

# **Module 3:**

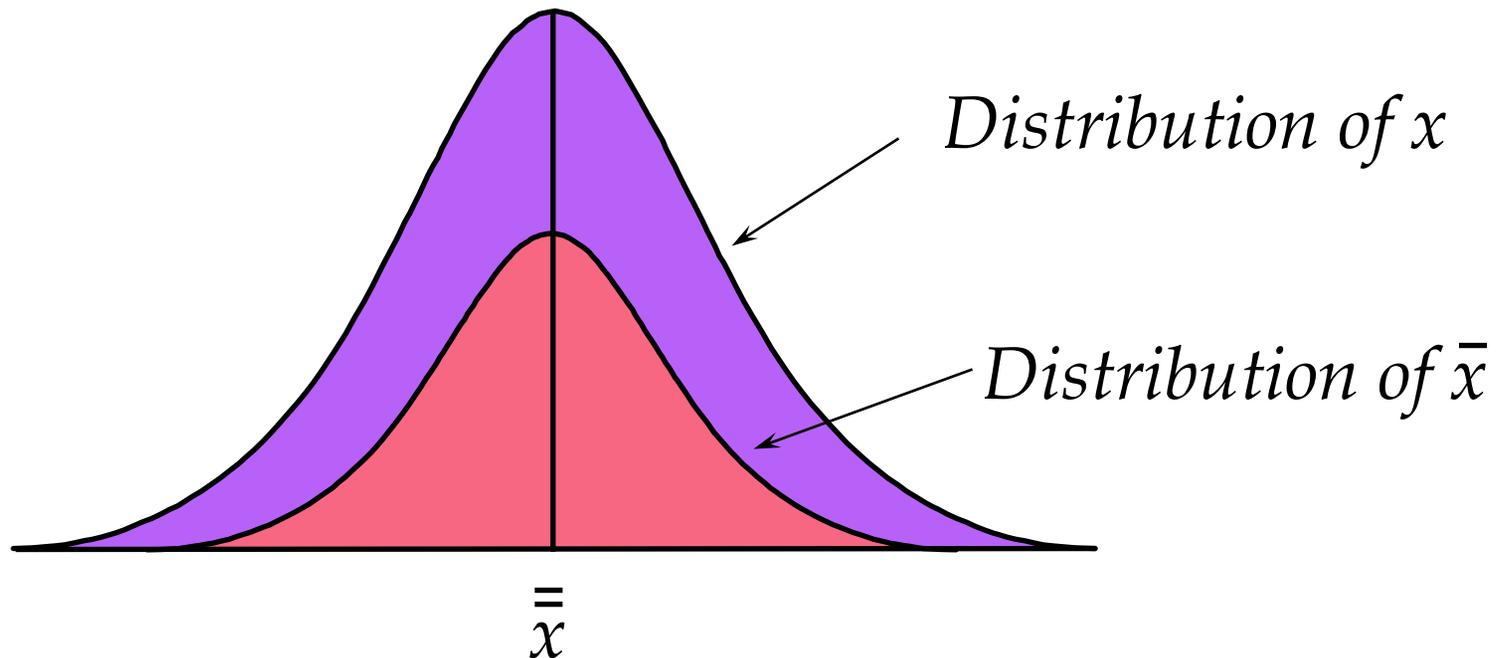
## **Data Characteristics and Variation**

