

# Understanding the Data

## A way to convert a numbers table to automatically generated predictive report-outs

**AT THE END** of business quarters, many people spend precious time and effort preparing to satisfy management's need to know how the business is faring. Executives may receive a large deck of PowerPoint slides or a huge Excel file that tries to summarize their organization's performance.

After weeks of collecting this data, however, the compilation often contains outdated information, can be difficult to interpret and does not present information in a format so that the most appropriate action or non-action will be taken.

In addition, this untimely historical data presentation does not provide a predictive statement, which, if presented, could dra-

matically improve the executive's decision-making process. One form for this type of report-out is a table of numbers.

An actual executive management report, shown in Online Table 1, which can be found on this article's webpage at [www.qualityprogress.com](http://www.qualityprogress.com), provides measurements for four products. Table 1 shows a close-up of the entries for product A so the names of the categories are more readable.

For each of the four product categories:

- Much emphasis is given to comparing one week to the next. This form of reporting doesn't encourage process and process-improvement thinking. The output of a process is a function

of its inputs and process steps. If an enhancement is desired in a stable process' output, the inputs or process steps must be improved.

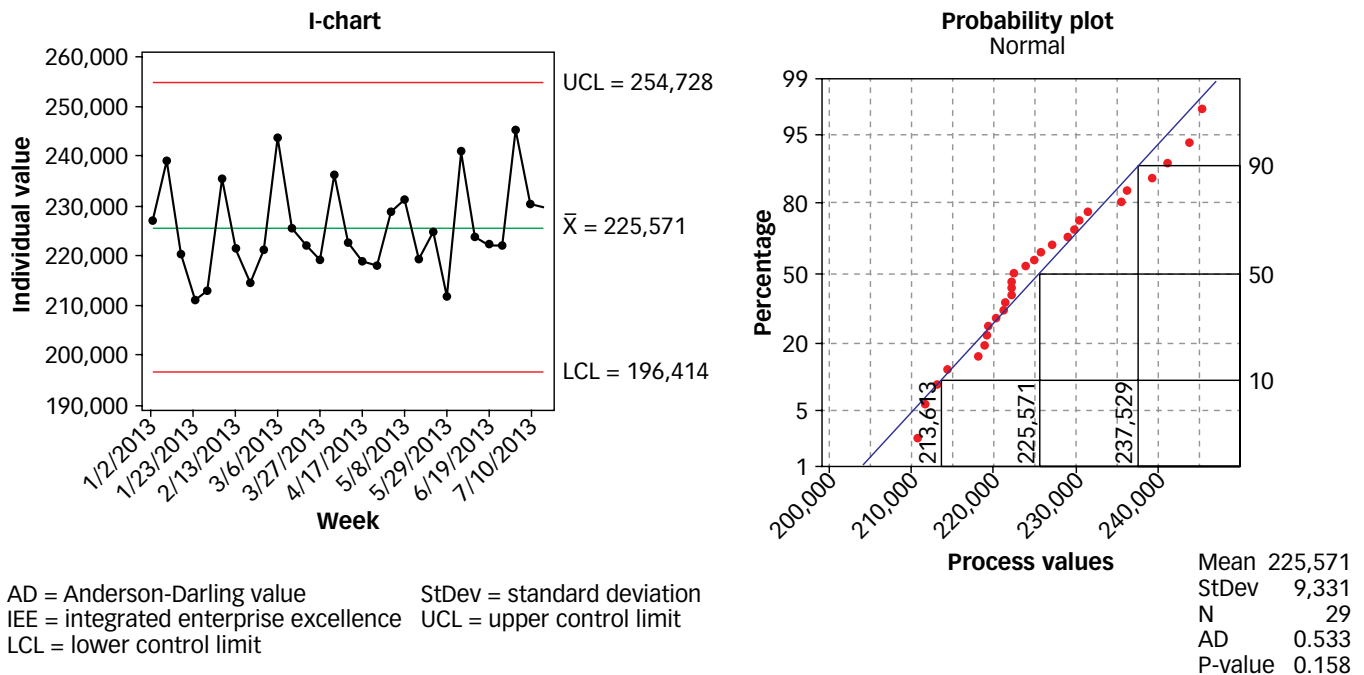
- There is no mention of profitability, which you would think would be an important business metric.
- Sales and other costs are not addressed in this executive performance report, which would affect organizational profitability.

