

# 2018 CME NATIONAL LEAN CONFERENCE

## A3 PROBLEM SOLVING

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June 4, 2018

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  5. Accept terms
  6. Click submit
  7. Access your email and confirm your guest account message from telus.
- Happy browsing!

# A3 PROBLEM SOLVING

Objective:

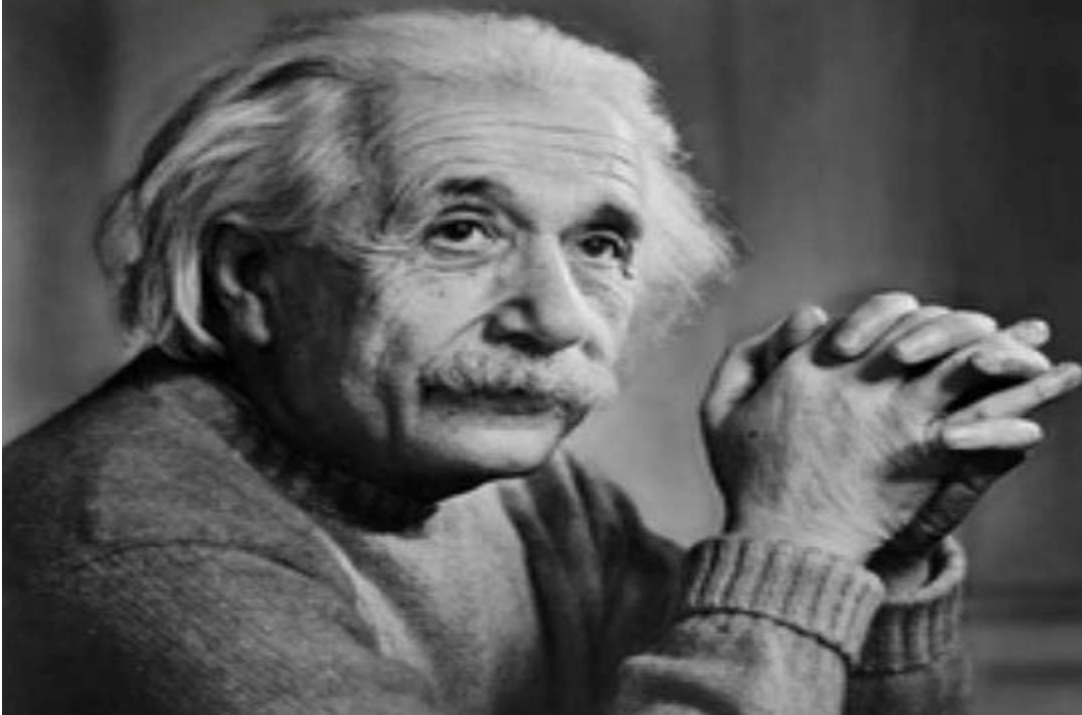
- ✘ To increase your understanding of A3 Problem Solving, Reporting, and Coaching.
- ✘ To learn from and with each other.



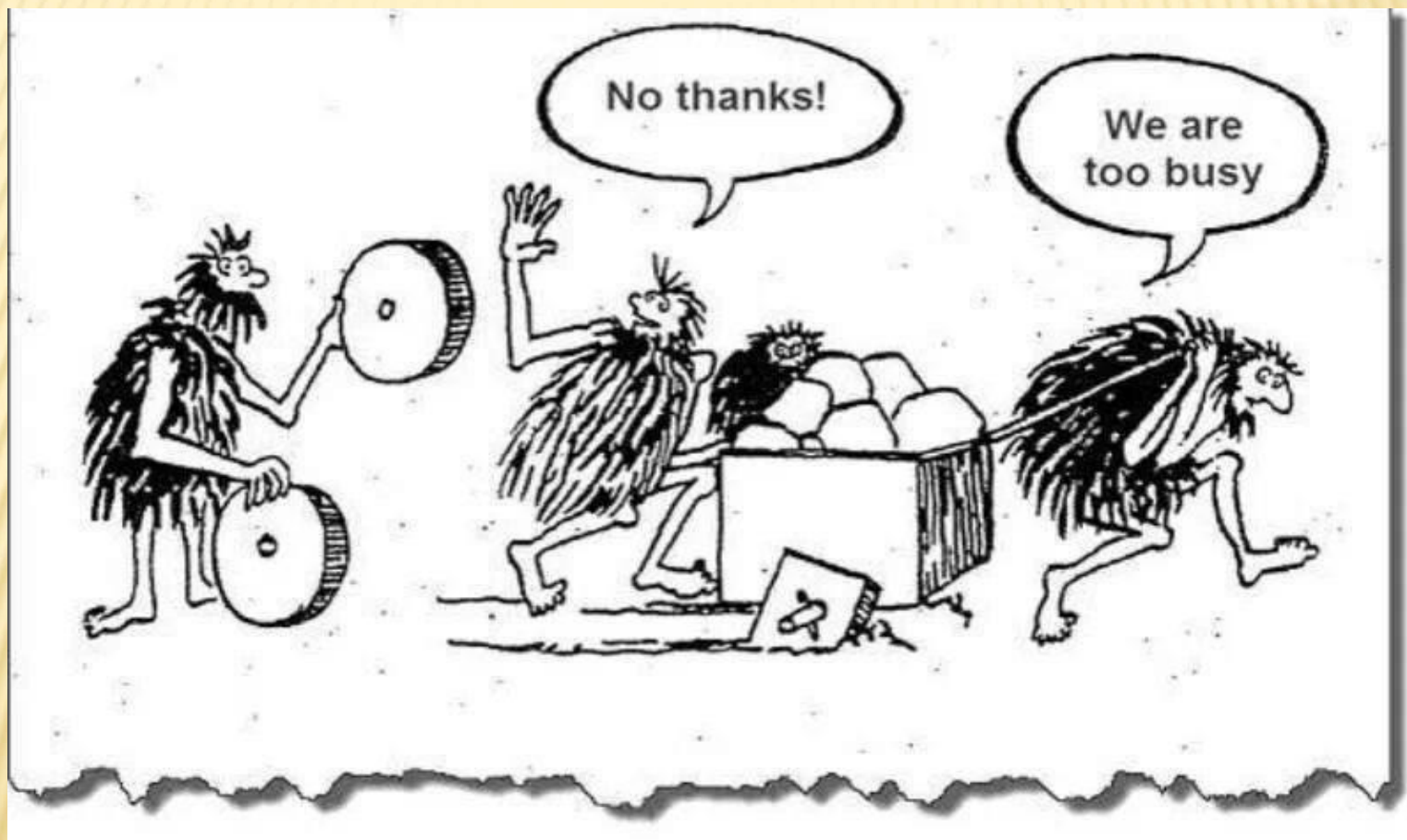
# A3 Problem Solving

If you can't explain it **simply**, you don't understand it well enough.

– Albert Einstein



# Sound Familiar?



# TABLE EXERCISE

- ✕ Introduce Yourself
- ✕ Share - What would a “10” be for you from this Workshop?

**Table Group Discussion**



# WORKSHOP OVERVIEW

- |    |                           |               |
|----|---------------------------|---------------|
| 1. | Background Basics         | 8:00 – 8:45   |
| 1. | Principles and Philosophy |               |
| 2. | Basic Concepts            |               |
| 2. | Definitions               | 8:45 – 9:15   |
| 1. | A3 Reporting              |               |
| 2. | What is a problem?        |               |
| 3. | Problem Solving Method    | 9:15 – 11:30  |
| 4. | Wrap-up                   | 11:30 – 12:00 |

**We will build a 15 minute break in around 10:00**

# A3 Problem Solving

Title: \_\_\_\_\_

Date: \_\_\_\_\_ By: \_\_\_\_\_ Approval: \_\_\_\_\_

**Background:**

**(4 a) Develop Solutions / Countermeasures:**

**(4 b) Implement Countermeasures:**

**(5) Evaluate Results and Process:**

**(6) Standardize Process & Control Plan:**

**(7) Draw Conclusions:**

**(1) Clarify the Problem:**

**(2) Breakdown the Problem and Set Target:**

**(3) Root Cause Analysis:**



# PROBLEM SOLVING BASICS

- ✖ Principles and Philosophy
- ✖ Standard Method (SOP)
- ✖ Tools and Techniques
- ✖ Expert Coaching

# GUIDING PRINCIPLES & PHILOSOPHY

- ✗ Deming's System of Profound Knowledge
  - + Appreciation for a system
    - ✗ Aim/Mission (i.e. True North), Processes, Optimize System, etc.
    - ✗ Alignment and Leadership
      - ★ Strategic/Mission Critical Priorities, KPIs & Focus
  - + Knowledge of Variation
    - ✗ Common and Special (Assignable) Cause
  - + Theory of Knowledge
  - + Psychology
- ✗ Improve the process, don't manage for results.
  - + Process/Results Matrix
  - + It's Process not people!
- ✗ Facts, Data, Scientific Method (PDSA), Measurement & Statistical Thinking.

