



LEAN
SOLUTIONS
ACADEMY

A group of five professionals (three men and two women) in business attire are gathered around a table, smiling and looking at a laptop screen. The image is overlaid with a large blue diagonal graphic that contains the text.

Lean & Six Sigma Training Green Belt Certification

brought to you by:



**PATRICK
ADAMS**
CONSULTING

Meet Your Instructor



- Background
- Lean Solutions "Train-The-Trainer" Course
- Internationally Certified Trainer



CLASS SCHEDULE

Day 1

- Yellow Belt Class Refresh
- Structured Problem Solving
- DEFINE
 - Introduction to DMAIC
 - Project Charter
 - SIPOC
 - Gantt Charts
- MEASURE
 - Quality Tools
 - Time Study
 - Process Mapping

Day 2

- Green Belt Project Review
- MEASURE (continued)
 - Value Stream Map
- ANALYZE
 - Pareto
 - Fishbone Diagram
 - 5 Whys
- IMPROVE
 - Impact/Effort Matrix (Affinity Diagram)
 - FMEA
 - Trial

Day 3

- Green Belt Project Review
- CONTROL
 - Control Plan
 - Layered Audits
- Facilitating a Kaizen Event
- Change Management

Yellow Belt

- The Fundamentals of Lean Six Sigma
- History / Process / Cause & Effect
- Principles of Lean / Six Sigma
- Process Mapping / DMAIC
- PDCA / Kaizen & Kaizen Events
- Kano Analysis
- Voice of Customer, & Business
- Defining a Process / CTQ
- The 8 Elements of Waste / Belt Roles
- 5S / Lean Tools / Visual Management / SMED
- Kanban / Poka-Yoke / Standardized Work
- Lean & Six Sigma Belt Roles
- Total Productive Maintenance
- Value Add & Non Value Add Work

Lean Green Belt

- Project Management
- Project Charter
- SIPOC
- 7-Quality Tools / Pareto Analysis
- Control Charts
- Control Plans
- Gantt Chart
- Structured Problem Solving
- Fishbone Diagrams / Graphical Analysis
- Lean Metrics & Projects
- FMEA
- Facilitating a Kaizen Event
- Strategy Execution
- Hoshin Kanri
- Change Management

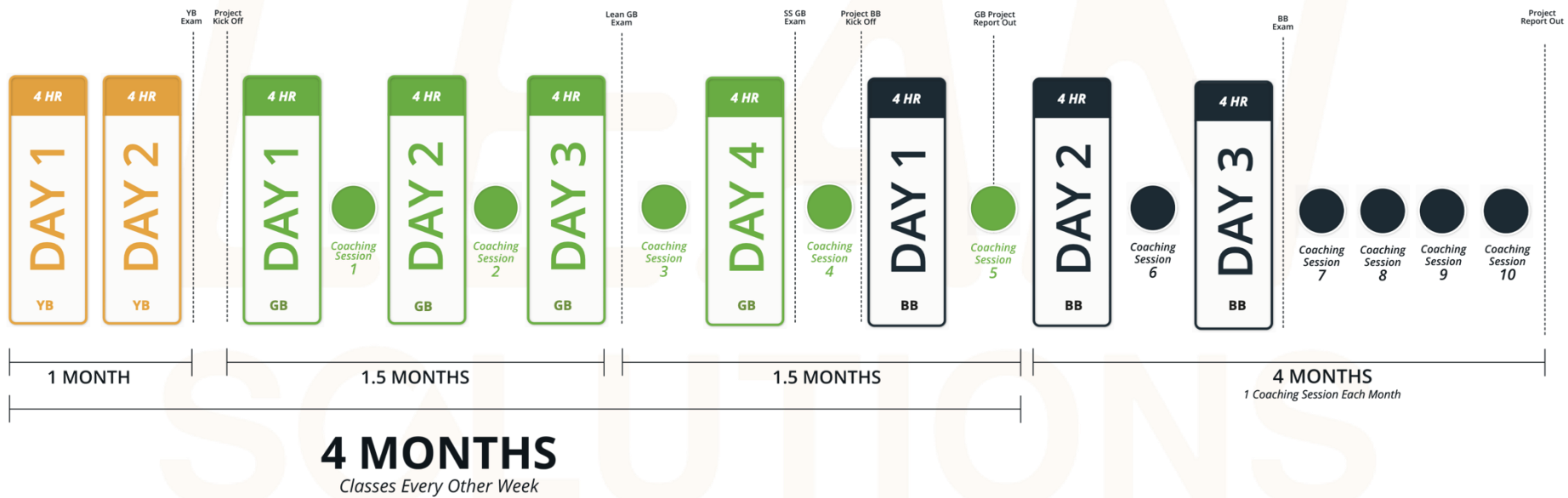
Six Sigma Green Belt

- Six Sigma Statistics
- Measurement Systems Analysis
- Process Capability
- Correlation and Regression
- Introduction to DOE
- Hypothesis Testing

BODY OF KNOWLEDGE

Black Belt

- Mann-Whitney / Kruskal-Wallis
- Friedman Mood's Median / Simple Linear Regression
- 1 Sample Sign / 1 Sample Wilcoxon
- One and Two Sample Proportion
- Chi-Squared (Contingency Tables)
- Correlation / Regression Equations
- Regression Equations / Residuals Analysis
- Non- Linear Regression
- Multiple Linear Regression
- Confidence & Prediction Intervals
- Designed Experiments / OFAT
- Experiment Objectives
- Experimental Methods
- Experiment Design Considerations
- Linear & Quadratic Mathematical Models
- Orthogonal Designs
- Full Factorial Experiments & Designs
- Fit, Diagnose Model and Center Points
- Taguchi Designs Control Phase
- Statistical Process Control (SPC)
- Data Collection for SPC / I-MR Chart
- Xbar-R Chart / U Chart / P Chart
- NP Chart / X-S chart
- CumSum Chart / EWMA Chart
- Binomial Distribution and Calculations
- Poisson Distribution and Calculations
- Design for Six Sigma (DFSS) / Hoshin Kanri
- Cost Benefit Analysis / ROI, Payback Period



Homework

- ☐ Homework – Due before Day 2
- ☐ Homework – Due Before Day 3
- ☐ Homework – Due before Day 4
- ☐ Homework – Due before Day 5
- ☐ Homework – Review
- ☐ ILSSI Green Belt Exam Information

HOMework

As a Green Belt student, you are expected to review and complete the homework for each lesson.

Homework items include information specific to the classroom instruction as well as your project work.

The assignments can be accessed on the student dashboard.



GREEN BELT CERTIFICATION EXAM

- Lifetime certification
- Done online on your student dashboard after training is finished
- Open Book
- 100 Multiple Choice Questions
- Pass mark is 70%
- Result issued immediately
- Retake is available

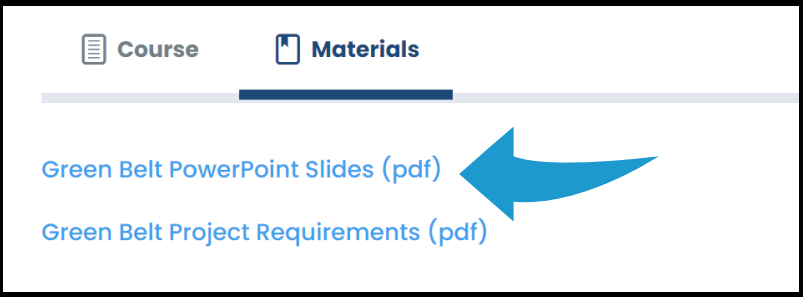
GREEN BELT CERTIFICATION EXAM

Find information on how to access the exam on the student dashboard



 Green Belt Exam Review

Download the class PowerPoint slides (as a searchable pdf) to help while studying for and taking the exam



 Course

 Materials

[Green Belt PowerPoint Slides \(pdf\)](#)

[Green Belt Project Requirements \(pdf\)](#)



Yellow Belt Review



YB Review:



1. What was the name of the first company to use the name 'SIX SIGMA' to describe its Quality Management System?
 - **MOTOROLA**
2. What is the First Principle of Lean production ? What is the most important thing that a Lean process must produce?
 - **VALUE** (for the customer of the process)
3. Which Japanese company is considered as being the first to use true 'Lean Production "effectively and successfully"?'
 - **TOYOTA**
4. A basic principle of Six Sigma is to always find the true original source of a defect or problem. This is called _____?
 - **ROOT CAUSE ANALYSIS**
5. A "Six Sigma Process" is often described one that produces no more than 3.4 DPMO What does DPMO stand for?
 - **DEFECTS PER MILLION OPPORTUNITES FOR DEFECTS**

YB Review:



1. What is the role of a Yellow Belt on a Lean Six Sigma project?
 - **A YELLOW BELT IS A TEAM MEMBER WHO ASSISTS A GREEN OR BLACK BELT, USING THEIR KNOWLEDGE OF THE PROCESS THAT THEY CURRENTLY ARE WORKING WITHIN.**
2. What is the role of a Green Belt in an organisation ?
 - **A GREEN BELT IS A PROJECT TEAM LEADER FOR SMALL AND MEDIUM SIZED PROCESS IMPROVEMENT PROJECTS.**
3. What is the role of a Black Belt in an organisation ?
 - **A BLACK BELT IS A PROJECT TEAM LEADER FOR LARGE PROBLEM SOLVING / IMPROVEMENT PROJECTS or OVERSEES THE WORK OF GREEN BELTS FOR MULTIPLE PROJECTS. A BLACK BELT IS A FULL TIME PROBLEM SOLVER FOR THE ORGANISATION.**

YB Review:



1. All work shall be highly specified as to content, sequence, timing and _____.
 - **OUTCOME**
2. True or False? Standard work provides a routine for consistency of an operation.
 - **TRUE**
3. True or False? Standard work helps to hide problems.
 - **FALSE**
4. Discussion: Why is it so important to audit standard work?

YB Review:



1. Which of the traditional 8-Wastes of 'DOWNTIME' is concerned with reducing the complexity of processes and taking out unnecessary steps or activities ?
 - **NON-ESSENTIAL PROCESSING / OVER PROCESSING**
2. What is the name of the Waste of producing more than the customer demand can absorb ?
 - **OVER-PRODUCTION**
3. What is Waste called when an activity or step in process needs to be repeated because it was not done 'Right-First-Time' ?
 - **REWORK / DEFECTS**
4. What Waste results in Queues or Backlogs of materials or work ?
 - **WAITING (DUE TO A BOTTLE-NECK IN THE PROCESS)**
5. What is the Japanese word for 'Waste' ?
 - **MUDA**

YB Review:



1. Which stage of the 5S method is used to ensure that the workers have the good habits and discipline to continue the other 4S tasks?
 - **SUSTAIN**
2. In 5S the action of removing unnecessary tools, equipment and materials from the workspace is called _____.
 - **SORT**
3. Cleaning the workplace of dirt, dust and litter is called what in 5S ?
 - **SHINE**
4. Give one example of a 5S method used for **SET IN ORDER / STRAIGHTEN**
 - **SHADOW BOARDS**
 - **RACKS**
 - **COLORED LABELS**
 - **FLOOR MARKING etc**

YB Review:



1. What Tool is used to understand what is Critical to Quality (CTQ) by Forming 3 categories: *threshold*, *performance*, and *excitement*?
 - **KANO ANALYSIS**
2. Splitting Customers into groups according to different needs or behaviours is called _____.
 - **SEGMENTING**
3. CTQs are also sometimes called CTCs or CTSs. What does CTS stand for?
 - **CRITICAL TO SATISFACTION**
4. Give one example of a method used to understand the **Voice of the Customer**?
 - **SURVEYS**
 - **FEEDBACK**
 - **FOCUS GROUPS**
 - **REPEAT SALE METRICS, etc**

YB Review:



1. What does kaizen stand for?
 - **SMALL CHANGE FOR THE BETTER / CONTINUOUS IMPROVEMENT**
2. What are the three criteria of kaizen?
 - **DOES THE IDEA REDUCE WASTE, IMPROVE QUALITY, AND/OR INCREASE SAFETY?**
 - **DOES THE IDEA ADDRESS THE ROOT CAUSE?**
 - **IS IT STANDARDIZED?**
3. What are the different types of Gemba walks?
 - **SAFETY, 5S, WASTE, VALUE STREAM WALK**

YB Review:



1. What is a 'Gemba Walk' ?
 - **GOING TO SEE FOR YOURSELF WHAT IS HAPPENING WHERE THE REAL WORK IS DONE**
2. What is the benefit of having a Visual Work Place ?
 - **ALL TEAM MEMBERS CAN SEE THE STATUS OF WORK AND OPERATIONS EASILY AND AT THE SAME TIME.**
3. Give one example of a Visual Management tool or technique ?
 - **COLOR CODING, NOTICE BOARDS, GRAPHS AND CHARTS, GOOD LABELLING**
4. What are the key components to a good SOP (Standard Operating Procedure)?
 - **WHAT**
 - **HOW**
 - **WHY**
 - **USE A PICTURE OR VIDEO**
5. A fundamental concept of any Lean Process is that it has well defined and repeatable actions by workers. This concept is call _____work
 - **STANDARDIZED**

Project Selection

What makes a good Green Belt Project?

- Choose a problem in your work environment that is aligned with current business issues; this can be a project you have already been assigned or one you create in response to a problem you are currently dealing with.
- The solution to the problem is not evident. You do not know how to solve the problem.
- It should be possible to complete the project within 3-6 months.
- The process needs to cycle often; you will need to observe the process happening frequently within the next few months.



PROJECT CHECK-IN'S

- What is your Problem Statement?
- Give some background on your Project
- What are your goals?

- Do you foresee any roadblocks?
- Do you need help with anything?
- What are your next steps?



STRUCTURED PROBLEM SOLVING

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Scientific Method (1620)	DMAIC (1986)	PDCA (1939)	8D (1987)
Define Problem	<u>Define</u>	<u>P</u> lan	1. Establish the Team
Formulate Hypothesis	<u>M</u> easure		2. Describe the Problem
Gather Appropriate Data	<u>A</u> nalyze		3. Develop Interim Containment Actions (ICA)
Test Data			4. Define/Verify Root Causes
Develop Conclusions	<u>I</u> mprove	<u>D</u> o	5. Choose/Verify Permanent Corrective Action (PCA)
	<u>C</u> ontrol	<u>C</u> heck	6. Implement/Validate PCA
		<u>A</u> ct	7. Implement/Validate Preventive Action
			8. Recognize the Team

Source: KAVON International, Inc.
and JMP Consulting

Figure 1: *Roadmap Comparisons to the Scientific Method*



INTRODUCTION

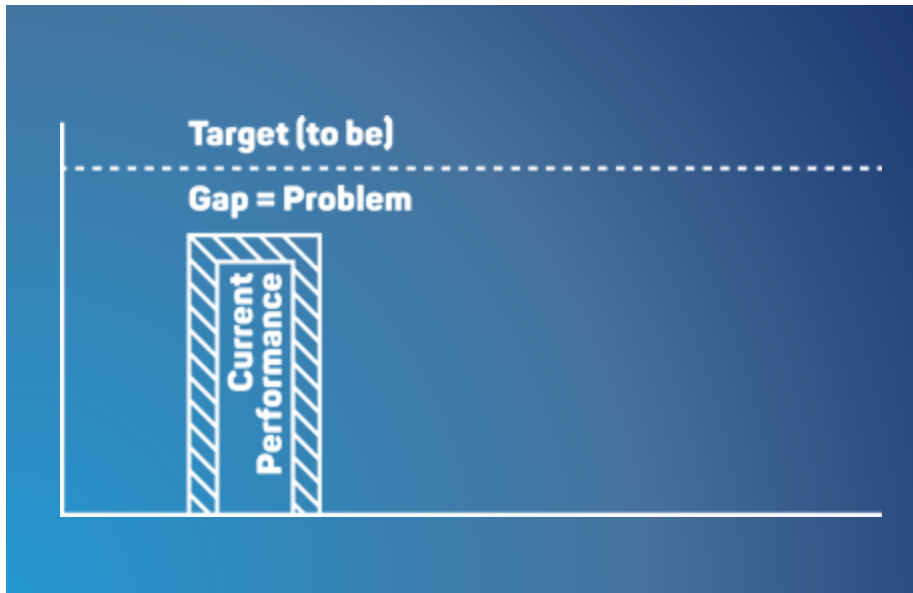
- What types of problem solving are in use throughout your Organization?
- How effective is the problem solving in your facility at determining the TRUE root cause?



