Improve Your Improvement Process!

Critical Thinking, Deviation Management, Lean & Six Sigma …

How does the BPI critical thinking framework fit with process improvement efforts? The critical thinking framework offers a way to think about anything that concerns you or your team, inside or outside of process improvement. It applies to any initiative including Lean, Six Sigma, and Deviation Management.

How might critical thinking be used with DEVIATION MANAGEMENT efforts? In a highly-regulated environment select processes are well-defined. When there is a deviation from the defined process, an analysis is required to explain what happened. Root cause analysis is a critical thinking tool that offers a very specific fact-based, systematic process for uncovering what happened.

What are LEAN and SIX SIGMA and how does critical thinking fit with them? Both Lean and Six Sigma were designed to improve processes. Lean procedures seek to eliminate process waste. Six Sigma procedures seek to reduce process variation. Both Lean and Six Sigma are composed of a prescribed series of steps that use an assortment of quality improvement tools. Both Lean and Six Sigma are highly structured in some areas and very unstructured in others. The **BPI** critical thinking tools can be viewed as filling some gaps left by this typical collection of tools providing a process to separate facts from opinions, improving results and saving time.

There are dozens and dozens of quality improvement tools. What does critical thinking analysis offer that these don't have? Most of the tools associated with quality improvement predate even quality circles (circa 1970's) and were created as data gathering, creativity or statistical analysis tools but not critical thinking tools. Teams have been unknowingly left on their own for critical thinking using the information gathered by the other types of tools but having no comprehensive critical thinking process to follow. But, the need to make judgments and to analyze complex situations remains. **BPI**'s critical thinking tools can help teams reduce time and improve their output. For example,

Improve Your Improvement Process!

with the **BPI** Problem Solving tool a list of possible causes can be evaluated logically before any tests or changes are done.

It's an improvement of the continuous improvement process? Yes. There is an opportunity here to improve how both Lean and Six Sigma function by upgrading the tools they use – perhaps using some of the standard tools less often but more appropriately. And, having a visible process enables collaboration to evolve beyond verbal dialogue. You could say critical thinking is applying Lean principles to the earlier problem solving processes, reducing wasted discussions by providing key questions to answer, reducing the number of potential causes by starting with the facts, reducing waiting for approvals by improving communication to leaders, and avoiding re-investigating unresolved problems.

Six Sigma requires very careful selection of process variables for statistical analysis. Failure to understand the situation and improper selection of analytical tools will likely yield poor results. The **BPI** Problem Solving / Root-Cause process enables teams to identify the critical process variables for statistical analysis.

Of course, the critical thinking tools can be used on any concern the team might have and not just process improvement. The critical thinking framework supplies a process enabling any team to think together using the available information.

-LEAN-

How might the critical thinking tools be used with Lean?
The Lean approach provides a specific definition of a problem. In Lean a problem is any part of a process that fails to add value for the customer. This is waste. Examples of waste include: unnecessary transportation, waiting, inventory, defects, over-processing and so forth. A detailed mapping of the current process as it is implemented is followed by making a list of problems that fit this definition.

Improve Your Improvement Process!

BPI CONCERN ANALYSIS (or Problem Inventory). Critical thinking processes start with a list of observations (problems). So, this step is identical to the Lean procedure. The next Concern Analysis step is to edit the list to make sure that each problem is significant and requires independent action. Some problems are grouped, causal chains are revealed, and decisions made about what analysis is needed.

BPI PROBLEM SOLVING. If understanding how a problem came into being is necessary a cause / root cause tool is used. The **BPI** Problem Solving process is one of these tools. Other traditional quality improvement tools may also be used alone or in concert with any **BPI** tool. For example, the Cause-Effect diagram (Fishbone) is useful to start an informal listing of possible causes which can then be followed by the more precise listing of potential causes (step #2 of the **BPI** Problem Solving process).

BPI DECISION MAKING. Use this tool to evaluate options for how to improve the process and eliminate the high priority waste. It is especially important to represent stakeholder objectives in the process (step #2 of the **BPI** Decision process). Brainstorming, a traditional quality tool, can be used to generate options to consider (insert step #3 of the **BPI** Decision process).

BPI PLANNING (or Project Management). A simple yet complete planning process avoids waste when the implementation is carried out – a so called Lean execution!

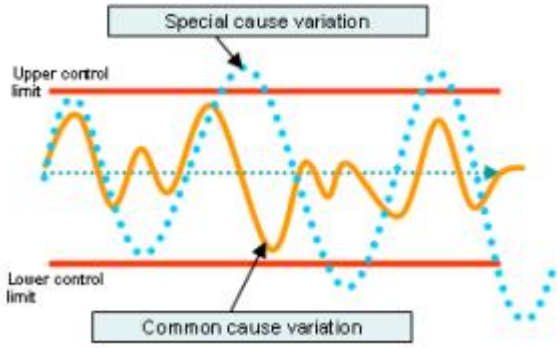
-SIX SIGMA-

How does critical thinking fit in with the Six Sigma process? Six Sigma tools include powerful statistical methods for analyzing variation. However, these methods require a significant amount of preparation and time to conduct. It is best to evaluate problems logically first, using whatever information is already available. A statistical analysis (e.g. design of experiments) may be needed to verify the logical analysis (from **BPI** Problem Solving) and to

Improve Your Improvement Process!

generate new information so the optimum solution can be determined (using **BPI** Decision Making). In this way process-improvement can require less labor, time and materials owing to the narrowing of the focus before using statistical and experimental tools. The quality of the information will also be affected yielding more useful information per experiment. The process becomes: Factual convergence — Logical convergence — then Physical testing convergence. Skipping to Physical testing is expensive!

