10 Ways to Improve your SPC System

September 14, 2021

Meet the Presenters

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PQ Systems

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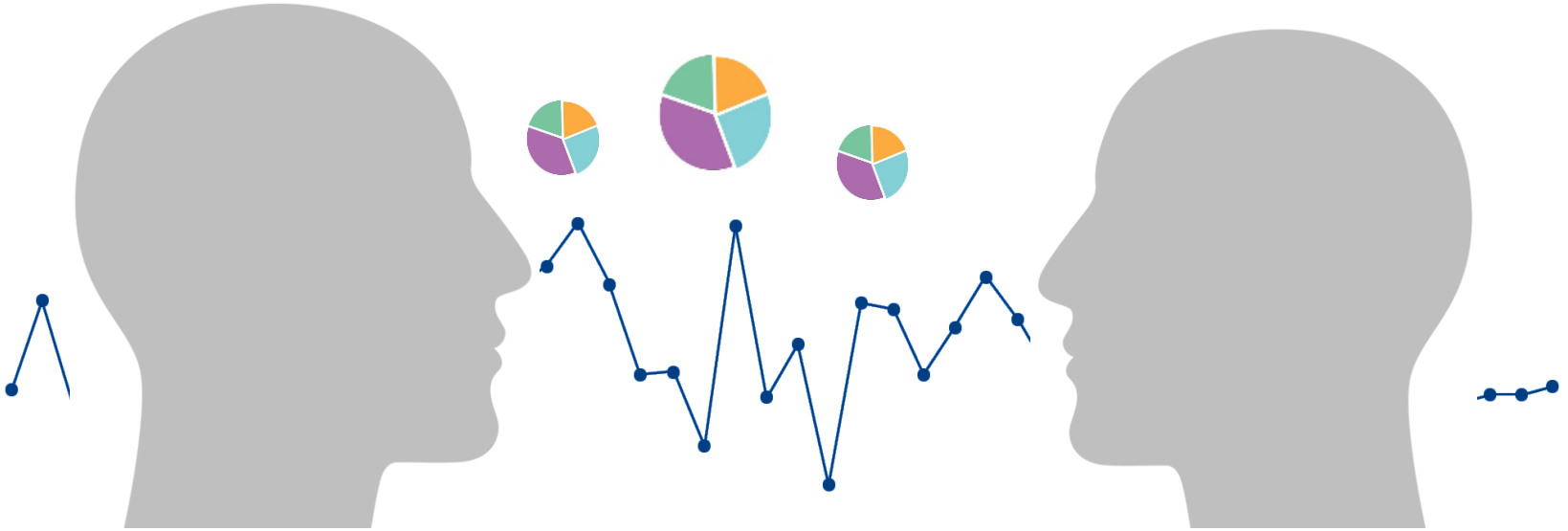
SPC – By Definition

Statistical Process Control (SPC) is the practice of using statistical techniques such as control charts and capability analysis to monitor and control a process.

Why Implement SPC?

Common language to Communicate about Quality



Why Implement SPC?

Increase
Customer Satisfaction

Increase confidence
in quality results

Reduce scrap,
rework, and waste

Decreased human effort
and probability of recalls

Find the Proper Balance

- While SPC can be extremely beneficial to any organization focused on quality improvements, there are many ways to start and later improve when first establishing a program.

- In our time together, we'll cover 10 of them!

STATEMENT #1

To recognize the most immediate impact, phase in your changes in a way that's least disruptive to production. Pilot new ideas to confirm results are desirable.

Avoid overload when implementing SPC

Phase it in

How to Prepare for a Marathon:

1. Get the right gear
2. Educate yourself
3. Create a plan
4. Gradually increase your training distance
5. Go run a marathon!

How NOT to Prepare for a Marathon:

1. Go run a marathon!

SPC is a Marathon

Preparing for a Marathon:

1. Get the right gear
2. Educate yourself
3. Create a plan
4. Gradually increase your training distance
5. Go run a marathon!

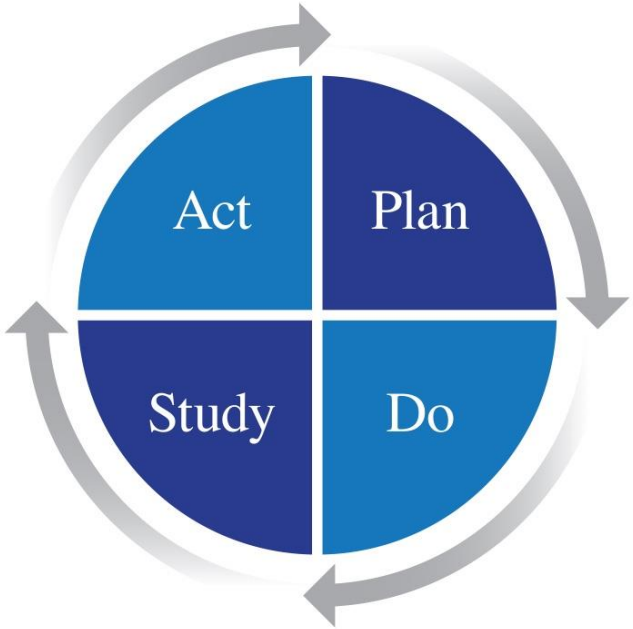
Preparing for SPC:

1. Obtain the right tools
2. Educate yourself
3. Create a plan
4. Educate a small team on your plan
5. Go run *a* *mile*!

SPC is a Marathon

Study the first Mile:

1. Learn from your Pilot
2. Make changes if necessary
3. Test your changes
4. When satisfied, expand!



STATEMENT #2

It’s important for your quality technicians (data collectors) to have some formal training on SPC.

What we've heard …

You want me to do what?

I just make sure we're still in tolerance.

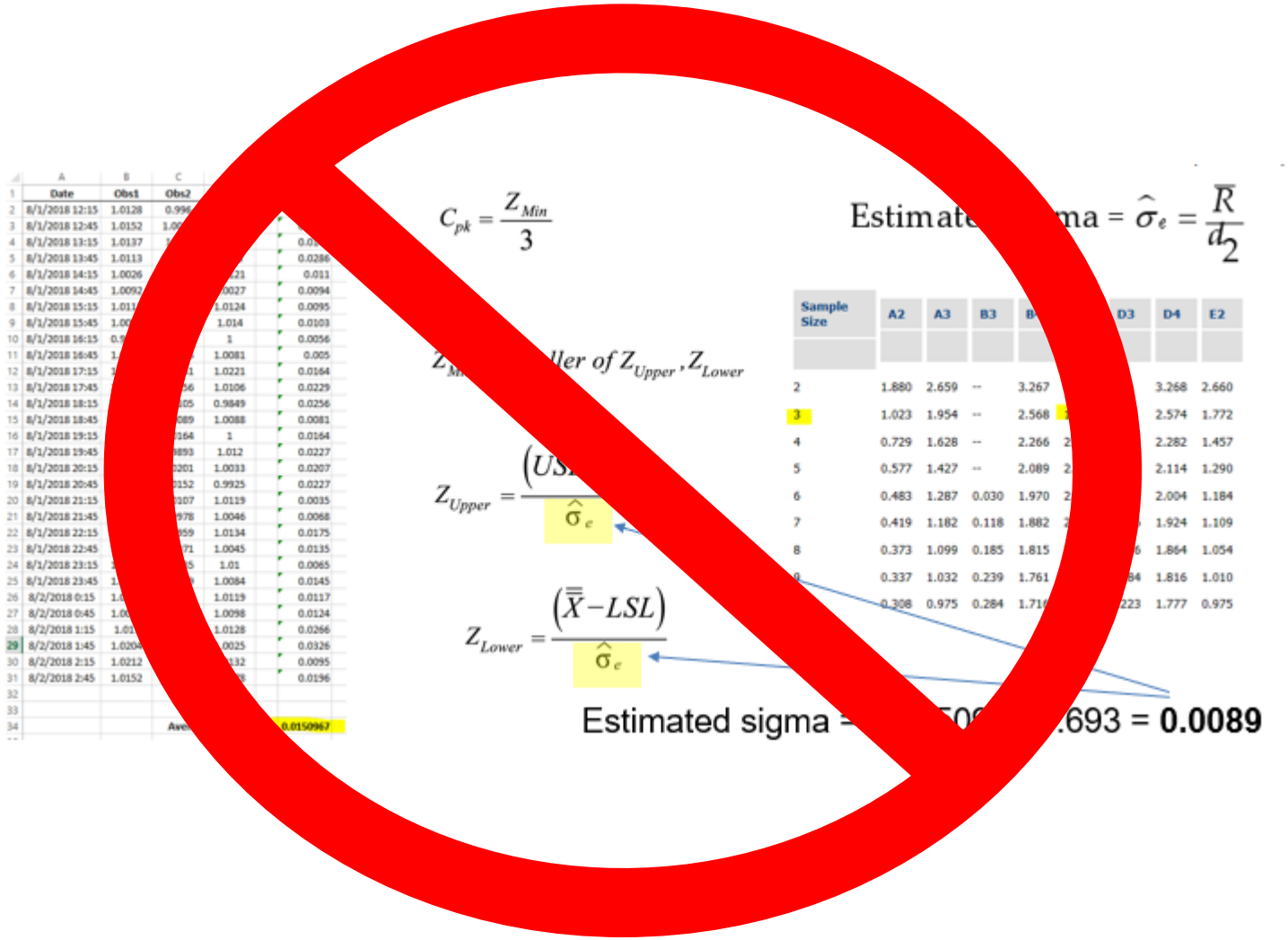
That's someone else's job, not mine!

