Increasing the Value of Instinct

EDITOR'S NOTE: "Human Side of Six Sigma" is a new column focused on the personal aspects of Six Sigma implementation. Watch for future installments in upcoming editions of Six Sigma Forum Magazine.

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When lean Six Sigma (LSS) teams come to the measure phase of a project, as part of the define, measure, analyze, improve and control (DMAIC) approach, they may feel as if they are on the brink of a great wilderness. What data do they need to sufficiently describe the current situation and prepare for the analyze phase? This question often overwhelms team members.

For many people, the orderly collection and analysis of evidence can feel excruciating. To gather data systematically takes patience, and that's a rare trait. In fact, people have a tendency to respect intuition more than scientific research. Sensational, attention-grabbing information—even when it requires suspension of rational minds—is more likely to stimulate people than dry facts and data.

On the other hand, Americans value perseverance and the ability to overcome seemingly insurmountable obstacles. Trial and error is accepted as the usual way of life; learning from mistakes is valued more than doing it right the first time. Sometimes, an achievement isn't considered praiseworthy unless the person tripped a few times along the way to the finish line. For example, the inventor Thomas Edison is admired because he tried thousands of light bulb filaments before stumbling on one that worked.

One way of overcoming cultural tendencies is to strike a balance between "hard" facts and data and "soft" instincts. Obviously, there is some risk in this approach. Previous circumstances create biases that influence the ability to solve problems. While it is beyond the scope of this article to describe the many cognitive biases that affect decision making, rest assured that, often, logical thinking is abandoned in favor of an irrational need to force data to fit previously developed beliefs.

Although you can let instinct guide data-gathering efforts, you must agree to use facts and data to prove or disprove those instincts. In this way, you can focus data collection on the vital few factors that will conclusively confirm or invalidate your instinct, which is stated as a hypothesis.

Hypotheses

A hypothesis is a proposed explanation for a problem, while a rival hypothesis is an alternative reason for that problem, another way of describing the opposite results or events. Frequently, the hypothesis is a statement about causation; the data indicate that X caused Y or that B occurs when A is present. Teams gather data to prove or disprove a hypothesis.

The danger of using just one hypothesis to explain a problem is twofold:

1. Some data will be ignored. If focusing on a single hypothesis, teams may overlook information that does not bear on the truth or falsity of the hypothesis; however, such information might bear on the truth or falsity of another hypothesis.
2. Teams may form an emotional commitment to one hypothesis. The idea of becoming overly attached to a particular theory is not limited to problem solving, of course. When this happens, you begin searching for and selecting only the data that supports the hypothesis, ignoring or subconsciously filtering out information that argues against the favored theory.

To avoid these two problems, LSS teams should attempt to generate as many reasonable hypotheses as possible, and test each of them against the data gathered.

Using instinct to generate potential hypotheses

Brainstorming is the most common method used to generate a list of potential hypotheses regarding the cause of a problem. Work with your team to brainstorm a preliminary high-level cause-and-effect (fishbone) diagram. Do not try to brainstorm every possible cause, just the ones that come quickly to mind. Have team members select three to five causes

that they believe are most likely to be the root cause.

Most team members enjoy brainstorming because it moves quickly and encourages creativity. If the team has members with varied backgrounds and experiences, the brainstorming session can generate enough diverse potential hypotheses to ensure that all likely causal systems are considered.

It is important that team members understand that their initial selections are almost never the root causes. Instead, refer to these selections as potential causes. Typically, one or more of these potential causes are related to the actual root cause, but they reflect too high a level—the actual root cause usually becomes apparent as the analyze phase progresses.

