# Measurement uncertainty is not a measure of error

Many laboratory analysts have a misconception that measurement uncertainty is a measure of error. This is not true.

If we take a look at the definition of error, we see that error is a measure of difference between your test result and the true value of the targeted analyte in a sample. However, we can never know the true value of the targeted analyte in a given sample unless it has an assigned value or a certified value by a third party. Or, a true value is actually a spiked value because a certain known amount of 'pure' analyte has been added to the sample prior to analysis. But such given value still has a certain amount of uncertainty by itself.

Measurement uncertainty on the other hand is defined by ISO VIM (International Vocabulary of Basic and General Terms in Metrology) as: "a *parameter, associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurand (or analyte)*".

It does mean that measurement uncertainty is a statistical parameter, associated with a result of measurement in a calibration or test that defines a range (or a *dispersion*) of the values that could reasonably be attributed to the measured quantity. When uncertainty is evaluated and reported in a specified manner, it indicates the level of confidence (usually 95% confidence) that the true value actually lies within the range defined by the uncertainty interval. Hence, the objective of uncertainty evaluation is to determine an interval that can be expected to encompass a large fraction of the distribution of values that could *reasonably* be attributed to the analyte. At 95% confidence level, it means if you were to repeat the test by 20 times, there is a likelihood that only one result could be found outside this range of interval.

The relationship between measurement uncertainty and error is best described by the following diagram: