MBC 638

LIVE SESSION WEEK 1

Agenda

Topic	Time	Thursday 9:00 Section	Sunday 6:30 Section
Introduction	15 min	9:00-9:15PM	6:30-6:45PM
Review Syllabus and Project	30 min	9:15-9:45PM	6:45-7:15PM
Highlights from Week 1 Video	35 min	9:45-10:20PM	7:15-7:50PM
Upcoming Assignments	10 min	10:20-10:30PM	7:50-8:00PM

Introduction 15 min

Topic

Who are you? Watch the intro videos

Tech Review and Ground Rules:

- Learning Management System(2U)
  - Course work, quizzes, tests, watch the videos prior to class, files section will have the material we'll review in each live class
- Launchpad
  - Homework will be done here for the text book, login ASAP
- Live Sessions
  - 9 out of 10 sessions for min of 45 mins for full credit, no excessive pausing, no excuses accepted, no inappropriate class "behavior"
- Wall
  - Good for general questions
- Messages
  - Email is best contact method.
- Get 2U app and Syracuse email app for your phone(**check email OFTEN)**
- Office hrs.
  - After classes listed on calendar

Who am I?

Introduction

Lynn Gill

Educational/Certifications: Industrial Engineering and Computer Integrated Manufacturing systems, ASQ Certified Black Belt in Six Sigma, and holder of two patents

Work Background: 22 years at Xerox in a variety of roles: Industrial Engineer - manufacturing and non-manufacturing projects, Market Analyst – forecasting, primary market research, share reporting, Global Services Analyst-bid tool development and support, Senior Business Systems Analyst in Information technology for an application supporting the supply chain, Program Manager in Pricing Strategy focusing on the total cost of ownership in pricing development, as well as developing pricing tools for solutions

Personally: I've got 3 kids with ages ranging from 9 to 15, I still currently work at Xerox, and I pretty much have no hobbies with the exception of reading and the occasional TV show

Philosophy for this class:
We are in this together, let's take it a week at a time and get it done. The importance of the tools and techniques we will learn in this class is that they will provide a framework for how to approach a project in the real world – how to think about it, form a plan, and how to step through answering a question or solving an issue.

I don't have much patience for procrastination, if you have an issue or question please let me know asap.

Contact Info:
The best way to contact me is via email, then I can respond or we can set-up a time to talk live.
Office hrs: Thursday 10:30PM, Sunday 8PM– shoot me an email if you plan to attend the office hrs. not immediately after your class in case we end early
Email: lsgill@syr.edu , phone: 585-703-6463

Review of Syllabus 30 min

Topic
Point by Point Review of Syllabus • 01 Syllabus • 02 Optional Learning • 03 Calendar • 04 Launchpad for Hmwk • 05 DMAIC Course Flow
Project Requirements and Ideas • 06 Process Improvement Project Reqts • 07 Project ideas • 08 Examples of Storyboards • 09 Project Rubric • 10 Improvement Tool List • 11 Which Tool When • Display only – Project Example • 12 Assignment #1 Problem Definition Wksht • 13 Rubric for Problem Definition Wksht • Display only - worksheet • File 14-21: 14 SQL table, 15 helpful Excel functions, 16 StatPlus helpful hints, 17 Kappa calcs, 18 peanut pdf, 19 descriptive stats example, 20 Lynda resource, 21 Macmillan support, 22 Links to Microsoft software and tool pak for MAC

Review: Project Ideas

There is a large list of thought starters for project ideas posted in the file section of the learning management system.