# Objectives

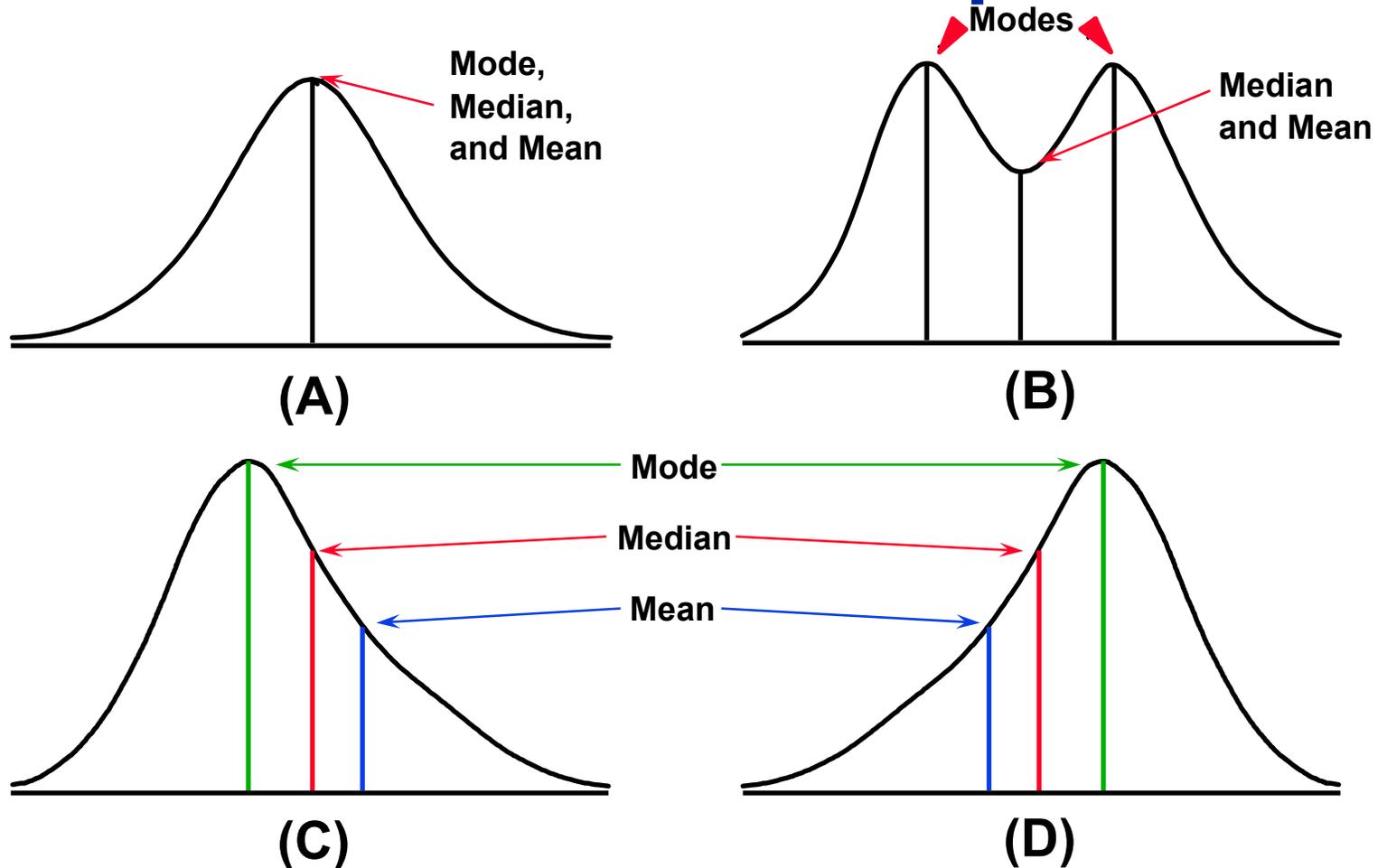
- ❑ **Identify characteristics of data sets**
- ❑ **Identify sources of variation**
- ❑ **Distinguish between process stability and capability**

