

Jump Starting Quality “Advanced” Track

Welcome!

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Disclosures

- Munish Gupta has no relevant financial disclosures.
 - Michael Posencheg is on the contract faculty for the Institute for Healthcare Improvement.
 - Heather Kaplan has no relevant financial disclosures.
 - Wendy Timpson has no relevant financial disclosures.
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Overall Objectives

- Understand the importance of data over time to QI
 - Know how to distinguish signal from noise
 - Understand, make, and interpret run charts
 - Understand, make, and interpret control charts
 - Have fun! Or at least... don't fall asleep
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[placeholder slide for results of pre-survey]

Outline

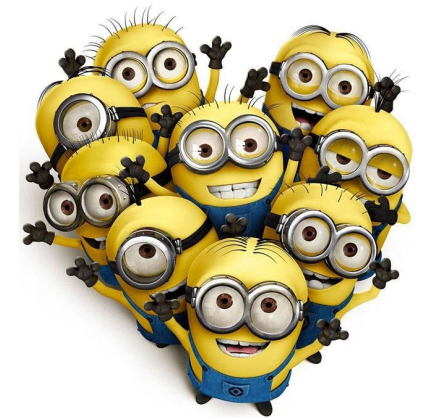
- Understanding variation – Munish
 - Run charts – Mike
 - Control charts – Heather
 - Group exercise – Everyone!
 - Using charts better – Mike
 - Group exercise – Everyone!
 - Examples, open discussion, wrap-up – Everyone!
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References

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- Gupta, M, and H Kaplan, Using Statistical Process Control to Drive Improvement in Neonatal Care: A Practical Introduction to Control Charts. *Clinics in Perinatology*, 2017. 44:627-644.
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- Lloyd, R. Quality Health Care: A Guide to Developing and Using Indicators. 2nd edition, 2017, Jones and Bartlett Publishers.
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- Provost, L.P. and S.K. Murray, The Health Care Data Guide: Learning From Data for Improvement. 1st ed. 2011, San Francisco, CA: Jossey-Bass. 445 p.

Introductions to Start!!

