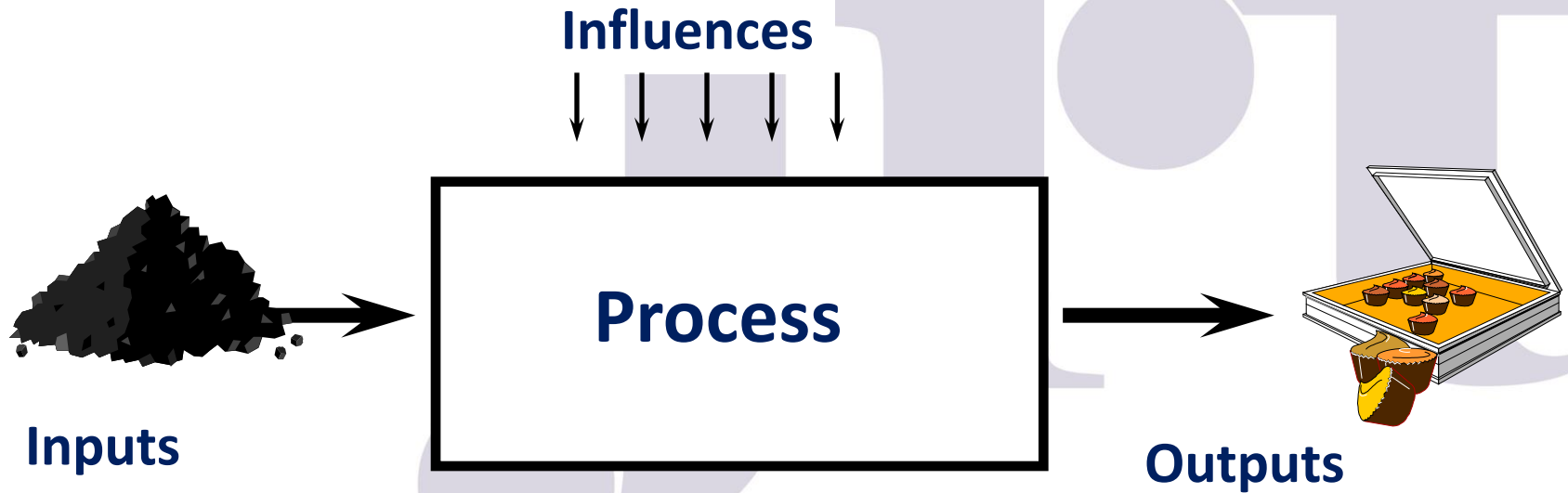


Understanding the Capability of a Manufacturing Process



Dr. John R. Thomas



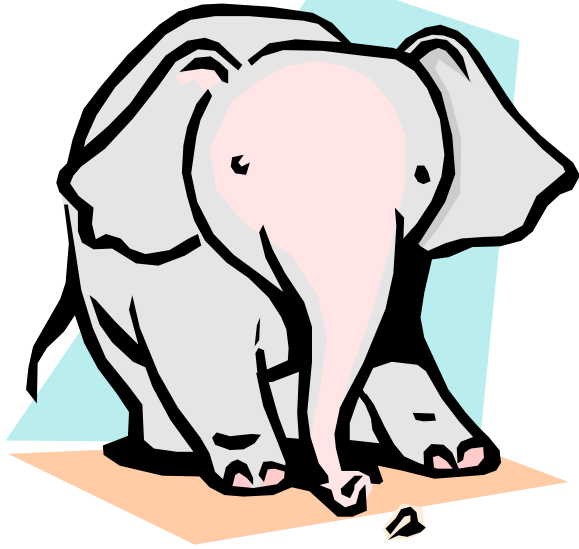
Content

1. **What is Process Capability?**
2. **The concept of variation.**
3. **The Normal distribution.**
4. **Standard deviation.**
5. **The concept of control charts.**
6. **Specification limits and process capability.**
7. **Measures of process capability.**
8. **Moving on to 6 Sigma philosophies.**

What is Process Capability?

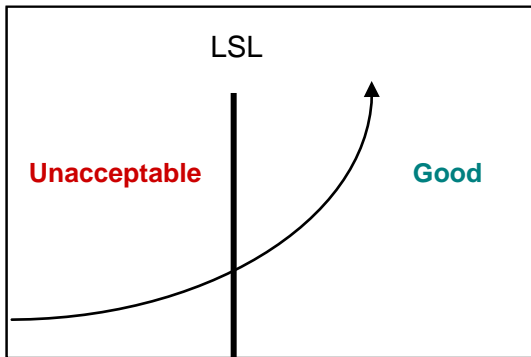
- It measures the “goodness of a process” - comparing the ‘voice of the process’ with the ‘voice of the customer’.
- It is calculated by the proportion of output that can be produced within product specification.
- The voice of the customer here is the specification range (tolerance).