I was never really trained.

I don't have time for that!

I've seen the charts but don't know what they mean.

Educate the Whole Team



Advice for Educating the Team

- Keep it Simple
- Sell the benefits
- No formulas or math
- Keep it Conceptual
- Employ software that makes their lives easier
- Share (and celebrate) your successes
- Practice, Practice, Practice!

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STATEMENT #3

Identify characteristics that are best suited for monitoring. Focus your energy on those which are key indicators for success in your processes.

What's Most Important?

CMM

CMM Data

PC-DMIS

PART NAME : TRotMes | November 23, 2007 | 13:49

REV NUMBER : | SER NUMBER : | STATS COUNT : 1

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CNC/UPDATEWORKOFFSET,STARTUP,A1,$PRESET,50.wrk,xxxx,YYYY,NO,NO,YES,ROTARY,0

MM | LOC1 - CIR1

AX	NOMINAL	+TOL	-TOL	MEAS	DEV	OUTTOL
X	0.000	0.010	0.010	0.003	0.003	0.000
Y	0.000	0.010	0.010	-0.013	-0.013	0.003
D	50.001	0.010	0.010	50.003	0.002	0.000

MM | LOC2 - CIR2

AX	NOMINAL	+TOL	-TOL	MEAS	DEV	OUTTOL
X	0.000	0.010	0.010	0.000	0.000	0.000
Y	0.000	0.010	0.010	0.000	0.000	0.000
D	50.001	0.010	0.010	50.002	0.001	0.000

MM | LOC3 - PLN1

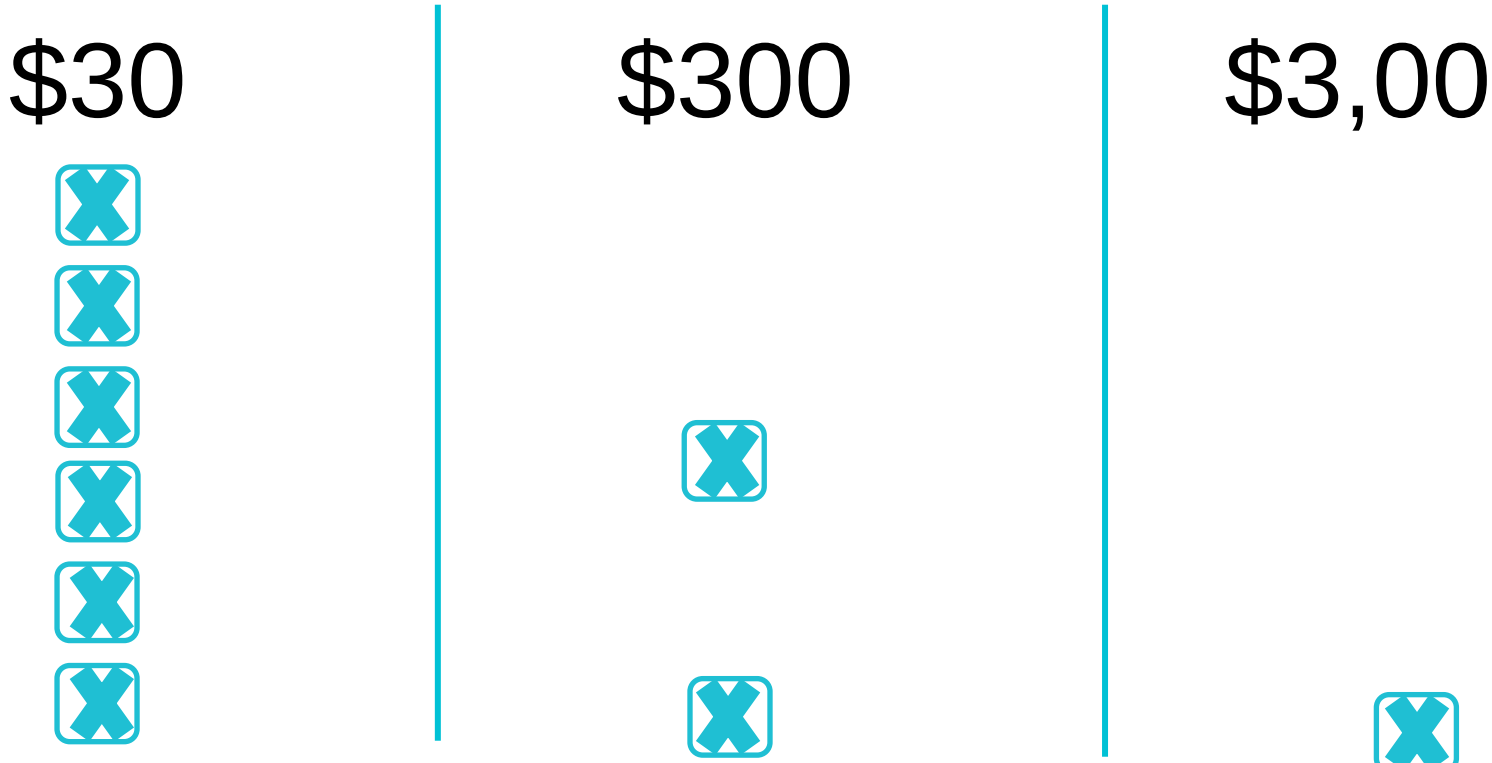
AX	NOMINAL	+TOL	-TOL	MEAS	DEV	OUTTOL
Z	0.000	0.010	0.010	-0.590	-0.590	0.580

What's most Important?

For each possible Metric, ask yourself:

- Does this metric cause me to lose sleep?
- How quickly would I respond if a signal were detected?
- Would I respond if a signal was detected?
- Is there be a financial impact of missing a signal?
- Could this signal impact customer satisfaction?

The Value of an Hour of Work



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STATEMENT #4

Understand the differences between Common and Special cause variation to avoid over-controlling your processes.