WHY

BASIC PROBLEM SOLVING?

It's a general rule of life that we will try anything easy that doesn't work before we will embrace anything harder that does.



WHAT IS A PROBLEM?

A problem is a “gap” - between:

Current condition – **what is actually happening**
Target or ideal condition – **what should be happening, what is needed**

WE NEED

STRUCTURED PROBLEM SOLVING

Unstructured Problem Solving

Time consuming



Drags out



May solve a problem,
but not the root cause



May need to be repeated
over and over



Structured Problem Solving

Saves time

Has an end goal in mind

Identifies the actual cause of the
problem, not just the symptom

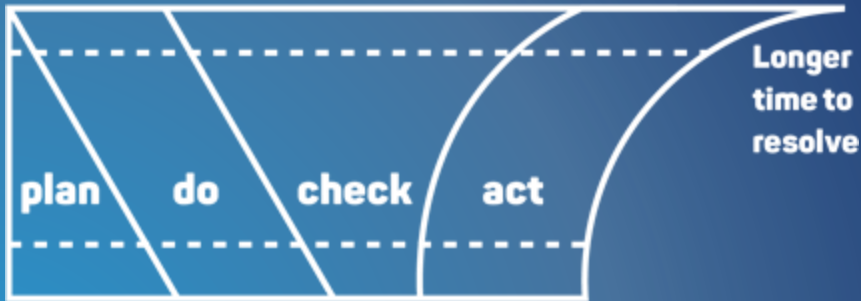
Fixes the problem for good

WHO SHOULD BE INVOLVED IN SOLVING PROBLEMS?

-  Members (40-400)
-  Leads (3-9)
-  Middle Management (2-4)
-  Upper Management (1-2)



Typical quick planning



**Longer
time to
resolve**

Slow, thorough planning

PRACTICAL

PROBLEM SOLVING



DMAIC

The Six Sigma Framework for
Problem Solving





Define - The business problem (or opportunity), Team and Scope

Measure - The process current state (as-is) of the problem area

Analyze - Determine Root Cause of the problem

Improve - Identify and Choose Best Solution then implement the solution

Control - Ensure your solution is working. Monitor and Control.

DMAIC Project Checklist		
Steps	Tools	X
DEFINE		
1	Which pain point(s) resulted in project identification	Problem Statement (Charter)
2	Define Customer/Supplier & Customer Relationship	SIPOC
3	Voice of Customer gathered	Surveys & Interviews
4	Specific requirements identified	Kano Analysis, Benchmarking
5	Identify core business process to improve	SIPOC, Process Map or VSM, Pareto
6	Complete charter with sponsor	Charter
7	Financial Discussion with Sponsor	ROI Worksheet
8	Project Plan	Gantt Chart
MEASURE		
9	Define Current State	Gemba walk, Process Map
10	Data Collection Plan	Pull reports, Time Studies, SMED
11	Documentation	Standard Work, SOPs
12	Now that we have data, does project continue?	DMAIC Management
ANALYZE		
13	Process Time, Lead Time and Takt Time calculated	Lead Time, Process Time, Takt Time
14	Calculate steps, rework, hand-offs, Delays/waits, backlog, productivity	
15	"Value" Identification	Downtime, Brainstorming
16	Identifying problem areas of the process to focus on	FMEA, Check Sheet, Control Chart, Spaghetti Diagram, Fishbone, 5-Whys, Pareto, Brainstorming, Multi-Vote
17	List of items out of scope but that need to be addressed	Parking Lot
18	Document Update	Update A3
IMPROVE		
19	Identify potential solutions	Brainstorm, SIPOC, Fishbone, Kanban
20	Determine best solution to implement	Affinity, Voting, Pareto, Impact Matrix, FMEA, Daily Kaizen, Kaizen Event
21	Create Future State Map	Process Map, VSM
22	Further Considerations	Poka-Yoke, 5S, SQDC Board
23	Pilot Executed	Gantt Chart
24	Using data from Pilot, decision made to tweak and re-pilot or go to wide scale implementation	
25	Wide scale project plan	Gantt Chart
26	Execute implementation	Gantt Chart
CONTROL		
27	Change Management Plan	Stop-Keep-Start, ADKAR
28	Game plan to return process to owner	Gantt Chart
29	Collect and analyze data from wide scale implementation	Control Chart
30	Training and Communication on new process to area	RACI Chart, Tier meetings, Escalation Plan
31	System for monitoring new system	Audits, Gemba, Standard Work
32	Lessons learned	Project Team
33	Initial Report Out	Report out Template
34	Celebrate Completion	Key Stakeholders and Project Team
35	Project closer documents updated	Control Plan
36	30, 60, 90 day, 6 & 12 month Report Out - action plans if needed (update ROI)	Report out Template

We do NOT need to use all the possible tools on every project.

Be 'LEAN' in selecting correct tools according to:

- The type of problem
- The scale/size of problem
- How much money and time you have
- The skills /experience of your project team

What is an A3?

- A3 = A structured, one-page problem-solving and communication tool
- Originated from Toyota Production System (TPS)
- Named after the paper size (A3, ~11"x17")
- Provides a standard way to document:
 - The problem
 - Analysis
 - Goals
 - Improvement ideas
 - Actions & controls
- Encourages concise storytelling and alignment

Why use an A3?

- Creates a shared understanding of the problem and solution
- Keeps focus on facts, data, and process – not opinions
- Drives clear ownership and accountability
- Encourages systematic thinking vs. jumping to solutions
- Visual communication tool for leadership & teams
- Works well with DMAIC methodology

How to Use this A3?

A3				
Project Title:	Project Champion:	Project Manager:	Core Team Members	Original Creation Date:
	0	0	0	
	Process Owner(s):			Rev Date/ Rev #
	0			
Problem Statement What is the problem to be solved (use a metric), when and where is it occurring, what is the requirement and who is affected.			Measure	
Business Case Why should we work on solving this problem now, why is it important to the business.			Analyze	
Scope In Scope Out of Scope			Improve	
Include both what is in scope and out of scope. SIPOC can help with this				
Goal What is the goal of this project (x to y by when)? What are the process characteristics of the project in addition to the metric change (for example, one piece flow)? Note: this should not be the solution.			Project Champion Approval	
Define			Control	

- We have created an A3 that also includes tabs for most tools that you will use
- All header information and Problem Statement, Business Case, Scope and Goal will automatically pull in from the Project charter



DEFINE PHASE

Defining the PROBLEM

Defining the PROJECT

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

DEFINE

Problem & Project Definition

- The most important Phase of any DMAIC Project
- Choose the right problem to tackle
- Define the PROBLEM
- Identify the key TEAM members and STAKEHOLDERS
- Understand the SCOPE
- Present a good BUSINESS CASE
- Develop a PROJECT CHARTER



3 DOCUMENT OUTPUTS OF DEFINE

1. Project Charter
2. SIPOC
3. Gantt Chart

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

PROJECT SELECTION – CORE COMPONENTS

Project Charter –

- defines the Problem and the Business motivation for considering the project.
- This document further focuses the improvement effort. It can be characterized by two primary sections; one, basic project information and two, simple project performance metrics.

High Level Process Map – Used to show a high level understanding of the scope of the process that is to be measured, analyzed, improved and controlled. The SIPOC tool can also be used.

Gantt Chart - Used to show the project tasks and timeline

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL



WHAT IS A PROJECT CHARTER?

The *Project Charter* clarifies the project's focus and the measures of project performance. The Project Charter completed by the Six Sigma Belt (Green or Black).

DEFINE

MEASURE

ANALYZE

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CONTROL

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SOLUTIONS

PROJECT CHARTER

DEFINITIONS

- **Problem Statement** - Articulates the pain of the defect or error in the process.
- **Business Case** – shares why this project should be worked on now
- **Goal**– States how much of an improvement is desired from the project.
- **Project Scope** – Articulates the boundaries of the project. (Use SIPOC diagram)
- **Project Champion** –senior leader who actively supports and advocates for a project, helping to remove obstacles, secure resources, and ensure alignment with organizational goal
- **Process Owner(s)**: person responsible for the performance, improvement, and overall management of a specific business process
- **Project Manager**: this is the person working on the project
- **Core Team Members**: these are the people that will be involved in all project work
- **Target Completion Date**: date that the project should be completed by
- **Objectives**: summarizes the goals of the project

Project Charter

Project Title

Problem Statement

What is the problem to be solved (use a metric), when and where is it occurring, what is the requirement and who is affected.

Business Case

Why should we work on solving this problem now, why is it important to the business.

Goal

What is the goal of this project (x to y by when)? What are the process characteristics of the project in addition to the metric change (for example, one piece flow)? Note: this should not be the solution.

Scope

In Scope

Out of Scope

Include both what is in scope and out of scope. SIPOC can help with this

Project Champion:

Process Owner(s):

Project Manager:

Core Team Members:

Target Completion Date:

Project Deliverables

Objectives

Baseline

Target

Objective #1

Objective #2

Objective #3

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

THE PROBLEM



DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

“ YOU CAN'T MANAGE
WHAT YOU DON'T MEASURE.

- W. Edward Deming



DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

THE PROBLEM STATEMENT

Must include:

1. What is the problem?
2. When/Where are we seeing the problem?
3. What requirement is affected?
4. Who does it affect?

Should not:

1. Be more than one problem
2. Suggest a solution
3. Make assumptions

THE PROBLEM STATEMENT

Poor:

The widget is too long (1)

Better:

The widget exceeds the requirement (1) of 38cm (3)

Best:

The last 10 production runs (2) show the widget measured an average of 41cm (1), which exceeds the customer (4) requirement of 38cm +/- 2cm.(3)

1. What is the problem?
2. When / Where are we seeing the problem?
3. What requirement is affected?
4. Who does it affect?



UNDERSTAND NEEDS & REQUIREMENTS

- Determine customer needs, requirements and expectations.
- Product and process requirements must be understood prior to efforts to improve or change them.
- Understand technical requirements.
- Determine mandatory criteria.
- Assess any potential risk.

PROBLEM STATEMENT EXERCISE

Instructions:

1. Analyze the Statement (5 min): - What's wrong with the problem statement? - Is there bias, blame, assumptions, or a proposed solution?
2. Rewrite the Statement (10 min)
3. Report Out

PROBLEM STATEMENT EXERCISE

- Team 1 “We need to get rid of the old inventory system because it's making us lose money.”
- Team 2 “The shipping team is lazy and keeps messing up orders.”
- Team 3 “Our customer service would be better if we just hired more people.”
- Team 4 “People don’t follow the process and that’s why we have so many errors.”
- Team 5 “If we upgraded our software, our project timelines wouldn’t be so delayed.”
- Team 6 “We’re not doing as well as we should.”

1. What is the problem?
2. When / Where are we seeing the problem?
3. What requirement is affected?
4. Who does it affect?

WHAT IS A BUSINESS CASE?

A Business case has 3 main parts :

1. What is the problem that the business or the customer is experiencing? This part is called the 'Problem Statement'
2. What is the target or goal we are trying to reach ?
3. What are the consequences for the business if the problem is not solved, or business benefits if it is solved ? In other words, what is the business motivation for a project to solve the problem ?

The Business Case is constructed with the help of the Process Owner / Manager or the Business Owner / Manager.

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

BUSINESS CASE EXAMPLE

Problem Statement

- Customer complaints have increased by 50% in 2019. The 2017 average was 20 complaints per month with a total of 240 over the full year. 2018 average was 21 per month with a total of 252 over the year, The average for the first 5 months of 2019 is 30 complaints with a total of 150 in 5 months.

Target

- We need to reduce complaints back down to the 2017 level of an average of 20 per month.

Consequences

- We will see a drop in new customers and also customers leaving if we do not reduce the complaints and increase customer satisfaction.



Goal

When choosing the best METRIC to use as the main measure of success of your project, consider the SMART method of choosing metrics

- Clearly state: What will be improved (metric), By when (concrete date)
- Metric is the same from the problem statement
- Format: Metric from x to y by when.

Might also list out deliverables of the project: these are not solutions but conditions that must be met – ex convert from push to 1 piece flow



SMART METRIC

When choosing the best METRIC to use as the main measure of success of your project, consider the SMART method of choosing metrics

Specific - Is the metric well defined?

Measurable - How will we measure it easily?

Attainable - Can we achieve the target?

Relevant - Is the metric related to the problem?

Time Bound - When are we going to measure it?



USING A TEAM APPROACH

Collaborate with cross-functional team members from various levels that have a vested interest in solving the problem.

Philosophy

- Problem-solving efforts should be fact-based
- The person doing the job is the probably the most knowledgeable about it.
- People want to be involved and want to do their jobs well.
- More is accomplished together.
- Greater success comes with a structured approach.
- Are there employees with undiscovered talents.

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

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THE MARSHMALLOW CHALLENGE

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS



**PETER
SKILLMAN**

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

1



DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

THE CHALLENGE

Build the Tallest Free-Standing Structure



20 Sticks of
spaghetti

1 yard tape

1 yard string

One
marshmallow

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

THE KIT



DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

THE RULES

1

Build The
Tallest
Freestanding
Structure

2

The Entire
Marshmallow
Must Be On
Top

3

Use As Much
Or Little Of
Kit As You
Want

4

Break
Spaghetti,
Cut Yarn As
You Wish

5

May Not
Hold
Structure Up

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS



18 MINUTES

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

Was Your Team

SUCCESSFUL

In Building A Free-standing Structure?

WHY OR WHY NOT?



DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

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Would you do anything
DIFFERENTLY
If you could do it over
again?



