AGING INFRASTRUCTURE & ASSET MANAGEMENT
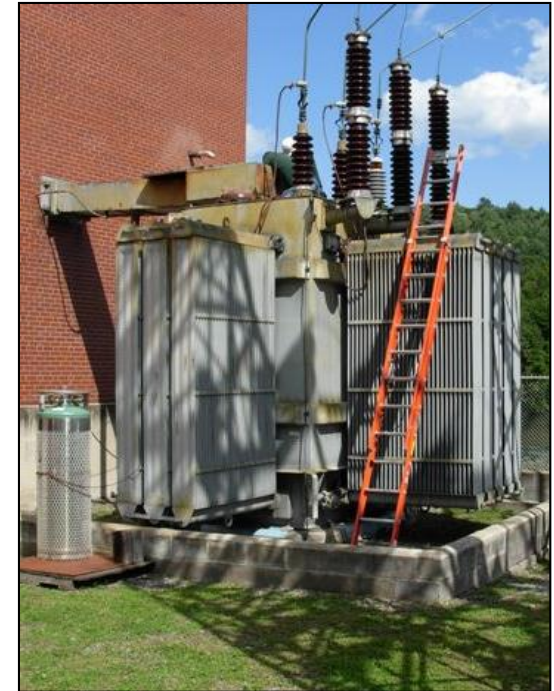
Ken Elkinson

### Apparatus Analytics Engineer

Doble Engineering Co.

Why is the condition of critical equipment important?

- OBJECTIVES:
- Identify Condition Status - Good & Bad
- Life Extension
- Maximize Assets
- Minimize Outages
- Safe & Productive Operation
- Insurance Compliance
- Industry Compliance
- Informed Decisions