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Two common control chart mistakes

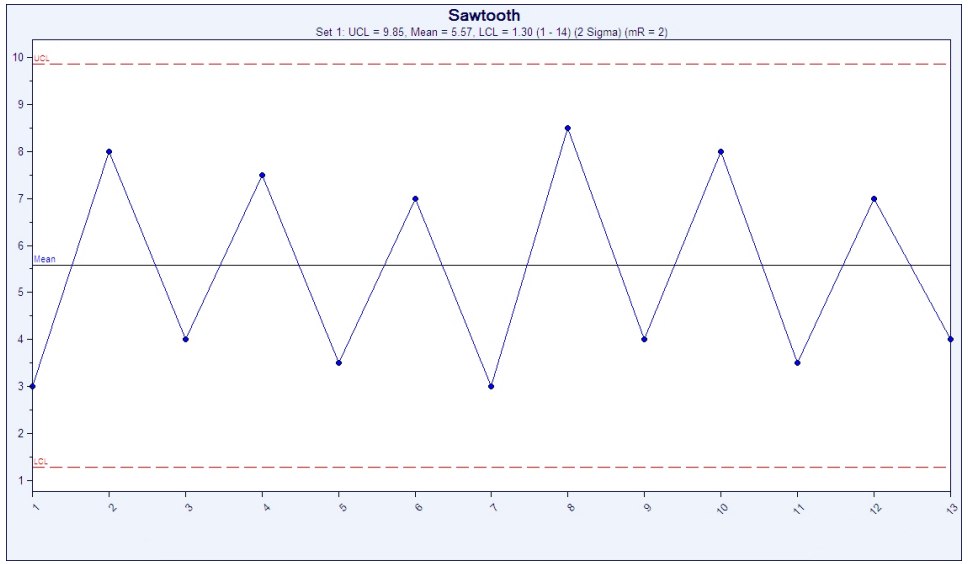
OVERCONTROLLING

Treating common-cause variation as special-cause
(Making changes when none were necessary)

UNDERCONTROLLING

Treating special-cause variation as common-cause
(Failing to make changes when they were necessary)

Sawtooth



Are you really improving your process?
Reducing time and effort?
Letting statistics do the monitoring?

STATEMENT #5

Sometimes, there's a reason to ignore Out-Of-Control signals on your Control Charts.

There's a Signal … Is it important?

- Swerve to avoid?
- Often the impediment will take care of itself

Are all Signals important?

- Hit the brakes!
- Continuing can lead to serious issues!

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STATEMENT #6

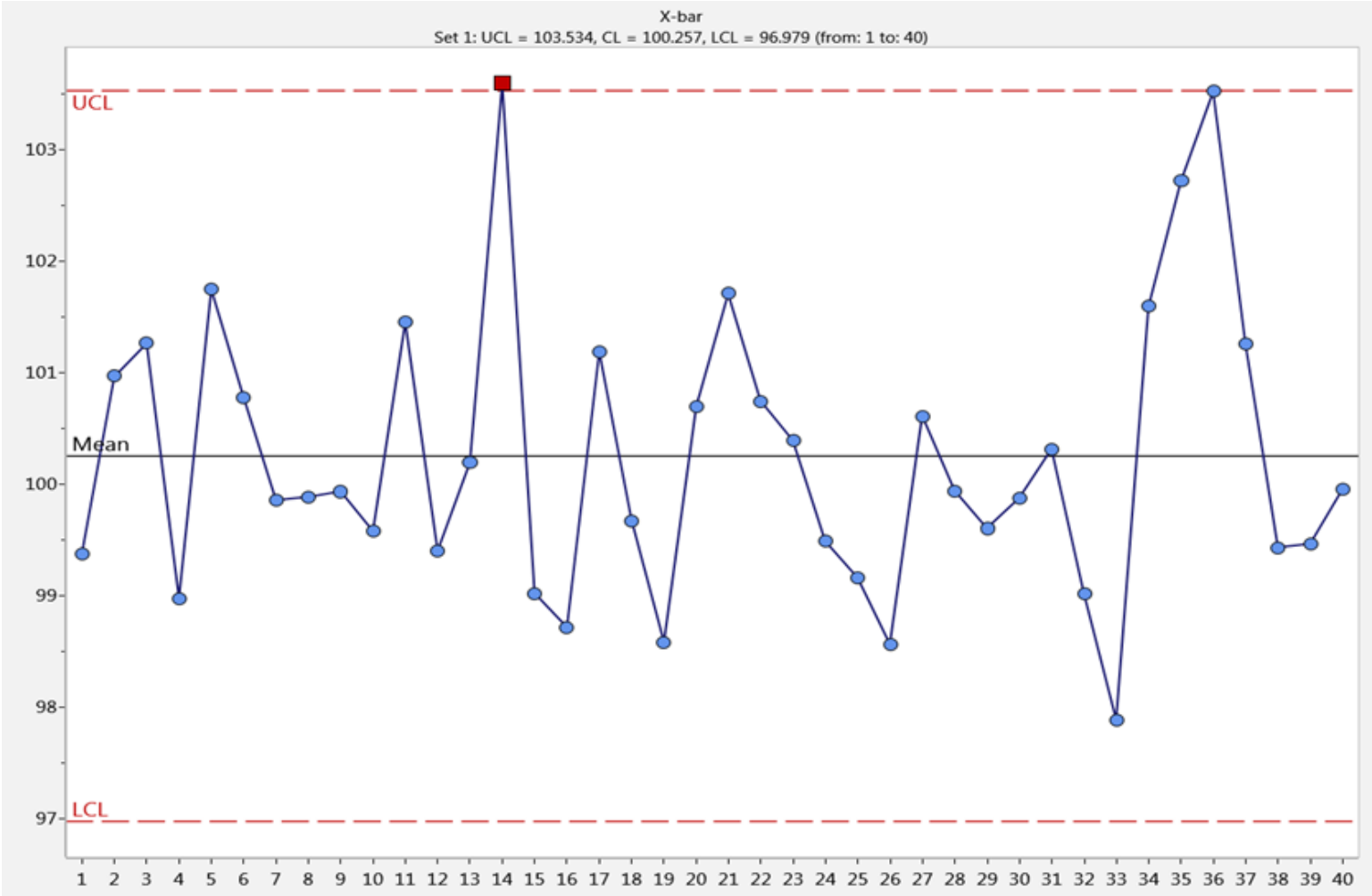
Compute control limits when you're happy with a particular process and compare the future against that state. Use tests which accurately signal special cause variation.