Some additional ideas based on my own background in various areas as well as some additional personal examples:

- Decrease time to receive product cost data on pre-launch products for inclusion in a bid tool
- Improve time to deliver a finished product to the end customer based on distribution locations and mix of inventory
- Reduce daily sugar intake by 25%
- Increase savings per day by 10%
- Decrease grocery cost per day by 10%

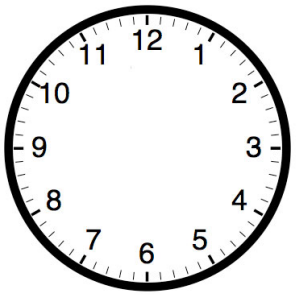
- **No athletic performance improvement projects – we know practice goes up so does performance also injury risk to completion.**

- **No weight loss projects**

- **You should not have a preconceived solution – the project is about using the tools to discover a solution.**

- **You need the to have available data and control over the process.**

- **Think data you can collect daily**



Think measurable continuous data ……TIME or MONEY

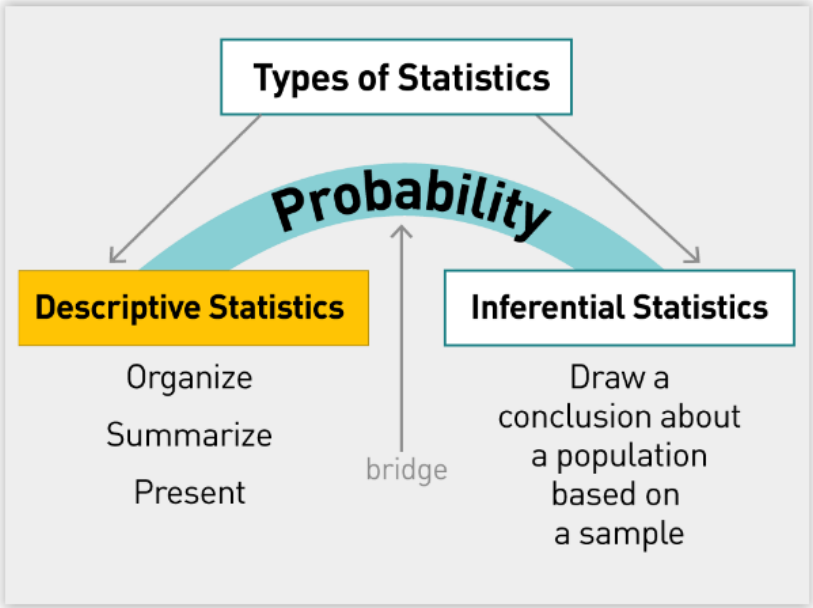
Highlights from Week 1 Video: 35 min

Topic
1.3 DMAIC, Y=F(X)
1.4 Types of Data
1.6 Defects and SQL
1.7 Operation Definitions and Describing Data
1.8 Soft Tools
1.9 Kappa

Highlights: Video Segment 1.3 DMAIC

Statistics

Statistics provides the means to collect, organize, analyze, present and interpret numerical information in order to make more informed and effective decisions.



Highlights: Video Segment 1.3 DMAIC

DMAIC

Define – what is important, clearly articulate the business problem, goal, potential resources, business case, project scope and high-level project timeline

Measure – how are we doing, develop a data collection plan and implement, decide on what should be measured and how to measure it, establish current state baseline as the basis for improvement, the Measure phase will be compared to the performance metric at the conclusion of the project to determine objectively whether significant improvement has been made.

Analyze – what is wrong, the purpose of this step is to identify, identify and verify critical Xs, validate and select root cause for elimination

Improve – what needs to be done, identify, test and implement a solution to the problem

Control – how do we maintain the improvements, sustain the gains, create a control plan.

Highlights: Video Segment 1.3 DMAIC

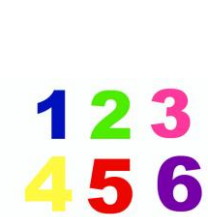
The generalized equation of **Y = F(X)** describes the relationship between the inputs and the outputs, independent(X) and dependent(Y) variables.

What inputs drive your output? If looking at your sugar intake, what meal is driving the sugar consumption up? What day of the week? What particular food item? What activities are you engaged in on a daily basis? What location? Time spent driving?

