* Scope
  + Calculations for setting the trend indicators
    - Actual value
  + Calculations for the actual forecast variance indicator
    - Delta of actual and forecast
* Not all metrics should have a trend indicator
  + We need to add a flag/type to indicate whether or not a metric should have a control chart calculated, e.g.
    - No trend
    - Control chart
    - Simple Delta Evaluation
    - Other statistical calculation
  + The mechanism for calculating the trend should be implemented such that the calculation can be changed by configuration..
  + Control chart trend calculations should be applied only to the metrics that are the outcomes of a process, e.g.
    - "AB Rate" but not "Max Agents on Payroll"
* Control Chart Parameter Creation & Update rules
  + Creation Rules
    - These rules define when the control chart parameters should be created.
    - If you have no previous calculation of the control chart parameters (e.g., new metric, first calculation)
      * If < 8 contiguous reporting periods, do not create control chart parameters, use the existing formula for trend variance
        + Horizontal = There was no continuous increase/decrease within last 5 weeks
        + 45 degrees up = Continuously increased for the last 3-4 weeks
        + 45 degrees down = Continuously decreased for the last 3-4 weeks
        + 90 degrees up = Continuously increased for over 4 weeks
        + 90 degrees down = Continuously decreased for over 4 weeks
      * If >= 8 contiguous reporting periods, use the most current data between 8 and 20 periods
        + e.g.,

50 weeks of data, use the last 20

If 12 weeks, use 12

* + - * + Decision variables must be configurable

Minimum & maximum observations for control chart (per above, 8 & 20)

Number acceptable gaps in time periods = 0

[what other variables need to be captured?]

* + - The following control chart parameters must be persisted and an audit history maintained
      * Mu ()
      * Sigma ()
      * UCL of Sigma
      * LCL of Sigma (cannot be < 0)
      * UCL - Upper control limit
      * CL - Center line
      * LCL - Lower control limit
      * Cp
      * Cpk
        + Cp and Cpk are calculated if USL and LSL have been provided
      * USL - variable defined for a metric/project
      * LSL - variable defined for a metric/project
      * UWL - Upper warning limit
        + Mu + Sigma \* 2
      * LWL - Lower warning limit
        + Mu - Sigma \* 2
      * # of observations used to calculate
  + Update Rules
    - These rules define when the control chart parameters should be updated.
    - If there is a previously calculated set of control chart parameters for the metric and project
      * An analyst requests that the control chart parameters be recalculated
      * If the previously calculated control limits was calculated on < max observations && …
        + Use Case

Initially calculated based on 8 observations

Recalculate at 1/3 between min and max, 12

Recalculate at 2/3 between min and max, 16

Again at max, 20

* + - * + Clay to propose a business rule (add configuration to allow multiple recalculation points)
    - If a historical gap is filled, or a value is updated that was used to calculate the control chart parameters, then the parameters should be updated and any trends should be recalculated as well. (low priority)
  + Configurable Variables
    - Minimum # of observations for creation of control chart parameters
      * Initial value = 8
    - Maximum # of observations to include in the calculation of control chart parameters
      * Initial value = 20
    - Number of allowable gaps in the time periods reported
      * Initial value = 0
    - Number of Standard Errors
      * Initial value = 3
    - Upper Specification Limit
      * Defined per metric and project
    - Lower Specification Limit
      * Defined per metric and project
* Trend Indicator Business Rules
  + 90 degrees up
    - If observation is above the UCL
    - Or if 8 of the last 8 are above the CL
    - Or if the moving range of the current observation is greater than the UCL of Sigma
  + 90 degrees down
    - If observation is below the LCL
    - Or if 8 of the last 8 are below the CL
    - Or if the moving range of the current observation is less than the LCL of Sigma
  + 45 degrees up
    - If 2 out of the last 3 time periods (including the current) are between the UWL and UCL
    - Or if 6 of the last 8 (including the current) are above the center line (Mu)
  + 45 degrees down
    - If 2 out of the last 3 time periods (including the current) are between the LWL and LCL
    - Or if 6 of the last 8 (including the current) are below the center line (Mu)
  + Horizontal
    - If none of the preceding are true.