DEFINE

MEASURE

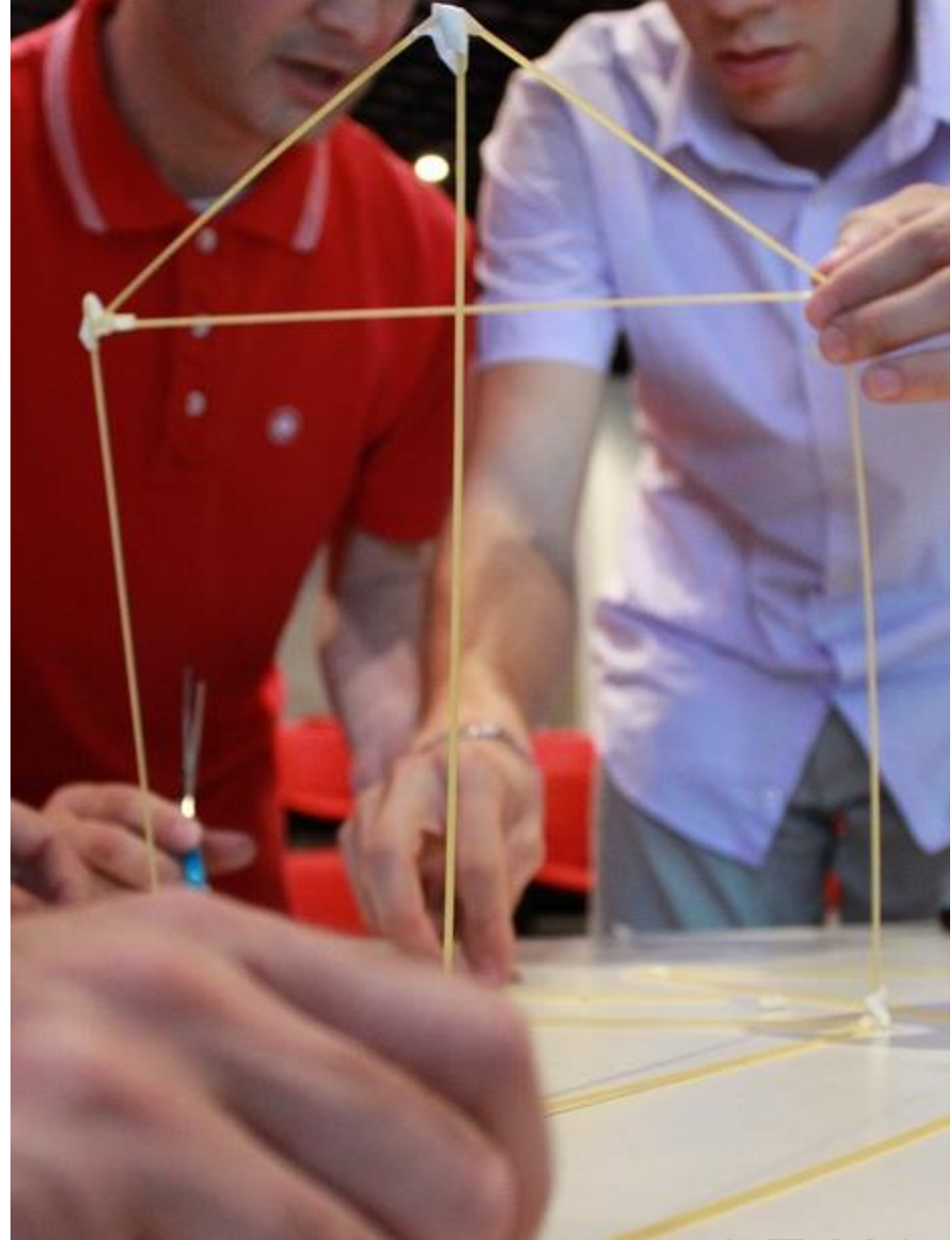
ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

Be honest...How well
did You work as a
TEAM?



DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS



WHO CONSISTENTLY PERFORMS POORLY?

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

RECENT BUSINESS SCHOOL GRADUATES



DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS



WHO CONSISTENTLY PERFORMS WELL?

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

RECENT KINDERGARTEN SCHOOL GRADUATES



DEFINE

MEASURE

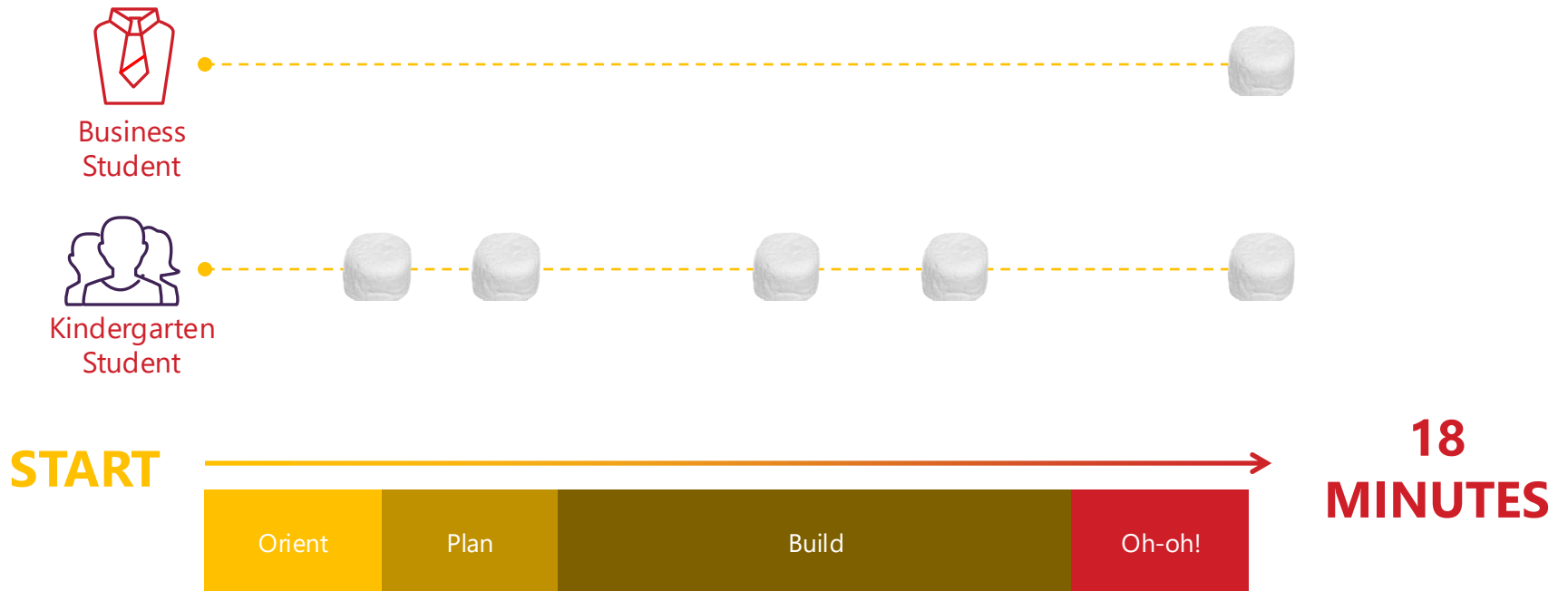
ANALYZE

IMPROVE

CONTROL

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TYPICAL PROGRESS



DEFINE

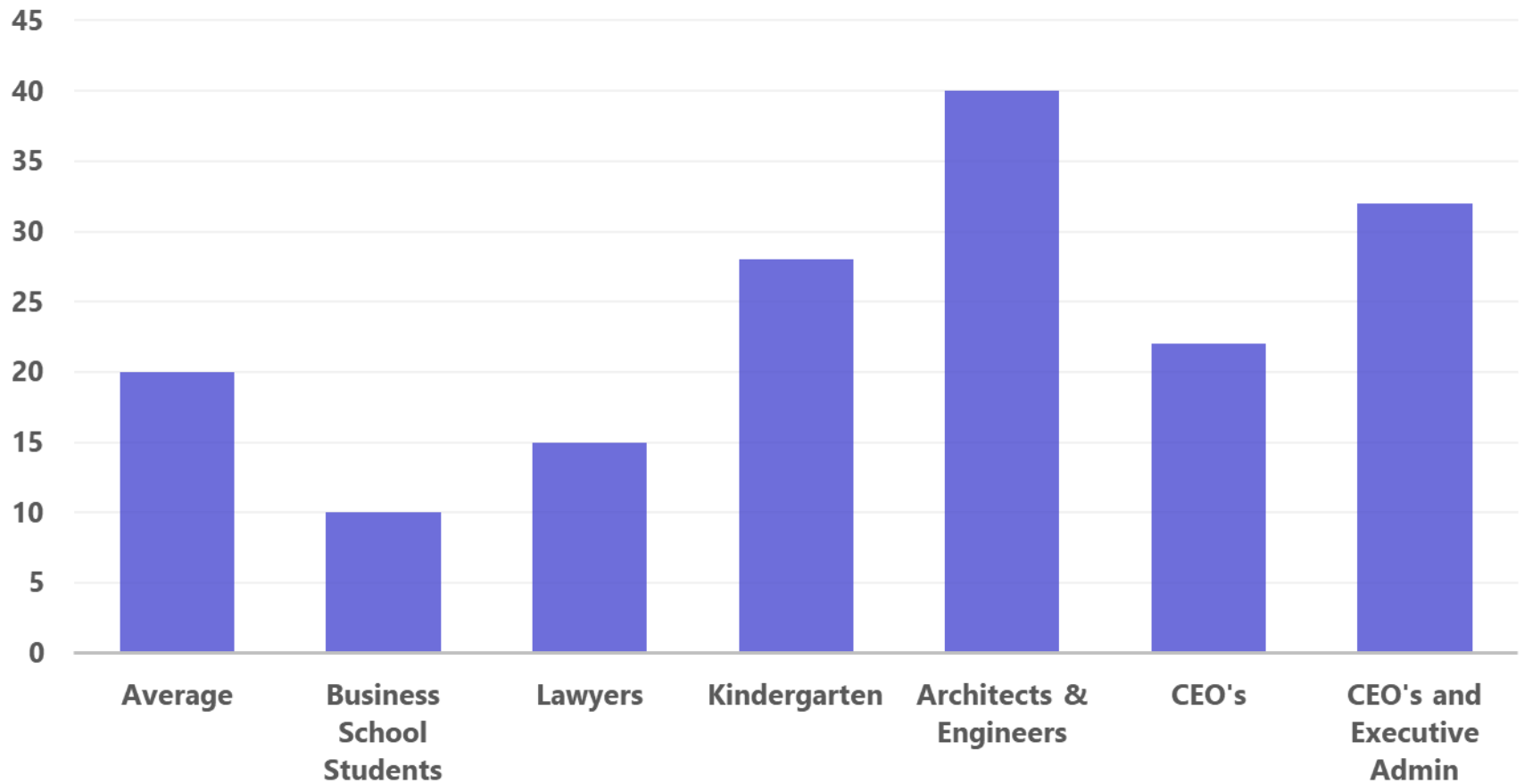
MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS



DEFINE

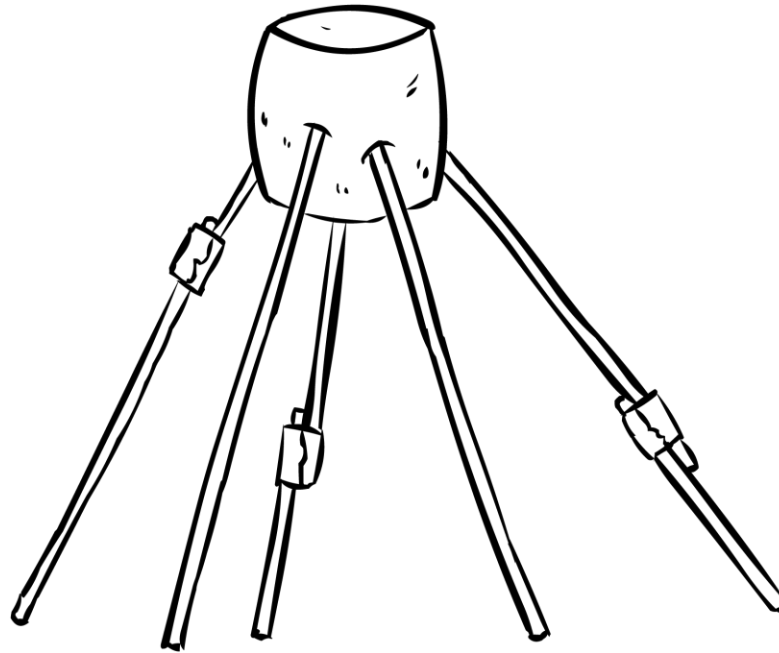
MEASURE

ANALYZE

IMPROVE

CONTROL

SIMPLE ACTIVITY, DEEP LESSON



DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

PROBLEM SOLVING LESSONS

- ✓ Use a Team Approach – Collaborate Quickly!
- ✓ Diversified Skills Matter
- ✓ Use Rapid PDCA Cycles (Prototyping Matters)
- ✓ Drive out Hidden Assumptions with PDCA Cycles

DEFINE

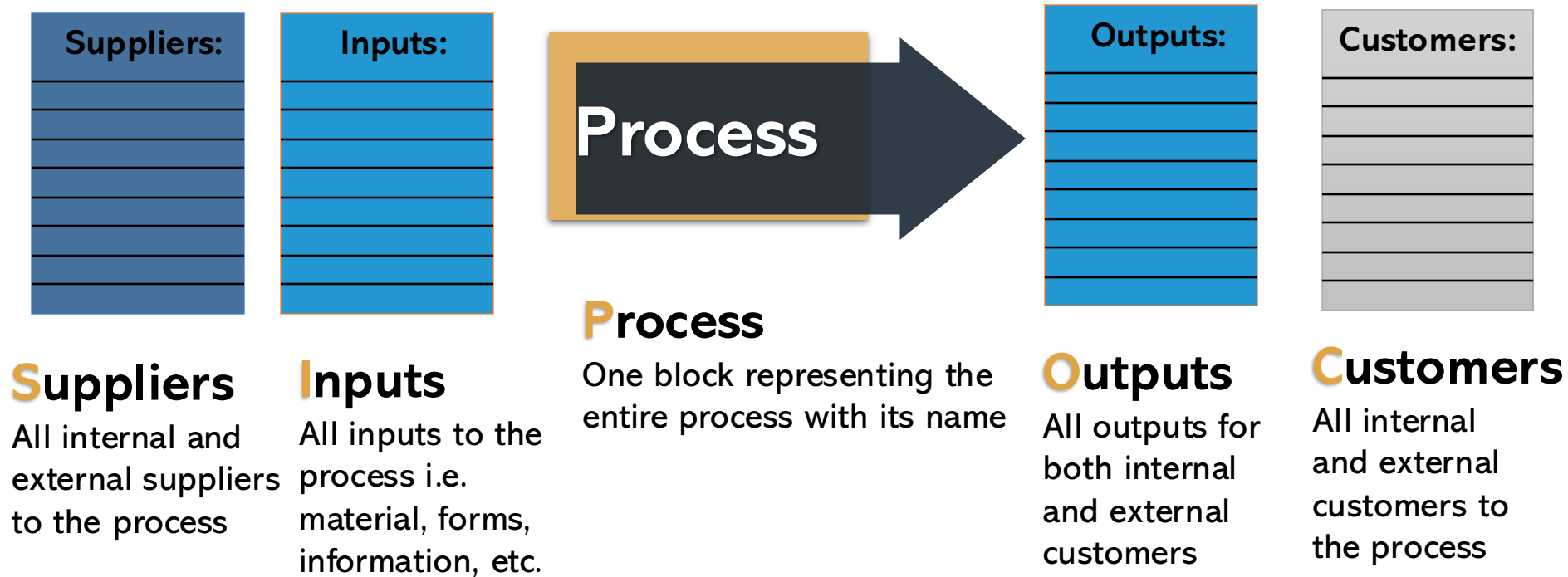
MEASURE

ANALYZE

IMPROVE

CONTROL

SIPOC FOR THE DEFINE PHASE



DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

SIPOC

SIPOC				
Project Title:	Project Champion:	Project Manager:	Core Team Members	Original Creation Date:
Customer Order Process	0	0	0	
	Process Owner(s):			Rev Date/ Rev #
	0			
Suppliers	Inputs	Process	Outputs	Customer
Who supplies the process inputs?	What inputs are required	What are the major steps in the process?	What are the process outputs?	Who receives the outputs?
ATT Phones	Phone	Answer Phone	Friendly answer	Customer
		↓		
Office Depot	Notepads, Pens	Write Order	Order sheet for cook	Cook
		↓		
ATT Phones Customer	Pizza type, size, quantity, extra toppings, special orders, drink types and quantity	Confirm Order	Correct order per customer	Customer
		↓		
TI Claculators	Size and quantity of each item, price of each item	Sets Price	Price	Accounting
		↓		
Customer	Address, name, time of day, date	Address & Phone	Delivery information	Delivery driver and customer

SIPOC FOR THE DEFINE PHASE

Class exercise: Complete this SIPOC for making a package delivery of a product that a customer has purchased through your company website.