Us
You



Understanding Measurement and Variation

Munish

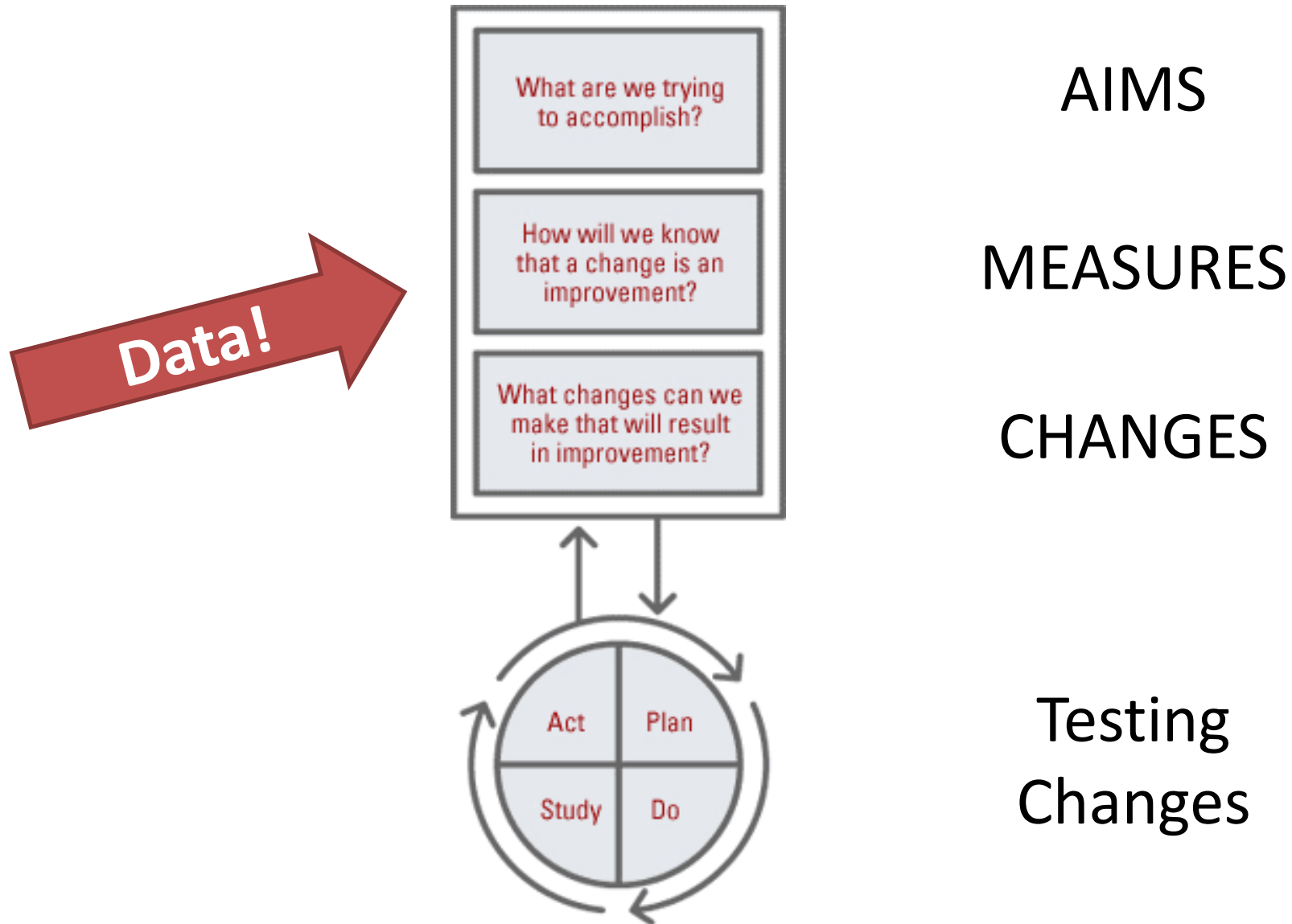


Obvious but Important Point #1