	Y	X1	X2	X3	X4	X5	X6	X7	X8
	Total Grams of Sugar per Day	Week day vs Weekend Day	Miles Driven	Out of Town	Breakfast Grams	Lunch Grams	Dinner Grams	Social Time in Mins	Mins Worked
Day 1	55	WD	20	Y	10	20	35	50	480
Day 2									
Day 3									
Day 4									

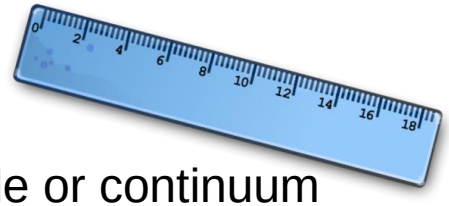
For your project – you will collect data of your current state and after you have made changes or improvements

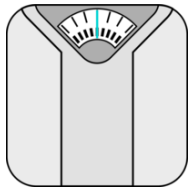
Highlights: Video Segment 1.4 Types of Data



Discrete: the number of or proportion that fit into a category

Examples: Eye color, martial status, good/bad, boy girl, grade, objects that come in whole units(people, cars, animals, etc.)





Continuous: A number from a measurement scale or continuum

Examples: Weight, height, distance, money, time, temperature, length

Highlights: Video Segment 1.4 Data Pros/Cons

Discrete Data

Pros	Cons
Fast to collect	Prone to greater error due to subjectivity
Easy to collect	No measure of variability
Can be used to measure subjective concepts	Analysis is limited – many statistical techniques need continuous data
	Need a lot more data to use any statistical tests or tools

Continuous Data

Pros	Cons
Variability is measurable	Make take longer to collect the data
Data is objective	Data may be more difficult to collect
Less data provides more certain results	Not as easily applicable to subjective data
Get more information out of the data (instead of Small, Large, 15 inches and 27 inches)	
Statistical tests and tools can be applied	

Highlights: Video Segment 1.6: Defects and SQL

A defect is not meeting customer requirements.

- In terms of your projects, you must calculate SQL which requires you to identify a defect.
- Using my example of getting pre-launch product data to include in a bid tool – a defect could be anytime I didn't receive the pre-launch data at least 30 days prior to launch.
- For trying to save additional money per week, anytime you didn't save at least X dollars or X percent of your income per week or per day etc., would be a defect.
- For cutting sugar intake, any time you exceeded the daily recommended amount of sugar per day you could count it as a defect.

SQL – Sigma Quality Level - A sigma quality level serves as an indicator of how often defects are likely to occur in processes, parts, or products. It can be used to describe if the process is capable of meeting customer requirements. The best possible process in the world would have a Sigma Level of +∞ (infinity) and the worst possible process in the world would have a Sigma Level of –∞ (negative infinity).

Sigma Quality Levels are based on DPMO

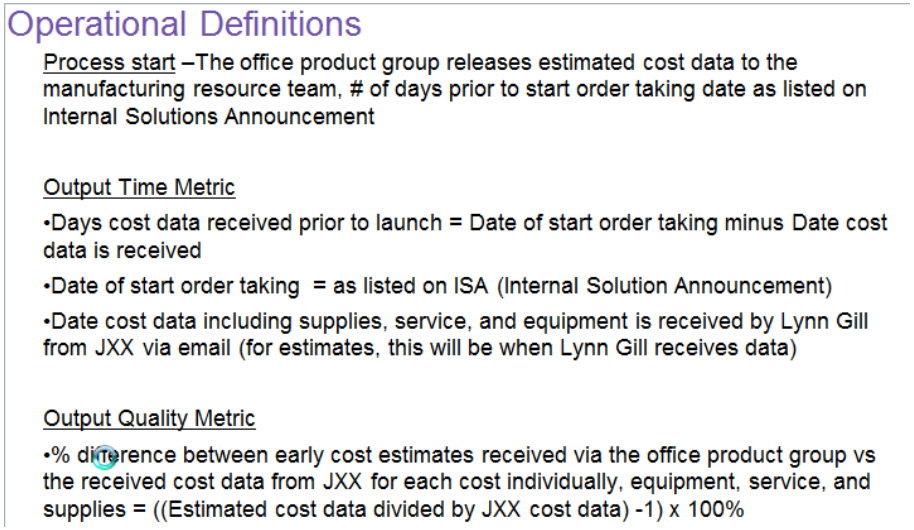
How do you calculate DPMO & SQL?