# A3 PROBLEM SOLVING - WHAT IS A PROBLEM?

- ✘ “A gap between the standard and current performance” – Toyota
- ✘ A statement of fact....no hypothesis....



# PDC/SA Method

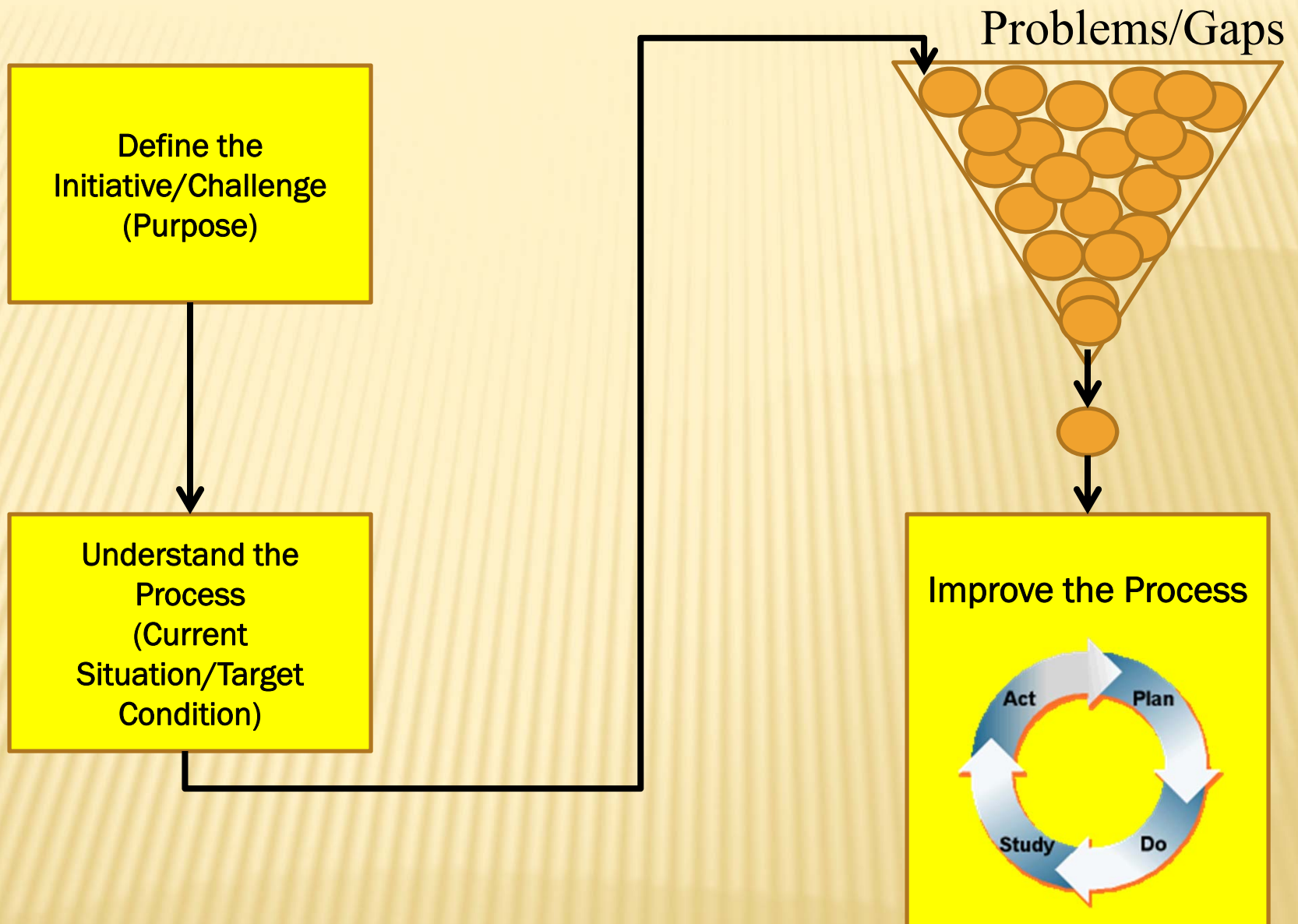
4. Standardize/stabilize what works, or begin the PDSA cycle again.

1. Define what you expect to do and to happen.  
This is a hypothesis or prediction.



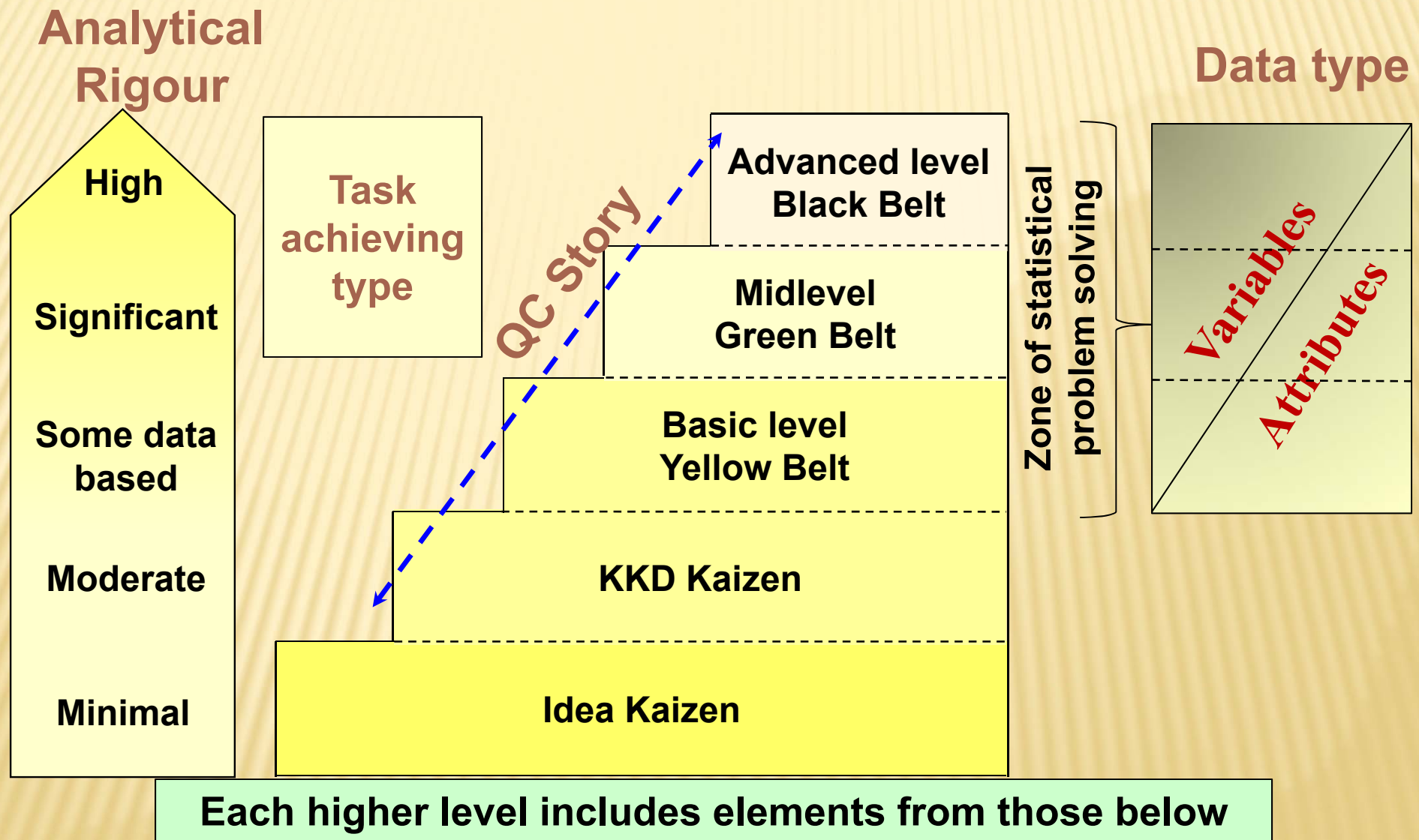
3. Compare Actual outcome with expected outcome (both impact and implementations)

2. Test the hypothesis.  
i.e. try to run the process according to the plan.  
Observe closely.



**Problem: A gap between current performance and standard.**

# Continuum of Problem Solving





# TOOLS AND TECHNIQUES

- ✖ 7 QC & 7 Management & Planning Tools
- ✖ Higher Level Analytical and Statistical tools
- ✖ Lean Tools & other tools you may develop

Remember – The tools are just tools....they help us analyze facts & data to form and test theories.