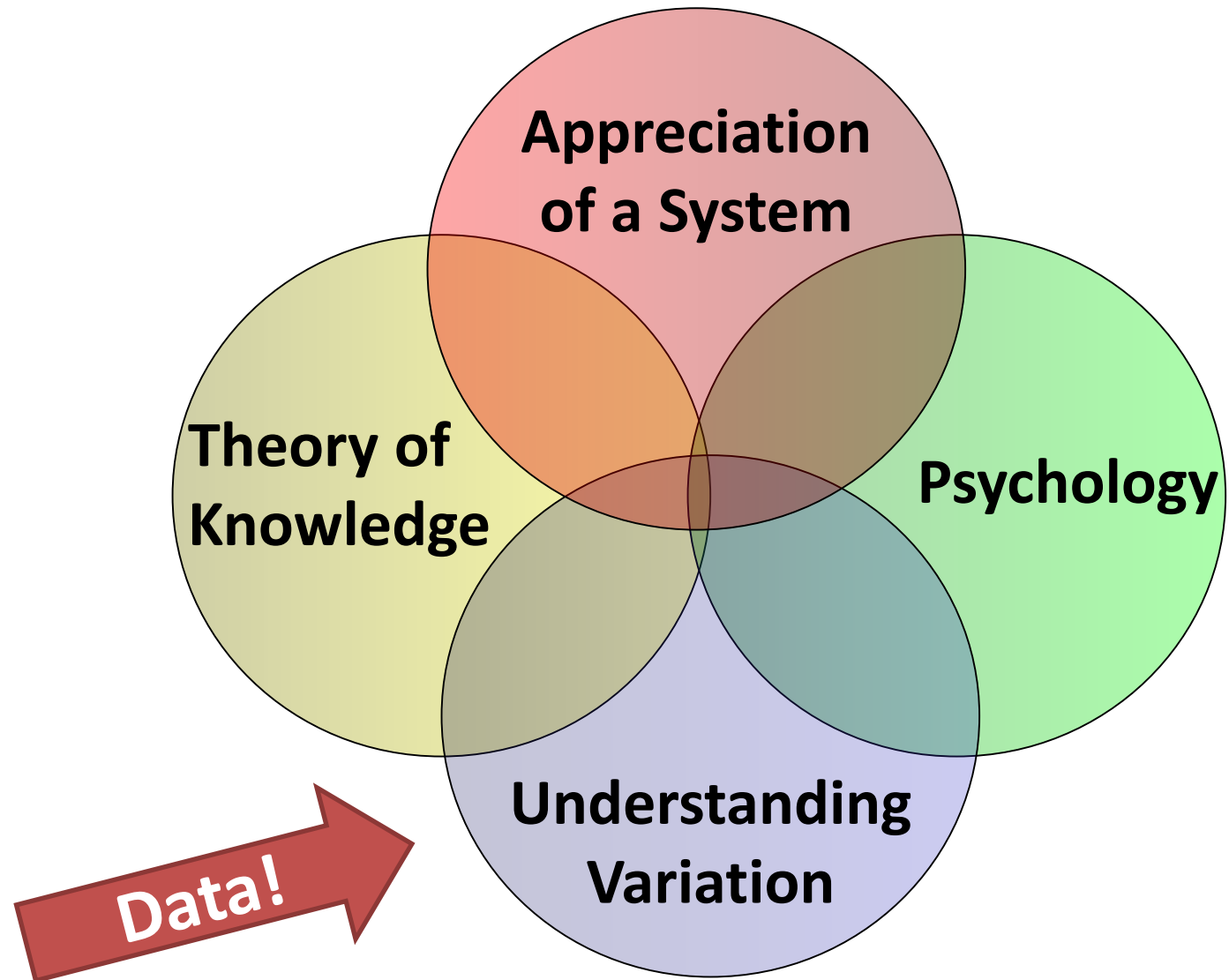
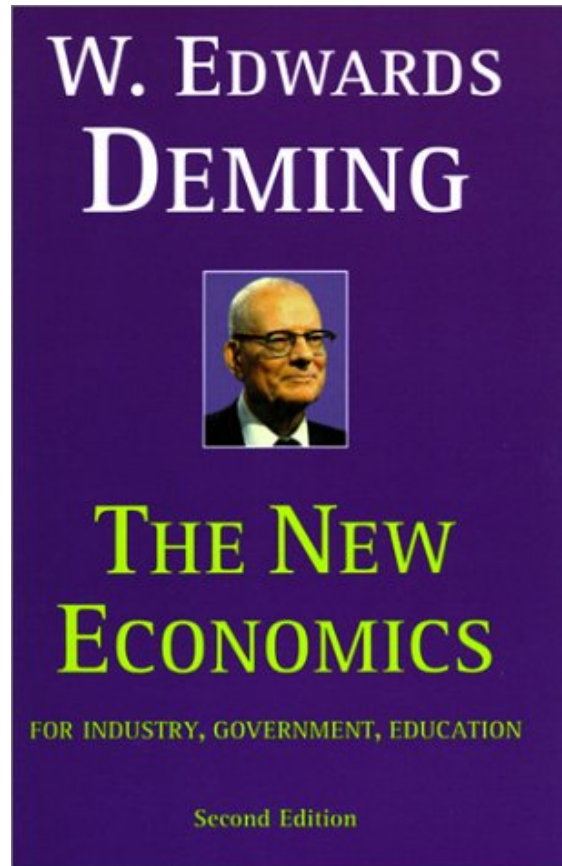
Measurement is critical
for improvement.



