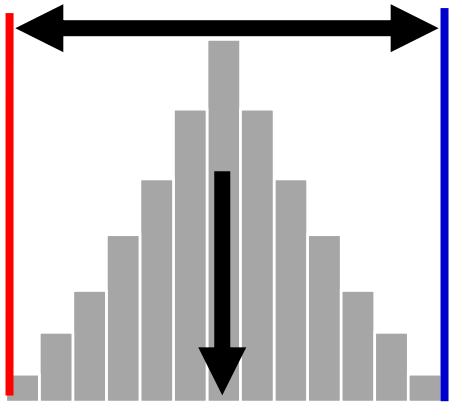
Continuous Improvement Toolkit

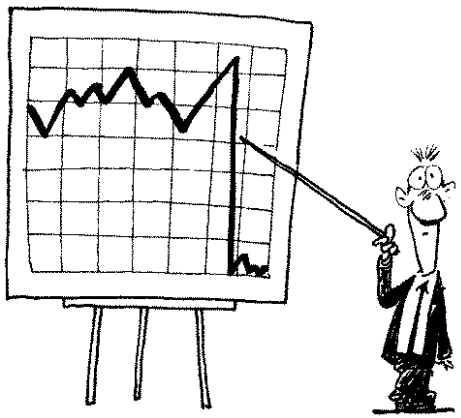
Descriptive Statistics




Managing Risk
PDPC
FMEA
RAID Logs
Fault Tree Analysis
Risk Assessment*
Traffic Light Assessment
Deciding & Selecting
Pros and Cons
Importance-Urgency Mapping
Break-even Analysis
Cost -Benefit Analysis
Force Field Analysis
Voting
Pugh Matrix
Decision Tree
TPN Analysis
QFD
Matrix Diagram
Kano Analysis
Prioritization Matrix
Critical-to Tree
Paired Comparison
Planning & Project Management*
RACI Matrix
Stakeholders Analysis
PEST
PERT/CPM
Activity Diagram
SWOT
Roadmaps
Project Charter
Gantt Chart
PDCA
Control Planning
Gap Analysis
Hoshin Kanri
Kaizen
How-How Diagram
Tree Diagram**
Standard work
Lean Measures
KPIs
OEE
Capability Indices
MSA
RTY
Descriptive Statistics
Cost of Quality
Reliability Analysis
Graphical Analysis
Cause & Effect Matrix
Pareto Analysis
Confidence Intervals
Understanding Cause & Effect
Probability Distributions
ANOVA
Hypothesis Testing
Design of Experiments
Scatter Plot
Correlation
Regression
Multi-Vari Charts
5 Whys
Chi-Square Test
Relations Mapping*
Identifying & Implementing Solutions***
Simulation
TPM
Mistake Proofing
Pull Systems
JIT
Ergonomics
Work Balancing
Automation
Bottleneck Analysis
Visual Management
Flow
Value Analysis
5S
Understanding Performance
Run Charts
Control Charts
Benchmarking
Sampling
Fishbone Diagram
TRIZ***
Brainstorming
Analogy
SCAMPER***
Nominal Group Technique
Mind Mapping*
Affinity Diagram
Attribute Analysis
Lateral Thinking
Visioning
Creating Ideas**
Wastes Analysis
SMED
Time Value Map
Process Redesign
IDEF0
Value Stream Mapping
SIPOC
Flow Process Chart
Process Mapping
Flowcharting
Service Blueprints
Designing & Analyzing Processes
Data Collection
Focus groups
Interviews
Photography
Check Sheets
Measles Charts
Surveys
Critical Incident Technique
Observations

- Descriptive Statistics

- Statistic is the science of describing, interpreting and analyzing data.
- **Statistics Types:**
  - **Graphical Statistics:**
    Makes the numbers visible.
  - **Inferential Statistics:**
    Makes inferences about populations from sample data.
  - **Analytical Statistics:**
    Uses math to model and predict variation.
  - **Descriptive Statistics:**
    Describes characteristics of the data (central tendency, spread)

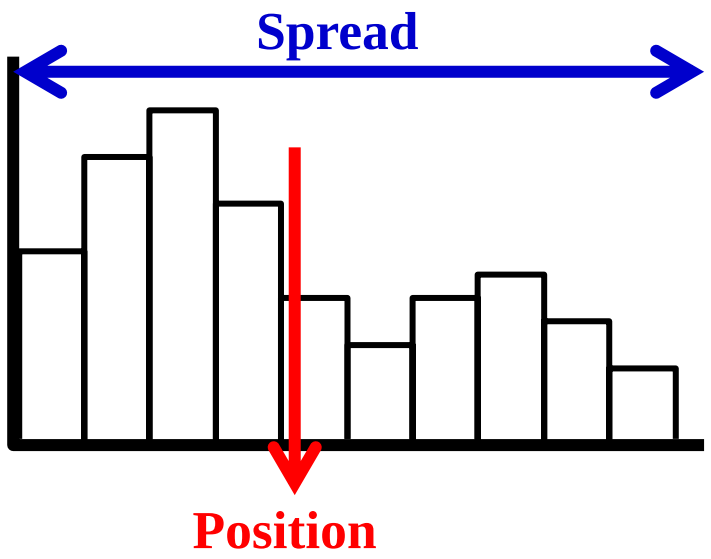


- Descriptive Statistics

Statistics for Process Position And Process Spread:

- **Process Position Statistics** measure the central tendency (setting) of the process.
- They refer to where the process is centered.

