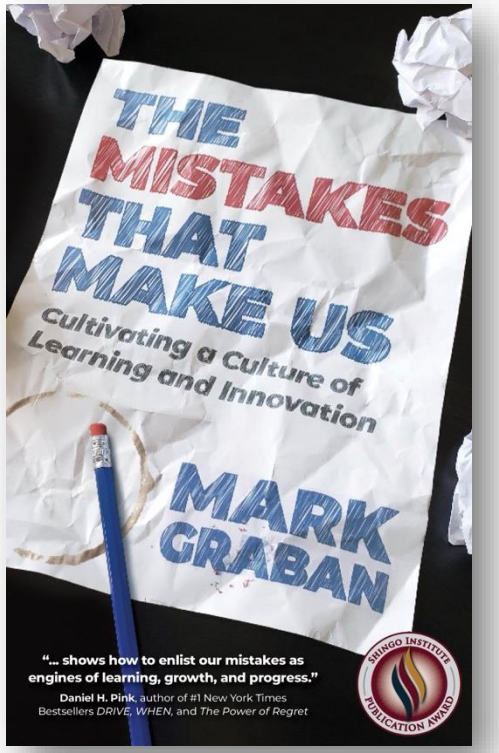
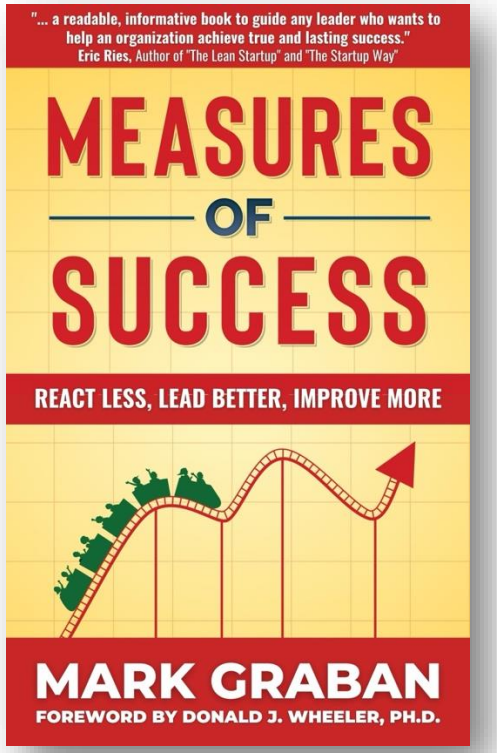
IMPROVING THE WAY WE IMPROVE

AME Roadshow 2025

Slides & More: MarkGraban.com/AME2025Post





Scan For Anonymous Polling

Our Agenda

Psychological Safety & Lean

9:00 am	Introductions
9:30 am	Session 1 starts
11:00 am	Morning Tea Break
11:15 am	Session 1 continues
1:00 pm	Lunch

Measures of Success

1:30 pm	Session 2 starts
2:30 pm	Afternoon Break
2:45 pm	Session 2 Continued
4:15 pm	Wrap-Up and Reflections

4:30 pm	Networking Drinks, Book Signing and Informal Discussions
5:30 pm / 6:00 pm	Event Ends

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What Industry Are You Currently Working In?

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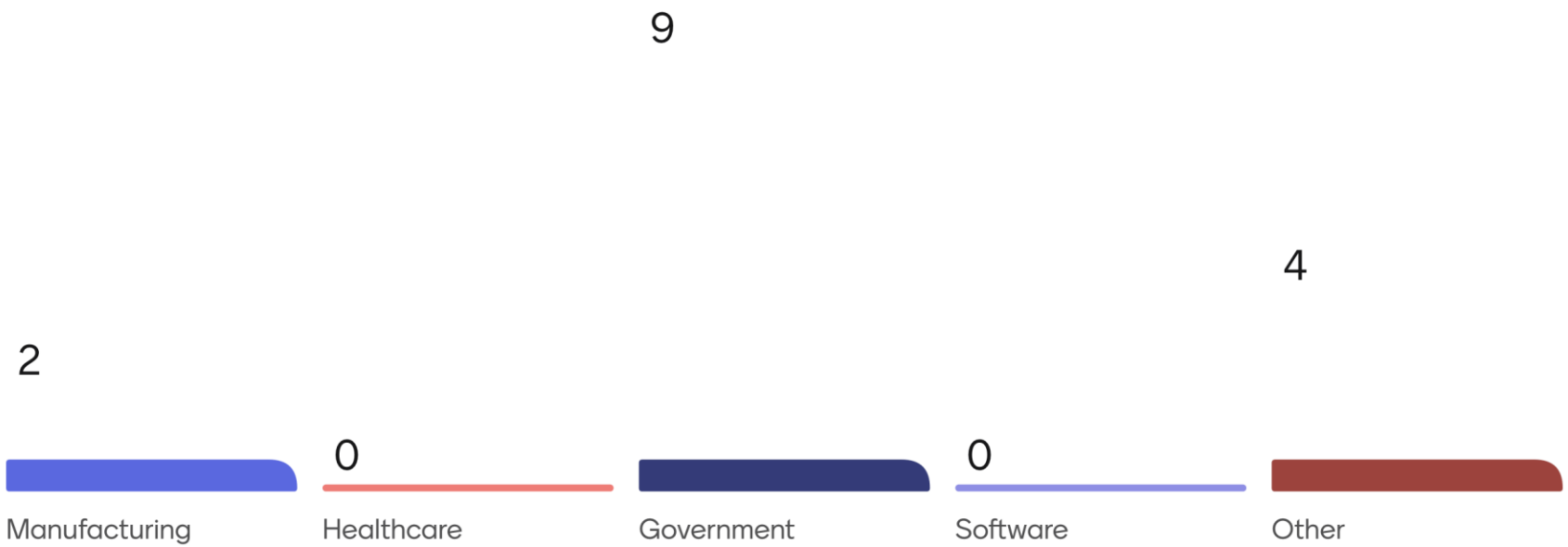

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More About You

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Verbal Introductions

WHO ARE YOU?

SOMETHING UNUSUAL ABOUT YOURSELF?

PSYCHOLOGICAL SAFETY

As a Foundation for Continuous Improvement

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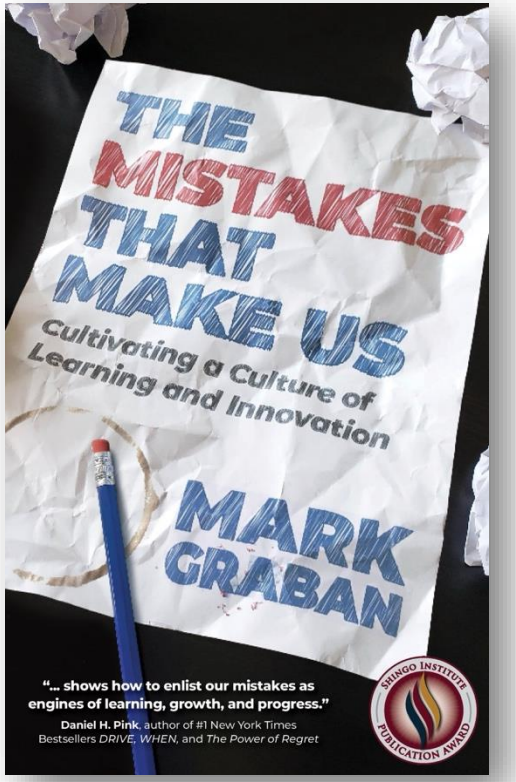
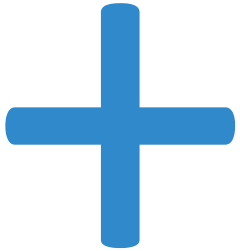


Andon Cord

“Number of Incident Reports”

What's Required to Speak Up?

PSYCHOLOGICAL SAFETY



PROBLEM SOLVING

What is Psychological Safety?

- "Psychological safety is a **belief** that one will not be punished or humiliated
- for speaking up with
  - ideas
  - questions
  - concerns or
  - mistakes."

Amy Edmondson
Harvard Business School
The Fearless Organization

Google's Project Aristotle

- What makes teams there most successful?

PSYCHOLOGICAL SAFETY

“…psychologically safe teams made fewer errors and spoke up about them more often.”

Edmondson, Amy C.. The Fearless Organization: Creating Psychological Safety in the Workplace for Learning, Innovation, and Growth . Wiley. Kindle Edition.

Benefits of Psychological Safety

Improves Cultural Clarity

A psychologically safe organization has no hidden problems or pockets of toxicity.

Increases Retention

When psychological safety is consistent, applications pour in while top talent never wants to leave.

Improves Inclusion

A psychologically safe organization is a place where everyone has a voice and is listened to.

Increases Accountability

There’s no micromanaging on psychologically safe teams. High levels of accountability drive success.

Improves Performance

When they have psychological safety, teams are effective, high-performing and engaged.

Increases Innovation

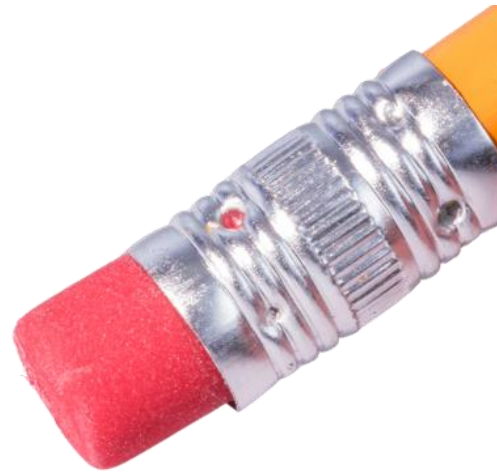
When psychological safety is consistent, people can innovate because it's safe to challenge the status quo.

When We Only Have One...

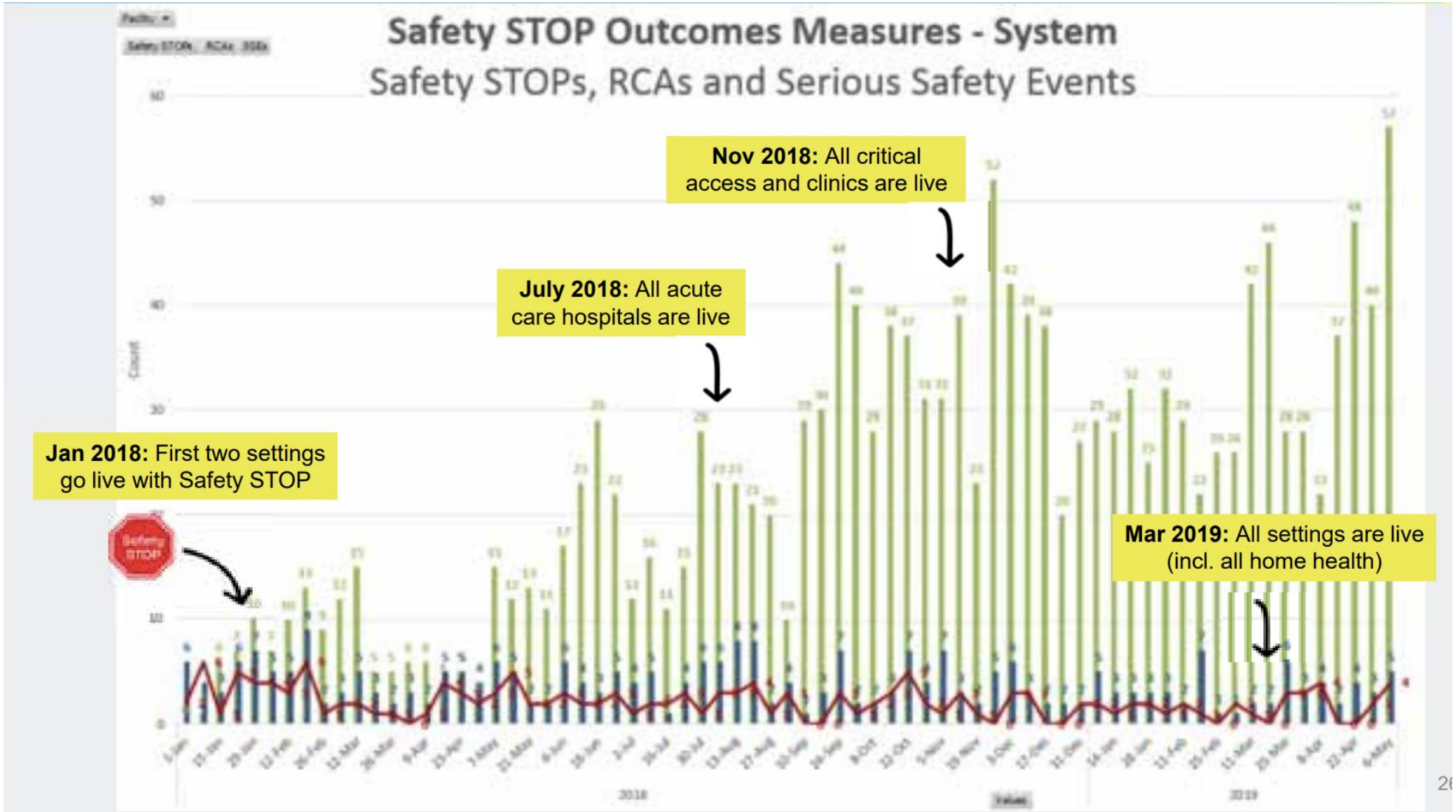
PSYCHOLOGICAL SAFETY

+

PROBLEM SOLVING

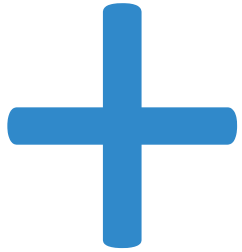


Safety Reports (U.S. Hospital)



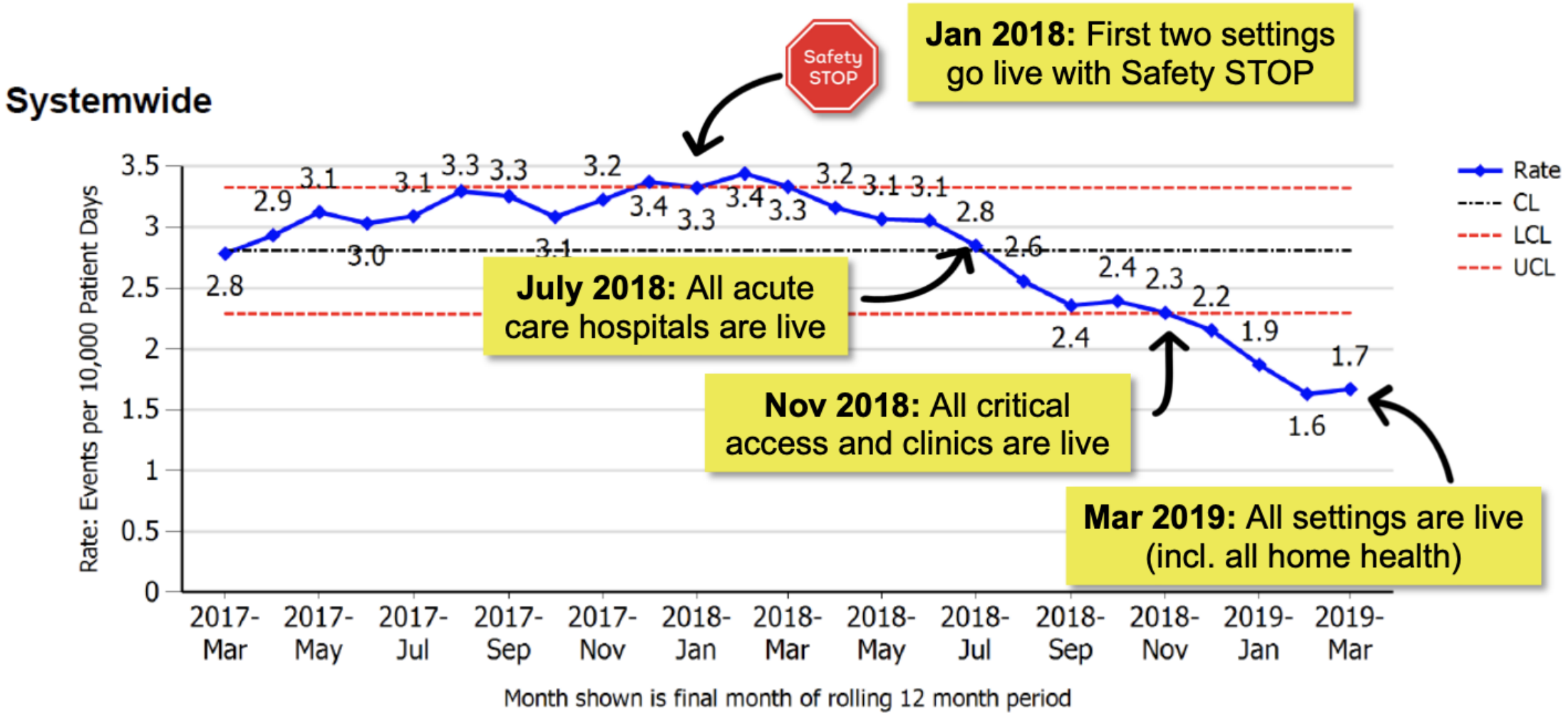
A Powerful Combination

PSYCHOLOGICAL SAFETY



PROBLEM SOLVING

Serious Safety Events (Same Hospital)



What's Required for Tiered Huddles?

PSYCHOLOGICAL SAFETY

PROBLEM SOLVING

What's Required for Catch Ball?

PSYCHOLOGICAL SAFETY

+

PROBLEM SOLVING

For Daily Improvement??

PSYCHOLOGICAL SAFETY

+

PROBLEM SOLVING

REAL IMPROVEMENT,
NOT WORKAROUNDS

What Psychological Safety is NOT (1)

- Niceness – false harmony, shying away from intellectual debate
- Coddling – overprotecting people from anxiety, fear, stress, adversity, and trauma
- A Shield – from accountability when you don't perform

What Psychological Safety is NOT (2)

- Consensus Decision Making – but it DOES reduce power differentials based on title, etc.
- Unearned Autonomy – autonomy is earned through competence, not entitlement
- Rhetorical Reassurances

MISTAKES

Mistakes are actions or judgments that turn out to be misguided or wrong.

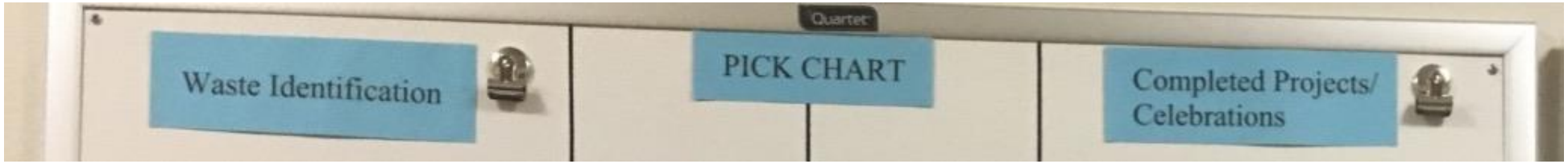
Expected Outcome

GAP

Mistakes are actions or judgments that turn out to be misguided or wrong.

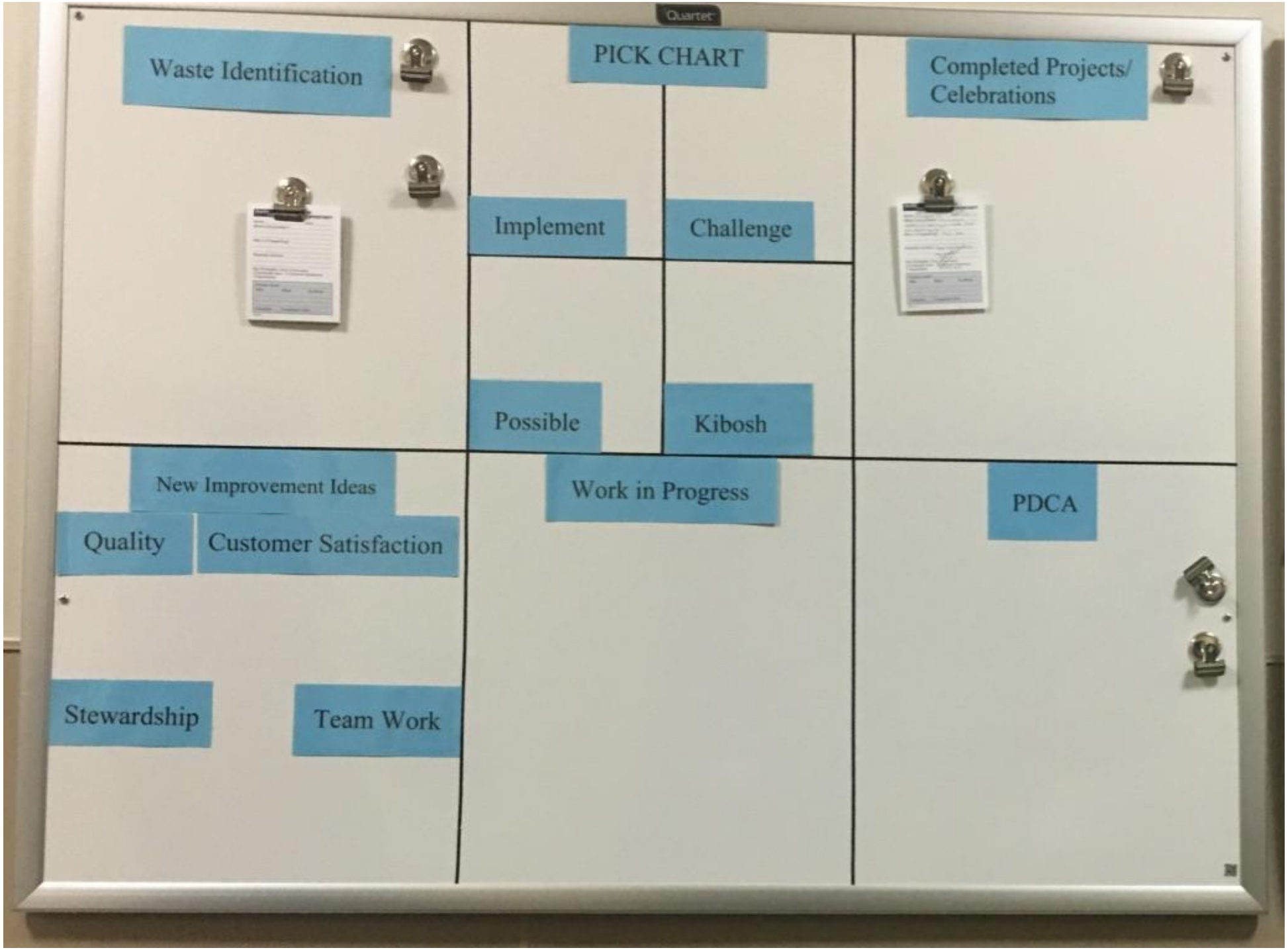
Actual Outcome

“YOU’RE MAKING A MISTAKE!”



MISTAKE:

ASSUMING PEOPLE WILL USE A HUDDLE BOARD


Waste Identification
PICK CHART
Completed Projects/
Celebrations
Implement
Challenge
Possible
Kibosh
New Improvement Ideas
Work in Progress
PDCA
Quality
Customer Satisfaction
Stewardship
Team Work

WHY?

Fear
factor

Futility
factor

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What Keeps You From Speaking Up at Work?

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Oops, I made a mistake! The question should ask about "speaking up" not "speak up."

What keeps you from speak up at work?

Oops, I made a mistake! The question should ask about "speaking up" not "speak up."

What keeps you from speak up at work?

You can see how people vote. **Learn more**

Fear	**12%**
Futility	**29%**
Fear AND Futility	**30%**
No barriers to speaking up	**29%**

247 votes • 4d left • **Hide results**

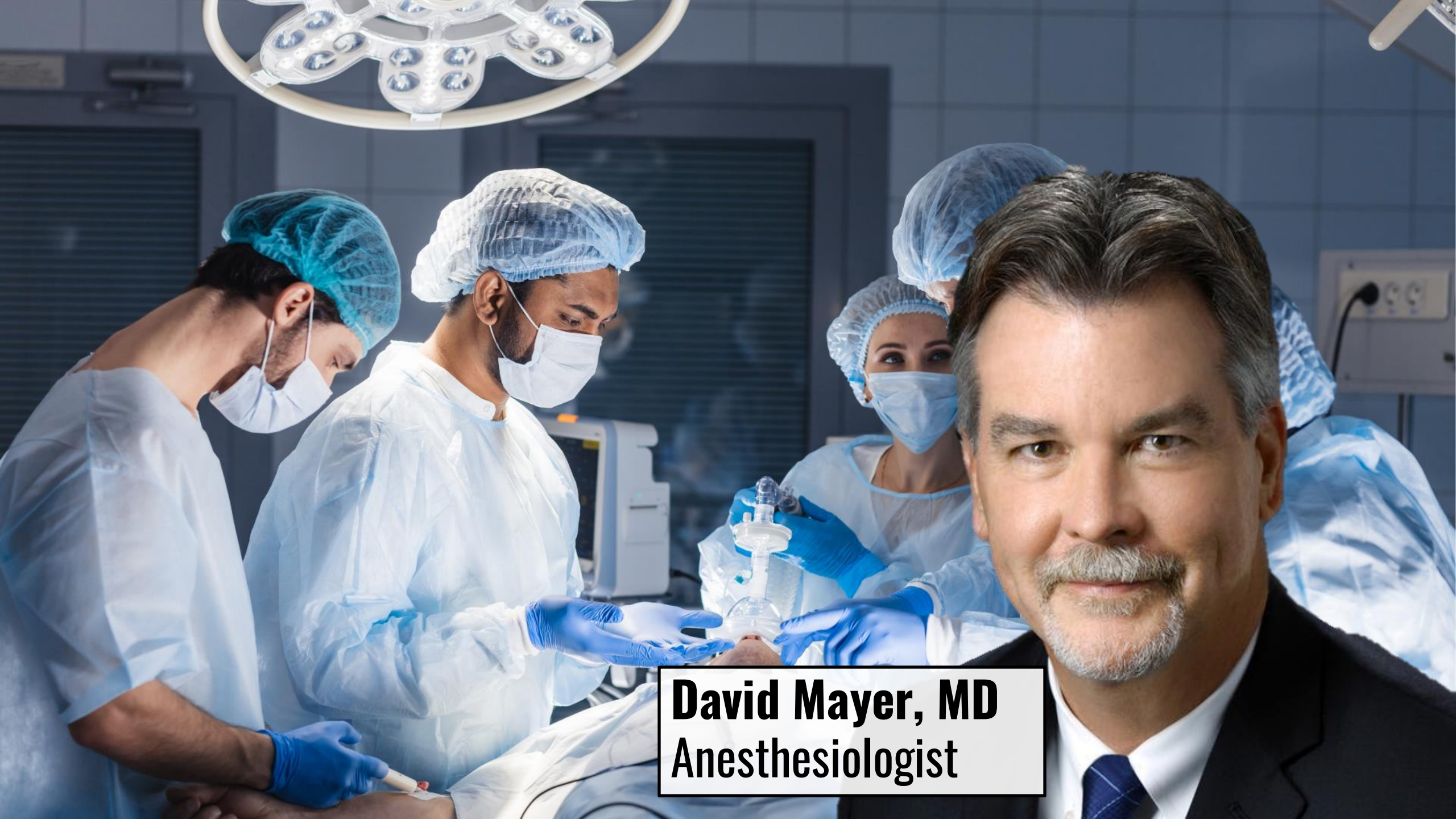
David Mayer, MD
Anesthesiologist

Table Discussion!

PLEASE SHARE A RECENT MISTAKE AND WHAT YOU LEARNED

Reflecting on a Mistake

- What decision did I make?
- What did I expect to happen?
- What actually happened?
- What do I learn from the gap?
- What would I do differently?
- What would I expect to happen?

Two Types of Mistakes

PROCESS MISTAKES

INNOVATION MISTAKES

Preventing or Mitigating?

PROCESS MISTAKES

- MISTAKE-PROOFING
- CHECKLISTS

INNOVATION MISTAKES

- ITERATION / PDSA
- SMALL TESTS OF CHANGE

Our Response to Mistakes…

PUNITIVE

NICE

KIND

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What's the Most Likely Reaction to Mistakes in Your Workplace?

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What is Psychological Safety?

"A culture of rewarded **vulnerability**"

Timothy R. Clark
LeaderFactor
The 4 Stages of Psychological Safety

What is Vulnerability?

EXPOSURE TO THE RISK OF HARM OR LOSS

SAY SOMETHING

KEEP QUIET

Table Discussion Report Out!

WHO IS WILLING TO SHARE YOUR MISTAKE WITH ALL OF US?

What is Candor?

BEING FRANK, OPEN, AND SINCERE IN SPEECH

What is Psychological Safety?

"A culture of rewarded **candor**"

Examples of Candor That Might Be Punished?

- Speaking up to answer that question is one!
- Is this less vulnerable?

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Examples of Actions That Might be Punished at Work

15 responses

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Candor Always Comes Out…

- In the meeting?

- Or in the hallway?
  - –Or the text message?
  - –Or the private chat Zoom message?

We Need a Culture of Candor

- What's potentially problematic about this?

- A leader who frequently says:
  - "To be candid…"
  - "Candidly…"

Do I Feel Psychologically Safe?

Does a Team Have Psychological Safety?

EACH.

PERSON.

DECIDES.

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Personally, which of these acts do you feel is most vulnerable?

12

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Mark's Ladders – 2 Different Settings

Company A

- Accepting more responsibility
- Sharing something personal
- Receiving feedback

- Pointing out a mistake
- Admitting you don't know
- Making a mistake

Company B

- Expressing your emotions
- Offering a different point of view
- Challenging the way things are done

- Clarifying expectations
- Asking for help
- Admitting you don't know

Table Discussion!

DISCUSS A SITUATION WHERE YOU FELT

LESS SAFE OR MORE SAFE TO SPEAK UP COMPARED TO USUAL

Cultivating Psychological Safety?

IT'S SAFE TO SPEAK UP HERE

“YOU SHOULD
SPEAK UP”

“IT’S YOUR PROFESSIONAL OBLIGATION TO SPEAK UP”

Speaking up isn't a matter of *character* or *courage*...

Speaking up isn't a matter of *character* or *courage*... it's a function of CULTURE

You Can Improve Psychological Safety

Encouraging

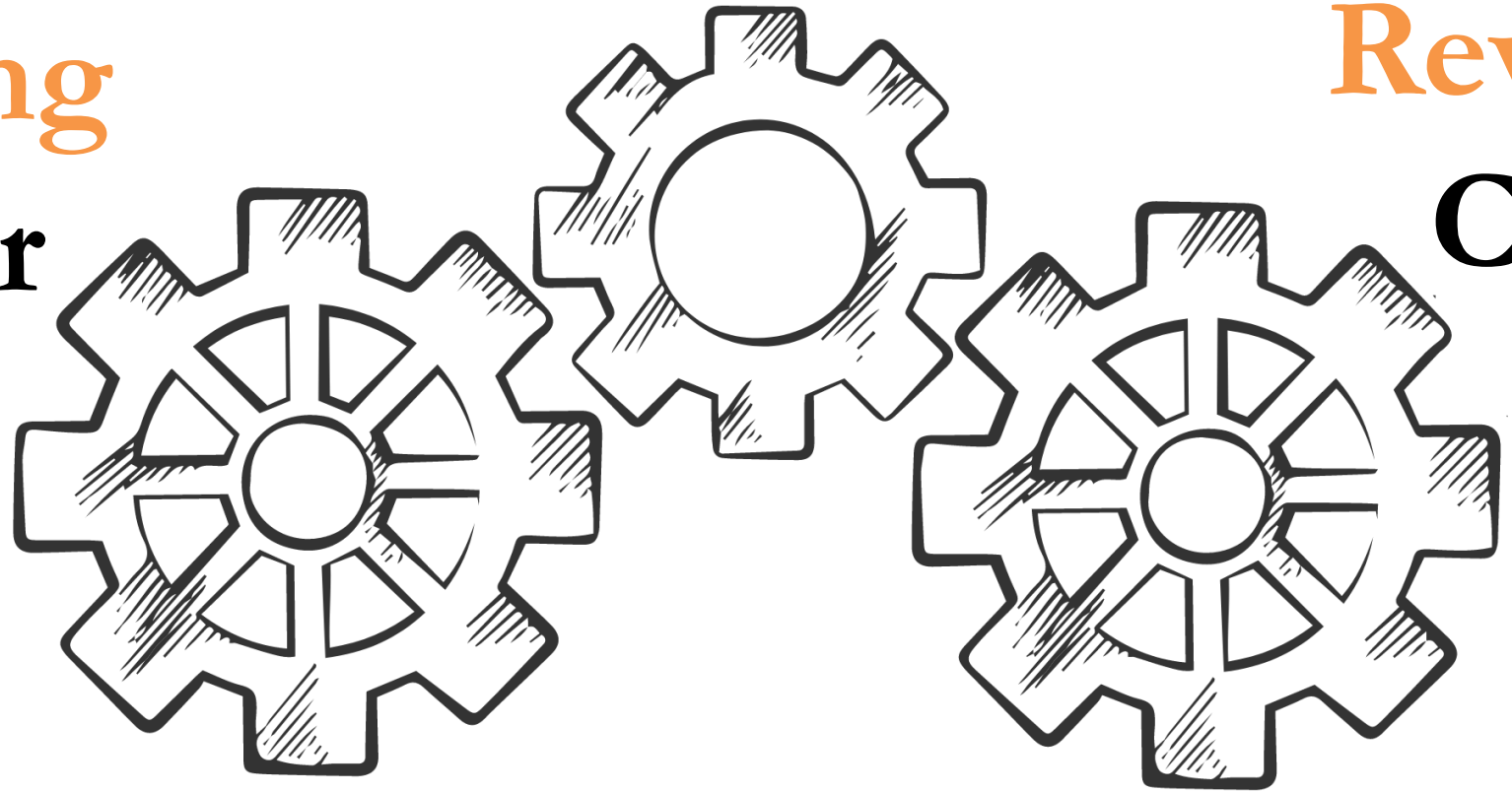
Candor

Modeling

Rewarding

Candor

Candor

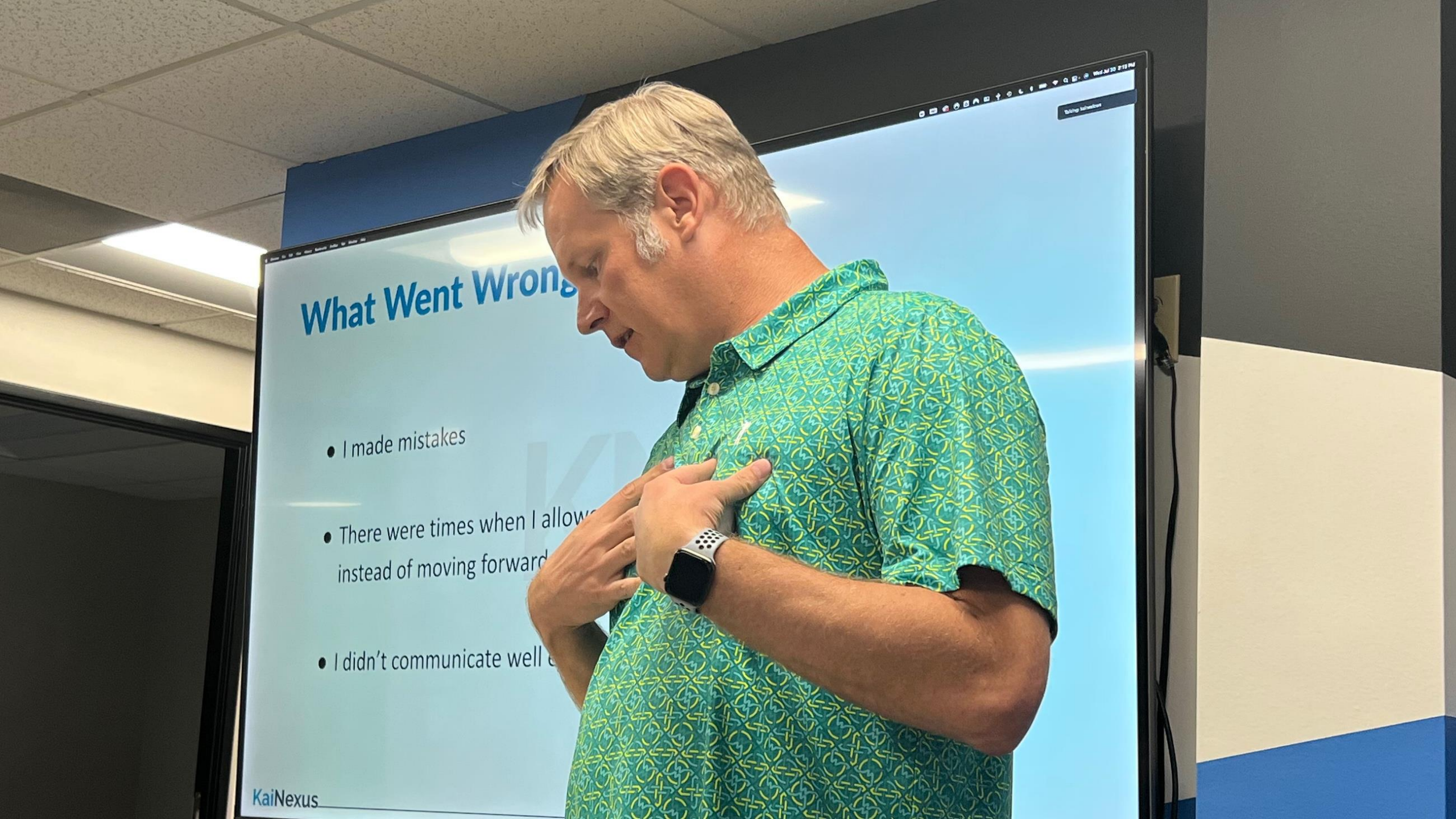


"I want to hear the bad news. I want to hear it fast."

Larry Culp, CEO of General Electric

"The moment of truth: Do you shoot the messenger, or do you listen even if you are unhappy?"

Larry Culp, CEO of General Electric


What Went Wrong
• I made mistakes
• There were times when I allow
instead of moving forward
• I didn't communicate well
KaiNexus

“You can’t have a culture of continuous improvement without learning from mistakes.”

Greg Jacobson
CEO and co-founder, KaiNexus

Stephanie Hill, MPH, MBB (She/Her) • 1st

Sr. Lean Strategist at KaiNexus -/- Owner of Light Bulb Mom...

1d •••

Celebrate · 4 | Reply

Stephanie Hill, MPH, MBB (She/Her) • 1st

Sr. Lean Strategist at KaiNexus -/- Owner of Light Bulb Mom...

1d •••

I THOUGHT I had a pretty significant “failure” yesterday at work. And I told everyone who might want to know. Instead of pointing fingers at me, my leader, a VP, and an executive all rallied around me to help “right the ship.” At no time did they imply I had done wrong. All they said was, “WE learned.” In fact, all complimented me about how I handled the situation. It encouraged me to continue trusting them with my mistakes.