Misuse of Control Limits

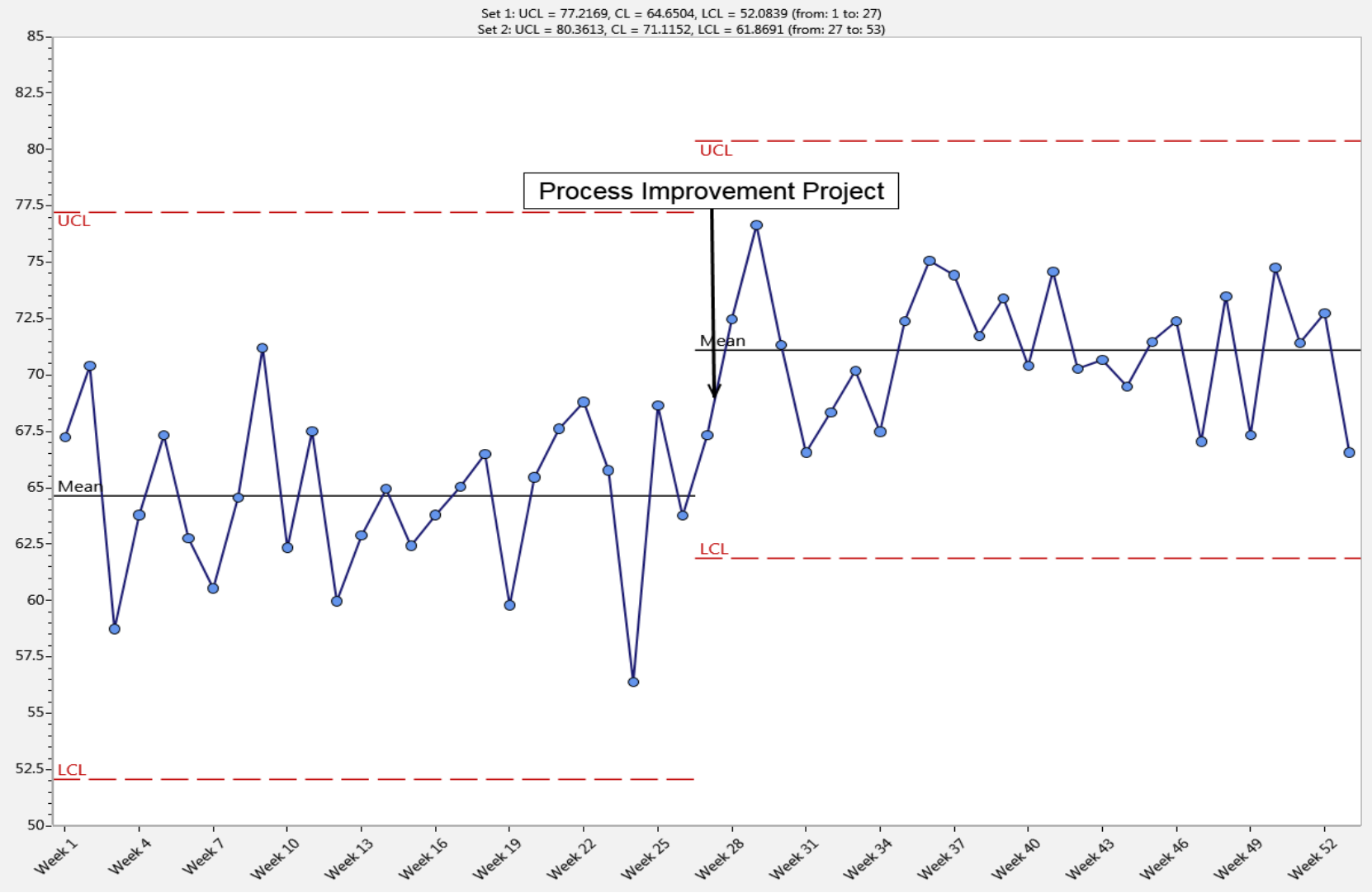
- Relying on Excel
  - Wrong standard deviation
    (STDEV.P or STDEV or STDEV.S)
- Never computing or re-computing limits
- Using too many or too few tests to provide signals

Standard Deviation vs. Estimated Sigma

Using Estimated Sigma



Recomputing Limits



Control Testing

Use tests that are:

1. Simple
2. Avoids false alarms
3. Signals that the average changed
4. Signals of a trend up / down
5. Signals for large / small variation
6. Detects unusual patterns

AIAG

- Beyond Limits
- 7 ascending
- 7 descending
- 7 above centerline
- 7 below centerline

JURAN

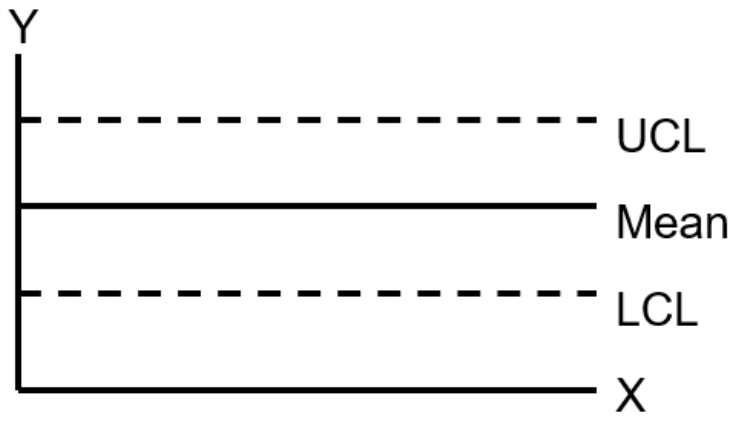
Beyond Limits
2 of 3 above 2 sigma
2 of 3 below 2 sigma
4 of 5 above 1 sigma
4 of 5 below 1 sigma

9 above centerline
9 below centerline
6 ascending
6 descending
8 beyond 1 sigma

STATEMENT #7

Understand the difference between Control limits and Specification limits. They are not the same thing!

Control Limits vs. Spec Limits



Control limits reflect actual process variation

Voice of the **Process**

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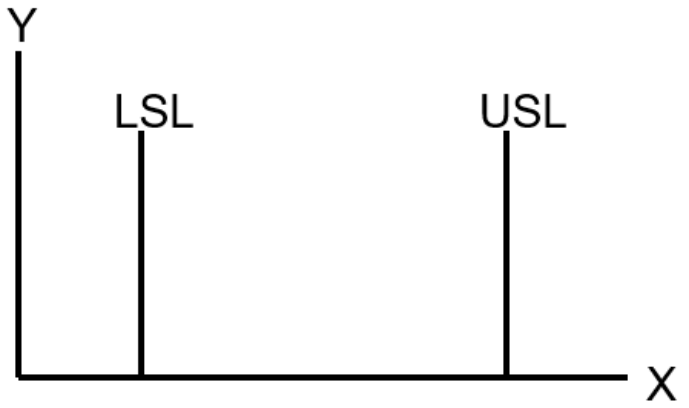


Specification limits reflect allowable process variation

Voice of the **Customer**

Control Limits vs. Spec Limits

We're measuring Tensile Strength

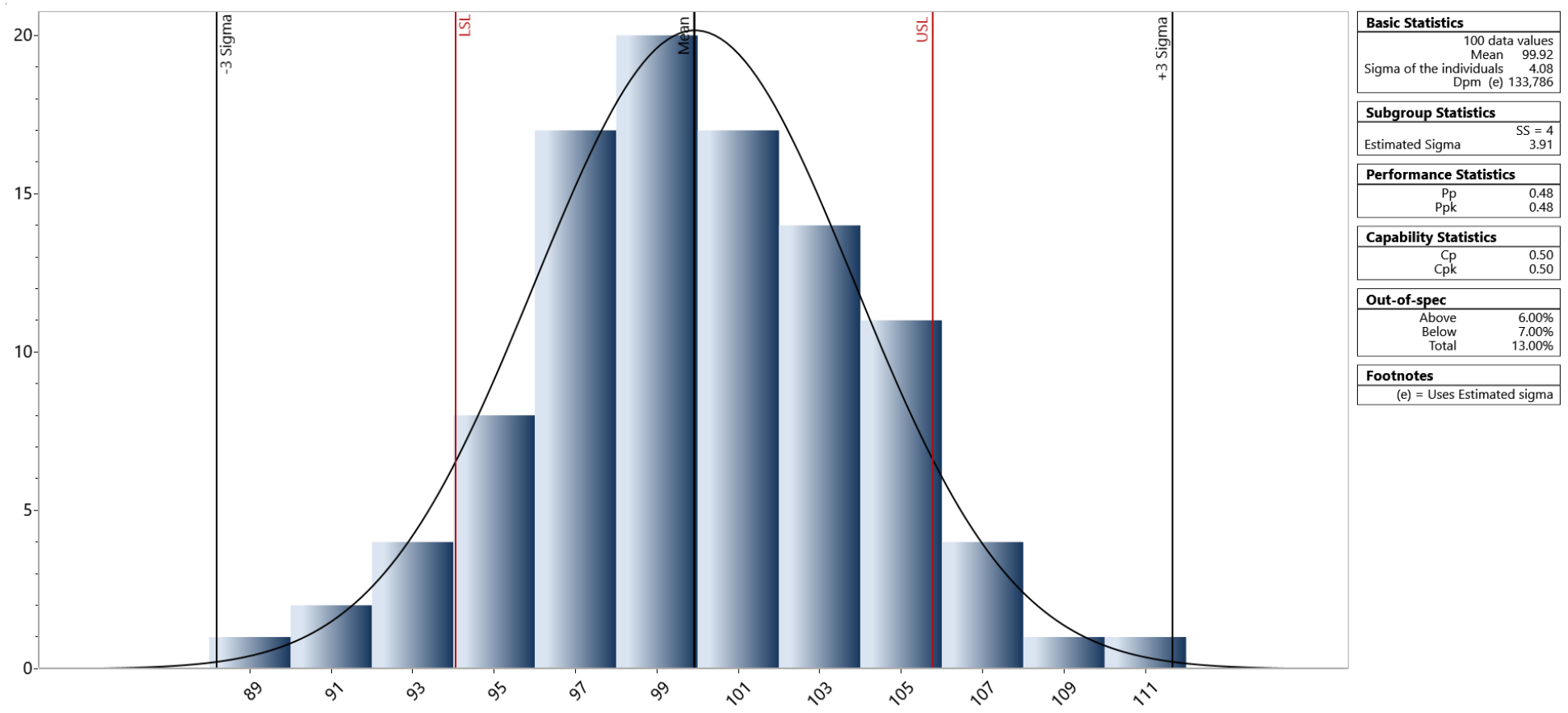
Under normal conditions, we expect the Tensile strength of that material to be between 95 and 115 PSI.