# PROBLEM SOLVING

1. Establish the Focus
  1. Clarify the Problem
2. Examine the Current Situation
  1. Breakdown the problem, Set Target
3. Analyze the Causes
  1. Root Cause Analysis
4. Act on the Causes
  1. Develop Countermeasures
  2. Implement Countermeasures
5. Study/Check the Results
  1. Evaluate Process and Results
6. Standardize the changes
  1. Standardize Processes
7. Draw Conclusions
  1. Reflect and learn

# 1. ESTABLISH THE FOCUS

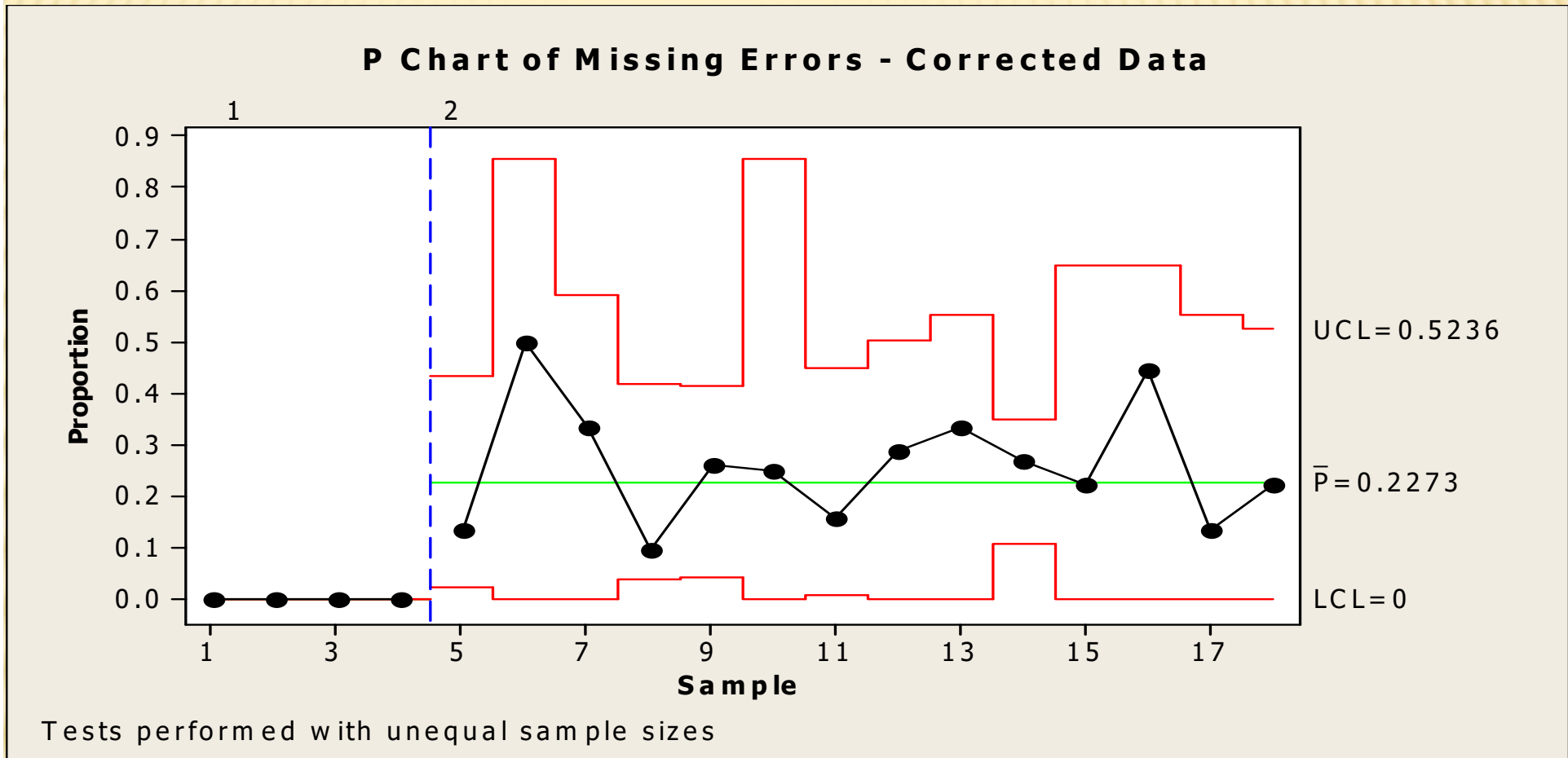
- ✘ Clearly define & verify the Problem
  - + Clarify the Problem, Define the Gap.
  - + Only look at results of problem, not causal theories
- ✘ Actions
  - + Charter
  - + Baseline process standards and data
  - + Establish the Objective
- ✘ Tools – Flow maps, 7 QC Tools, Lean Tools



# STEP 1 – ESTABLISH THE FOCUS

Important Steps	Key Points	Tools
<p>Describe the Problem</p> <ul style="list-style-type: none"> <li>• Clear problem statement.</li> </ul>	<ul style="list-style-type: none"> <li>• Charter team (if required)</li> <li>• Go see (Get to Gemba)</li> <li>• Deeply understand the current conditions</li> <li>• Develop clear problem statement (fact based).</li> </ul>	<ul style="list-style-type: none"> <li>• Flow charts</li> <li>• Data collection forms &amp; checksheets</li> </ul>
<p>Verify the problem with data/facts.</p>	<ul style="list-style-type: none"> <li>• Analyze data in the context of the stated problem.</li> <li>• Display data/facts visually</li> </ul>	<ul style="list-style-type: none"> <li>• Run charts, control charts, histograms, other graphical methods.</li> </ul>
<p>Define the improvement objective.</p> <p>Complete A3 &amp; Review with Champion/Coach</p>	<ul style="list-style-type: none"> <li>• Refine problem statement (if required).</li> <li>• Define improvement objective (Process/Problem, measure, direction, baseline/target, deadline.</li> </ul>	

**Problem:** 95% of line items reach Drafting Scheduling with at least 1 missing buyout. There are 12 Opportunities per line Item with each opportunity having a 23% probability of occurring.



**Objective** – Reduce the probability of a missing buyout from 22.7% to 2.7% by April 30, 2009.

# EXERCISE

- ✗ Select a Problem that you would like to work on through the remainder of this workshop.
- ✗ Examples:
  - + A work problem
  - + Golf Handicap
  - + Weight/Health
  - + Work Related Problem
    - ✗ Meeting Waste.
  - + Children Issue
  - + Others???

If you don't have data, for today's exercise, we will break every rule and estimate!! 😊