How does critical thinking apply to the different types of variation? Let's consider two types of variation: Common Cause and Special Cause.



COMMON CAUSE VARIATION is variation created by causes that are part of the target process as it is now constituted. The variation created by these causes is predictable based upon the historical performance of the process as revealed by a control chart. The variation falls between established control limits.

Six Sigma's specialty is reducing common cause variation (by using the design of experiments technology, for example). But, **BPI**'s critical thinking tools (e.g. RCA or root cause analysis) can help here, too. The **BPI** analysis relies upon looking at differences between similar processes as well as on-going changes inherent to the current process to develop and then logically test potential causes of the historical variation. (Workshop participants please refer to *Start-Up Problem* article in **BPI**'s Critical Thinking text.)

Improve Your Improvement Process!

The answer to these questions can help develop potential causes:

- What is different between the target process and similar higher performing processes?
- What is different when the process is working well vs. when it is working less well?

After building a list of potential causes focus on those that pass the **BPI** logical test. These most likely causes can be formally tested by other (e.g. Six Sigma) methods.

What about Special Cause variation?
SPECIAL CAUSE VARIATION is always a surprise. This variation is from new, unanticipated, emergent, or previously overlooked aspects of the system. This is evidence of some change in the system or a lack of understanding of same. Statistical theory requires separating the Common Cause variation from Special Cause variation to apply statistical analysis. The analysis is applied to Common Cause variation only.

How is Special Cause variation analyzed?
The **BPI** Critical Thinking tools analyze and correct Special Cause variation. The Problem-Solving tool uncovers and verifies the cause of the variation. Then the Root Cause Analysis procedures more fully reveal the sequence of events that created the variation. With a full understanding of how the variation was created the Decision-Making tool is used to select the best corrective action and Planning used to map out implementation steps. As mentioned above, other quality and process improvement tools can be used to gather data and generate ideas as needed within the critical thinking framework. These other tools include, for example, Cause-Effect Diagram (Fishbone); Brainstorming; and Run Charts. The use of 5 Whys technique can help determine a suitable problem statement by reaching a point where asking why is unanswerable.

Regarding using the BPI tools outside of process improvement, does understanding Common Cause and Special Cause variation help when finding a problem's cause?

Improve Your Improvement Process!

In the absence of control chart data and before the real cause is determined it is not possible to state whether the cause is due to Common Cause or Special Cause variation. Therefore, how Problem Solving is done should not assume one or the other.

Special Cause variation is really the default option when using the **BPI** Problem Solving process. That is, it is not necessary to have any special awareness of the distinction between Special Cause vs. Common Cause variation to handle Special Cause variation.

But, regarding Common Cause variation, here are two tips for how to do the **BPI** Problem Solving process to allow fair consideration of Common Cause variation. First, when setting up comparisons between the Problem Area and the Non-Problem Area make sure to include similar objects, organizations, or groups.

For example, a manufacturer producing a product using a process common in the industry should set up comparisons of similar products within that industry. This forces a perspective that fits the industry-wide reality.

If the problem is common across the industry, then the most likely cause could be the common cause variation associated with the process being used.

The second Problem Solving tip is in the Potential Causes step. Potential Causes should be developed based on what is different about the Problem Area compared to the Non-Problem Area. This forces common elements between the two areas to drop out of the analysis leaving only what is unique to the Problem Area. Note that this step relies on a clear and properly constructed Problem Description to focus on differences. If you have not put in similar objects (services, organizations) nothing is there to keep you from chasing dead ends – thinking something is different when it is not.

The way the type of variation comes into play in these **BPI** critical thinking tools is:

Improve Your Improvement Process!

Problem Solving. There are two steps to pay special attention to. The first, and most important, is step one (Problem Description) when setting up comparisons between the Problem Area and the Non-Problem Area. And, the second comes in step two (Potential Causes) when developing Potential Causes using the comparisons setup in step one.

Decision Making: It also comes into awareness when using Decision Making to decide what action to take, if any. You can use Common Cause tools (e.g. DOE) to explore combinations of variables.

Planning: Also, in the Planning process, troubleshoot the plan anticipating what might go wrong including both types of variation.

The power of **BPI**'s Critical Thinking technique is that it provides teams the opportunity to consolidate large quantities of information, data, and knowledge so there is a superior visibility of the salient facts. This fosters the best possible use of their thinking – improving how they apply their knowledge, experience, and judgment.

See descriptions of **BPI Workshops.**

Contributions from these three authors:

Author #1
Director – Global Operations Learning & Development
Root Cause Expert Facilitator
X Corporation

Author #2
Independent Consultant
Innovation & Problem Solving
Master Black Belt.

Author #3
Richard C. Wells
Vice President
Research & Development
Business Processes Inc.
rcw@critical-thinking.com