### Reporting alternative

To improve this quarterly task for managers, a 30,000-foot-level reporting<sup>1-3</sup> method can be used to provide a higher-level view than a simple tabular report-out. This

## Predictive 30,000-foot-level report: all products / FIGURE 1

IEE scorecard for total sales of all products



AD = Anderson-Darling value      StDev = standard deviation  
 IEE = integrated enterprise excellence      UCL = upper control limit  
 LCL = lower control limit

The process is predictable.  
 The estimated median is 225,571 with 80% of the events between 213,613 and 237,529.

## 3.4 PER MILLION

outlook also provides a predictive measurement alternative: If you don't like what is expected to occur in the future, something must be done to improve the process or its inputs.

These future-telling charts can be manually created or automatically generated using enterprise performance reporting system software.<sup>4</sup>

With 30,000-foot-level reporting:

- Process common-cause variability is separated from special-cause variability. A process needs to improve if it exhibits common-cause variability and the response is undesirable.
- Stability for a process is determined from a high level or 30,000-foot-level point of view. The time-series 30,000-foot-level report-out is staged when there is a performance shift.

- For processes that exhibit a recent region of stability, the process can be called predictable. Data from this recent region can be considered a futuristic random sample and used to formulate a predictive statement.

### Total sales of all products

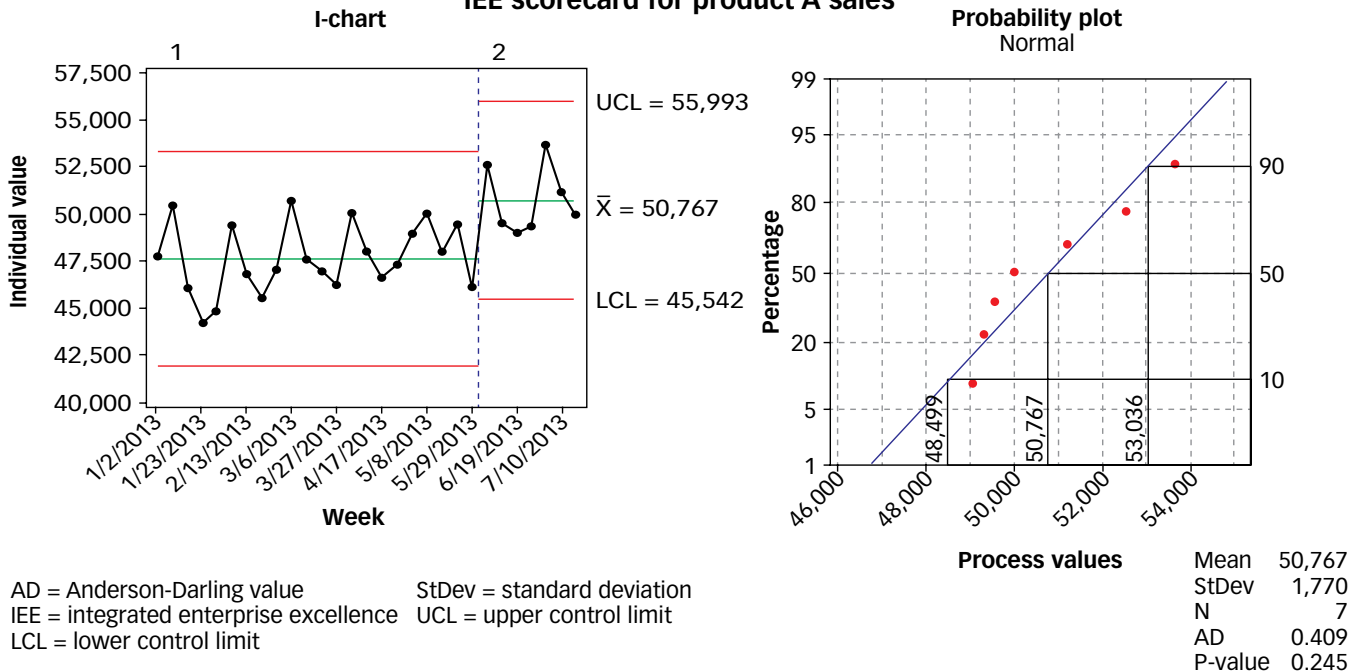
For Online Table 1, the following illustrates the application of 30,000-foot-level

