

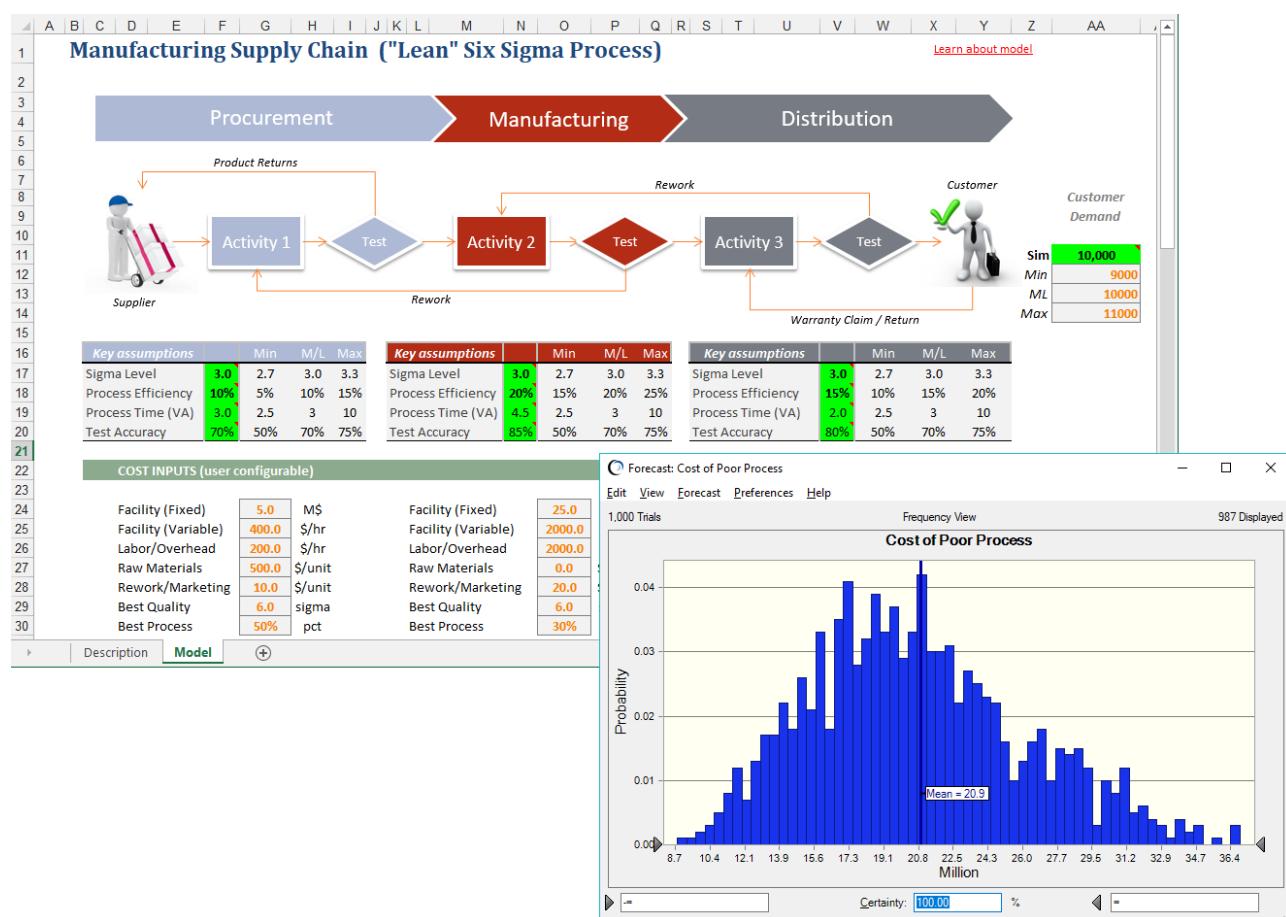
## One-Minute Spotlight

### THE CRYSTAL BALL CHARTS: SENSITIVITY

As you become more proficient at building spreadsheet models, you will want to know how much a given assumption affects your result. In other words, you want to determine the sensitivity of the forecast to each assumption. The sensitivity chart gives you with ability to quickly and easily judge the influence each assumption cell has on a particular forecast cell.

A Process Quality analysis model is shown below. After 1000 trials, Crystal Ball reports a mean cost of having a poor process as \$20.9 million. You'd like to know which of the thirteen assumptions has the greatest effect on this forecast. Do they all have an equal impact, or do specific assumptions drive the variation of the forecast results?

