

Live Session 8

1. Welcome/Intro (including polls)
2. Control Charts (Process Behavior Charts)
3. Assignments for next 2 weeks
4. Wrap up and Feedback

Improve

Control

Description:

Develop potential solutions, select best solution, pilot solutions, measure results, document new process.

Key Concepts:

Discover $y = f(x)$

Project:

Implement a solution, run a pilot, evaluate the results, complete a hypothesis test.

Tools:

Affinity diagram
Fishbone cause/effect diagram
Pareto
Control charts
Hypothesis testing
Process map
Solution selection matrix

Description:

Implement process changes and controls. Verify expected performance was achieved, monitor performance to sustain new levels.

Key Concepts:

Xbar/R and ImR control charts, Different control charts applicable to different processes, time series forecasting methods predict future performance.

Project:

Utilize an appropriate control chart and /or time series forecasting method

Tools:

Control charts
Time series analysis
Operational definitions
Process map
Sigma Quality Level (SQL)

Week 8

Week 9

Control Charts (Process Behavior Charts)

All processes have variation.

Control charts help you see the type of variation in your process

One of the most common use of control charts is to monitor a process

Common cause: predictable, routine, stable; noise

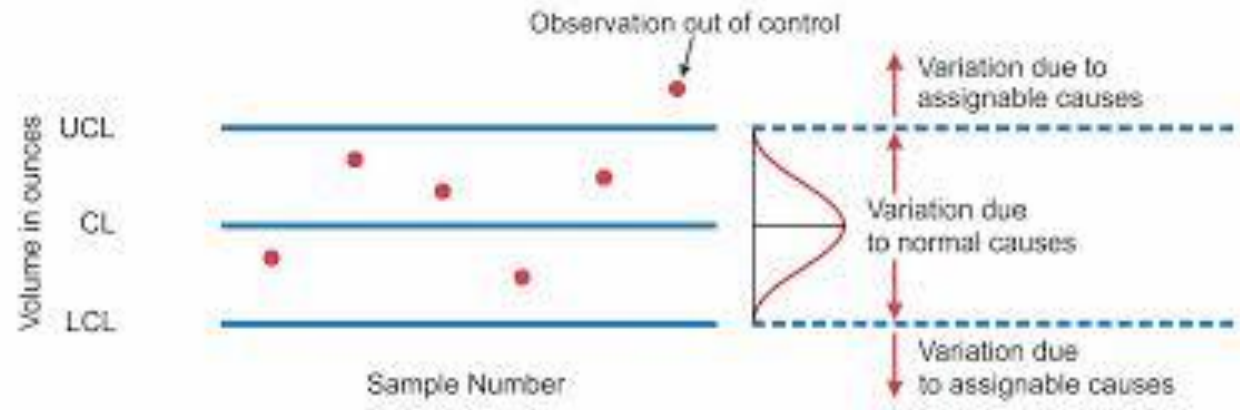
Special cause: unpredictable, unstable, out of control; a signal

If a control chart indicates special cause variation, something needs fixing/investigating

What are some common cause and special cause variations in your processes?

Control Charts (Process Behavior Charts)

Elements of a control chart:



Centerline = average

Control Limits:

UCL (upper control limit) LCL (lower control limit)

y = your metric, process output

x = your subgrouping plan (usually time)

When a process is “in control” does this mean that it’s a good process?

Give an example to explain

Control Charts (Process Behavior Charts)