The Model for Improvement



Deming's Profound Knowledge



What We Are NOT Covering

- Full model for improvement
 - Setting aims
 - Choosing measures
 - Key drivers
 - Change concepts, theory of change, PDSA cycles
 - All of Statistical Process Control
 - Will cover run charts and control charts
 - Not other elements: histograms, Pareto charts, etc.
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Slightly Less Obvious but Important Point #2

Measurement over time,
shown graphically, is ideal.



A (Real) NICU Example

- You would like to reduce the incidence of necrotizing enterocolitis (NEC) in your NICU.
 - You have identified two evidence-based strategies for reducing risk of NEC:
 - Increasing the use of human milk; and
 - Standardizing feeding practices.
 - You create a key driver diagram with aims and measures.
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Key Driver Diagram

SMART Aims

Decrease rate of NEC in VLBW infants by 25% by January 2017
Outcome measure: NEC rate per 100 VLBW days

Primary Drivers

Use of Mother's (MM)
Process Measure: % of infants receiving BM at discharge

Standardized Feeding Protocol
Process Measure: % of infants who followed feeding protocol

Secondary Drivers/Interventions

Mother's Milk Initiation
Process Measure: % of infants w/ first feeding of BM
Process Measure: time to first use of HM for oral care

Milk Continuation
Process Measure: # of days held skin-to-skin in first month

Donor milk use

Standardized feeding advancement

Standardized fortification

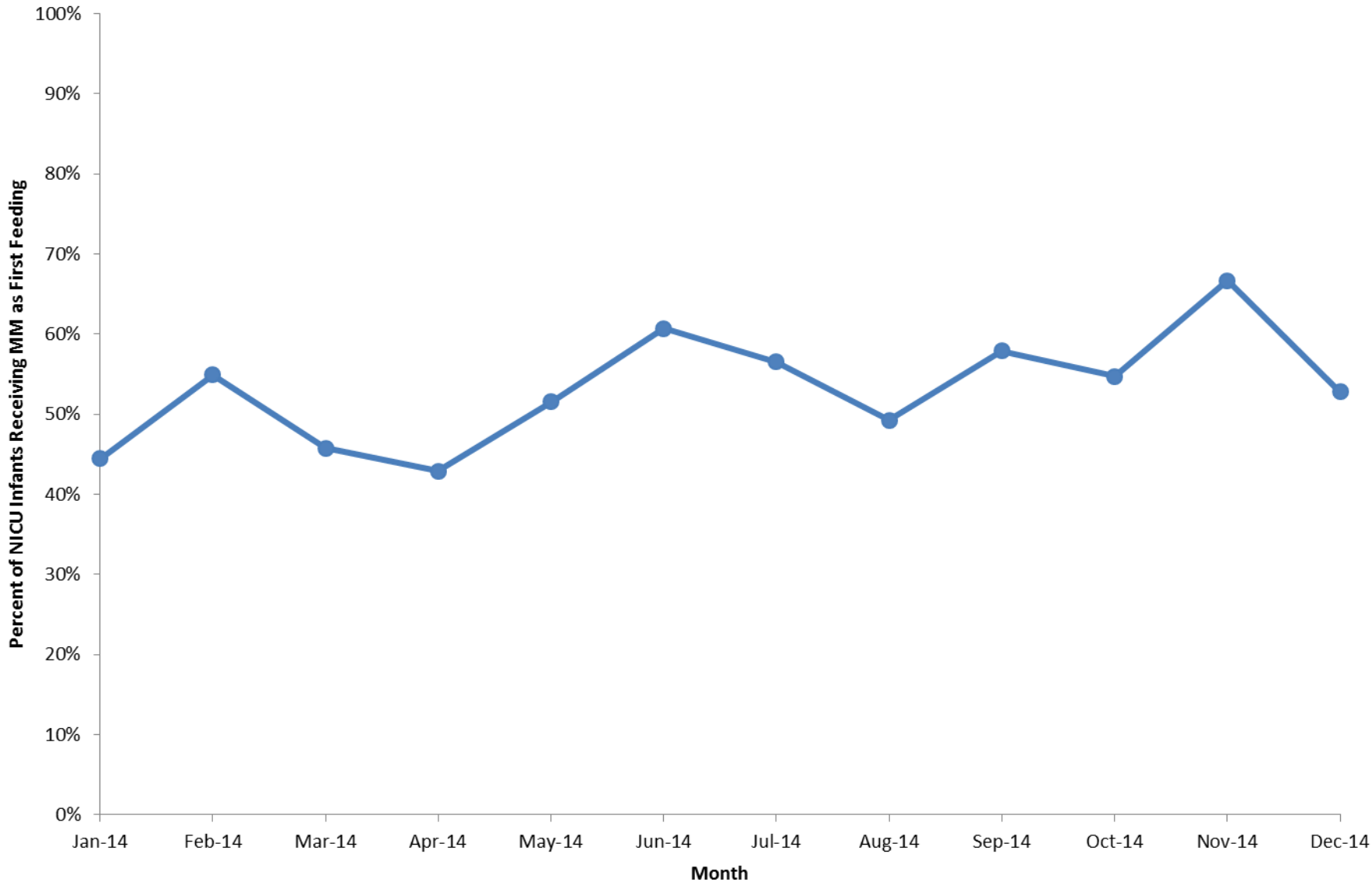
First Measure: First Feeding as MM

| Month | First Feeding MM | NICU Infants |
|--------|------------------|--------------|
| Jan-14 | 12 | 27 |
| Feb-14 | 28 | 51 |
| Mar-14 | 16 | 35 |
| Apr-14 | 18 | 42 |
| May-14 | 17 | 33 |
| Jun-14 | 34 | 56 |
| Jul-14 | 26 | 46 |
| Aug-14 | 31 | 63 |
| Sep-14 | 22 | 38 |
| Oct-14 | 29 | 53 |
| Nov-14 | 22 | 33 |
| Dec-14 | 19 | 36 |

What's good about this approach?

What's missing?