All Processes Need Clear Specifications



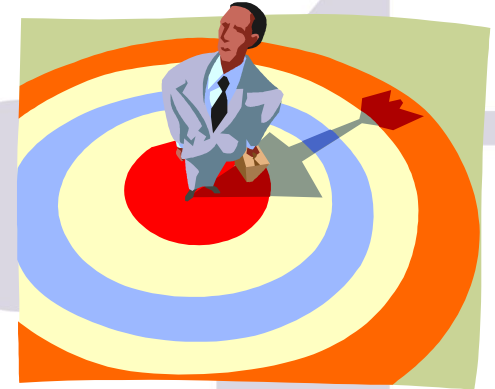
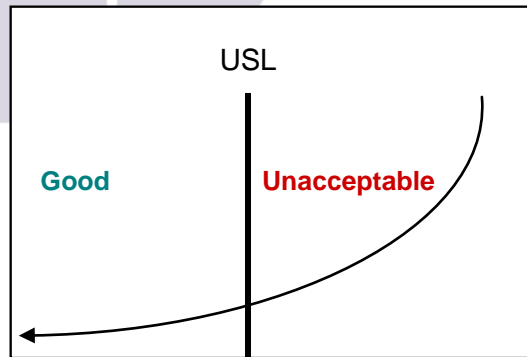
Larger is Better

