Metrology Department KPIs Reporting for Calibration

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Metrology department key performance indicators (KPIs) reporting for calibration should quantify and report, like other business functions, functional KPIs in terms that everyone can easily understand. To accomplish this objective, an organization benefits when they use an **integrated enterprise excellence (IEE) value chain** approach for this reporting, which aligns predictive performance measurement reporting with the processes that create the metrics.

Metrology Department KPIs Reporting in a Business Using an IEE Value Chain

According to Wikipedia, metrology is the science of measurement. Metrology includes all theoretical and practical aspects of measurement. Similarly, an organization's metrology department KPIs reporting for calibration can be a measurement of this function's effectiveness relative to a quality, cost, and time criteria.

An IEE value chain's reporting of these metrology department KPI measurements can provide a predictive quantification of future expectations, which is linked to the processes that created these metrics. With this understanding, one can determine where efforts should focus on any of these metrics that need improvement.

A high-level view of an organization's value chain is shown in Figure 1. In this value chain the primary functions of the organization are connected by arrows and the support functions are not. A computer-mouse click on a box would provide a drill down to the functional processes and their associated performance metrics.

A drill down of the "manufacture products" function would provide the associated performance metrics and processes for this function. One of the sub-functions to this "manufacture products" drill down could be metrology. A drill down of the metrology's calibration function might then yield what is shown in Figure 2.

In Figure 2, the top swim lane describes the KPIs for the metrology department calibration function relative to quality, cost, and time. The bottom swim lane is a basic calibration department process, where these steps can have drill downs to additional process details.

Predictive Metrology Department KPIs Reporting

Within the IEE system, KPIs are reported from a high-level, **30,000-foot-level perspective**. This airplane-in-flight perspective of the output of a process provides a predictive statement, when appropriate. The 30,000-foot-level methodology might initially appear to be traditional control charting; however, there are differences as described in "**x-bar and R chart issues and resolution.**" An example 30,000-foot-level report-out is illustrated in Figure 3 for the "calibration delivery time" metric in Figure 2.

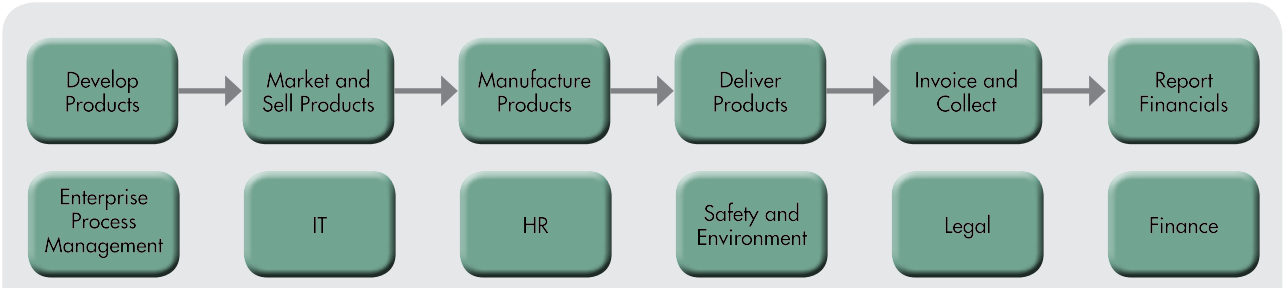

Figure 1: High-level Organizational Value Chain

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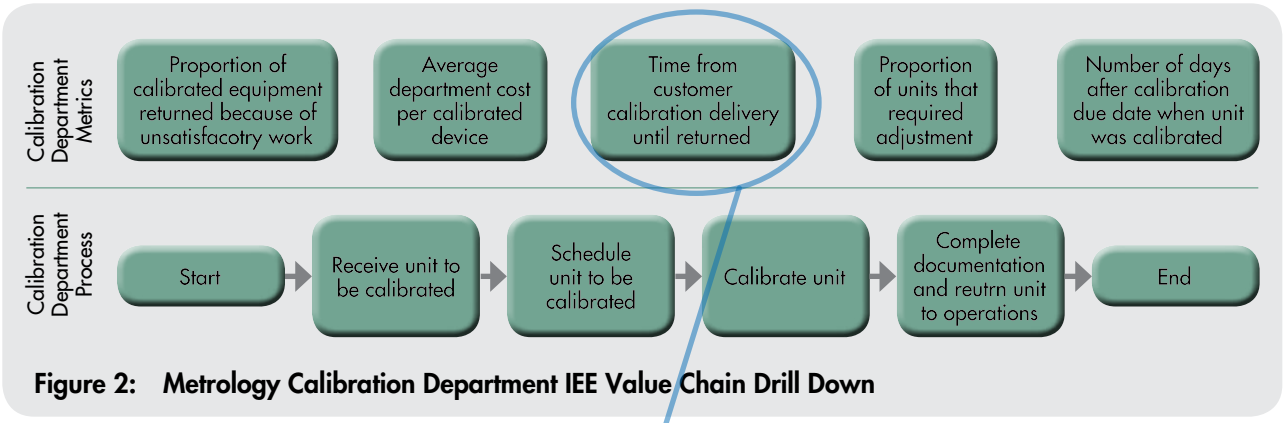