Example - Substation Transformers Age Profile

**Substation Operating Transformers Age Profile**
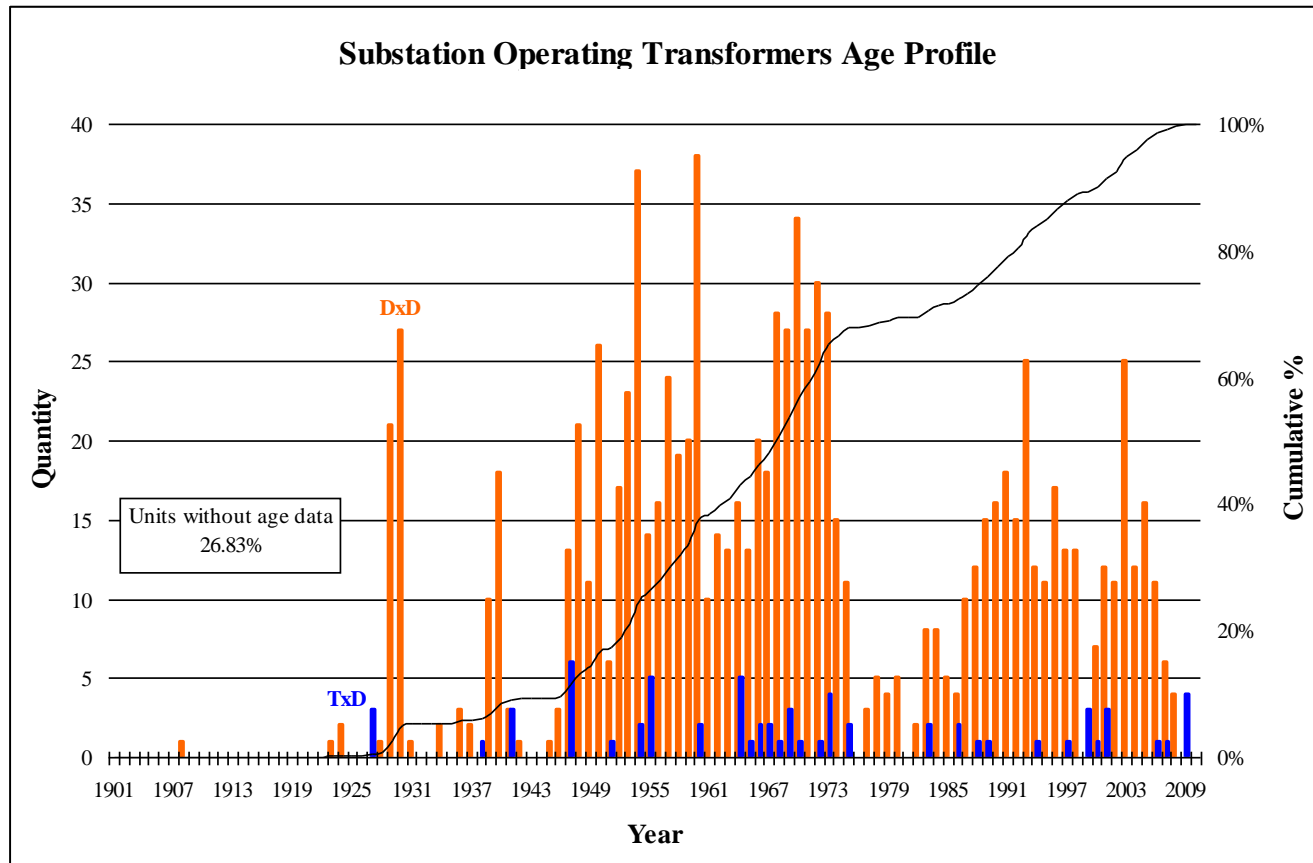
Why Condition Monitoring?

The Key is in Visualization

- Informative, role-based views for decision support
    - One person's critical assets are not another's
    - Concentrate on the things that are important to you
  - "At-a-glance" understanding of asset condition
    - Drill down to events
    - No need to search for information
    - Views provided within a geospatial, substation or asset context
    - SCADA-like in nature-e.g. live alarms, trends, status, values

- Provides real time, substation asset health

- System architecture allows rapid integration of new data sources, and then prototype & deployment of new views
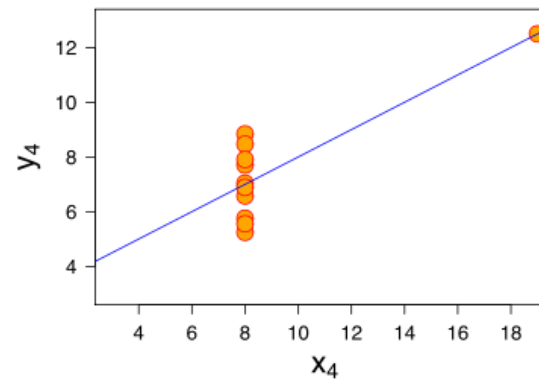
Visualization of information is Important
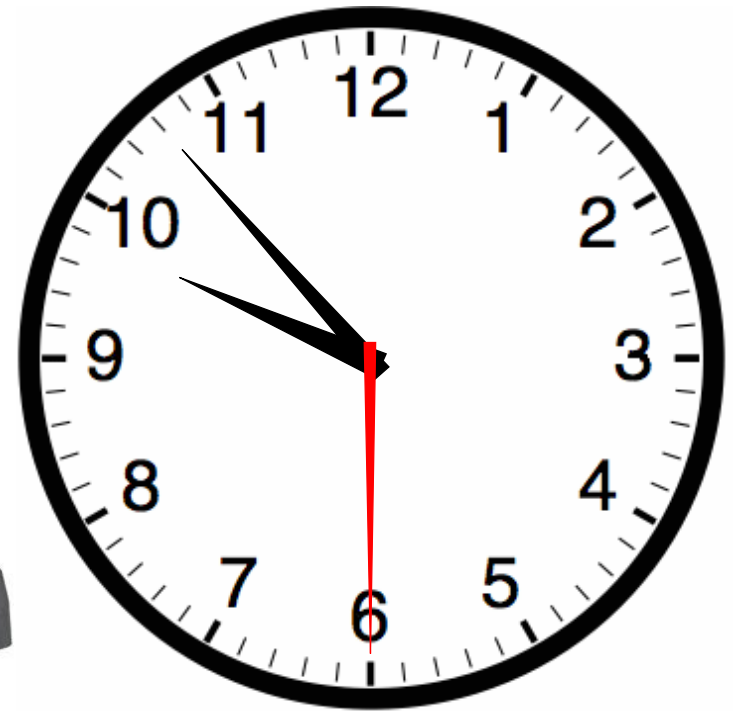
Visualization of information is Important

◆ Anscombe Quartet data

Anscombe's Quartet							
Set I		Set II		Set III		Set IV	
Time	Condition	Time	Condition	Time	Condition	Time	Condition
4	4.26	4	3.1	4	5.39	8	5.25
5	5.68	5	4.74	5	5.73	8	5.56
6	7.24	6	6.13	6	6.08	8	5.76
7	4.82	7	7.26	7	6.42	8	6.58
8	6.95	8	8.14	8	6.77	8	6.89
9	8.81	9	8.77	9	7.11	8	7.04
10	8.04	10	9.14	10	7.46	8	7.71
11	8.33	11	9.26	11	7.81	8	7.91
12	10.84	12	9.13	12	8.15	8	8.47
13	7.58	13	8.74	13	12.74	8	8.84
14	9.96	14	8.1	14	8.84	19	12.5