1. Defect opportunities per unit:	D = 3
2. Units produced per day:	U = 100
3. Total possible defects per day:	D × U = 300
4. Total actual defects:	A = 20
5. Defect per opportunity rate:	A ÷ DU = DPO X 100= 6.7%
6. Defects per million opportunities (DPMO):	DPO × 1,000,000 = 67,000
7. SQL value (from SQL table):	3

DPMO	S.Q.L.	Yield	DPMO	S.Q.L.	Yield	DPMO	S.Q.L.	Yield
934,000	0	6.60%	308,000	2	69.20%	6,210	4	99.40%
920,000	0.1	8.00%	274,000	2.1	72.60%	4,660	4.1	99.50%
900,000	0.2	10.00%	242,000	2.2	75.80%	3,460	4.2	99.70%
880,000	0.3	12.00%	212,000	2.3	78.80%	2,550	4.3	99.75%
860,000	0.4	14.00%	184,000	2.4	81.60%	1,860	4.4	99.81%
840,000	0.5	16.00%	158,000	2.5	84.20%	1,350	4.5	99.87%
810,000	0.6	19.00%	135,000	2.6	86.50%	960	4.6	99.90%
780,000	0.7	22.00%	115,000	2.7	88.50%	680	4.7	99.93%
750,000	0.8	25.00%	96,800	2.8	90.30%	480	4.8	99.95%
720,000	0.9	28.00%	80,800	2.9	91.90%	330	4.9	99.97%
690,000	1	31.00%	66,800	3	93.30%	230	5	99.98%
650,000	1.1	35.00%	54,800	3.1	94.50%	150	5.1	99.99%
610,000	1.2	39.00%	44,600	3.2	95.50%	100	5.2	99.99%
570,000	1.3	43.00%	35,900	3.3	96.40%	70	5.3	99.99%
540,000	1.4	46.00%	28,700	3.4	97.10%	40	5.4	99.996%
500,000	1.5	50.00%	22,700	3.5	97.70%	30	5.5	99.997%
460,000	1.6	54.00%	17,800	3.6	98.20%	20	5.6	99.998%
420,000	1.7	58.00%	13,900	3.7	98.60%	10	5.7	99.999%
382,000	1.8	61.80%	10,700	3.8	98.90%	8	5.8	99.999%
344,000	1.9	65.60%	8,190	3.9	99.20%	5	5.9	99.9995%
						3.4	6	99.9997%

Highlights: Video Segment: 1.7 Operational definitions

- Operational definitions are very important. i.e. peanut exercise – what defines a good peanut, good operational definitions for discrete data collection is critical
- An operational definition can be defined as a clear and understandable unambiguous description of what is to be observed and measured relative to a specific process or measurement, such that different people collecting, using and interpreting data will do so consistently.
- An operational definition is a concept to guide what properties will be measured and how they will be measured.



Operational Definitions

Process start –The office product group releases estimated cost data to the manufacturing resource team, # of days prior to start order taking date as listed on Internal Solutions Announcement

Output Time Metric

•Days cost data received prior to launch = Date of start order taking minus Date cost data is received

•Date of start order taking = as listed on ISA (Internal Solution Announcement)

•Date cost data including supplies, service, and equipment is received by Lynn Gill from JXX via email (for estimates, this will be when Lynn Gill receives data)

Output Quality Metric

•% difference between early cost estimates received via the office product group vs the received cost data from JXX for each cost individually, equipment, service, and supplies = ((Estimated cost data divided by JXX cost data) -1) x 100%

Chapter 3 in the textbook

Highlights: Video Segment: 1.7:Describing Data

3 Ways to Measure the Center of the Data

1. Mean(average): To find the mean of the values in a data set, simply add up all the numbers and divide by how many numbers you have.
2. Mode(most frequent value): The mode of a data set is the data value that occurs with the greatest frequency.
3. Median(middle point of the data): The median of a data set is the *middle data value* when the data are put into ascending order. Half of the data values lie below the median, and half lie above. If the sample size *n* is odd, then the median is the middle value. If the sample size *n* is even, then the median is the mean of the two middle data values.

