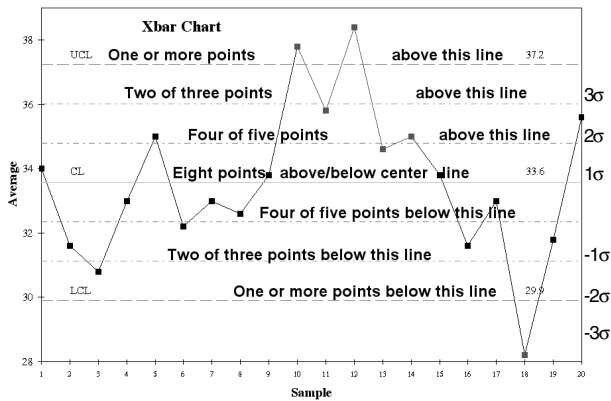


Analyze Stability

Processes that are "out of control" need to be stabilized before they can be improved using the problem-solving process. Special causes require immediate cause-effect analysis to eliminate variation.

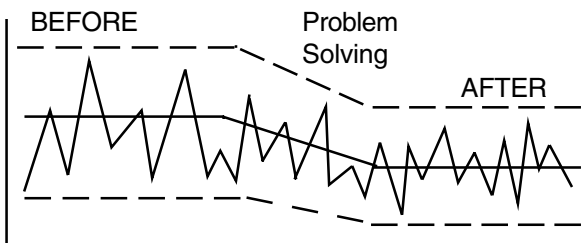
The following diagram will help you evaluate stability in any control chart. Unstable conditions can be any of the following:



Various trends are also considered unstable conditions. For a complete list see qimacros.com/qiwizard/stability.html. Any of these conditions suggests that an unstable condition may exist. Consider investigating the special cause of variation. The QI Macros automatically identify these for you.

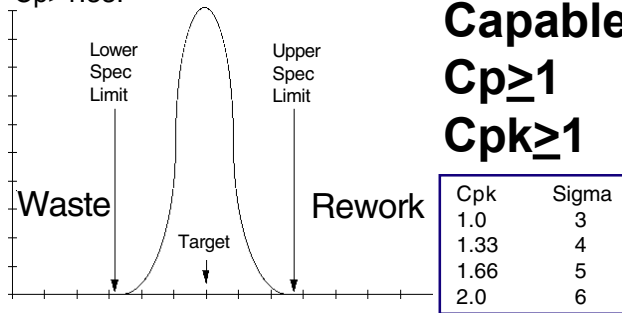
Use the Ishikawa diagram to analyze potential root causes.

Once you've eliminated the special causes, you can turn your attention to using the problem solving process to reduce the common causes of variation:



Analyze Capability

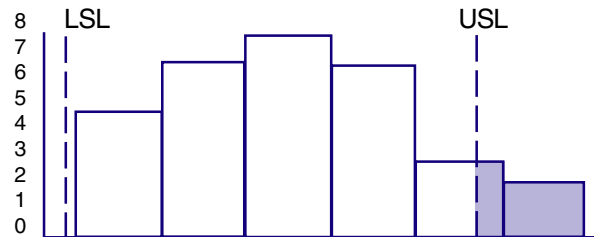
When C_p , the process capability index, and C_{pk} , the centering index, are over 1.0, the process is capable, but most manufacturers require $C_p > 1.33$.



Capable
 $C_p \geq 1$
 $C_{pk} \geq 1$

Use the problem solving process to identify and prevent the root causes of waste (usually below the lower specification limit) and rework (usually above the upper specification limit). The goal, is to reduce variation so that all of your points fit within the specification limits, clustered around a target.

Time to Install (Before)

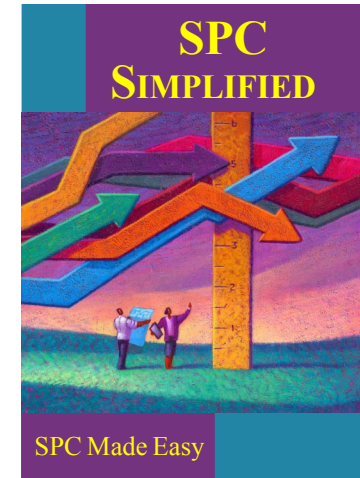


Time to Install (After)



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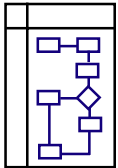
\$3.00

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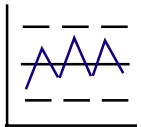
Sustain the Improvement

Purpose: Stabilize and Sustain the Improvement

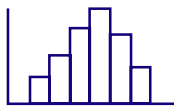
Key Tools



Flowchart: Show the flow of work through a process including all activities, decisions, and measurement points.



Control Chart: Help analyze, sustain, and monitor the current levels of process stability and to identify key issues for problem solving or root cause analysis.