First Feeding as Mother's Milk, NICU Infants

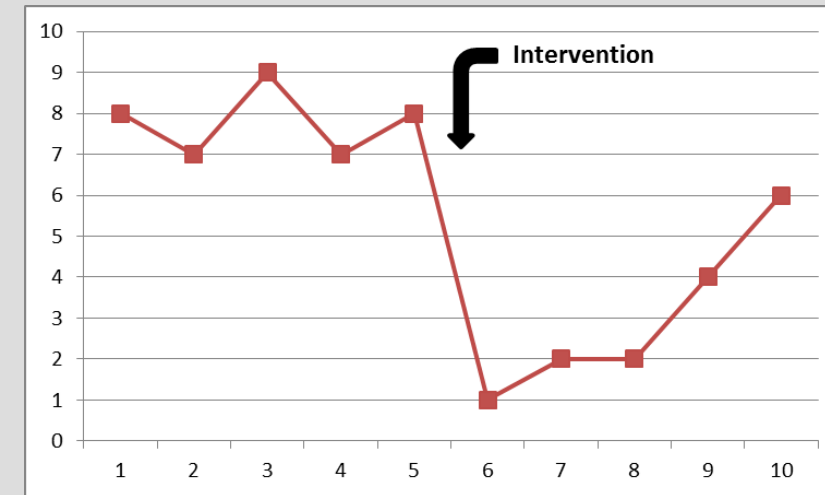
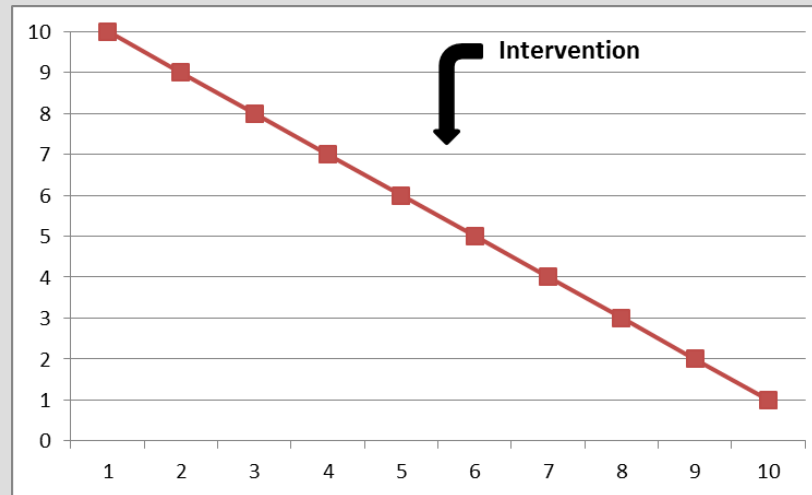
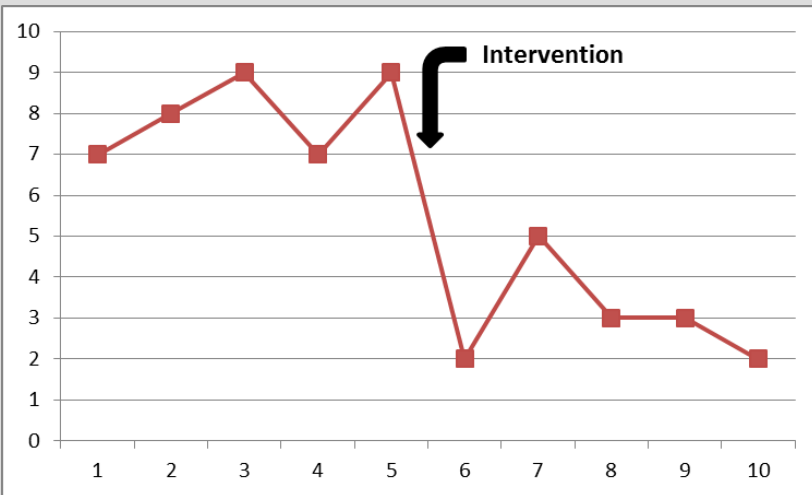
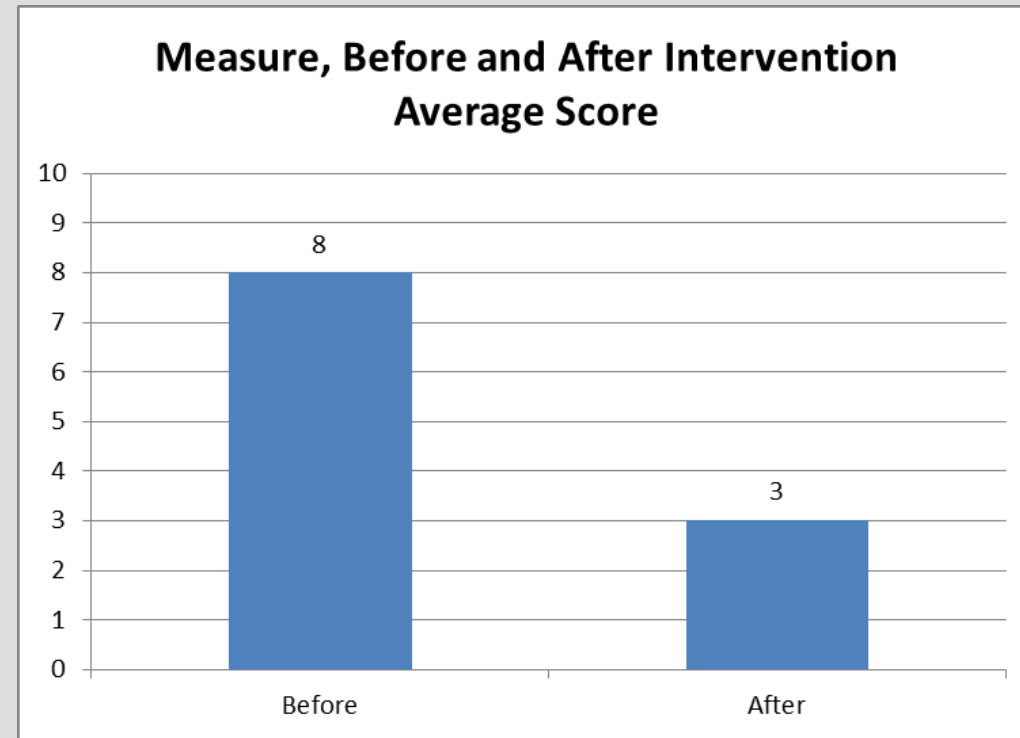


What's good about this approach?