Out-of-Control Signals → means special cause variation

One or more points outside control limits

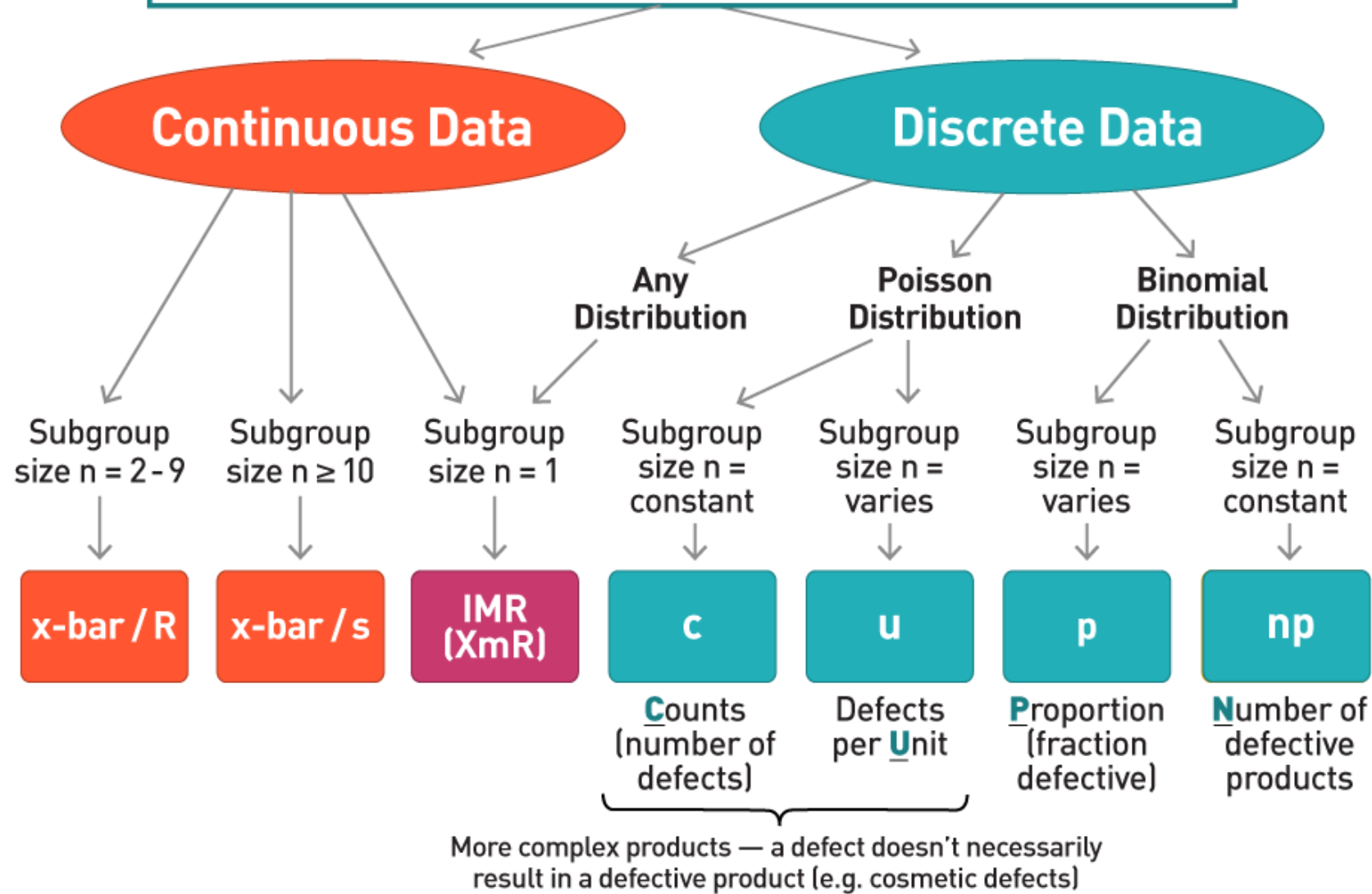
Also, data patterns inside control limits

- Seven or more consecutive points above/below centerline
- Look for patterns forming
- E.g., consecutive points all above; all below; repeatedly alternating above and below