# **Variation: The Tale of Two Shooters and The Quincunx**

# Relationship Between a Distribution of Individuals and a Distribution of Averages



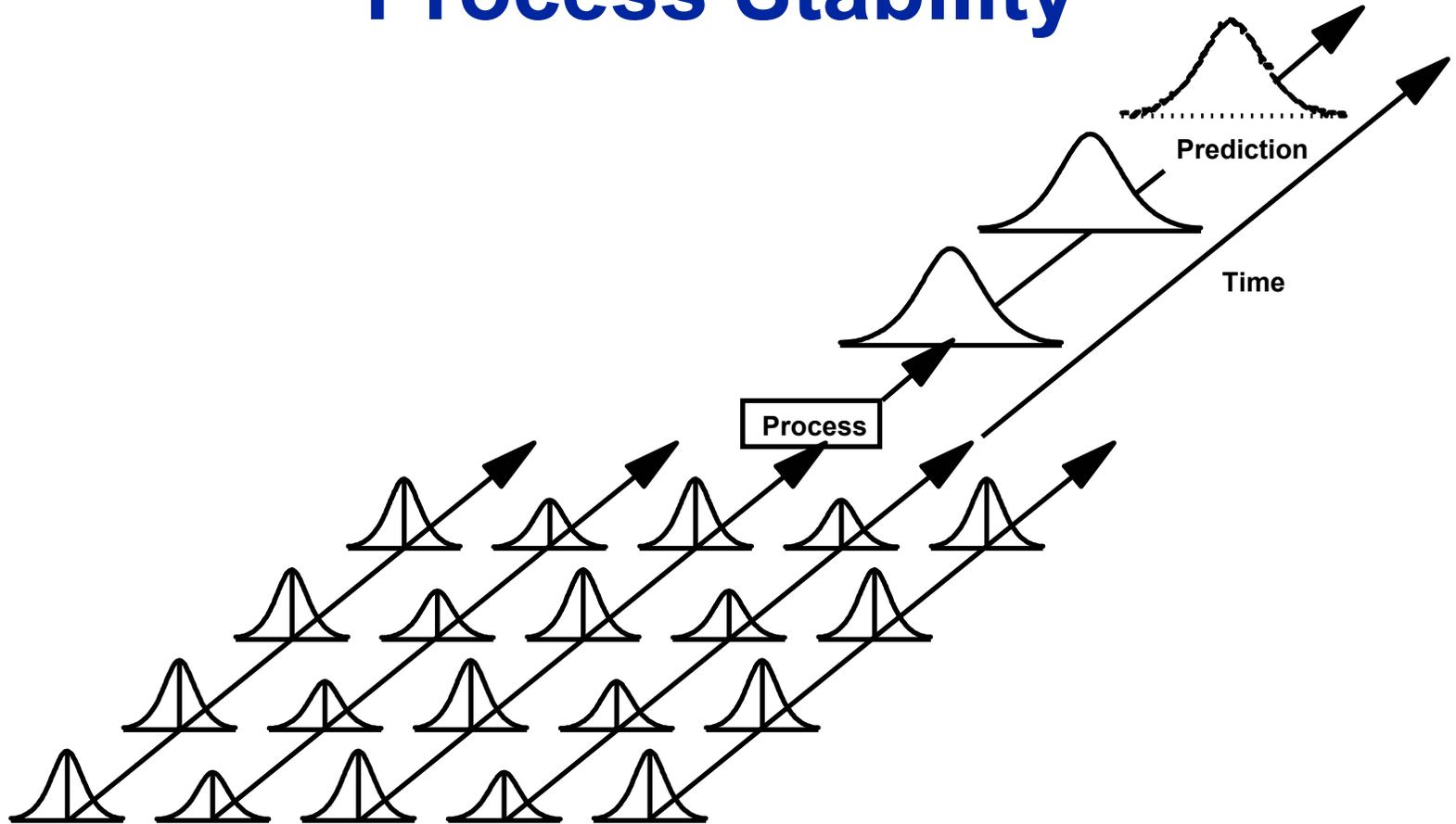
# Relationship Between Measures of Location and Shape