3 Ways to Measure the Dispersion of the Data

1. Range: The range of a data set is the difference between the largest value and the smallest value in the data set:
2. Standard Deviation: may be interpreted as the typical difference between a data value and the sample mean for a given data set. **i.e. 10**

$$s = \sqrt{s^2} = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}}$$

3. Variance: is approximately the mean of the squared deviations in the sample given by the formula, **standard deviation squared, i.e. 100**

$$s^2 = \frac{\Sigma(x-\bar{x})^2}{n-1}$$

Descriptive Statistics

Tool	What is it?	Textbook Reference	Example	Excel Function
Measure of Center (Measure of Location)	A measure of the middle (or central portion) of the data set. 3 measures are: **Mean** = arithmetic average **Median** = middle value **Mode** = most frequent value	Discovering Stats 3e – pg.108-117	Data: 5 7 8 8 2 **Mean** = (5 + 7 + 8 + 8 + 2) /5 = 6 **Median** = 2, 5, 7, 8, 8 … middle number =7 **Mode** = occurs two times = 8	**Mean** = AVERAGE (data range) **Median** = MEDIAN (data range) **Mode** = MODE (data range)
Measure of Variability (Measure of Dispersion or Spread)	A measure of how the data is spread around the mean. 3 measures are: **Range** = difference between the largest and the smallest data point **Standard Deviation (sample)** = measure takes into account each data point and its distance from the mean **Variance** = standard deviation squared	Discovering Stats 3e – pg.126-137	Data: 5 7 8 8 2 **Range** = 2, 5, 7, 8, 8 … largest – smallest = 8-2 = 6 **Standard deviation** = use Excel = 2.5495 **Variance** = standard deviation squared = 6.5	**Range** = MAX (data range) – MIN (data range) **Standard deviation** (sample) = STDEV.S (data range) **Variance** (sample)= VAR.S (data range)

$\mu = population\ mean$

$\bar{x} = sample\ mean$

$s = \sqrt{\frac{\sum(x-\bar{x})^2}{n-1}}$

$\sigma = population$

$s = sample$

Using Excel DataAnalysis Toolpak …..Select….. Data > Data Analysis > **Descriptive Statistics**

Input Range : ←-------- raw data goes here

Output Range: ←---------where you want the answer

☑ Summary Statistics

Highlights: Video Segment: 1.7:Describing Data

Example:
5,7,10,12,8,9,8,7,7,6,4,2

Descriptive Statistics from Excel Add-in

		Column1	
5			
7			
10		Mean	7.083333333
12		Standard Error	0.773209891
8		Median	7
9		Mode	7
8		Standard Deviation	2.678477632
7		Sample Variance	7.174242424
7		Kurtosis	0.405739907
6		Skewness	-0.106366273
4		Range	10
2		Minimum	2
		Maximum	12
		Sum	85
		Count	12

<u>How to Generate the Descriptive Stats in Excel</u>

1. Copy data into a column in Excel without commas
2. Click Data
3. Click Data Analysis
4. Select Descriptive Statistics
5. Select Input Range, as your column of data
6. Click Output Range, and click in the sheet where you want the output
7. Click Summary Stats
8. Click OK