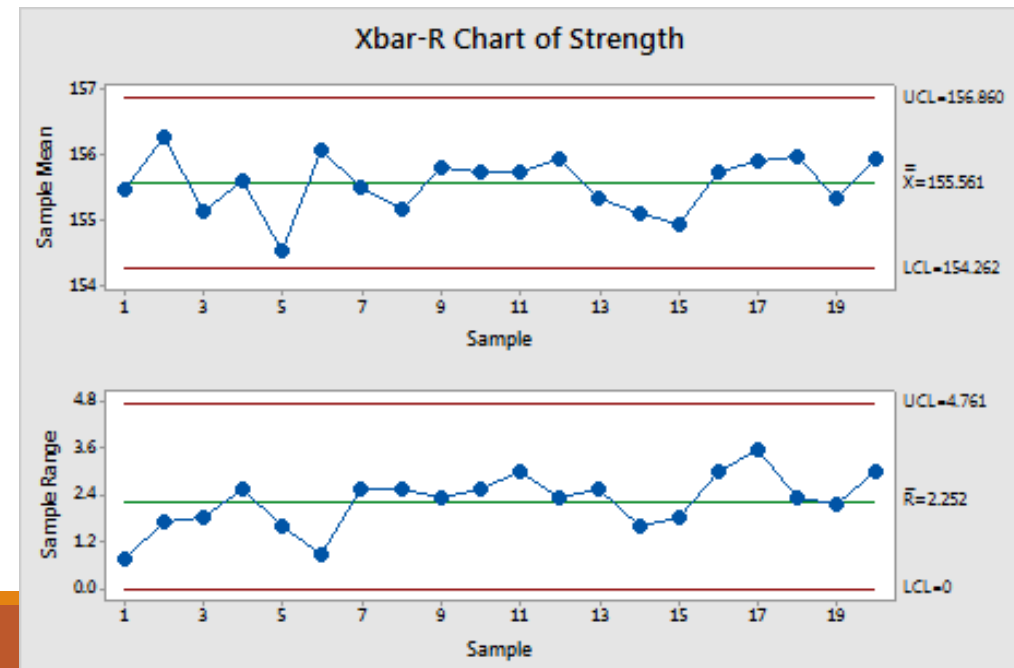
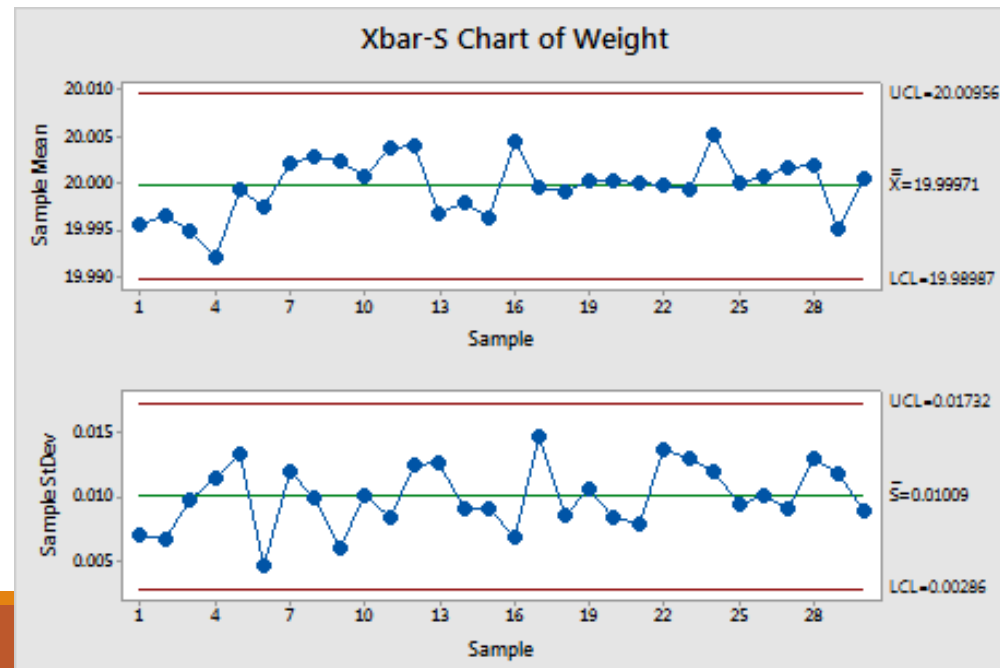