# Sources of Variation

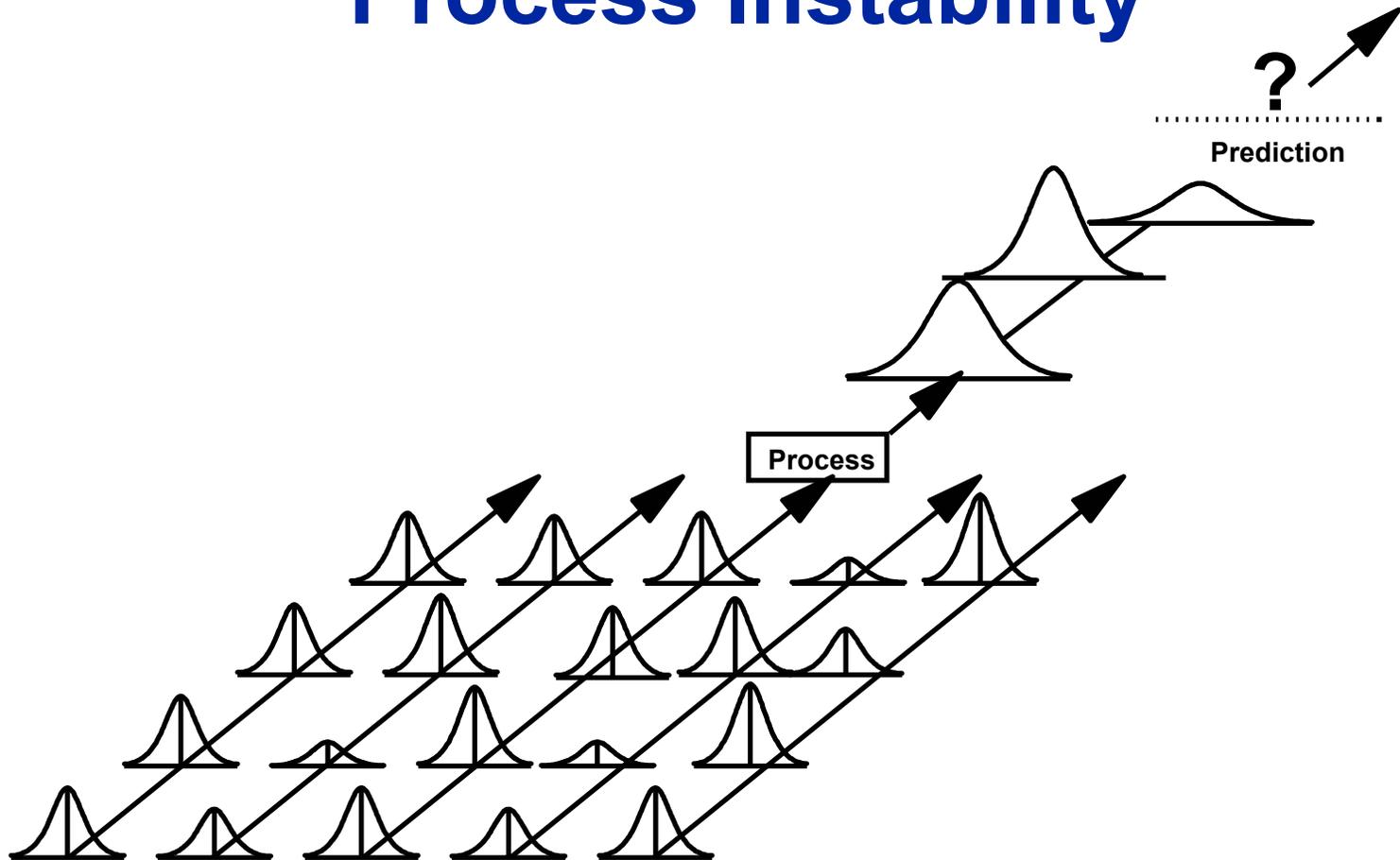
- **Common Causes:** Causes that are inherent in the process over time, affect everyone working in the process, and affect all the outcomes of the process.
- **Special Causes:** Causes that are not in the process all the time or do not affect everyone, but arise because of specific circumstances.