## Executive report-out: product A metrics / TABLE 1

Product A								
Week ending	New sales	Percentage change vs. previous week	Total sales	Percentage change vs. previous week	Market share new	Share change vs. previous week	Market share total	Share change vs. previous week
1/2/2013	13,766	26.8%	47,831	23.3%	16.3%	0.4%	16.3%	-0.1%
1/9/2013	16,543	20.2%	50,525	5.6%	15.8%	-0.6%	16%	-0.2%
1/16/2013	14,944	-9.7%	46,176	-8.6%	15.4%	-0.3%	16%	0%
1/23/2013	14,180	-5.1%	44,156	-4.4%	15.4%	0%	16.1%	0%

## Predictive 30,000-foot-level report: product A / FIGURE 2

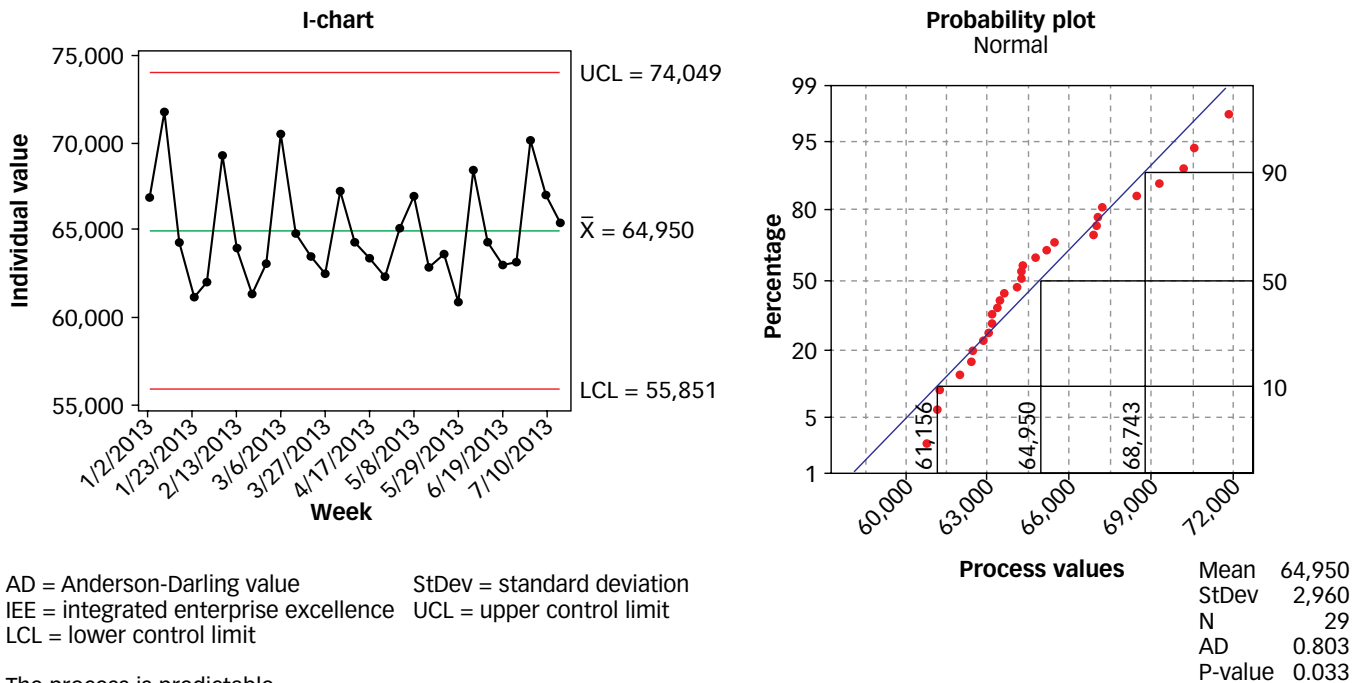
IEE scorecard for product A sales



The process is predictable since the last process change.  
The estimated median is 50,767 with 80% of the events between 48,498 and 53,035.

# Predictive 30,000-foot-level report: product B / FIGURE 3

IEE scorecard for product B sales



AD = Anderson-Darling value      StDev = standard deviation  
 IEE = integrated enterprise excellence      UCL = upper control limit  
 LCL = lower control limit

The process is predictable.  
 The estimated median is 64,949 with 80% of the events between 61,156 and 68,743.

reporting for total sales of all products and the four product types.