Process name :

Suppliers

Inputs

Process

Outputs

Customers

1. _____

1. _____

1. _____

1. _____

1. _____

2. _____

2. _____

2. _____

2. _____

2. _____

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

GANTT CHART

CREATE A TIMELINE FOR YOUR PROJECT

- Karol Adamiecki, a Polish engineer who ran a steelworks in southern Poland
 - The first Gantt chart was devised in the mid 1890s
 - interested in management ideas and techniques.
-
- Henry Gantt, an American engineer and project management consultant, devised his own version of the chart
 - and it was this that became widely known and popular in western countries.



Karol Adamiecki



Henry Gantt

DEFINE

MEASURE

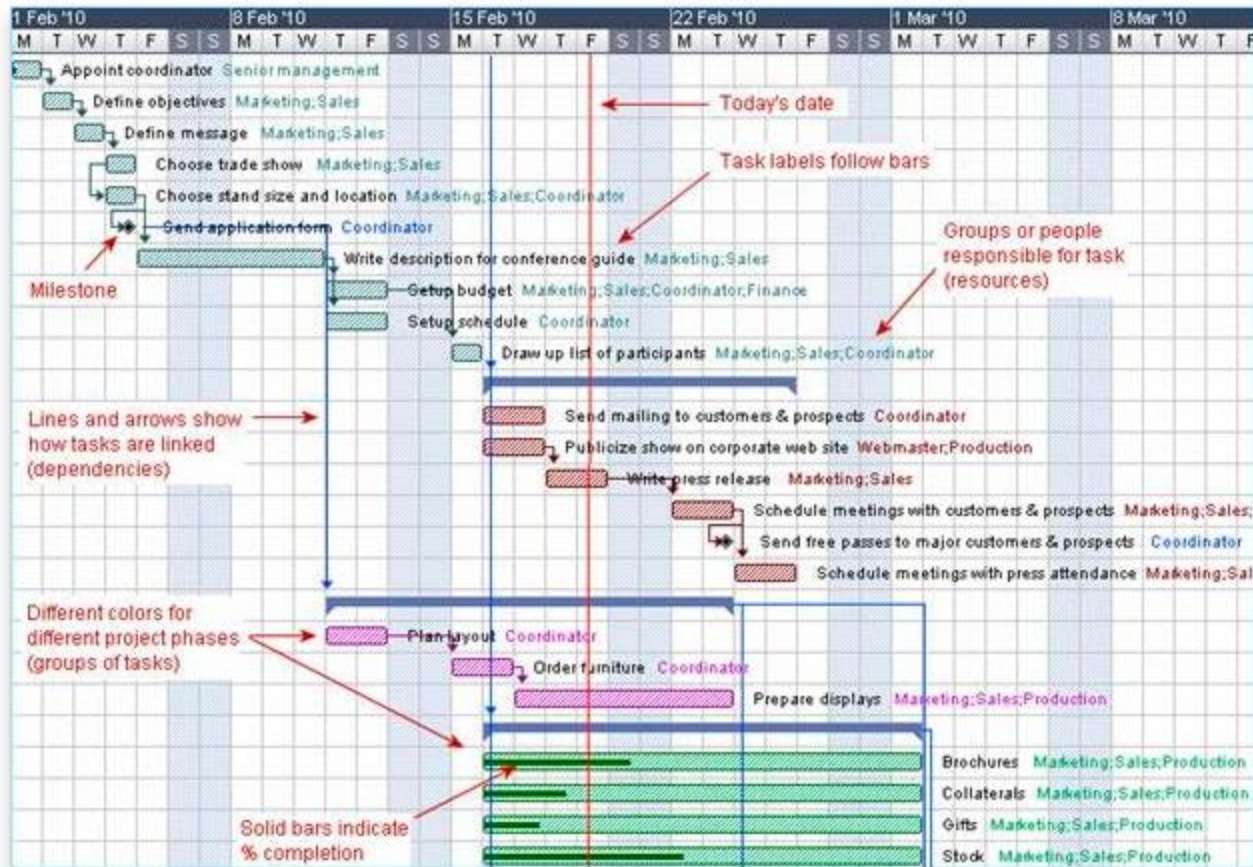
ANALYZE

IMPROVE

CONTROL

GANTT CHART

CREATE A TIMELINE FOR YOUR PROJECT



Common software:
Microsoft Project



Smartsheet



Team Gantt



DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

Update the A3

A3				
Project Title:	Project Champion:	Project Manager:	Core Team Members	Original Creation Date:
	0	0	0	
	Process Owner(s):			Rev Date/ Rev #
	0			
Problem Statement		Measure		
What is the problem to be solved (use a metric), when and where is it occurring, what is the requirement and who is affected.				
Business Case		Analyze		
Why should we work on solving this problem now, why is it important to the business.				
Scope		Improve		
In Scope	Out of Scope			
Include both what is in scope and out of scope. SIPOC can help with this				
Goal		Project Champion Approval		
What is the goal of this project (x to y by when)? What are the process characteristics of the project in addition to the metric change (for example, one piece flow)? Note: this should not be the solution.				
Define		Control		

- For everything you have learned during the Define Phase update the A3
- Think of this as a newspaper, hit on the highlights of what you learned and what tools were used

SUMMARY

At This Point You Should Be Able To...

- Understand the importance for the Define Phase.
- Understand the 2 main output documents of the Define Phase
 - Project Charter
 - SIPOC
 - Understand SMART Metrics
- Understand Gantt Charts

QUIZ 1:



1. What is the framework used in Lean Six Sigma for running Lean Six Sigma projects where we are unsure of the root cause or solution ?
 - **DMAIC Define – Measure – Analyse – Improve – Control**
2. What are the names of the 3 document deliverables in the DEFINE Phase ?
 - **Business Case (including Problem Statement)**
 - **Project Charter**
 - **Scope Statement or SIPOC**
3. What does the acronym SIPOC mean ?
 - **SUPPLIERS, INPUTS, PROCESS, OUTPUTS, CUSTOMERS**
4. What do we call a 1-page summary of your timeline with milestones?
 - **Gantt Chart**



Measure

Understand the Current State

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL



METHODS USED TO OBSERVE & GATHER DATA



Time Studies



Process Mapping or Flow Chart, Value Stream Mapping, Current State



Gemba Walks, The 8 Wastes and Waste Walks



Videos

QUALITY TOOLS

- Data Collection & Sampling
- Graphs
- Check Sheets
- Cause & Effect Diagrams
- Pareto Charts
- Histograms
- Control Charts
- Measurement Systems Analysis
- Failure Mode & Effects Analysis



DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

PERFORMANCE MEASURES



DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

PERFORMANCE MEASURES

- Performance measures are the indicators used to see the difference between what is, and what should (or could) be.
- Established at each level of the organization.
- Often used to describe a problem condition.

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

MONITORING WITH SPC

Statistical Process Control (SPC):

- SPC is used for monitoring of a process to make sure it is ' in control'
- The most common method of SPC is a Control Chart
- SPC was first introduced in the 1930 by **Walter Shewhart** and then popularized in the 1960 and 1970 by **Joseph Juran** and was the basis of the Motorola 'Six Sigma' Quality program.



CONTROL CHARTS

- Used to monitor and control a process input or output variable
- Control Charts indicate when a process is “out of control” or exhibiting Special Cause variation.
- Use of Control Charts can be applied to all processes.
 - Services, manufacturing and retail are just a few industries with SPC applications.
- Control Limits are used to define the limits that the business is setting for the process.
 - Ideally Control Limits should be narrower than customer specs
- Should have 25-30 data points to develop a control chart



VARIATION

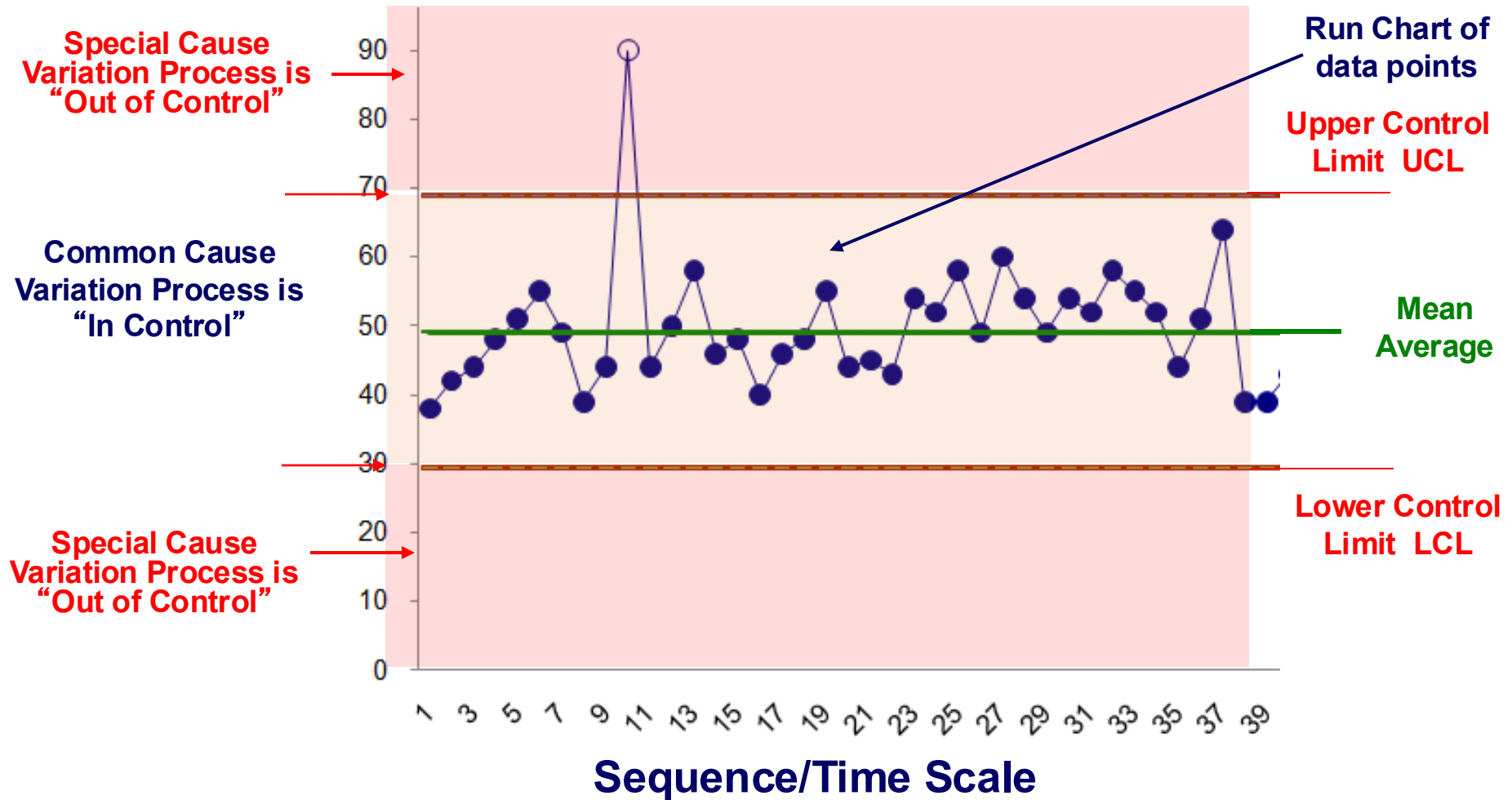
Common Cause Variation

- Expected, natural and inherent in every process.
- Due to random small changes in the process inputs.
- Small changes in temperature, vibration, wait time or worker energy level are examples. 'Chronic' variation

Special Cause Variation / Assignable Cause Variation

- Unexpected, not part of the process. Often due to external influences out of our control such as accidents, mechanical or electrical failures.
- 'Sporadic' variation.
- Can be either an 'Outlier' or an unusual '**Pattern or Trend**' in the data.