Celebrate · 4 | Reply

The Culture Formation Hypothesis

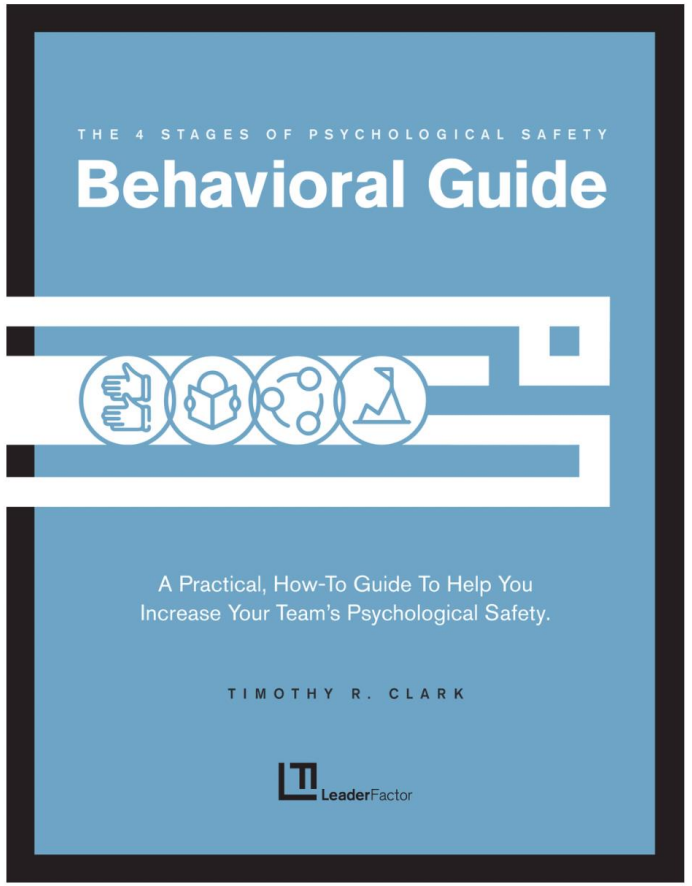
- The leader sets the tone
- Culture of a team reflects, more than anything, the behaviors modeled by the leader
- Teams do not outperform the leader, they reflect the leader

What We Can Do to Build Psychological Safety

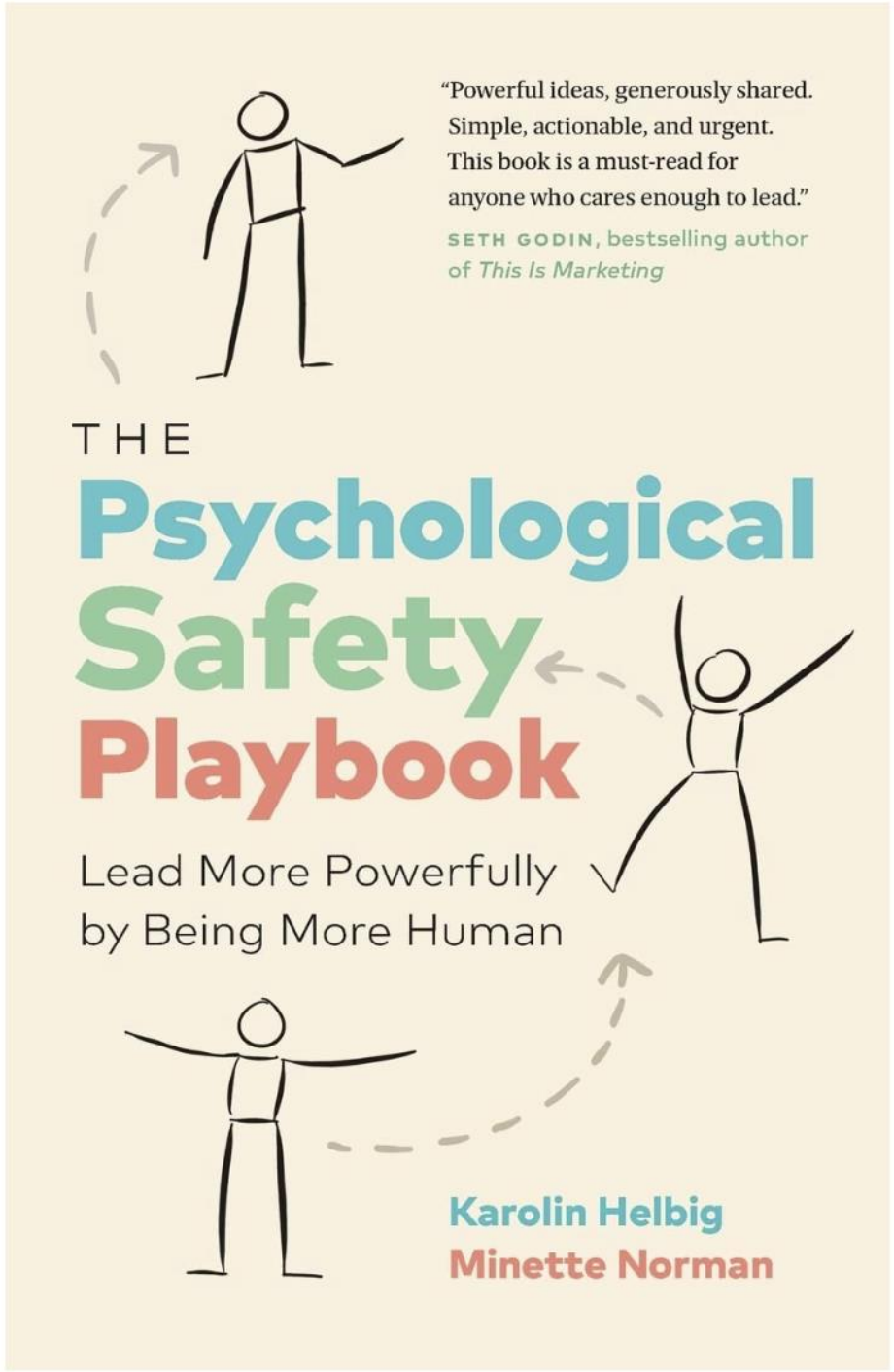
1. Frame the work as a learning problem, not an execution problem
2. Acknowledge your own fallibility
3. Model curiosity and ask lots of questions
4. Solicit input and opinions from the group
5. Share information about personal and work style preferences, and encourage others to do the same

33 Starting Point Behaviors

- https://www.leaderfactor.com/resources/the-4-stages-behavioral-guide
- Free PDF from LeaderFactor

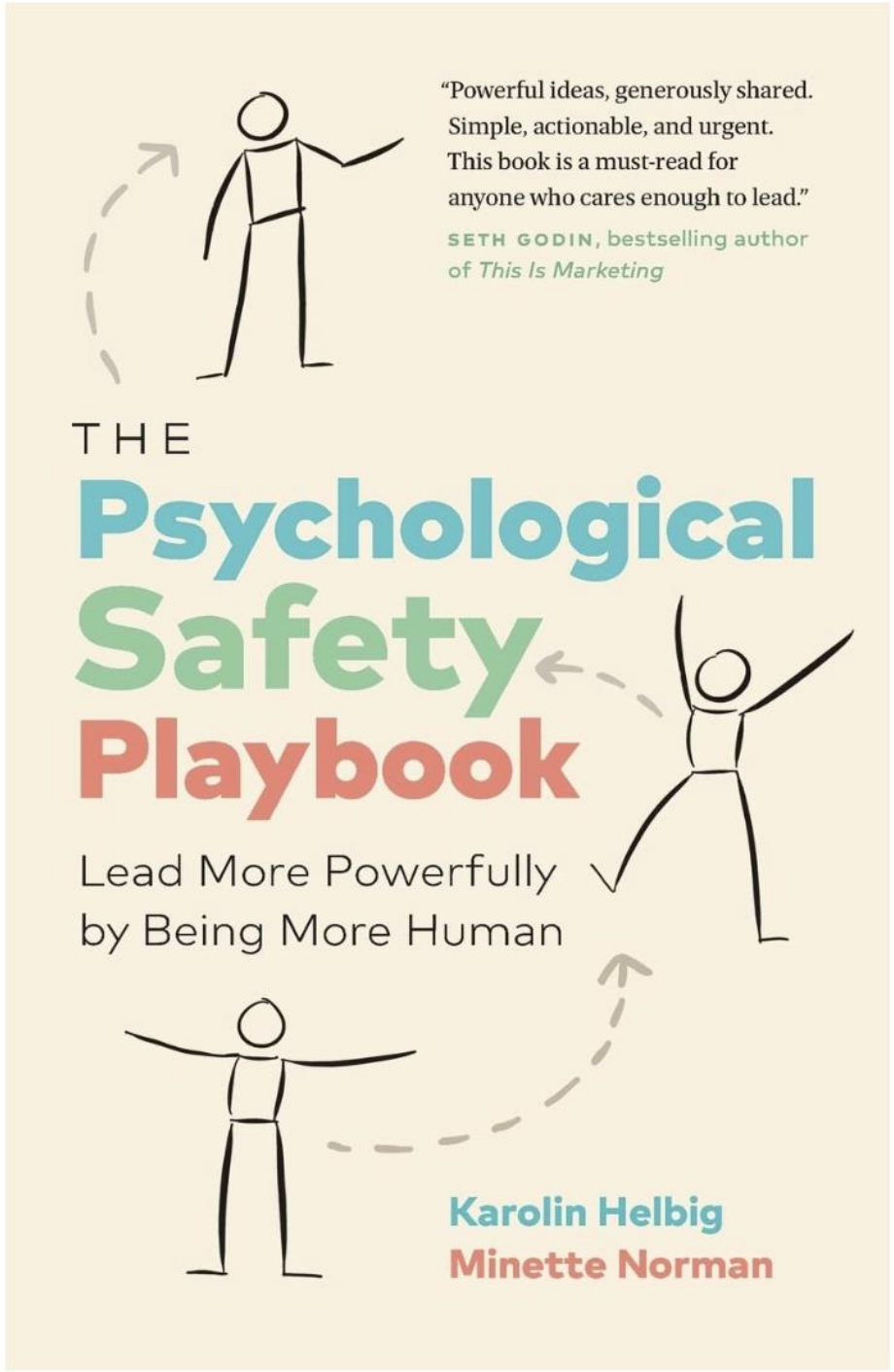


- I've linked to it here:
  - http://www.markgraban.com/MGMC2022



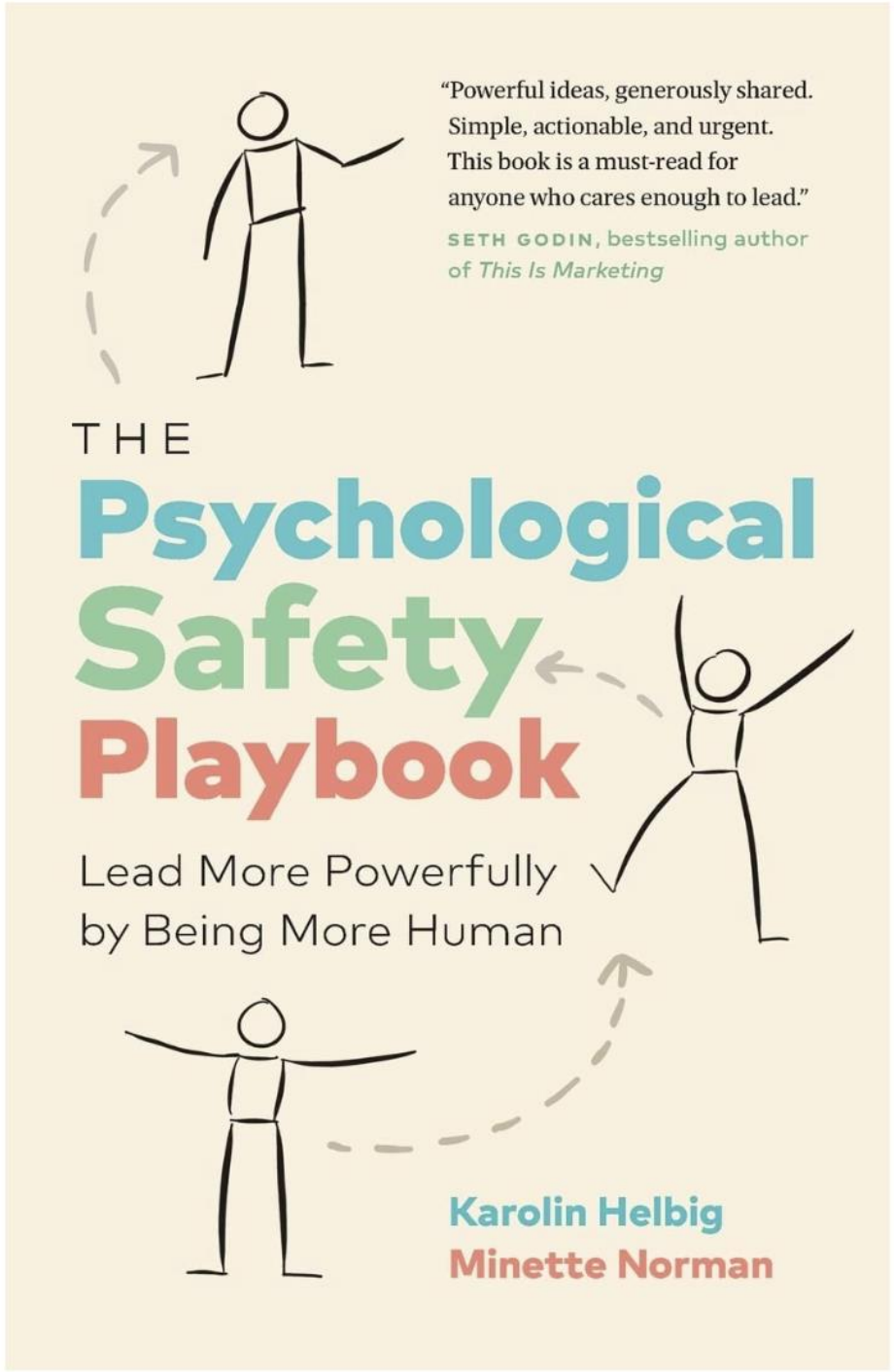
1) Communicate Courageously

1. Welcome Other Viewpoints: "What Am I Missing?"
2. Solicit Diverse Perspectives: "That's One Viewpoint; Let's Hear Some Dissent"
3. Open Up: Express Your Own Emotions
4. Take Off the Mask of Perfection: "I Don't Know Yet"
5. Nurture a Sense of Humor at Work: Laugh More (Especially at Yourself)



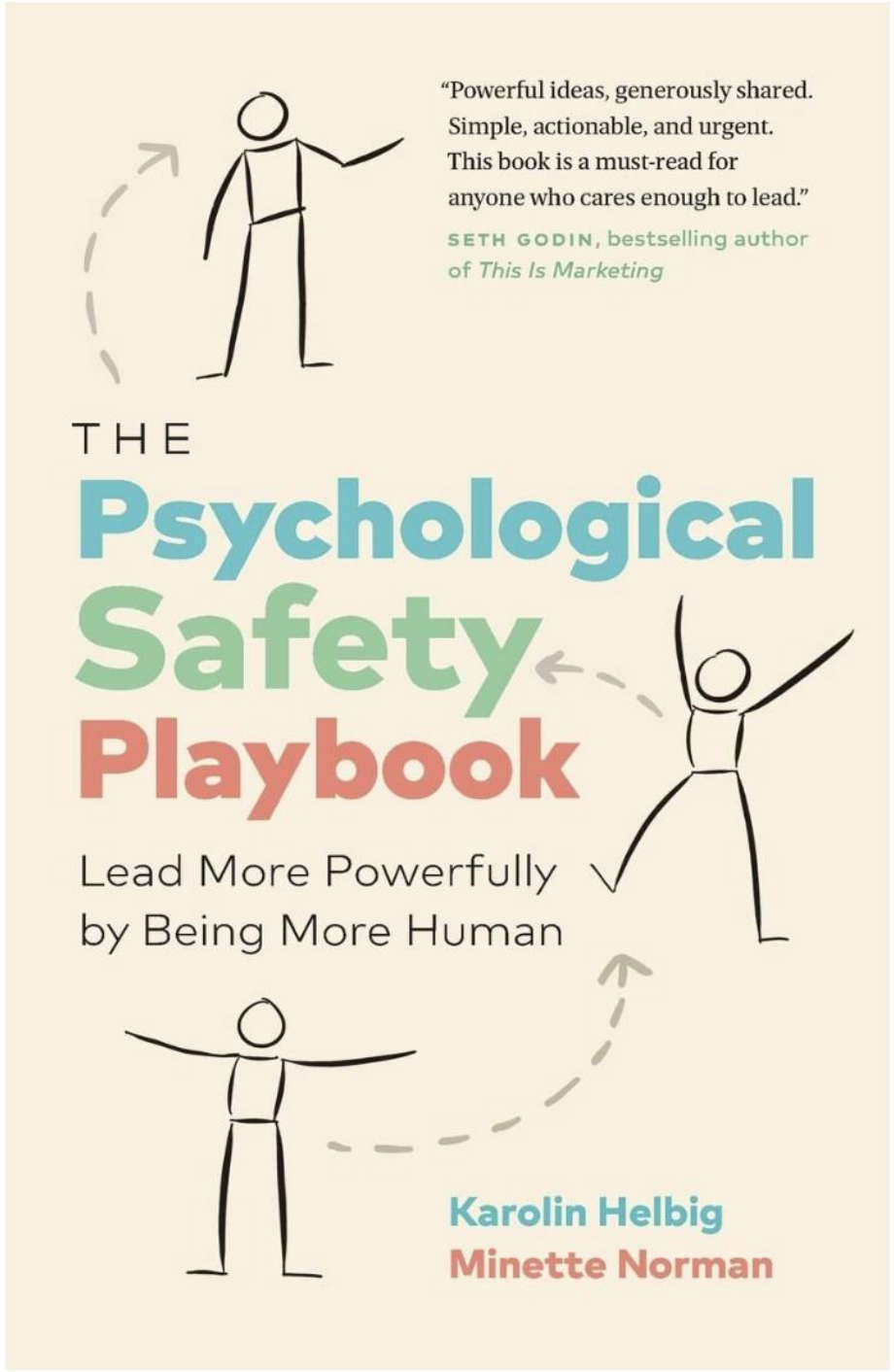
2) Master the Art of Listening

1. Listen to Understand: Develop the Discipline of Not Preparing a Response
2. Be Fully Present: Tame Your Wandering Mind
3. Clarify Your Understanding: Articulate What You Heard
4. Listen for Emotions: Hear What's Not Being Said
5. Commit to Curiosity: "Tell Me More"



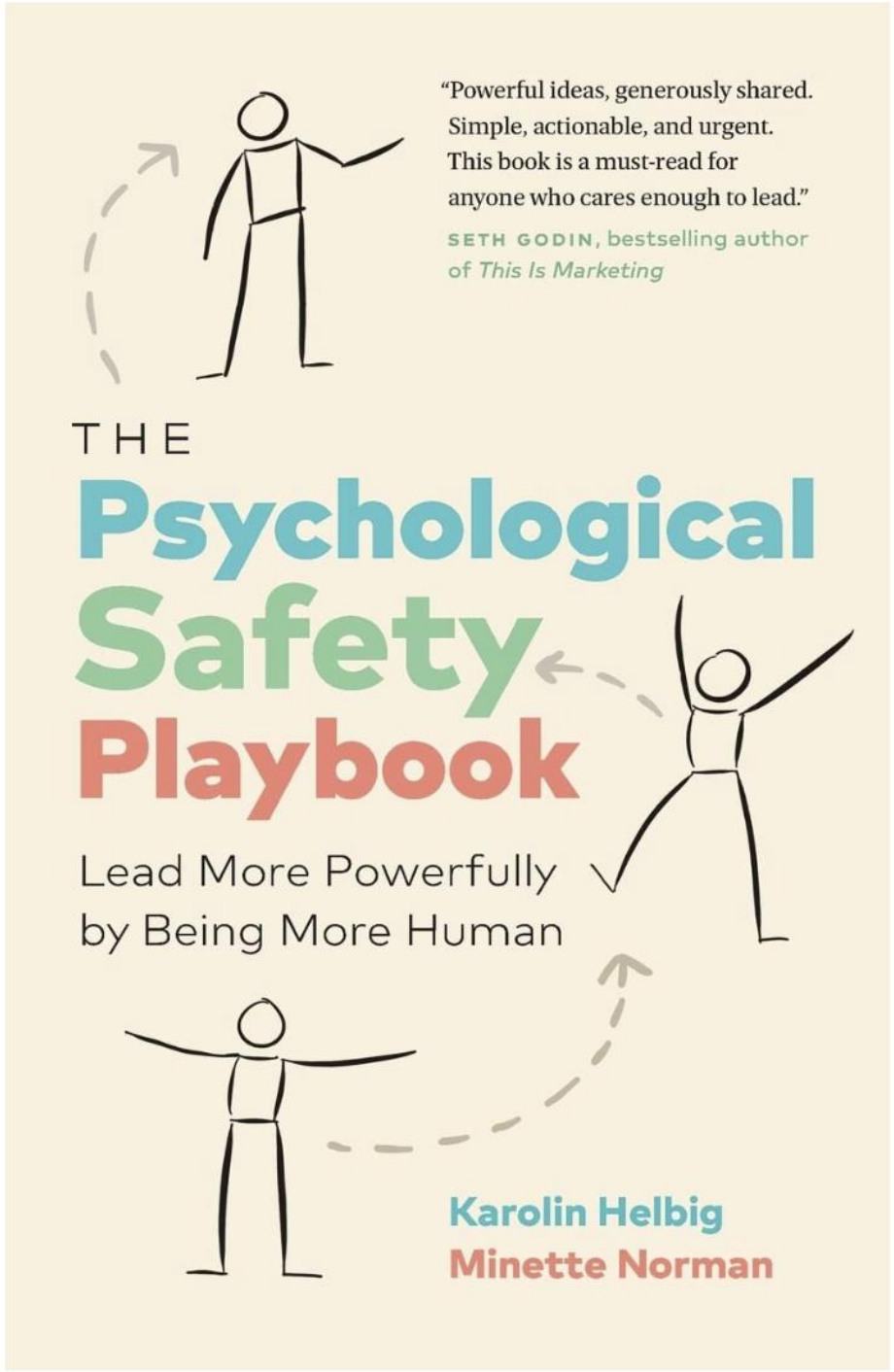
3) Manage Your Reactions

1. Model Non-defensive Reactions: Hit the Pause Button
2. Respond Productively: Label Your Emotions
3. Watch Out for Your Blind Spots: "What Stories Am I Telling Myself?"
4. Appreciate Being Challenged: Thank People for Their Courage
5. Build On Others' Ideas: "Yes, And"



4) Embrace Risk & Failure

1. Normalize Failure: "This Is New to Us, So We Will Experience Failure"
2. Reframe Failures as Learning Opportunities: "Interesting! What Can We Learn from This?"
3. Get Comfortable with Discomfort: Welcome Difficult Emotions
4. Model Learner Behavior: Admit Mistakes and Share Lessons Learned
5. Celebrate Continuous Learning: Implement Blameless Postmortems



5) Design Inclusive Rituals

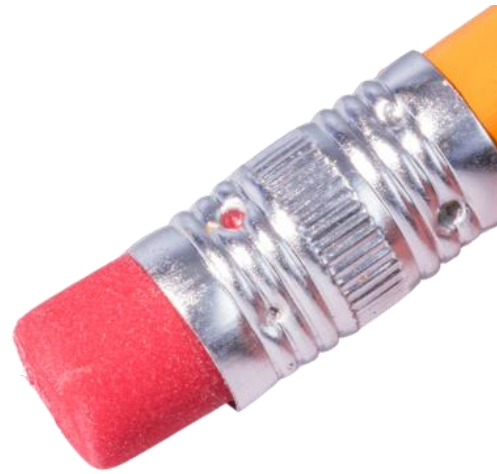
1. Upgrade Meetings: Appoint an Inclusion Booster
2. Respect All Voices: Establish a No-Interruption Rule
3. Take Turns: No One Speaks Twice until Everyone Speaks Once
4. Check for Psychological Safety: Gather Feedback after Meetings
5. Appreciate the Team: Express Gratitude

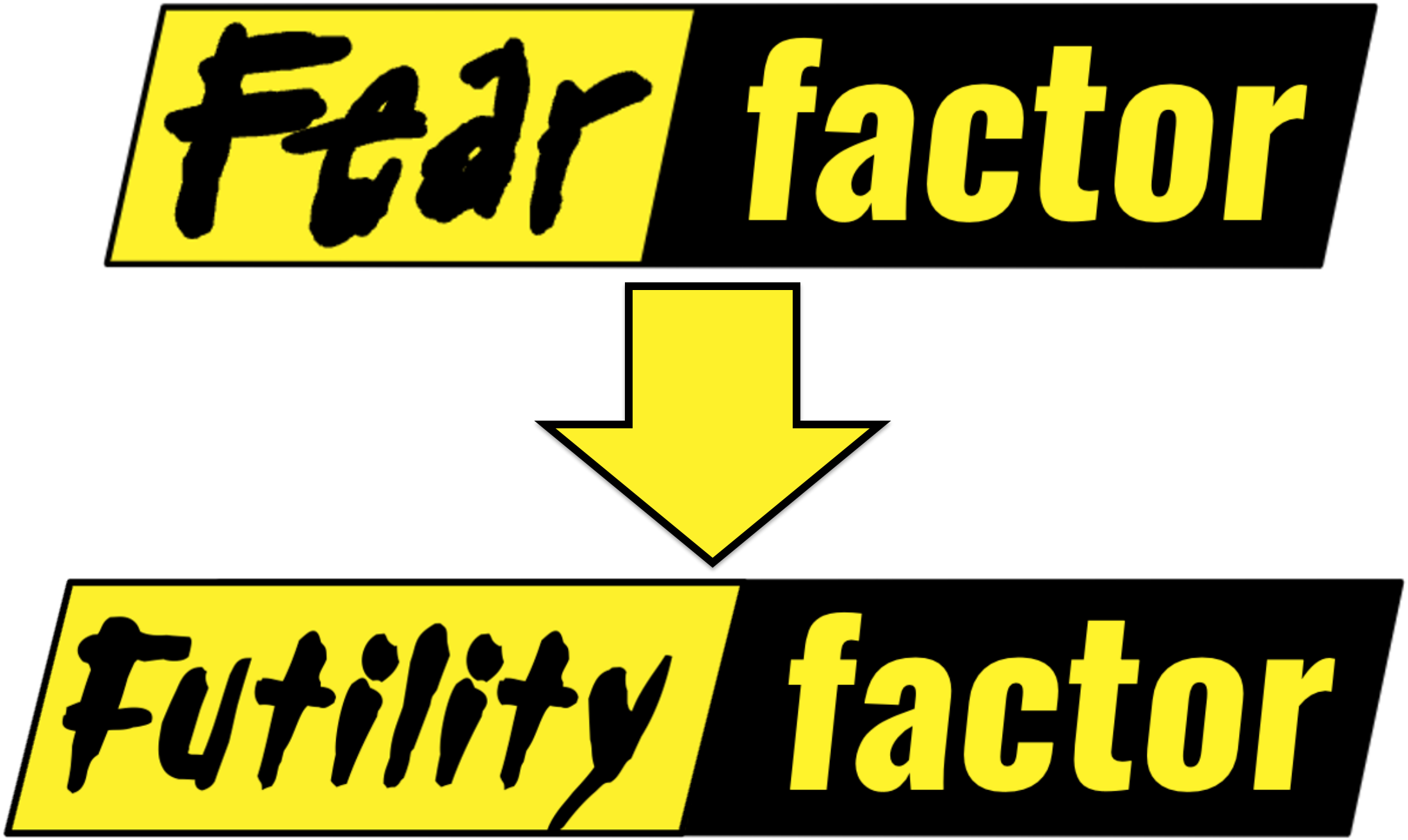
When We Only Have One...

PSYCHOLOGICAL SAFETY

+

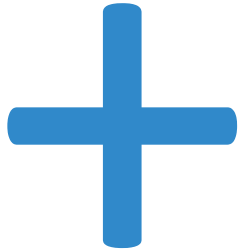
PROBLEM SOLVING




Fear factor
Futility factor

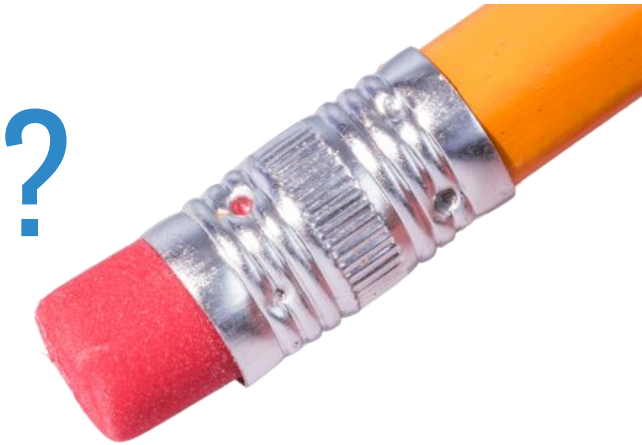
A Powerful Combination

PSYCHOLOGICAL SAFETY



PROBLEM SOLVING

What's Required for C.I.?



PSYCHOLOGICAL SAFETY

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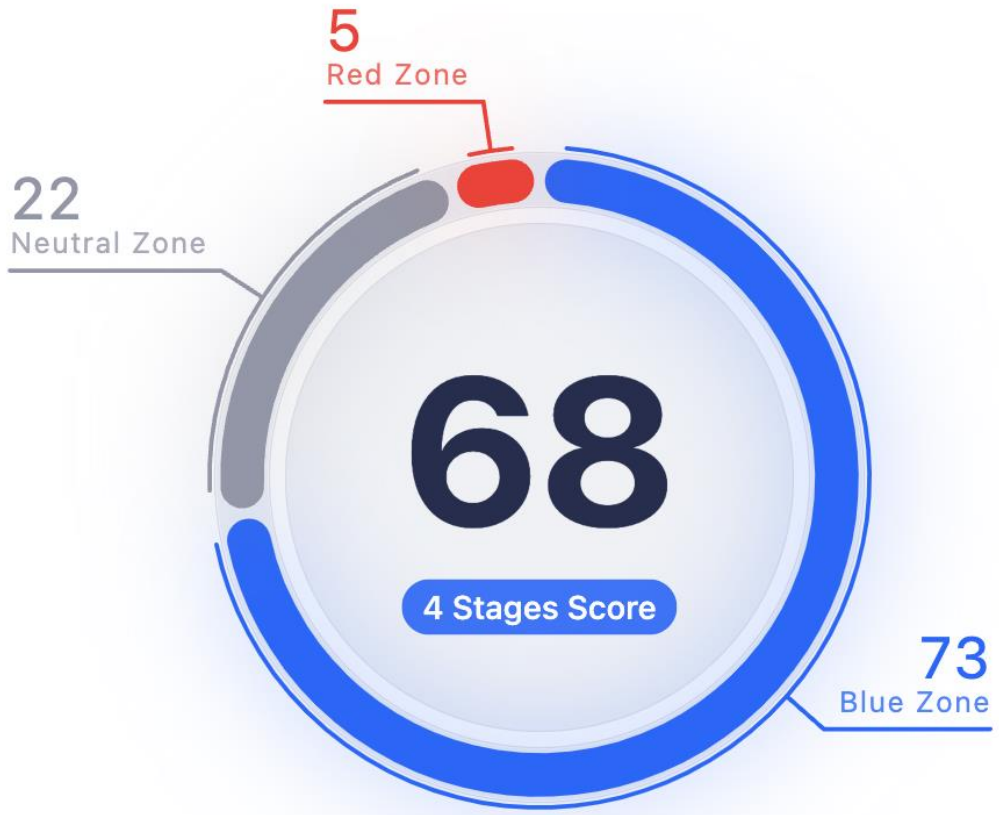
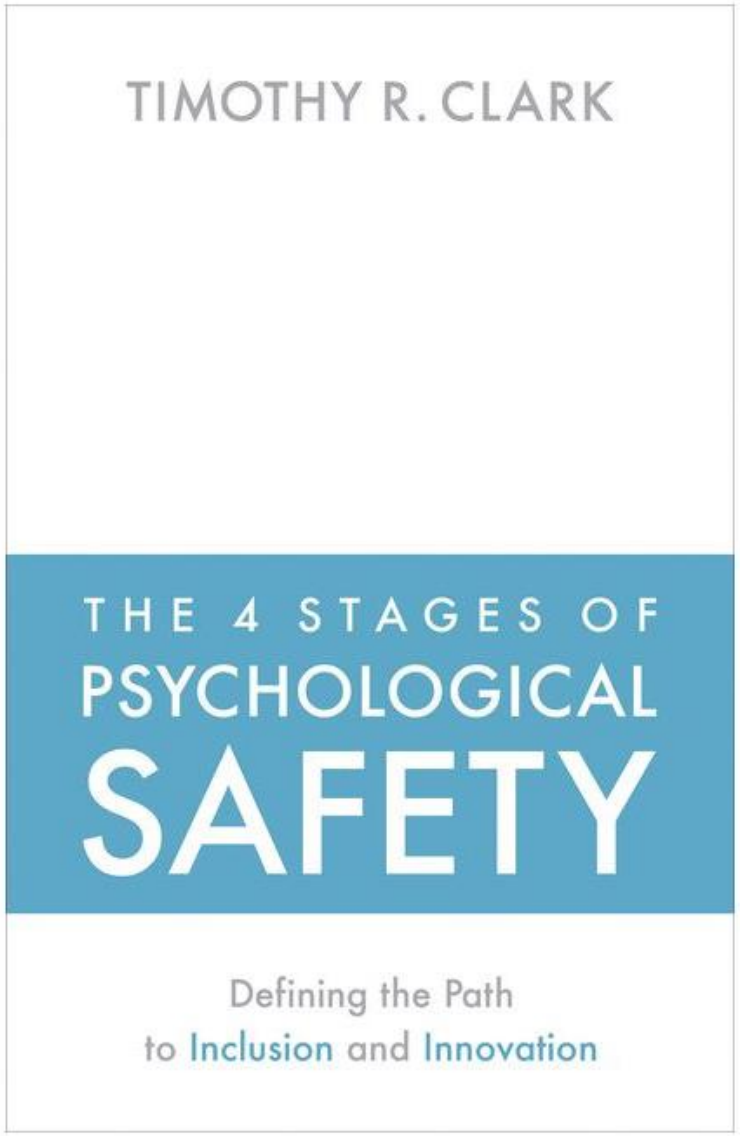
PROBLEM SOLVING

You Can Measure Psychological Safety

Possible scoring range is -100 to +100



80th percentile



4. CHALLENGER SAFETY

Can I be candid about change?

3. CONTRIBUTOR SAFETY

Can I contribute and create value

2. LEARNER SAFETY

Can I learn and grow?

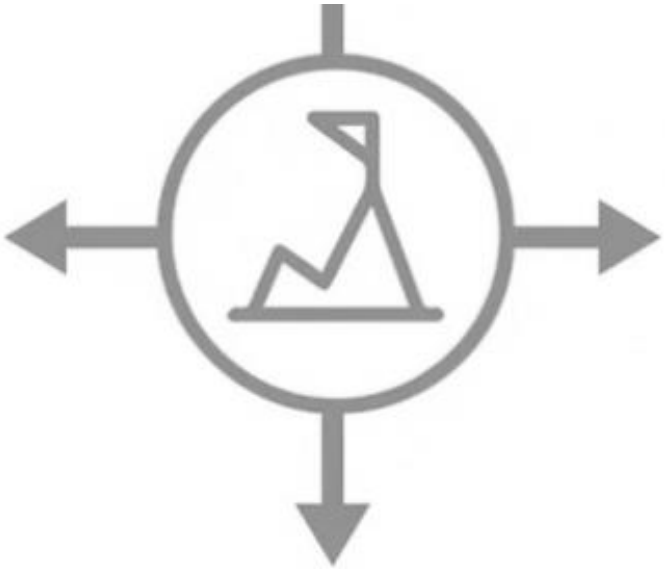
1. INCLUSION SAFETY

Can I be my authentic self?

What Stage 4 Challenger Safety Looks Like

Cultural
Flatness

Creative
Abrasion



Constructive
Dissent

Tolerance for Candor

Stage 4: Challenger Safety

- Is it safe to challenge the status quo???

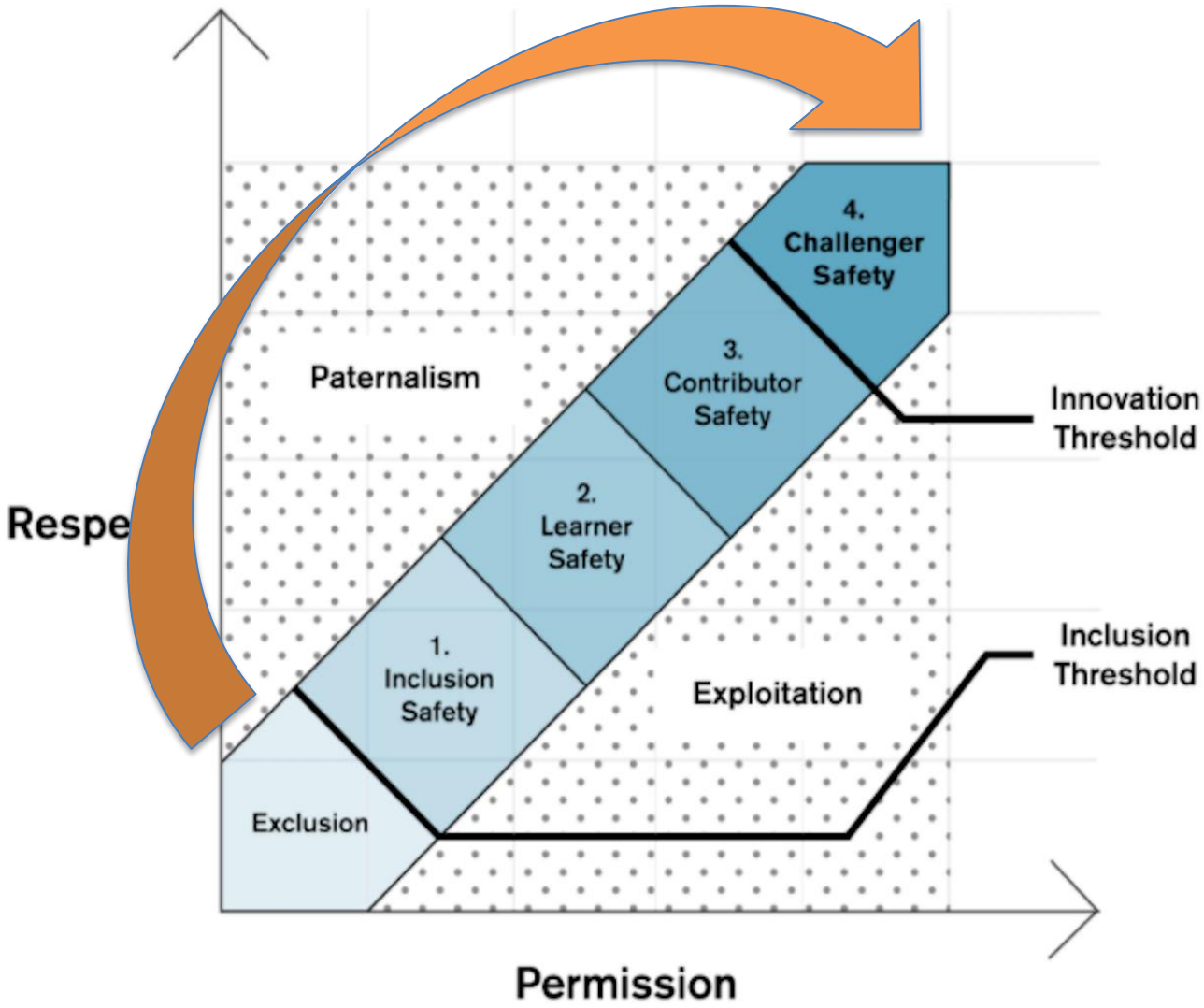
Kaizen!

- Any form of improvement or innovation

Stage 4: Challenger Safety

- "If you can bring a team to Stage 4, you're world-class."
- "We don't just tolerate challenging behavior, we encourage it."
- "It's **hard** to get to this place."

You Can't Jump Ahead to Stage 4!



Research-based progression

Can We Be Candid Experimentalists?

Is it Safe to Say?

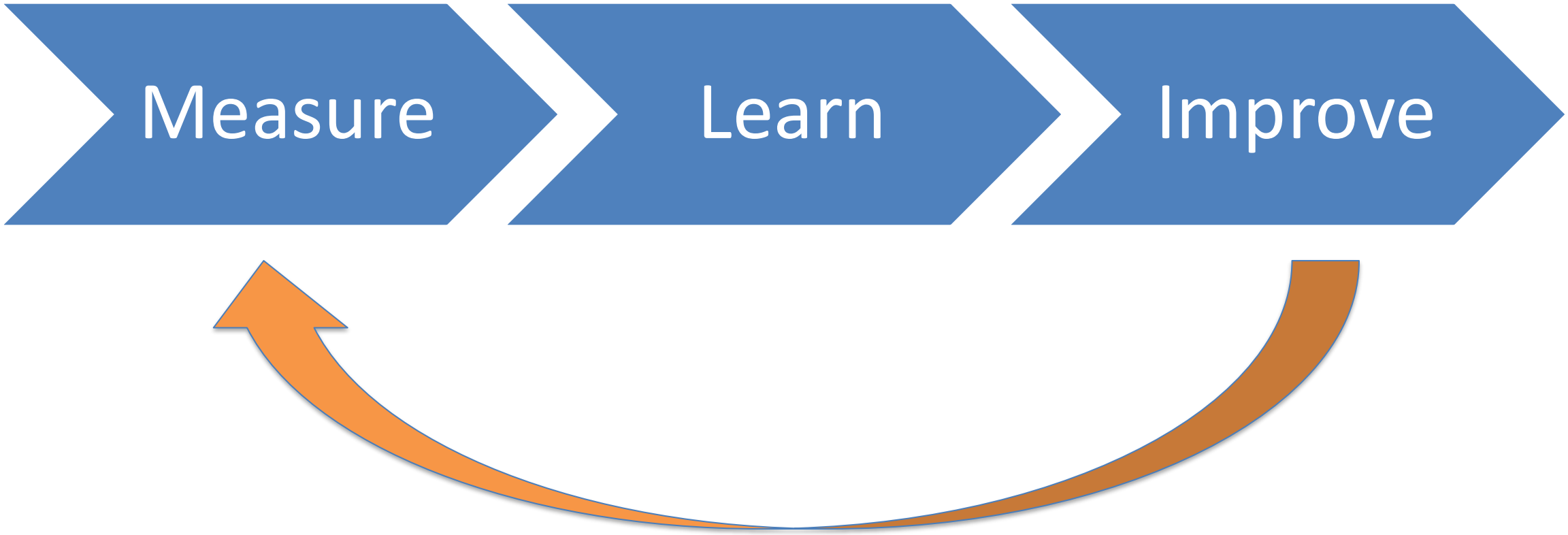
WE COULD BE WRONG

LET'S TEST IT AND SEE…

THAT DIDN'T WORK AS…

How much psychological safety do we have?

The Journey to Psychological Safety



You Can Measure It

- We can <u>measure</u> perception of its presence through occasional surveys
  - We can **<u>act</u>** every day to build Psychological Safety

Overall 60th %-tile

You Can Measure the 4 Stages

Possible scoring range is -100 to +100

74

Stage 1

Inclusion Safety

Percentile: 74th

76

Stage 2

Learner Safety

81st

74

Stage 3

Contributor Safety

76th

52

Stage 4

Challenger Safety

77th

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How much do YOU agree, at work?

Your connection seems to be unstable. Some features may not work as expected.

14

MG

Menti

Roadshow 2025

Choose a slide to present

Table Discussion!

YOUR REACTIONS TO THOSE RESULTS?

Join at menti.com | use code 3625 6313

How do you think OTHERS would generally answer at work?