We need the Tensile strength of that material to be between 100 and 125 PSI.

CONTROL LIMITS

SPECIFICATION LIMITS

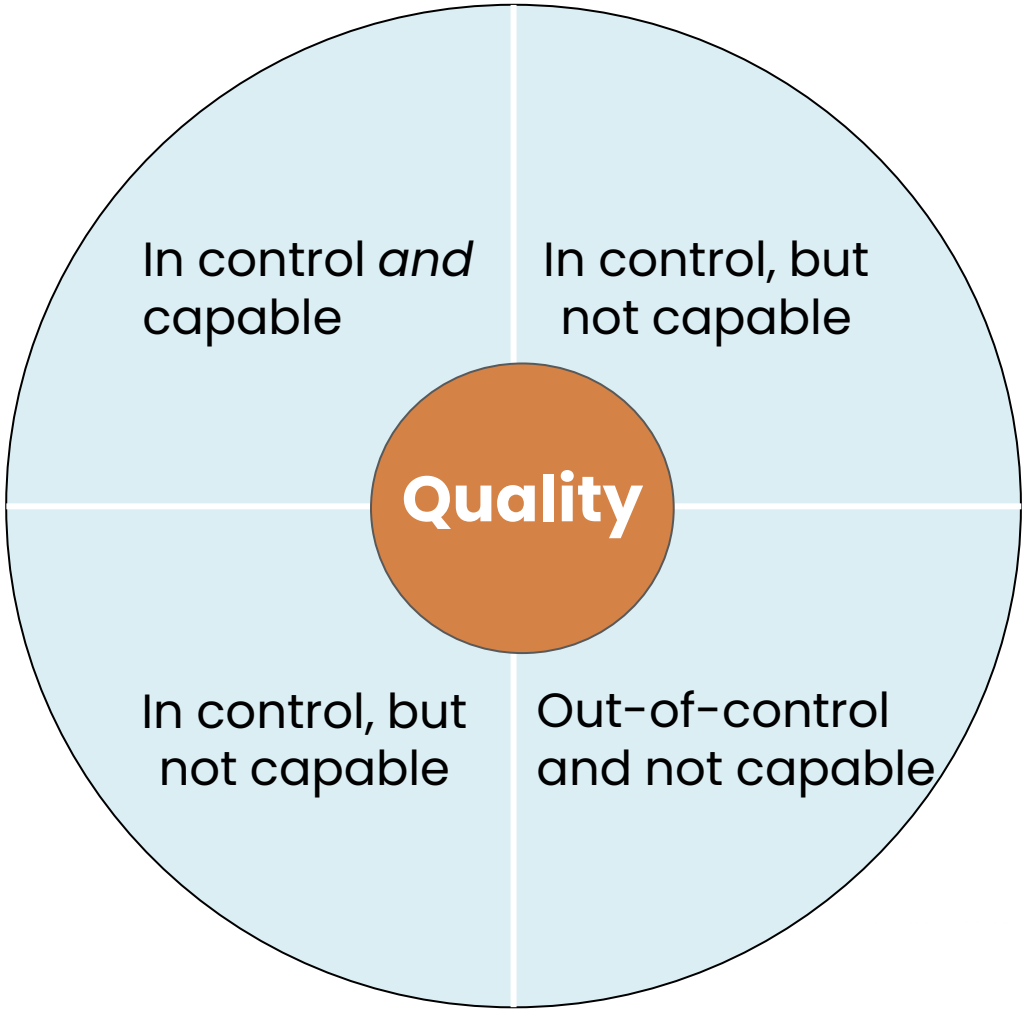
Control Limits vs. Spec Limits



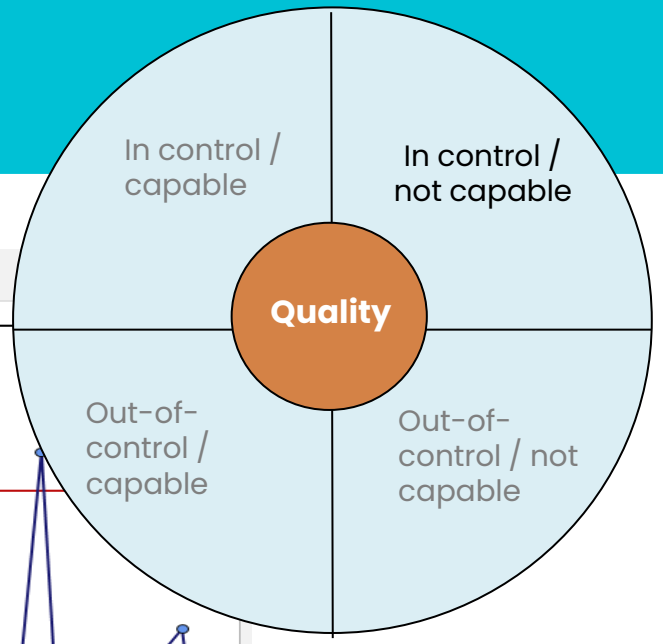
STATEMENT #8

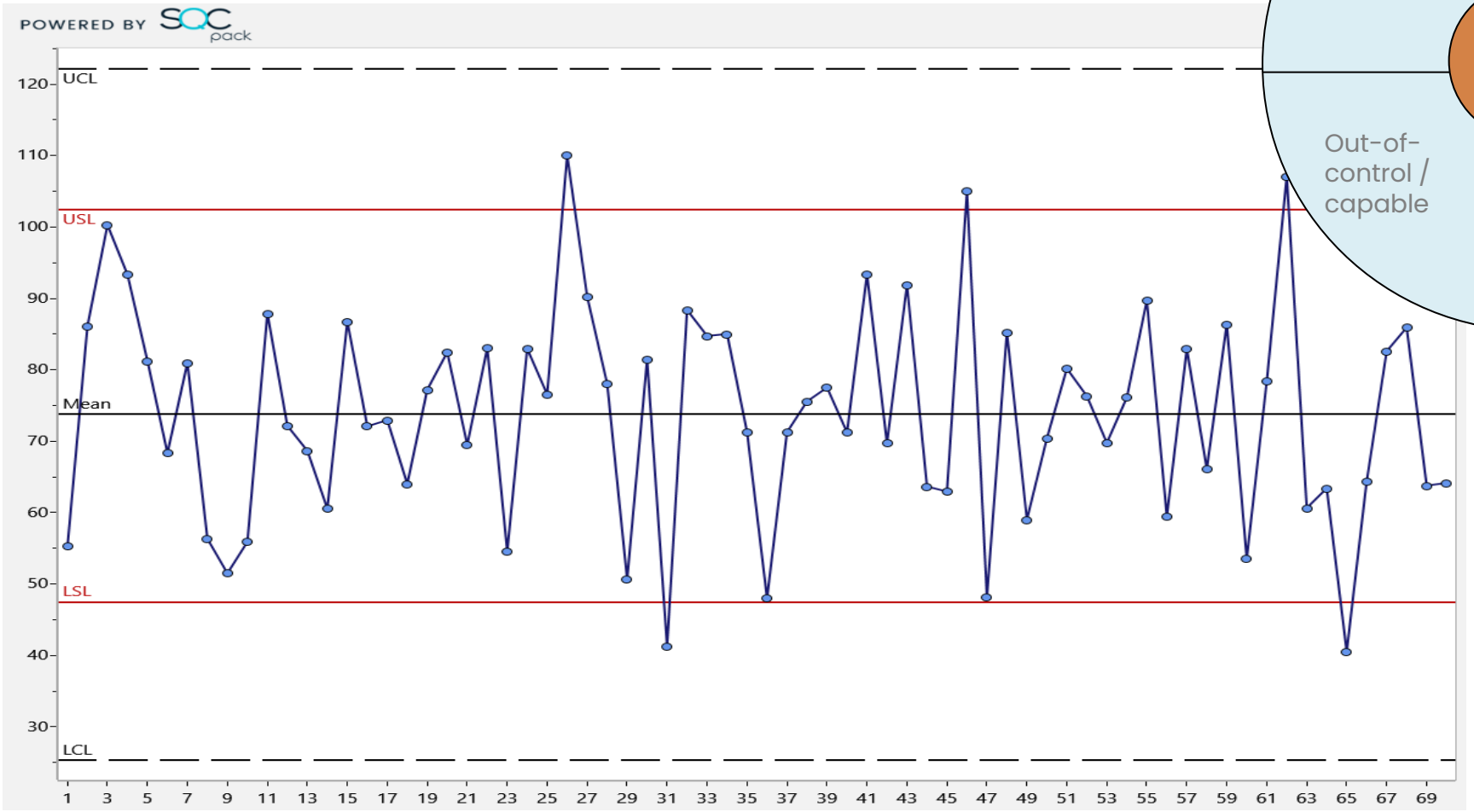
We've accomplished our goals when our processes are both Stable (in control) and Capable (In spec)