Figure 1 (p. 59) shows a 30,000-foot-level management report-out for total sales of all products. This 30,000-foot-level report-out of total sales for all products provides:

**1. Process stability test**—The individuals chart on the left of Figure 1 assesses stability. The upper control limit (UCL) and lower control limit (LCL) are statistically determined from the inherent variability between adjacent charted time periods. If there aren't data points beyond these lines and there aren't trends, you can conclude that the process is stable. From this data set, you can conclude that the corporate week-to-week response for all products' total sales is stable.

**2. Prediction determination**—A probability plot provides an excellent way to determine a prediction statement when data are continuous and the process is stable.

Initially, this plot could look intimidating, but its interpretation is not difficult.

The horizontal axis of this probability plot is simply the process-output response (vertical axis of the individuals plot). The vertical axis of the probability plot is a percent less than a selected x-axis value.

Because there is no specification for this metric, a median and 80% frequency of occurrence can be reported. The x-axis values corresponding to probability plot percentages of 90% and 10% on the vertical axis of the probability plot provide the 80% frequency of occurrence.

**3. Summary of how the process is performing**—At the bottom of the pair of charts in Figure 1, the median and 80% frequency of occurrence responses are reported for this stable, predictable process.

This 30,000-foot-level report-out indicates that from an overall point of view, the process's response has not changed over time.

## A closer look

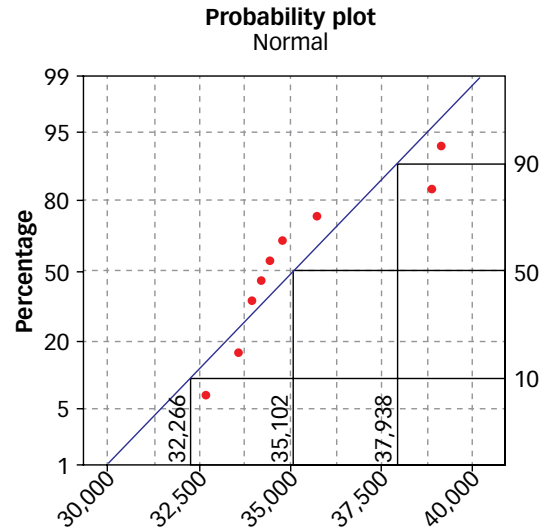
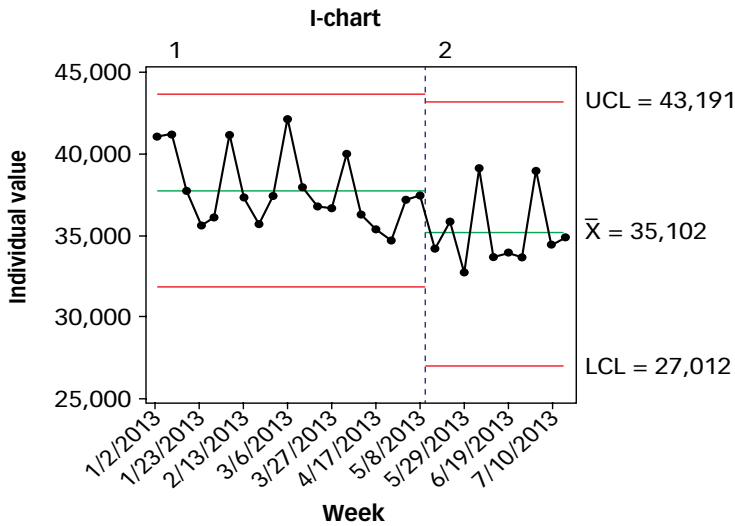
The following explains 30,000-foot-level performance report-outs for the four individual products:

**Product A** (Figure 2)—This 30,000-foot-level report-out provides additional insight into the process. From this reporting, you can conclude that the process output response changed at about May 29, 2013, to an increased level of performance.

**Product B** (Figure 3)—From this executive dashboard template format, you can see that there are no trends relative to the UCL and LCL, which were calculated from the variability of the process. Because of this, you can conclude that the process is stable and make a prediction statement from the use of all the data from the period of time shown. Note that with 30,000-foot-level reporting, you are not bound by the calendar year when making prediction statements.