CONTROL CHART



DEFINE

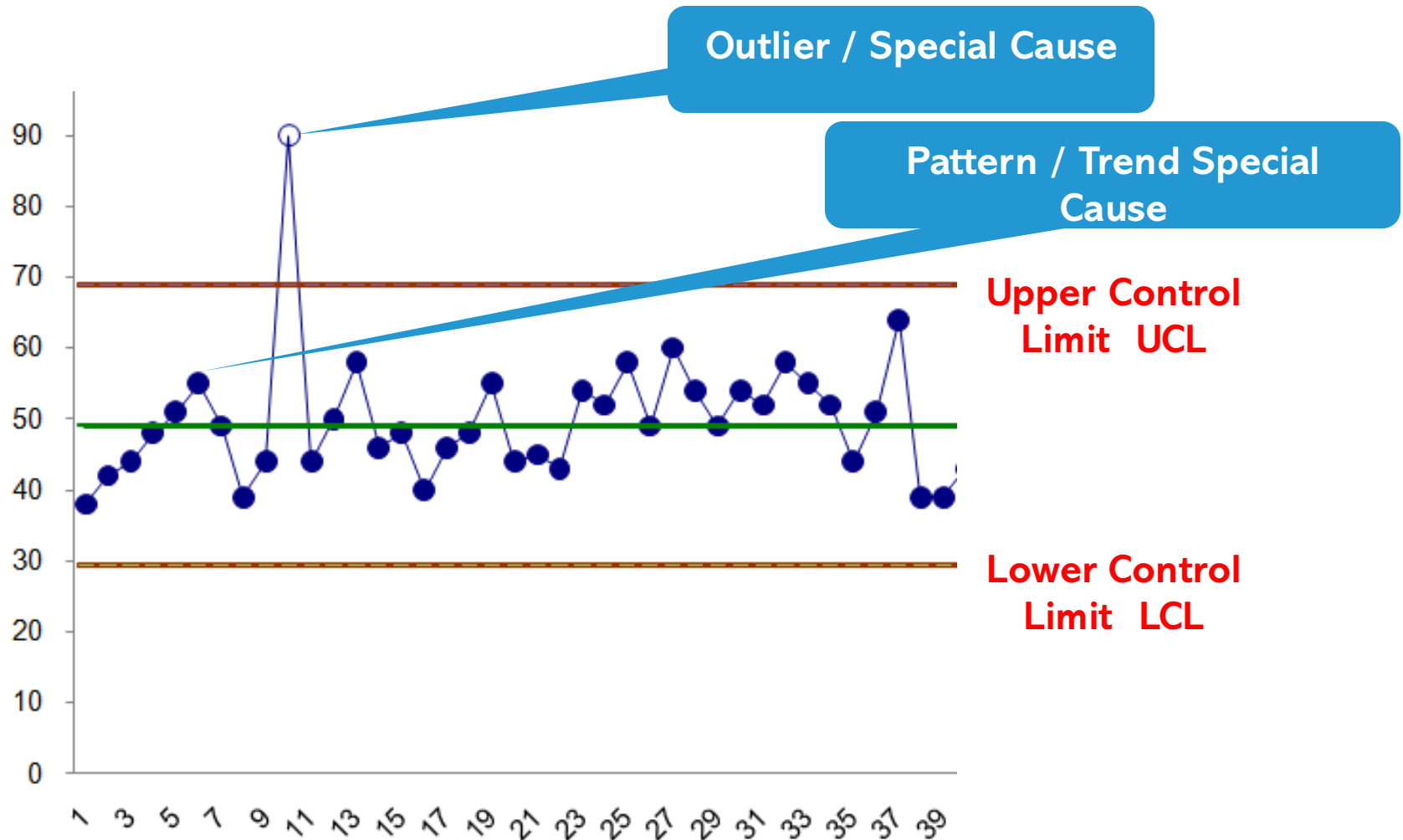
MEASURE

ANALYZE

IMPROVE

CONTROL

CONTROL & OUT OF CONTROL



DEFINE

MEASURE

ANALYZE

IMPROVE

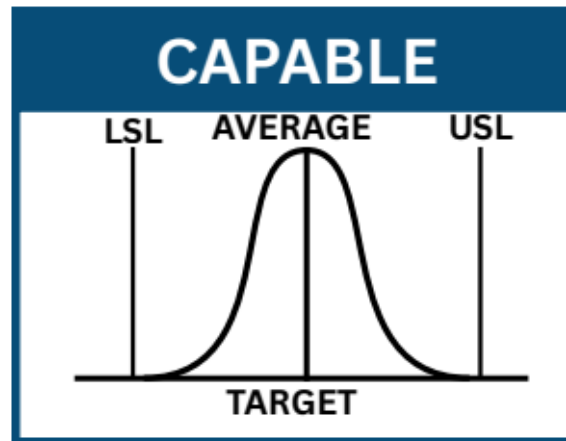
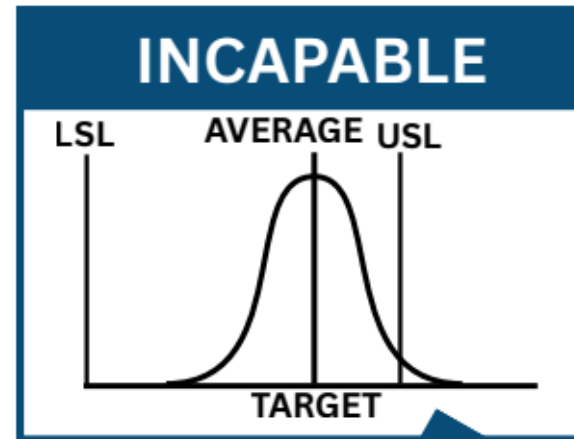
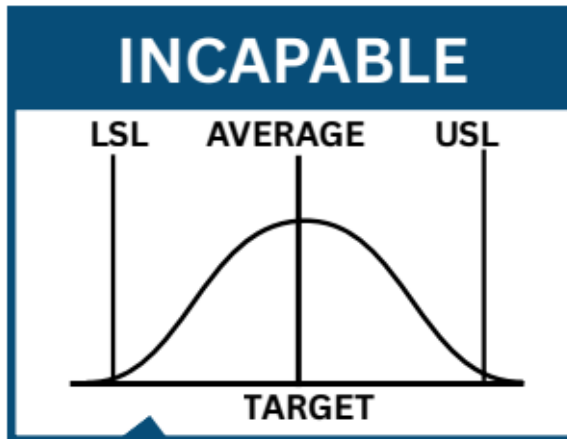
CONTROL

CAPABILITY STUDIES

Process Capability / Process Performance :

- The ability of a process to meet the expectations of the customer
- Provides insight as to whether the process has a:
 - Centering Issue (relative to specification limits)
 - Variation Issue
 - A combination of Centering and Variation
 - Inappropriate specification limits
- Provides a baseline metric for improvement.

CAPABILITY DEFINED



LEAN
SOLUTIONS

DEFINE

MEASURE

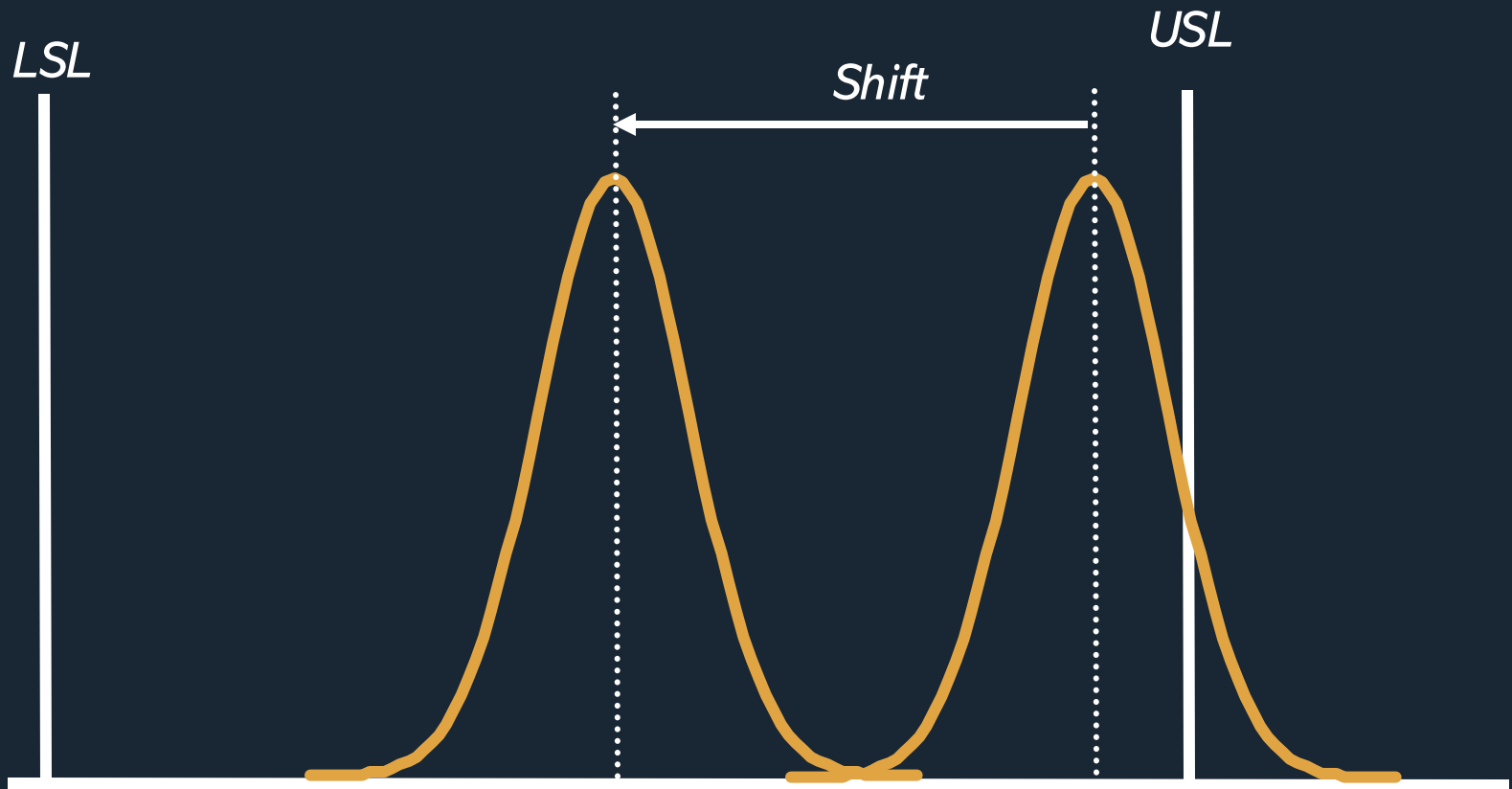
ANALYZE

IMPROVE

CONTROL

STEP 1 – SHIFT THE MEAN

This involves finding the variables that will shift the process to the target. This is what is done first.



DEFINE

MEASURE

ANALYZE

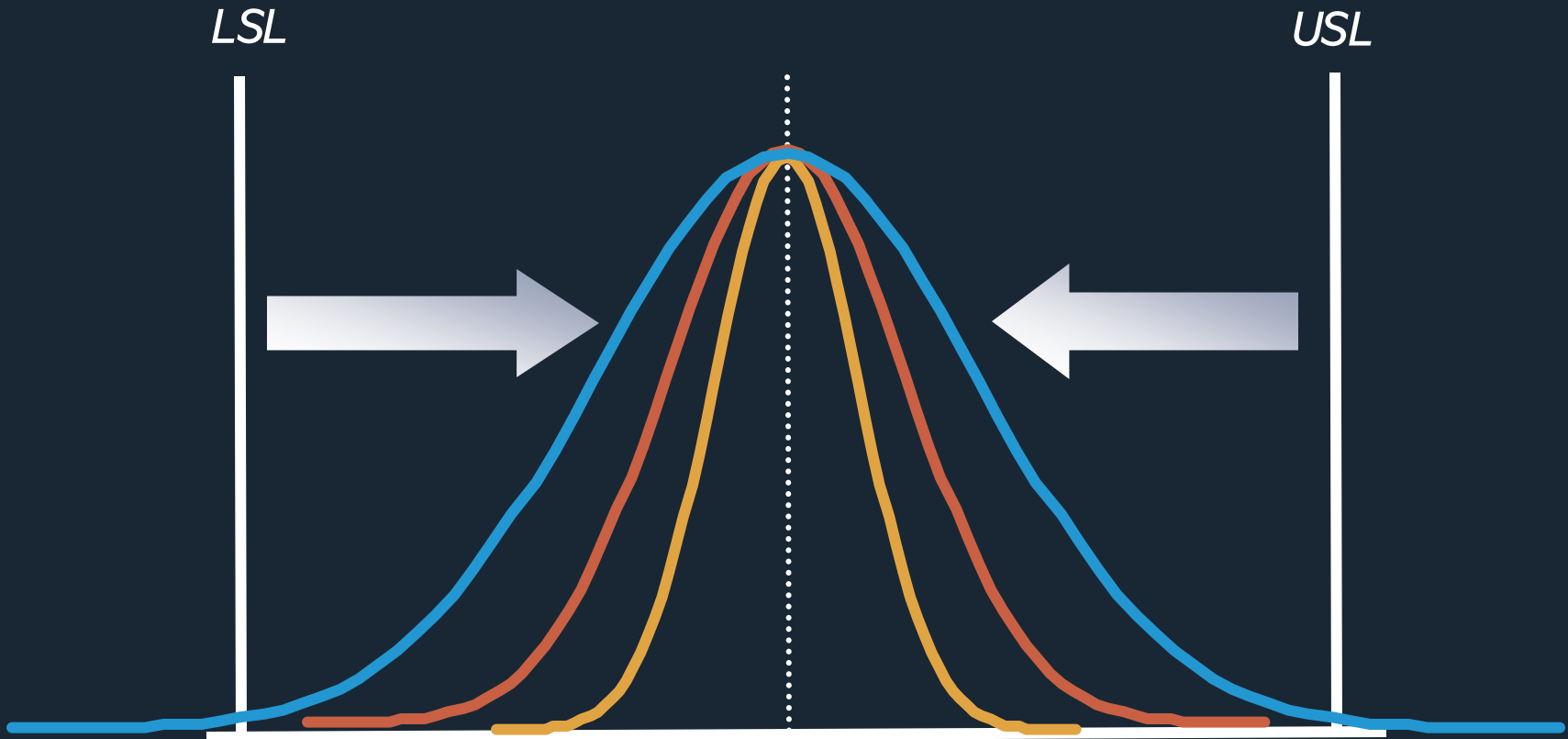
IMPROVE

CONTROL

LEAN
SOLUTIONS

STEP 2 – REDUCE VARIATION

Reducing Variation is typically not so easy to accomplish and is a main focus of Six Sigma projects.