## 2. EXAMINE THE CURRENT SITUATION

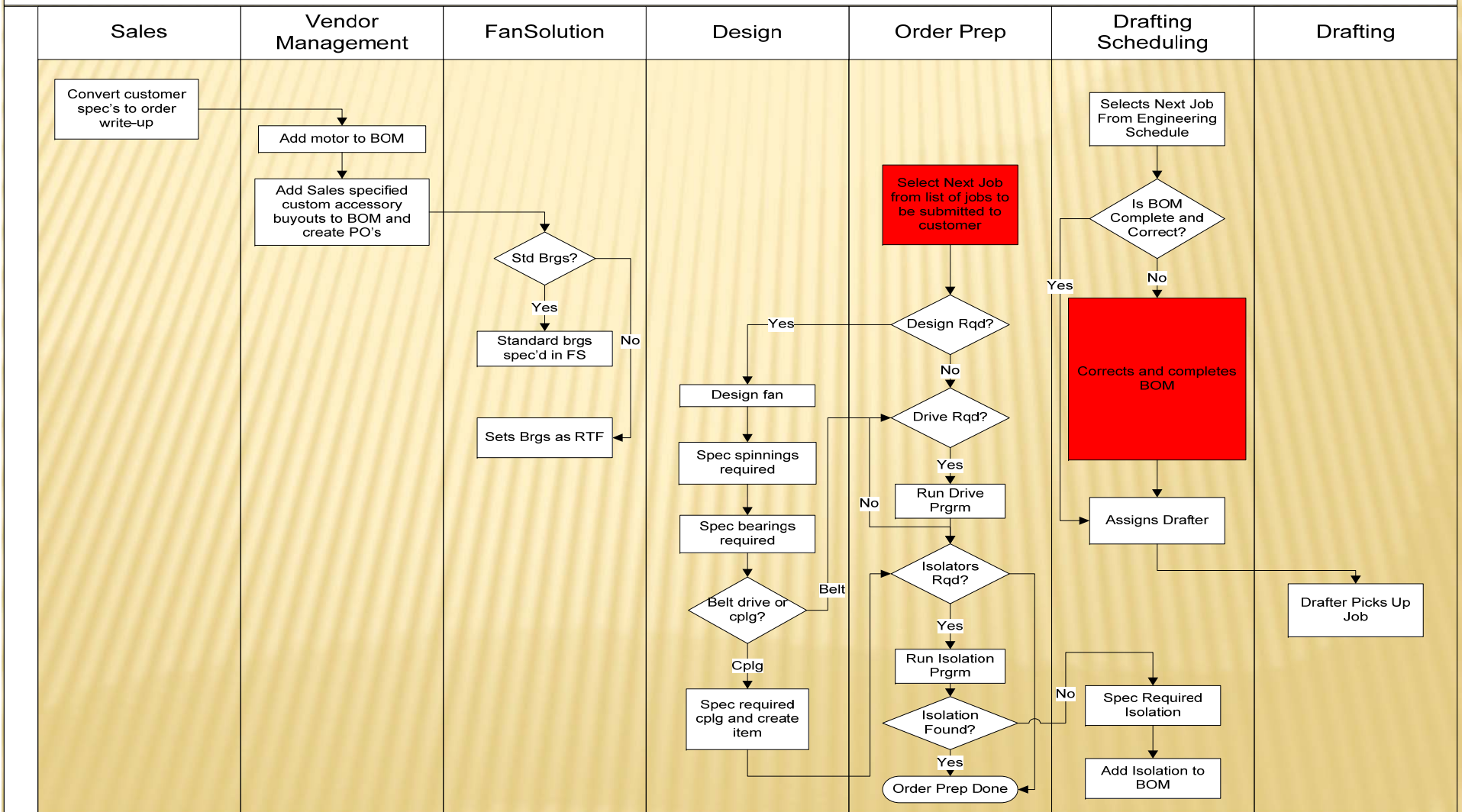
- ✖ Observe the problem from a wide range of perspectives.
  - + Investigate - What, where, when, who, symptoms
  - + Go See!! (Cannot do in office or remotely!!)
- ✖ Actions:
  - + Investigate to discover factors that impact problem (Be curious).  $Y = f(x)$
  - + Collect data, determine facts (Go See!!)
  - + Determine Focus point and set the target.
- ✖ Tools – Flow maps, 7 QC Tools, Lean Tools, Advanced Statistical tools (regression)

## STEP 2 – EXAMINE THE CURRENT SITUATION

Important Steps	Key Points	Tools
View the process flow in detail.	<ul style="list-style-type: none"> <li>What can we learn from the detailed process flow?</li> </ul>	<ul style="list-style-type: none"> <li>Appropriate Flow maps: Integrated map, spaghetti, etc.</li> </ul>
Describe the current situation with data.	<ul style="list-style-type: none"> <li>Check past data and collect fresh data. Examine the situation over time to see if changes have occurred.</li> <li>Stratify the data (place, person, machine, method, time, etc.). Identify potential variables (Xs).</li> <li>Narrow down the priorities (Focal Point or significant 'Xs').</li> </ul>	<ul style="list-style-type: none"> <li>What? Where? When? Who to/by?</li> <li>Data collection, run charts, control charts, histograms, pareto, scatter diagrams, regression analysis, etc.</li> <li>Risk Analysis – FMEA, matrix analysis</li> </ul>
Develop improvement strategies & improvement measures with targets.	<ul style="list-style-type: none"> <li>What? By how much? By when?</li> </ul>	<ul style="list-style-type: none"> <li>Pareto, Run chart, control chart, histogram, tree diagram, etc.</li> </ul>
Complete A3 – Review with Champion		

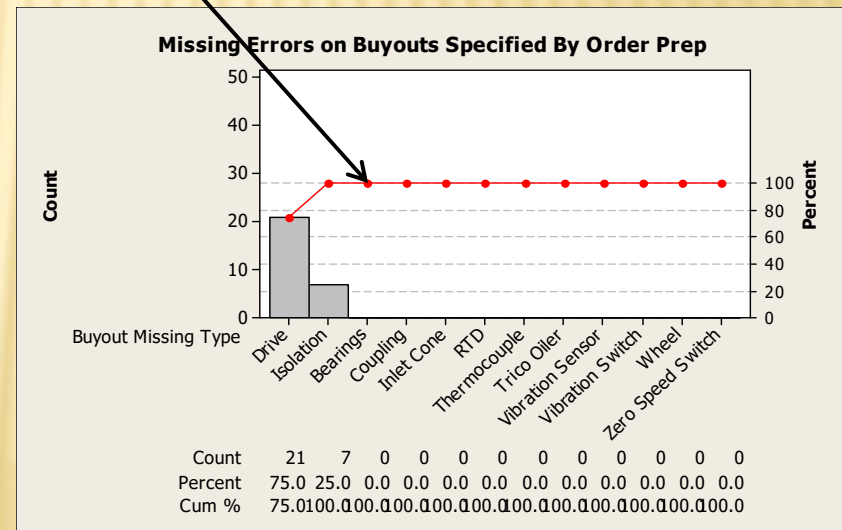
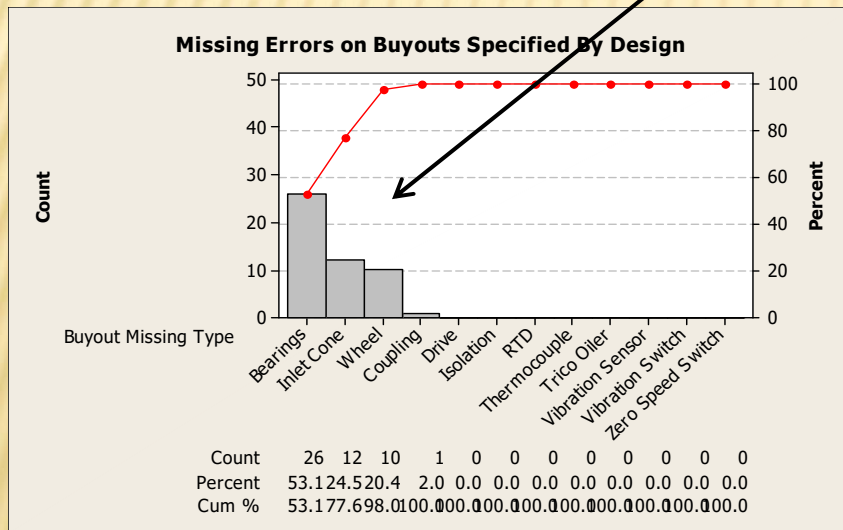
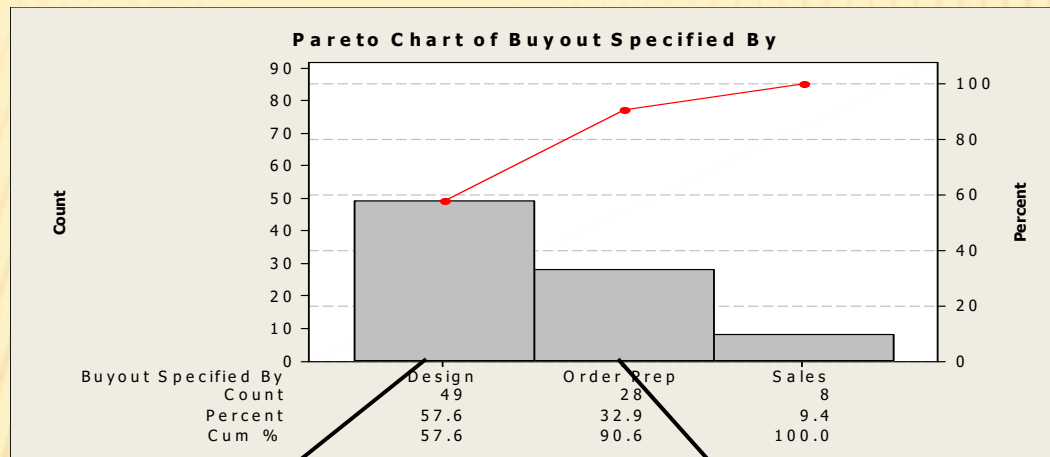
# INTEGRATED FLOW CHART (“AS IS”)

## Path from Sales to Drafting – Before Improvements





# XS FOR MISSING ITEMS (STRATIFICATION)



X1 – Design Engineering Specified Buyouts. X2 – Order Prep specified Buyouts.