# Process Stability



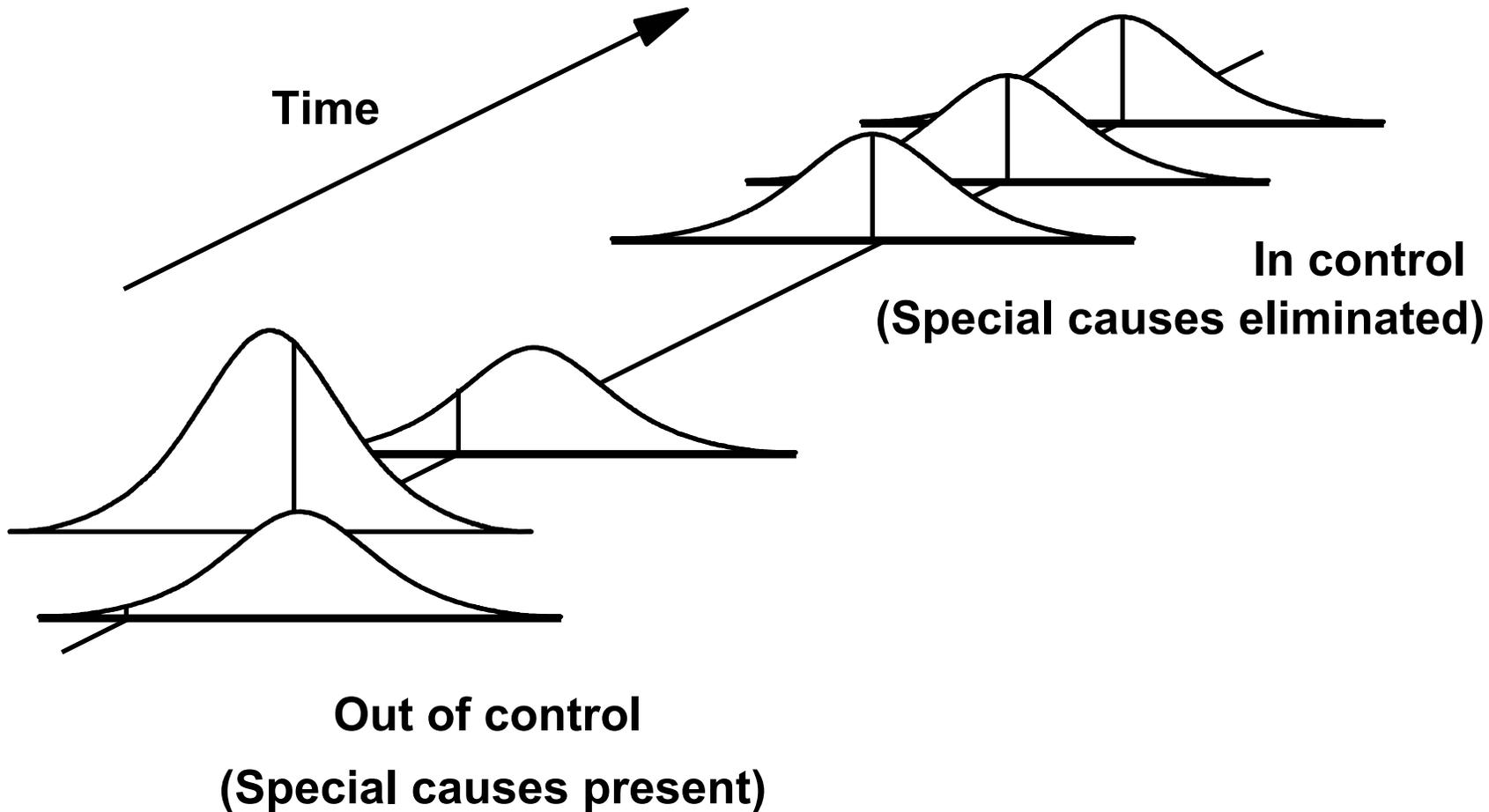
- **Process outputs form distributions that are stable over time; that is, they are predictable.**