What's missing?

Why not traditional statistics?

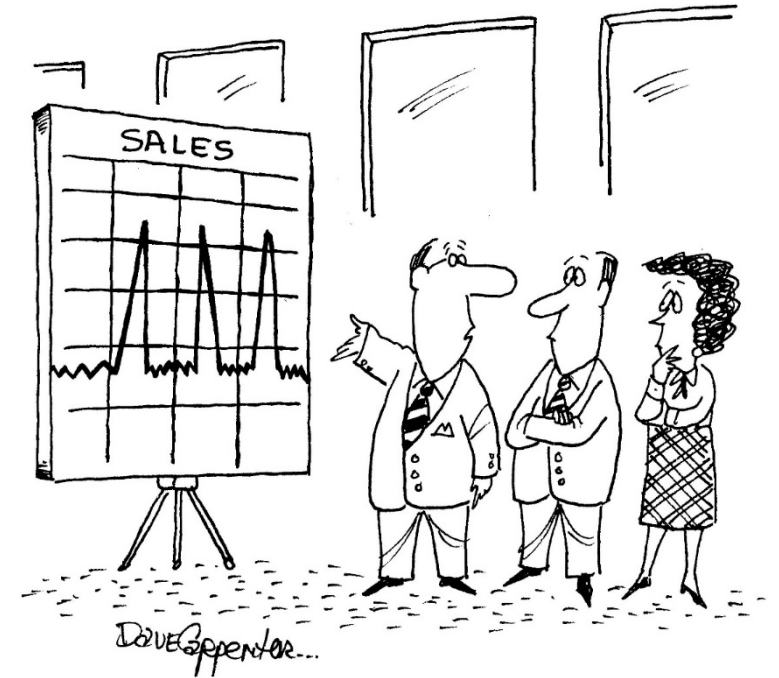
Pre-post comparisons do not tell the whole story.



Data for Quality Improvement

- Measurement critical for QI
- Data over time, graphically, is ideal
- But...we need tools to help us interpret data over time rigorously

Statistical process control (SPC)



"I'm not superstitious either, but those were the three days Harris wore his lucky socks."

Important Point #3

SPC gives us tools to understand data over time.



Statistical Process Control

- Manufacturing origins
- 1920s - Walter Shewhart, W.E. Deming (Bell Labs)
- Goal: make it easy for non-statisticians to detect process changes
- Ramped up extensively during WWII, post-war Japan, U.S. manufacturing
- Now used in all industries, including health care



Walter Shewhart

Understanding Variation

- In QI, we are looking for changes in key data.
 - But all things vary naturally – fact of life.
 - Need tools to identify true changes in data versus natural background variation.
 - And, we want to identify true changes fast.
 - Statistical process control (SPC): tools to help interpret variation – identify **signal** and **noise**.
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Signal vs. Noise

SIGNAL

- Statistically different than other data points
- **contains information**
- difference with a distinction
- **special cause variation** — specific causes not part of usual process (good or bad)