Visualization of information is Important

◆ Anscombe Quartet data – almost identical statistics

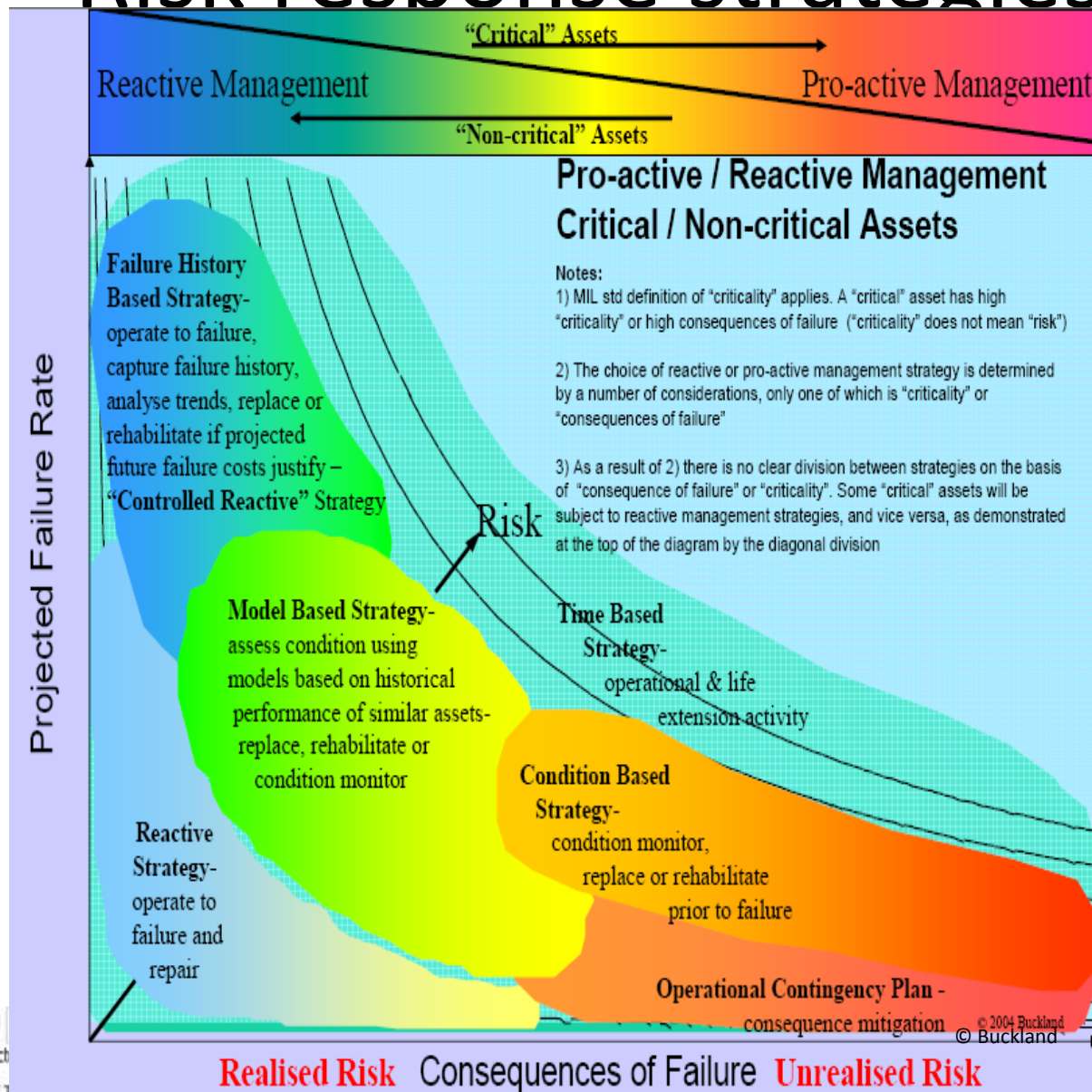| Property	Value
Mean of x in each case	9.0
Variance of x in each case	11.0
Mean of y in each case	7.5
Variance of y in each case	4.12
Correlation between x and y in each case	0.816
Linear regression line in each case	$y = 3 + 0.5x$