DEFINE

MEASURE

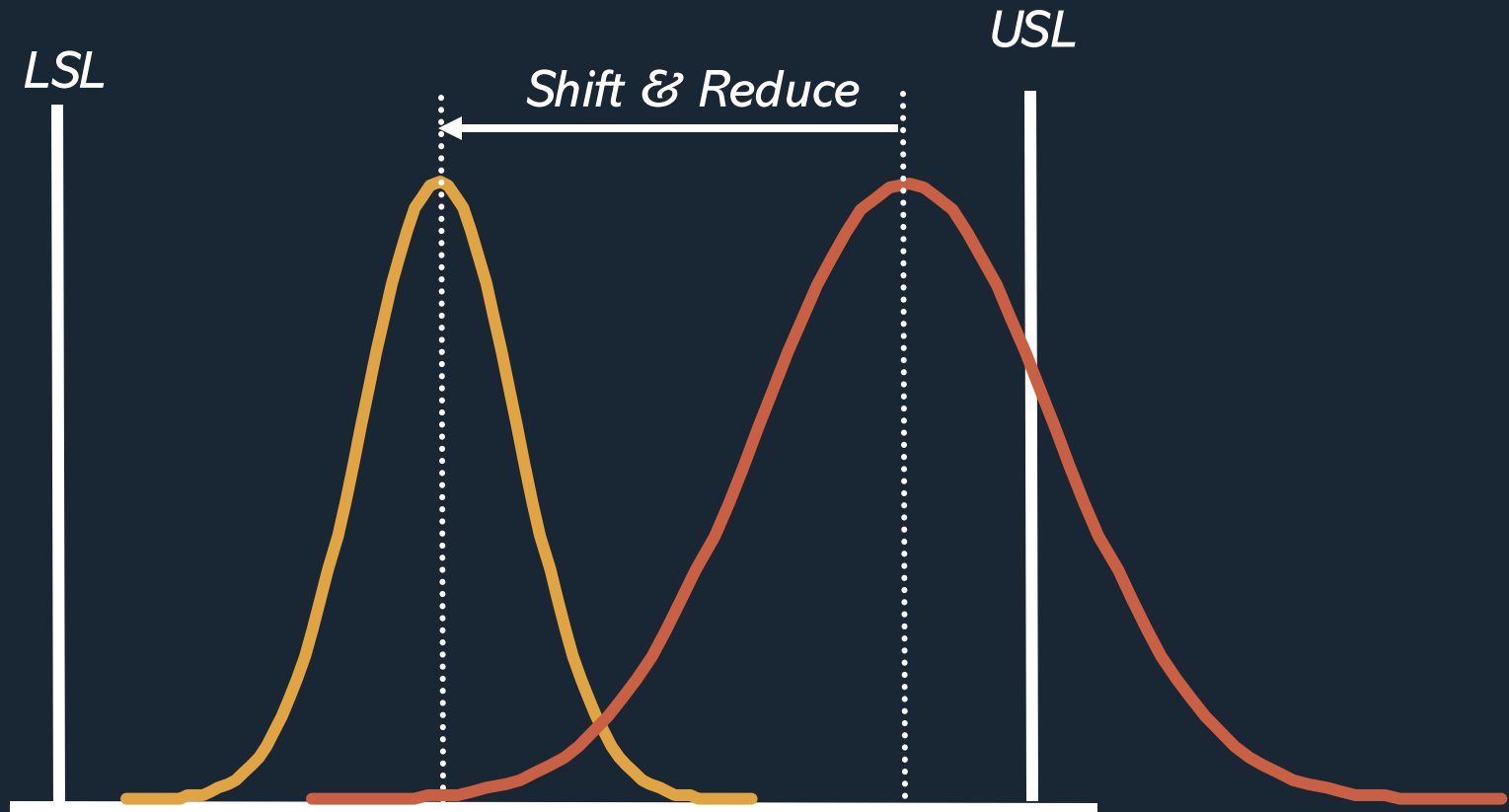
ANALYZE

IMPROVE

CONTROL

SHIFT MEAN & REDUCE VARIATION

This is the aim of most Six Sigma projects



DEFINE

MEASURE

ANALYZE

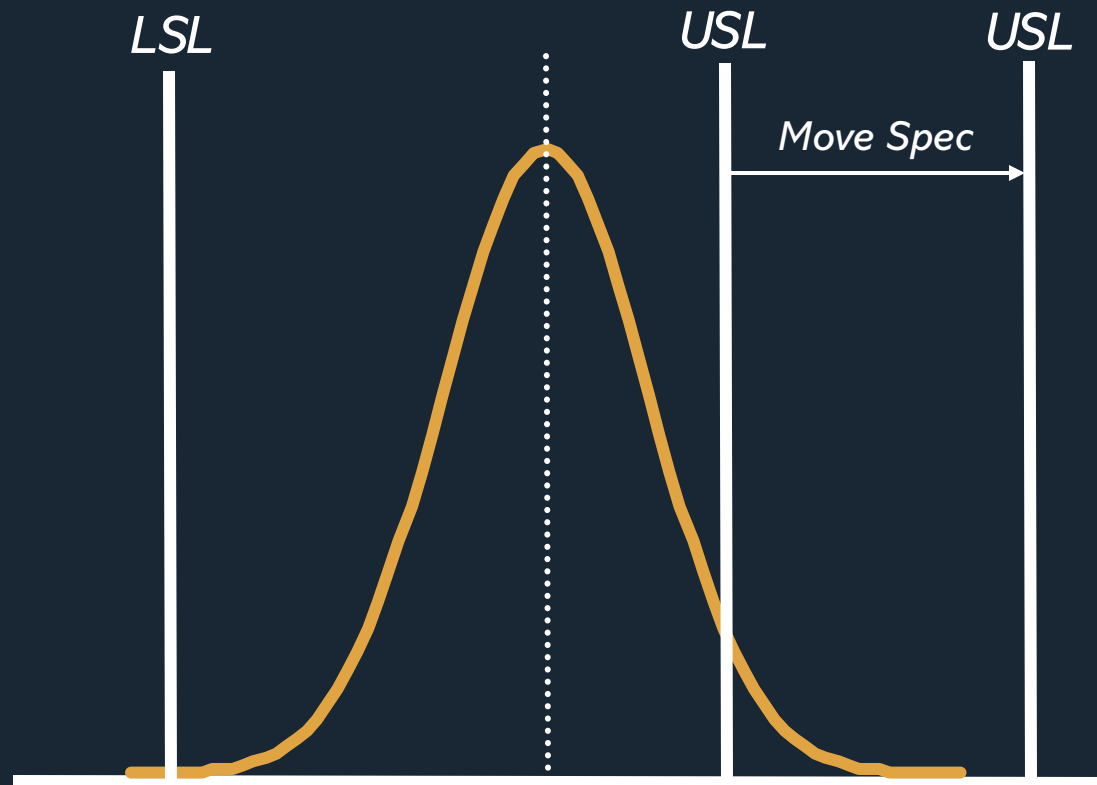
IMPROVE

CONTROL

LEAN
SOLUTIONS

MOVING CUSTOMER SPECIFICATION LIMITS

Customers usually do not go for this option but if they do...it is the easiest way to increase capability !



DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL



SOFTWARE USED TO CREATE CONTROL CHARTS



Minitab



SigmaXL



JMP (SAS)



Excel

DEFINE

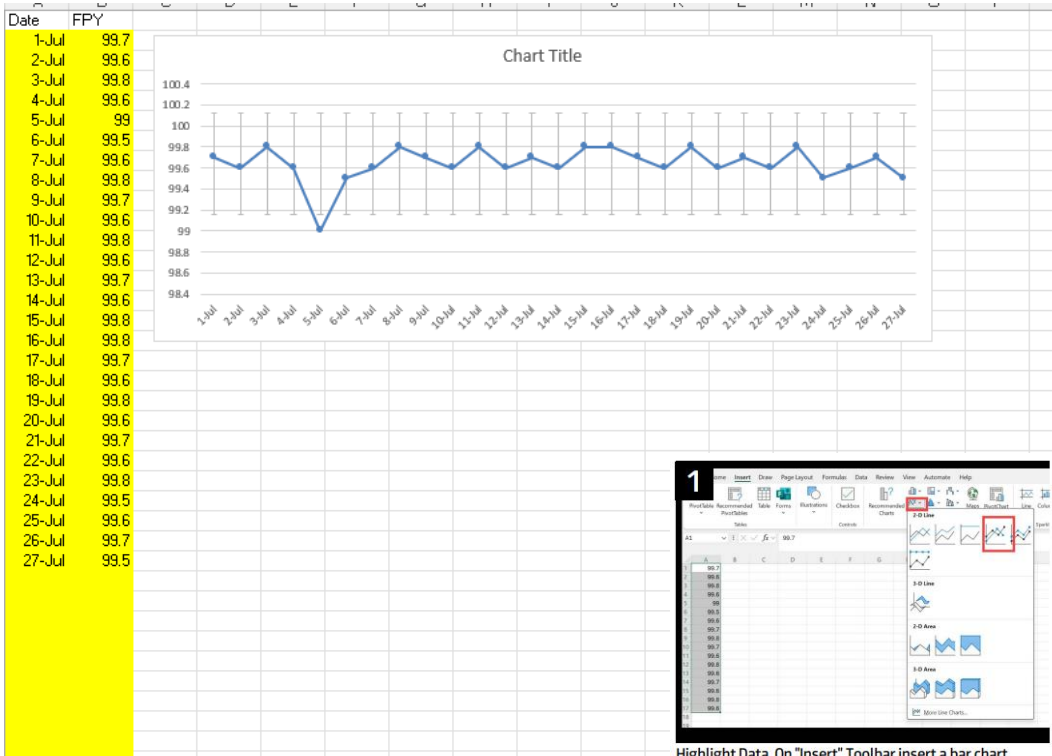
MEASURE

ANALYZE

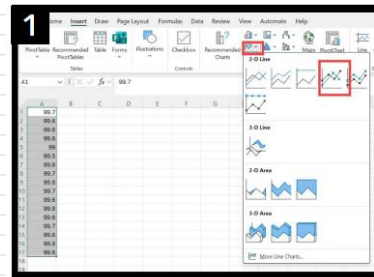
IMPROVE

CONTROL

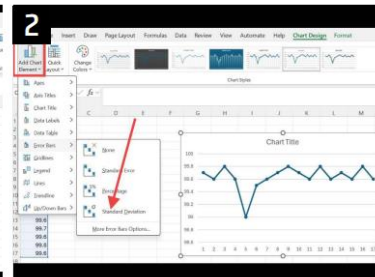
CONTROL CHART – Excel 1



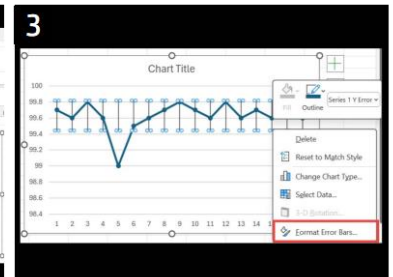
We have created examples in the A3 template for the control chart.



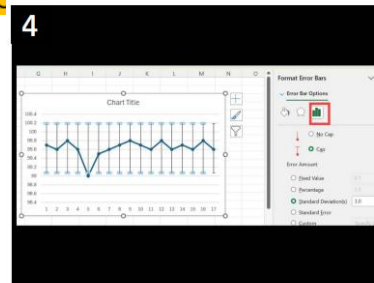
Highlight Data, On "Insert" Toolbar insert a bar chart



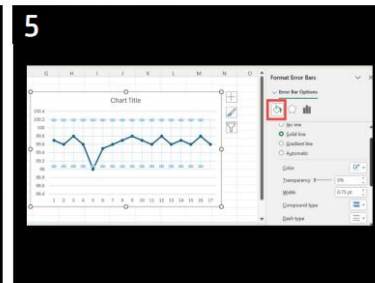
Under Design Toolbar: Add Chart Element, Select Error Bars, Standard Deviation



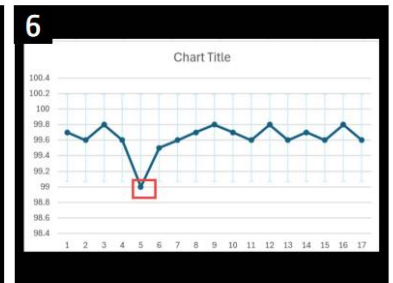
Right click on the error bar and select format data bars



Click on the graph image, scroll down and enter 3 in the standard deviation line.

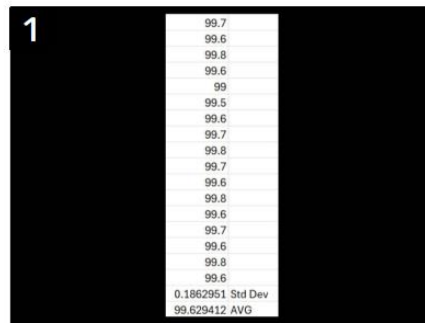
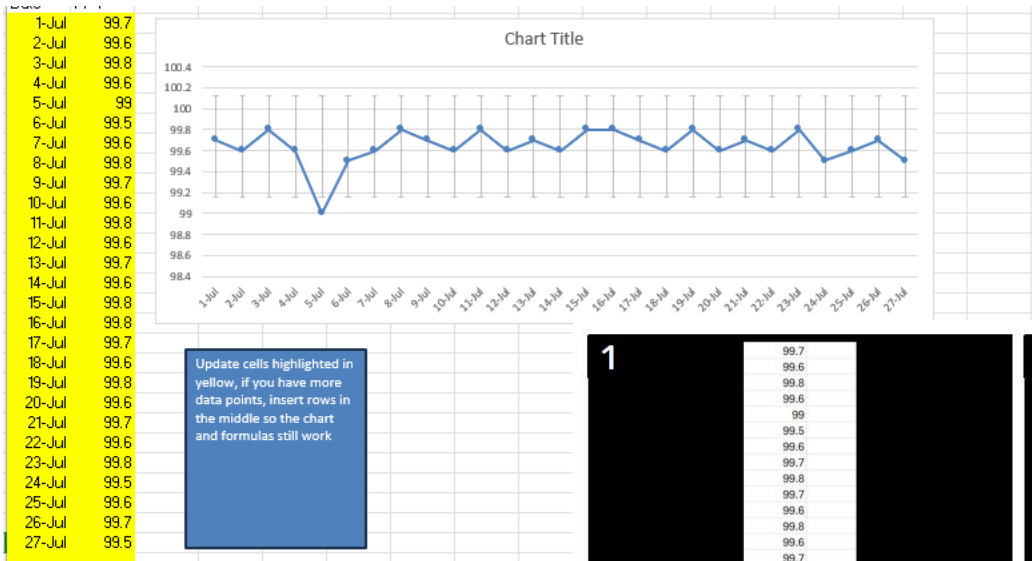


The error bars can be formatted with different colors, make it best for you to see out of control data points

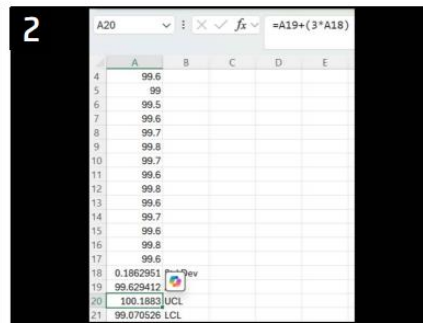


As you can see, the data point in the red rectangle is out of process control

CONTROL CHART- Excel 2



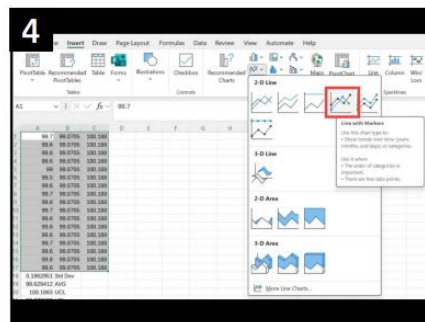
Use =STDEV.S(your data cells) to find the standard deviation and =AVERAGE(your data cells) for the average.



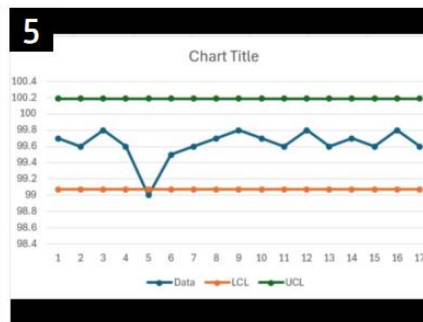
Calculate UCL with =average+ (3*standard deviation).
LCL with = Average - (3* standard deviation)



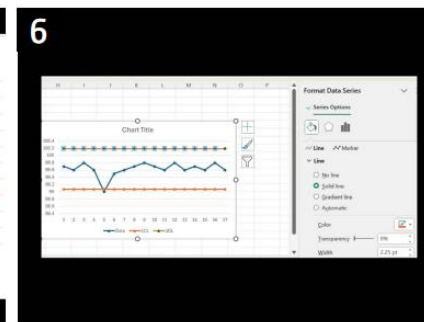
Paste LCL and UCL next to your data points



Insert Chart toolbar and insert chart shown



You can now see the UCL, LCL and your data points on the chart. It is easy to see points that are out of control.

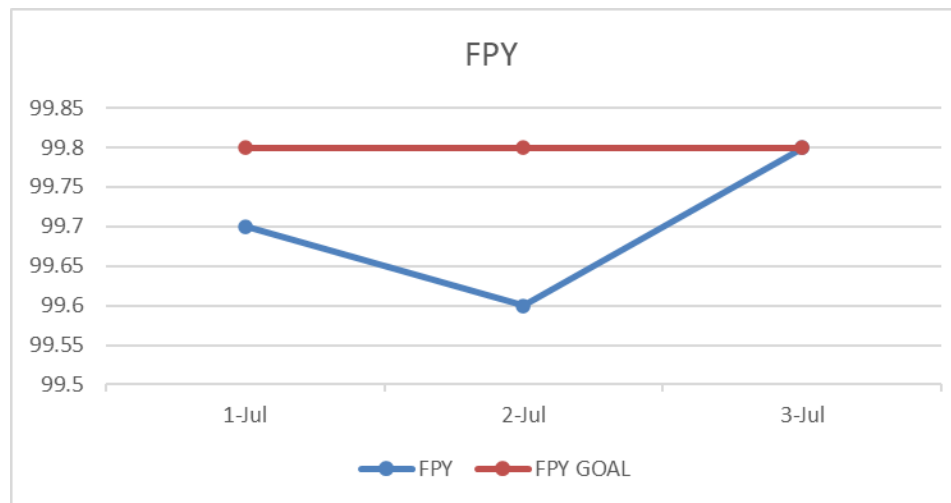


Right-click on UCL, LCL, or data to change color, line size, and format for clarity.

Trend Chart



- Purpose is to measure and track a key input, process or output measure over time
- Use this option if you have limited current state data





HOMework REVIEW

(Open Computers and Log into your Portal)



Project Charter



SIPOC



Gantt Chart

Homework will be reviewed during your coaching session
We will also review as a class during Day 2



END OF DAY 1



LEAN
SOLUTIONS
ACADEMY

A group of five professionals (three men and two women) in business attire are huddled together, smiling and looking down at something they are holding in their hands. The image is overlaid with a large blue diagonal graphic that contains the text.