The Four States of Quality

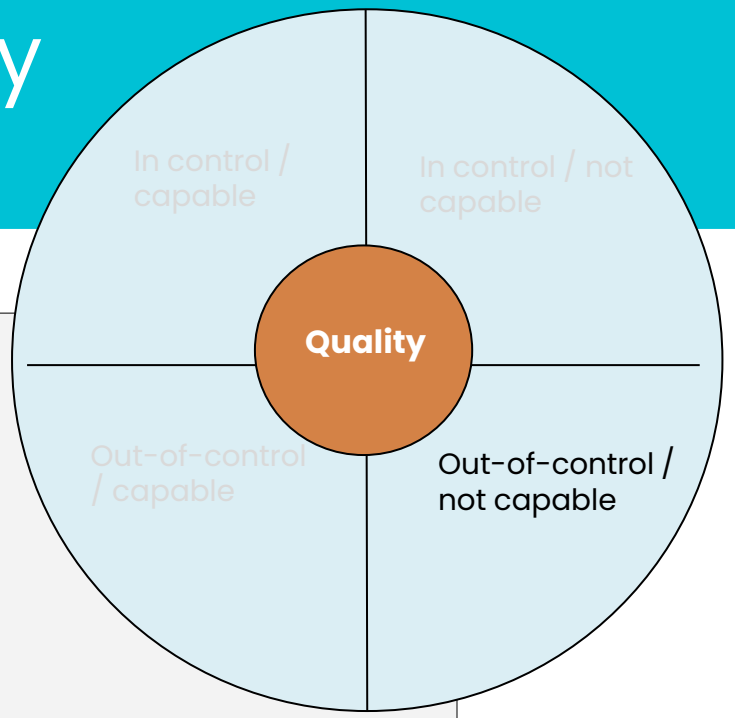


Four States of Quality

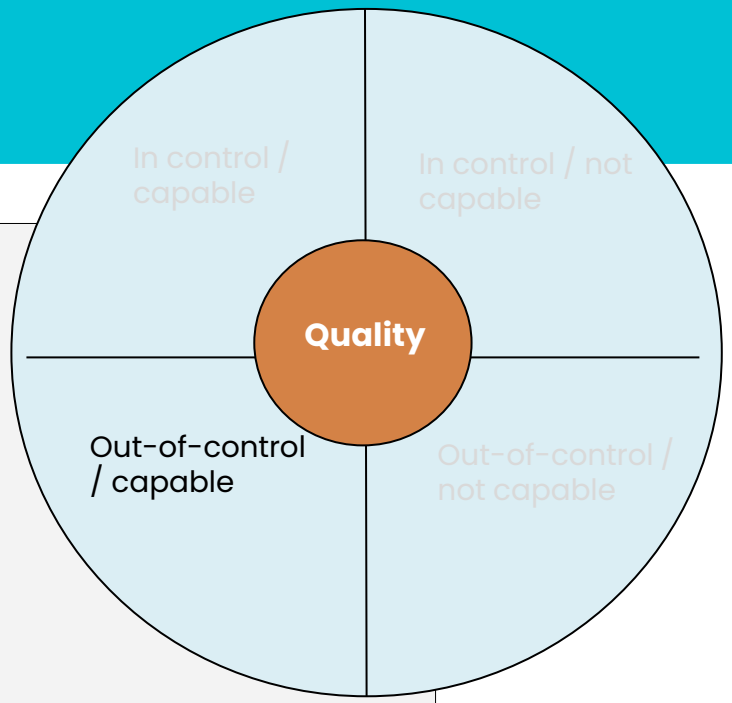




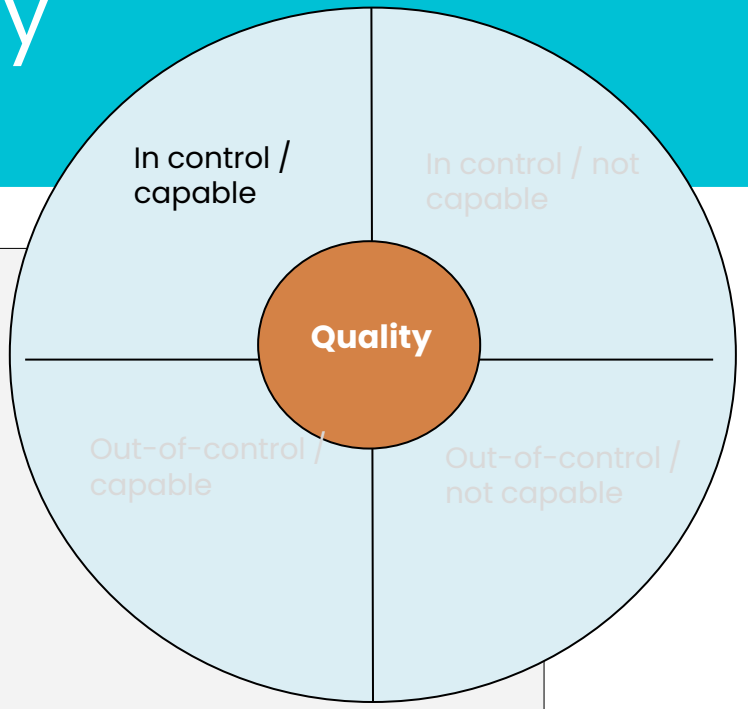
Four States of Quality



Four States of Quality



Four States of Quality




tability
SBC
efore
apability

STATEMENT #9

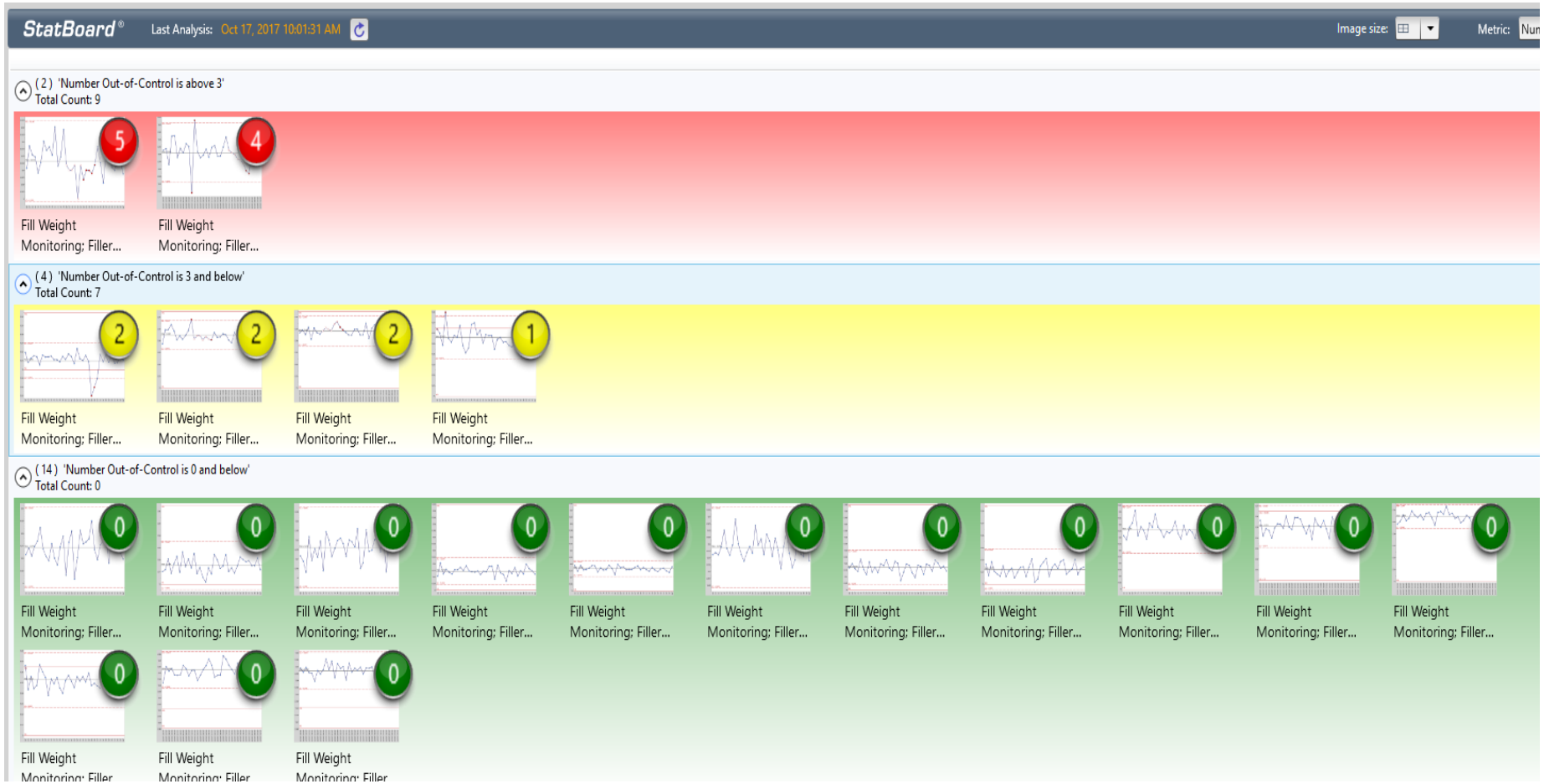
Statistical Process Control makes you aware of variation. Only your actions can reduce variation.

Reduce Variation

- Alerts / alarms are useful to get your attention, but you still must decide whether to act on them.
- The alert also doesn't tell you WHAT to do!