<u>A Framework for thinking about sources of variation:</u>

TOME model

Task – work being done

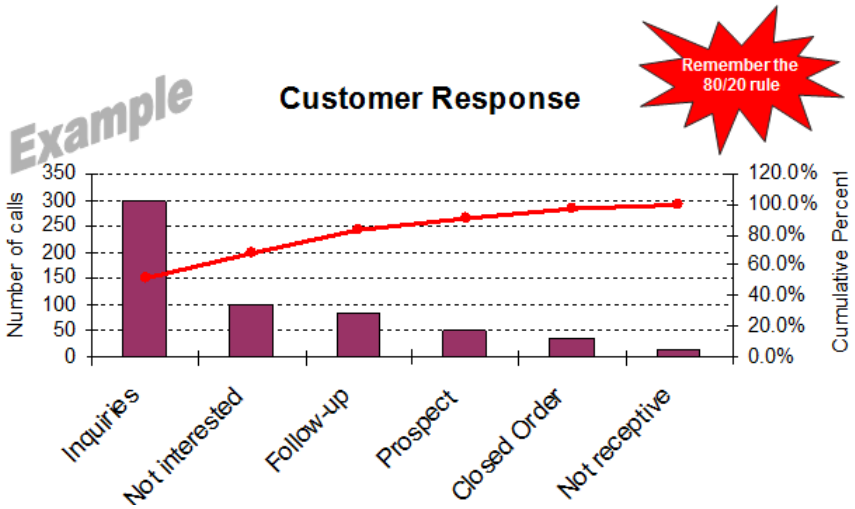
Operator – person

Machine – technology

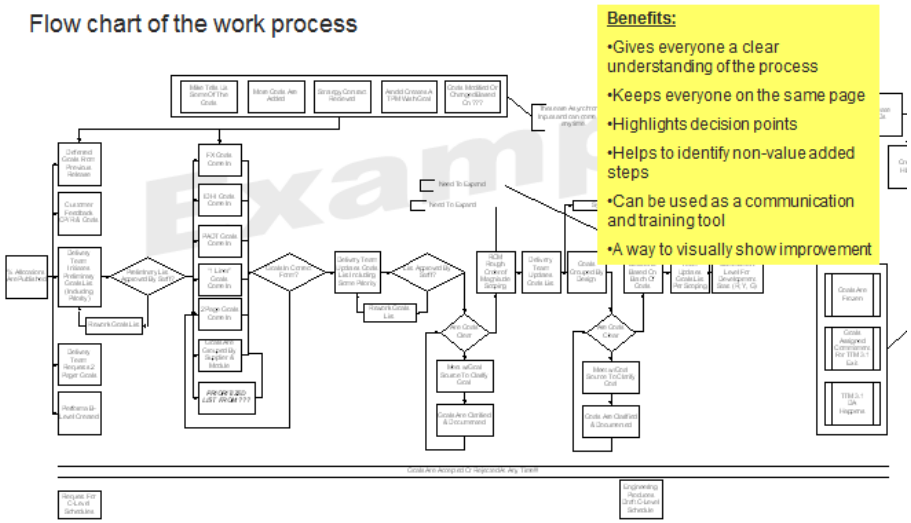
Environment – surroundings

Highlights: Video Segment 1.8 Soft Tools

Pareto Chart – Establishes Priorities

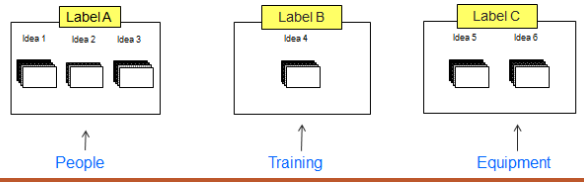


Process Map or Value Stream Map

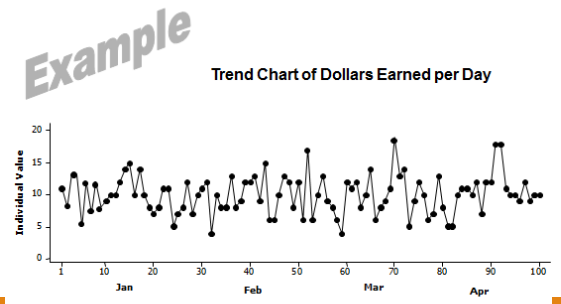


Affinity Diagram

1. Collect data/ideas from surveys, interviews, or brainstorming.
2. Write data/ideas on post-it-type notes (one idea per note).
3. Group the common ideas together (based on intuition not necessarily logic)
4. Select a common label for those ideas