Figure 2: Metrology Calibration Department IEE Value Chain Drill Down

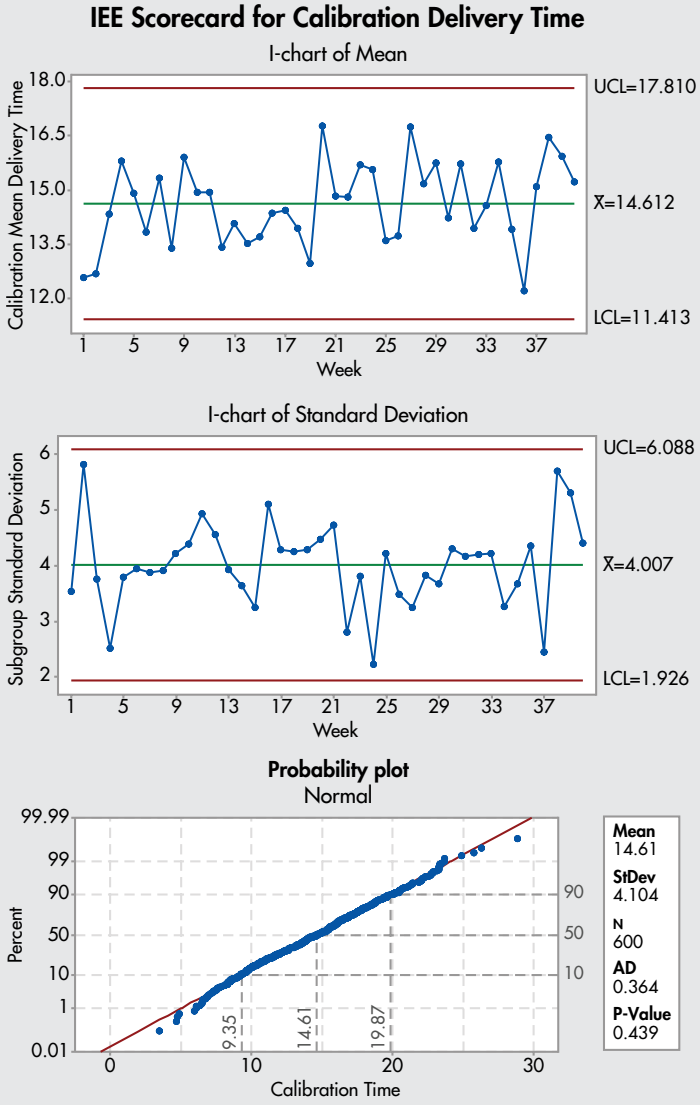

Figure 3: Predictive Metrology Department KPIs Reporting at the 30,000-Foot-Level

In this charting, the two top individual charts assess the stability of the process's delivery time relative to its current weekly means and standard deviations responses. Since there are no out-of-control departures or trends relative to the upper and lower control limits (UCL and LCL), this process is considered stable. Since the process has a recent region of stability, one can infer that the process is predictable. When stability occurs, the data from this recent region can be considered to be a random sample of the future.

The probability plot in the lower right corner of Figure 3 provides a prediction statement estimate. When the best-estimate drawn line in a probability plot is straight, one can assume that the data fits the probability plot's coordinate-system distribution, in this case a normal distribution.

The y-axis in this **probability plot** is a measure of percent-less-than. For a given x-value, one can estimate the expected frequency of occurrence below that value by extending a line vertically from the x-value to the best estimate line and then progress horizontally to determine the y-axis value.

Similarly, this methodology can also be applied to determine for a y-axis percentage value an estimated x-value. Since the delivery time KPI in this illustration had no specification, this determination is what was done in Figure 3 to quantify the estimated median and frequency of occurrence, which was reported at the bottom of the plot.

For this illustration, calibration delivery time is about 14.6 days with 80 percent of delivery times between 9.4 and 19.9 days. If this delivery time is not satisfactory, then something needs to be done to improve the process. Evidence that process improvement efforts were beneficial is that the individual chart(s) of the 30,000-foot-level report-out transitioned to a new, enhanced level of performance.

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Linking Metrology Department KPIs Reporting for Calibration to an Organizational Value Chain

The arrow linking Figures 2 and 3 illustrates the linkage of the delivery time 30,000-foot-level reporting metric in Figure 3 to its value chain entry. This 30,000-foot-level performance metric reporting can be made a clickable entry; e.g., through html coding.

Organizations benefit when an IEE value chain is readily available at any point in time to everyone who has authorization. Further benefits are gained when this measurement-reported data are automatically updated. These objectives can be accomplished using, for example, **enterprise performance reporting system (EPRS) software.**

Metrology Department KPIs Reporting of Other Metrics

The above illustration demonstrates the report-out format when there are multiple samples in a subgroup; however, some of the metrics shown in Figure 2 involve attribute data and a single point for each time-series timeframe. A similar 30,000-foot-level reporting format is available for each of these format types. For additional information about this reporting, see **Forrest's favorites.**

Summary

Management and others in a metrology department can gain much insight to how their processes are performing when they evaluate their KPIs through the **transition of traditional scorecard or dashboard reporting to an IEE 30,000-foot-level measurement approach** with value-chain integration. From this form of reporting, the organization can determine the most appropriate actions or non-actions relative to process improvement efforts that should be undertaken.