# Process Instability

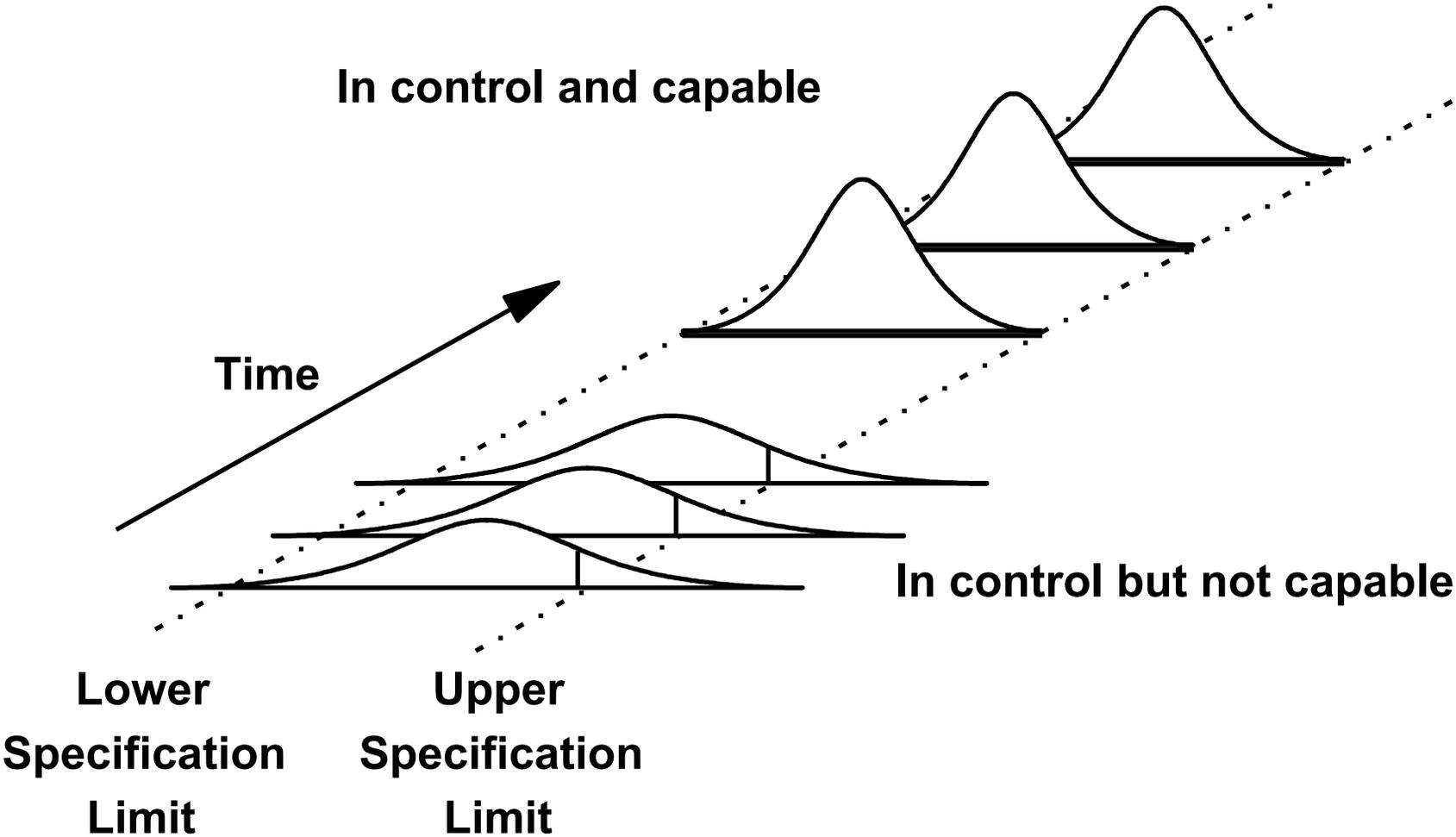


- **Process outputs will not be stable over time; that is, they are not predictable.**

# Statistical Process Control



# Process Capability



# Summary

- ❑ **Characteristics of data sets**
- ❑ **Sources of variation**
- ❑ **The distinctions between process stability and process capability**