Trend Chart / Time Plot

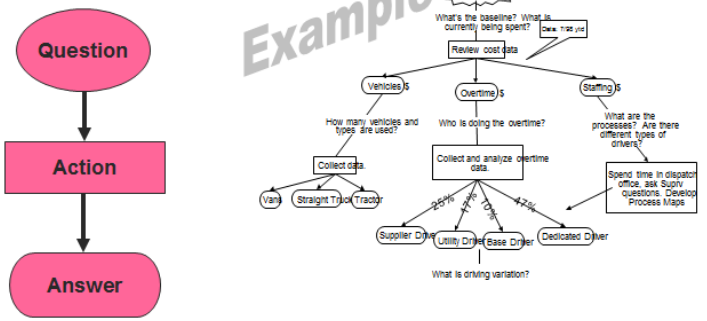


Also called Run Chart … shows trends in data over time.

Source: SU MBC638 asynchronous content L.Martin

Highlights: Video Segment 1.8 Soft Tools

Thought Process Map – Critical Thinking



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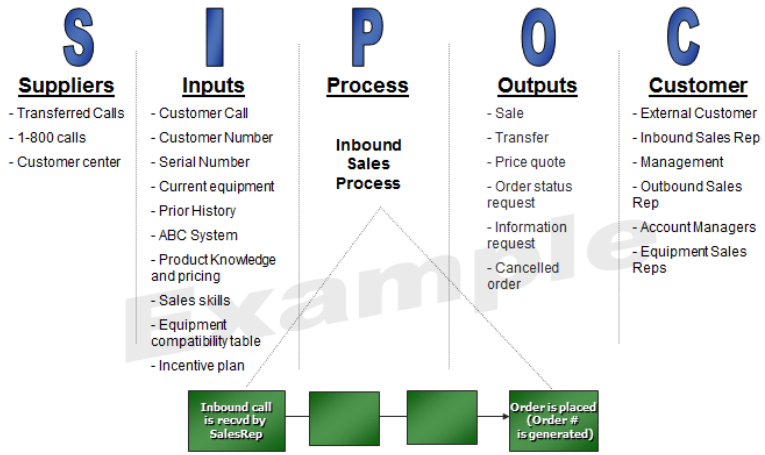
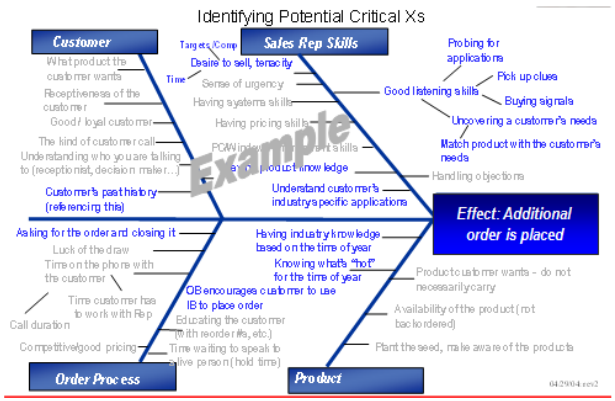
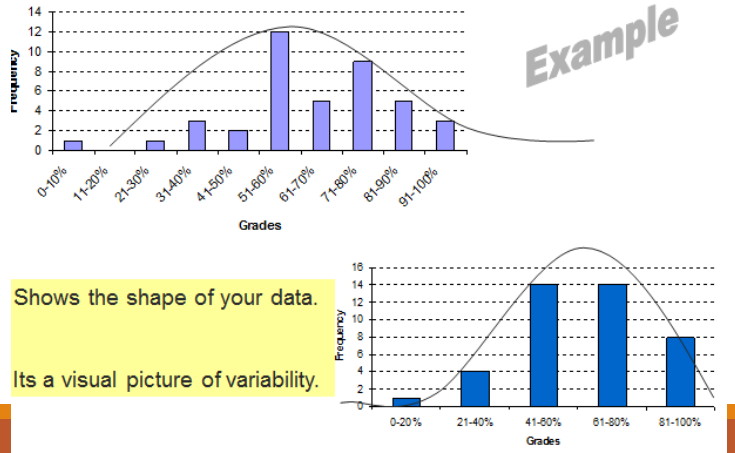


Cause & Effect Diagram (Fishbone, Ishikawa)

A way to identify all of the contributing root causes likely to be causing a problem, to document /understand the sources of process variability.