I feel included, accepted, and respected

7.2

I feel safe to learn by asking questions and admitting mistakes

6.0

I feel able to do my job without being micromanaged

5.8

I feel safe challenging the status quo and sharing improvement ideas

5.3

Strongly disagree

Strongly agree

12

MG

Menti

Roadshow 2025

Choose a slide to present

You Can Improve Psychological Safety

Encouraging

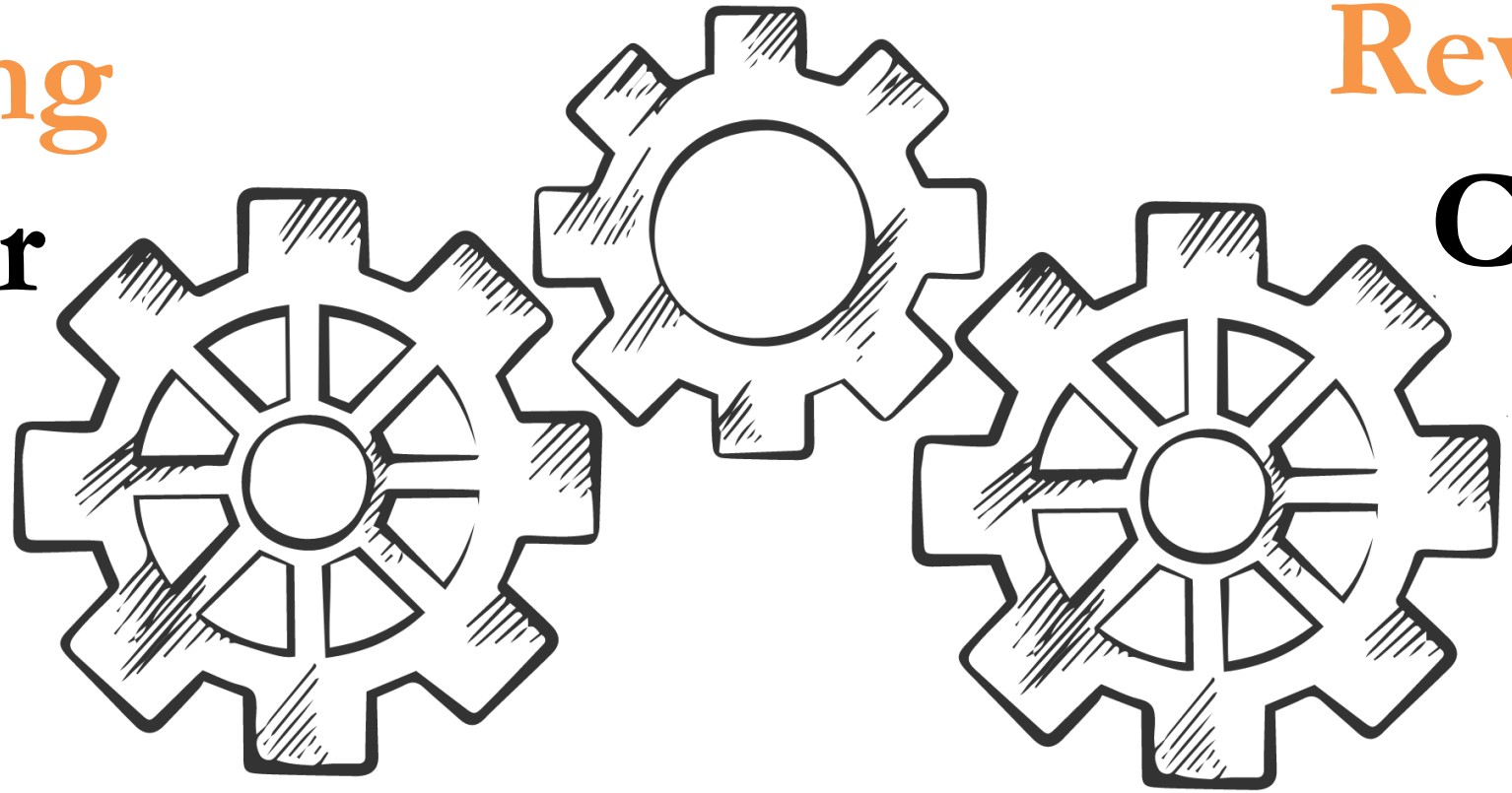
Candor

Modeling

Rewarding

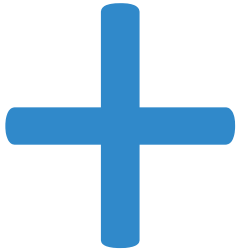
Candor

Candor



What's Required for C.I.?

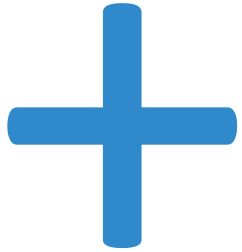
PSYCHOLOGICAL SAFETY



PROBLEM SOLVING

This Results In

HIGHLY ENGAGED PEOPLE



IMPROVING & INNOVATING

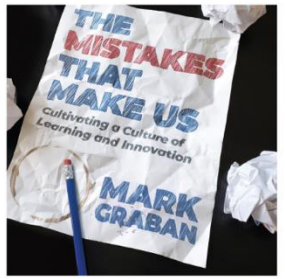
World Class Performance
Culture of Improvement
Culture of Learning from Mistakes
Culture of Psychological Safety
Leader Behaviors

Q&A Time

- **Slides & More:**
  http://www.markgraban.com/Brazil2024

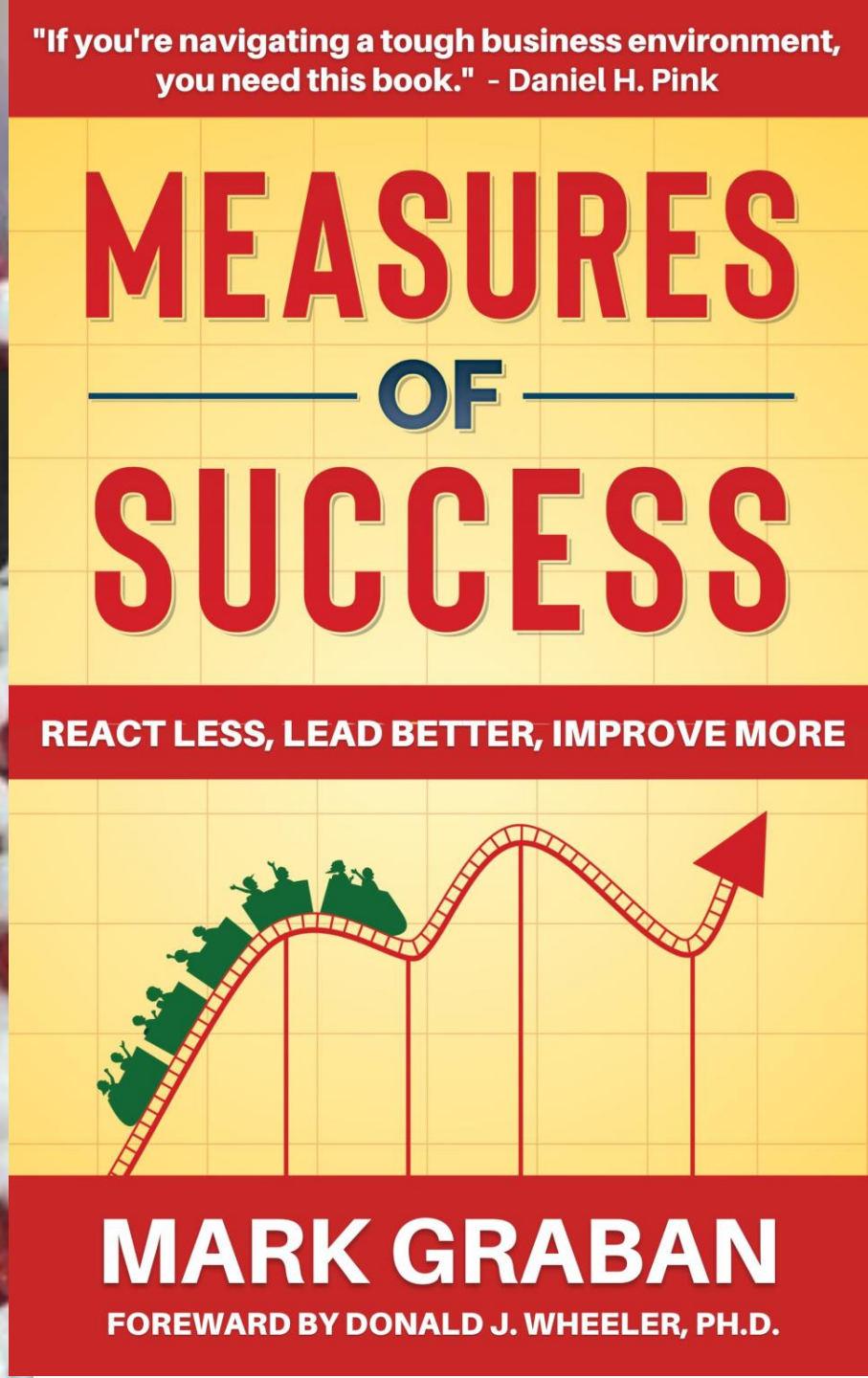
- **Email:** Mark@MarkGraban.com
- **Podcast:** MistakesPodcast.com
- **Book:** MistakesBook.com

NEW AUDIOBOOK!

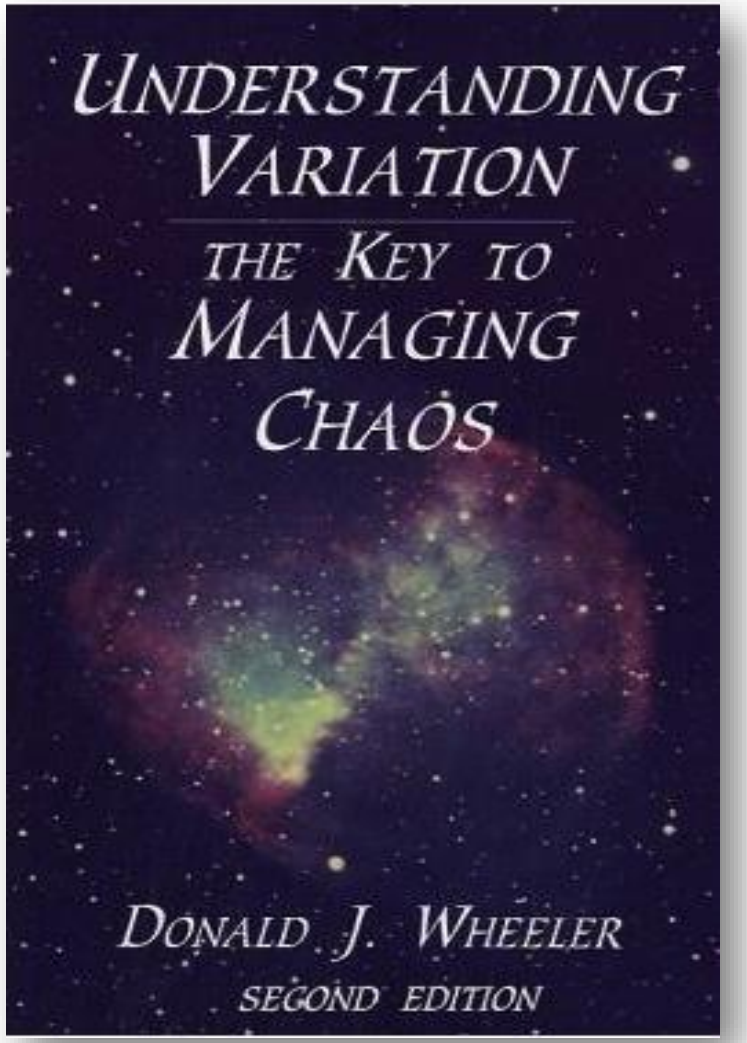


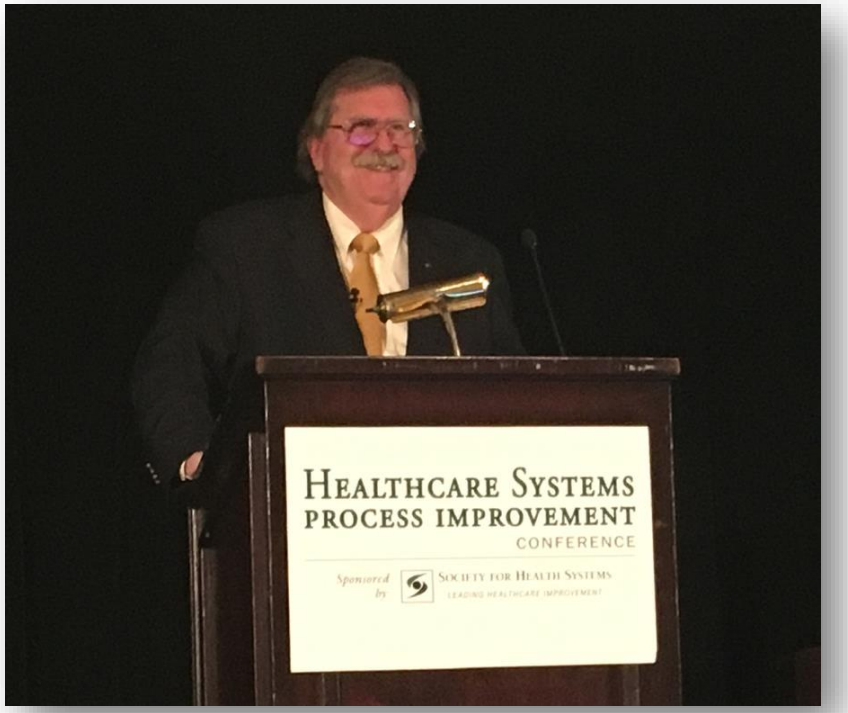
Improving How We Improve: The Deming Red Bead Game & Process Behavior Charts

Mark Graban



My Most Favorite Book Ever





Donald J. Wheeler, Ph.D.

http://www.spcpress.com/

Amazon: http://bit.ly/wheeler-book

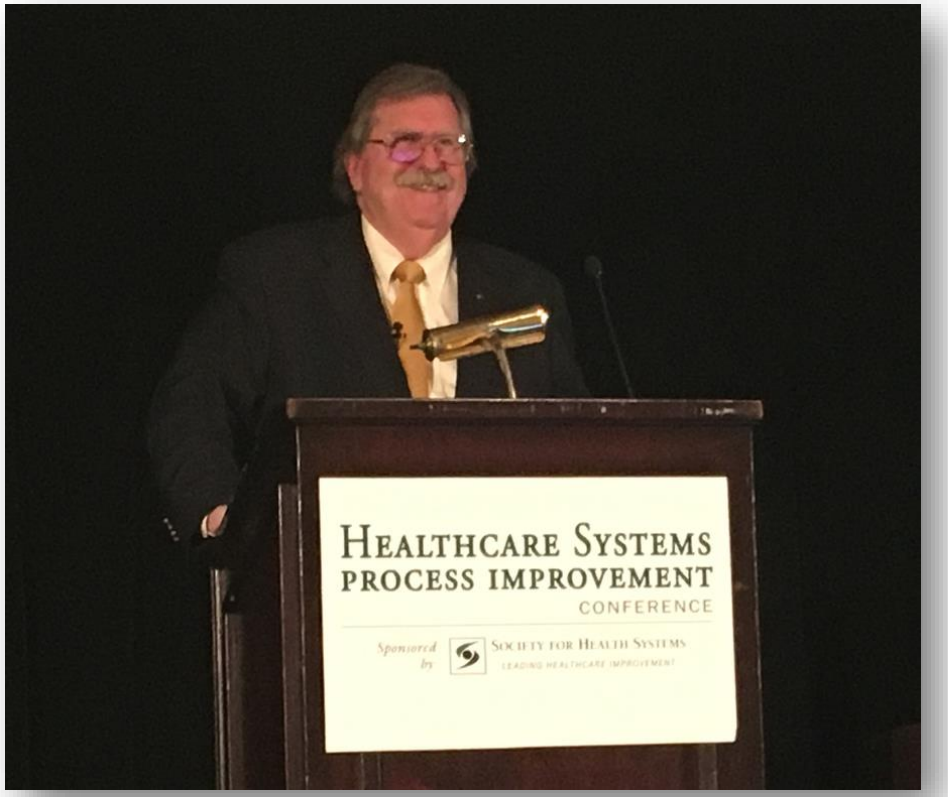
The Method We Are Here to Learn

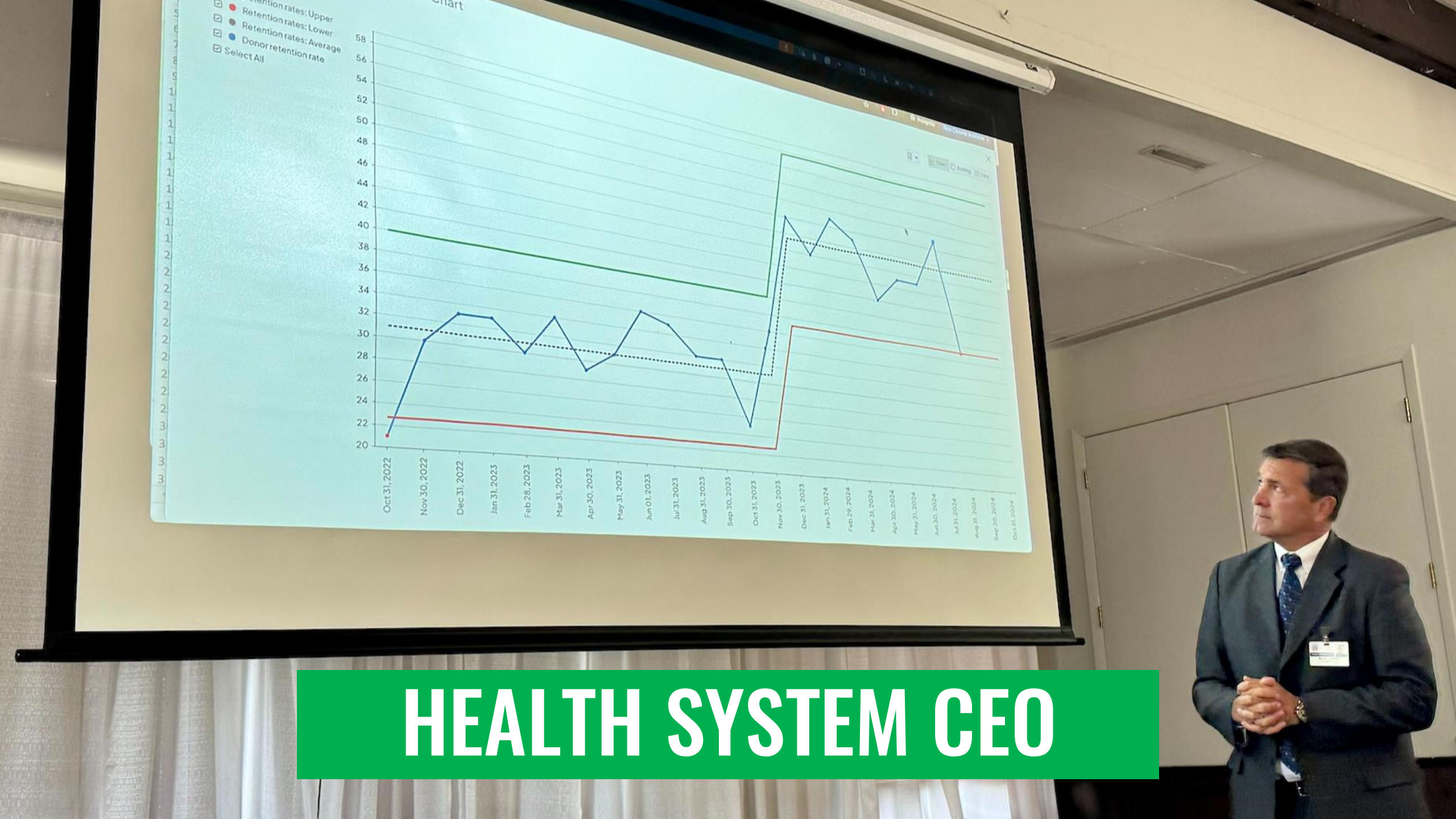
- **"SPC Chart"**
  - **Statistical Process Control**
- **a.k.a. "Control Chart"**
- **a.k.a. "Process Behavior Chart"**

- **"XmR Chart"**
  - **The "Has the Process Changed Chart?"** (Wheeler)
  - **The "Is It Time to Fix It Chart?"** (Wheeler)

Wheeler Says

"SPC is a way of thinking, with some tools attached."




Retention rates: Upper
Retention rates: Lower
Donor retention rate
Select All
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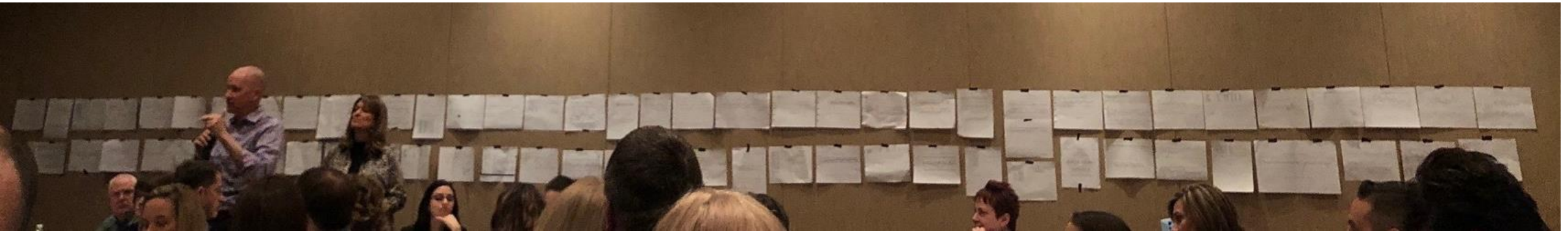
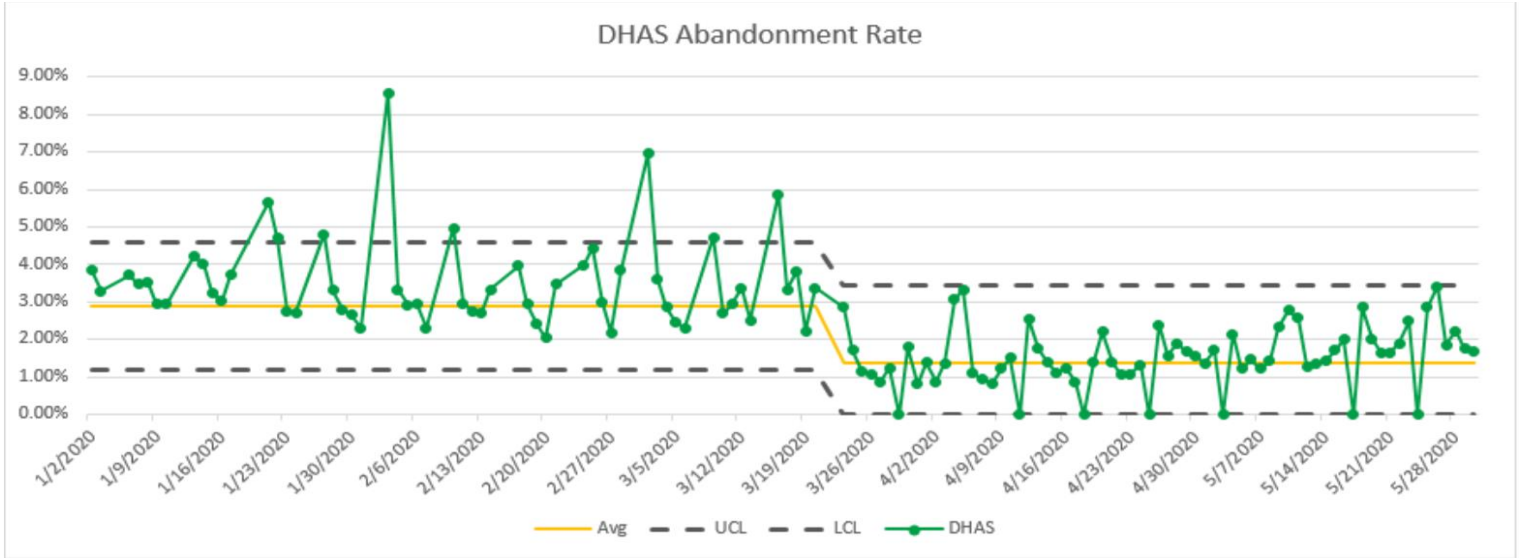
May 31, 2024
Jun 30, 2024
HEALTH SYSTEM CEO

Process Behavior Charts



"...will make us more effective at tracking what we improve or don't improve."

Process Behavior Charts

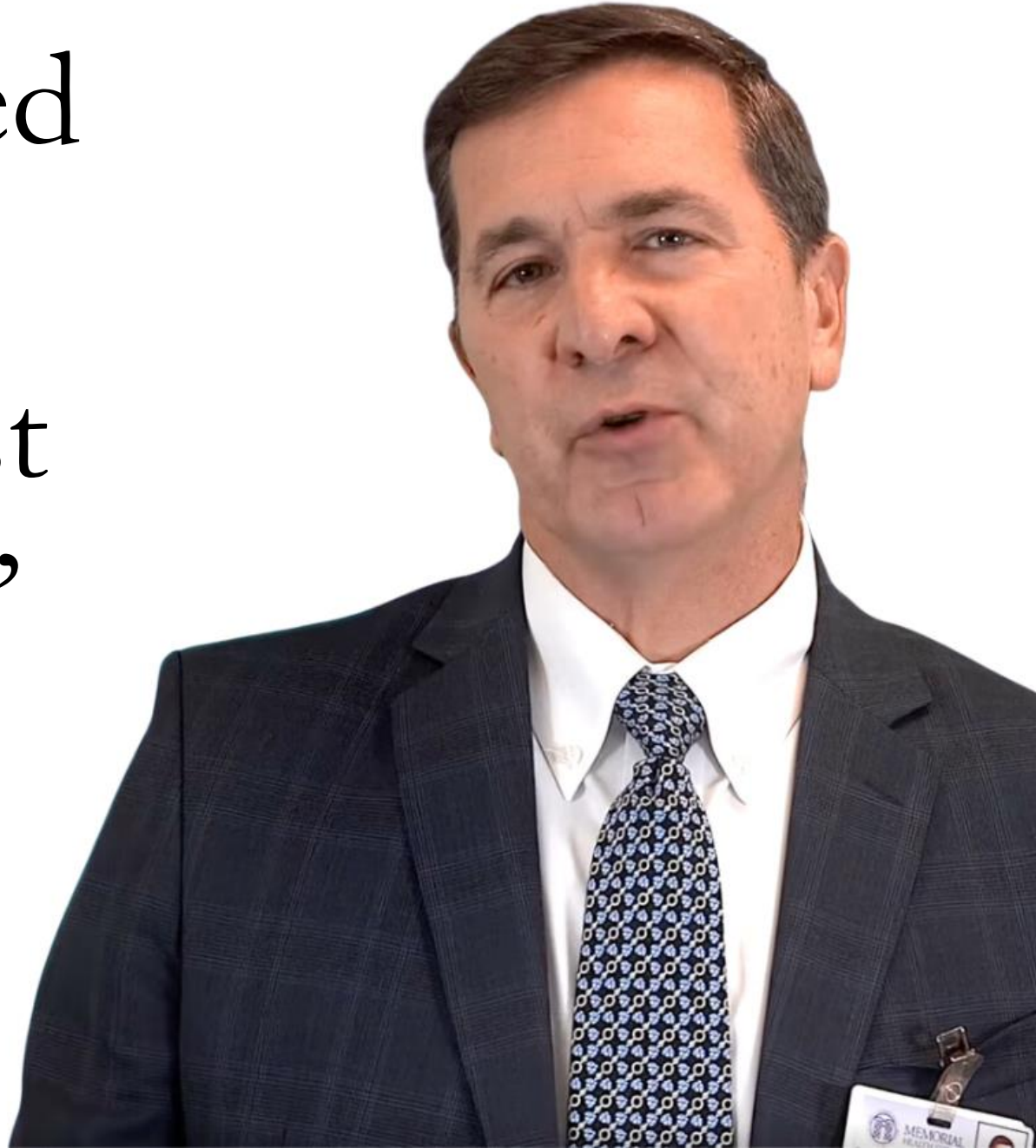


"A simple tool that helps drive a mindset change to being more systematic about the success of improvement work."

President, Ambulatory Services

“I believe we've saved lives with this… because it was most apparent in sepsis.”

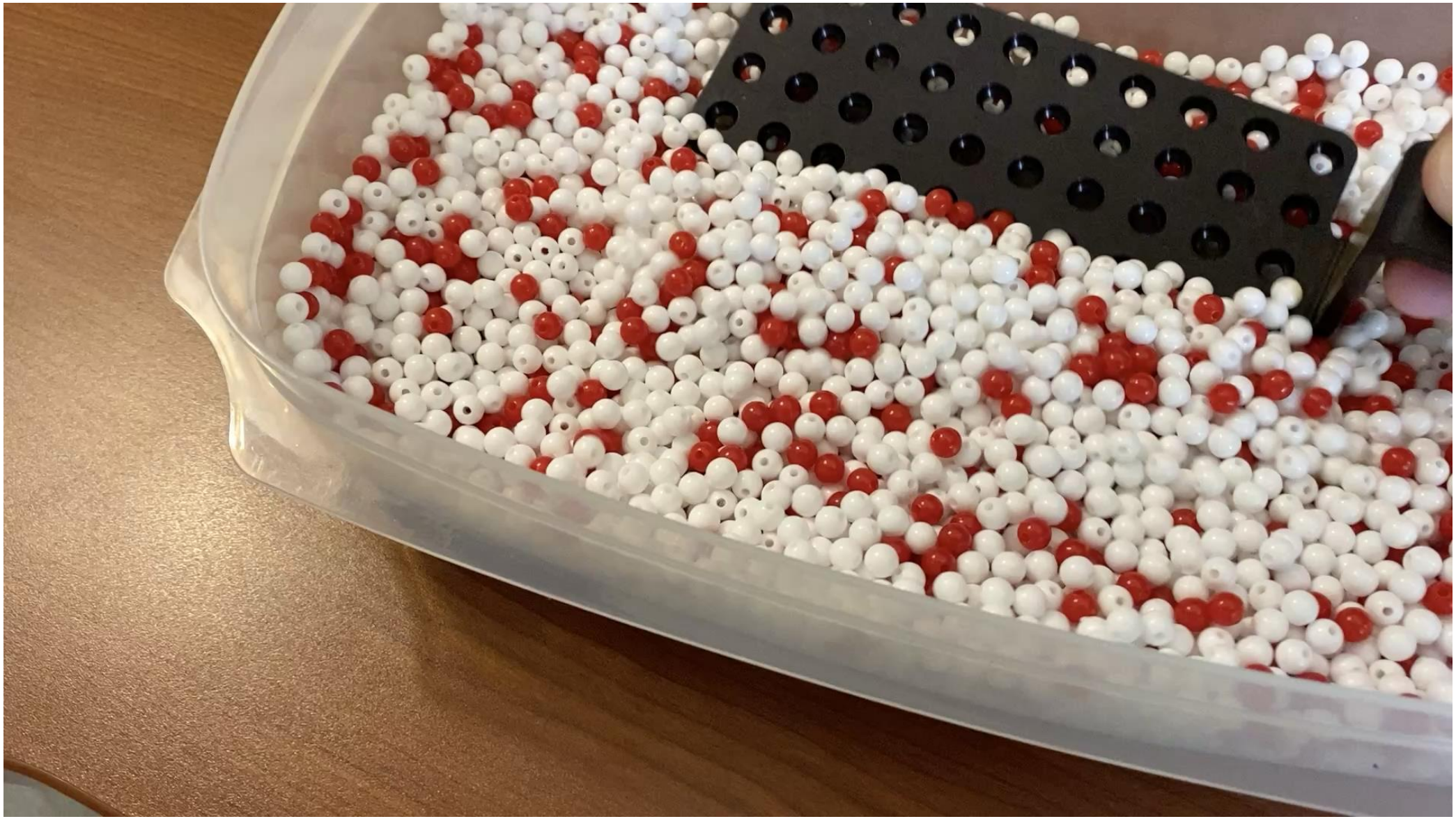
Scott Cantley
CEO of Marietta Memorial Health



Let's Play

W. Edwards Deming

Out of the Crisis



Dr. W. Edwards Deming (1900-1993)

- Used the "Red Bead Experiment" or "Red Bead Game" in his seminars
- Created at HP as a gift for Dr. Deming in 1982 by William Boller

Why Are We Here?

"To learn… and to have fun!

And to make a difference…"

W. Edwards Deming
(1900-1993)

BaaS

"Beads as a Service"

Beautiful beads, thoughtfully curated, and shipped each

Let's Start!

We have 10 job openings at the Beads as a Service (BaaS) Corp.

MONSTER

Resumes | Jobs | Career Resources

Job Information

- **Company:** BaaS Corp.
- **Location:** Louisville, KY
- **Salary/Wages:** $15/hr
- **Industries:** Wholesale Trade/Import-Export
- **Job Type:** Full Time Employee
- **Career Level:** Experienced (Non-Manager)
- **Job Category:** Other

Willing Worker (6 Openings)

Temporary Job

- Must be willing to put forth best efforts
- Continuation of job is dependent on performance.
- Experience in pouring beads is not necessary
- Educational requirements minimal

Chrome File Edit View History Bookmarks People Window Help 70% Wed 6:30 AM Mark Graban
Warehouse/Forklift Associate
Mark
jobview.monster.com/warehouse-forklift-associate-temporary-job-job-sioux-falls-sd-us-183608788.aspx?mescoid=4...
MONSTER
Resumes Jobs Career Resources

Job Information

- **Company:**
  BaaS Corp.
- **Location:**
  Louisville, KY
- **Salary/Wages:**
  $16-18/hr
- **Industries:**
  Wholesale Trade/Import-Export
- **Job Type:**
  Full Time
  Employee
- **Career Level:**
  Experienced (Non-Manager)
- **Job Category:**
  Other

Inspector (2 openings)

Temporary Job

Must be able to distinguish red from white

Preferred: able to count to 20

Experience not necessary

MONSTER

Resumes | Jobs | Career Resources

Job Information

- **Company:**
  BaaS Corp.
- **Location:**
  Louisville, KY
- **Salary/Wages:**
  $18-20/hr
- **Industries:**
  Wholesale Trade/Import-Export
- **Job Type:**
  Full Time
  Employee
- **Career Level:**
  Experienced (Non-Manager)
- **Job Category:**
  Other

Inspector General

Temporary Job

Must be able to distinguish red from white

Able to count to 20

Some supervision experience preferred

Must have a loud voice

MONSTER

Resumes | Jobs | Career Resources

Job Information

- **Company:**
  BaaS Corp.
- **Location:**
  Louisville, KY
- **Salary/Wages:**
  $15/hr
- **Industries:**
  Wholesale Trade/Import-Export
- **Job Type:**
  Full Time
  Employee
- **Career Level:**
  Experienced (Non-Manager)
- **Job Category:**
  Other

Recorder

Temporary Job

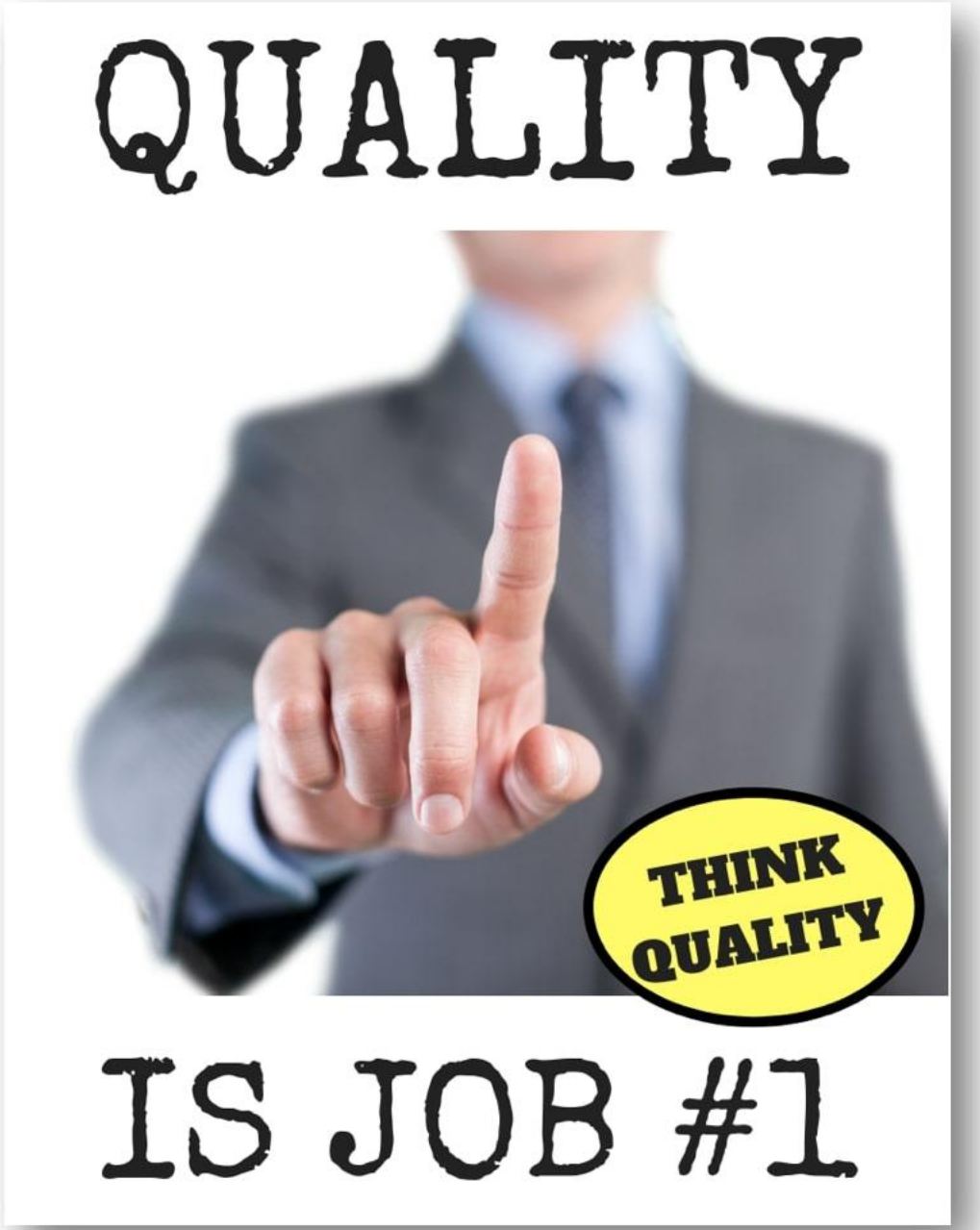
No experience required

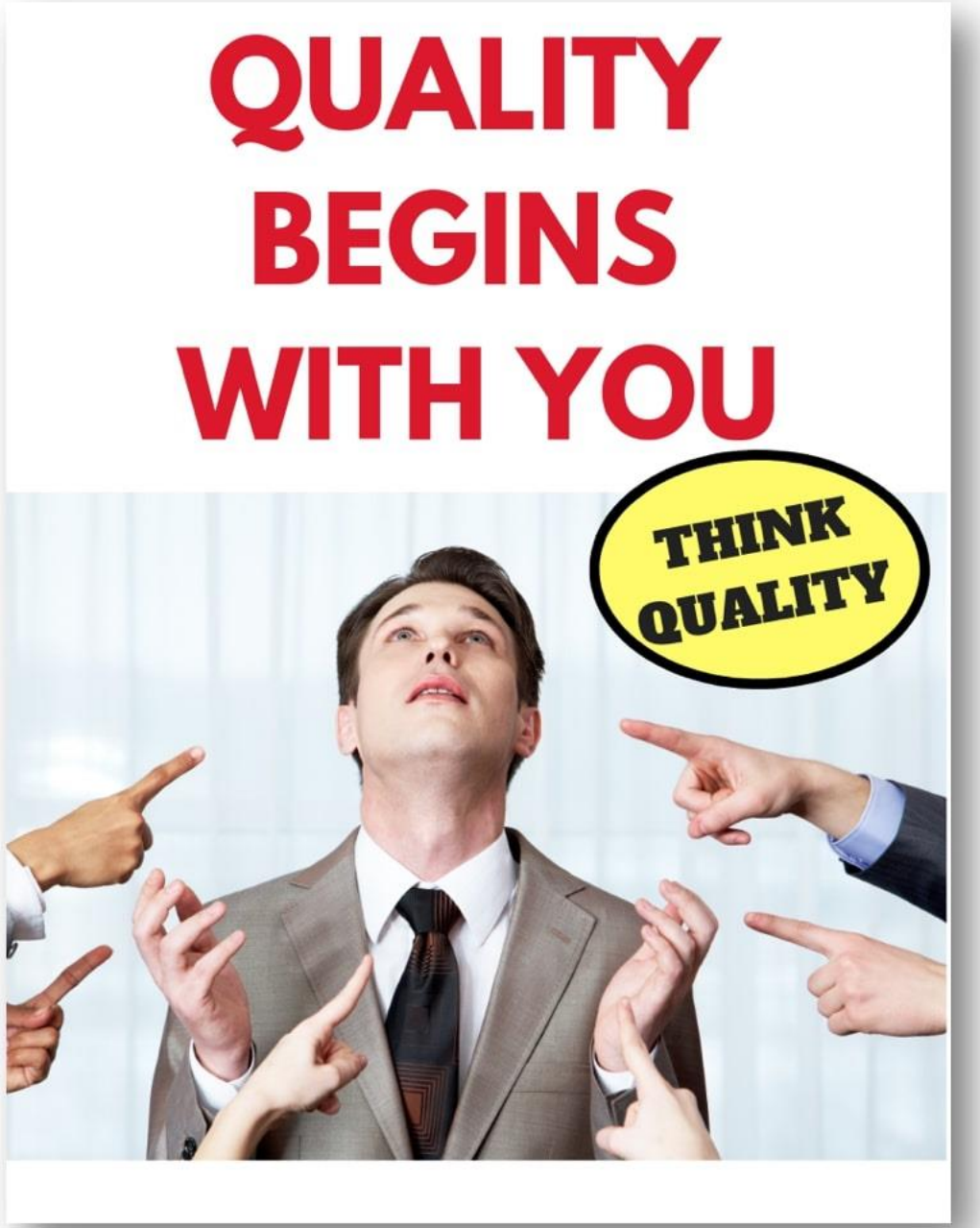
Must have neat handwriting

Account Name:	**BaaS Corp.**	CREATION DATE:	2/14/02
Process Location:	**Multiple**	CURRENT REVISION LEVEL:	3.3
Operator Process Type:	**Producing White Beads**	PREVIOUS REVISION DATE:	9/3/17

JOB BREAKDOWN SHEET

PROCESS TYPE				QUALITY/SAFETY	
ORDER OF PROCESS	JOB STEP	DESCRIPTION OF JOB CONTENT	Analysis Information (Process Type & Estimated Time)	DESCRIPTION OF KEY QUALITY ("Q") AND SAFETY("S") POINTS	
			ESTIMATE	WHAT	WHY
1	1	Ensure paddle holes are empty of all beads	2		
1	2	Grasp the paddle by the long edge.	2	Ensure holes are oriented upwards.	Necessary for proper capture of produced beads
1	3	Slide the paddle down into the beads until paddle is covered with beads.	4	Agitate slightly	To help fill holes
1	4	Pick up paddle to 4 inches above the bead level.	5		
1	5	Tilt paddle at a 47 degree angle to release excess beads.	5	Must be at precisely 47 degree angle.	Best utilizes gravity.
1	6	Withdraw paddle from container	3	Make sure one bead is in each hole.	Production quota
2	7	Take paddle to Inspector	5	Be careful to not spill any beads.	Safety
2	8	Present to Inspector for count of beads produced.	10		


QUALITY
THINK QUALITY
IS JOB #1


QUALITY BEGINS WITH YOU
THINK QUALITY

The
Target
Is:
3

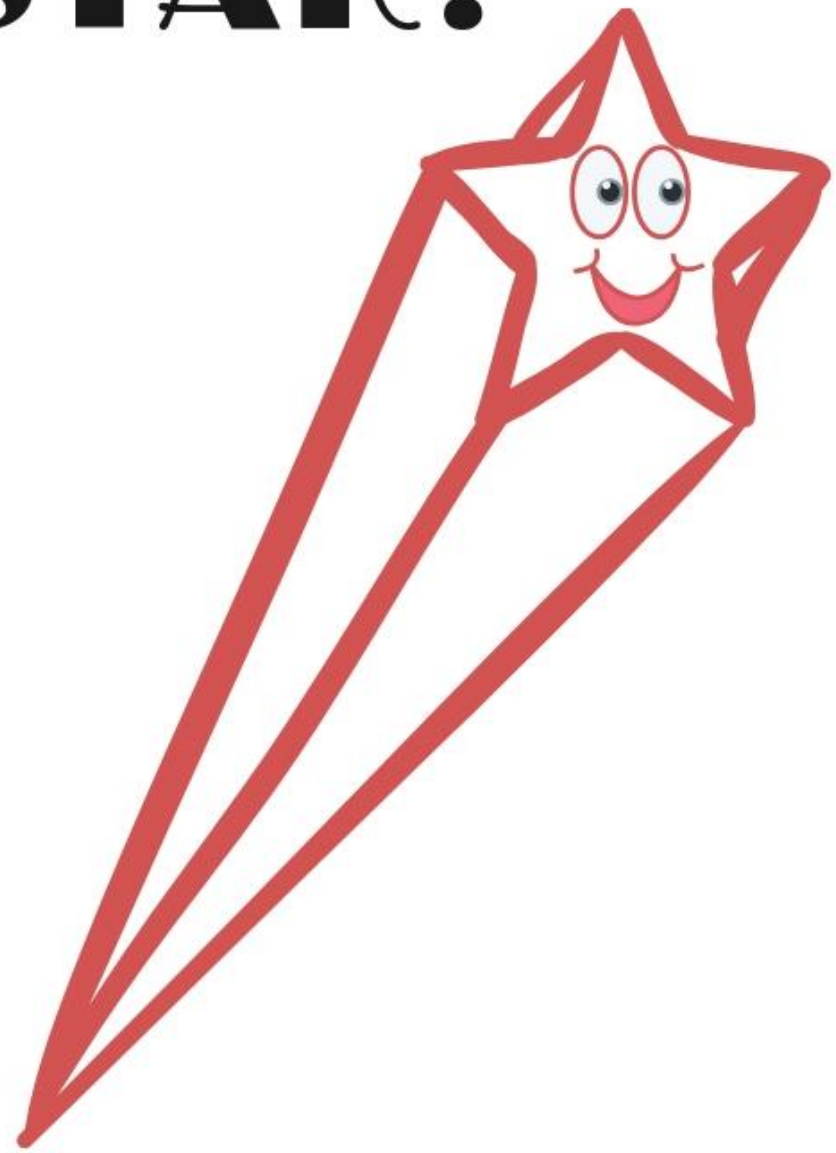
Be a STAR!