The sensitivity chart can help you to answer these critical questions.



### HOW DOES SENSITIVITY ANALYSIS WORK?

Crystal Ball calculates sensitivity by computing rank correlation coefficients between every assumption and every forecast while the simulation is running. Correlation coefficients provide a meaningful measure of the degree to which assumptions and forecasts change together.

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## The Sensitivity Chart, continued

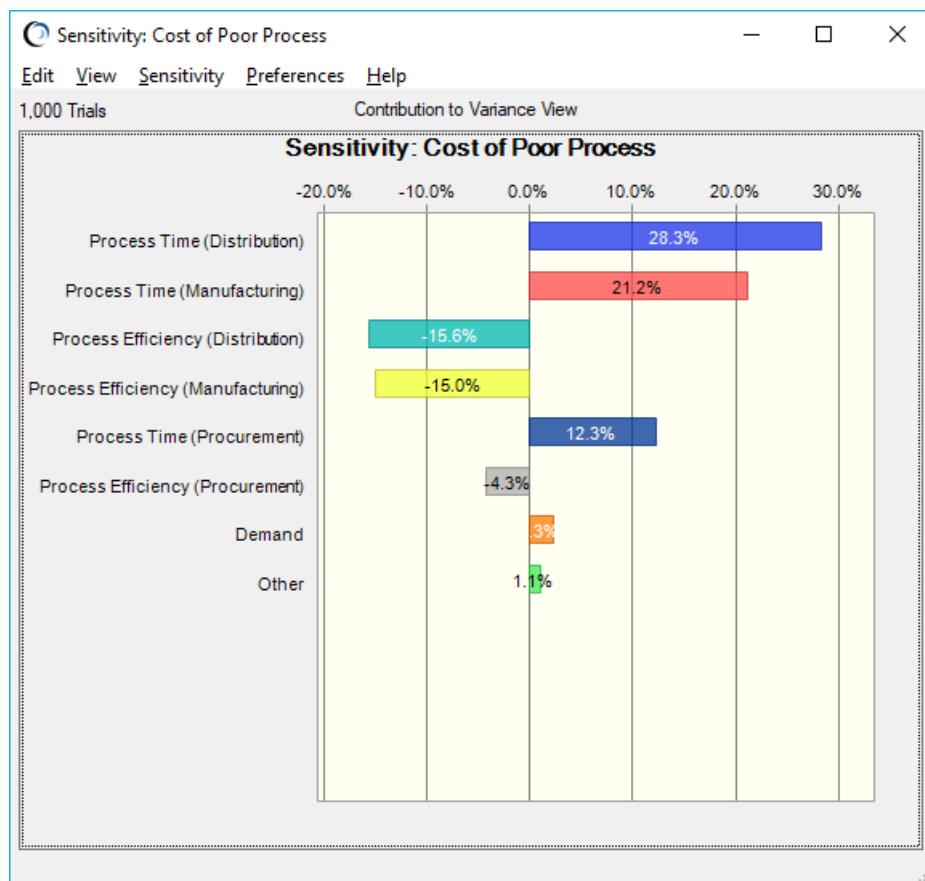
The sensitivity chart ranks the assumptions from the most important down to the least important in the model. If an assumption and a forecast have a high correlation coefficient, it means that the assumption has a significant impact on the forecast (through both its uncertainty and its model sensitivity). Positive coefficients indicate that an increase in the assumption is associated with an increase in the forecast. Negative coefficients imply the opposite situation. The larger the absolute value of the correlation coefficient, the greater the sensitivity.

## CREATING THE SENSITIVITY CHART

When you run a simulation, you need to make sure that the "Store assumption values for analysis" setting in Run Preferences is on (this is the default setting). After the simulation has been stopped, you can create a sensitivity chart by selecting the Open Sensitivity Chart option from the Forecast menu on the forecast chart.

## TWO WAYS TO VIEW SENSITIVITY

When you first open the sensitivity chart, the assumptions are listed on the left side, starting with the assumption with the highest sensitivity. In this case, Process Time (Distribution) has a sensitivity of 28.3%. The sensitivity information depicted in the Contribution to Variance view can be interpreted as the percent of forecast variance due to each assumption.