Visualization of information is Important

- ## Visualization of the Anscombe Quartet

Risk Signatures

© Buckland
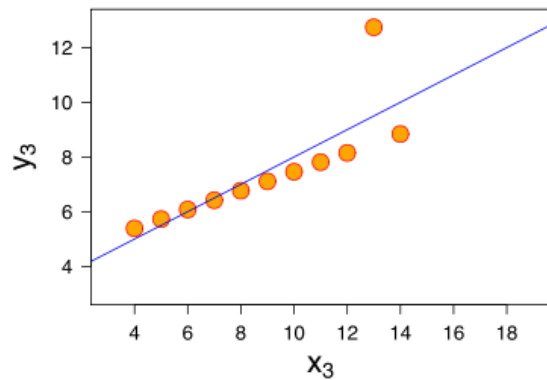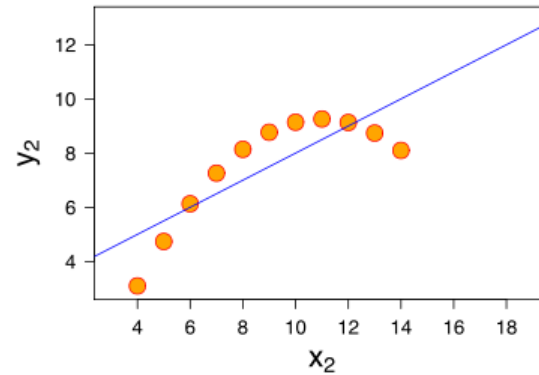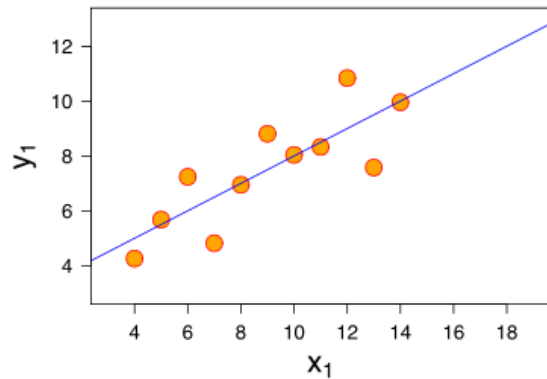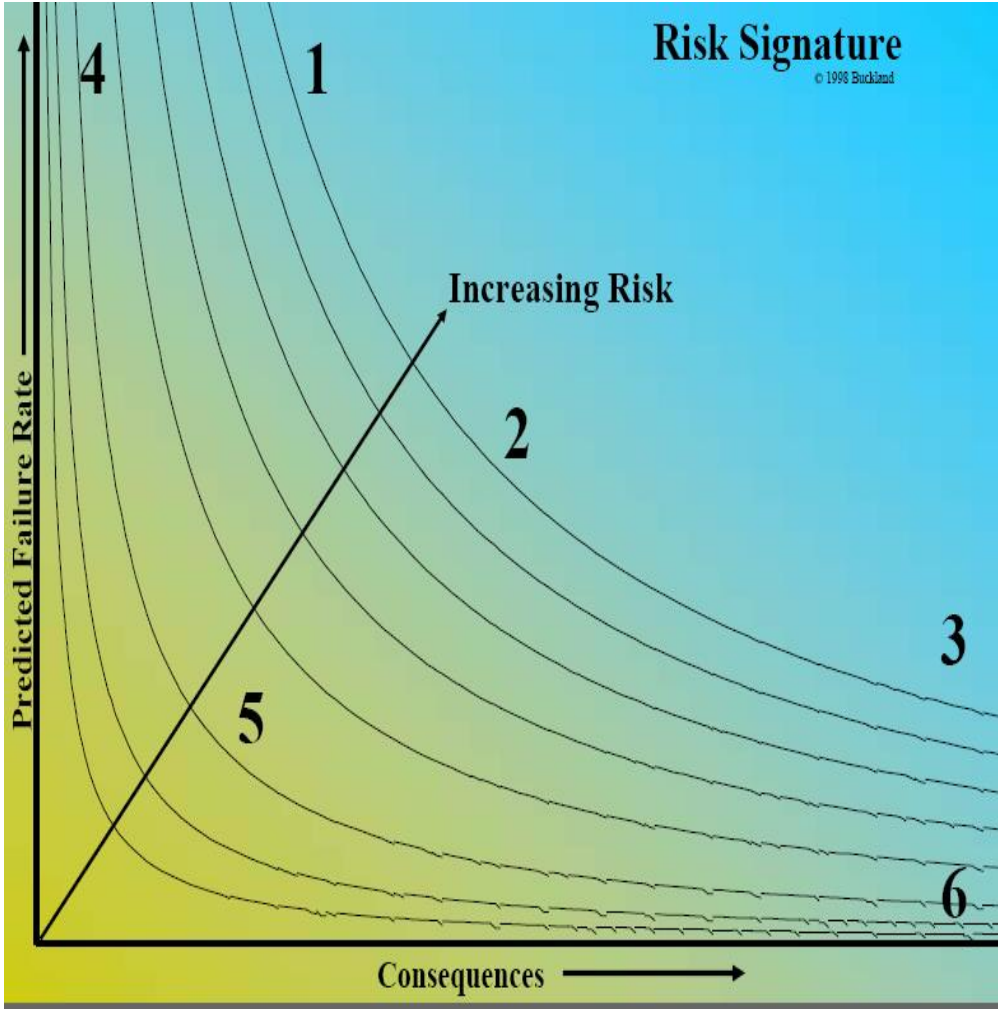
Risk response strategies

Visualization

Presentation Over

Thank you!!!

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