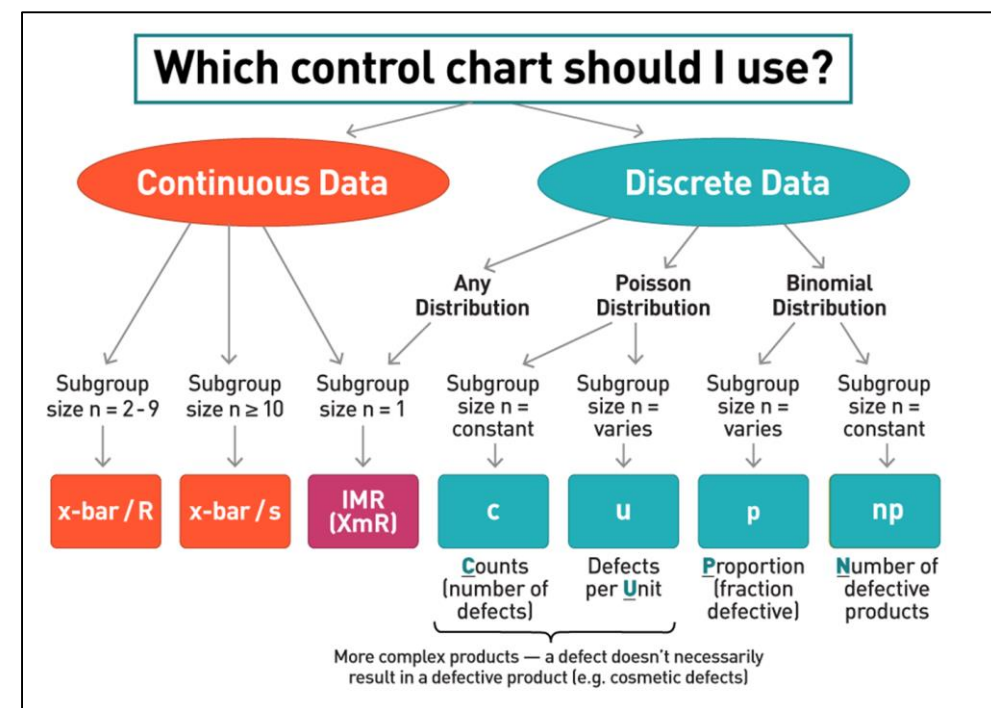
Random variation desirable