Histogram / frequency distribution



Source: SU MBC638 asynchronous content L.Martin

Highlights: Video Segment 1.9/1.10 Kappa

- Kappa(K) : is an index that can be used to determine if your measurement system(tool) is working correctly for discrete data in terms of reproducibility (between people) and repeatability(the same person's ratings).
- This acts as a flag that the measurement system needs to be reevaluated if it is not producing reproducible and or repeatable results. This means your results may not be valid.

	Is it Good or Bad?	Is it Good or Bad?	Did you agree?
Peanut #	Your answer	Your fellow inspector's answers	yes/no
1	G	G	TRUE
2	B	B	TRUE
3	G	B	FALSE
4	B	B	TRUE
5	B	G	FALSE
6	G	G	TRUE
7	B	B	TRUE
8	G	G	TRUE
9	G	B	FALSE
10	B	B	TRUE
11	B	G	FALSE
12	B	B	TRUE
13	B	G	FALSE
14	G	G	TRUE
15	B	B	TRUE
16	G	G	TRUE
17	B	B	TRUE
18	B	G	FALSE
19	B	B	TRUE
20	B	B	TRUE
Totals	20	20	
Percent Good	7	9	
Percent Bad	13	11	
Percent Agreed			14
Percent Good	0.35	0.45	
Percent Bad	0.65	0.55	
Percent Agreed			0.70

Reproducible(between two different operators) example calculations for peanut exercise

Calculate Kappa:					
K = (P observed - P chance) / (1- P chance) =					
P Observed	0.70			Note:	
P Chance	(.35X.45) + (.65X.55)=	0.515		good x good + bad x bad	
	K = (.70-.515)/(1-.515)=	0.381443299			
Is your measurement system good?					

IF K> .7 then the system is good, my K value is .38, therefore it is not a good measurement system in terms of reproducibility.

Highlights: Video Segment 1.9/1.10 Kappa

- Repeatable(within operator-same operator) example calculations for peanut exercise

Inspect the peanuts again			
	Is it Good or Bad?	Is it Good or Bad?	Did you agree?
Peanut #	Your 1st answer	Your 2nd answer	yes/no
1	G	G	TRUE
2	B	B	TRUE
3	G	G	TRUE
4	B	B	TRUE
5	B	B	TRUE
6	G	G	TRUE
7	B	G	FALSE
8	G	G	TRUE
9	G	B	FALSE
10	B	G	FALSE
11	B	B	TRUE
12	B	B	TRUE
13	B	G	FALSE
14	G	B	FALSE
15	B	B	TRUE
16	G	B	FALSE
17	B	B	TRUE
18	B	B	TRUE
19	B	B	TRUE
20	B	B	TRUE
Totals	20	20	
Count Good	7	7	
Count Bad	13	13	
Count Agreed			14
Percent Good	0.35	0.35	
Percent Bad	0.65	0.65	
Percent Agreed			0.70

Calculate Kappa:

K = (P observed - P chance) / (1- P chance) =

P Observe	0.70	
P Chance	(.35X.35) +	0.545
		0.340659

Is your measurement system good?

IF K>= .85 then the system is good, my K value is .34, therefore it is not a good measurement system in terms of repeatability.

Review of Upcoming Assignments: 10 min

Topic	Thursday Section Due Dates	Sunday Section Due Dates
Problem Definition Worksheet	Sunday 10/7 Midnight EST	Wednesday 10/10 Midnight EST
Login to LaunchPad	ASAP	ASAP
Quiz #1 (The quiz password is GoodLuck8488, 30 mins, we will review next week during class)	Sunday 10/14 Midnight EST	Wednesday 10/17 Midnight EST