Lean & Six Sigma Training Green Belt Certification

brought to you by:



**PATRICK
ADAMS**
CONSULTING

CLASS SCHEDULE

Day 1

- Yellow Belt Class Refresh
- DEFINE
 - Introduction to DMAIC
 - Charters
 - SIPOC
 - Gantt Charts
- MEASURE

Day 2

- Green Belt Project Review
- ANALYZE
 - Fishbone Diagram
 - 5 Whys
 - Value Stream Mapping
- IMPROVE
 - Impact/Effort Matrix (Affinity Diagram)
- Facilitating a Kaizen Event

Day 3

- Green Belt Project Review
- CONTROL
 - Control Plan
 - Layered Audits
- Strategy Execution/ Hoshin Kanri
- Change Management



PROJECT CHECK-IN'S

- What is your Problem Statement?
- What are your measures of success?
- What is your timeline? Milestones?
- Do you have any roadblocks?
- Do you need help with anything?
- What are your next steps?

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS



TIME STUDIES

- Establishes a Baseline
- Measure's Improvements
- Internal/External Customers
- Break Down Each Component

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

Time study example – do a blank time study form with the steps

Product: _____

Wk Ctr: _____

Process: _____

Date: _____

Name: _____

TIME OBSERVATION SHEET

Work Element	Repetition : Time in Seconds										Lowest Repeatable Time	Task Observation
	1	2	3	4	5	6	7	8	9	10		
Get up from Chair												
Walk to Flipchart												
Pick up marker												
Write on flipchart												
Put down marker												
Walk back to chair												
Sit down in chair												
Total For One Cycle:												

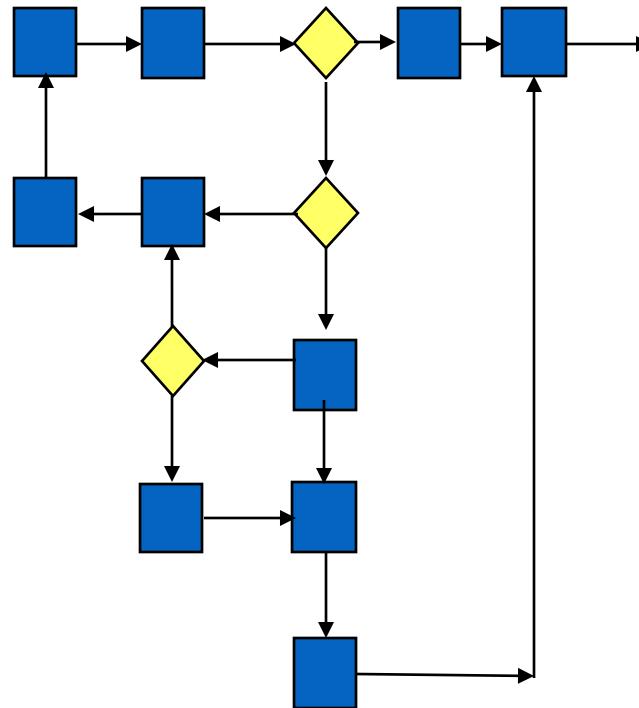




Process Observed: <i>Writing on Flipchart</i> Product/Service: <i>CP-550-0362</i>		TIME OBSERVATION FORM										Page <i>1</i> of <i>1</i>			
												Observation Date/Time: <i>March 14, 20YY/9:00:00 AM</i> Observer(s): <i>Hank Ford</i>			
No.	Component Task	Observed Cycles										D Lowest Repeatable Component Task Time	Machine Cycle Time	Points Observed	
		1	2	3	4	5	6	7	8	9	10				
1	<i>Get up from chair</i>	Cumulative	0:03	0:31	0:59	1:32	1:57	2:25	3:01	3:26			2		
		Task Time	3	2	2	2	2	3	2	2					
2	<i>Walk to flipchart</i>	Cumulative	0:09	0:38	1:04	1:37	2:03	2:31	3:06	3:32			5		
		Task Time	6	7	5	5	6	6	5	6					
3	<i>Pick up marker</i>	Cumulative	0:11	0:43	1:07	1:39	2:06	2:34	3:08	3:34			2		<i>(cycle #2) dropped marker</i>
		Task Time	2	5	3	2	3	3	2	2					
4	<i>Write on flipchart</i>	Cumulative	0:18	0:49	1:20	1:46	2:12	2:41	3:14	3:41			7	D+	<i>(3) made mistake, had to rewrite</i>
		Task Time	7	6	13	7	6	7	6	7					
5	<i>Put down marker</i>	Cumulative	0:21	0:51	1:23	1:48	2:15	2:44	3:16	3:44			2		
		Task Time	3	2	3	2	3	3	2	3					
6	<i>Walk back to chair</i>	Cumulative	0:27	0:54	1:28	1:53	2:20	2:56	3:21	3:50			5		<i>(2) sprinted back to chair, (6) stop and talked to team member</i>
		Task Time	6	3	5	5	5	12	5	6					
7	<i>Sit down in chair</i>	Cumulative	0:29	0:57	1:30	1:55	2:22	2:59	3:24	3:52			2		
		Task Time	2	3	2	2	2	3	3	2					
		Cumulative													
		Task Time													

UNDERSTANDING THE PROCESS

We must first understand the Process Flow before Process Problems can be understood.

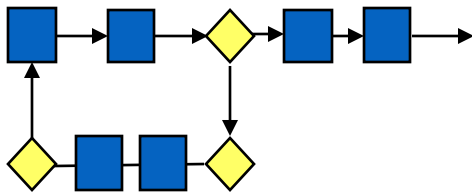


PROCESS MAPPING

There are usually 3 view of a process:

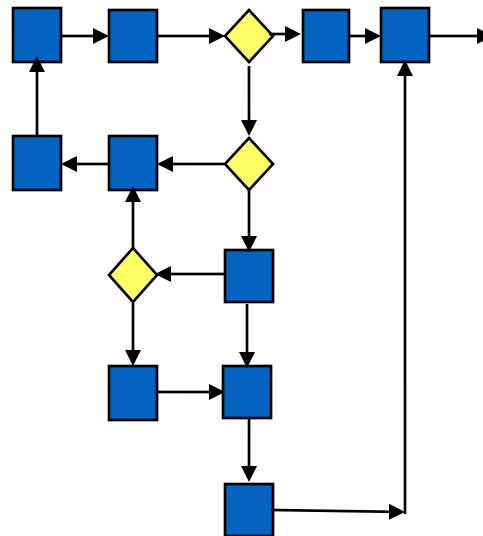
1

What people *THINK* it is..



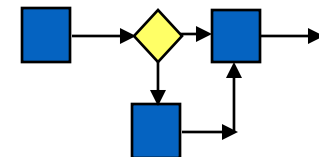
2

What it *ACTUALLY* is..



3

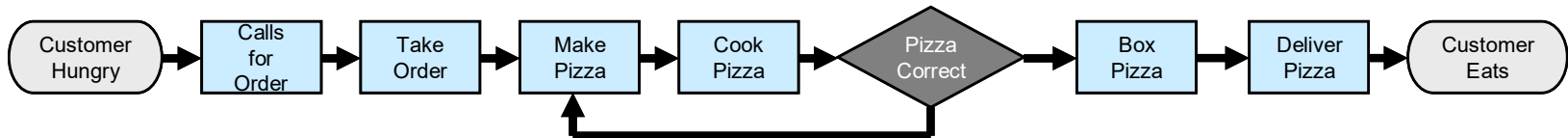
What it *SHOULD* be..



Process mapping is used to identify all steps and decisions of the process visually

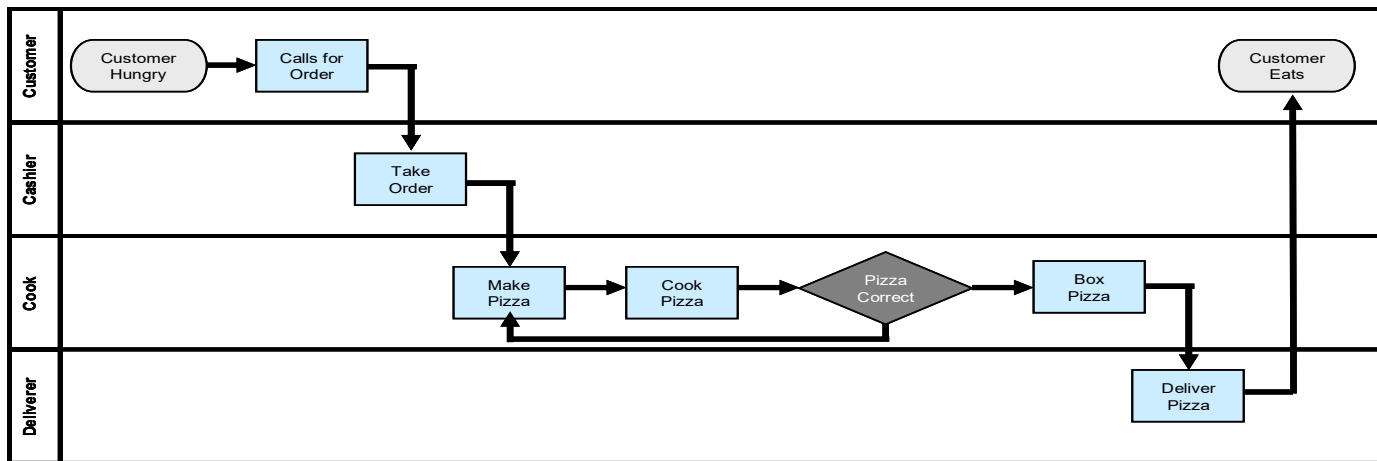
TYPES OF PROCESS MAPS

The Linear Flow Process Map



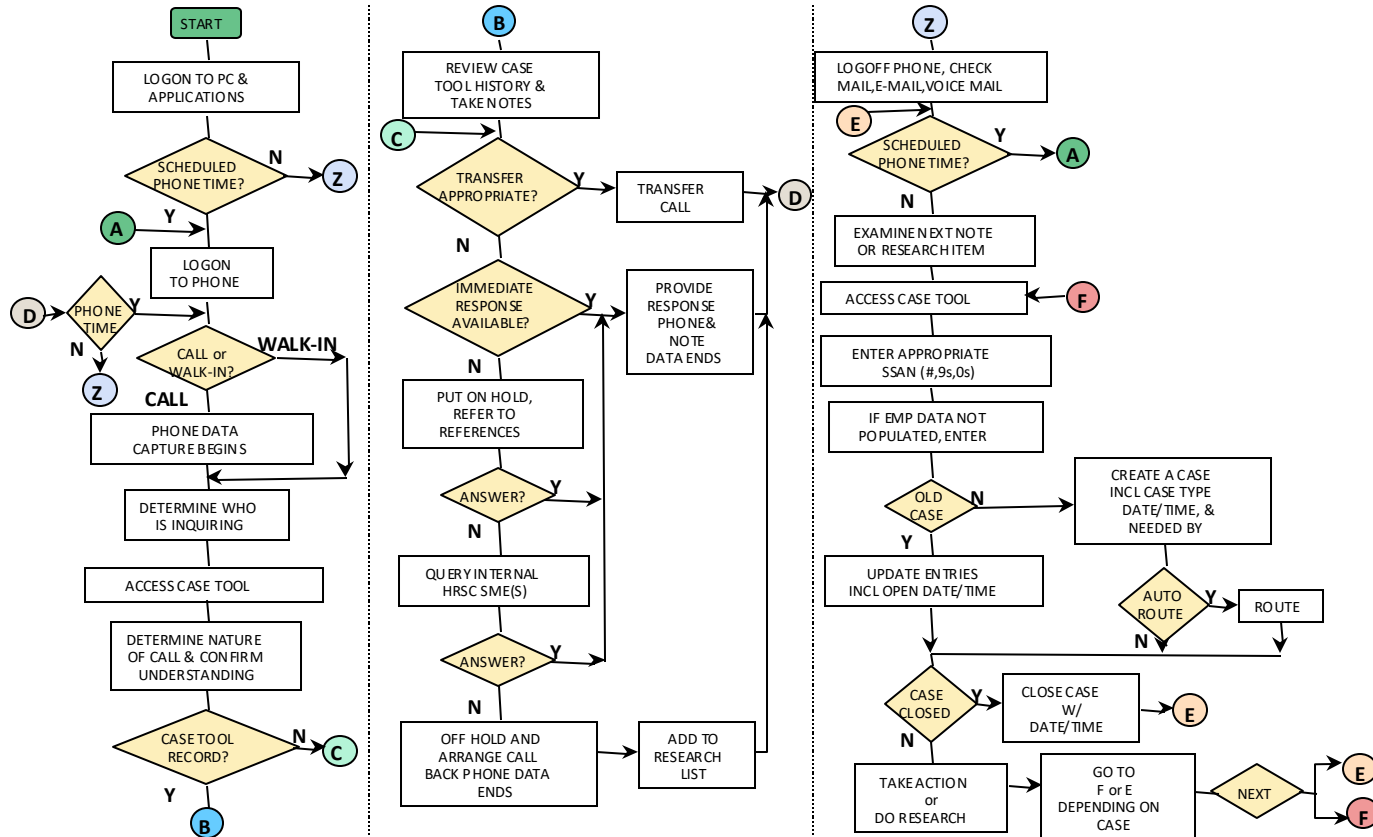
As the name states this diagram shows the process steps in a sequential flow, generally ordered from an upper left corner of the map towards the right side.

The Deployment-Flow or Swim Lane Process Map

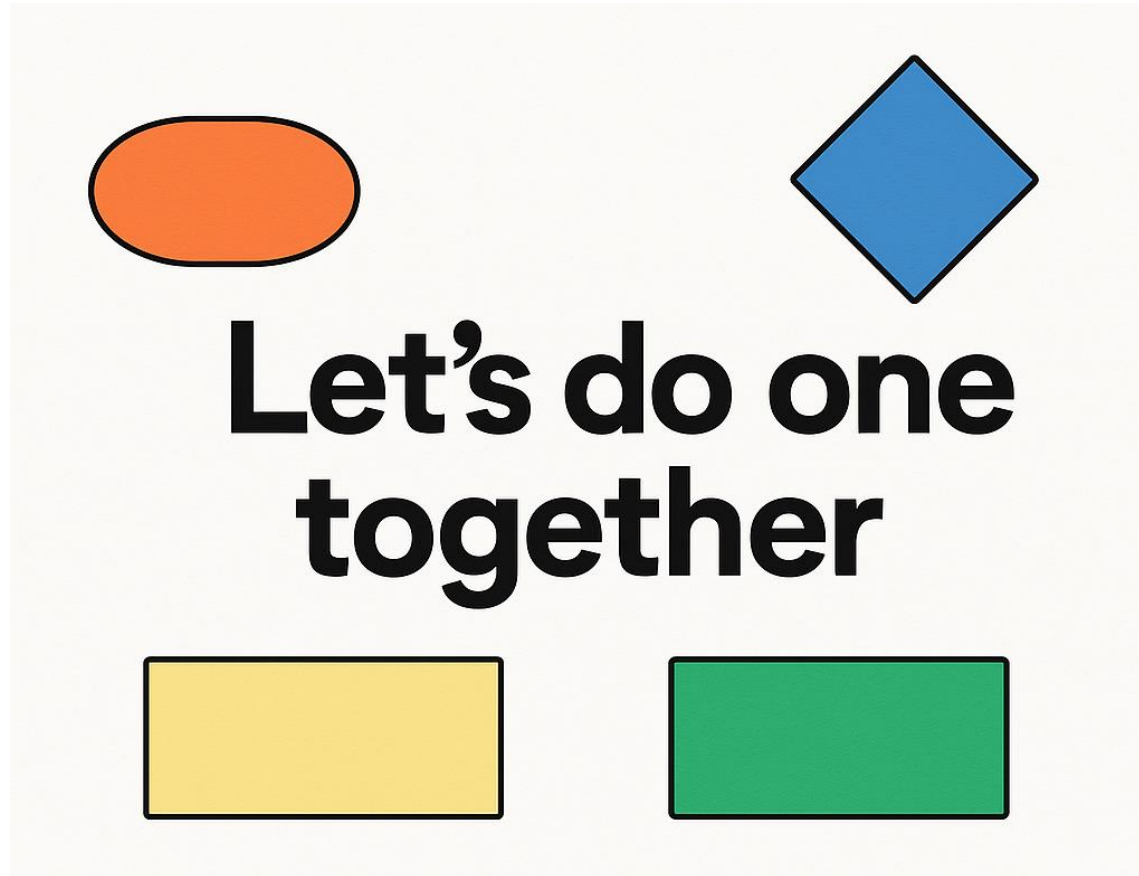


The value of the Swim Lane Map is that it shows you who or which department is responsible for the steps in a process. A timeline can be added to show how long it takes each group to perform their work. Also each time work moves across a Swim Lane there is a "Supplier – Customer" interaction. This is usually where bottlenecks and queues form.