Stop

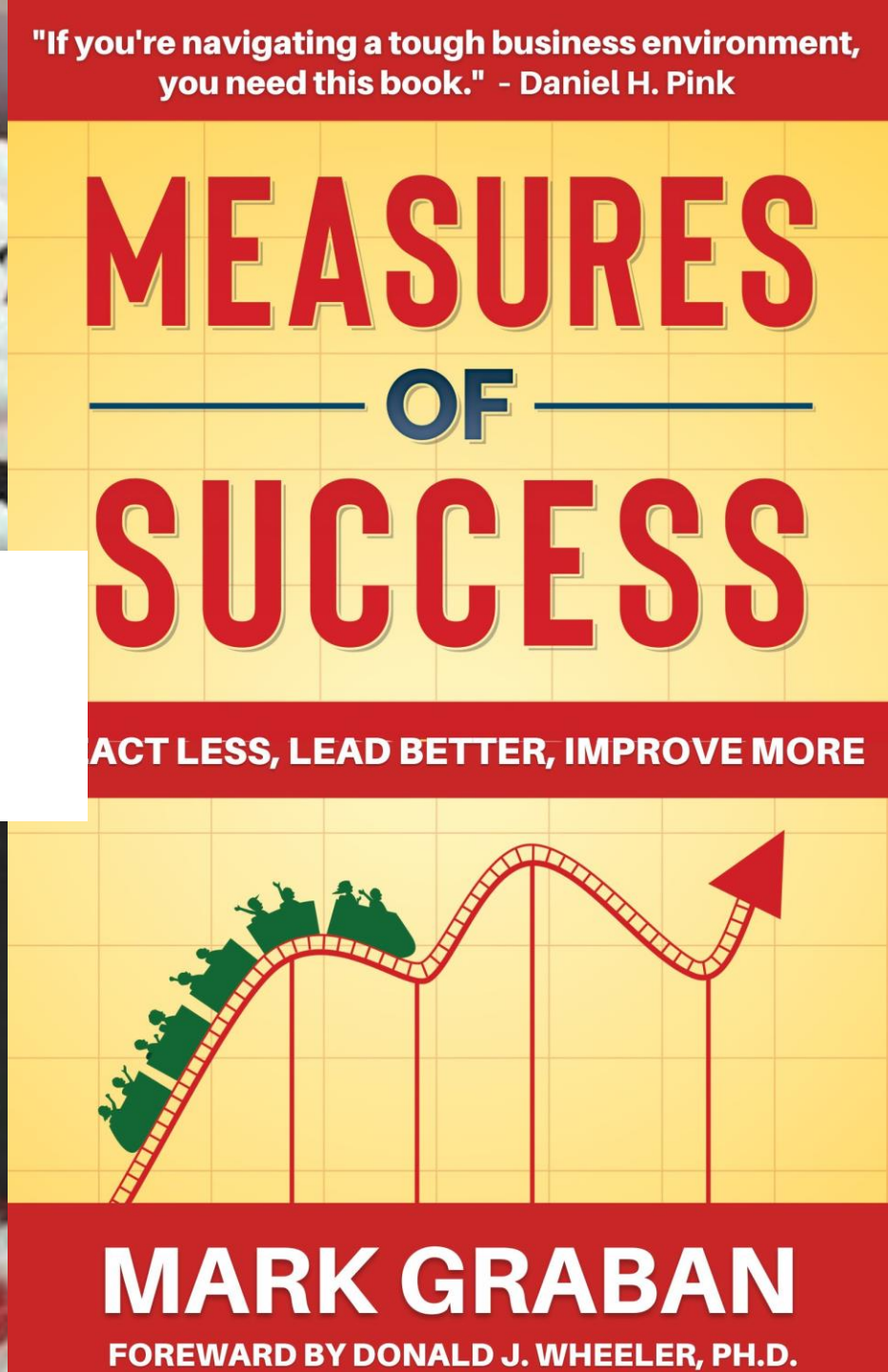
Think

Act

Review

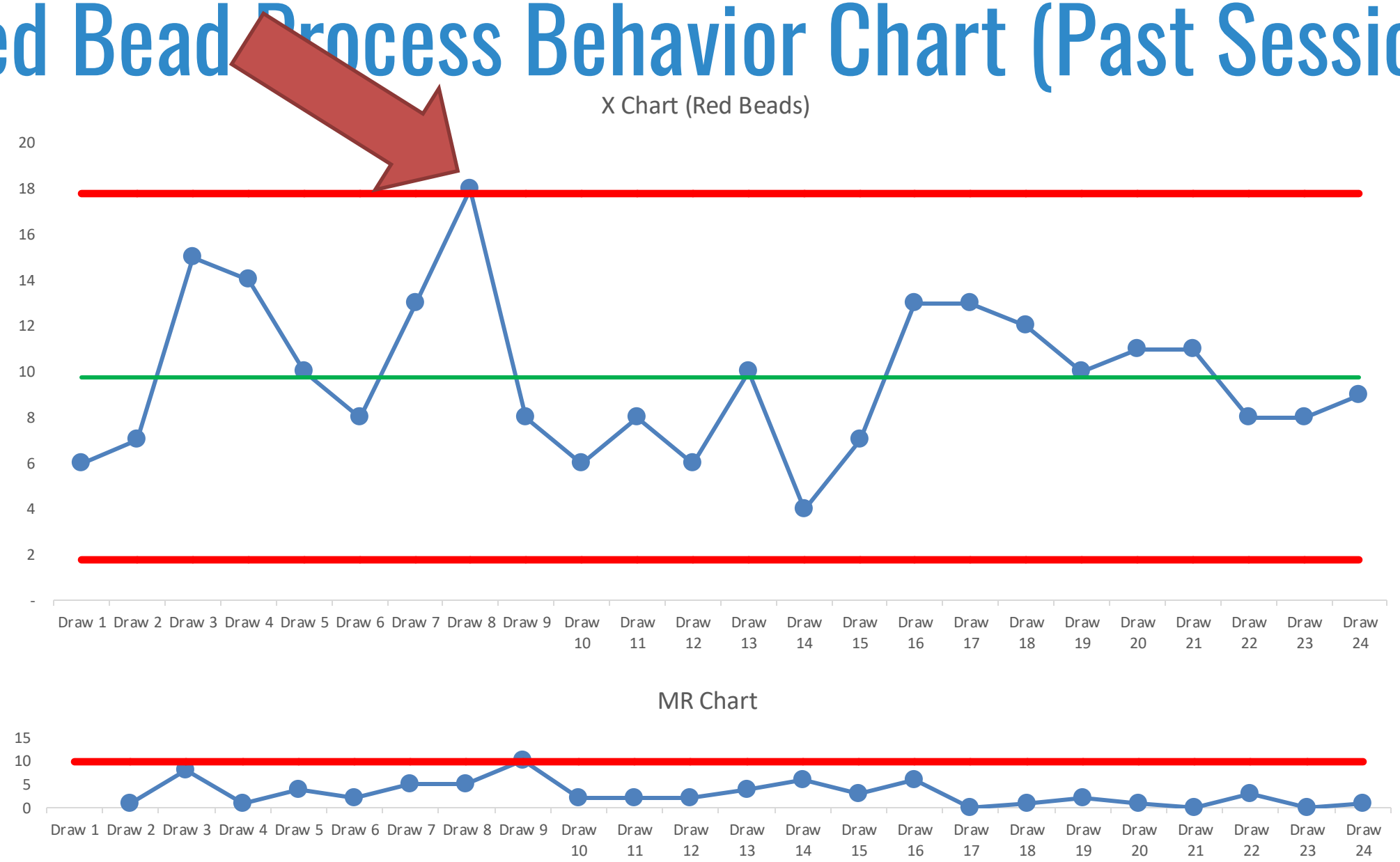


Debrief

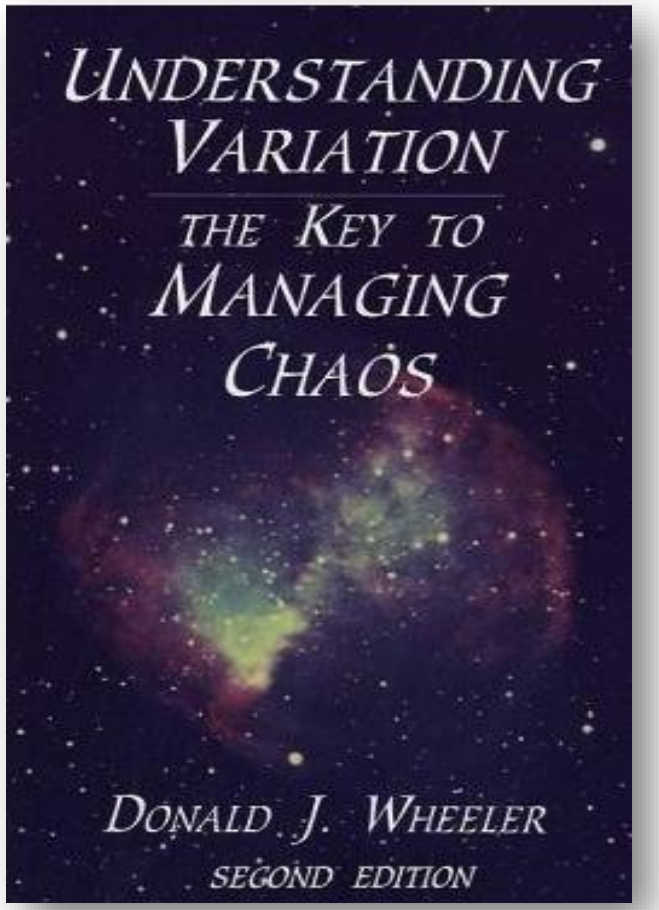

"If you're navigating a tough business environment, you need this book." - Daniel H. Pink
MEASURES
OF
SUCCESS
ACT LESS, LEAD BETTER, IMPROVE MORE
MARK GRABAN
FOREWARD BY DONALD J. WHEELER, PH.D.

Red Bead Process Behavior Chart (Today)

Red Bead Process Behavior Chart (Past Session)



Signal vs. Noise?

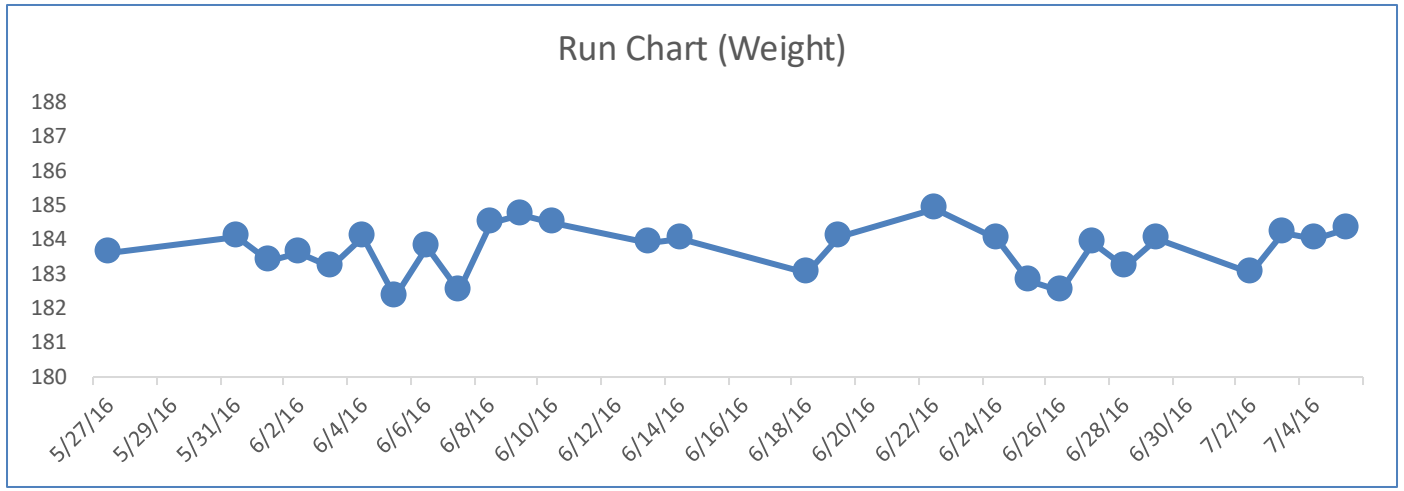


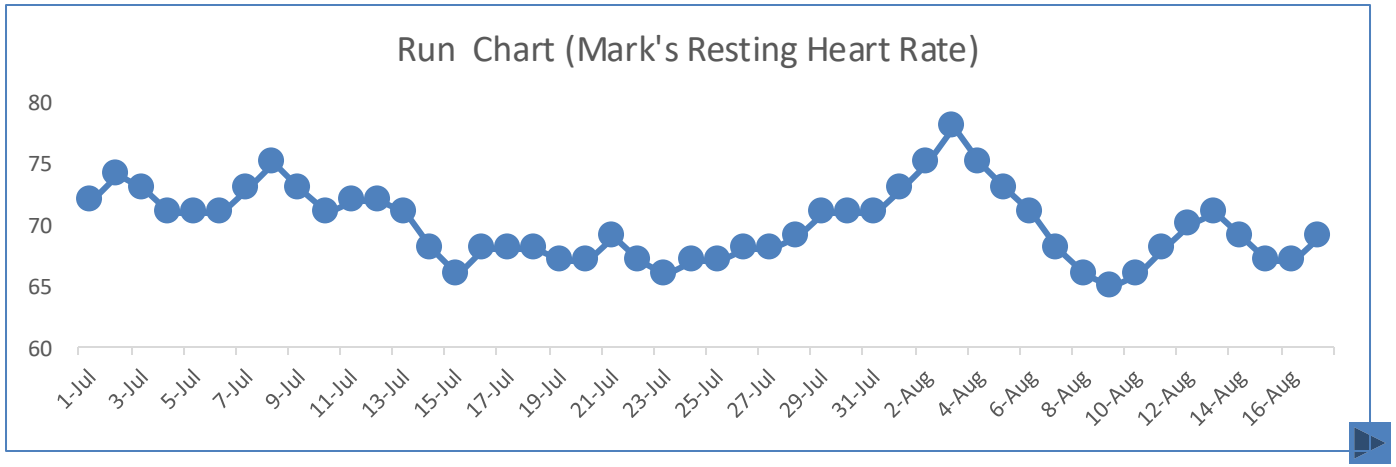
"While every data set contains noise,
some data sets may contain signals.
Therefore, before you can detect a signal
within any given data set,
you must first filter out the noise."

There is VARIATION in Every Metric

- The question is "how much variation is routine?"

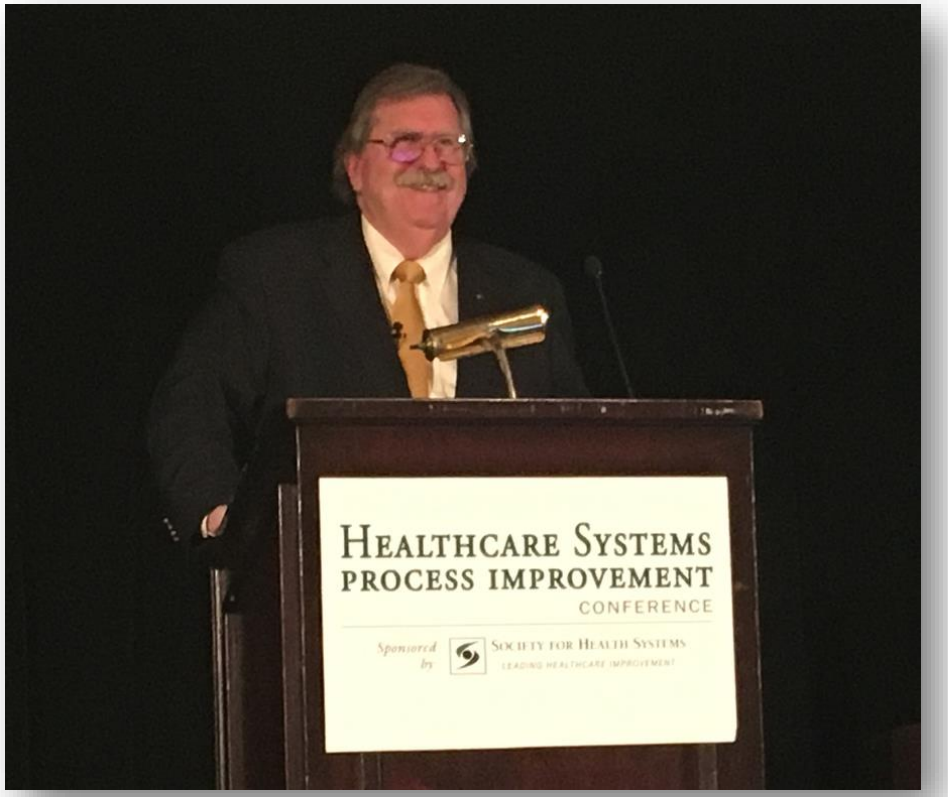
- Personal examples:
  - Body weight
  - Resting heart rate
  - Commuting time





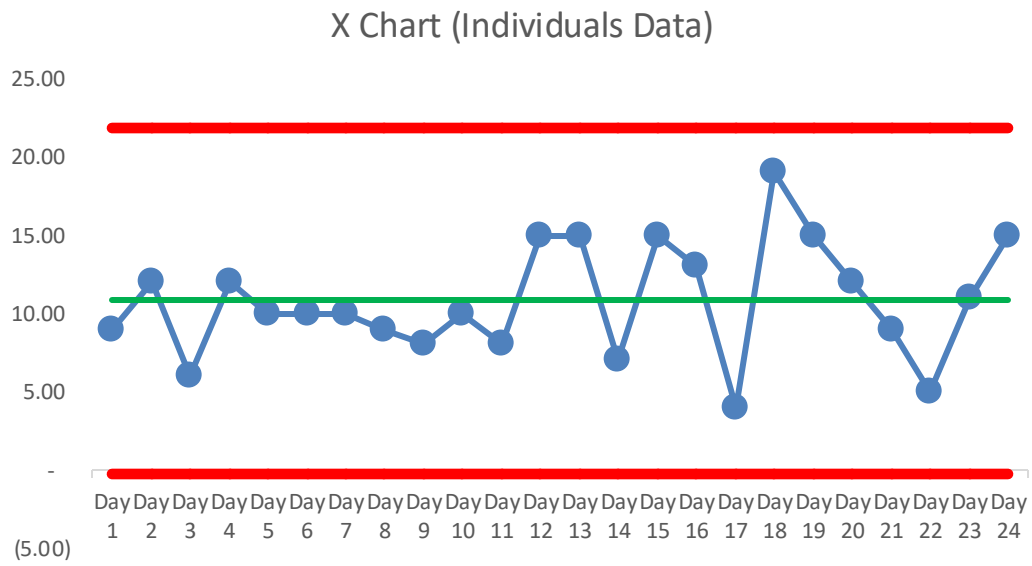
Wheeler Says

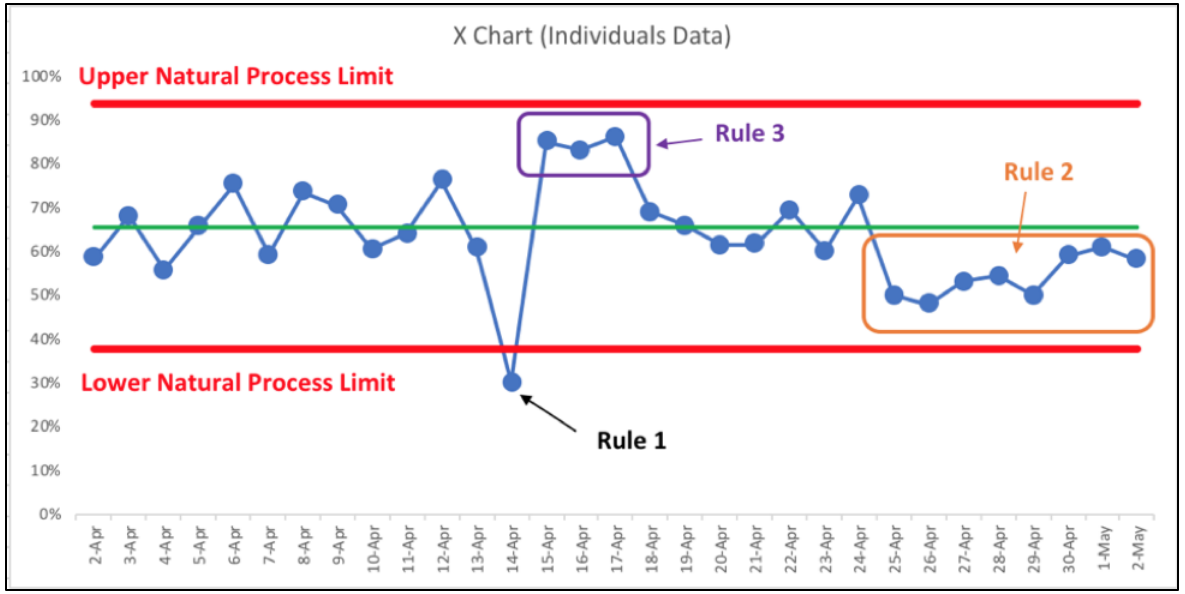
- Process behavior charts "will filter out virtually ALL noise in the system."



Which Type of Cause?

Common	Special
Routine	Exceptional
Noise	Signal





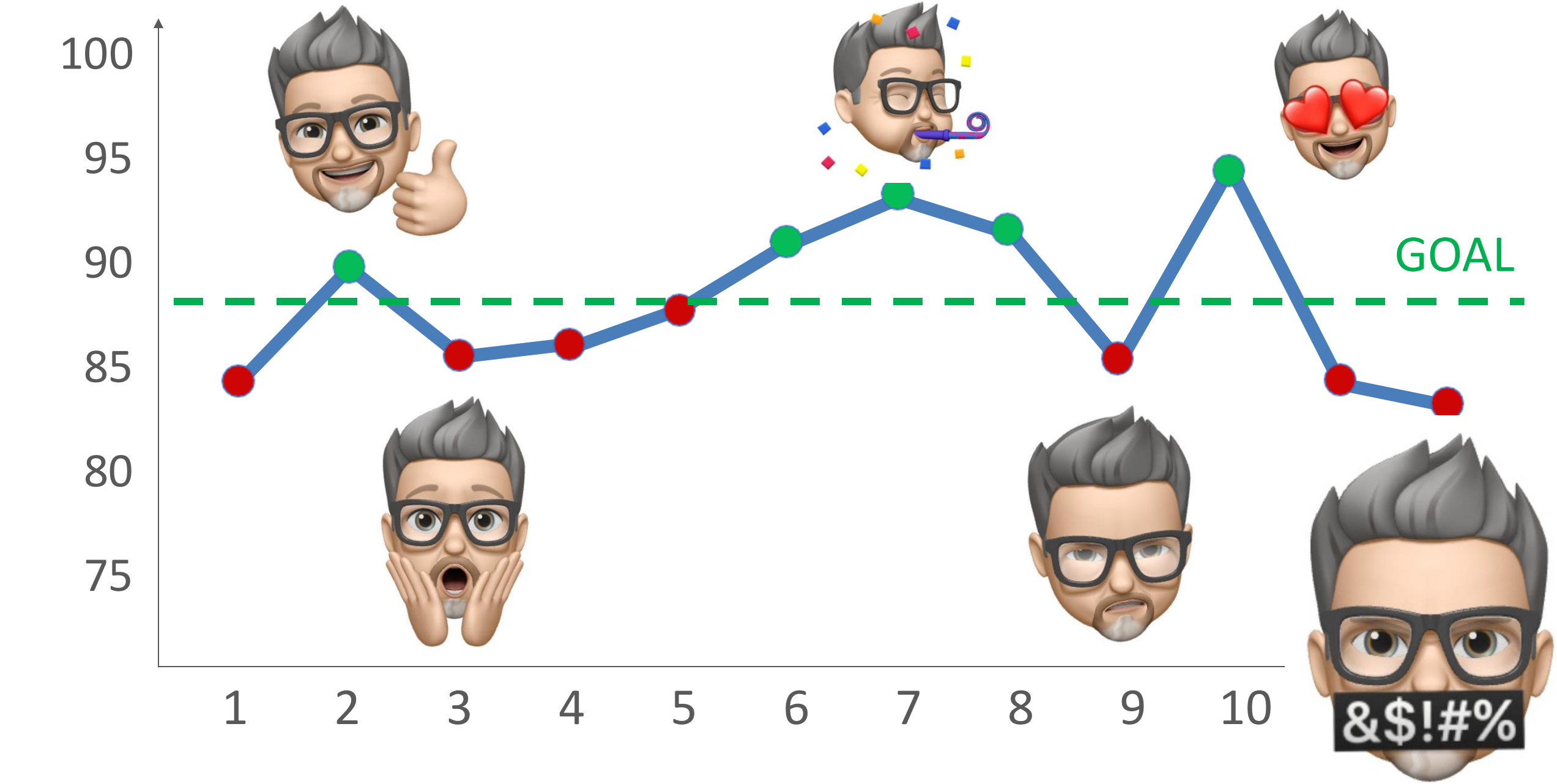
Two Kinds of Mistakes (Wheeler)

1. We get things wrong when the system does not change but we interpret the data as representing a change. This is the error of interpreting noise as a signal.

2. We also get things wrong when the system changes and we interpret the data as representing no change. This is the error of missing a signal.

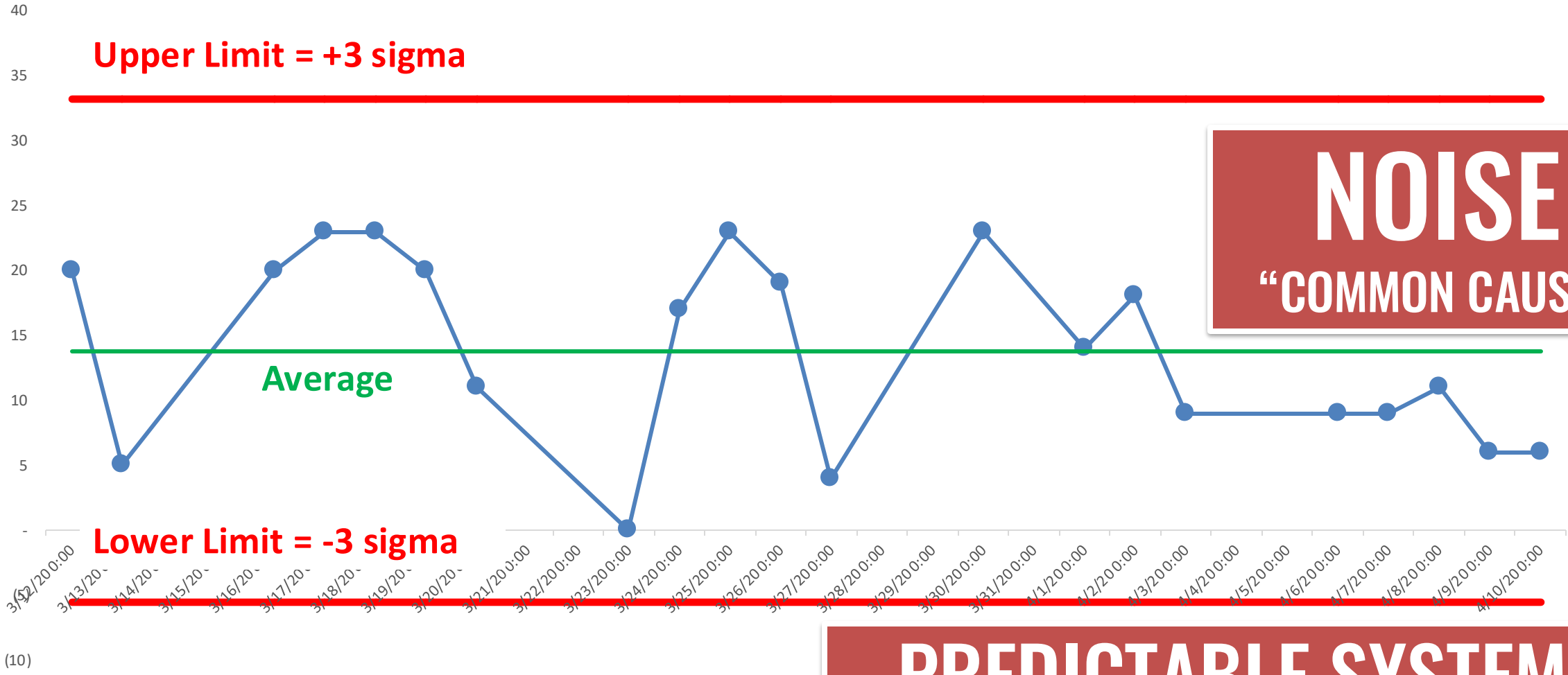
Process Behavior Charts strike a balance

% of Patients Waiting < 15 Minutes



Process Behavior Chart

X Chart (Number of Employees Out Sick)



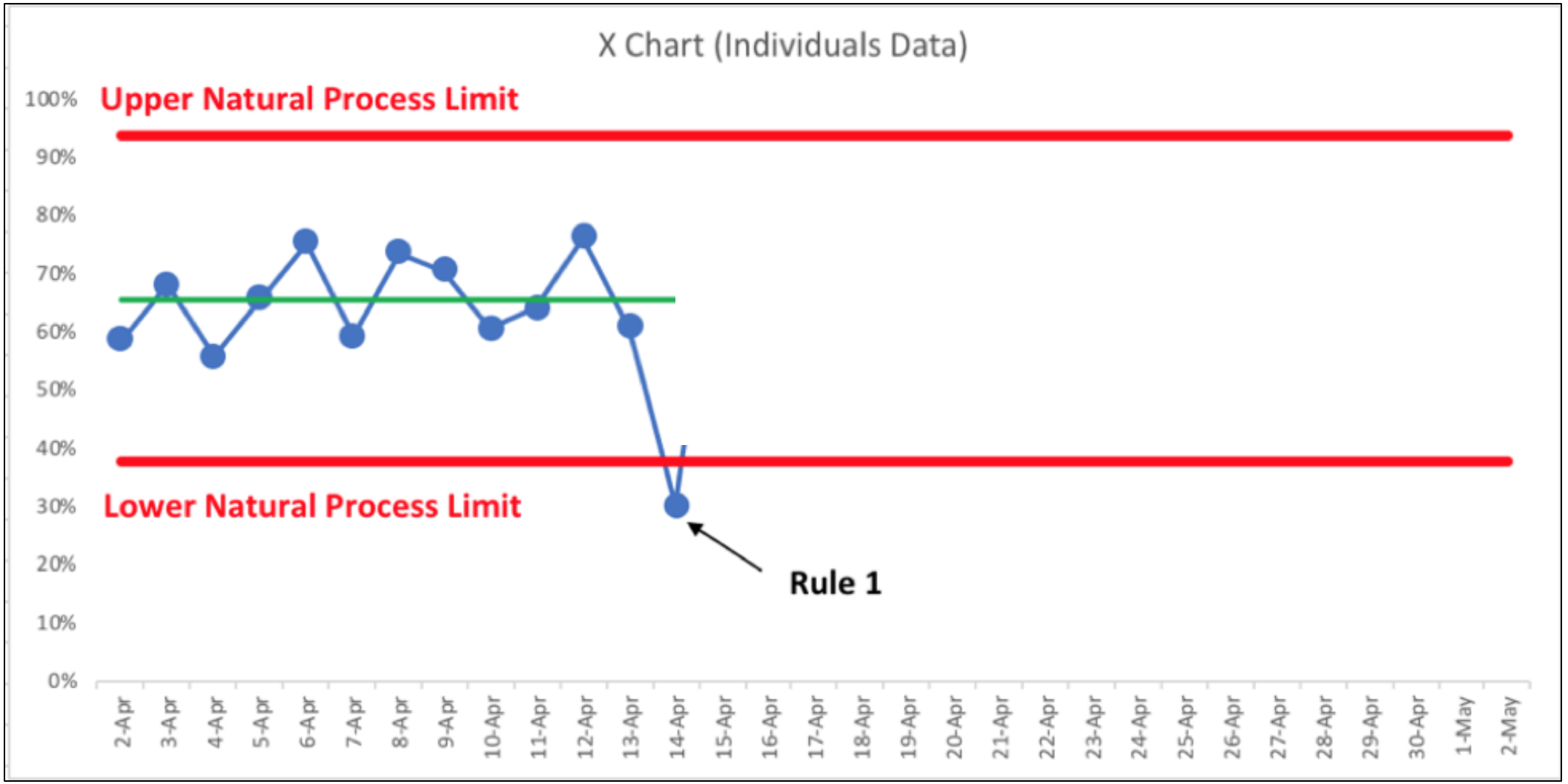
NOISE

"COMMON CAUSE"

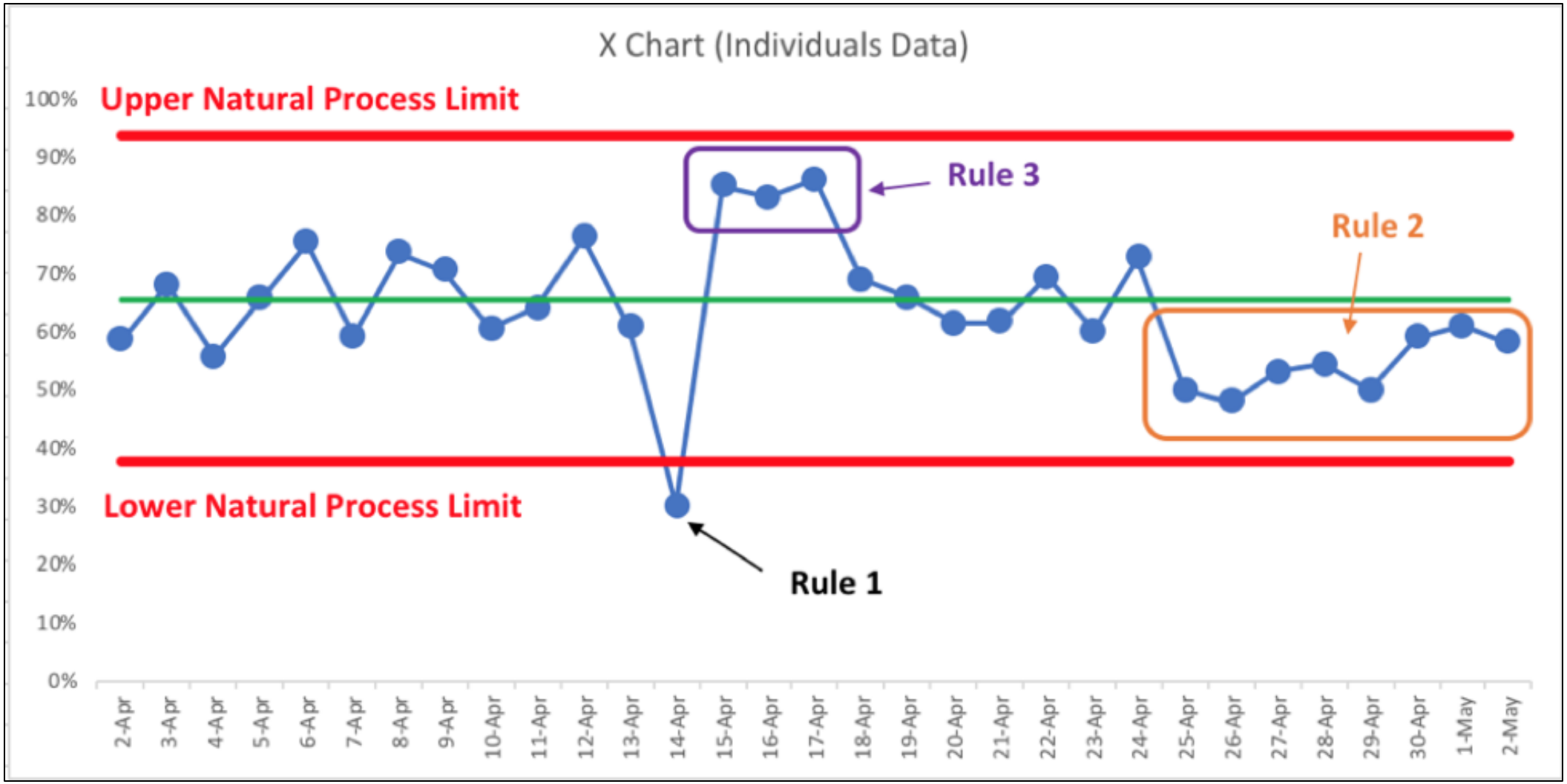
PREDICTABLE SYSTEM

Chart Courtesy of Memorial Health System (Marietta OH)