Pattern indicates a change in the process

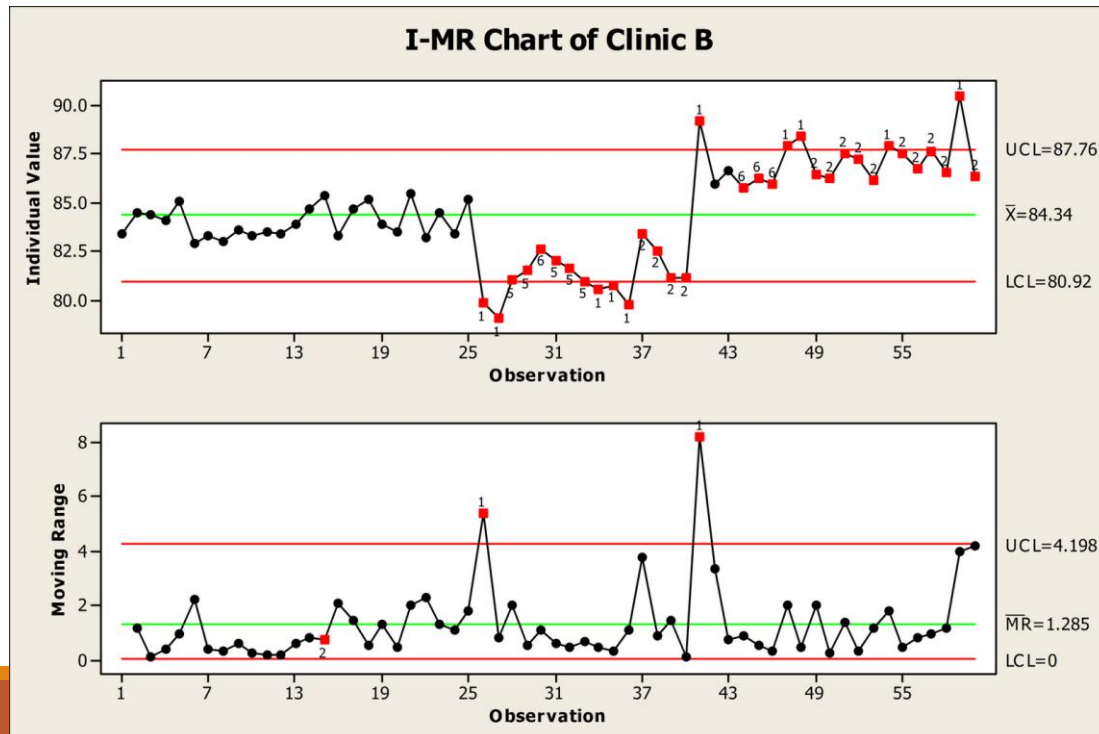
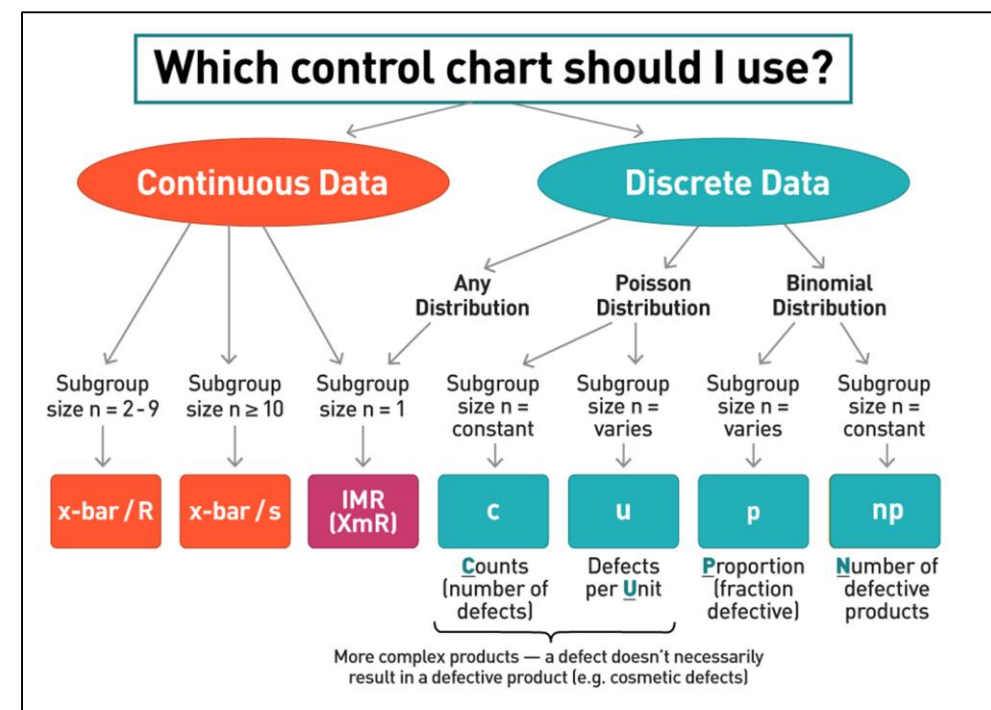
Which control chart should I use?



