Better Metrics, Better Management

Understanding variation with Process Behavior Charts

> Every data set contains **noise**. Some also contain **signals**. Before you can find a signal, you have to filter out the noise.

"What gets measured gets managed" gets quoted a lot (and the Drucker Institute says Peter Drucker never said it). Most organizations spend their time on the first half: what to measure, and what the target is. Far less goes into the second half: how we manage and improve. A single number on a whiteboard with a frowny-face magnet doesn't help. Neither does a big table of red and green numbers, the "bowling chart." A Process Behavior Chart (an XmR chart, a form of control chart) separates routine variation from meaningful change. As Donald J. Wheeler puts it, it's a way of thinking, with some tools attached.

Two ways to get it wrong

Treating noise as a signal

The system hasn't changed, but we act as if it has: asking for explanations, celebrating, or blaming.

Missing a signal

The system has changed, but we don't notice or investigate.

Process Behavior Charts strike a balance between those two mistakes. A chart tells you *that* something changed, not *what* changed. That's when you go to the gemba and ask.

Three rules for finding a signal

1. **Any single point** outside the upper or lower natural process limit.
2. **Eight consecutive points** on the same side of the central line (the average).
3. **Three out of four consecutive points** that are closer to the same limit than they are to the central line.

Anything else is noise. Don't waste time explaining noise in a metric: there is no simple, single "root cause" for noise.

Three questions for every metric

1. Are we achieving our target or goal?

Occasionally, or consistently?

2. Are we improving?

Can we predict future performance?

3. How do we improve?

When do we react? When do we step back and improve the system? How can we prove we've improved?

Build an XmR chart

1. Use a baseline of about 20 data points (or as few as six for temporary limits, recalculated once you have 20).
2. Calculate the average, and the moving ranges (the absolute difference between each point and the one before it).

3. Calculate the average moving range (MR-bar).
4. Natural process limits = average plus or minus 2.66 x MR-bar. The moving range chart's upper range limit = 3.268 x MR-bar.
5. Plot the data with the average and limits, then evaluate new points with the three rules.

- The Natural Process Limits are calculated, not chosen. They're the "voice of the process," not a target or a customer specification.
- Don't recalculate the limits every time you add a data point.
- Shift the limits only when the data show a distinctly different behavior, you know why, the change is desirable, and you expect it to last.

Predictable? Capable?

Unpredictable	**Predictable, not meeting target**	**Predictable, sometimes meeting target**
Stabilize the system. Find the root cause of each signal.	Improve the system. Reacting to each data point won't help.	Improve the system, and don't overreact to the misses.

People can't perform outside the bounds of the system they work in, so pressuring them to try harder won't help. Don't celebrate green that the same system will turn red next month. And don't wait for red: a signal below the lower limit is worth investigating even while the metric is still green.

Questions to take back to your team

- Which metric in our next review would look different as a Process Behavior Chart instead of a red and green scorecard?
- When did we last ask someone to explain a number that was probably noise?
- Which "improvement" have we celebrated without checking for a signal?

Go further

- *Measures of Success: React Less, Lead Better, Improve More*: measuresofsuccessbook.com. Free spreadsheet template: measuresofsuccessbook.com/extras
- Free guides: *The Red Beads in Your KPI Review* and *What Your Scorecard Isn't Telling You*
- Donald J. Wheeler, *Understanding Variation*, from SPC Press: spcpress.com
- All links and tools from this talk: markgraban.com/talk-resources/measures-of-success
- Questions or ideas? mark@markgraban.com