# IMPROVEMENT STRATEGY SUMMARY WITH TARGETS.

## **PROJECT OBJECTIVE:**

10 fold reduction in defects

Defect Rate – 2.2%

**Current Situation**  
Defect Rate – 22.7%

100% elimination of defects (missing errors)  
on Design Specified Buyouts

Defect Rate – 9.6%

100% elimination of defects (missing errors)  
on Order Prep Specified Buyouts

Defect Rate – 2.1%

# 3. ANALYZE THE CAUSES

- ✘ Root Cause Analysis
  - + Develop a theory of Root Cause
- ✘ Actions:
  - + Develop a Hypothesis
  - + Test the Hypothesis
  - + Causes must be determined scientifically (Go See!)
    - ✘ Discussion, voting, arbitrary decisions are usually erroneous.
- ✘ Tools- 7 QC Tools, Advanced Stats, 5 Whys
- ✘ Remember - “Opinion without data is just opinion!” We need facts!!



# STEP 3 – ANALYZE THE CAUSES

Important Steps	Key Points	Tools
Develop a Root Cause hypothesis.	<ul style="list-style-type: none"> <li>Brainstorm potential causes.</li> <li>Prioritize the most likely root causes</li> <li>State the root cause hypothesis for each root cause. (Link root cause to problem.)</li> </ul>	<ul style="list-style-type: none"> <li>Cause &amp; effect diagram</li> <li>Nominal voting or multi voting.</li> </ul>
Test the Root Cause hypothesis.	<ul style="list-style-type: none"> <li>Confirm with data that there is a link between the Root Cause and the problem.</li> <li>Do not guess; identify the facts correctly. Look at past data, daily data, data obtained from experiments in the workplace.</li> <li>Summarize the results of the analysis.</li> </ul>	<ul style="list-style-type: none"> <li>Scatter diagrams, Design of experiments, hypothesis testing, etc.</li> <li>5 Why Analysis, Fault tree Analysis.</li> <li>Talk to performers.</li> <li>Apply the team's technical knowledge.</li> </ul>
Determine the root causes to address. <b>Complete A3 – Review with Champion/Coach</b>	<ul style="list-style-type: none"> <li>Decide on the root causes against which counter measures will be tested.</li> </ul>	<ul style="list-style-type: none"> <li>Matrix Analysis (sometimes addressing 1 root cause hits others)</li> </ul>

# ROOT CAUSE ANALYSIS

- ▶ X1 – Design Engineering Specified Buyouts - Roles and responsibilities not clearly understood and no clear work instruction exists for the BOM upload which results in missing items.
  - Test – The Design Engineer was asked about BOM uploads. His belief was that Manufacturing Engineering (next step in the process) was responsible.
  
- ▶ X2 – Unclear roles, responsibilities and priorities and no clear work instruction exists for the BOM upload which results in missed items. In addition, the inspection by the senior engineer mitigated the risk.
  - Test – The Order Prep person confirmed the understanding.

## 4. ACT ON THE CAUSES

- ✘ Take Action on countermeasures to eliminate the root cause.
- ✘ Actions:
  - + Develop options to eliminate the causes.
  - + Evaluate the countermeasure options.
  - + Predict the impact & Beware of side-effects.
  - + Select and gain commitment to the action
  - + Test the Countermeasures (What, Who, By When)
- ✘ Tools – Brainstorm, Matrix Analysis, Lean Tools



# STEP 4 – ACT ON THE CAUSES

Important Steps	Key Points	Tools
Develop Countermeasures	<ul style="list-style-type: none"> <li>• Develop countermeasure options.</li> <li>• Evaluate the options.</li> <li>• Select the most promising countermeasure option(s) to test.</li> </ul>	<ul style="list-style-type: none"> <li>• Brainstorm, 70 change concepts, etc.</li> <li>• Matrix analysis, Impact/Ease matrix, 5S, SOPs, SMED, Impact Wheel, etc.</li> </ul>
Implement/Test countermeasures  <b>Complete A3 – Review with Champion/Coach</b>	<ul style="list-style-type: none"> <li>• Plan a test including process detail, training &amp; a method of evaluation (Predicted impact &amp; execution).</li> <li>• Communicate/Gain commitment to the countermeasure and the test.</li> <li>• Execute the test (Who, What, Where, When, How &amp; Why)</li> </ul>	<ul style="list-style-type: none"> <li>• Basic Project Management tools and methods.</li> </ul>

# COUNTERMEASURES

1. Unclear Instructions, Responsibilities and Operational definitions for the handoff from Design and Order Prep to Manufacturing Engineering Drafting as they relate to uploading buyouts to fan BOM's.
  1. **ACTION REQUIRED:**
    1. Create work instructions that clearly define the responsibilities of Design and Order Prep personnel and that also operationally define complete, quality information as the output. Provide training to the personnel on the tools for uploading items to fan BOMs.
  2. **ACTION REQUIRED:**
    1. Automate the upload of pre-engineered buyouts to the fan BOM. Significant amount of work has been done to standardize these buyouts with minimal additional effort they can be setup to upload automatically to the fan BOM without any manual intervention.
  3. **ACTION REQUIRED:**
    1. All orders that are missing buyouts and that are passed on to the next step will be passed backed to the individual who missed adding the buyout in order for them to correct the mistake. No defective/incomplete work should be passed onto the next process step.

# COUNTERMEASURES CONT'D

2. Order Prep and Manufacturing Engineering Scheduling are determining priorities independently from different information sources therefore resulting in incomplete BOMs at the time required by Manufacturing Engineering.

## 1. ACTION REQUIRED

1. Implement a standard system to prioritize orders between Manufacturing Engineering and Order Prep.
2. Implement daily 5 minute priority coordination meetings between Order Prep and Manufacturing Engineering Scheduling.



## 5. CHECK/STUDY THE RESULTS

- ✖ Were the Actions/countermeasures effective?
- ✖ Actions:
  - + Study the results compared to the “before” data.
  - + Study the process “side-effects”.
  - + Were the results as predicted (unbiased!).
  - + Decision - Modify plan & retest or implement on large scale?
- ✖ Tools – 7 QC Tools, Kano 4 Box Model

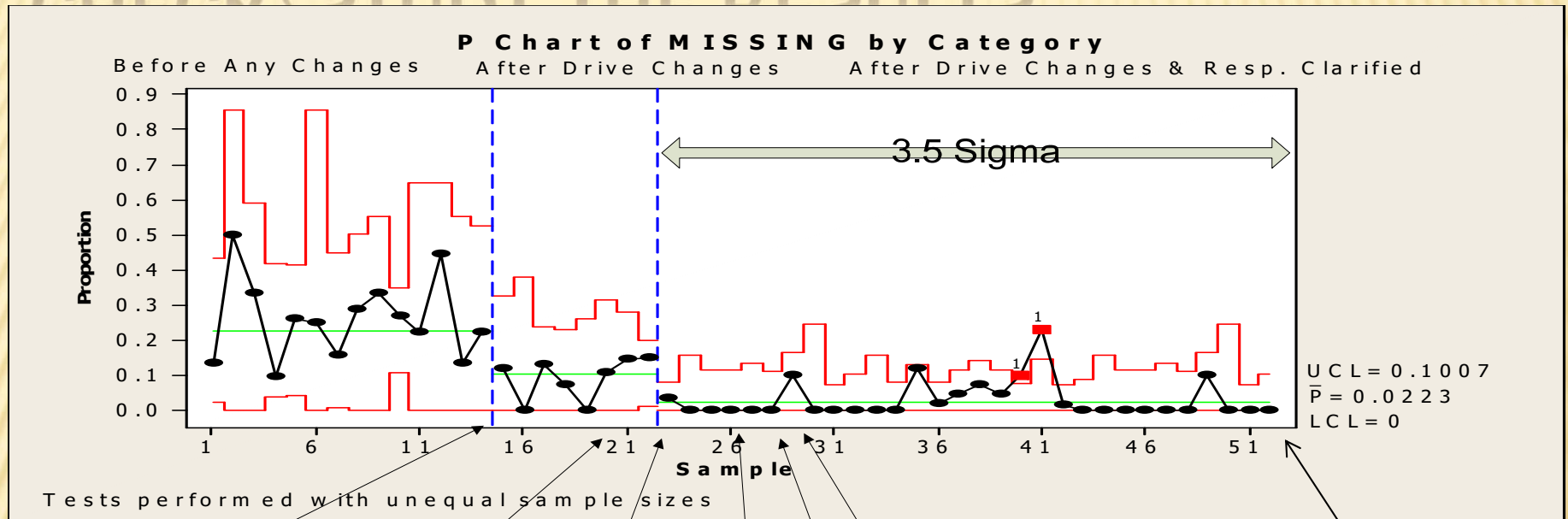
# STEP 5 – CHECK/STUDY THE RESULTS

Important Steps	Key Points	Tools
Study/Check the Results	<ul style="list-style-type: none"><li>• Study the test execution.</li><li>• Study the actual results as compared to the before data and the predicted results.</li><li>• Were there side effects/collateral issues?</li><li>• Are there changes required?</li></ul>	<ul style="list-style-type: none"><li>• Control charts, histograms, run charts, Pareto, other graphical tools.</li><li>• Kano 4 Box Model.</li></ul>
Implement countermeasure on “large” scale.  Complete A3 – Review with Champion/Coach	<ul style="list-style-type: none"><li>• Plan a large scale implementation including process detail, training &amp; a method of measuring/monitoring (Who, What, Where, When, How &amp; Why)</li><li>• Communicate/Gain Champion commitment to the implementation.</li></ul>	<ul style="list-style-type: none"><li>• Basic Project Management tools and methods.</li></ul>