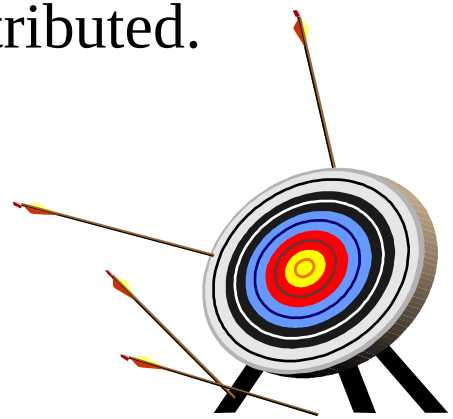
- **Process Spread Statistics** measure the amount of variation (variability / dispersion) in the process.



- Descriptive Statistics

Three common statistics that can be used to reflect position:

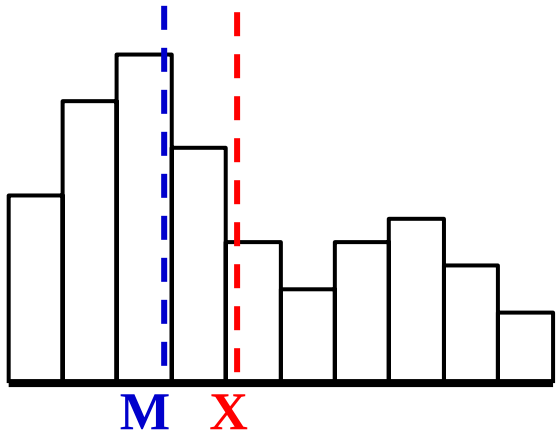
- **Mean (X):**
  - The **average** of a set of values.
  - Works well when the process is normally distributed.
  - Commonly used.
  - Easy to understand and calculate.
  - Works well where the process is symmetrical and there are no **outliers**.
  - **X bar**: used to represent the average of a sample.
  - **μ**: used to represent the average of the total population.



- Descriptive Statistics

Three common statistics that can be used to reflect position:

- **Median (M):**
  - The middle value of the data.
  - Less widely used.
  - Useful due to its robustness, especially when the data is significantly affected by outliers.

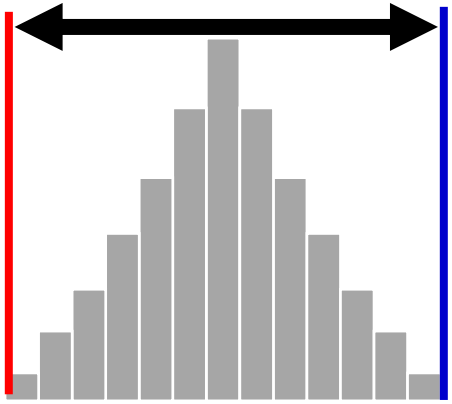


- **Mode:**
  - The most frequently occurring value.

- Descriptive Statistics

Two common statistics that can be used to reflect spread:

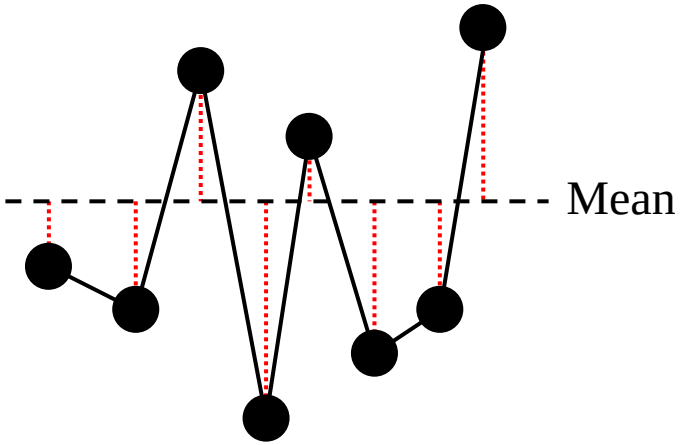
- **Range (R):**
  - The difference between the maximum & the minimum values.
  - Easy to understand but not very robust.
  - Just one outlier will increase the range dramatically.



- Descriptive Statistics

Two common statistics that can be used to reflect spread:

- **Standard deviation (S):**
  - A more robust measure of variation.
  - A measure of the spread of data in relation to the mean.
  - It is the average distance of the data points from their own average.

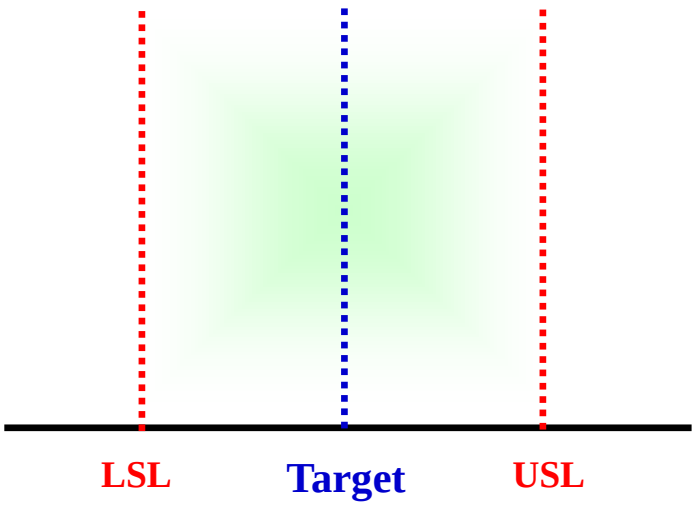


$$S = \sqrt{\frac{\sum (X - M)^2}{n - 1}}$$

S = Standard deviation (σ)
X = Data point
M = Average of all data points
n = Population

- Descriptive Statistics

- The mean and the standard deviation can provide a concise summary of the data set (where the output data shows a normal distribution).
- A measure of variation is essential.
- Six Sigma focuses on reducing process variation.



- Descriptive Statistics

Example:

- Find the Mode, Median, Range and Mean for the following set of data: 97, 36, 120, 36, 509, 5, 247