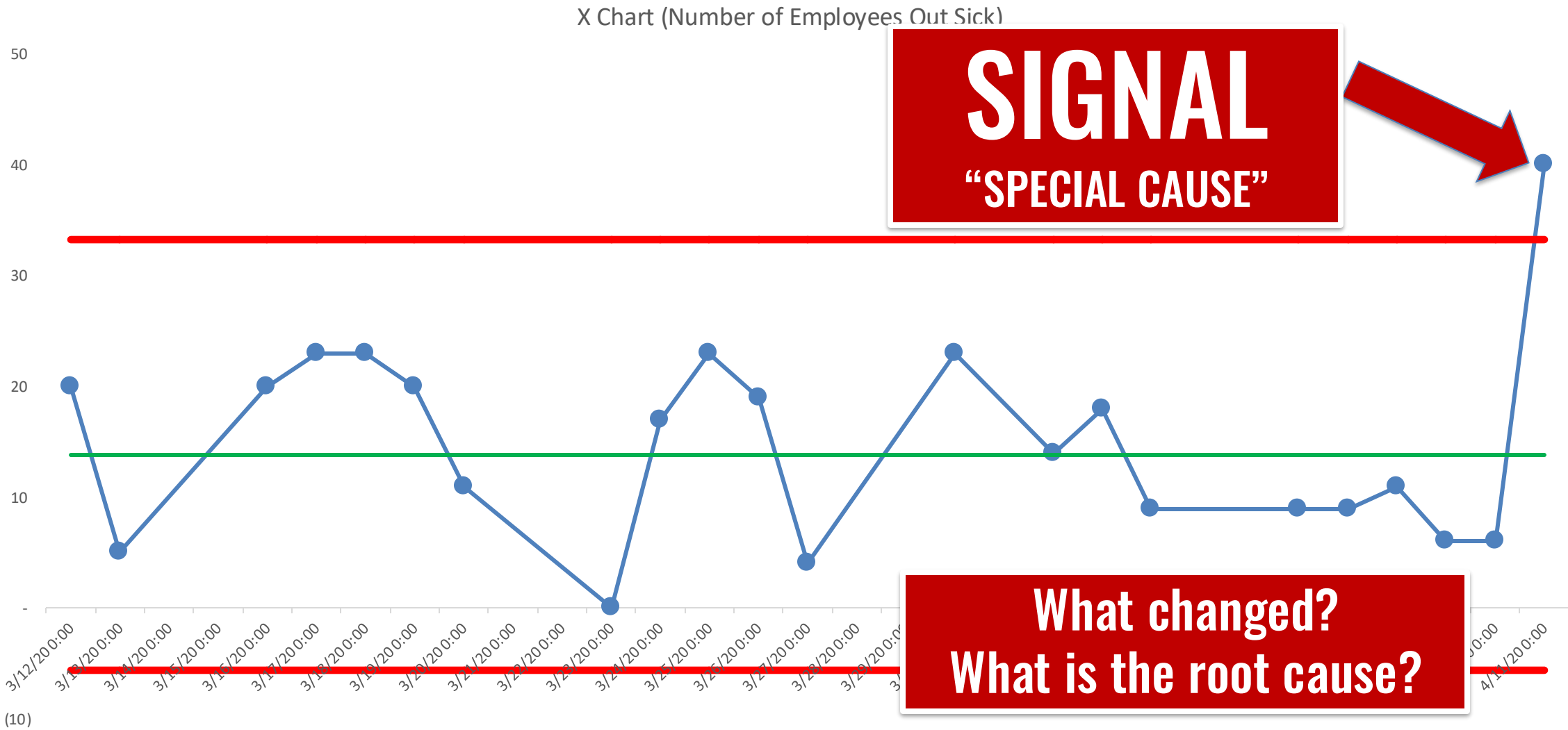
3 Rules for Finding a Signal



3 Rules for Finding a Signal



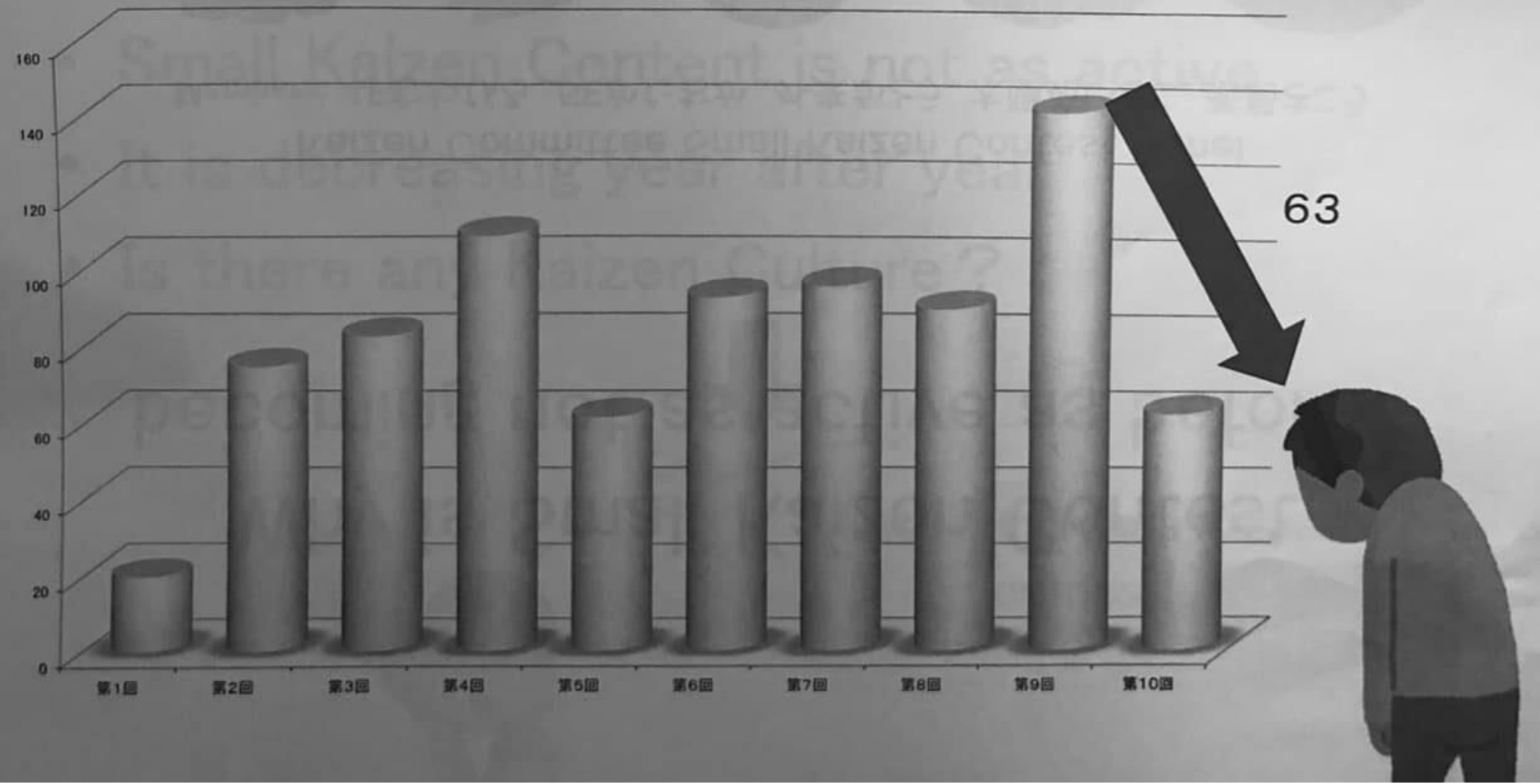
Has the System Changed?



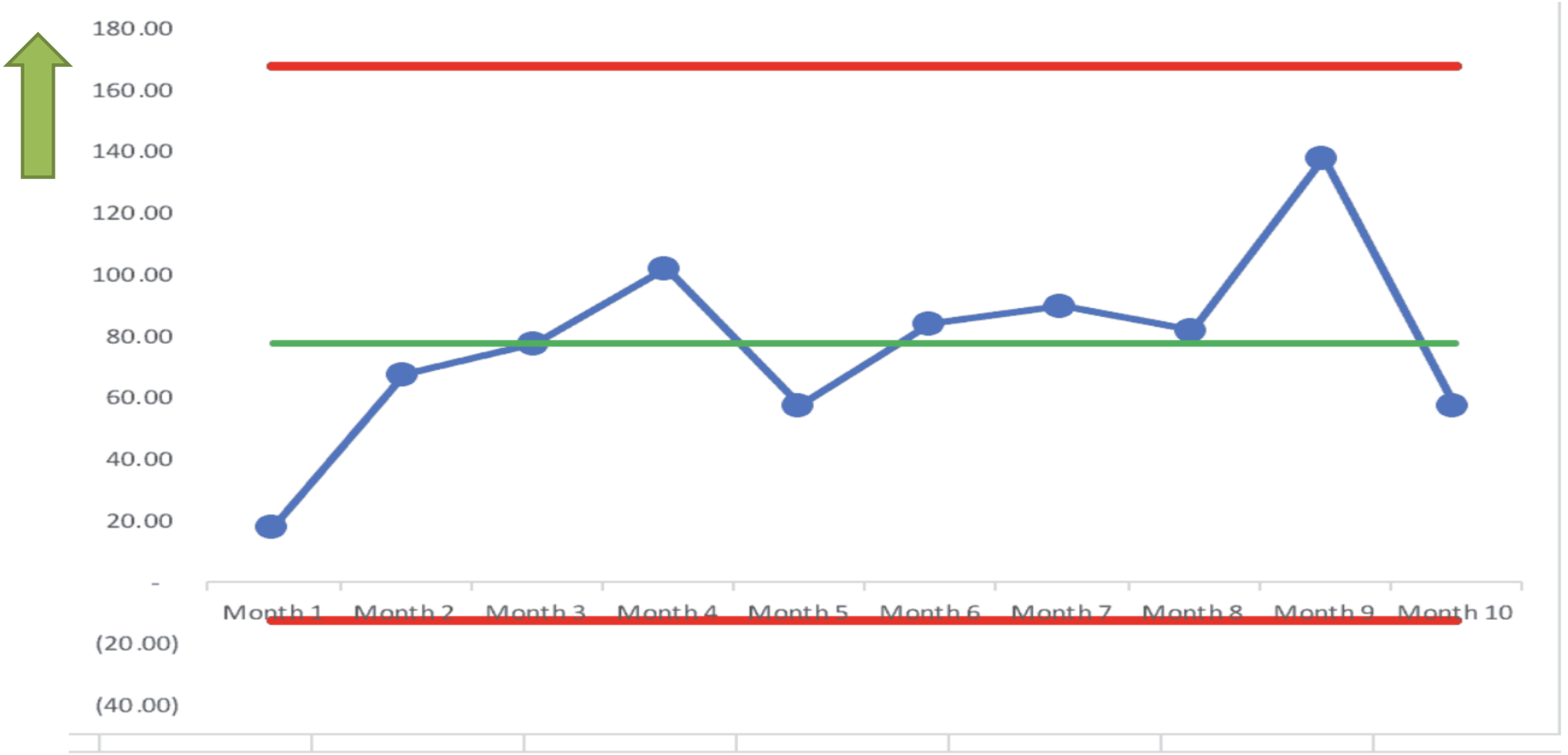
*Note: The last data point is a **hypothetical** situation*

DISTINGUISH SIGNAL FROM NOISE

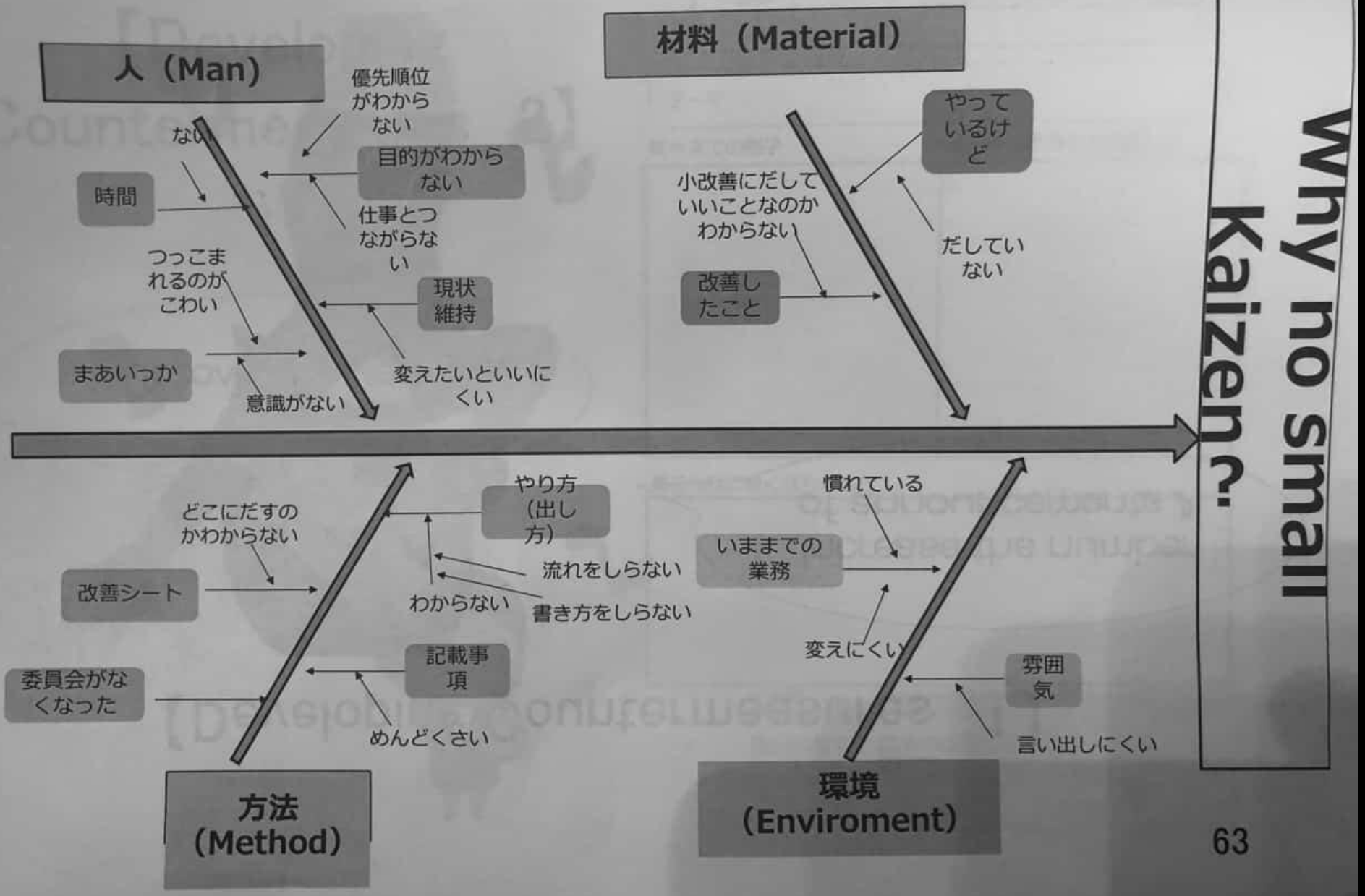
of Small Kaizen Activity Submitted



“Process Behavior Chart”

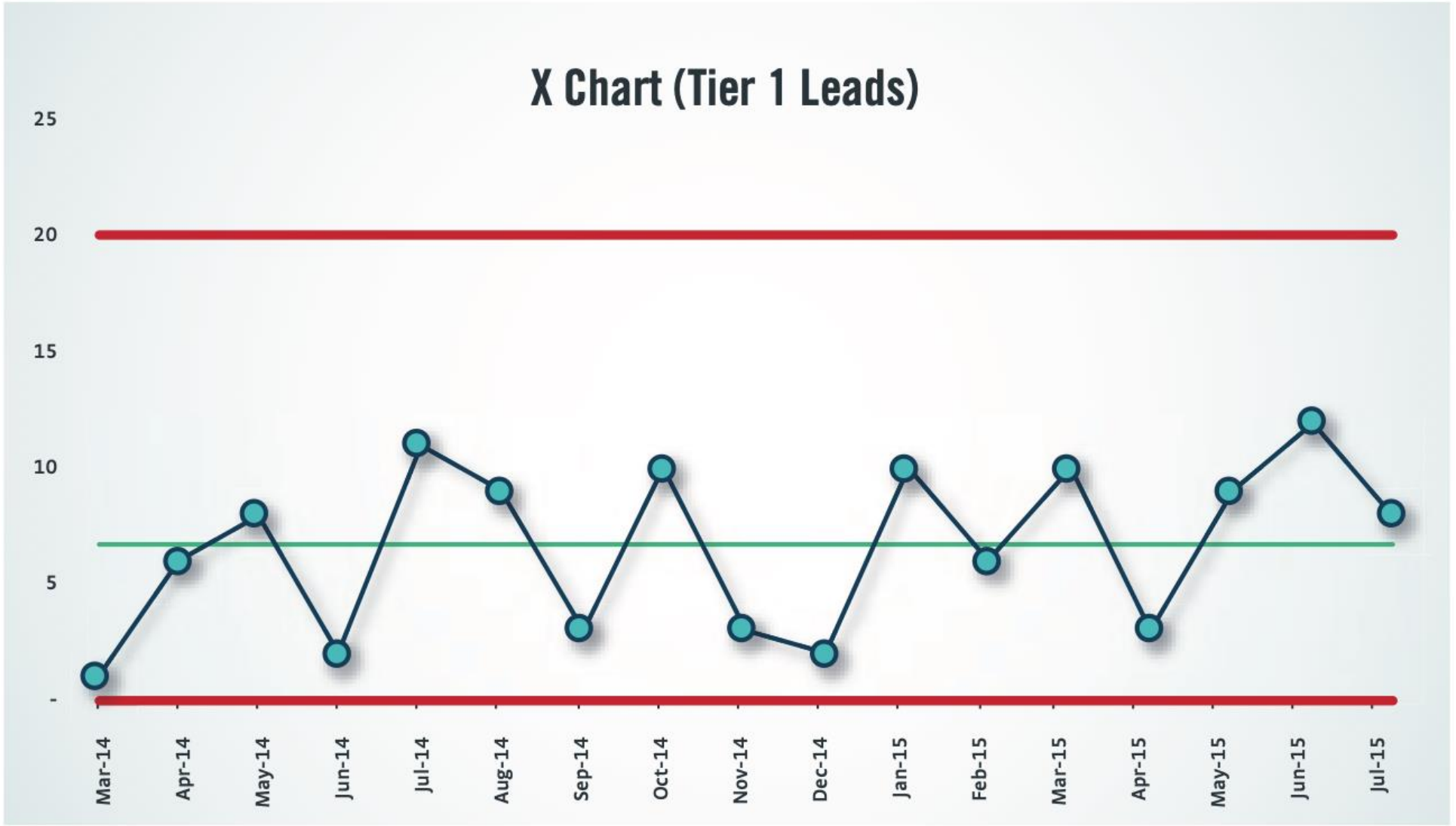


【 Cause and Effect diagram 】

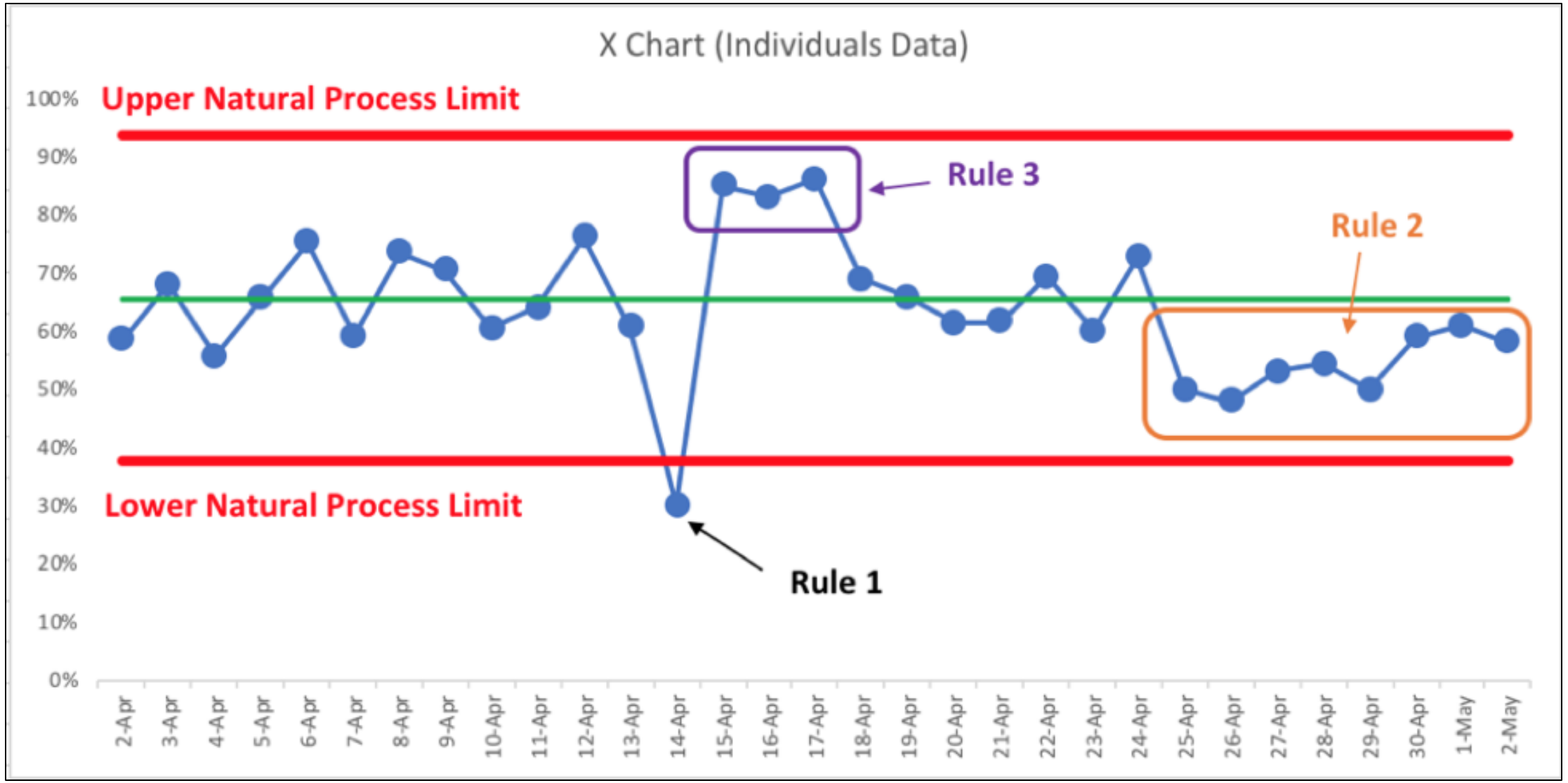


HAS THE SYSTEM CHANGED?

KaiNexus Metric = Noise

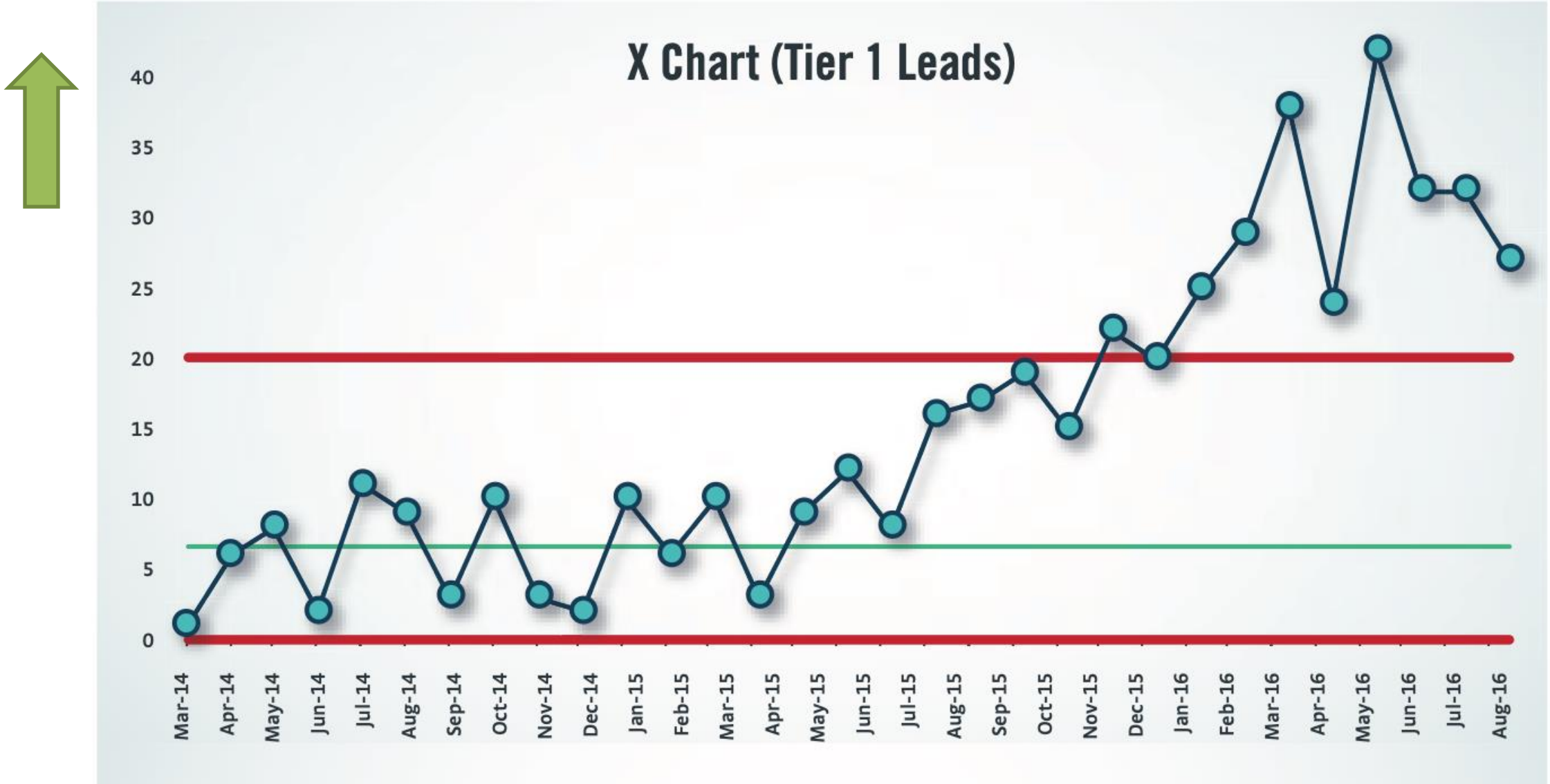


What Does a "Signal" Look Like?



DID WE IMPROVE THE SYSTEM?

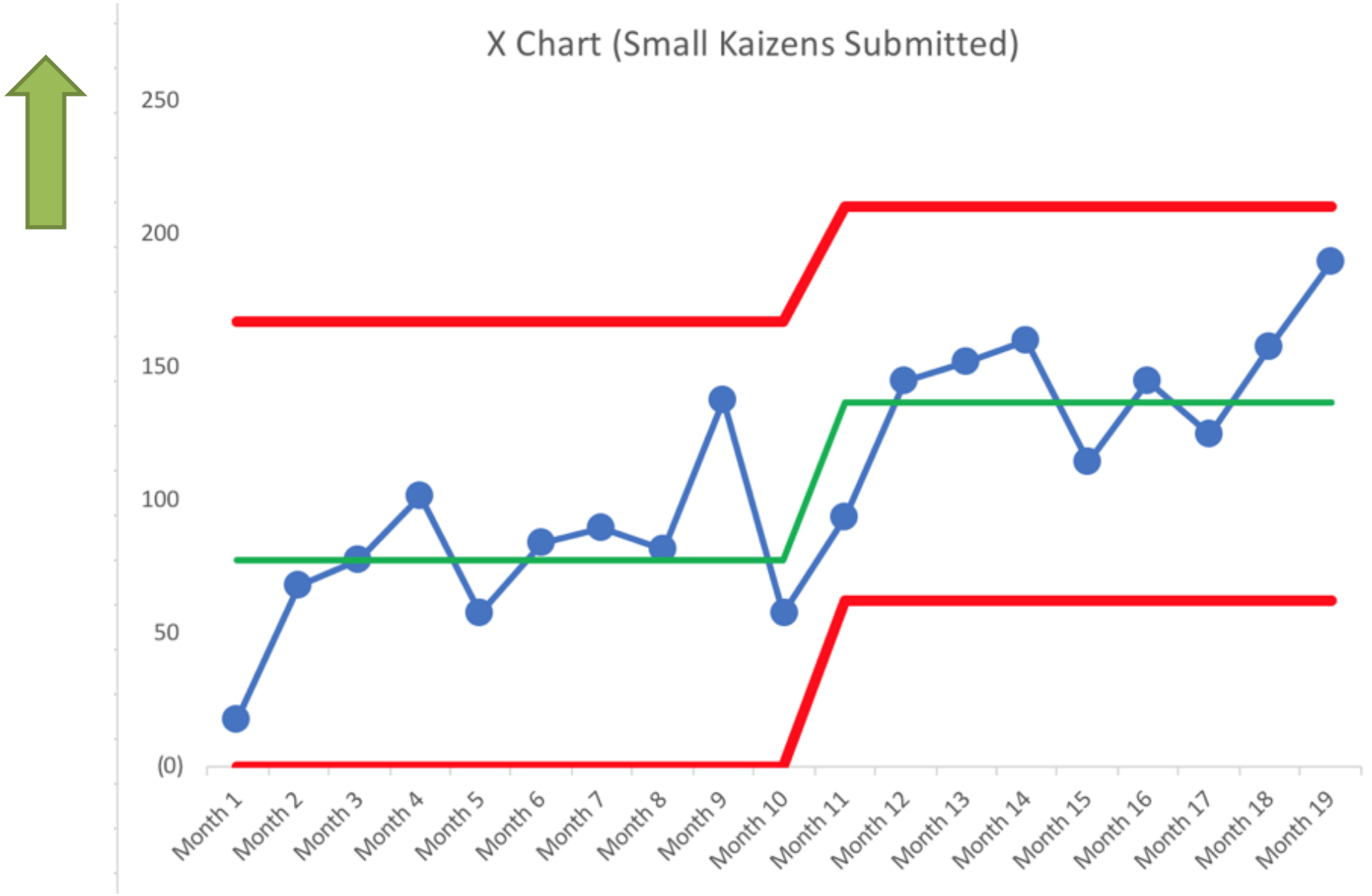
System Change → Signal



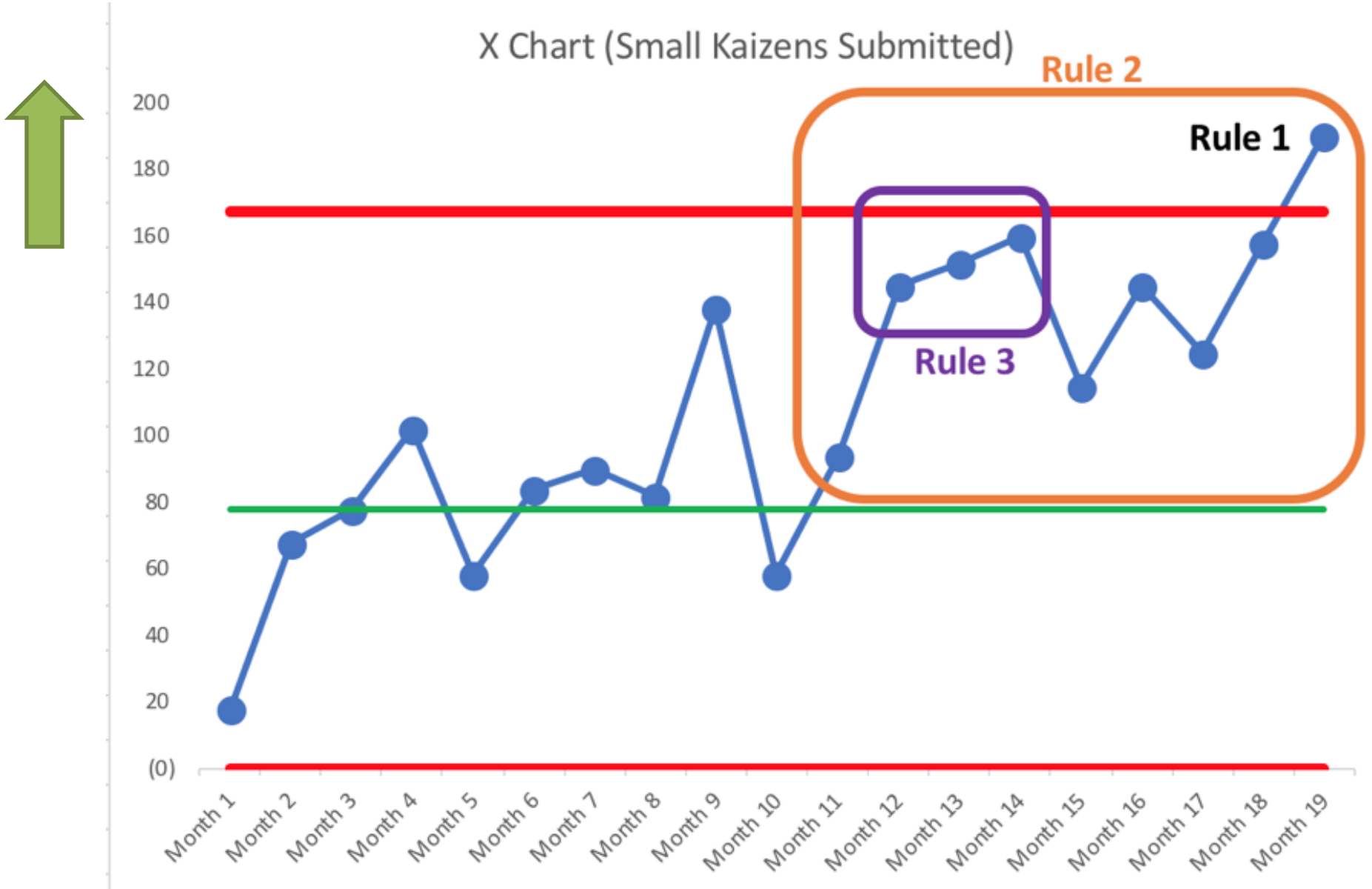
"Signal vs noise — understanding this distinction was one of the most profound changes to my business acumen… not only understanding variation in the system but also freeing up my time. It sharpens my focus on what's important while keeping an eye on a large set of metrics."

Greg Jacobson, MD
CEO and co-founder, KaiNexus

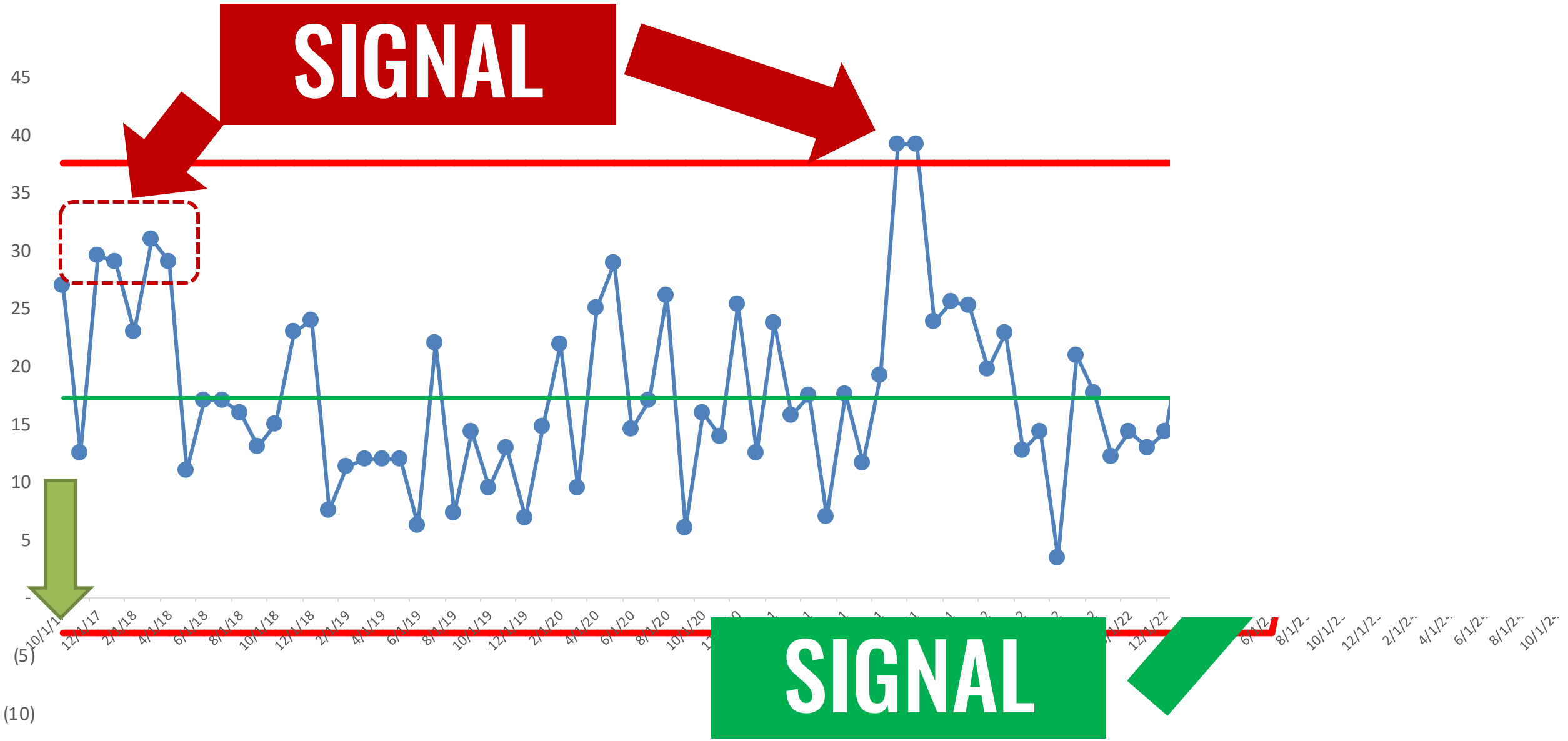
Shifts That Show Significant, Sustained Improvement



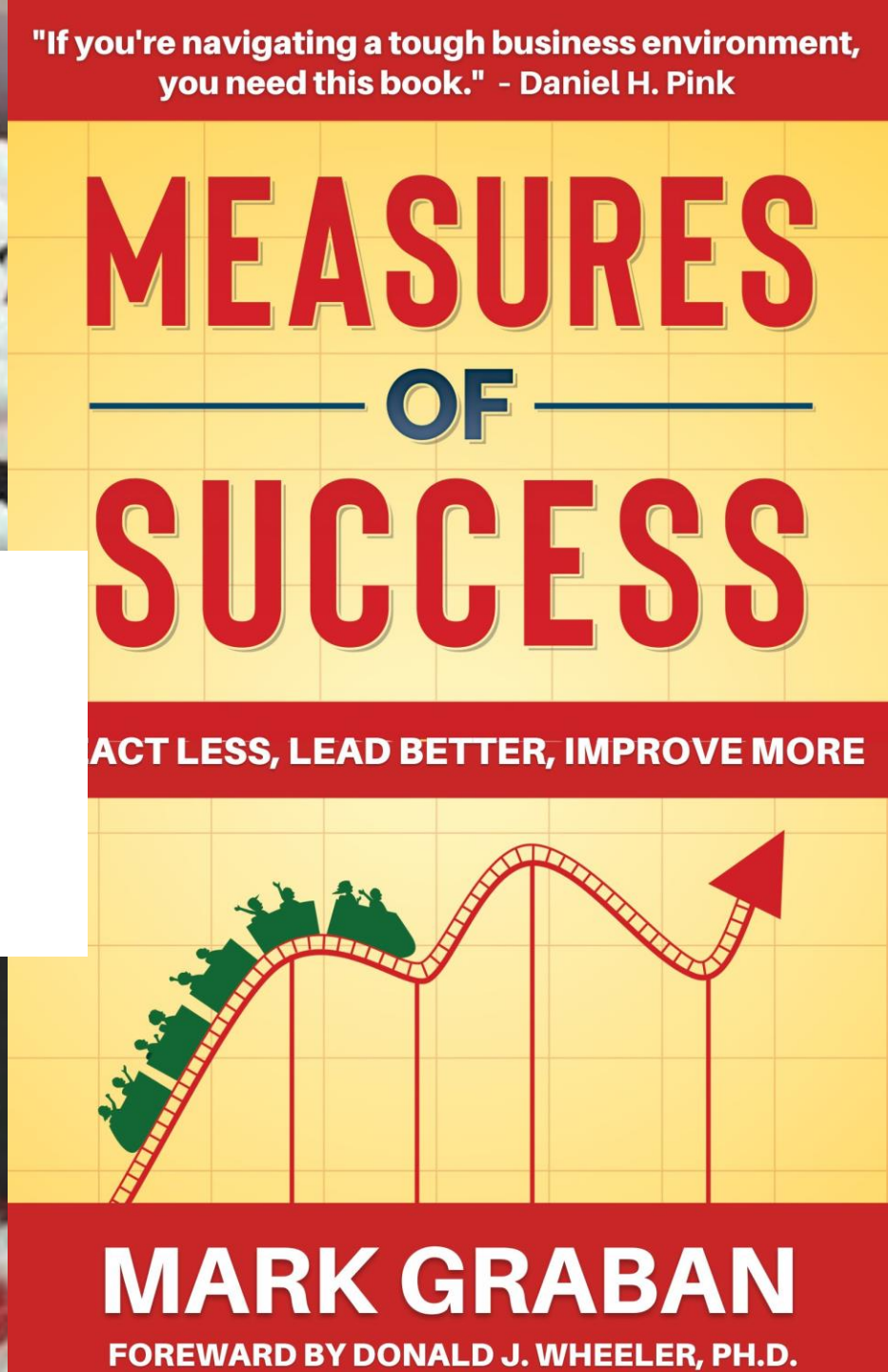
Shifts That Show Significant, Sustained Improvement



Severe Sepsis and Septic Shock Mortality Rate



Create a PBC


"If you're navigating a tough business environment, you need this book." - Daniel H. Pink
MEASURES OF SUCCESS
ACT LESS, LEAD BETTER, IMPROVE MORE
MARK GRABAN
FOREWARD BY DONALD J. WHEELER, PH.D.