One-sided - lower specification limit only



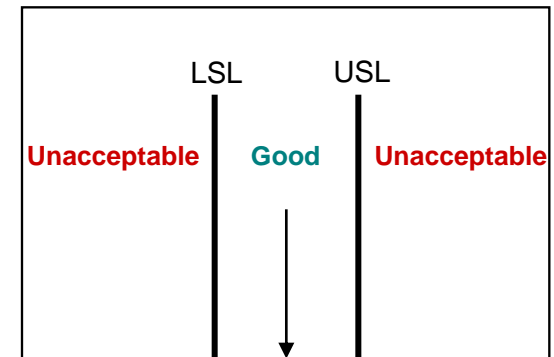
Smaller is Better

Target zero and upper specification limit



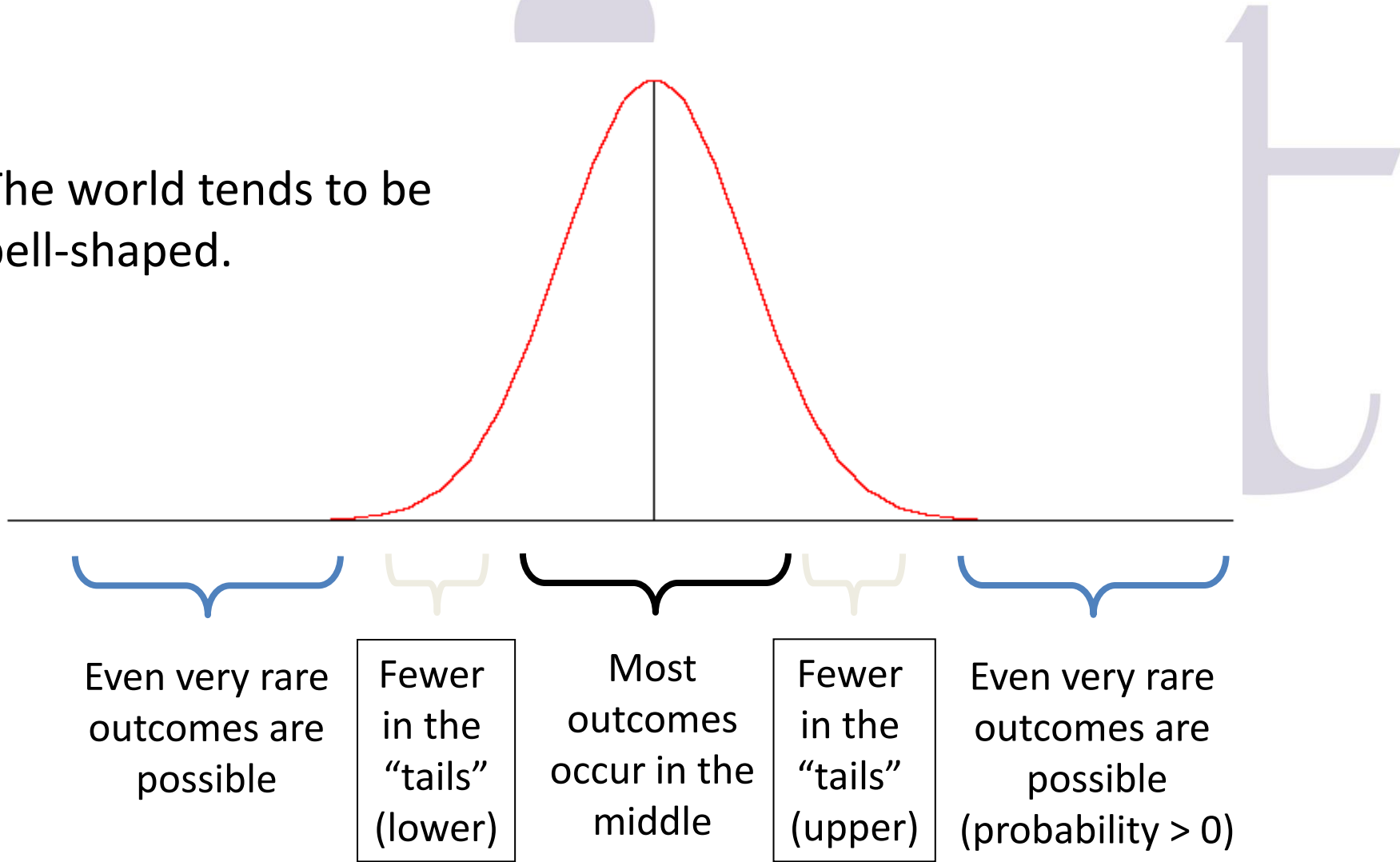
Target is Best

Two-sided specifications

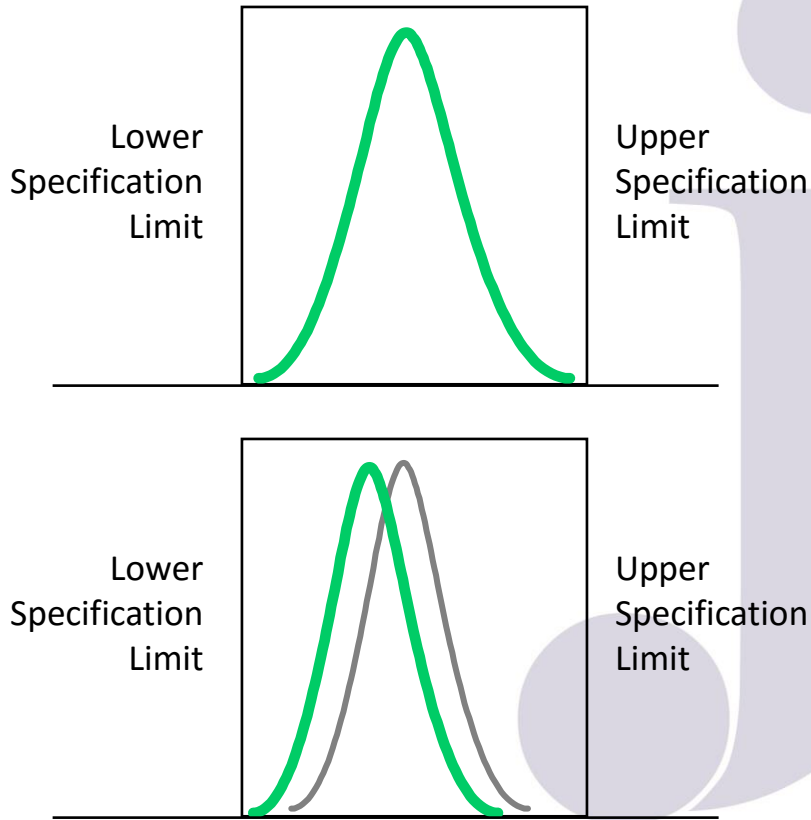


Variability

The world tends to be bell-shaped.