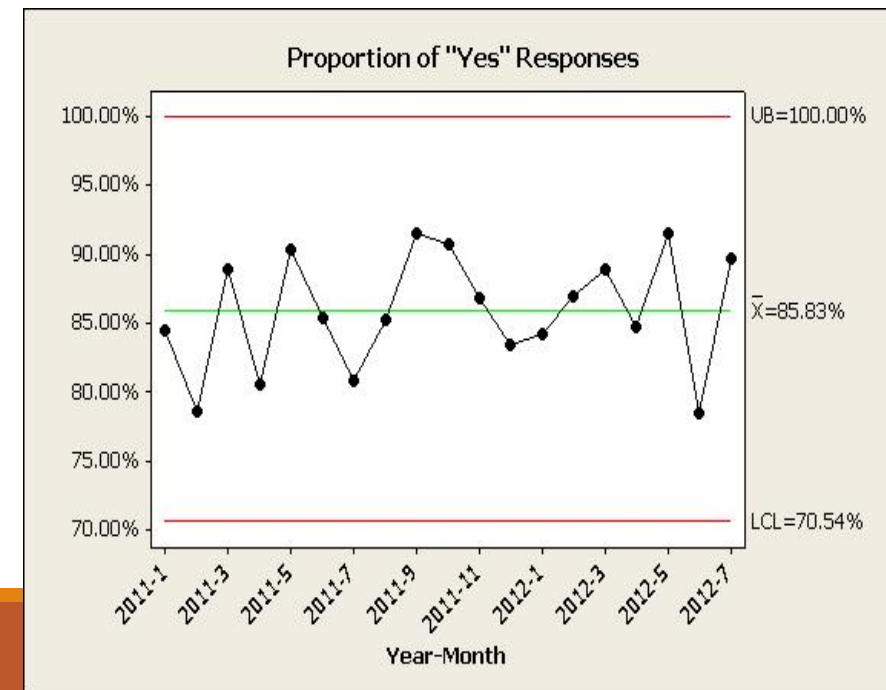
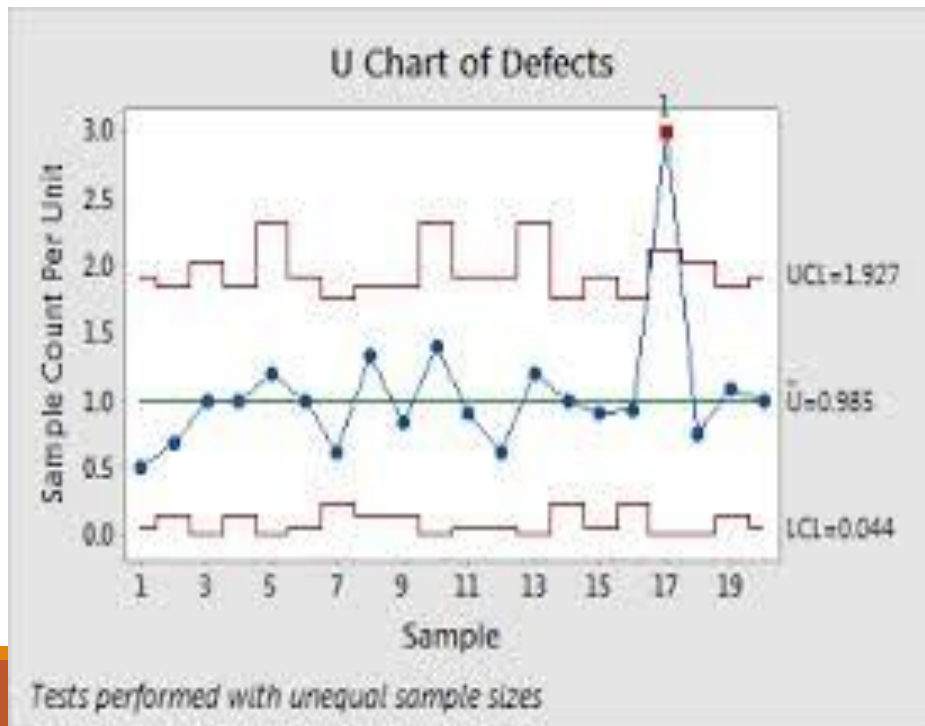
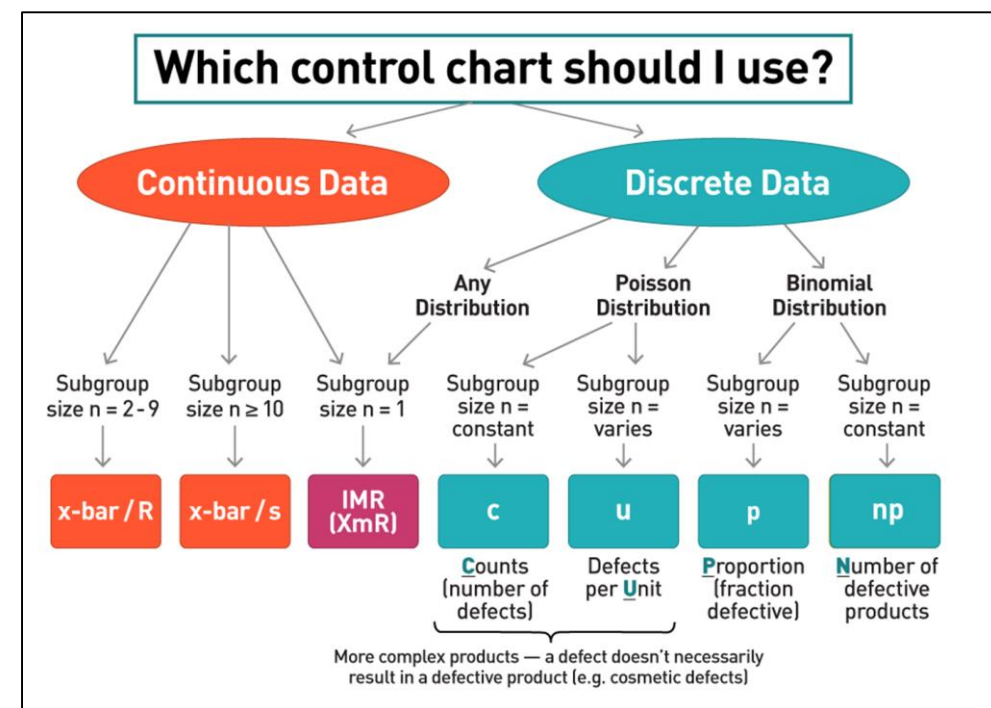
1. What type of data is measured in these charts?
2. Why was the chart chosen?
3. What can we say about the process variation for each chart?
4. Would you investigate further? Why or why not?