Creating & Using Process Behavior Charts -- Retrospective

Template and Data --
http://www.MarkGraban.com/PBCBlog

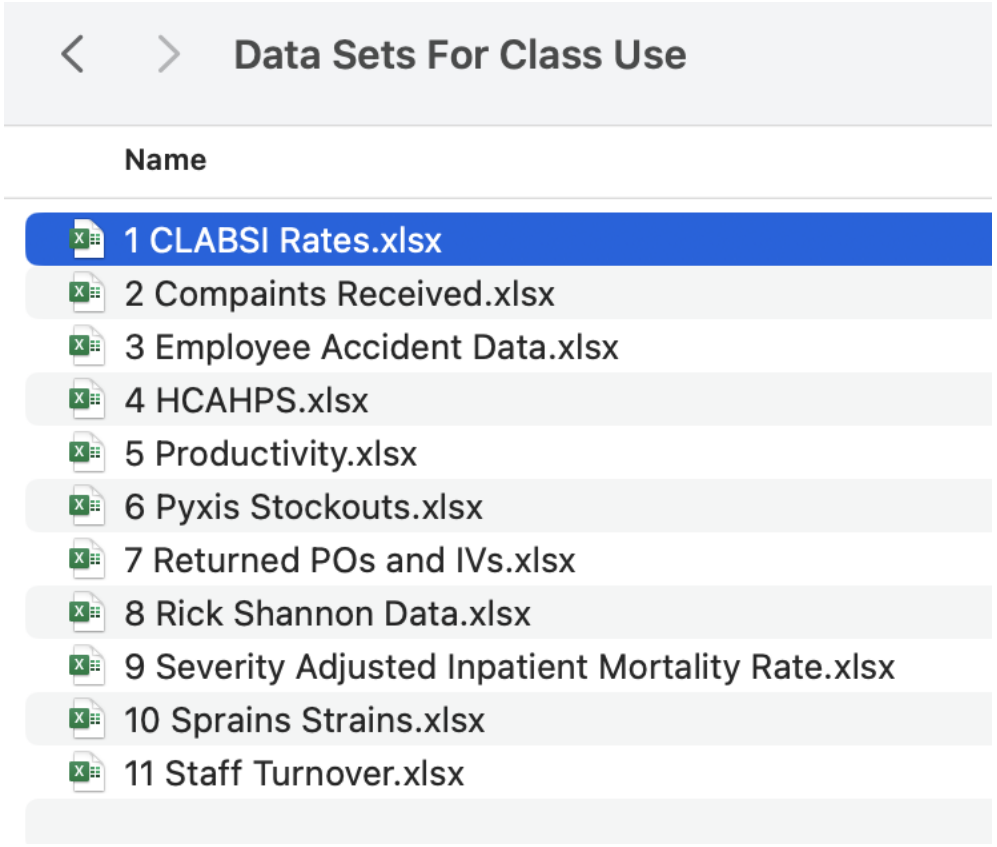
A Few Options

- Download my template
  - Excel or Google Sheets
  - https://www.measuresofsuccessbook.com/extras/

- Use your own time-series data OR
- Use my blog data: http://www.MarkGraban.com/PBCBlog

Data Sets to Download

- MarkGraban.com/data1 or number through 11



Step 1: Get Initial Data

- Generally, want about
  20 data points to calculate
  "natural process behavior limits"
  - (can start with just 4, worst case)
  - *Note: Weekends are excluded here because that is a different "system"*

	A	B	C
1	**Process Behavior Templa**		
2	**Date**	**Page Loads**	**Average**
3	1/2/12	999	1,576.20
4	1/3/12	1,654	1,576.20
5	1/4/12	1,773	1,576.20
6	1/5/12	1,523	1,576.20
7	1/6/12	1,275	1,576.20
8	1/9/12	2,225	1,576.20
9	1/10/12	1,916	1,576.20
10	1/11/12	1,798	1,576.20
11	1/12/12	1,622	1,576.20
12	1/13/12	1,385	1,576.20
13	1/16/12	1,604	1,576.20
14	1/17/12	1,551	1,576.20

Step 2: Calculate Average & the Moving Ranges

- Calculate average of the first 20 points

  C3: =AVERAGE(B3:B22)

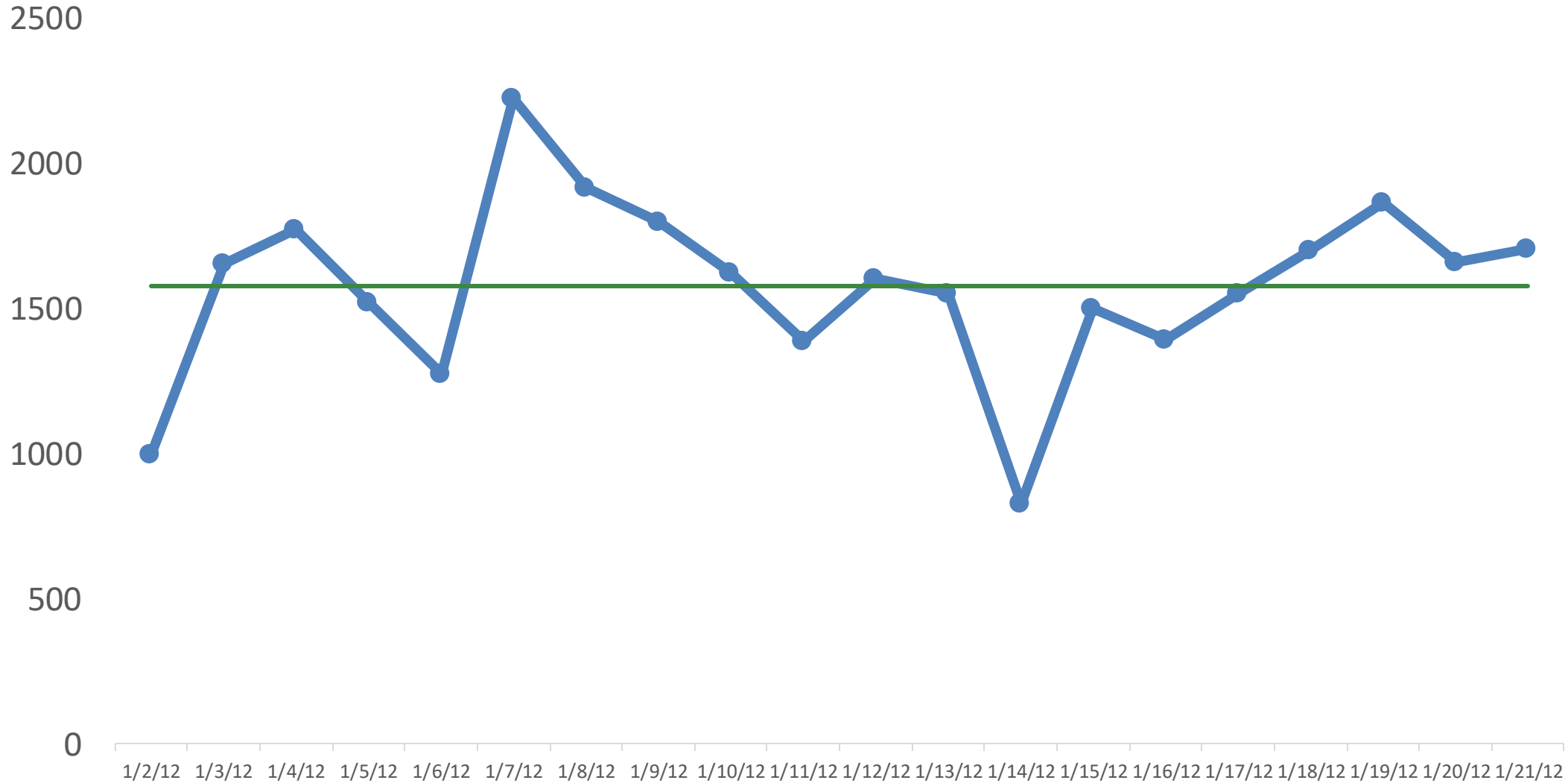
  (if data is in column B)

- Calculate the moving range of the first 20 points

  D4: =ABS(B4-B3)

	A	B	C	D
1	**Process Behavior Template provid**			
2	**Date**	**Page Loads**	**Average**	**Moving Range (MR)**
3	1/2/12	999	1,576.20	
4	1/3/12	1,654	1,576.20	655.00
5	1/4/12	1,773	1,576.20	119.00
6	1/5/12	1,523	1,576.20	250.00
7	1/6/12	1,275	1,576.20	248.00
8	1/9/12	2,225	1,576.20	950.00
9	1/10/12	1,916	1,576.20	309.00
10	1/11/12	1,798	1,576.20	118.00
11	1/12/12	1,622	1,576.20	176.00
12	1/13/12	1,385	1,576.20	237.00
13	1/16/12	1,604	1,576.20	219.00
14	1/17/12	1,551	1,576.20	53.00
15	1/18/12	828	1,576.20	723.00
16	1/19/12	1,502	1,576.20	674.00
17	1/20/12	1,391	1,576.20	111.00

Step 3: Draw Initial Chart (With Average Line)



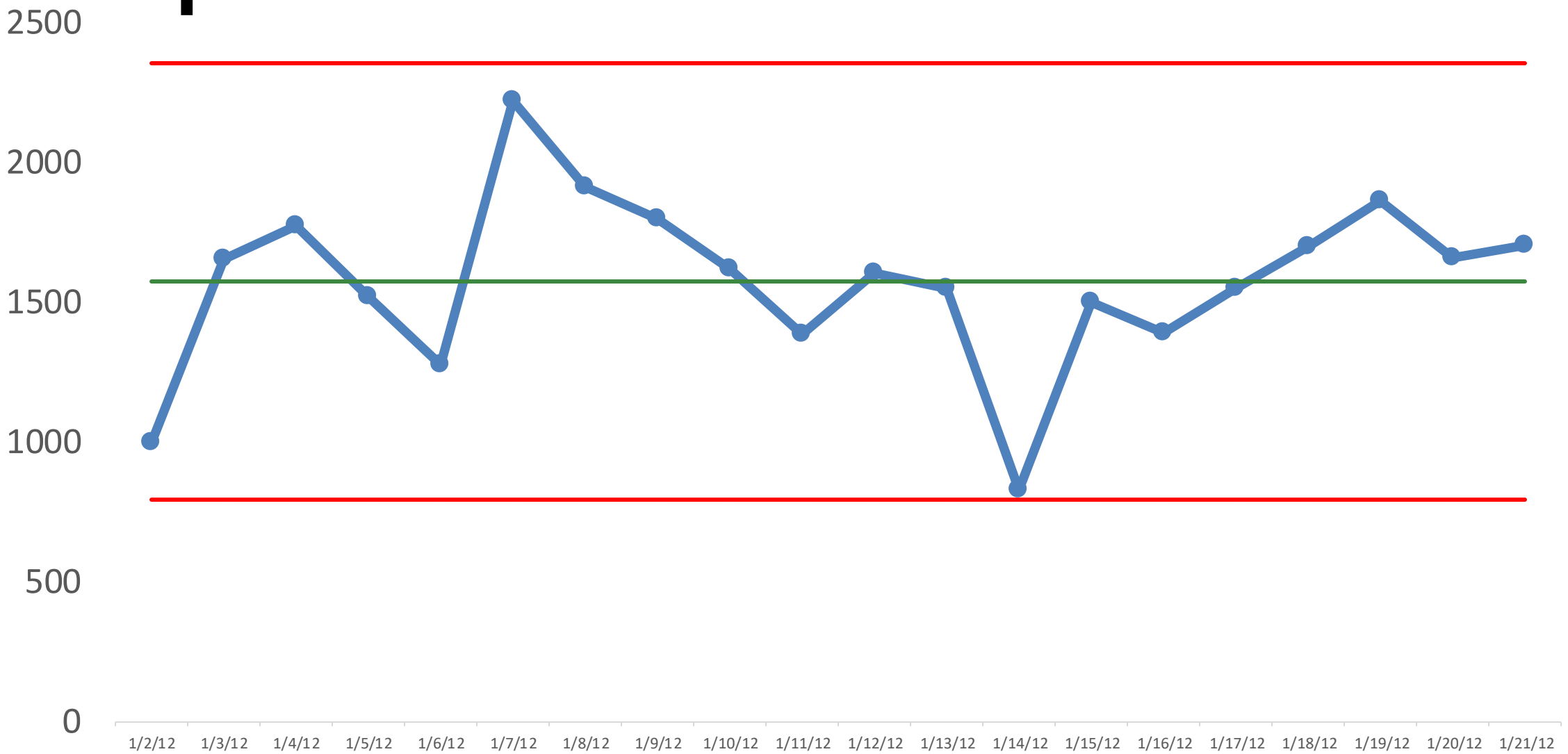
Step 4: Calculate Natural Process Limits

- Calculate "MR-bar"
  - Average of the 1st 19 MRs
  - E3: =Average(D4:D22)

	A	B	C	D	E	F	G
1	Process Behavior Template provided by Mark Graban, autho						
2	Date	Page Loads	Average	Moving Range (MR)	MR Bar	Lower Natural Process Limit	Upper Natural Process Limit
3	1/2/12	999	1,576.20		293.16	796.52	2,355.88
4	1/3/12	1,654	1,576.20	655.00	293.16	796.52	2,355.88
5	1/4/12	1,773	1,576.20	119.00	293.16	796.52	2,355.88
6	1/5/12	1,523	1,576.20	250.00	293.16	796.52	2,355.88
7	1/6/12	1,275	1,576.20	248.00	293.16	796.52	2,355.88
8	1/9/12	2,225	1,576.20	950.00	293.16	796.52	2,355.88
9	1/10/12	1,916	1,576.20	309.00	293.16	796.52	2,355.88
10	1/11/12	1,798	1,576.20	118.00	293.16	796.52	2,355.88
11	1/12/12	1,622	1,576.20	176.00	293.16	796.52	2,355.88

- Calculate the Limits
  - Lower = Average – 3*(MR bar)/1.128
    - F3: = C3-3*E3/1.128
  - Upper = Average + 3*(MR bar)/1.128
    - G3: = C3+3*E3/1.128

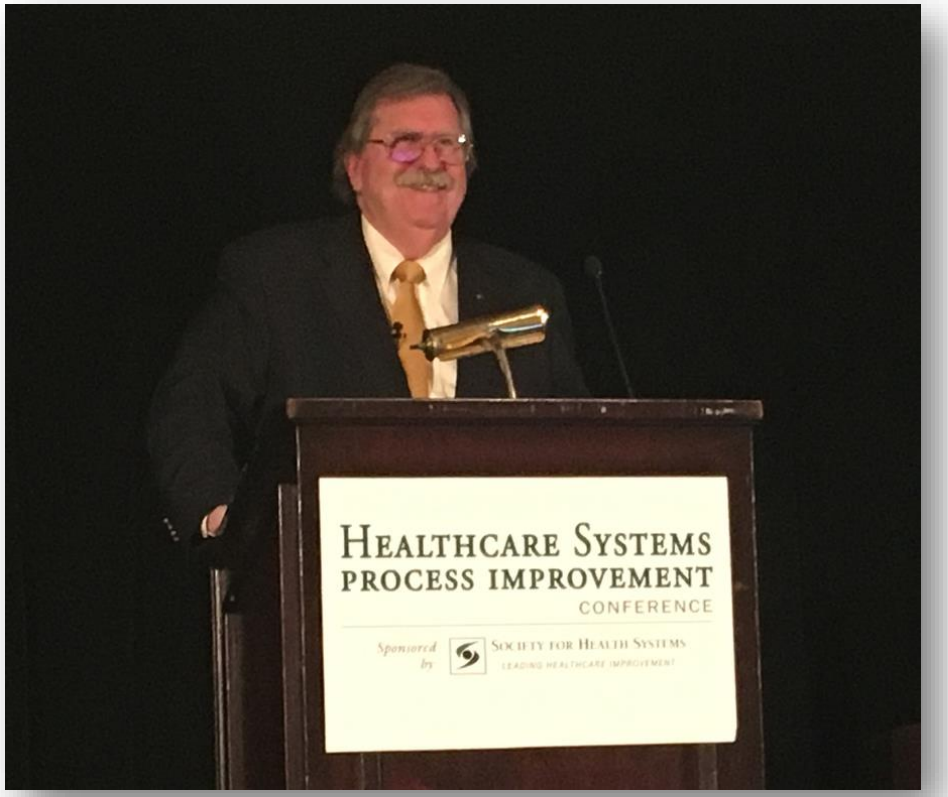
Step 5: Review Initial Chart With Limits



Key Points from Wheeler

- "Limits are computed from the data.

- You do NOT get to choose the limits."



More Key Points

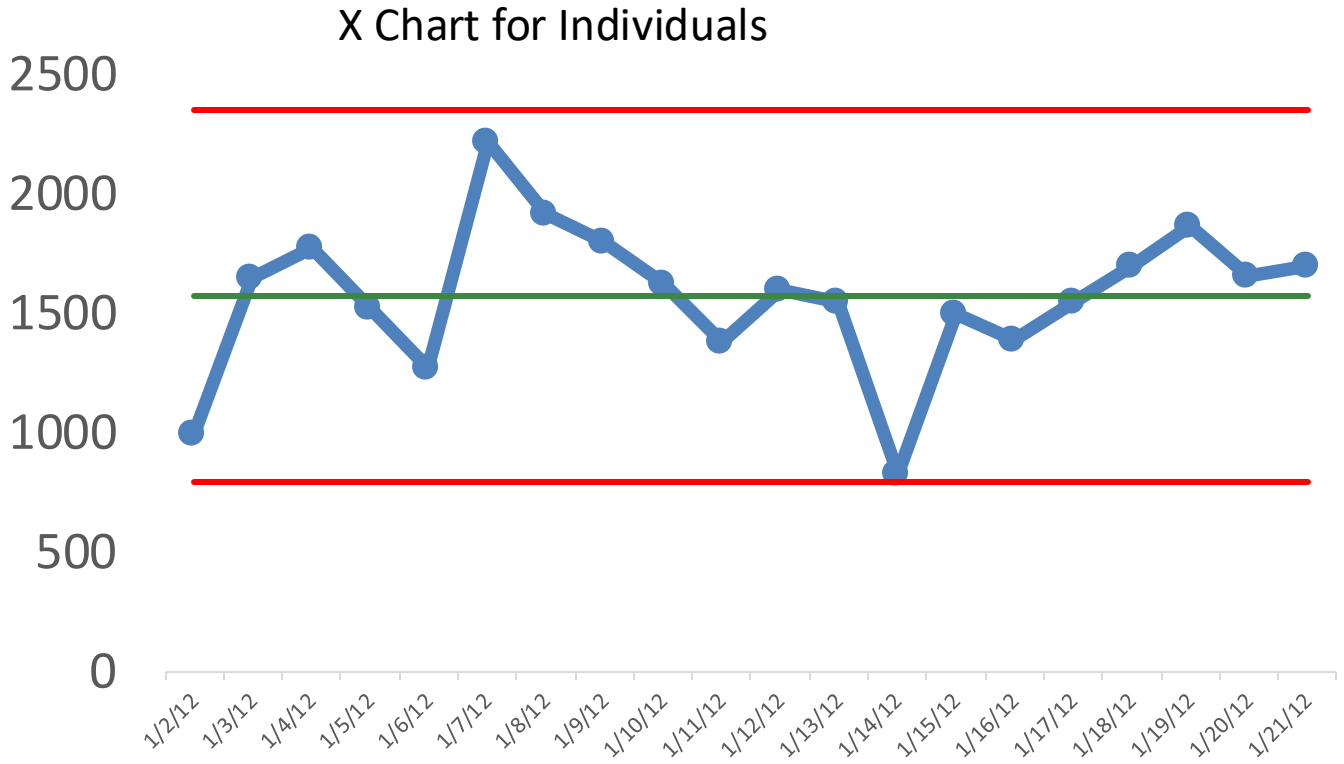
- The upper & lower limits are not arbitrary
- You don't choose the limits
- The limits are the "Voice of the Process"
- Goals or Targets might be different
  - "Voice of the customer" (??)

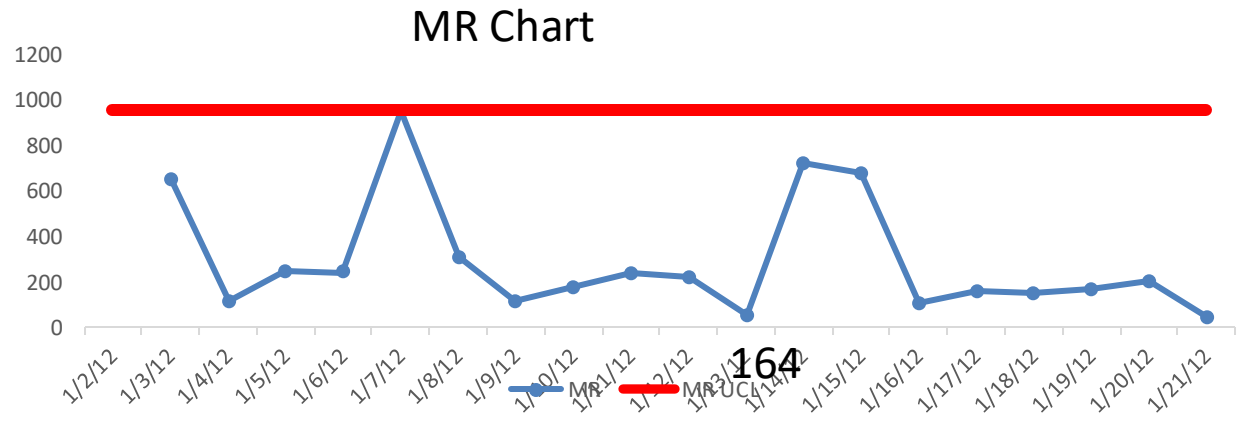
Another Key Point

- Do not continually recalculate the limits each time there is a new data
  - Exception – if you started your chart with just a few data points… recalculate limits (or add them) when you have 20 data points

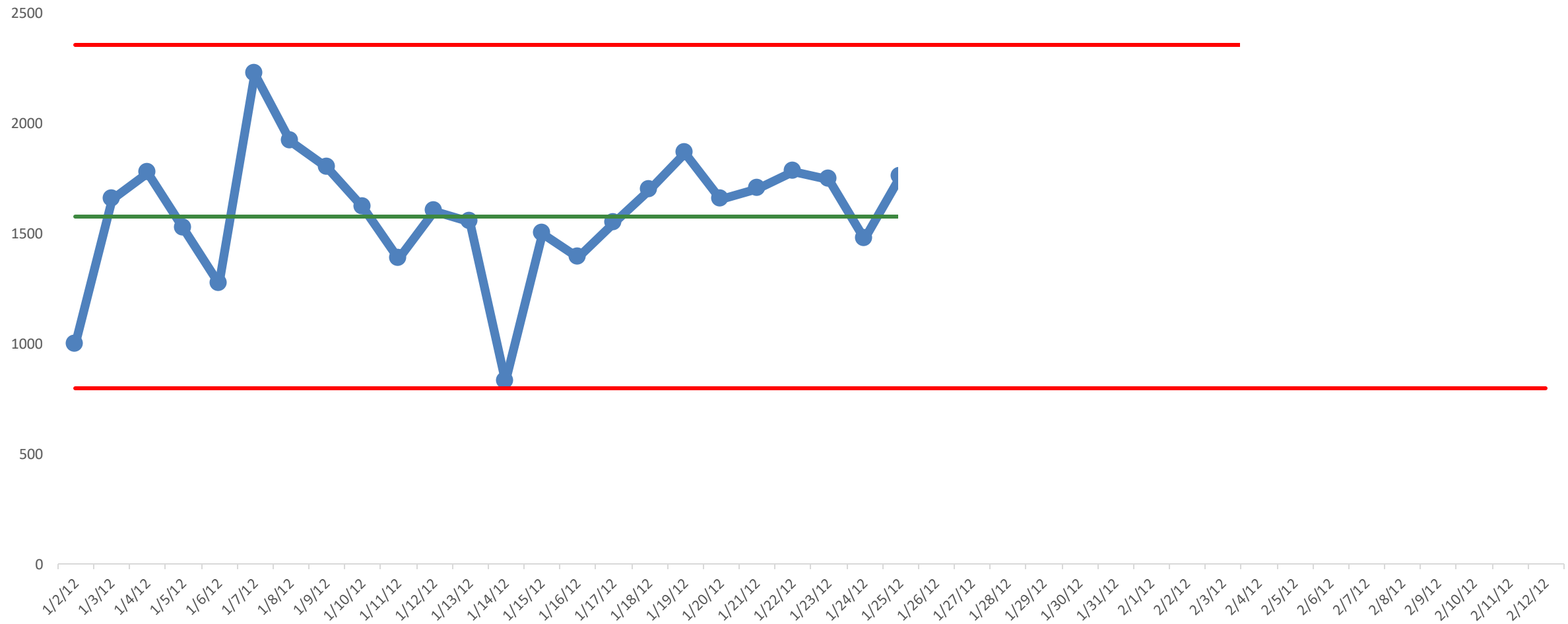
Step 6: Draw MR Chart & Evaluate

- Calculate MR Chart Upper Range Limit
  - URL = MR-bar * 3.27
    - H3: =E3*3.27

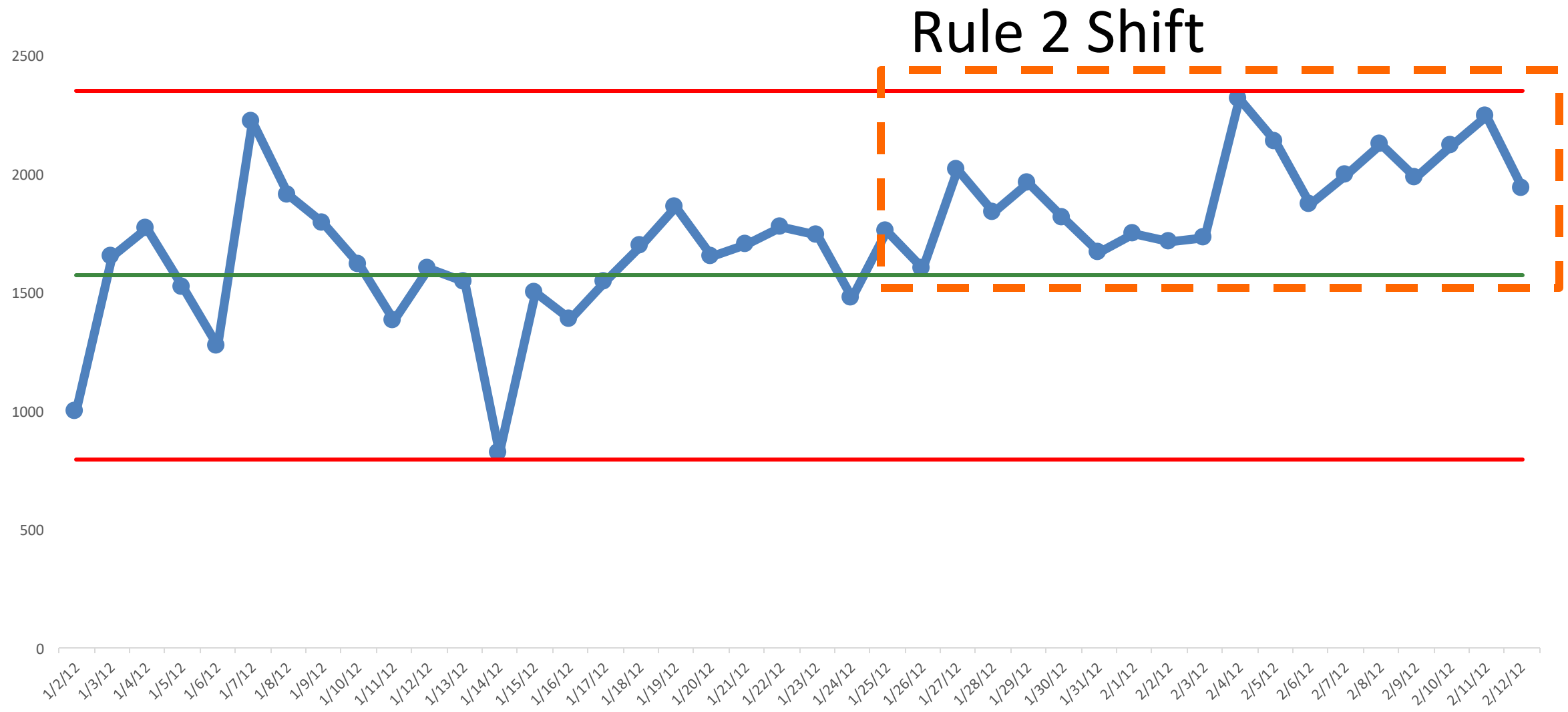




Step 7: Evaluate Over Time



Step 7: Evaluate Over Time



When Should You Shift Limits?

- Can you answer YES to all questions:
  1. Do the data display a distinctly different kind of behavior than in the past?
  2. Do you know the reason for this change in behavior?
  3. Is the new process behavior desirable?
  4. Is it intended and expected that the new behavior will continue?

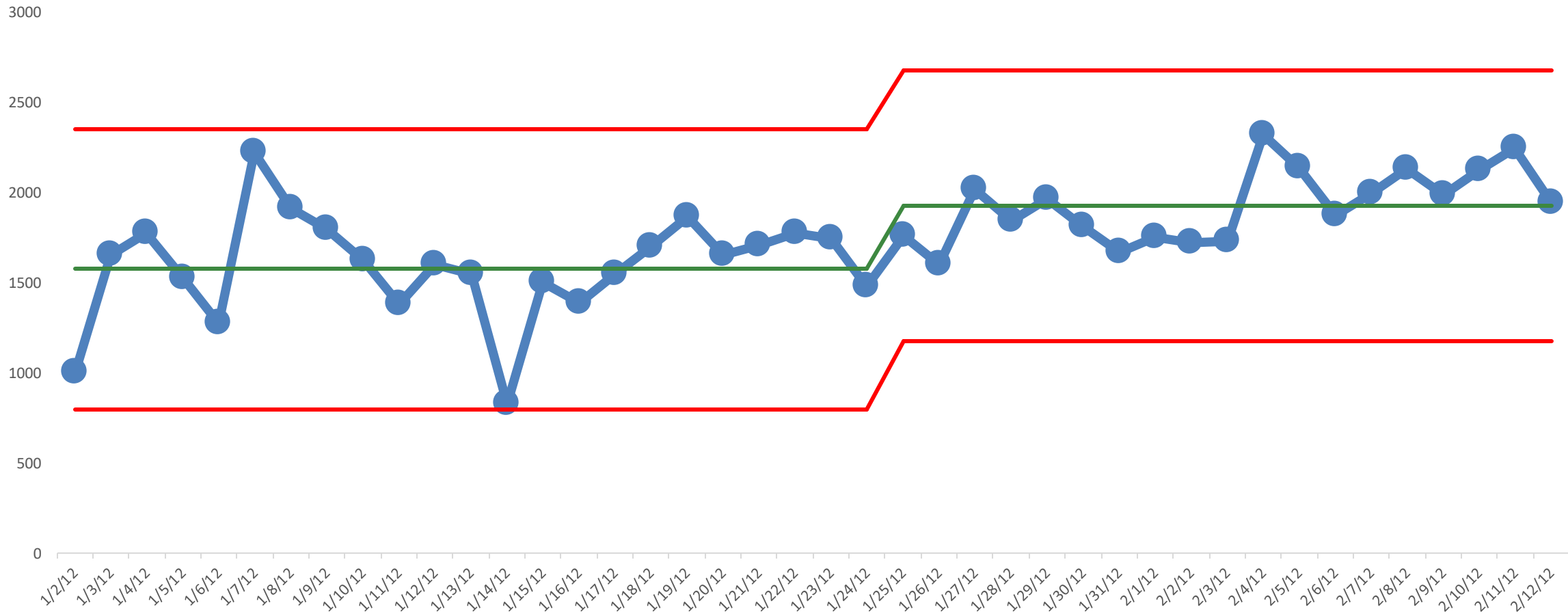
Credit: Perry Reiger

When Should You Shift Limits?

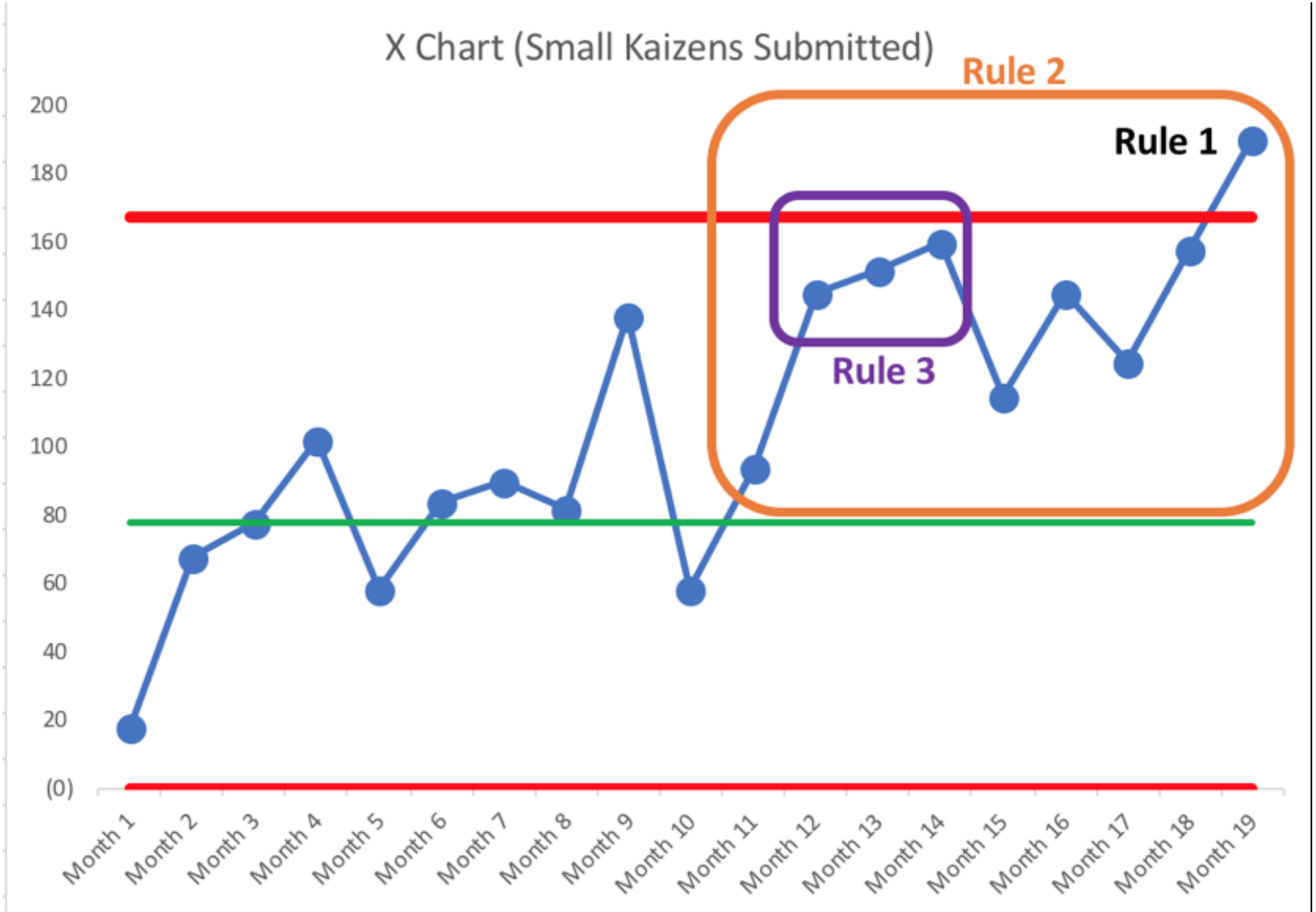
1. Do the data display a distinctly different kind of behavior than in the past?
   - NO? Don't shift limits
2. Do you know the reason for this change in behavior?
   - NO? "You should be looking for the assignable cause instead of tinkering with the limits"
3. Is the new process behavior desirable?
   - NO? "Why aren't you working to remove the detrimental assignable cause instead of tinkering with the limits?
4. Is it intended and expected that the new behavior will continue?
   - NO? Same advice again

Credit: Perry Reiger

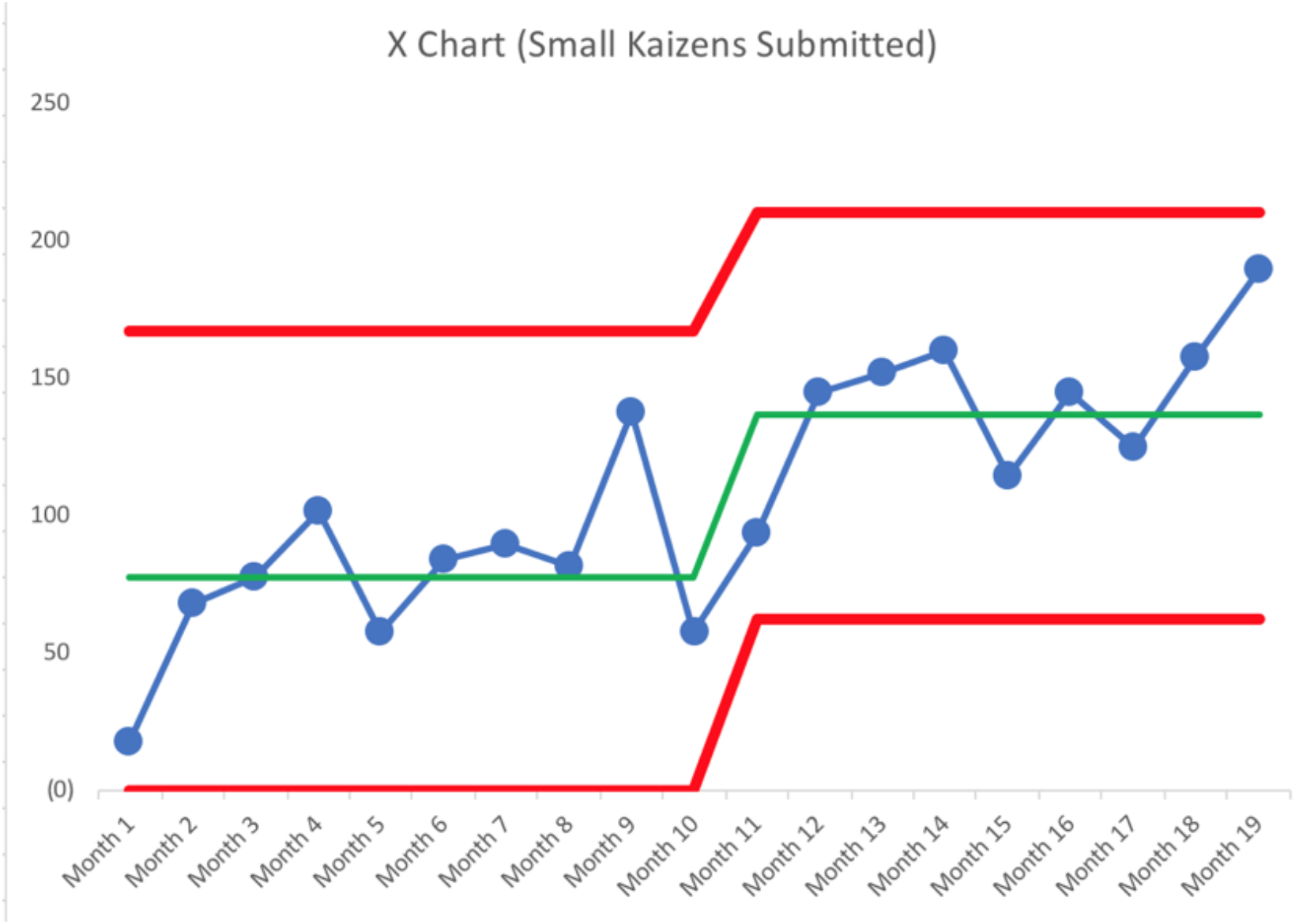
Step 8: Shift the Limits (If Applicable)



Shifts That Show Significant, Sustained Improvement

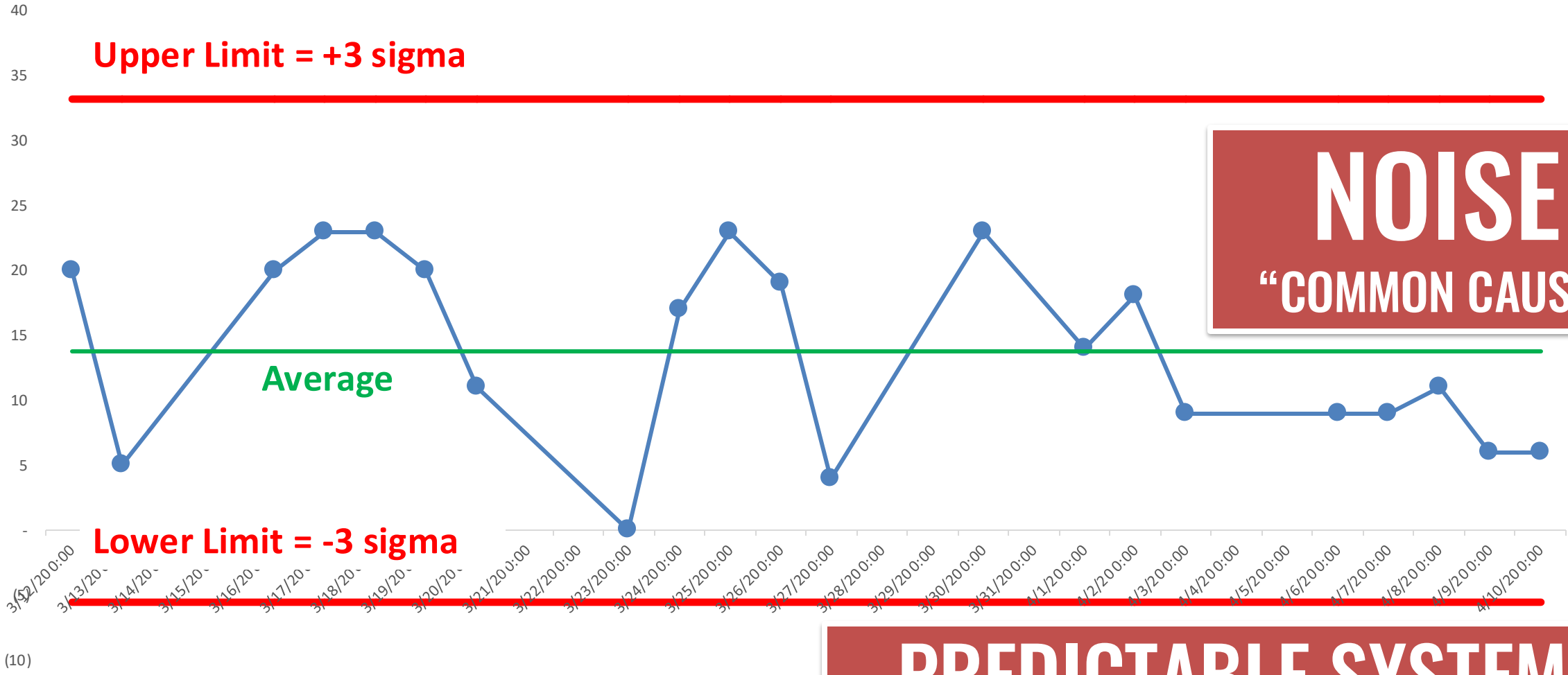


Shifts That Show Significant, Sustained Improvement



Process Behavior Chart

X Chart (Number of Employees Out Sick)