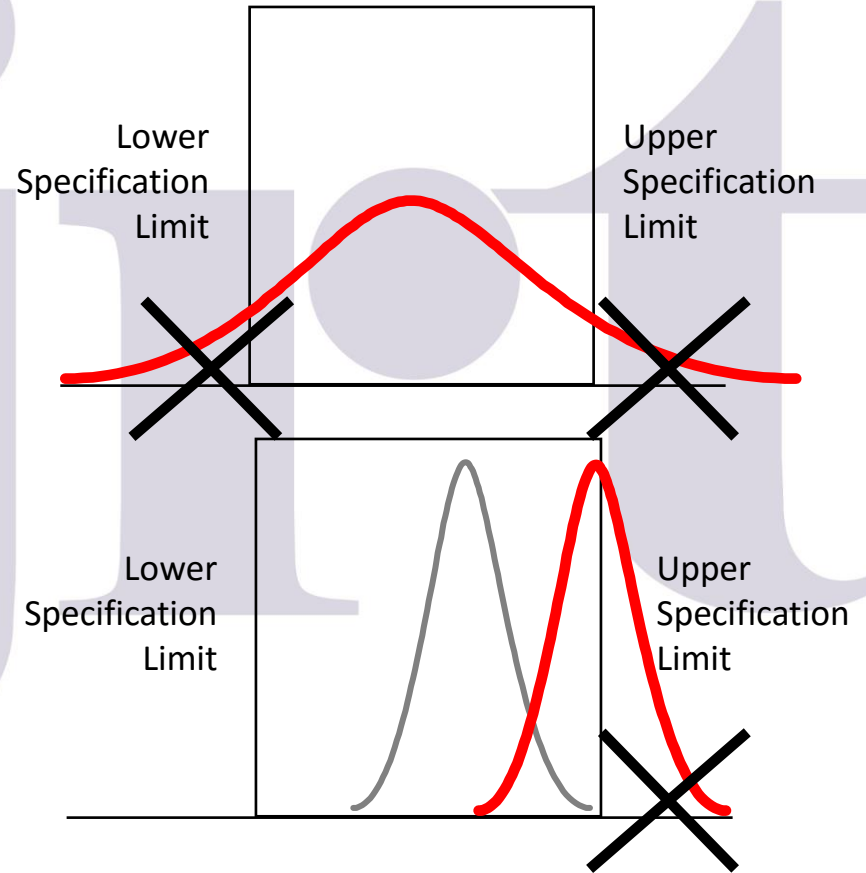


GOOD: High Capability



This process is capable

BAD: Low Capability



This process is not capable

Stable Processes Are More Profitable

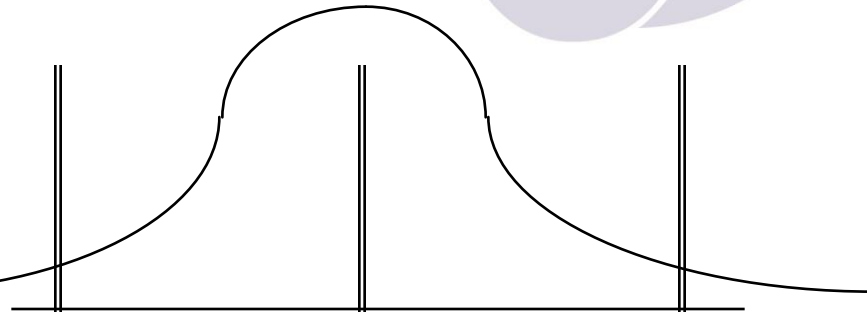
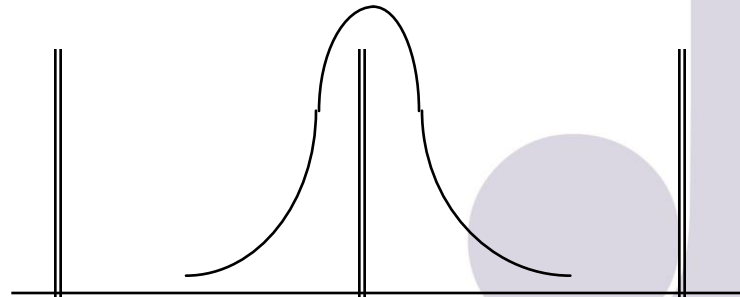
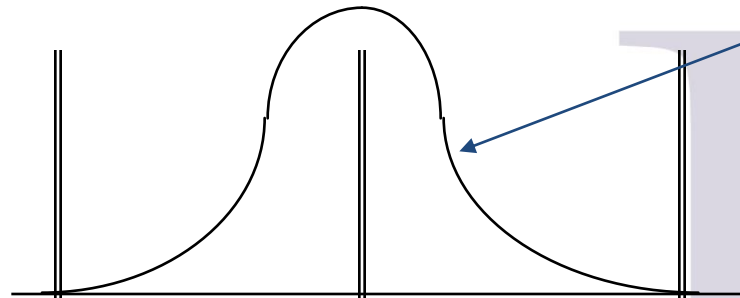
- They produce better products and less scrap
- They take less work to maintain
- The output schedules are more predictable
- They transfer less variation to following processes



Process Capability

LSL Spec USL

Process variation



- Capable process
- Very capable process
- Process not capable

Summary of Indices

- C_p is the best indicator of *potential* process capability because it assumes a stable and on-target process.
- C_{pk} is an indicator of actual process capability. It takes into consideration if the process is off-target.

Technical Definition of Six Sigma

Technical Definition (Motorola)

