FLORIDA POLYTECHNIC UNIVERSITY

Six Sigma: Week 3

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Agenda: Week 3

- Managing Six Sigma Projects
  - Project Charter
  - Using Microsoft Project® to manage DMAIC phases and schedule
- Six Sigma graphical tools
  - See next slide

Measure: Six Sigma Graphical Tools

- ✓ Summary of graphical tools (page 118)
- ✓ Histograms (page 123)
- Graphical Summary (page 126)
- Pareto Analysis (page 136)
- Time Series Plots (page 130)
- Dot Plots (page 125)
- Scatter Plots (page 145)
- Box Plots (page 140)
- Fitted Line Plots (page 198)
- p-value – statistical tool (page 156)

Demonstration & in-class practice of Six Sigma analysis tools using Minitab

Measure: Types of Data (Data Worlds)

Data Worlds – Overview

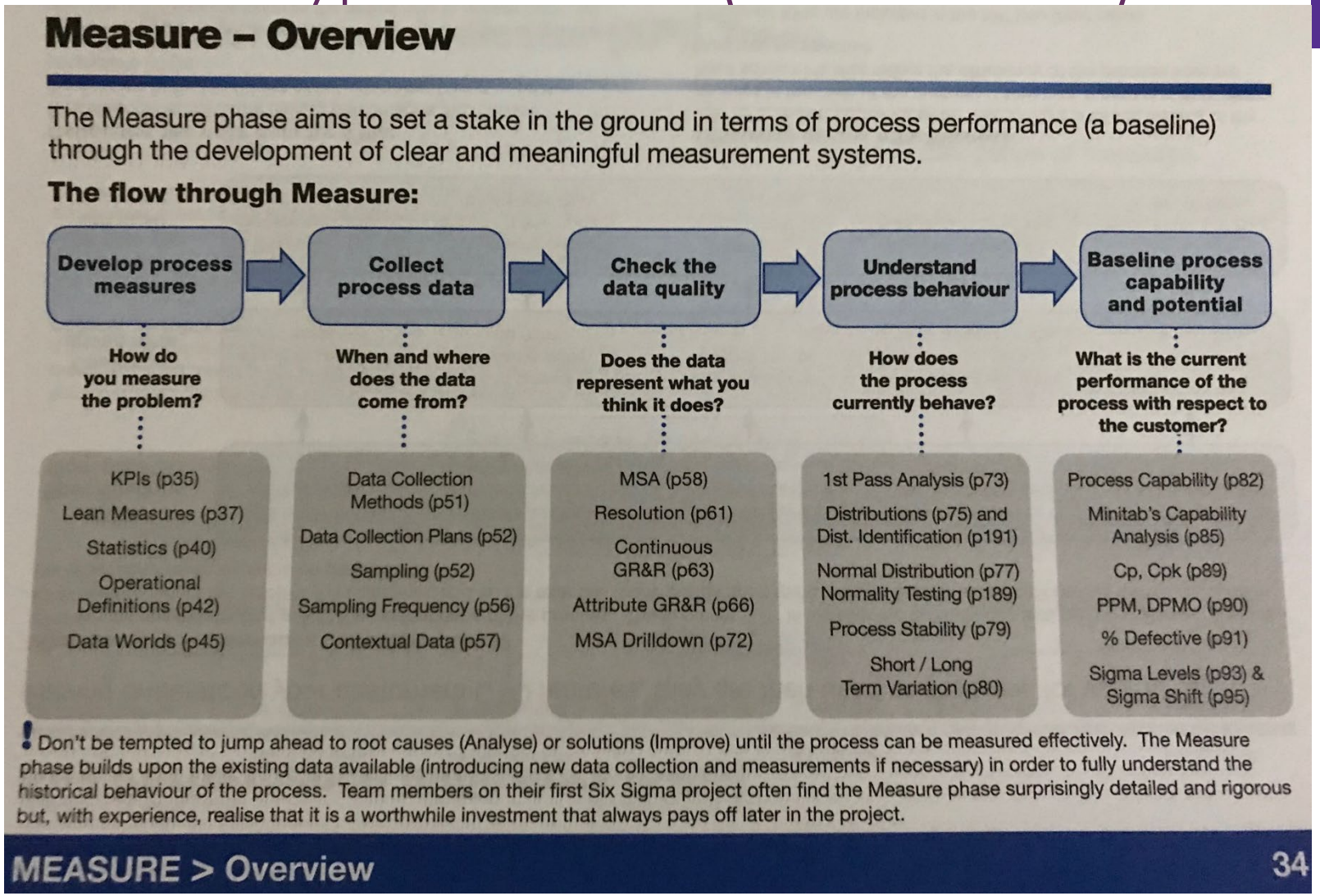
All numeric data can be placed into one of the three Six Sigma Data Worlds described below. Understanding the different data worlds is an important discipline because it has implications for the type of analysis, tools and techniques that will be used later on.