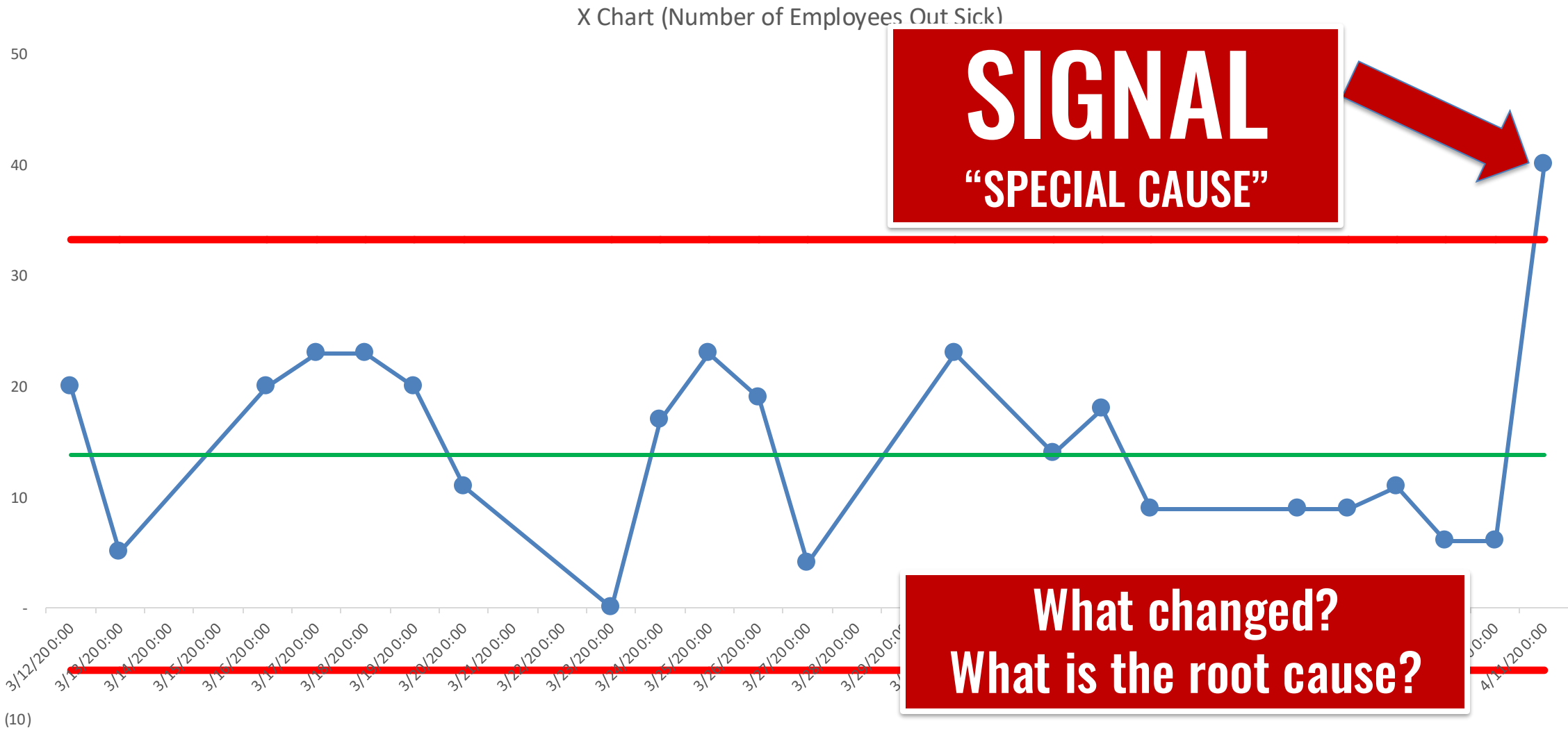
NOISE

"COMMON CAUSE"

PREDICTABLE SYSTEM

Chart Courtesy of Memorial Health System (Marietta OH)

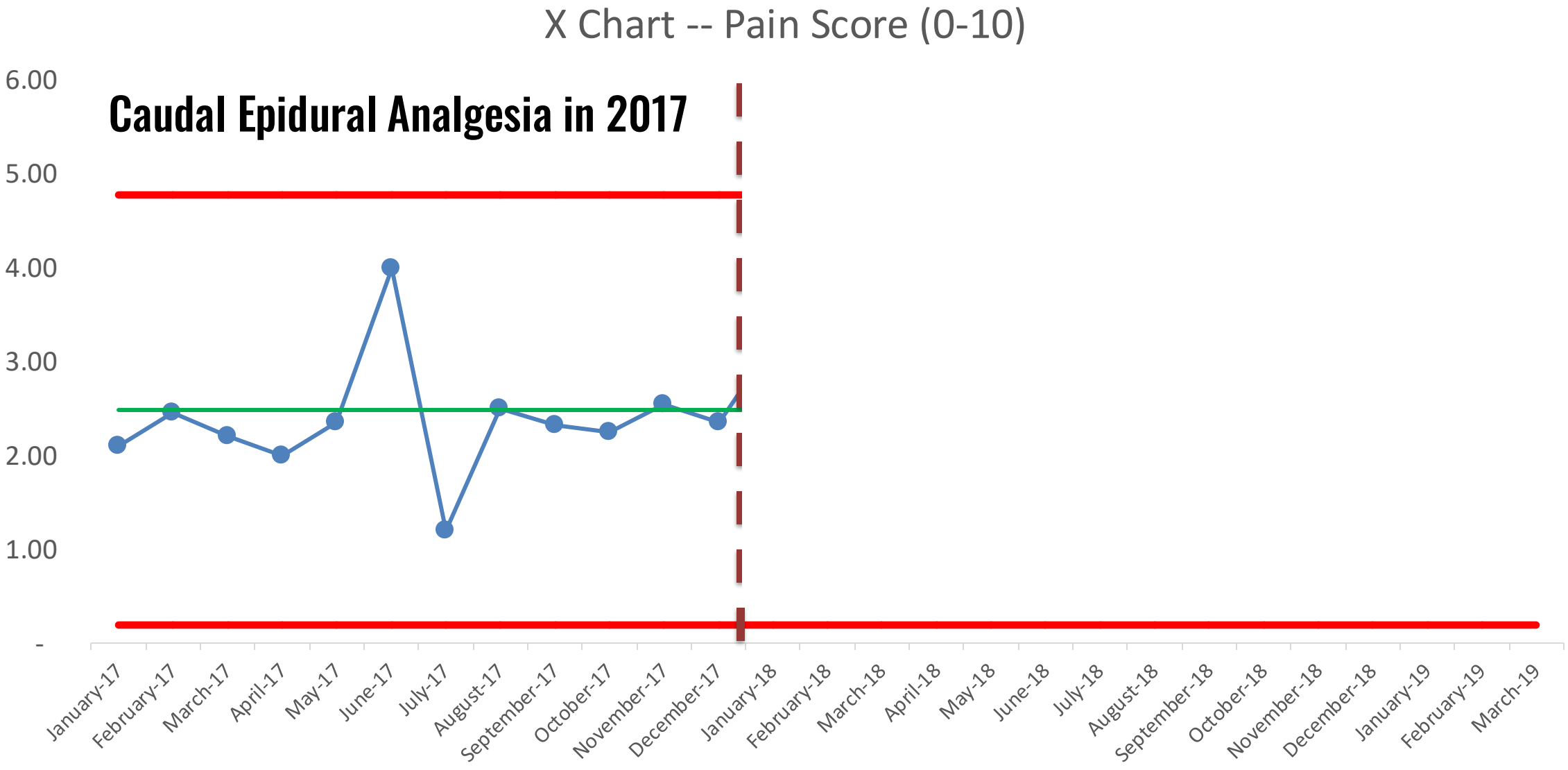
Has the System Changed?



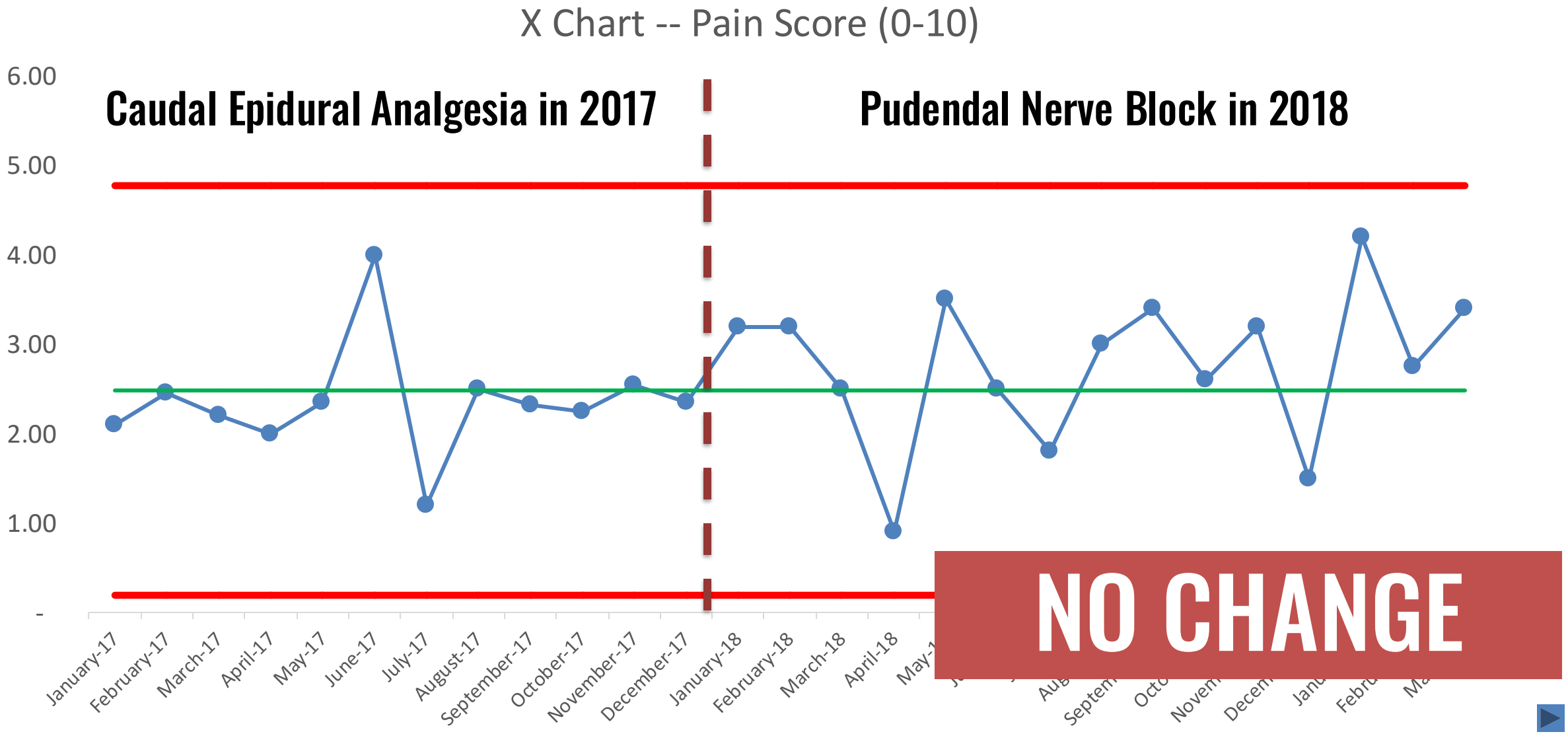
*Note: The last data point is a **hypothetical** situation*

PROCESS BEHAVIOR CHARTS HELP US EVALUATE IMPROVEMENT WORK

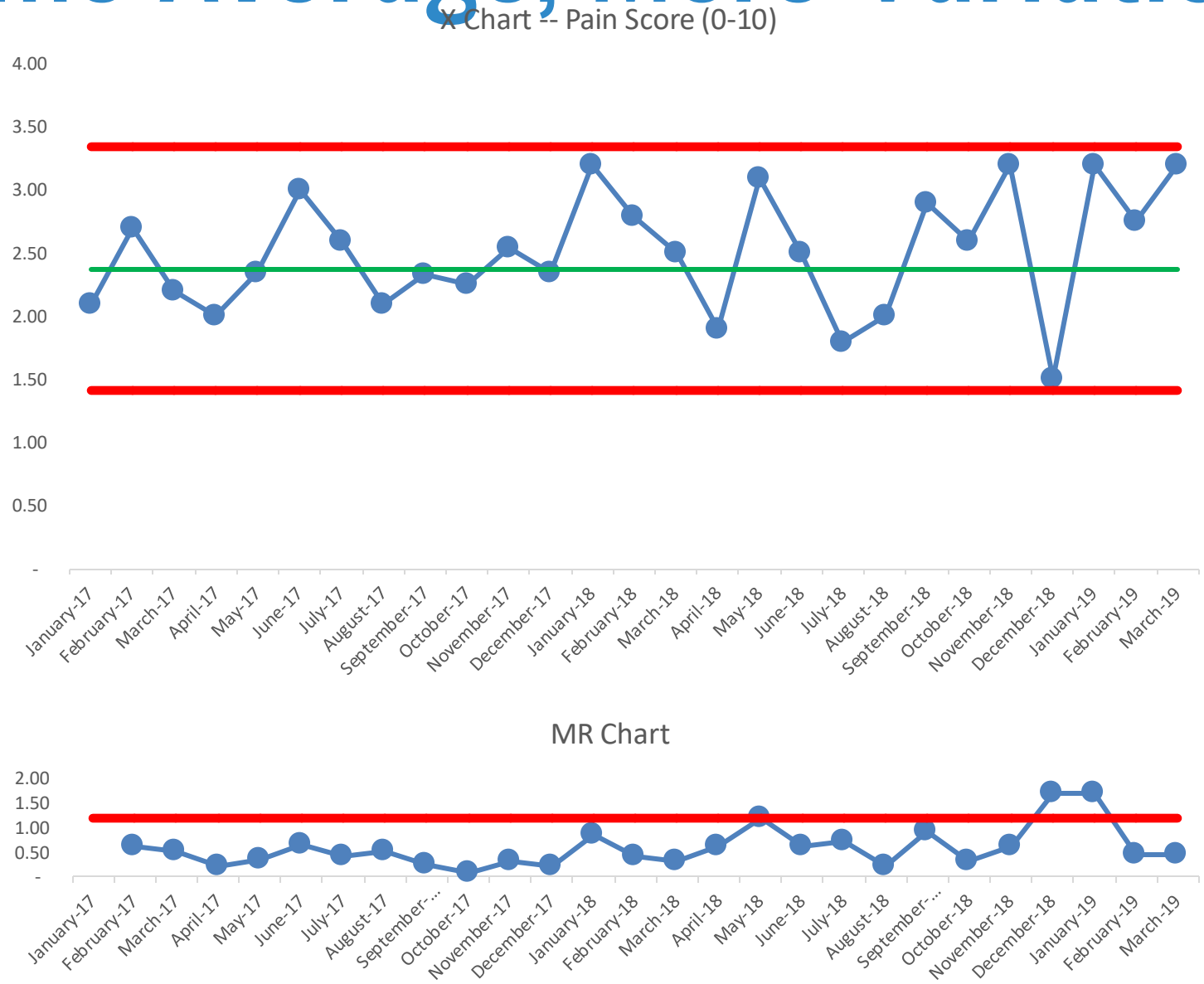
We Made Improvements (?) to the System



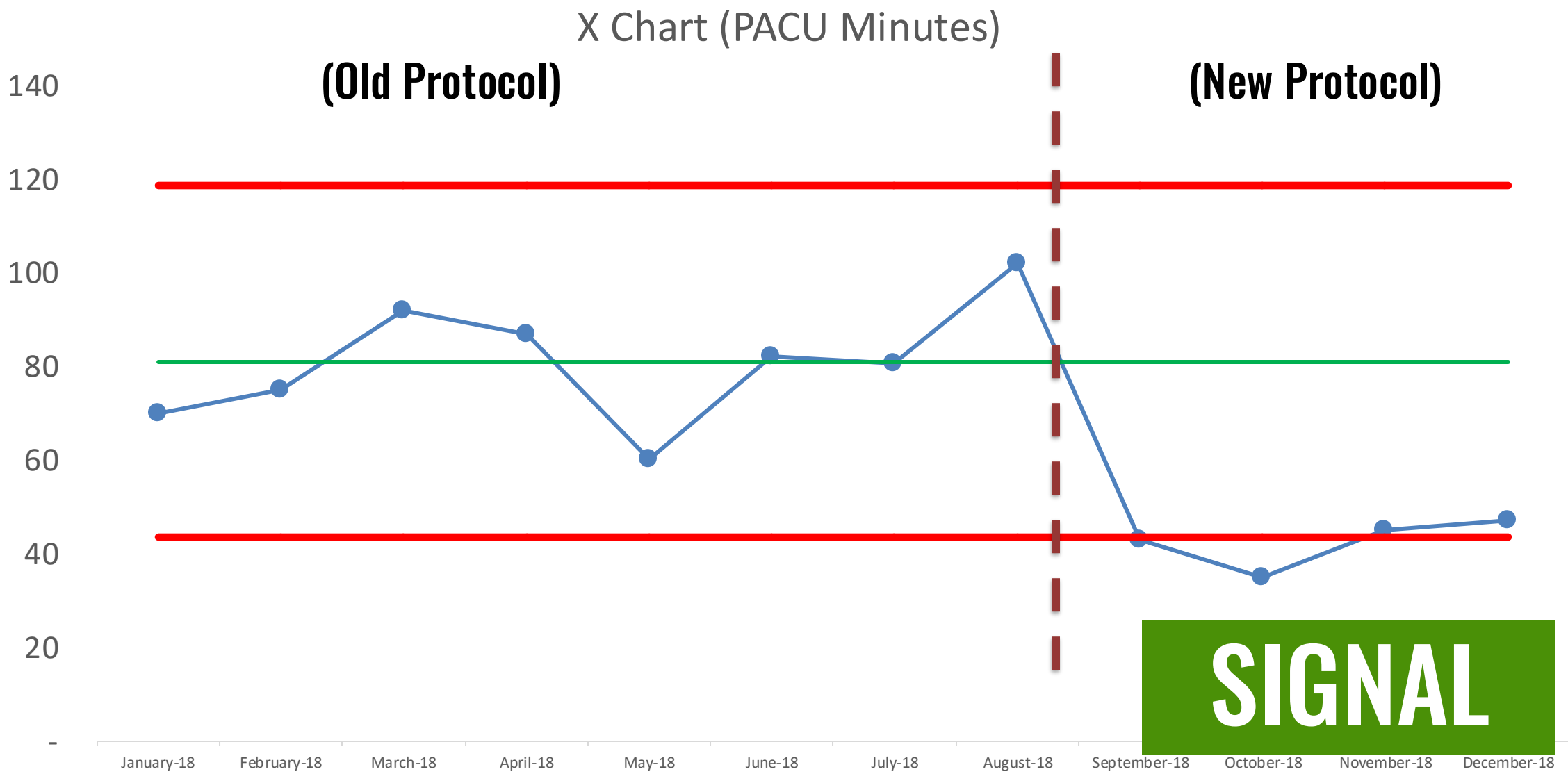
We Made Improvements (?) to the System



Same Average, More Variation?



We Made Improvements (?) to the System



PROCESS BEHAVIOR CHARTS HELP US EVALUATE ONGOING OPERATIONS

“Bowling Charts”

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Trend	Target
Hospital 1	4	36	46	39	43	41	59	52	66	72	74	75	↑	90
Hospital 2	80	63	58	60	57	60	64	67	68	58	78	69	↓	90
Hospital 3	85	92	93	79	76	76	78	76	78	77	73	76	↑	70
Hospital 4	75	67	69	72	74	67	65	63	70	72	67	71	↑	70

1. Are we achieving our target or goal?
2. Are we improving?
3. How do we improve?

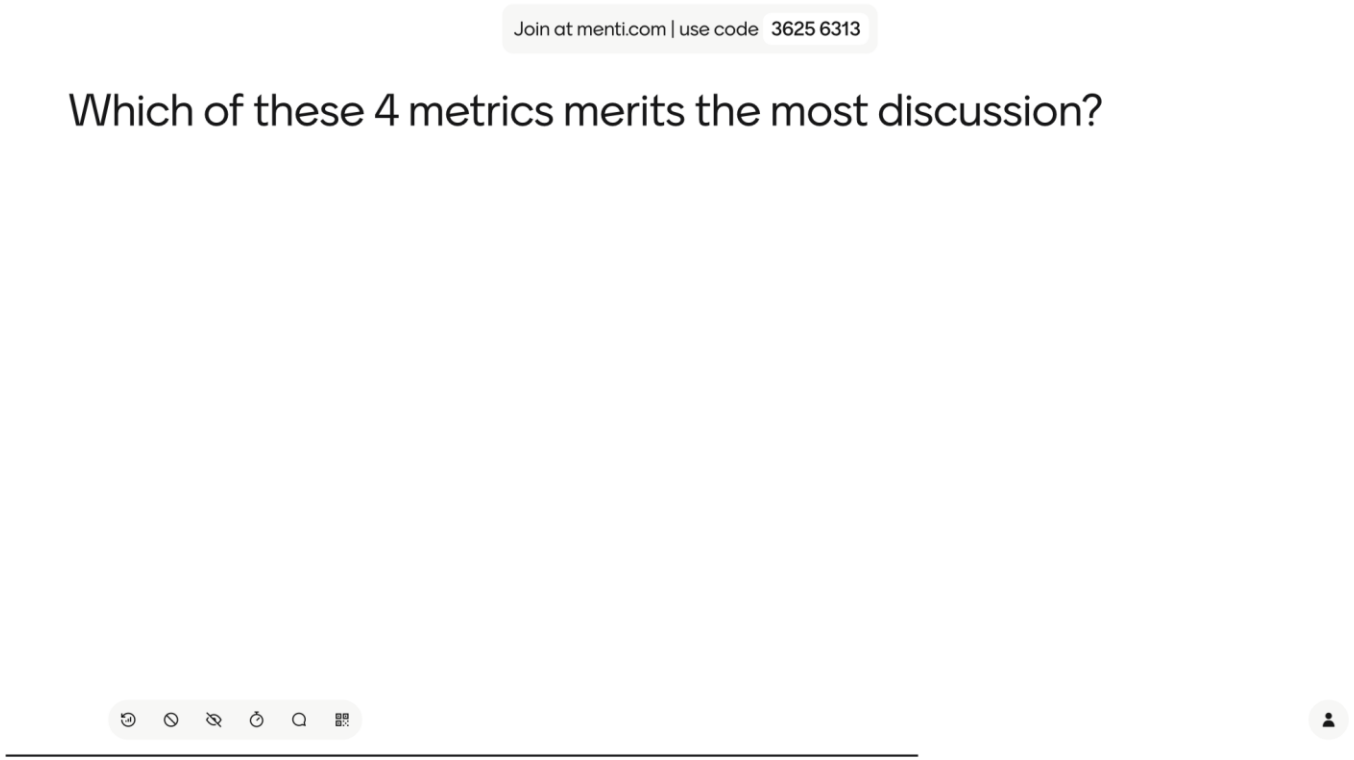
“Bowling Charts”

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Trend	Target
Hospital 1	4	36	46	39	43	41	59	52	66	72	74	75	↑	90
Hospital 2	80	63	58	60	57	60	64	67	68	58	78	69	↓	90
Hospital 3	85	92	93	79	76	76	78	76	78	77	73	76	↑	70
Hospital 4	75	67	69	72	74	67	65	63	70	72	67	71	↑	70

1. Which of these numbers (if any) suggests that the system has changed significantly?
2. Which of these merit reaction, investigation, or explanation?
3. How do we prioritize?

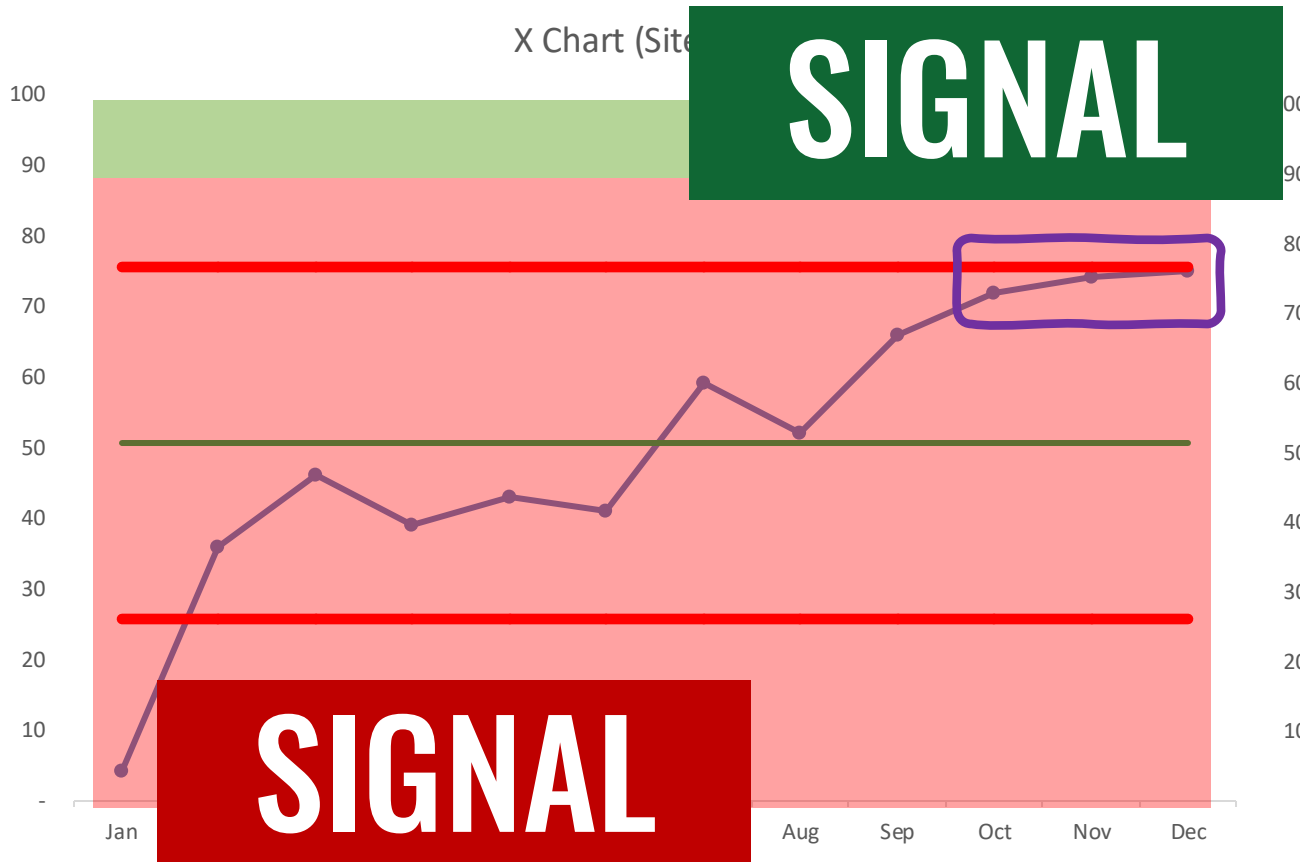
Bowling Charts

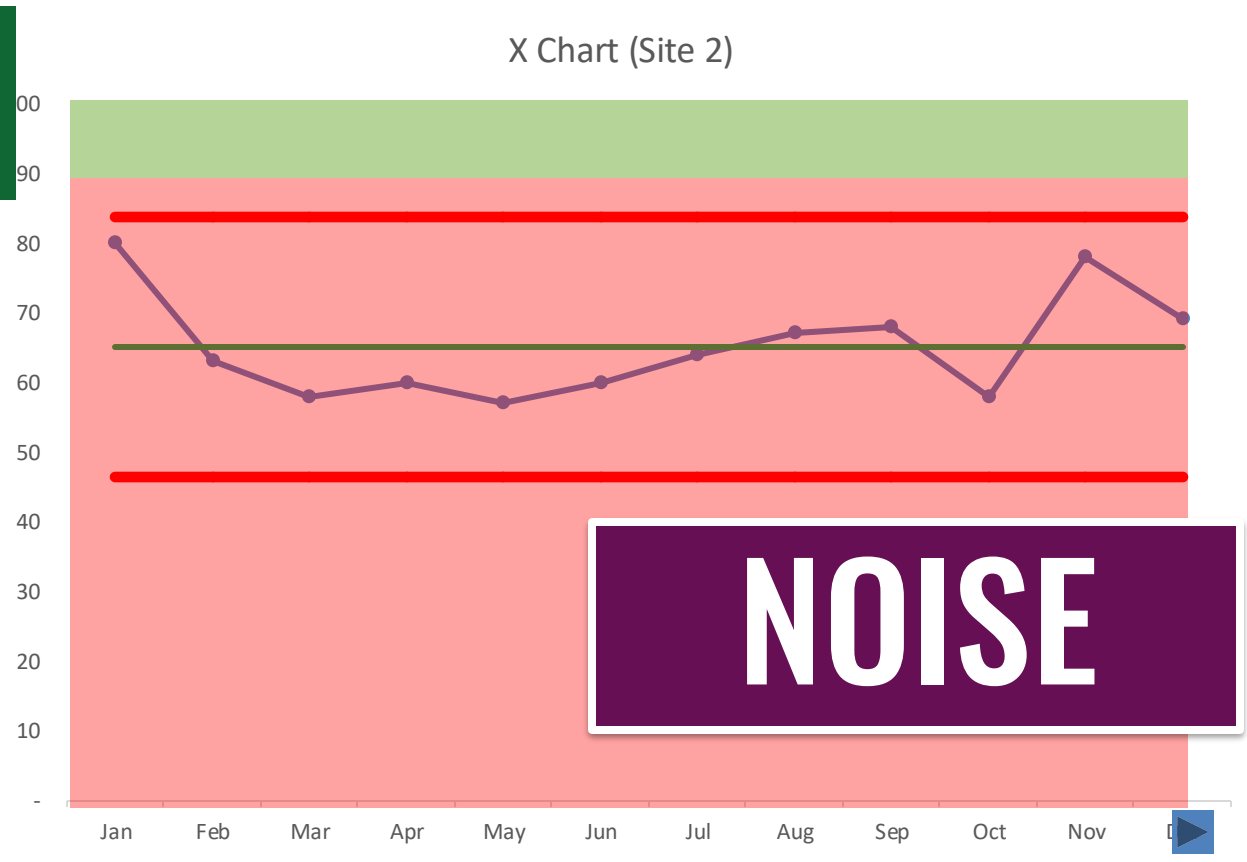
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Trend	Target
Site 1	4	36	46	39	43	41	59	52	66	72	74	75	↑	90
Site 2	80	63	58	60	57	60	64	67	68	58	78	69	↓	90
Site 3	85	92	93	79	76	76	78	76	78	77	73	76	↑	70
Site 4	75	67	69	72	74	67	65	63	70	72	67	71	↑	70



Bowling Charts vs. Process Behavior Charts

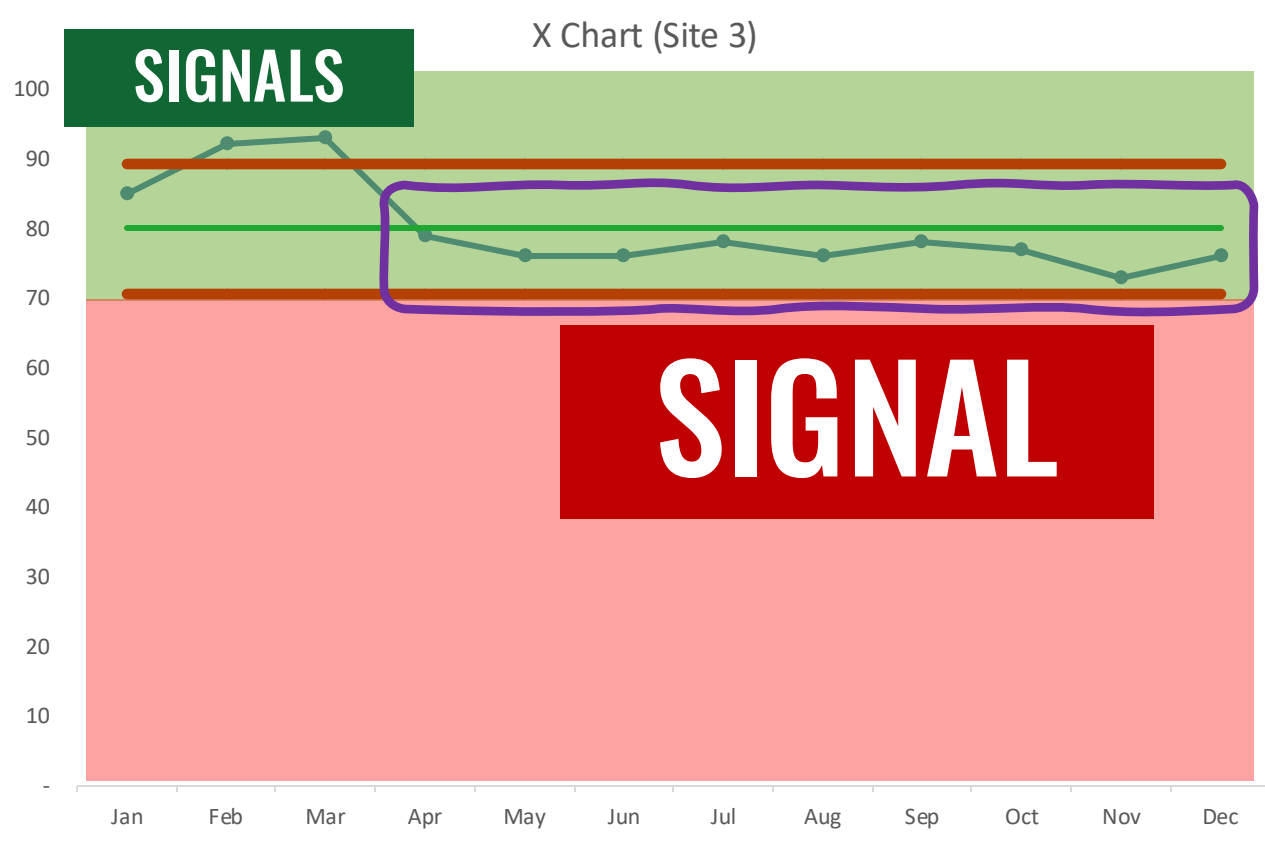
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Trend	Target
Site 1	4	36	46	39	43	41	59	52	66	72	74	75	↑	90
Site 2	80	63	58	60	57	60	64	67	68	58	78	69	↓	90
Site 3	85	92	93	79	76	76	78	76	78	77	73	76	↑	70
Site 4	75	67	69	72	74	67	65	63	70	72	67	71	↑	70

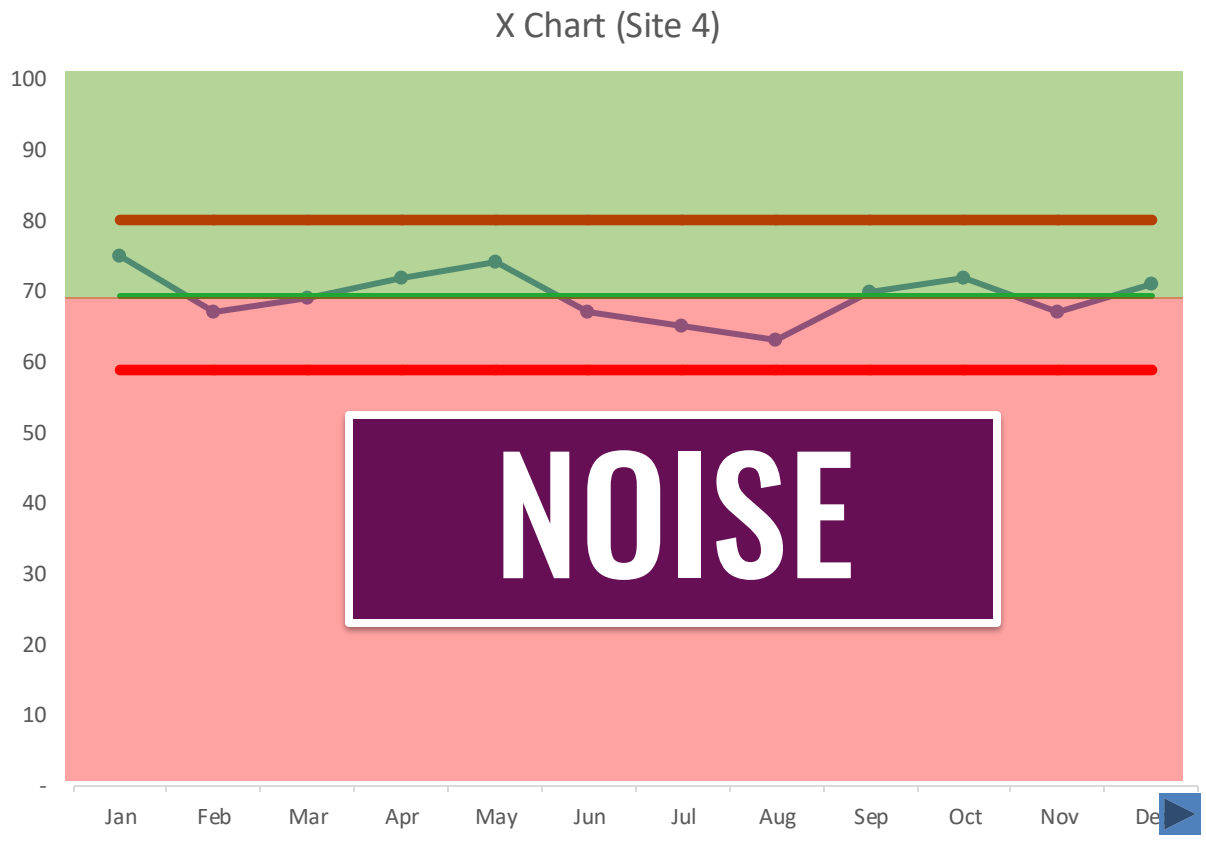




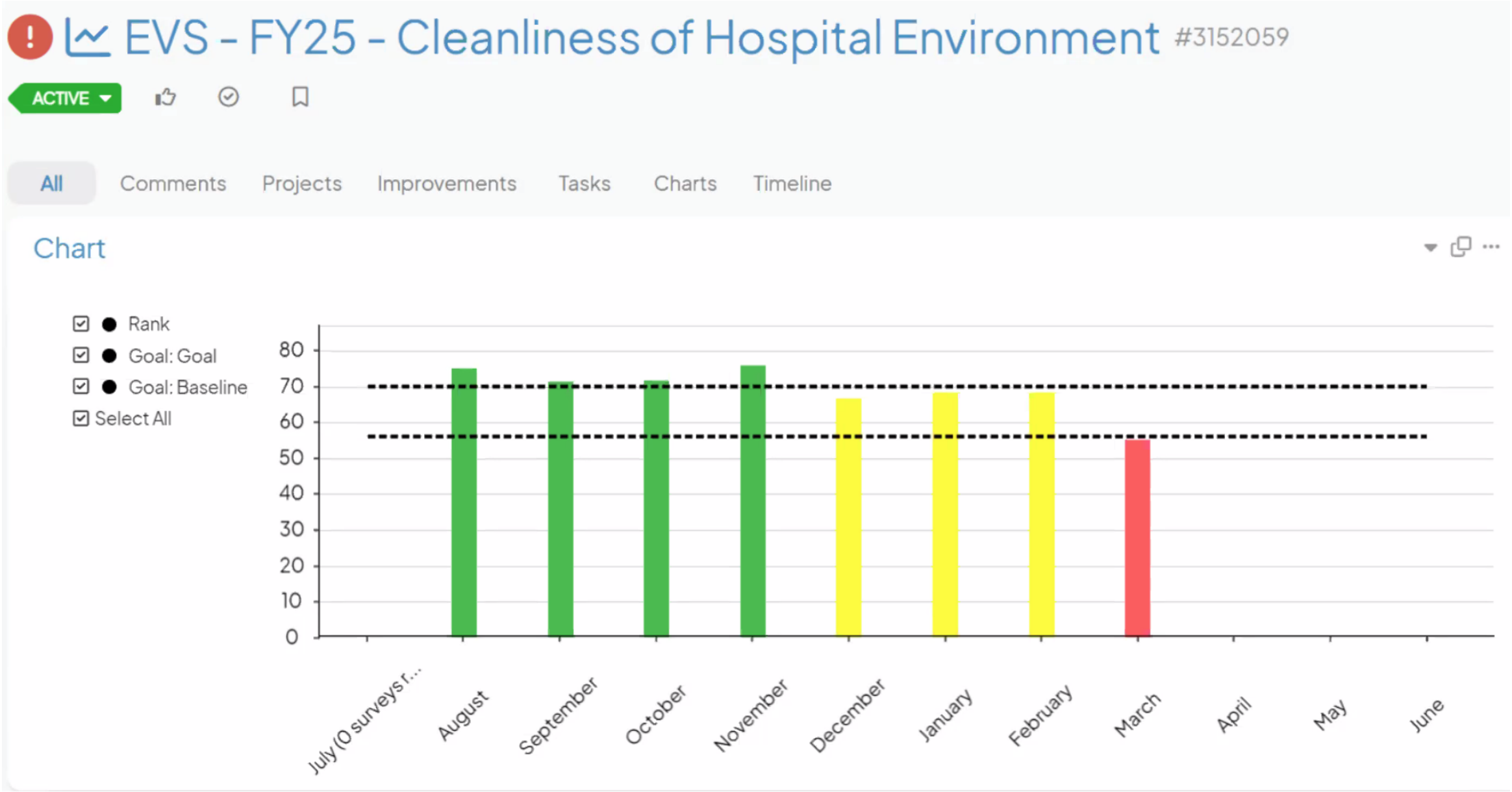
Bowling Charts vs. Process Behavior Charts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Trend	Target
Site 1	4	36	46	39	43	41	59	52	66	72	74	75	↑	90
Site 2	80	63	58	60	57	60	64	67	68	58	78	69	↓	90
Site 3	85	92	93	79	76	76	78	76	78	77	73	76	↑	70
Site 4	75	67	69	72	74	67	65	63	70	72	67	71	↑	70