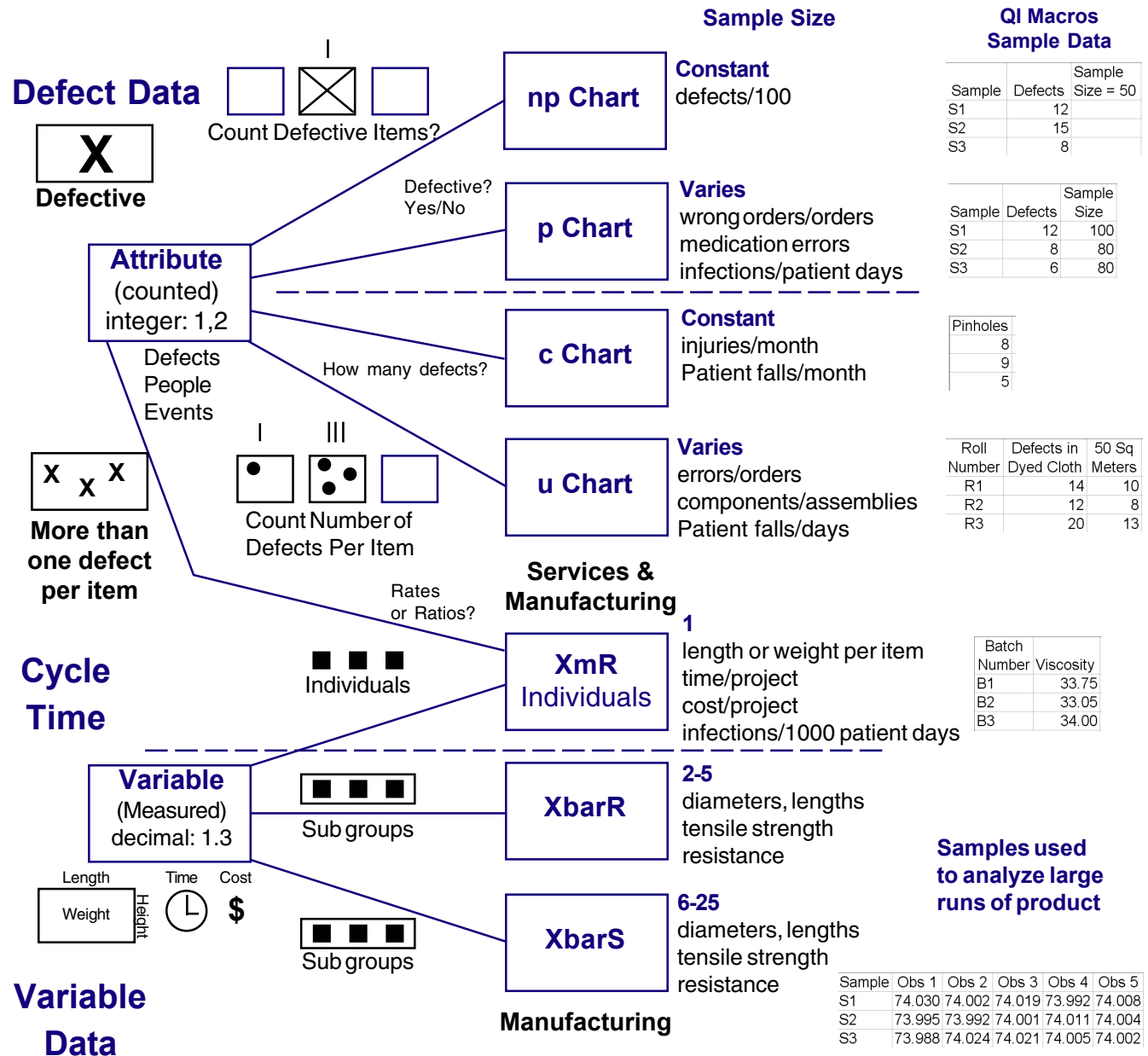
Histogram: Determine the capability (i.e., the level of performance the customers can consistently expect) of the process and the distribution of measurable data.

Sustain The Improvement (Control)

FISH	Step	Activity
Focus	1	Refine the process
Define Measure	2	Identify the critical to quality indicators (CTQs)
Improve	3	Implement the critical to quality indicators
Analyze Improve		
Sustain	4	Check the process for stability and capability
Control		
Honor	5	Review, recognize, and refocus

To learn more about SPC, consider our one hour training video: www.qimacros.com/spc-simplified-training-video.html

Choosing The Right Chart



Sample Data

Sample	Defects	Sample Size = 50
S1	12	
S2	15	
S3	8	

Sample	Defects	Sample Size
S1	12	100
S2	8	80
S3	6	80

Pinholes

8
9
5

Roll Number	Defects in Dyed Cloth	50 Sq Meters
R1	14	10
R2	12	8
R3	20	13

Batch

Batch Number	Viscosity
B1	33.75
B2	33.05
B3	34.00

Samples used to analyze large runs of product

Sample	Obs 1	Obs 2	Obs 3	Obs 4	Obs 5
S1	74.030	74.002	74.019	73.992	74.008
S2	73.995	73.992	74.001	74.011	74.004
S3	73.988	74.024	74.021	74.005	74.002

To automate these charts, try the QI Macros for Excel. **Download a FREE 30 day trial at** www.qimacros.com/freestuff.html.

QI Macros Control Chart Wizard
The QI Macros can analyze your data and select and run the right control chart for you.