The Six Sigma data world is likely to be...	**Continuous** data world (p46)	**Count** data world (p47)	**Attribute** data world (p48)
When you are...	**Measuring** something	**Counting** things	**Classifying** something
The clues to look out for are...	If you have calculated averages and variation, and if the resolution of your data is only limited by how good your measurement system is.	If you are counting whole things, or if the data can only be integers.	If you are categorising things into different categories that do not necessarily have any numerical value or order (e.g. pass/fail).

Data Worlds – a forgotten principle:
Many training programs do not cover data worlds in enough detail. Understanding the different data worlds and their implications in detail is critical to ensuring that a Six Sigma analyst will be able to select the right tool or technique when back in their workplace.

! There are a variety of different terminologies used for the data worlds which can be very confusing. Appendix D compares and explains the different terminologies in more detail. The terms **Continuous**, **Count** and **Attribute** will be used consistently throughout this text.

Measure: Types of Data (Data Worlds)



Measure – Overview

The Measure phase aims to set a stake in the ground in terms of process performance (a baseline) through the development of clear and meaningful measurement systems.

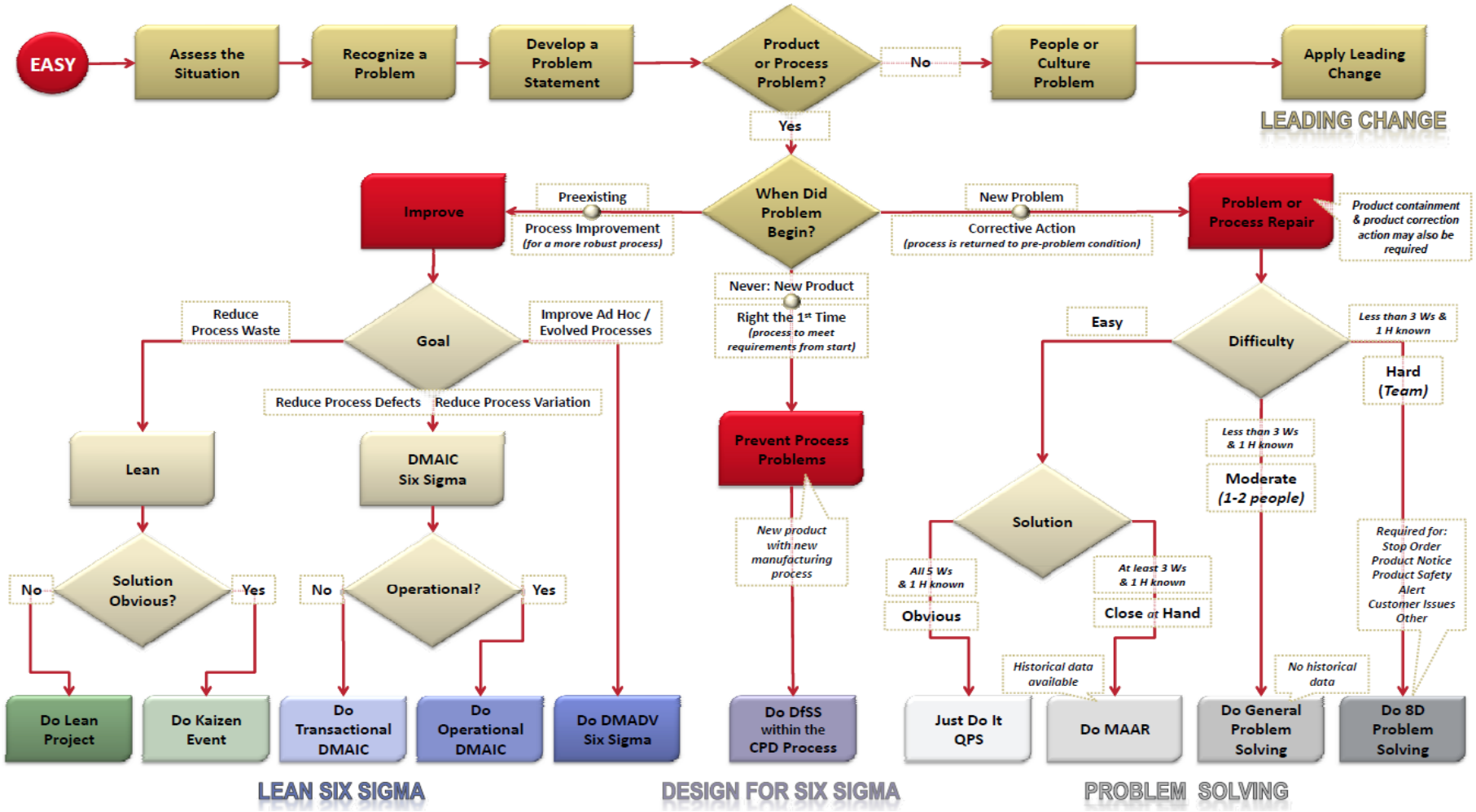
The flow through Measure:

Develop process measures	Collect process data	Check the data quality	Understand process behaviour	Baseline process capability and potential
How do you measure the problem?	When and where does the data come from?	Does the data represent what you think it does?	How does the process currently behave?	What is the current performance of the process with respect to the customer?
KPIs (p35)	Data Collection Methods (p51)	MSA (p58)	1st Pass Analysis (p73)	Process Capability (p82)
Lean Measures (p37)	Data Collection Plans (p52)	Resolution (p61)	Distributions (p75) and Dist. Identification (p191)	Minitab's Capability Analysis (p85)
Statistics (p40)	Sampling (p52)	Continuous GR&R (p63)	Normal Distribution (p77) Normality Testing (p189)	Cp, Cpk (p89)
Operational Definitions (p42)	Sampling Frequency (p56)	Attribute GR&R (p66)	Process Stability (p79)	PPM, DPMO (p90)
Data Worlds (p45)	Contextual Data (p57)	MSA Drilldown (p72)	Short / Long Term Variation (p80)	% Defective (p91)
				Sigma Levels (p93) & Sigma Shift (p95)

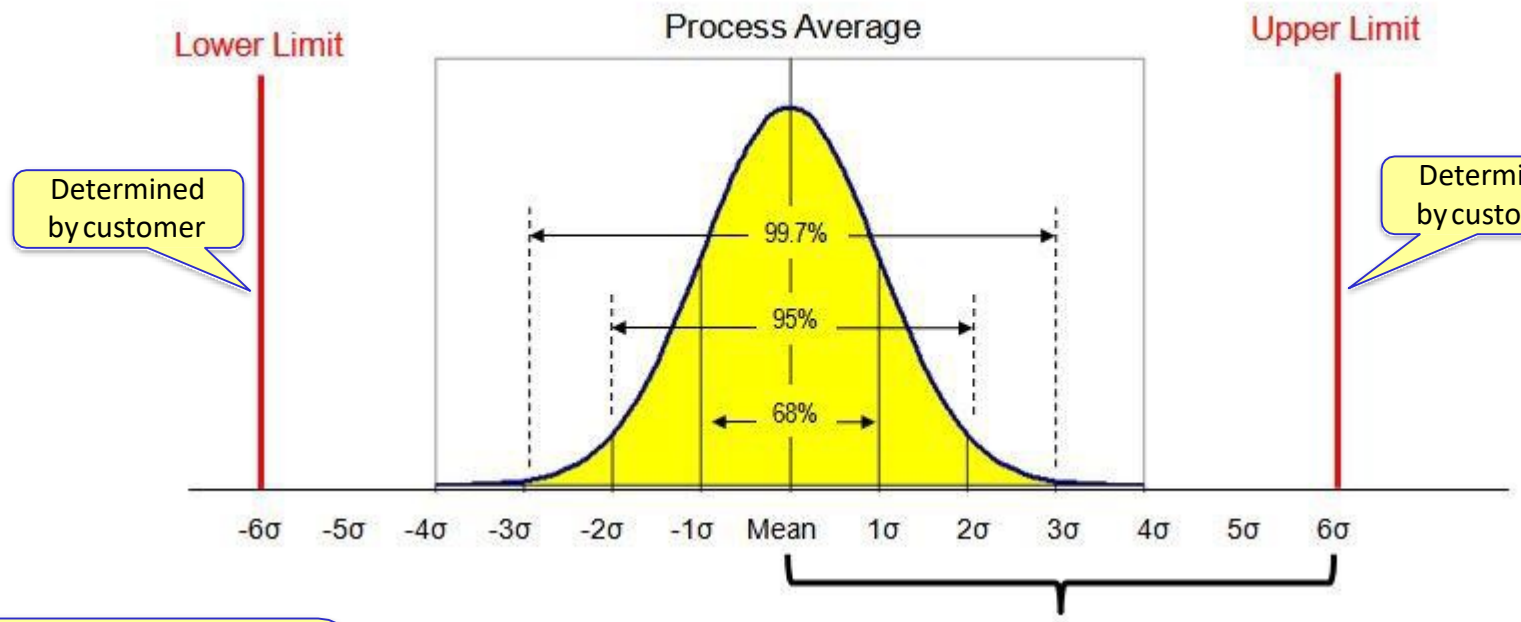
! Don't be tempted to jump ahead to root causes (Analyse) or solutions (Improve) until the process can be measured effectively. The Measure phase builds upon the existing data available (introducing new data collection and measurements if necessary) in order to fully understand the historical behaviour of the process. Team members on their first Six Sigma project often find the Measure phase surprisingly detailed and rigorous but, with experience, realise that it is a worthwhile investment that always pays off later in the project.

MEASURE > Overview 34

Problem Solvers Guide



Six Sigma Defined Visually (cont'd)



Example: In a 2 Sigma process, 95% of the measured values taken in a process will be within two standard deviations from the process average.

Within in a standard normal distribution:
- 68% of the data points will fall within ± one standard deviation from the mean
- 95% will fall within ± two standard deviations
- 99.73% of the data points will fall within ± three standard deviations from the mean

Initially deployed at Motorola in 1986. Adopted at GE at a global scale in 1990s; inspiring many other companies to follow.

σ = Standard Deviation