Data-gathering jamboree

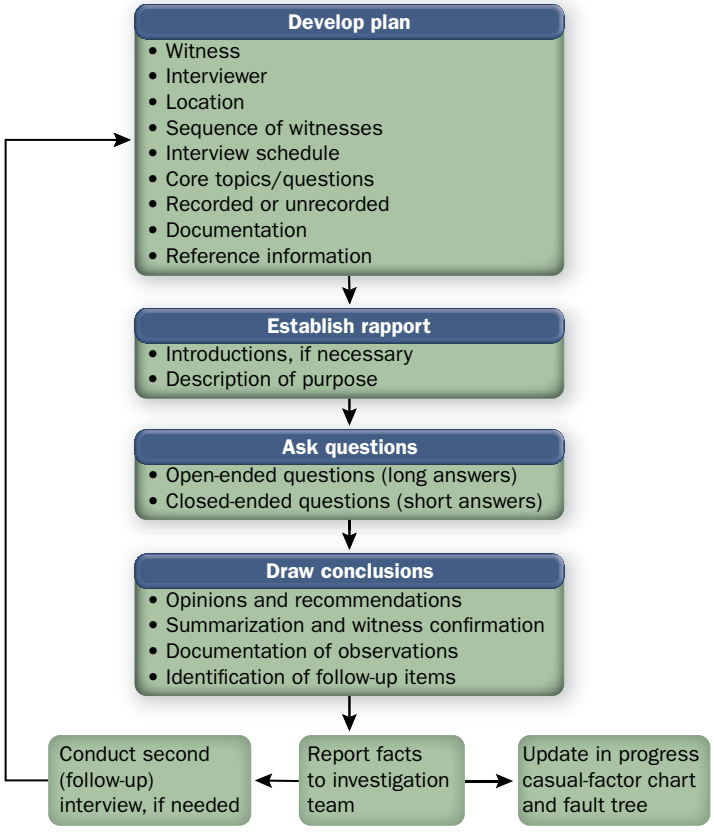
Give team members one week to collect and analyze any and all data that they feel is relevant to the problem. No time is spent at this point to develop a plan for data collection and analysis. No special data collection efforts are initiated, sampling plans devised or experiments conducted. Instead, team members gather data that already exist, perform simple analyses on these data and see how the information relates to the potential hypotheses.

Additionally, no attempt is made to coordinate the data gathering. It is likely—in fact, it is desirable—that more than one team member will gather and analyze the same data. This ensures that differing perspectives are considered in the next step. As the analyses are performed, team members may find additional potential hypotheses to add to the original list.

Team members should use a worksheet tool to summarize their finding as:

- **Type and source of the data.**
- **Estimated trustworthiness of the data.** These are simple, qualitative estimates, and ratings of high, medium and low are sufficient. The idea is to let other team members know how much they should weight the data during the selection process. Measurement data gathered directly from the process associated with the problem might earn a higher rating than opinion-based data collected from people who don't regularly work with the process.
- **A brief description of what the data suggest.** The team member analyzes the data and lists any patterns, including estimates of the mean and variation, trends, and outliers, on the worksheet. The idea is to summarize the key conclusions that might be drawn from this high-level analysis.
- **Related causes.** After gathering and analyzing the data, team members determine which potential hypotheses they support, and those are listed on the summary sheet.

Figure 1. **Interview process**



Selecting hypotheses

Next, team members present their summary sheets. In the interest of efficiency, team members do not debate one another's analyses, inferences or related causes. Only questions of clarification are entertained.

Then, the team uses multivoting to select the three most likely potential causes, which are used for the initial, more scientifically conducted investigation. The other

potential causes are reserved for later investigation if none of the first batch emerges as the root cause.

Instead of relying solely on instinct for this voting and selection process, however, the team uses these guidelines to steer its decisions:

1. The selected hypotheses should account for all possible relevant data. An explanation that covers only part of the data or that is in conflict with a major fact is not a good explanation. Remember, though, that especially early on, all explanations will have problems and will face some seemingly conflicting data. Facts are refined and clarified as better information becomes available. So, don't throw out all but perfect explanations; there won't be any left.
2. Simpler explanations are usually preferred over more complex explanations.
3. More-possible explanations are usually preferred over less-probable ones. Many things are possible; fewer things are probable.
4. The consequences following from the truth of the hypothesis must match the facts. When team members first read how data match a theory, they might be tempted to think, "Why, yes, that must be it." On the other hand, when the team makes the effort to consider a few rival hypotheses—alternative explanations—the original hypothesis suddenly may become less persuasive.

Focused data gathering, analysis

Factual evidence derived from data-gathering activities serves as the basis for all valid conclusions and recommendations. Without effective data gathering, the problem cannot be defined correctly and solved. Data gathering is an ongoing process throughout the LSS effort. It continues until causal factors and root causes are identified.

Interviews can be used to learn about people's observations, perspectives and instincts. Figure 1 describes an interview process that can be conducted by a skilled practitioner. Planning for the interview is essential if the interviewer wants to obtain the maximum amount of accurate data. During the interview, the interviewer should ask open-ended questions. These questions should encourage the interviewees to respond with long, descriptive answers, providing supplemental facts and data to support their input. Closed-ended questions that can be answered with "yes" or "no" or short responses are used to verify or clarify information obtained with open-ended questions. At the end of the interviews, the team can use the information gathered to expand understanding of the other data and analyses that have been gathered. Follow-up interviews may be needed to answer additional questions that arise during the course of the analysis. These interviews are conducted in the same general way as the initial interviews, but a more structured, straight-to-the-point interview style is usually appropriate.

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