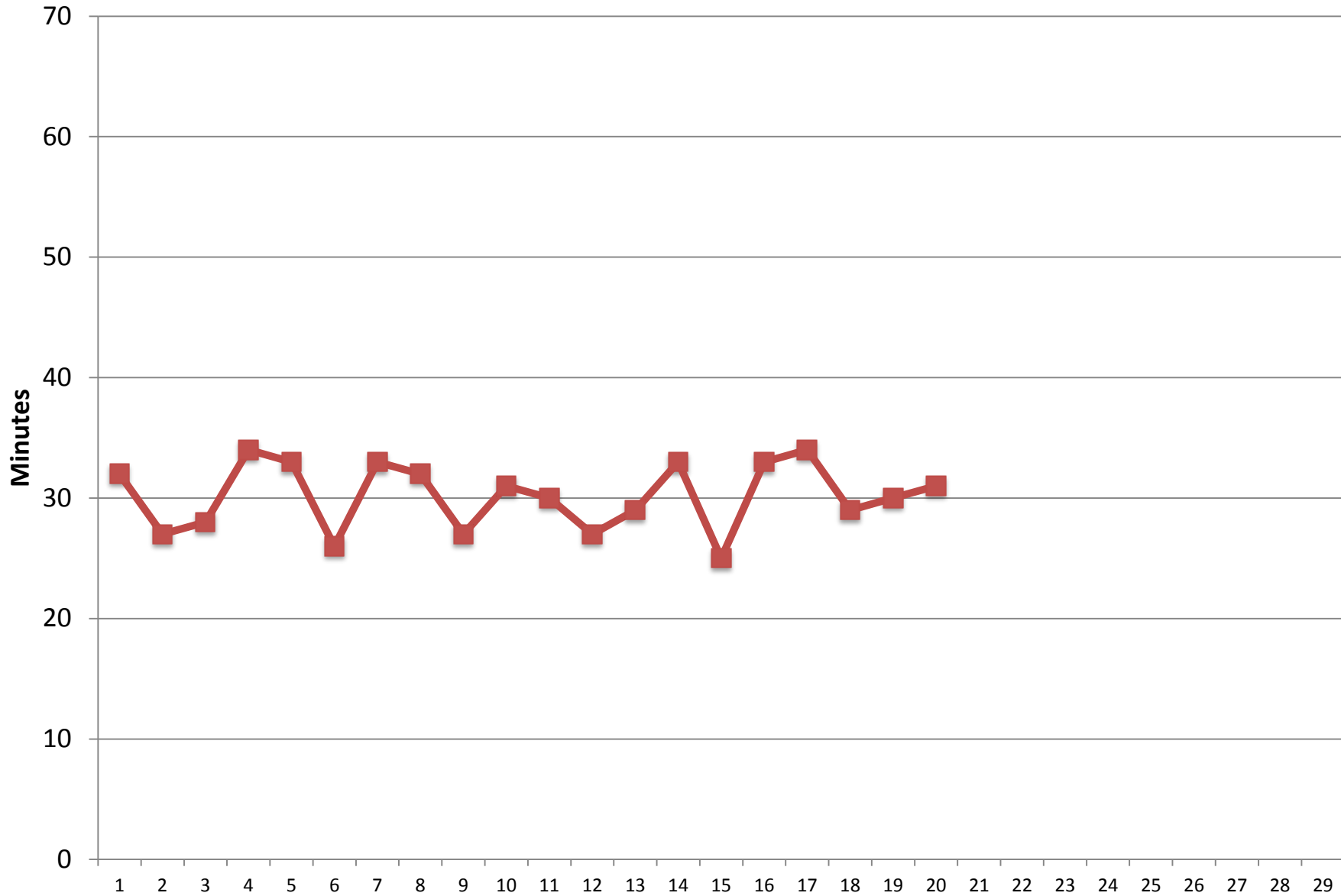
NOISE

- statistically similar to other data points
- **no new information**
- difference without a distinction
- **common cause variation** — causes inherent as part of usual process (good or bad)