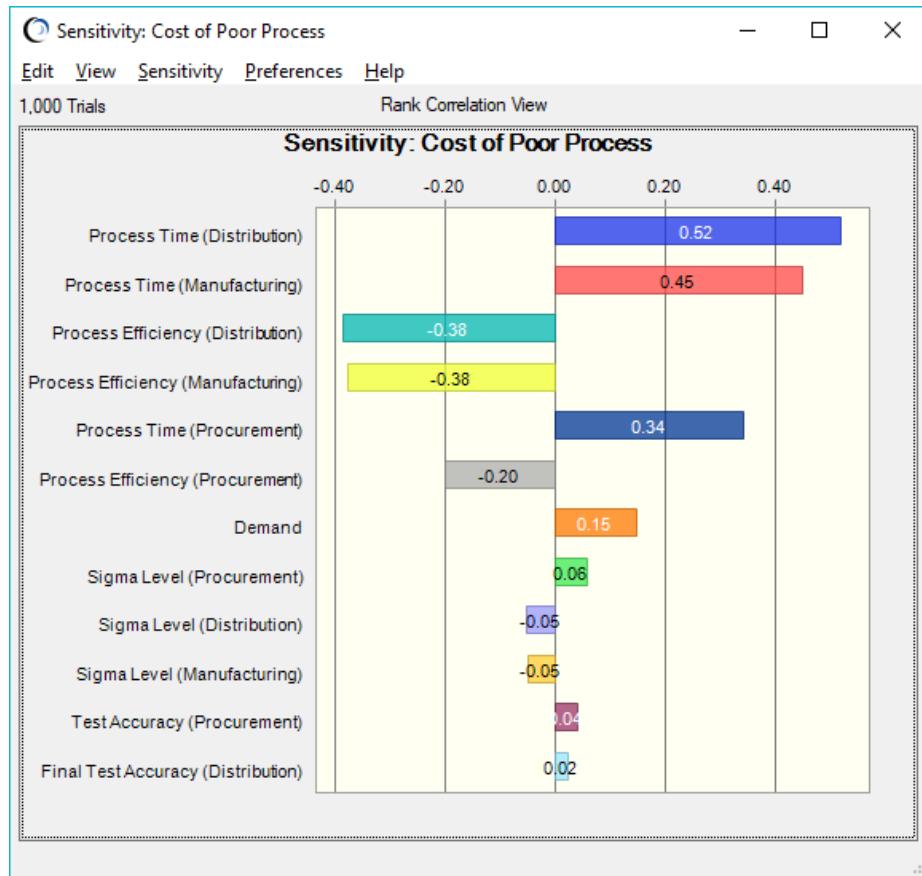


## The Sensitivity Chart, continued

The target forecast that you are analyzing is listed above the chart. You can change the target forecast in the Sensitivity menu.

In the View menu (or by right-clicking the chart), you can also switch the view from Contribution to Variance to Rank Correlation, shown below. In this view, Crystal Ball displays the sensitivity information as the raw correlation coefficient for each assumption in relation to the target forecast.

Some people prefer the Contribution to Variance view because they find that percentage values are easier to interpret and explain than correlation coefficients.



## INTERPRETING THE SENSITIVITY CHART RESULTS

While sensitivity analysis is an important method for determining the key factors that drive the uncertainty in a forecast, you must combine the results with your knowledge of the structure of the model.

In this example, the Process Time (Distribution) assumption has the greatest impact on the uncertainty of the overall cost, followed closely by the Process Time (Manufacturing) assumption. This might mean that the company's top priority should be improving the time management components of their supply chain process. The remaining eleven assumptions have a lesser degree of impact on cost uncertainty.

## The Sensitivity Chart, continued

Is this the result you expected? One of the benefits of sensitivity analysis is that it can help you to reassess the validity of your model. If you did not expect to see the results shown above, then you have the opportunity to recheck the logic of your model and the parameters of your assumptions. For example, a single, dominant assumption can sometimes indicate a mathematical or typographical error that has artificially inflated the impact of an assumption.

## THE PROS AND CONS OF SENSITIVITY ANALYSIS

The sensitivity chart feature has several limitations you should be aware of when correlated assumptions or non-monotonic (nonlinear) relationships are present in your model. These limitations are detailed in the sensitivity results chapter of the *Crystal Ball User Manual*.

In summary, the sensitivity chart feature provides three key benefits:

- You can find out which assumptions are influencing your forecasts the most, reducing the amount of time needed to refine estimates.
- You can find out which assumptions are influencing your forecasts the least so you can ignore or discard them altogether.
- As a result, you can construct more realistic spreadsheet models and greatly increase the accuracy of your results because you will know how all of your assumptions affect your model.

For more information or to contact us, browse to

<http://www.oracle.com/technetwork/middleware/crystalball/overview/index.html>.