Metrics Mania:
Make your metrics work for you

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"What gets measured gets done." We have all heard this maxim at one time or another. Furthermore, the various manifestations of continuous improvement activities tell us that we need metrics to know if progress is being made. Frequently, we observe improving metrics without improvement in the business, metrics that show no direction at all, or metrics that send confusing signals. Why would this be the case? If people respond to how they are measured, and the purpose of metrics to drive business progress, it stands to reason that some care must be taken with the design of those metrics.

Well designed metrics share a few common characteristics. Those characteristics are:
- Tied directly to company goals
- Elicit the desired response from the organization
- Accessible
- Timely
- Visible

We will examine each of these characteristics in more detail.

Tied directly to company goals

This one may seem obvious, but is missed more often than one would expect. A powerful metric has a direct link to the business objectives. If the trend in the metric is favorable, a favorable change in business outcome should be evident. A metric of scrap dollars is an interesting study. At first blush, this would seem to be directly tied to profit, since scrap increases cost of goods, thereby decreasing profit. Closer examination shows that it is subject to other influences, making trends ambiguous. For example, if a company has two product lines with dramatically different material costs, a change in mix from low cost to high cost product will increase scrap dollars even if the gross margin is exactly at plan. Even in a single product company, a simple increase in shipments will result in an increase in scrap dollars if the process yield is constant. Therefore, scrap changes will reflect other changes in the business, and can send conflicting messages, such as scrap $ are up (bad) because shipments are up (good) or vice versa. Scrap as a percent of gross revenue is better, in that it normalizes to the shipments. Yield (number good vs. number started) is a better measure still, but not completely free of mix bias if product line yields are aggregated. Typically, product line yields are tracked separately. If so, an increase in yields will reflect a decrease in cost of goods and an increase in profits for that product line.

Elicit the desired response from the organization

Given that people respond to how they are measured, poorly designed metrics can drive strange behaviors. One type of metric that can produce this result is one that measures quantity only, without specifying quality. A few examples are: number of patent applications per year, R&D spending, number of products released per year, or

number of quality improvement teams. In the case of patent applications, focus on only the number of applications will certainly get quantity, but nothing is guaranteed about the value to the company, or the company product line. Measuring R&D spending levels will certainly drive spending up (or down), but the company needs profitable products, not just R&D spending. Similarly, number of products released per year will not guarantee profit or sales if the products do not deliver the required value to the customer. Without some other qualification on number of quality improvement teams, there may be teams rearranging the cafeteria chairs or painting the water fountains. A focus on business result improvement must be included. In general, metrics should focus on output rather than input, as well as the quality of that output.

Accessible

By accessible, I mean that the people using the metric understand it, know what to do about it, and there is no "cognitive dissonance." If we want people to respond to their metrics, we need to spend the time to ensure that they understand how their daily job relates to the metric and vice versa. When the connection is made, most people will respond enthusiastically and creatively. However, they must feel that they have some degree of control over the outcome. An example that I came across recently was a metric for Warranty Cost posted on a factory floor. The quality of the factory output (as influenced by the people on the shop floor) does have some impact on warranty claims. But, marginal design or poor quality purchased components can have as strong or stronger influence. Out of Box Quality (no problems as unpacked by the customer) is much more closely related to the output of the factory, and is a more current measure (warranty claims may not materialize for six months to a year).

What I have called "cognitive dissonance" is the most insidious shortcoming. An example of this is a stated goal of outstanding customer service while measuring number of calls processed per customer service agent per hour (credit to Alan Weiss for this example). The metric drives a quick, but not necessarily a high quality, resolution from the customer perspective. Airline on-time departures are measured from push-back from the gate. Have you ever been on a flight that pushed back right on time, and then sat on the tarmac, 30 feet from the gate, for the next 30 minutes? The passengers typically don't feel like they departed on time, but the flight crew gets a gold star for an on-time departure. If there is cognitive dissonance in the metric, and the metric is used in a punitive fashion, truly bizarre behavior results (from the desired outcome perspective). A high profile example is the way progress is measured in the No Child Left Behind Act. Schools are expected to steadily improve the percentage of students that qualify as proficient in reading and math (a worthy goal), with an ultimate target of 100% proficiency by 2014. The definition of "proficient" is left up to the individual states. Schools that fail to demonstrate adequate progress face punitive measures. What results is a redefinition of "proficient" and a race to the bottom. The result is like a goal to be competitive in the Olympics driving the requirement that all school athletes succeed at the high jump. The coach receives an electric shock if the athletes fail to clear the bar, and the required height of the bar is left to the discretion of the coach. The coach will try to achieve Olympic class results, but eventually, in his own self interest and sense of self preservation, the coach will lower the bar until everyone can clear it. This is hardly the desired or intended outcome, and is unlikely to result in competitive athletes at the

Olympics. We should also test hidden assumptions for validity. The unspoken assumption for the NCLB Act is that all children are equally capable of a high proficiency in math and reading, and the unspoken assumption in the Olympic example is that all athletes are capable of world class performance in the high jump.

Timely

If metrics are only posted monthly or quarterly, they are more of a report card than a tool to drive improvement. The time for action has passed by, and all that remains is to explain what happened, promise to do better, and then proceed to fly blind until the next report card is issued. Using the Out of Box Quality example from above, if feedback to the factory floor is closely coupled to when the product shipped, appropriate action can be taken to address whatever shortcoming is in the process and prevent more poor quality product form being shipped. On the other hand, if a sales office stockpiles customer returns for three or four months (to save shipping cost, paperwork, or whatever), the evidence trail pointing to the cause is cold, thereby increasing the time to resolution. In the meantime, more poor quality product could be shipped. If fact, some of the later product in the returns stockpile may have been avoidable altogether!

Visible

For maximum impact, metrics must be visible to those who can respond. If we want the factory to demonstrate improvement, but the measure of that improvement resides on the engineer's computer in the back office, they are "flying blind." Visibility is as important as Timely. A hand plotted trend chart at the right workstation is much more valuable than a computer generated, four color, fully annotated printout that can't be seen by the people who can actually influence the result.

A set of metrics is like the instrument panel in an airliner. The information allows the company to navigate to the desired destination, respond to process deviations in a timely manner, and avoid storms along the flight path. A well designed, carefully considered set will be a powerful tool to maximize the value of your enterprise. Is it time to rethink your instrument panel?