# KANO - 4 BOX MODEL

		Implementation per plan	
		Yes	No
Result as Predicted	Yes	Target	Check Implementation & improve
	No	Check Improvement Theory	Check Implementation

# CHECK/STUDY THE RESULTS



**Dec 8, 2008** - Modified Drive program to automate upload to BOM

**Dec 17, 2008** - Modified Isolator program to automate upload to BOM

**Jan 1, 2009**

- Told Alex not to short circuit the process, He will tell Marlene when he needs an order completed
- Told design that they must add all custom wheel cones, inlet cones, and bearings to the BOM
- Told Alex to pass back any defects he finds to the source

**Jan 13, 2009** - Confirmed responsibilities with Alex and Marlene for all buyouts at "EDM" stage

**Jan 14, 2009** - Created manual buyout (used to be EDM) stage in Hawthorne to allow Alex and Marlene to effectively schedule work.

**Jan 21, 2009** - Deployed the manual buyout changes and instructed Alex and Marlene on its use. They agreed to start using it for scheduling.

**May 1, 2009**



## 6. STANDARDIZE/CONTROL

- ✖ Eliminate the Root Cause Permanently (Entropy!!)
- ✖ Actions:
  - + Standardize the improved process (5 W's and an H)
  - + Education and Training (TWI)
  - + Ownership
  - + Monitoring Measures, Audits
  - + Self-Discipline
  - + Develop and implement a control plan
- ✖ Tools
  - + 7 QC Tools, Lean Tools

# STEP 6 – STANDARDIZE THE PROCESS

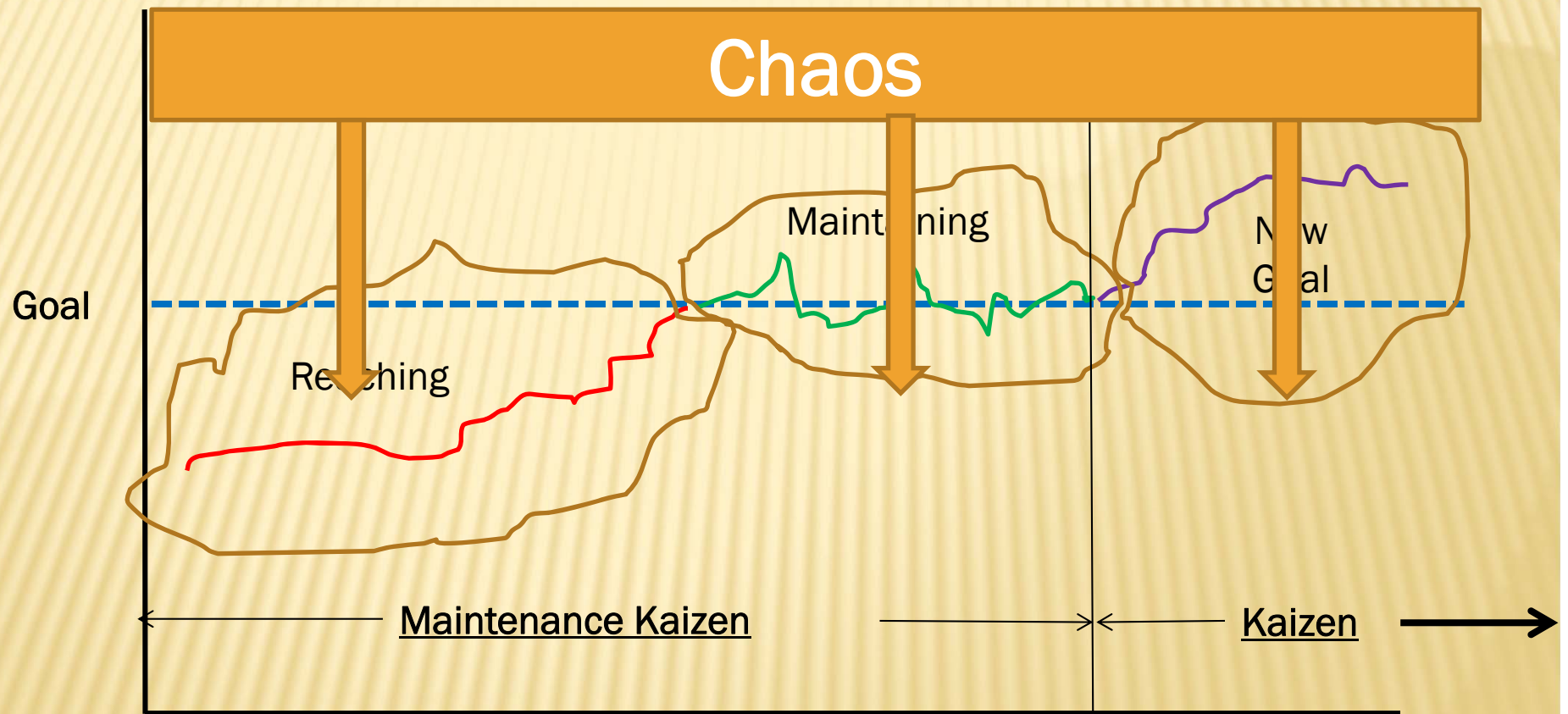
Important Steps	Key Points	Tools
Standardize the Improved Process.	<ul style="list-style-type: none"><li>• Develop/modify standards for the improved process.</li><li>• Educate and train all affected.</li><li>• Assign ownership.</li><li>• Determine monitoring metrics and measurement system.</li></ul>	<ul style="list-style-type: none"><li>• 5 Ws and an H</li><li>• SOPs/Training Within Industry (TWI)</li></ul>
Develop and Implement a process Control Plan.  Complete A3 – Review with Champion/Coach	<ul style="list-style-type: none"><li>• Define and implement the control plan including ownership, monitoring metrics, standards &amp; standard review, process review, etc. See Kano questions.</li></ul>	<ul style="list-style-type: none"><li>• Run charts, control charts, Statistical Process Control (SPC).</li><li>• Integrated Daily Management Systems</li></ul>

# KANO QUESTIONS FOR DAILY MANAGEMENT

- P1. What is the mission, role or objective of the job of your group?
- P2. What are your indicators (KPIs) to evaluate the status of P1?
- P3. Have you prepared standards for the job?
- P4. Do you have a system to check the status?
- D1. Are you doing the job as specified standards in P3.
- D2. Are you monitoring the job in the appropriate frequency using the control points?
- C1. Have you evaluated the current status of the job by the data compared to specifications?
- C2. Could you find abnormalities in appropriate frequencies?
- A1. Have you taken immediate action on non-conformities?
- A2. Have you taken timely corrective and preventative action? Have you revised standards, control points and control levels as appropriate?

Has the KPI status improved over the long term?