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Control Charts (Process Behavior Charts)

Control Charts as a proactive tool:

Measurement System Analysis

- Also referred to as Gauge R&R
- Useful in confirming that your measurement system is capable of measuring differences between items
- Similar to discrete tool (Kappa) used for peanut exercise
- You WANT to see your range in control and your x-bar chart out of control

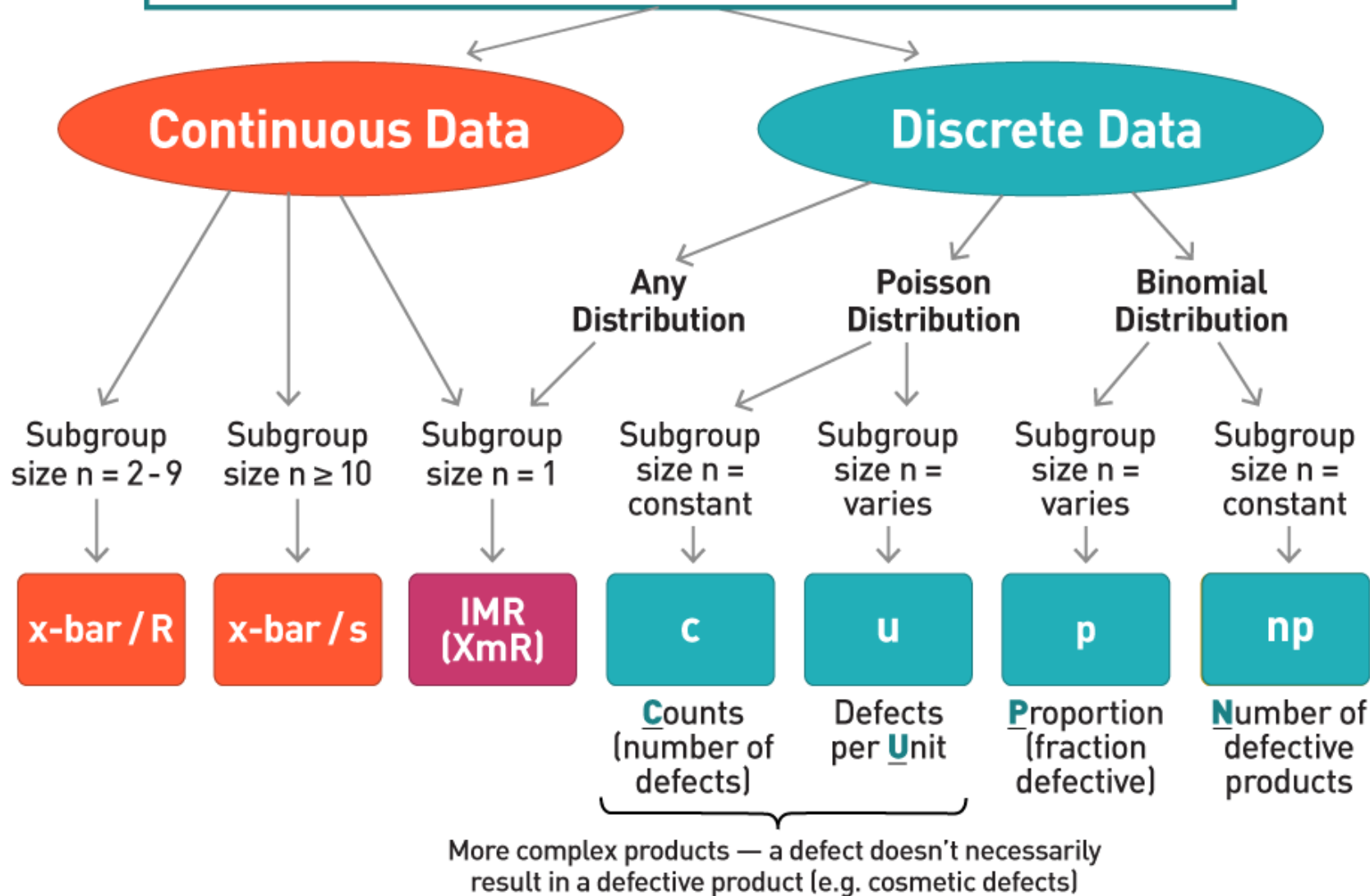
Trends

- Is my process shifting?
- Is there a pattern in my data that needs investigating?

Rational Subgrouping

- Is there a difference between different factors in my process? i.e. shift, operator, product line, location...

Which control chart should I use?



How could you use Control Charts in your project?

1. What type of data would you want to monitor?
2. What's your plan for out of control data?
3. Which chart could you use?

Process Improvement Project

-Rubric-

Content Requirements	Possible Points
A) An executive summary is provided in the storyboard format including: Is the storyboard presented in 1 PowerPoint slide? Follows DMAIC? Are tools/graphs/charts used and clearly visible? Do they support findings and conclusions Are arrows, call-out boxes, etc. used to summarize, highlight questions and key learnings? Are expected results clear? And next steps noted?	5.0
B) Is it a cohesive presentation opening with the business process and problem statement? The back-up slides (5-15) detail and support the storyboard content.	2.0
C) Was the success measure clearly identified, operationally defined and baseline identified? (Was the data identified as continuous or discrete, includes SQL?)	3.0
D) Was the data measurement plan or data stratification tree included?	1.0
E) Was the data collection method identified?	1.0
F) Was there rationale for the sample size taken? Use of the formula? Is there any reference to measurement error and how to minimize?	1.0
G) Are at least 5 different tools and techniques clearly identified? Are the tools linked/ pertinent to the data analysis?	5.0
H) Does the data analysis clearly tie to the problem conclusion? Is the “discovery” clear to the reader?	2.0
Total	20

Sample projects

Next two weeks

1. Project Next Steps – Analyze/Improve Phases

Analyze tools

Begin identifying solutions to try

Plan pilot or implementation of solutions

2. Coursework BLT's:

8.7 Test Your Knowledge: Measurement System

8.8* Relate Control Charts to Your Project

9.9 Test Your Knowledge: Time Series Models

9.10* Relate Time Series to Your Project

3. Assignments:

Homework #5: (worth 3 points)

Three days after live session 8

Assignments and Deliverables folder on 2SU

- Complete Control Chart problems **#1-10 on pgs 114 -116** from the ***Understanding Variation*** Book.

Upcoming assignment:

Homework #6: (worth 2 points) Three days after live session 9

Assignments and Deliverables folder on 2SU

- Complete Time Series problems - **Excel data file**