Reducing Variation

Use software to highlight biggest sources of variation in your SPC program

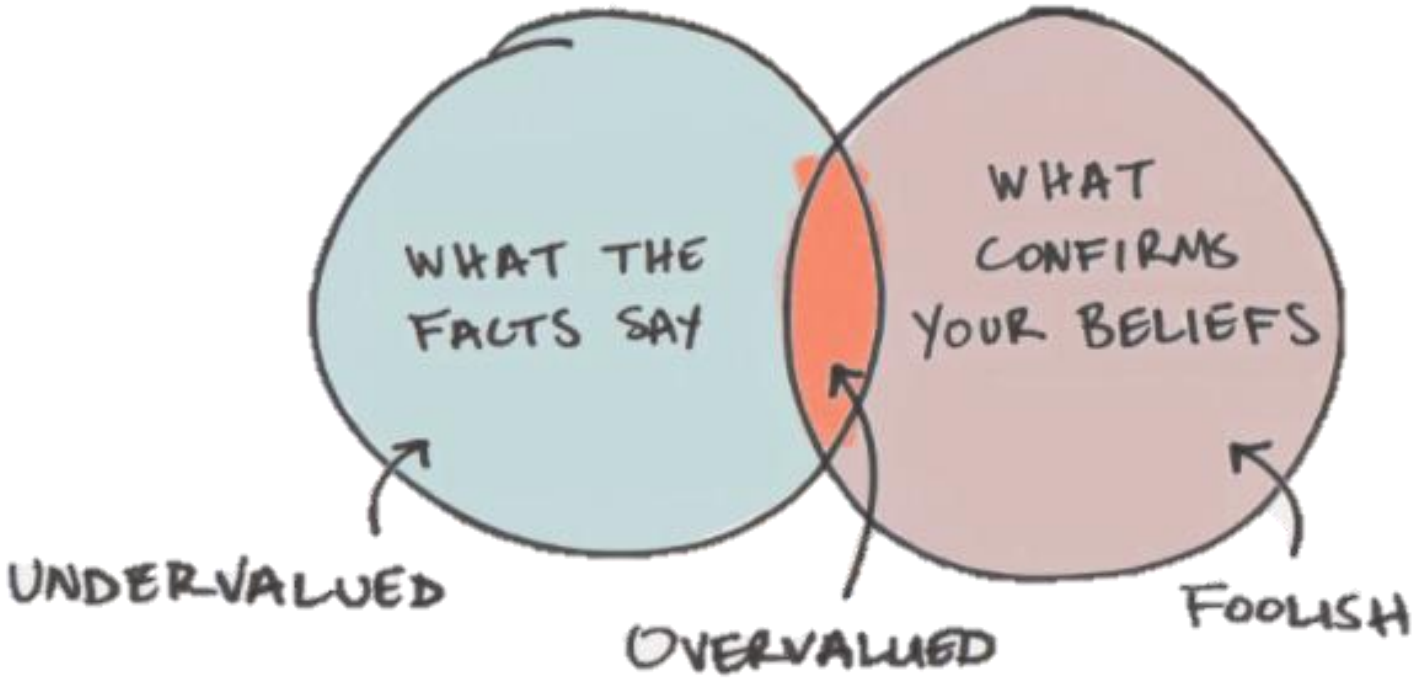


STATEMENT #10

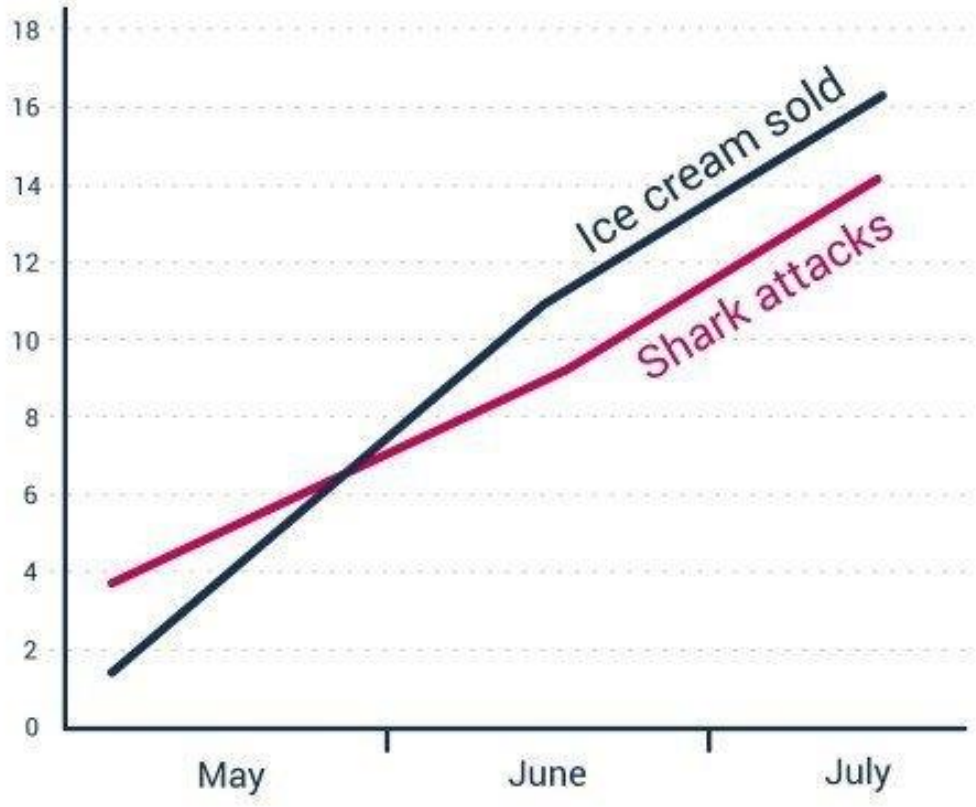
Control charts are only as valuable as the good practices that accompany them.

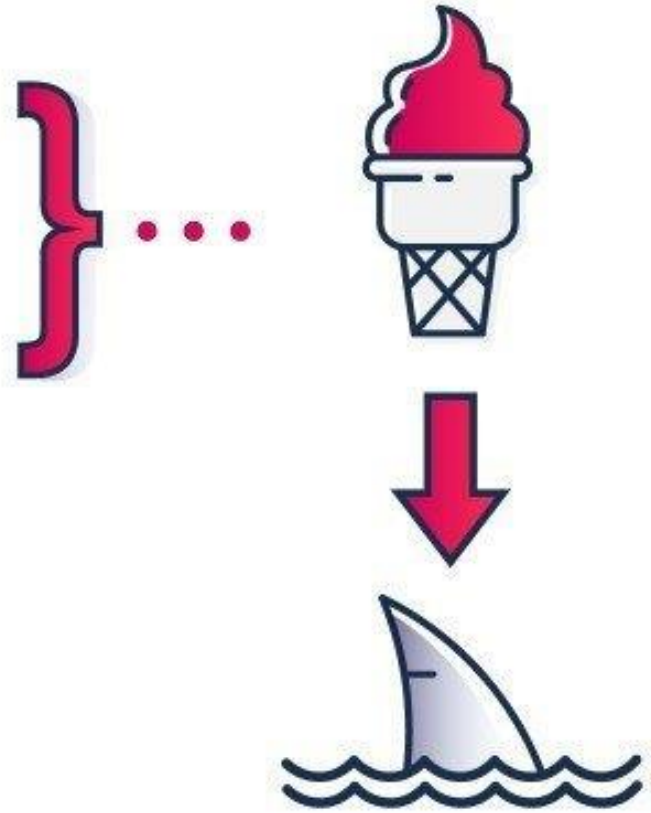
Confounding Factors

Searching for the facts that benefits your theories

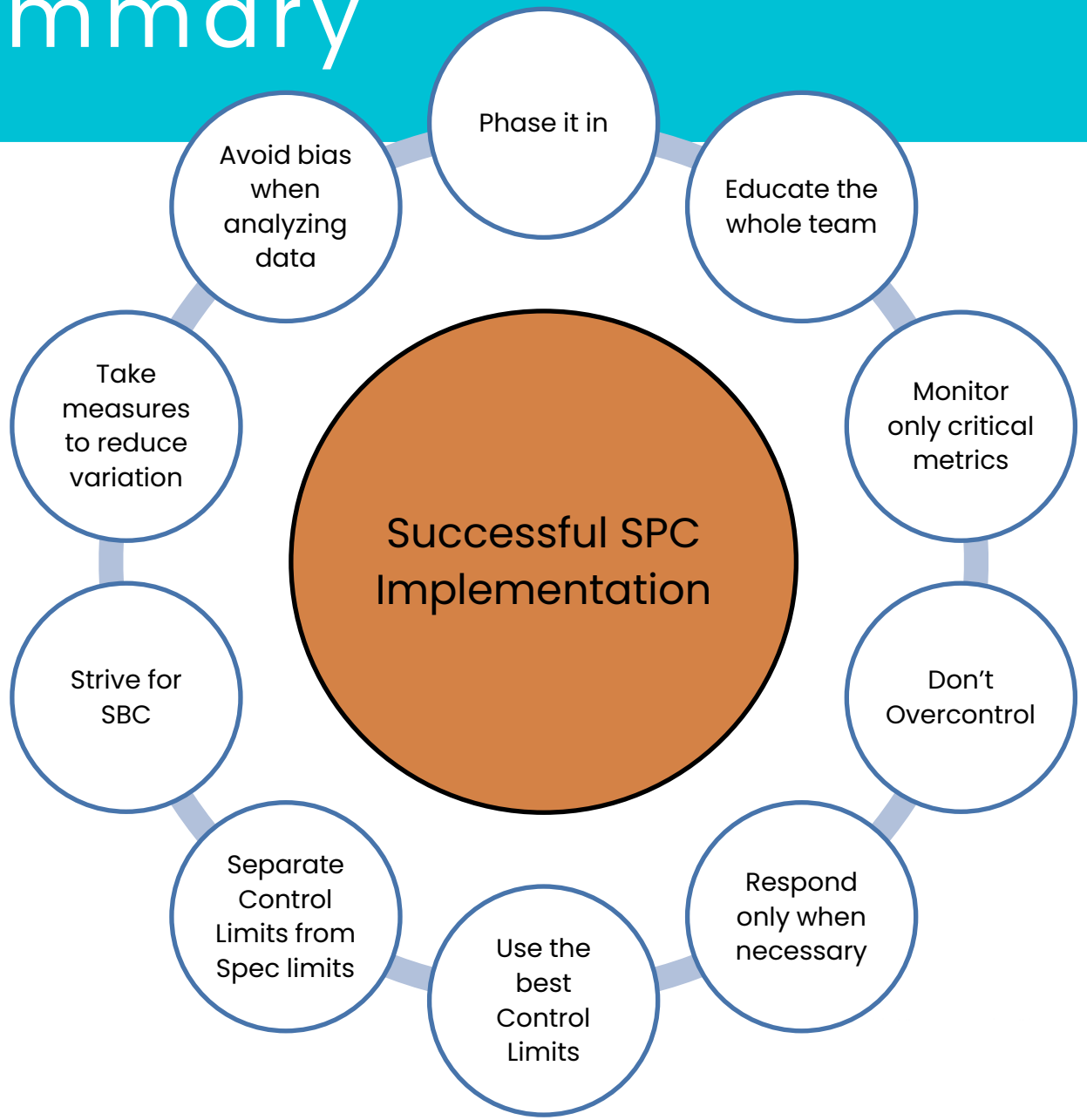


Confounding Factors





In Summary


Successful SPC Implementation
Phase it in
Educate the whole team
Monitor only critical metrics
Don't Overcontrol
Respond only when necessary
Use the best Control Limits
Separate Control Limits from Spec limits
Strive for SBC
Take measures to reduce variation
Avoid bias when analyzing data

Thank You, Quality Digest!

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