulation must be used to represent a particular input. Each node has its own independent Monte Carlo set in order to prevent bias. Lone Star's experience is between 10,000 and 50,000 Monte Carlo trials per node are required to generate repeatable outputs across multiple simulation runs. The TruNavigator model is, however, not limited in the number of trials it can execute.

Monte Carlo sets have a significant impact on processing scalability because each node has its own independent data set. As an example, for a small model of 200



nodes generating 50,000 Monte Carlo trials, each model run produces 10,000,000 data points as simulation outputs. As models attempt to scale up to thousands of influence nodes, alternative tools break down. Either processing failures occur rendering the tools unusable or the time to process becomes too long. To support rapid analysis required by the NAE customers most models with 1,000's of nodes need to run in less than 5 minutes and the largest models in less than 1 hour on a standard business laptop.

Lone Star is currently unaware of any competitor that has implemented similar type models in excess of 8,000 nodes and a sample set of 8×10^7 (80,000,000 data points) utilizing Monte Carlo simulation. In addition, these tools are unable to process the simulation in time frames which match client requirements.

The Model Output

The entire model is built using the language of the customer's organization, not predefined Lone Star terms, which makes interpreting the model's outputs more easily understood and useful to the organization. The graphical outputs of the model provide an intuitive way to see the effects of potential decisions. Sensitivity analysis of any strategic element can be run to determine what influences it, what matters most in determining the outcome, and which outcomes have the best profitability or the greatest risk. The analysis process typically promotes running an infinite number of "What-if" scenarios, which can be built quickly with results generated in minutes.

You may find it curious that an influence diagram built using such small and easy to answer questions may seem miles off from the Big Question, but in actuality, Lone Star enhanced decision analysis accurately answers the desired Big Question. The process may sound simplistic, but with the right tools (and mathematics) this approach produces answers with a high degree of accuracy.

In the next article, "TruNavigator: Answering the Questions that Cannot Be Answered" data elicitation is explored as a critical element in executing predictive enhanced decision analysis (EDA). Frequently little or no historical data exists which can be mined for use in analysis. In order to develop the probabilistic input ranges required varying techniques are used to obtain knowledge from subject matter experts and other personnel with specific knowledge. These techniques include interviews, surveys, Delphi groups, focus groups, and other options as appropriate. They become the foundation for delivering the right answer to Big Questions.

Lone Star • 4555 Excel Parkway • Suite 500 • Addison, TX 75001

Tel: 972-690-9494 Fax: 972-690-9495 www.lone-star.com