# STAGES OF PROBLEM SOLVING

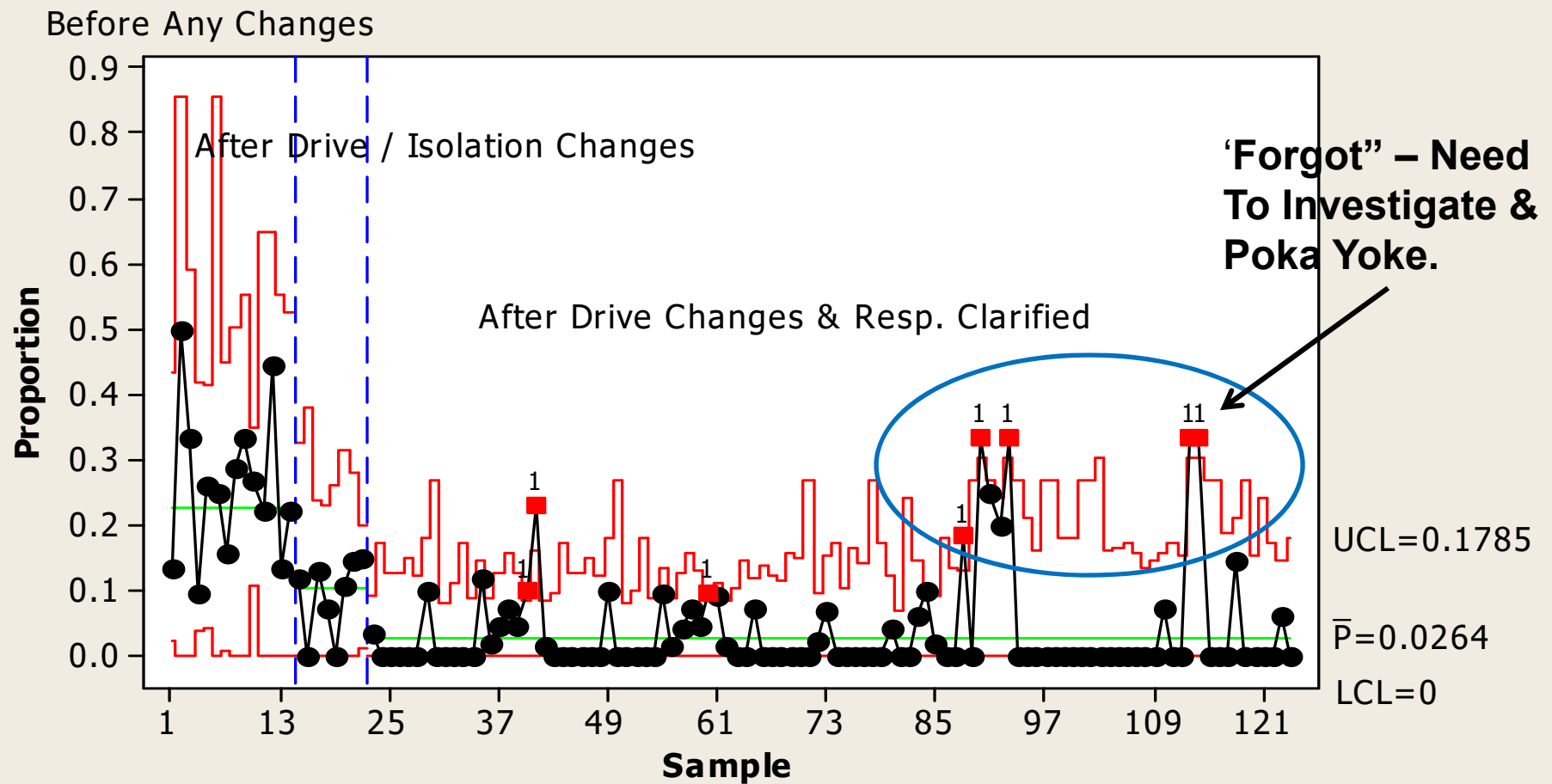


Source - Toyota Culture



# STANDARDIZE/MONITOR

**P Chart of MISSING Errors**



Tests performed with unequal sample sizes

## 7. DRAW CONCLUSIONS

- ✖ Review the Problem Solving Process, plan future work.
- ✖ Actions:
  - + Plan future problem solving
  - + Reflect...What went well? What could be improved?
  - + Share (Yoketan)
- ✖ Tools – Deep thought – Aim for perfection!

# STEP 7 – DRAW CONCLUSIONS

Important Steps	Key Points	Tools
Plan Future Problem Solving	<ul style="list-style-type: none"> <li>Determine next steps and strategy to address.</li> </ul>	<ul style="list-style-type: none"> <li>Matrix Analysis, Ease/Impact Analysis</li> </ul>
Share/spread improvement	<ul style="list-style-type: none"> <li>Communicate &amp; spread the improvement: benefits, challenges, lessons learned.</li> </ul>	<ul style="list-style-type: none"> <li>A3 Summary Story</li> </ul>
<p>Hansei – Reflect/learn</p> <p>Complete A3 – Review with Champion/Coach</p>	<ul style="list-style-type: none"> <li>Reflect on problem solving process.....how could you improve next time?</li> </ul>	<ul style="list-style-type: none"> <li>Deep, open thought.</li> </ul>

# A3 Problem Solving

Title: \_\_\_\_\_

Date: \_\_\_\_\_ By: \_\_\_\_\_ Approval: \_\_\_\_\_

**Background:**

**(4 a) Develop Solutions / Countermeasures:**

**(4 b) Implement Countermeasures:**

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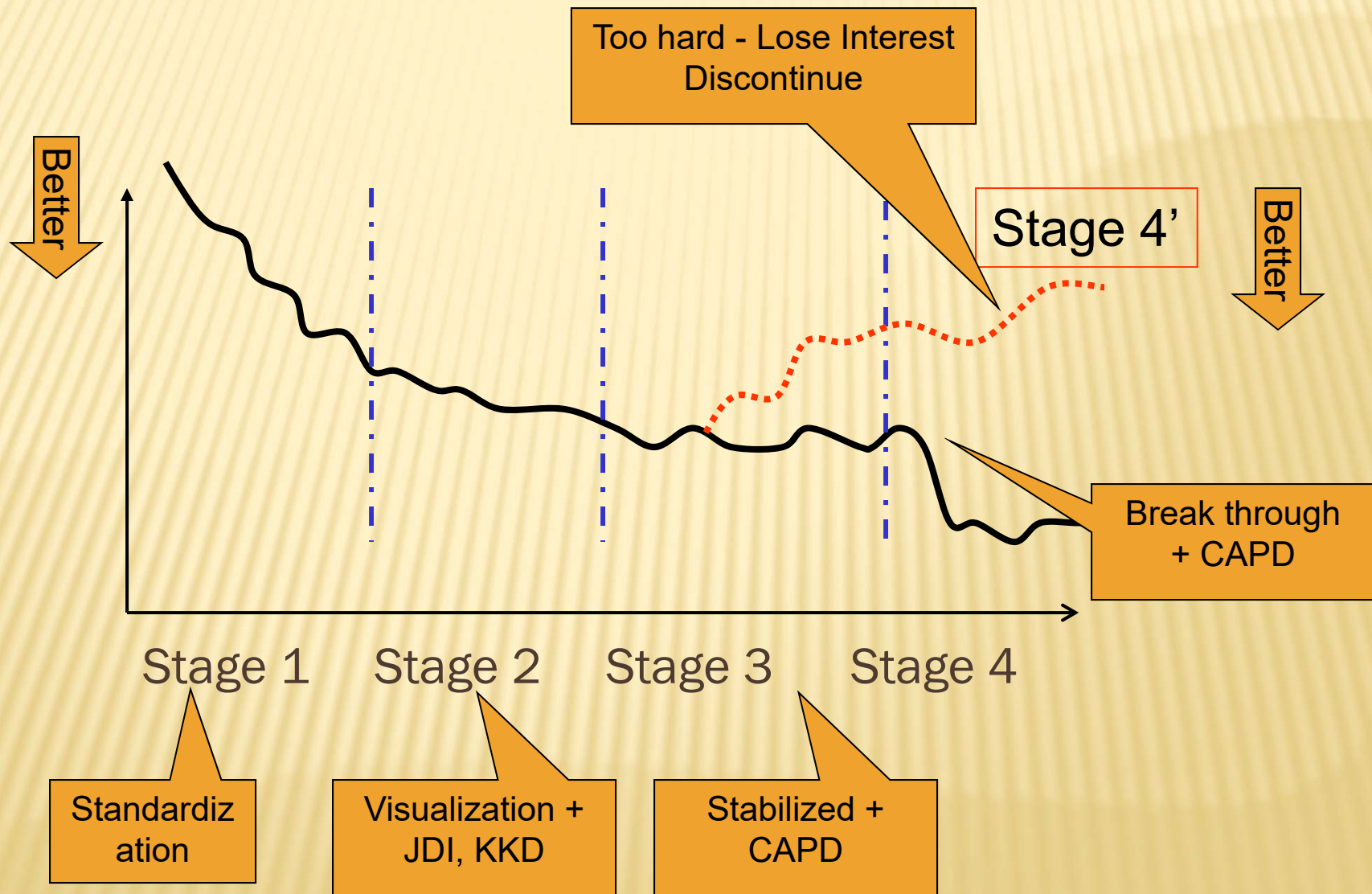
**(1) Clarify the Problem:**