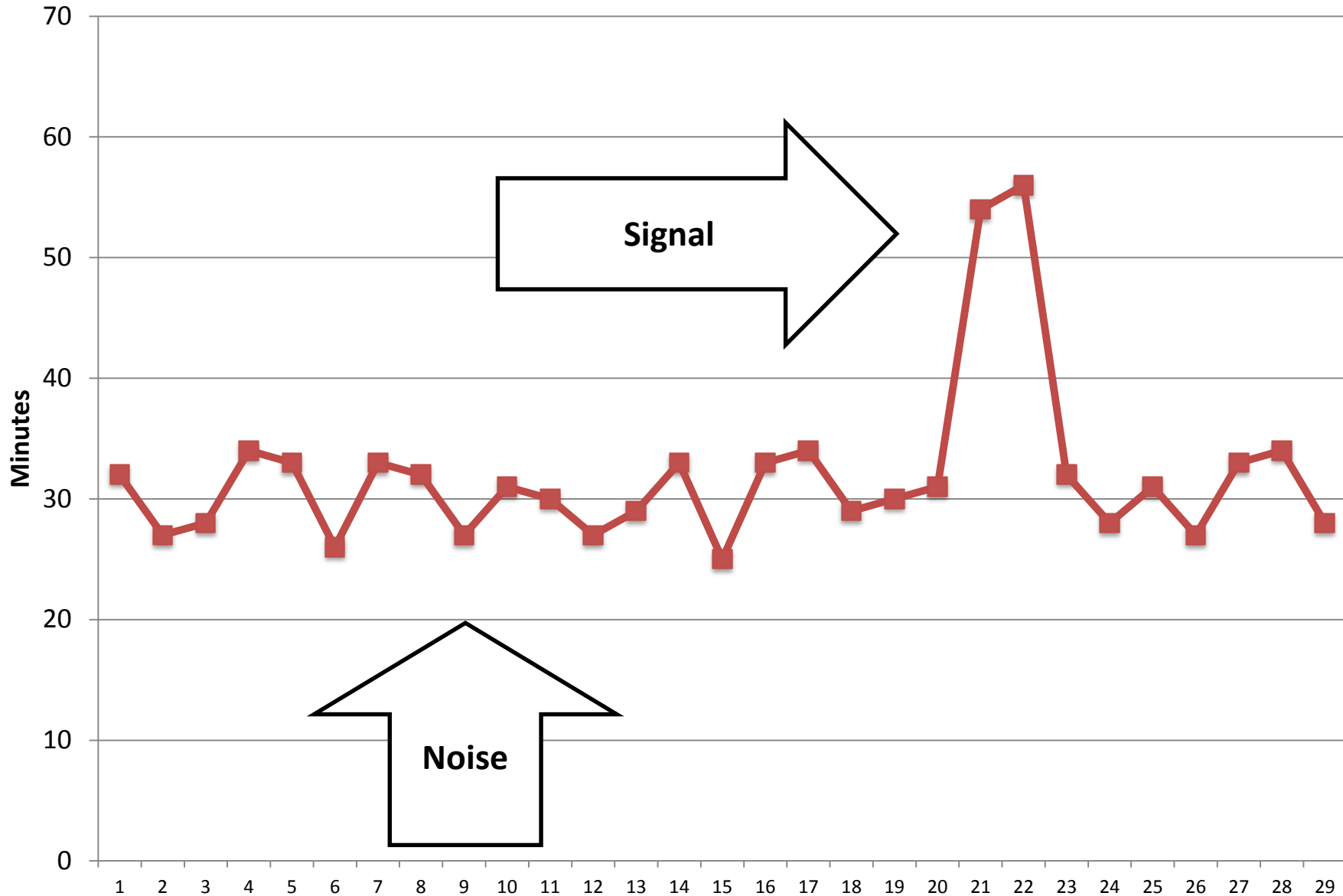
Definitions

1. Common Cause Variation: All noise, inherent as part of usual process (good or bad).
 2. Special Cause Variation: Signal, not part of usual process (good or bad).
 3. Stable Process: Predictable variation within natural common cause bounds.
 4. Unstable Process: Both special and common cause variation, variation unpredictable.
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Time to Get to Work, Daily



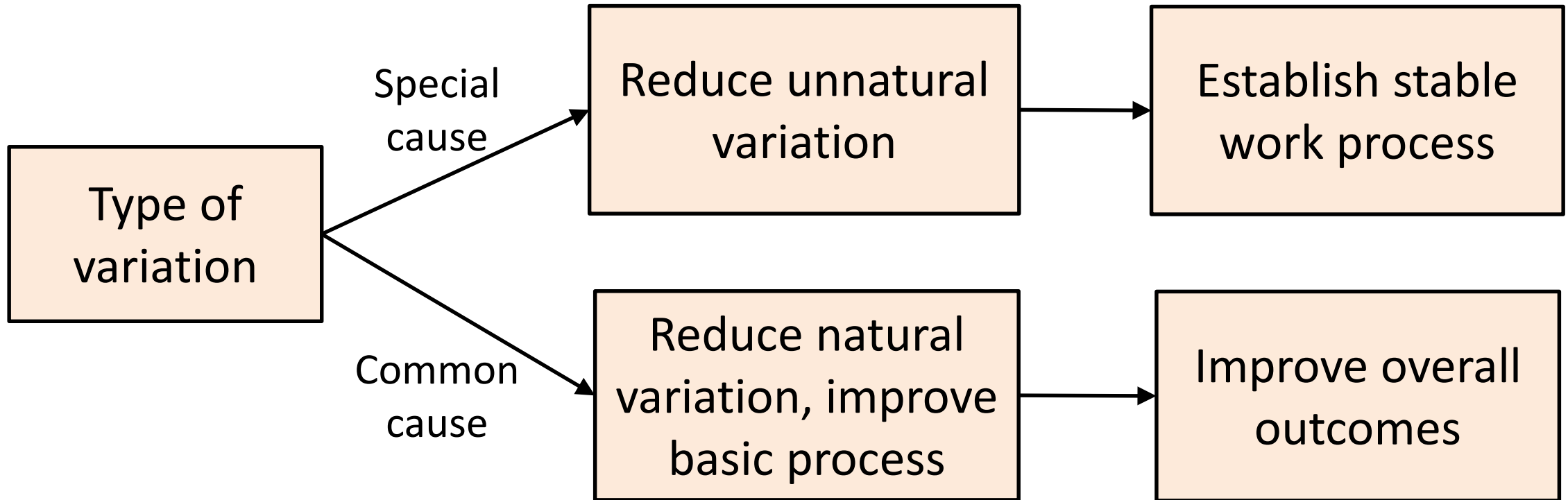
Time to Get to Work, Daily



SPC gives us tools to distinguish signal from noise.

Why This Is Important

Type of variation → type improvement action



Why This is Important

ACTUAL SITUATION

ACTION

| | NO Special Cause is occurring in System | Special Cause is occurring in System |
|---|---|--------------------------------------|
| Take action on individual outcome (treat special) | MISTAKE | OK |
| Treat outcome as part of system; work on changing the system (treat common) | OK | MISTAKE |

SPC Tools for Measurement

Statistical Process Control

- Tools to help distinguish signal from noise
- Plot data over time
- Interpret visually and statistically

Two tools:

1. Run charts – minimal standard
 2. Control charts
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