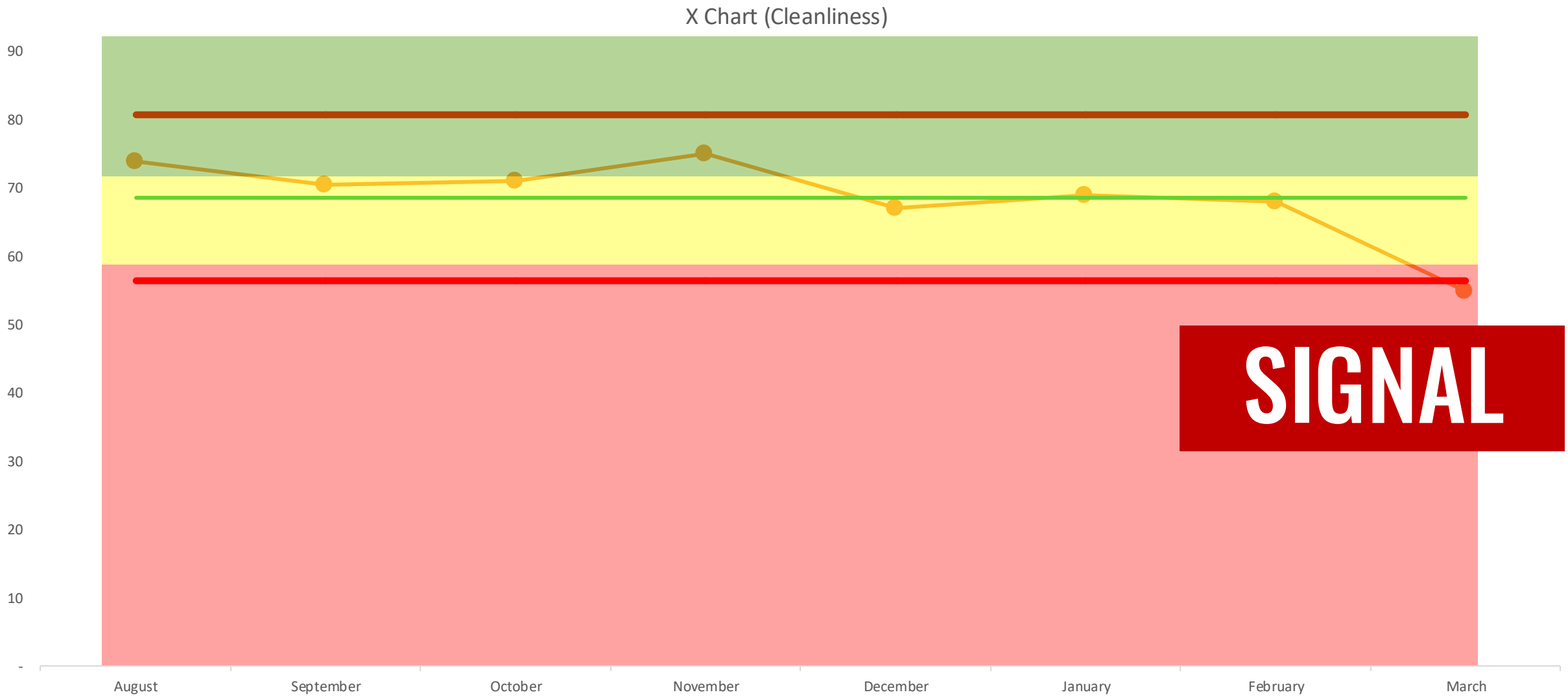




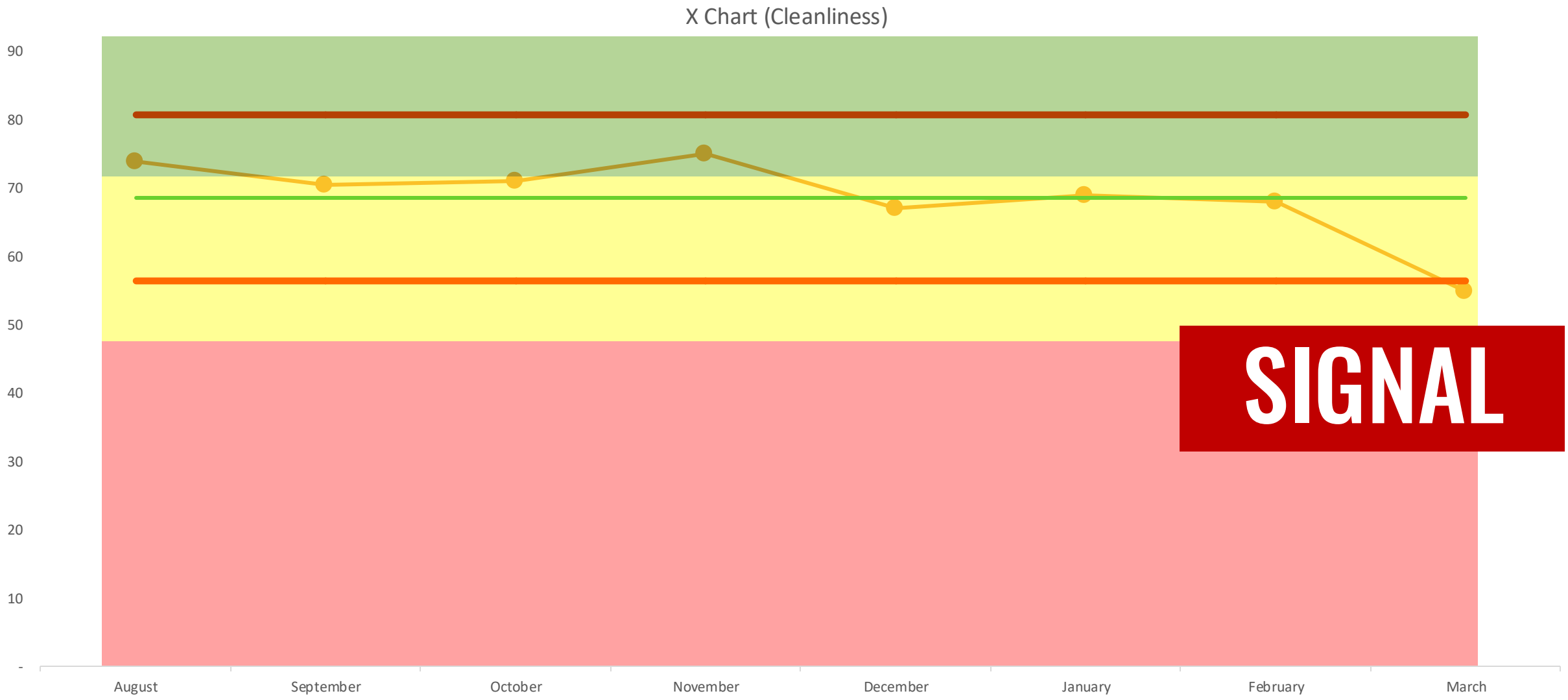
The Problem with RYG Column Charts?



Process Behavior Chart View



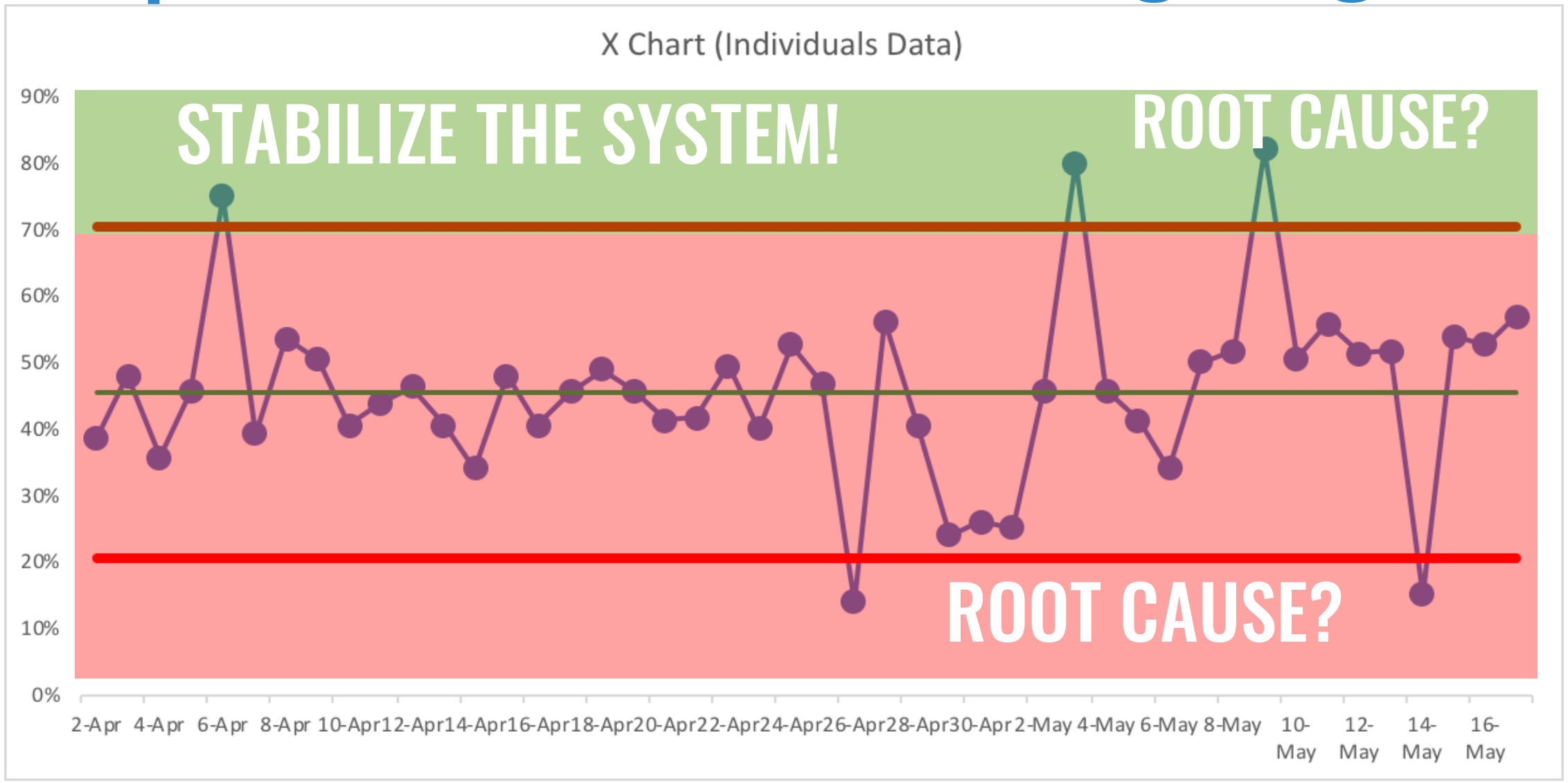
Process Behavior Chart View – Goals 2



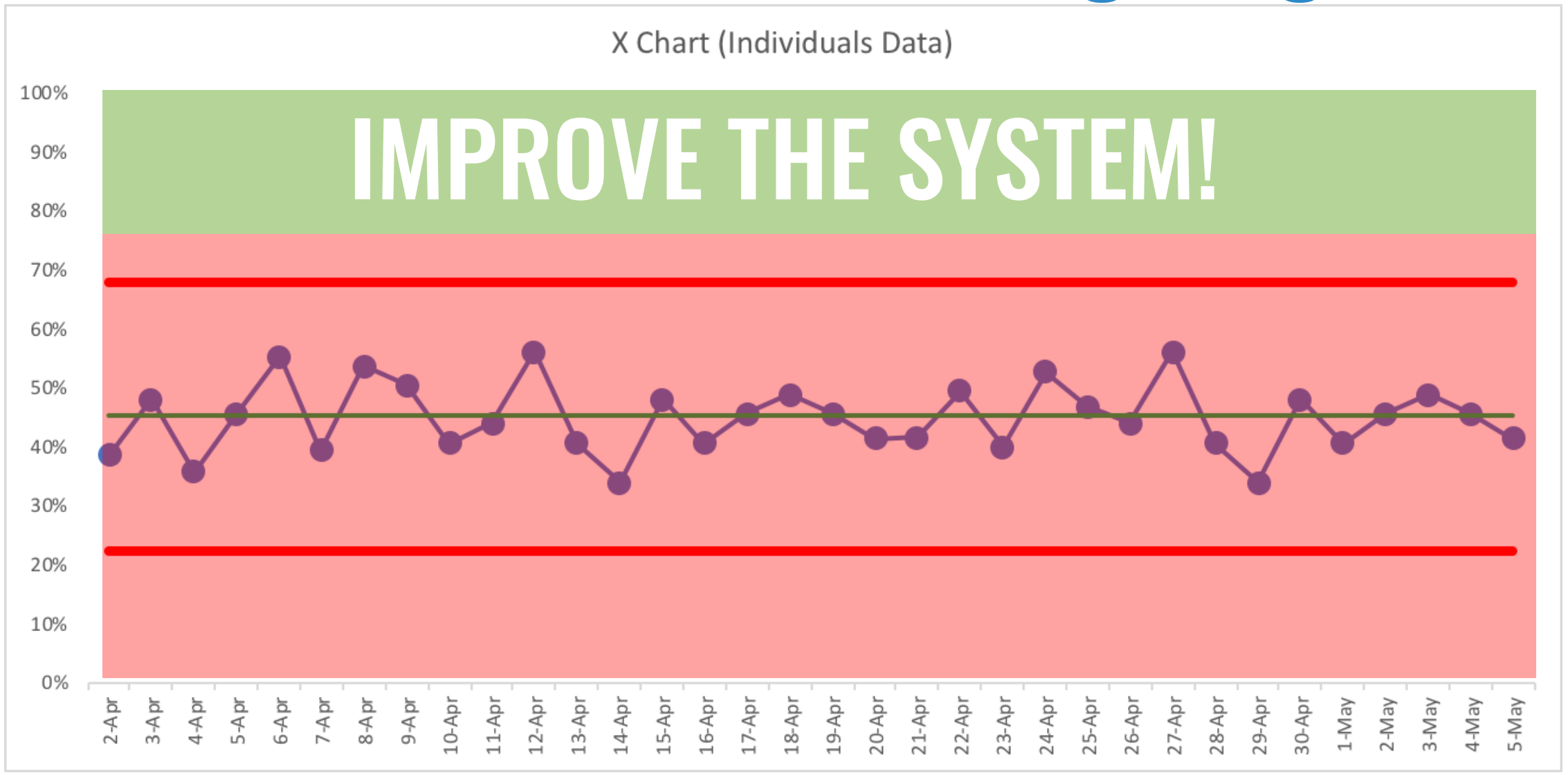
Is our Metric Predictable and/or Capable?

3/18/2025

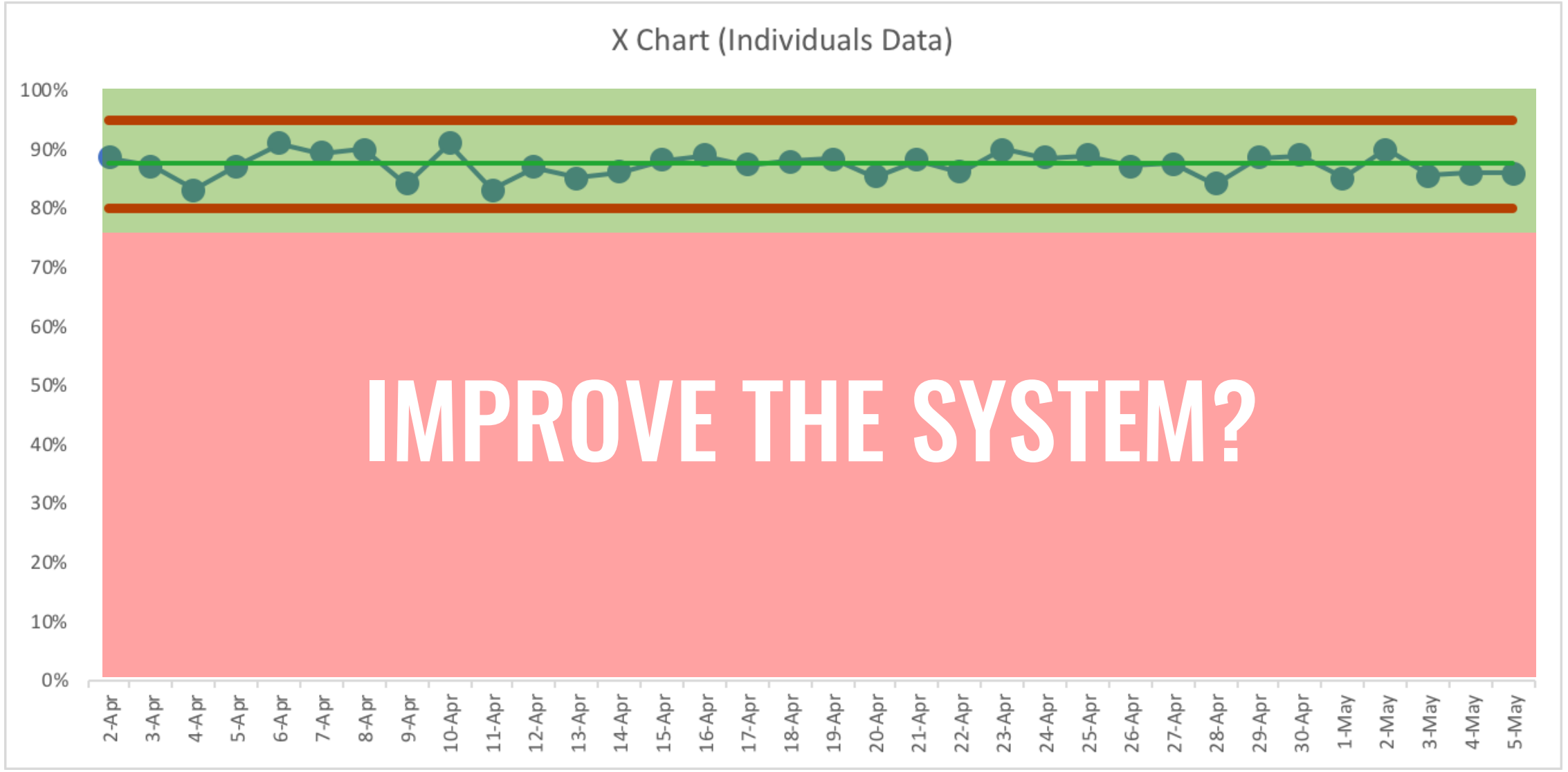
Unpredictable & Not Meeting Target



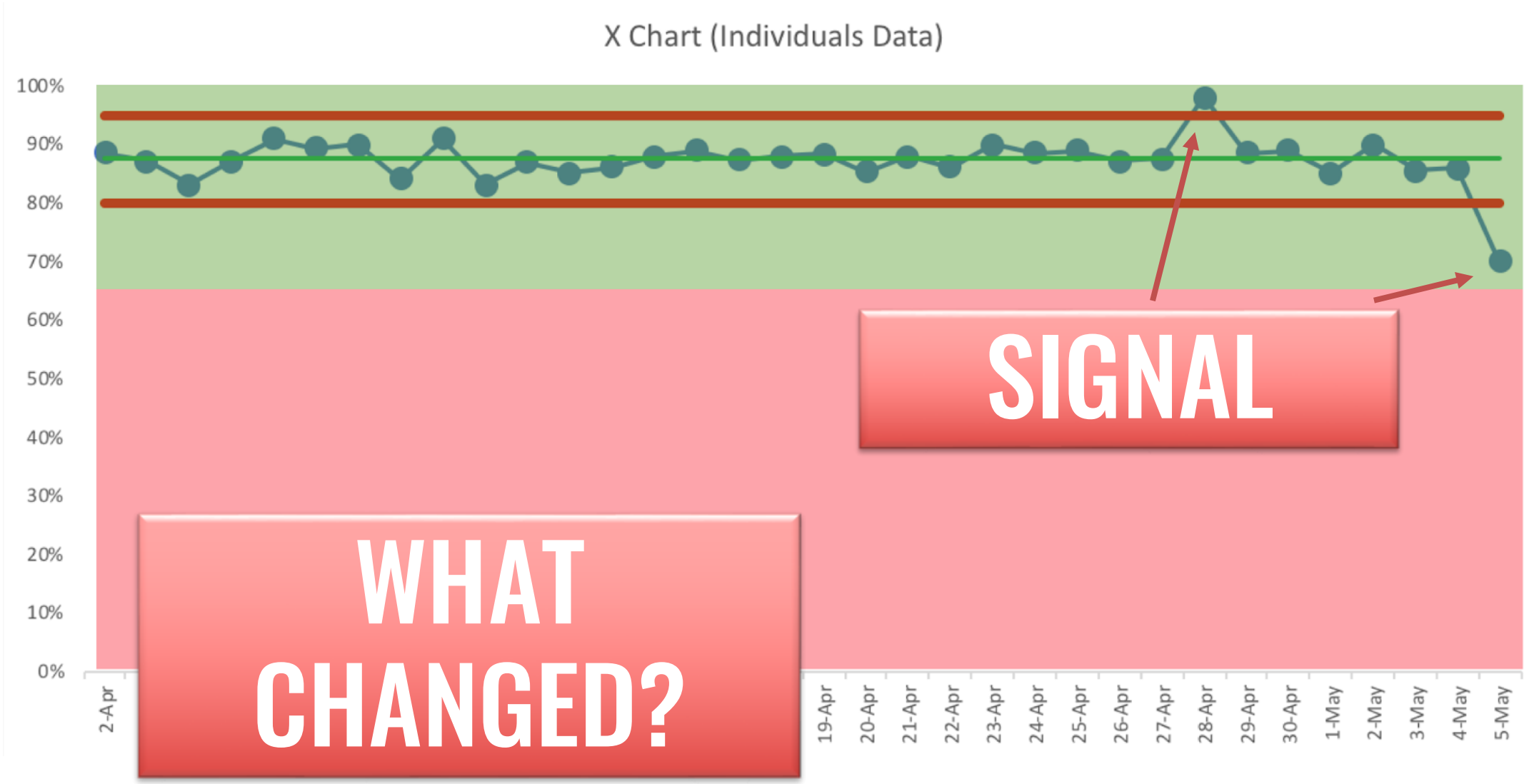
Predictable & Not Meeting Target



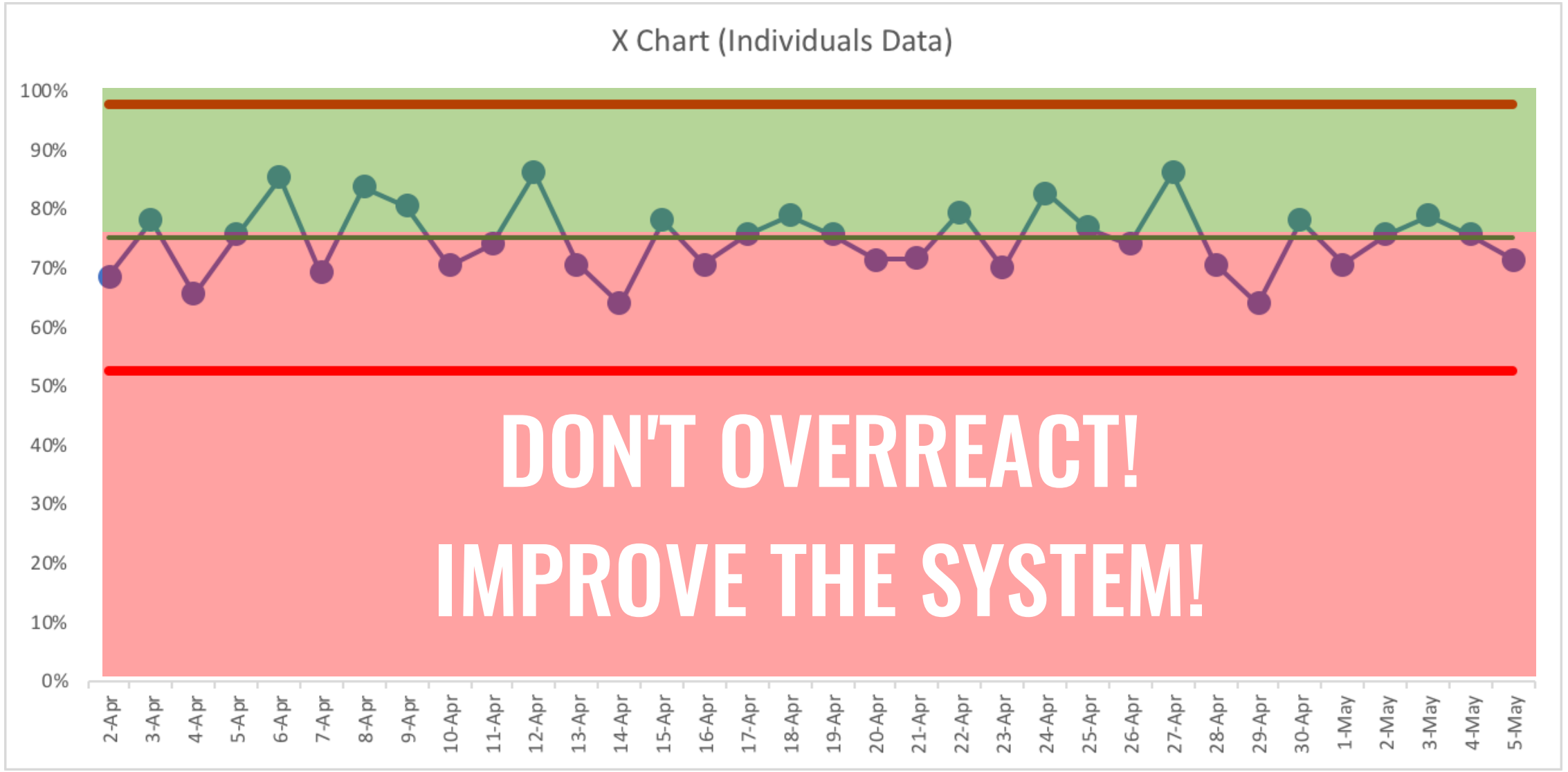
Predictable and Always Meets Target



Looking for Signals in a Metric That Meets Target



Predictable and Sometimes Meets Target

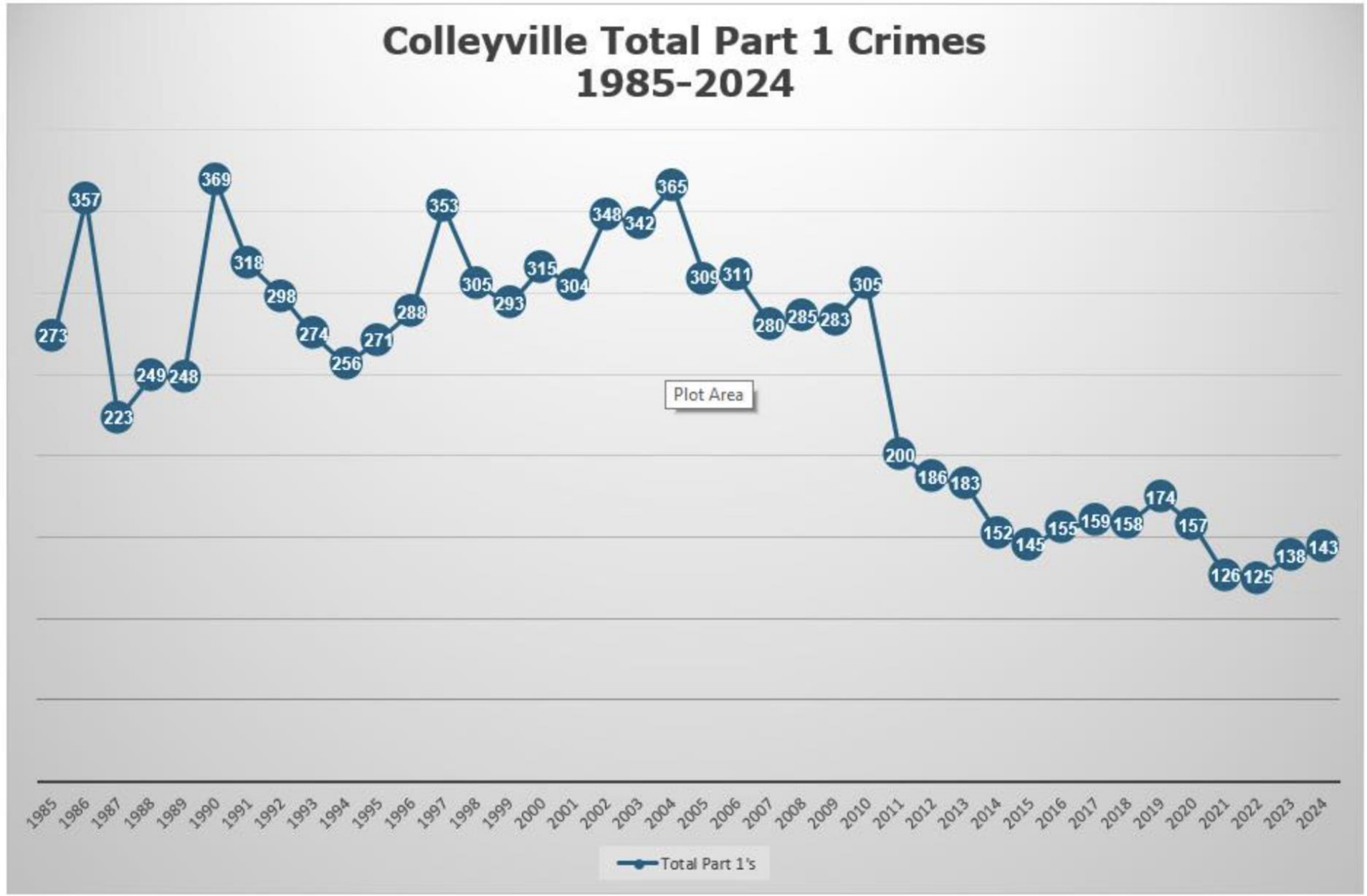


2024 Annual Crime Report – Part 1 Crimes

Part 1 Crimes	2023	2024	Change	% Change
Murder	0	1	1	N/A
Rape	7	1	-6	-86%
Agg Assault	8	6	-2	-25%
Robbery	0	0	0	N/A
Total Violent	15	8	-7	-47%
Burglaries				
Non-Residential	5	3	-2	-40%
Residential	3	1	-2	-67%
Thefts				
BOV	32	21	-11	-34%
Other	78	103	25	32%
Auto Theft	5	7	2	40%
Arson	0	0	0	N/A
Total Property	123	135	12	10%
Total Part 1	138	143	5	4%

Change in Crime
4%

Crime Trend by Year



ASKING PEOPLE TO EXPLAIN “NOISE” FIXES NOTHING

REACT LESS

LEAD BETTER

IMPROVE MORE

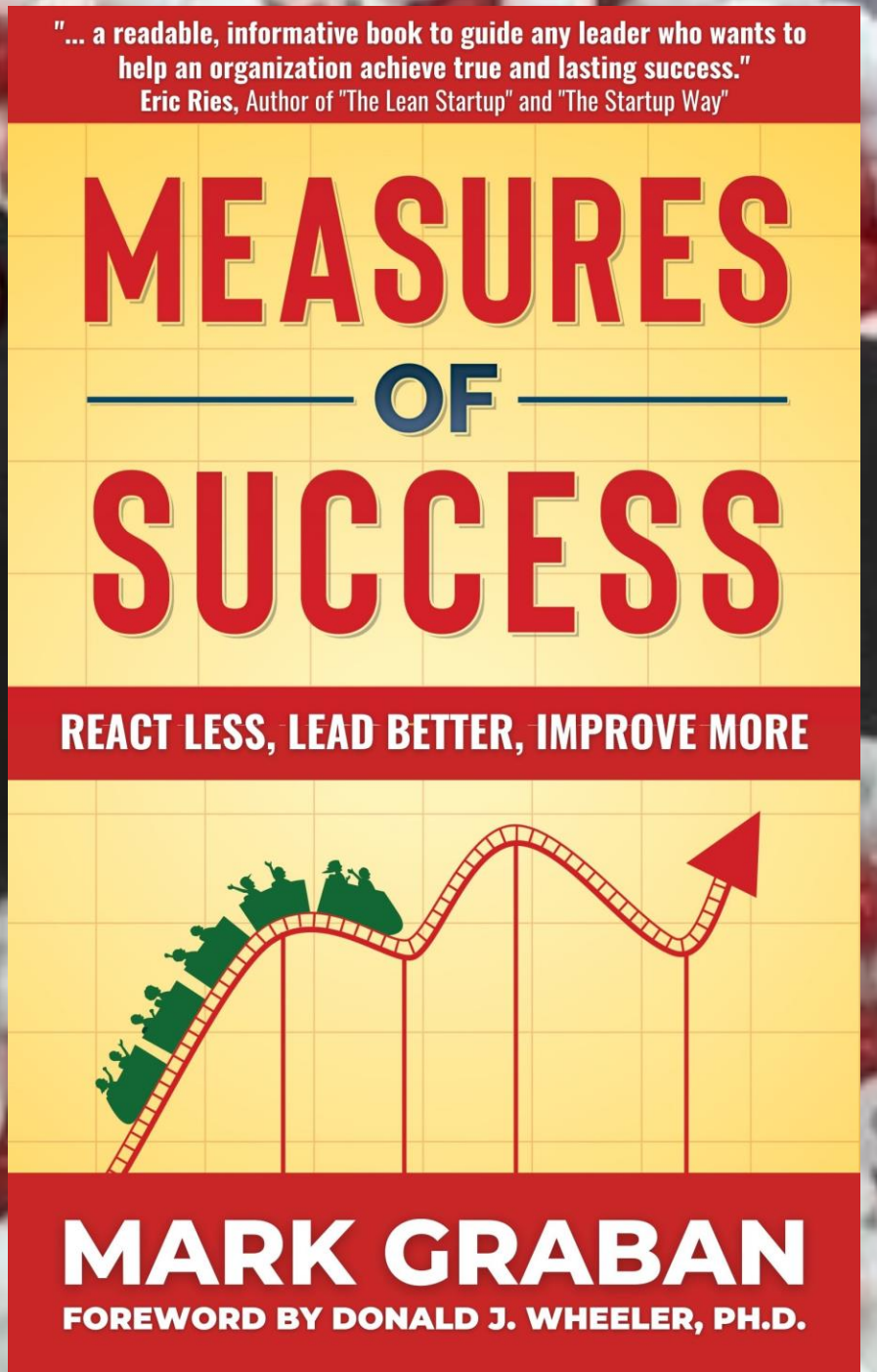
Q&A and Contact Info:

mark@markgraban.com

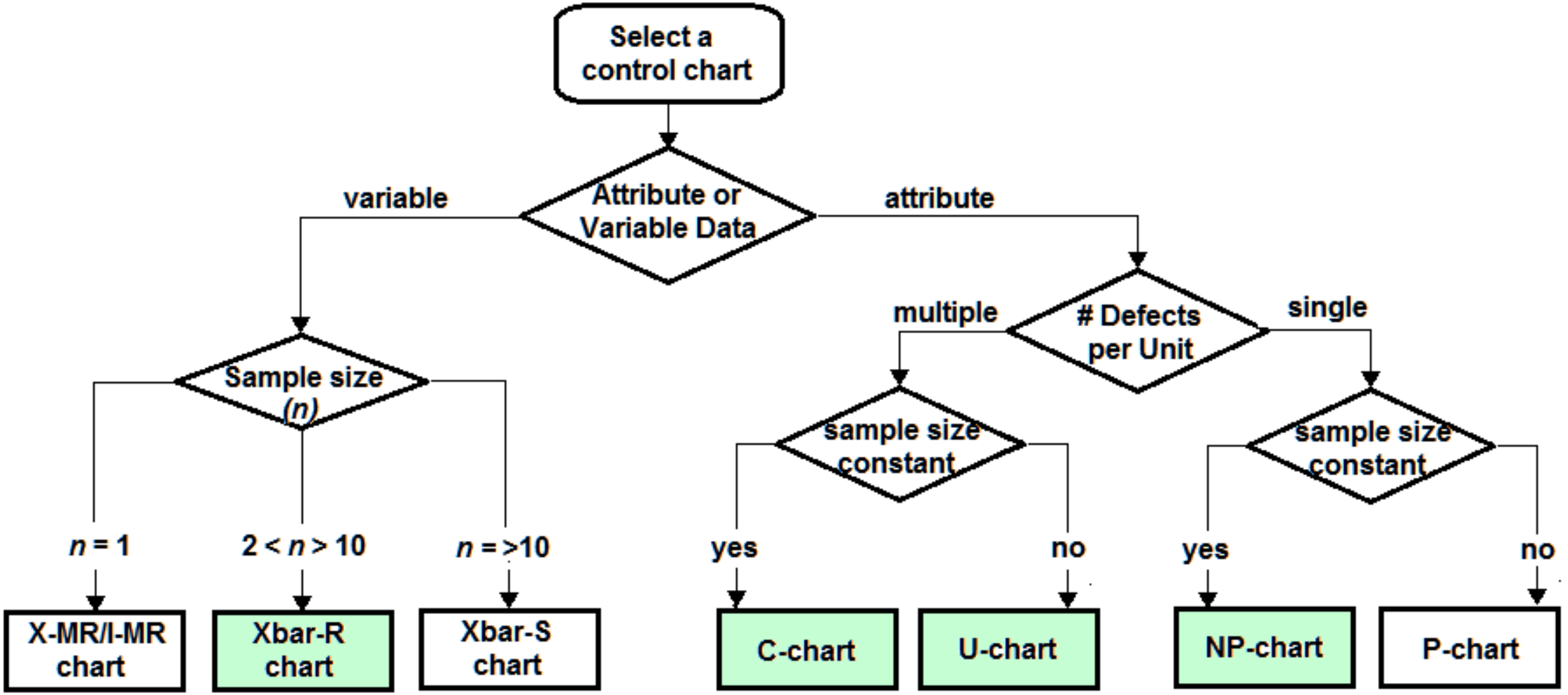
www.MeasuresOfSuccessBook.com

www.MistakesBook.com

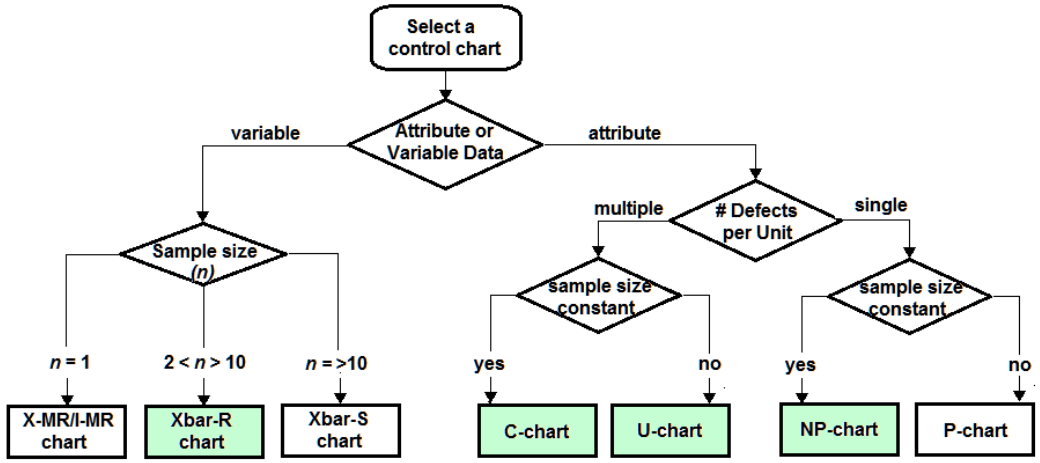
www.MarkGraban.com



What You Might Have Learned in Six Sigma is Arguably Wrong



What You Might Have Learned in Six Sigma is Arguably Wrong



- Bad assumptions about distributions
  - Don't hold up in the real world
- For business metrics, use the XmR Chart
  - No c-charts
  - No p-charts
- Do NOT use a calculated standard deviation with real world data
  - Use the XmR calculations