## Predictive 30,000-foot-level report: product C / FIGURE 4

IEE scorecard for product C sales

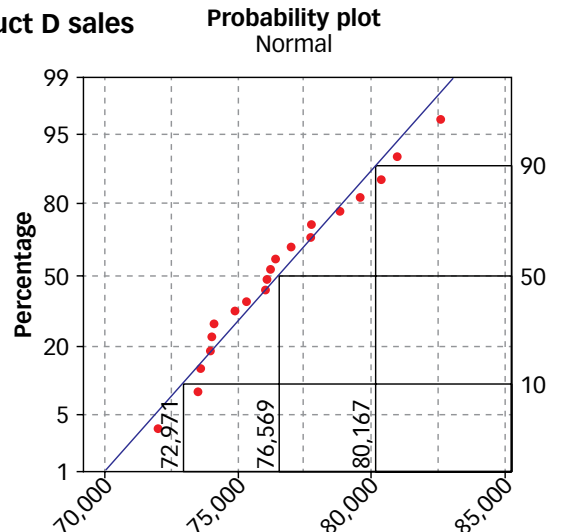
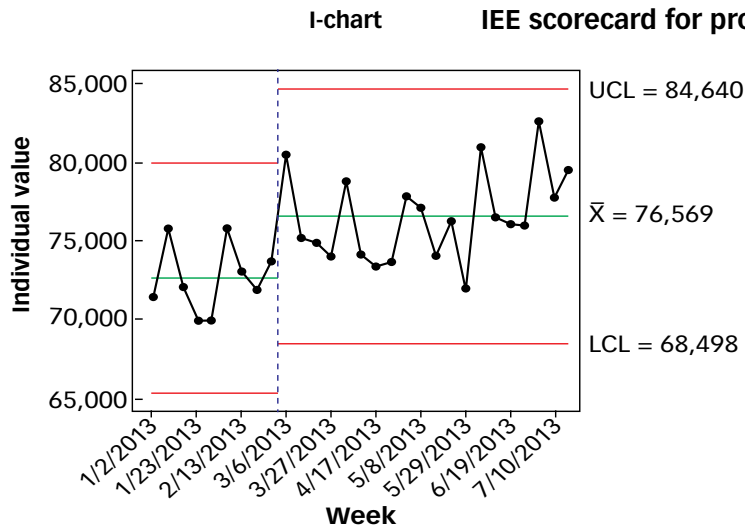


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 LCL = lower control limit

The process is predictable since the last process change.  
 The estimated median is 35,101 with 80% of the events between 32,265 and 37,938.

## Predictive 30,000-foot-level report: product D / FIGURE 5

IEE scorecard for product D sales



AD = Anderson-Darling value      StDev = standard deviation  
 IEE = integrated enterprise excellence      UCL = upper control limit  
 LCL = lower control limit

The process is predictable.  
 The estimated median is 76,569 with 80% of the events between 72,971 and 80,167.

**Product C (Figure 4)**—From this 30,000-foot-level management report, you would conclude the amount of sales for product C declined because there was a trend relative to the initial UCL and LCL. The data from the recent region of stability are now used to provide a predictive business dashboard statement; however, for this data probability plot, you might notice that the data are not following a straight line as well as one would like. An investigation into causation for this apparent lack of fit could provide valuable insight into what could be done differently to improve the current process' degraded performance.

**Product D (Figure 5)**—From this form of key performance indicator dashboards reporting, you could conclude that sales for product D increased from a process point of view at about March 6, 2013. Similar to the conclusions from the other 30,000-foot-level report-outs, it would have been difficult, if not impossible, to make this observation from the initial presentation of a table of numbers.

**Business intelligence scorecard**

From the 30,000-foot-level dashboard reporting, you can conclude that overall total sales did not change during the observed time period; however, two products saw an increase in total sales, while one product's sales declined.

It is highly unlikely that you would conclude this from the collection of numbers in Online Table 1.

The use of 30,000-foot-level performance reporting can provide a business intelligence scorecard that proves to be valuable in helping managers at all levels improve the decisions that they make, especially when this form of reporting is aligned with an organization's integrated enterprise excellence value chain.<sup>5</sup> QP

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*ment and Black Belt Guide for Going Beyond Lean Six Sigma and the Balanced Scorecard*, Citius Publishing, 2008, [www.smartersolutions.com/books/dmaic-step-by-step-execution-details](http://www.smartersolutions.com/books/dmaic-step-by-step-execution-details).

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