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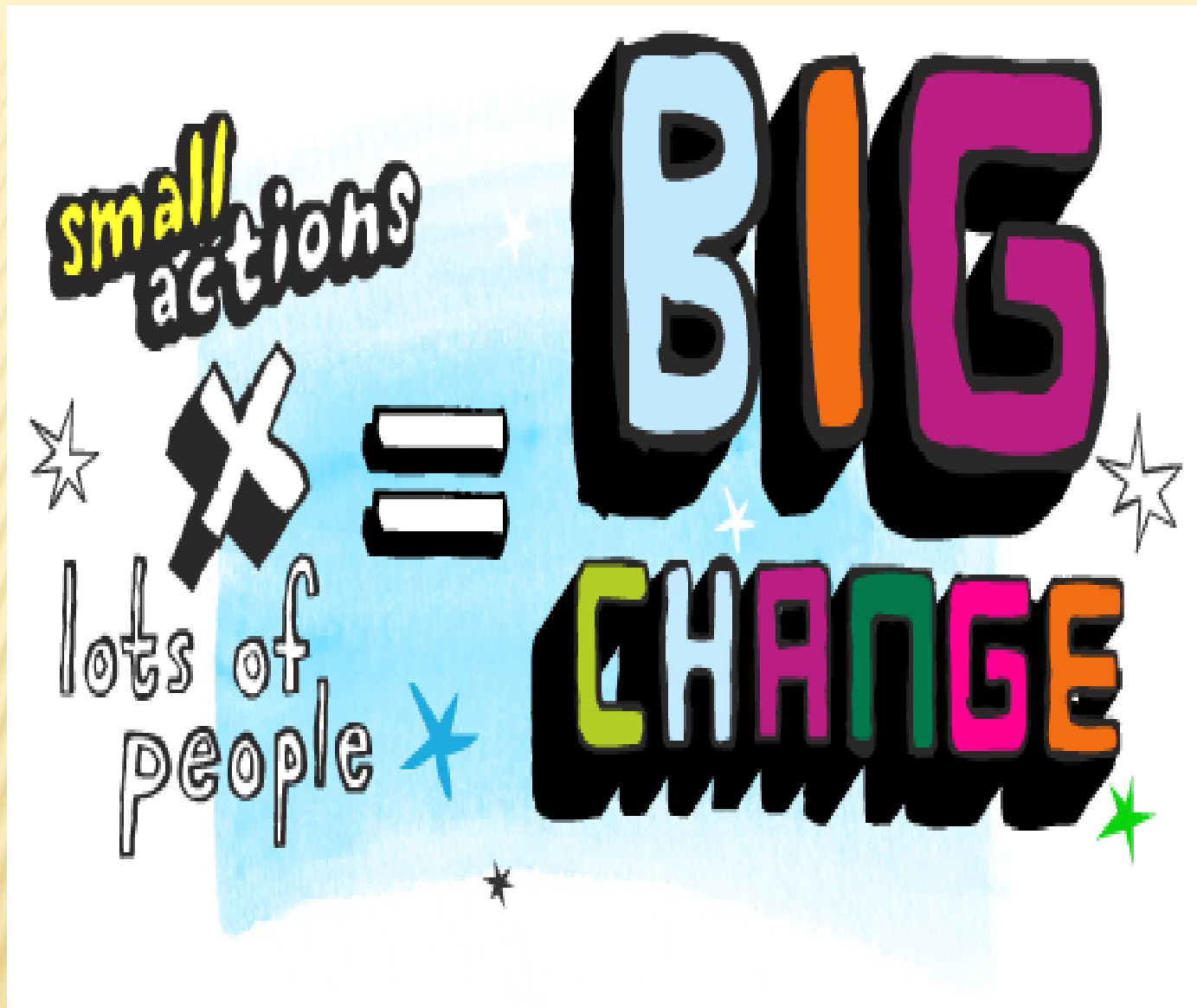
**(3) Root Cause Analysis:**



# STAGES OF DAILY MANAGEMENT PROMOTION



Source - Yuki Ando - Daily Management



Success is a million small changes and a few big ones!

# DEPLOYMENT

- ✖ Recognize that P.S. is an organizational core competence.
  - + Leaders Self Develop their P.S. competency.
  - + Leaders challenge, coach and develop others.
- ✖ A3 is a problem solving summary/storytelling tool.
  - + Equally important, A3 Problem Solving is a platform for coaching and personal development at all levels.

# STRUCTURED A3 PROBLEM SOLVING

What have you learned this morning that you can apply tomorrow morning?

**Table Discussion**



# FALL 2018 PUBLIC CERTIFICATION COURSES

## × LSS Yellow Belt

+ 3.5 days

× October 9 (1/2 day), October 31, November 20,  
December 6

## × LSS Green Belt

+ 6.5 Days

× September 26 (1/2 day), October 10, October 23,  
November 6 & 7, November 28, December 12

# QUESTIONS???

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Process Management

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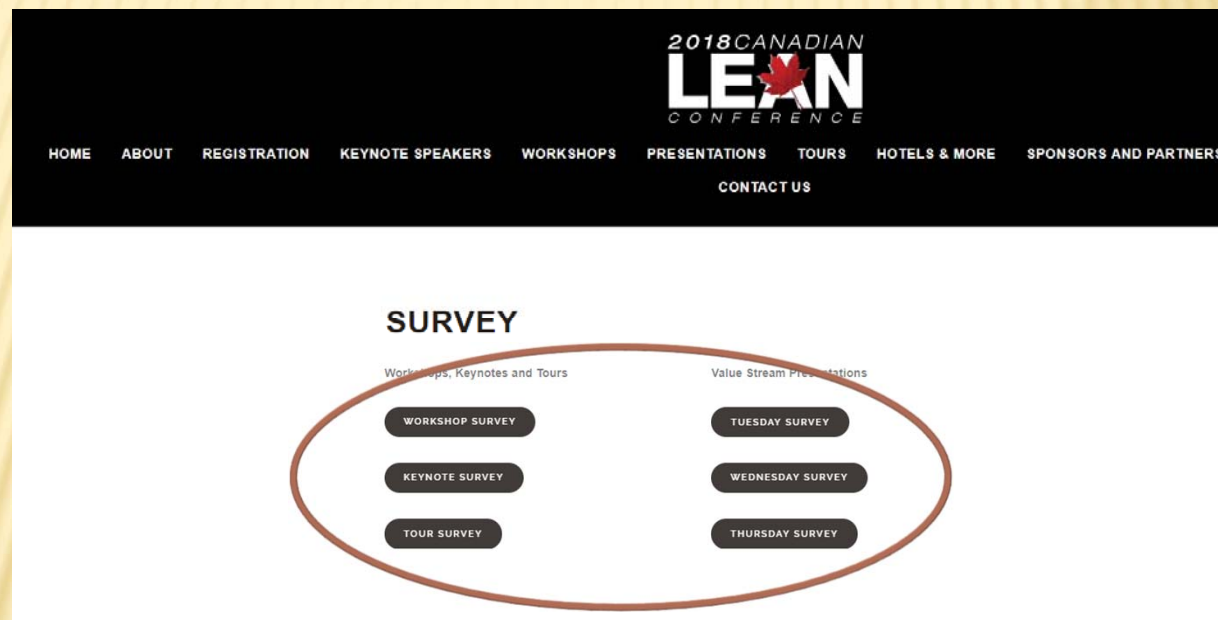
[Vern.campbell@verncampbell.com](mailto:Vern.campbell@verncampbell.com)

STEP 1: Scan the QR CODE using an app (QR READER)



Or **visit** [embracingexcellence.ca/survey](https://embracingexcellence.ca/survey)

## STEP 2: Choose the type of Survey





## STEP 3: Choose from the dropdown menu

Value Stream Presentations -  
Thursday Survey

\*Required

Select the presentation you attended. Choose from the dropdown list: \*

Choose

Assiniboine Credit Union - Banking On Lean

Westjet - The Secrets of Westjet's Success

Systems Control - Lean Management Systems Driving Performance

The Property Registry - Our Journey from Paper to Electronic

Intermountain Healthcare - Creating a Culture of Continuous Improvement

Zingerman's Mail Order - Zingerman's Lean Journey: From Kanban to Kata

Duha Group - Dynamic Value Stream Transformation

Superior Cabinets - The Value of Lean

# STEP 4: Answer the five questions and click **Submit**

**Thursday Survey**

\*Required

Select the presentation you attended. Choose from the drop down list. \*

Choose v

Question 1: How well did the speaker(s) cover the material in the time allotted? \*

1 2 3 4 5

Very Poor ☐ ☐ ☐ ☐ ☐ Very Good

Question 2: How well did the speaker(s) demonstrate a good command of the topic? \*

1 2 3 4 5

Very Poor ☐ ☐ ☐ ☐ ☐ Very Good

Question 3: How well did the speaker(s) engage the audience with examples? \*

1 2 3 4 5

Very Poor ☐ ☐ ☐ ☐ ☐ Very Good

Question 4: How well did the speaker(s) cover the 'HOW' in addition to the 'WHAT'? \*

1 2 3 4 5

Very Poor ☐ ☐ ☐ ☐ ☐ Very Good

Question 5: How would you rate this session overall? \*

1 2 3 4 5

Very Poor ☐ ☐ ☐ ☐ ☐ Very Good

**SUBMIT**

**THANK  
YOU!**