PROCESS MAP EXAMPLE



PROCESS MAP EXERCISE



DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

Spaghetti Diagram

- Purpose

- Show the physical flow of members and materials
- Used to improve the physical layout



Spaghetti Diagram Preparation

- Think about what you want to show
 - Parts/part families
 - People
 - Functions
 - If showing multiple items, can show on same map in different colors
- Think about what you want to understand
 - Distance, # steps
 - Use these to quantify the resulting map

Spaghetti Diagram Steps to Create

1. Obtain a drawing of the area
 - Several copies, A couple plotted and a handful A3 size, and clipboards
2. Observe the process and record the steps
 - If it is in one area, observe to flip chart,
 - if distributed make assignments distribute clipboards and follow and map
3. Begin with the first step and draw lines between each successive step
 - Use arrowheads to show direction on map
 - "#x" to represent paths that are repeated numerous times
4. Record time and/or distance between each step
5. Record overall time and/or distance for the process
6. Identify improvement opportunities
 - Alternate layouts, draw a diagram of the improved process

QUIZ 2:



1. How do you calculate Takt Time?
 - **EFFECTIVE WORKING TIME PER TIME PERIOD / CUSTOMER DEMAND PER TIME PERIOD**
2. What is the difference between special cause and common cause variation?
 - **COMMON CAUSE IS EXPECTED WHILE SPECIAL CAUSE IS UNEXPECTED.**
3. What is the goal of the measurement phase?
 - **EVALUATE THE “AS-IS” CAPABILITY OF THE PROCESS**



VALUE STREAM MAPPING

DEEPER DIVE!

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL



INTRODUCTION

Definition: All the actions (both value added and non-value added) currently required to bring a product from raw material to customer.

- Shows the “Big Picture”.
- Documents the path from customer to supplier and back.

WHY IS THIS

AN ESSENTIAL TOOL?

- Helps you “see” the flow
- Identify the waste and its source
- Provides a common language
- Decisions about the flow become apparent
- Linkage between information flow and material flow
- Allows team to document current AS IS and determine TO BE states

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

REDUCE

LEAD TIME

- Lead time is measured from the point where flow is initiated or triggered in a process until the product or service reaches the customer
- The aim is to reduce this timeframe by only producing in response to a pull from the customer (or the next process as customer) and eliminating the things that waste time and resources.
- LT reduction is often accomplished by eliminating queue times between processes



“All we’re trying to do is shorten the time line...”

Taiichi Ohno

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

CURRENT STATE VS MAP STEPS

- **Step 1:** Identify customer requirements and calculate takt time
 - Our customer is sometimes internal or external
 - Our customer is also the shareholder
- **Step 2:** (DATA BLOCKS) Identify Main Processes In Order
 - Each one will be different and unique to the area you are working with.
 - A data block is created when a person or area passes a product or service to the next step.

CURRENT STATE VS MAP STEPS

- Step 3: Add arrows for the Flow of Information.
 - Straight arrows
 - Right Angles (NO diagonals)
 - Information flow arrows
- Step 4: Walk the Value Stream: Add inventory / delay queues. Note movement and inventory
 - What will be considered the WIP? What is considered inventory?
 - Inventory triangles should be noted between process blocks.
 - Stay customer centric here. A customer doesn't care if you have a price on a line item if they are waiting for a package...

CURRENT STATE VS MAP STEPS

- **Step 5:** Walk the Value Stream - Populate the Data Boxes with Metrics
 - Identify Key Performance Indicators for the Value Stream.
 - For today => See Data Box
- **Step 6:** Summarize Value Stream Metrics - Calculate Lead Time Ladder
 - Lead time complete = lead time PLUS Inventory



DATA INTEGRITY

There are four scenarios for data collection.



Data exists



Data can be gathered through observation of work



Data can be collected through simulation of activities



If you cannot observe or simulate the activity you may have to make an educated “estimate”

DEFINE

MEASURE

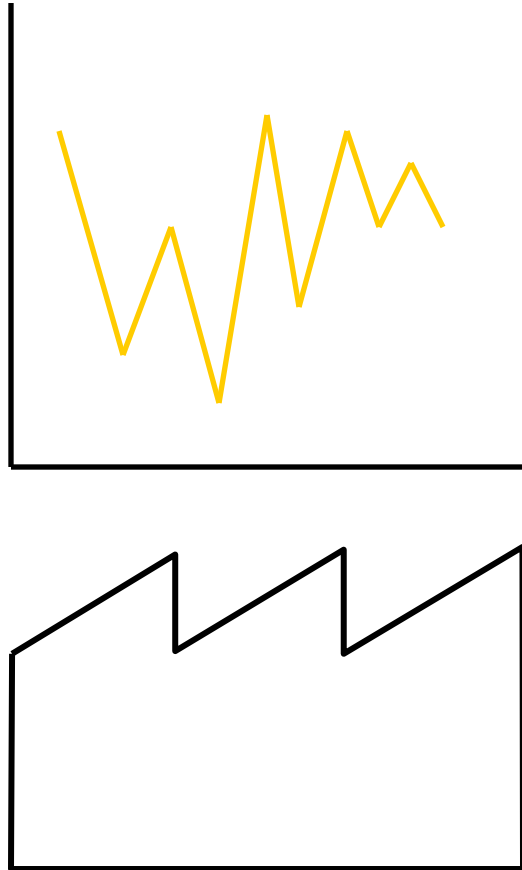
ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

CREATING THE CURRENT STATE VALUE STREAM MAP



Always Start With the Customer

- What capability /service do you provide?
- What are the boundaries of your map?
- What is the demand profile?

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL



TAKT TIME


$$\text{Takt Time} = \frac{\text{Time Available / Period}}{\text{Customer Demand / Period}}$$

Takt Time – *The available production time divided by customer demand.*

- Defining the “right goods or services”, is done in the design and development process.
- The steps to transform the raw material or data to the customer defined value are captured as the work elements.
- To provide goods and services “in the right quantity, at the right time”, customer demand (takt time) must be understood.
- Cycle Time should be $\leq$ to Takt Time

TAKT TIME EXAMPLE

Takt Time = Demand Rate

- Synchronizes pace of processing to match pace of customer need.

$$\begin{aligned}\text{Takt Time} &= \frac{\text{Effective working time per time period}}{\text{Customer requirement during the time period}} \\ &= \frac{460 \text{ minutes / day}}{46 \text{ quotes}} = 10 \text{ minutes per quote}\end{aligned}$$

Ideally, one quote every 10 minutes must be processed

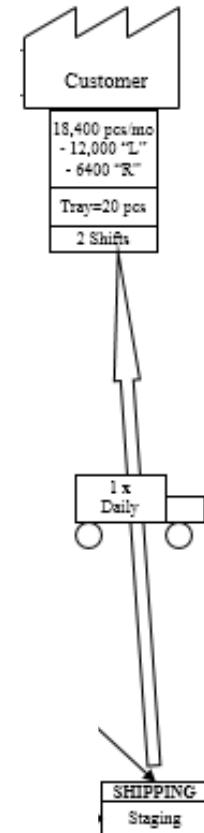
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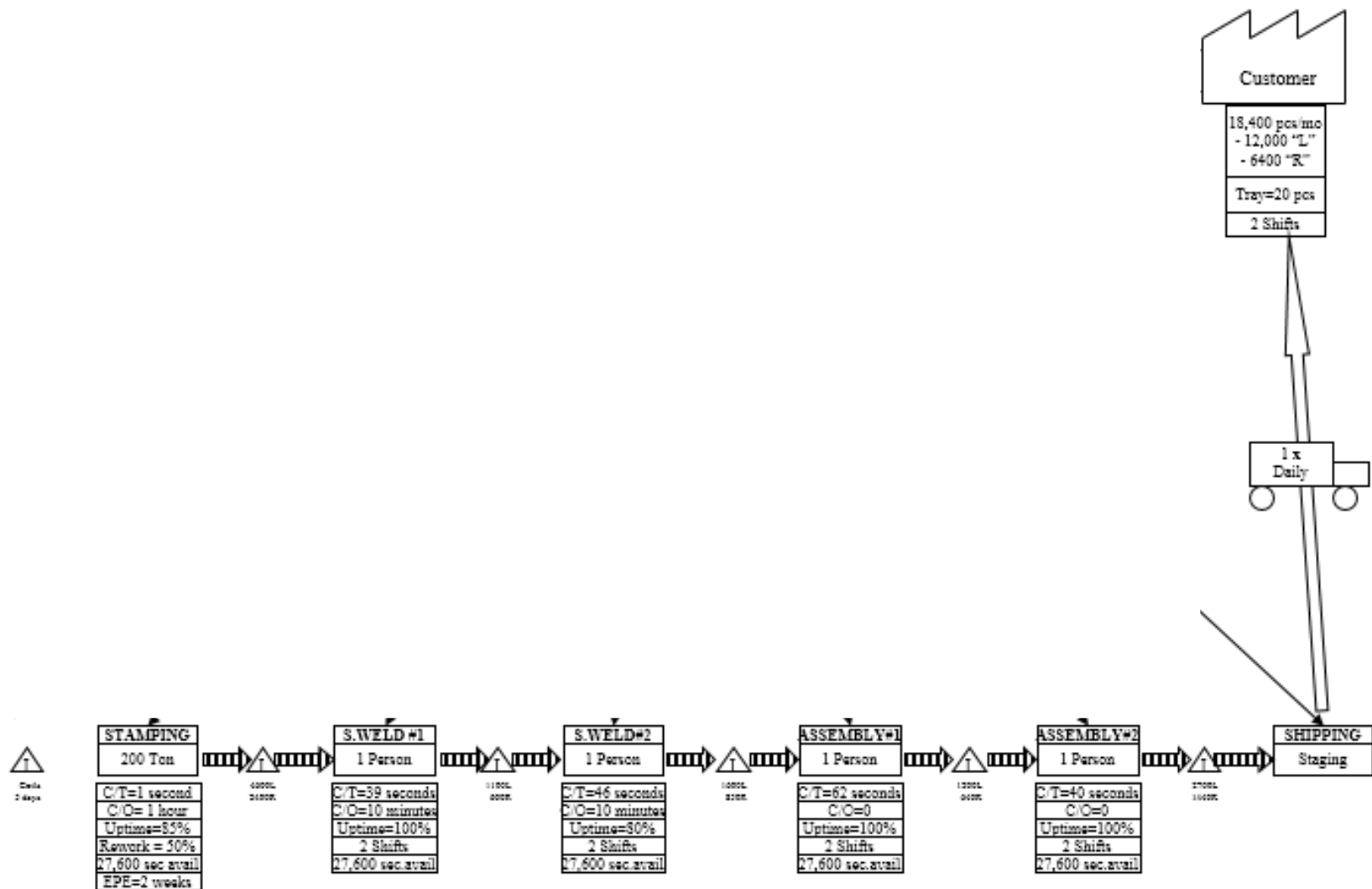
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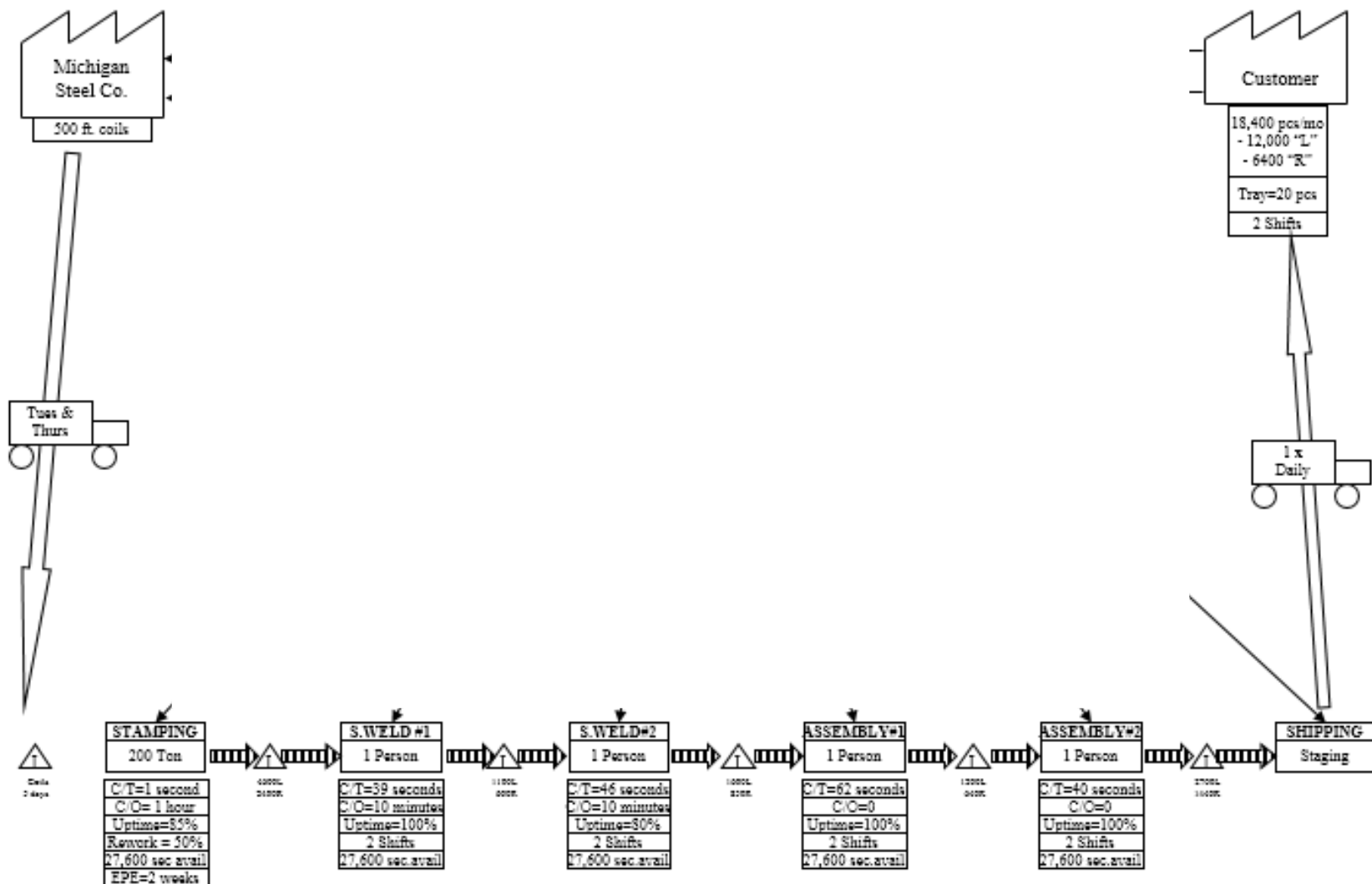
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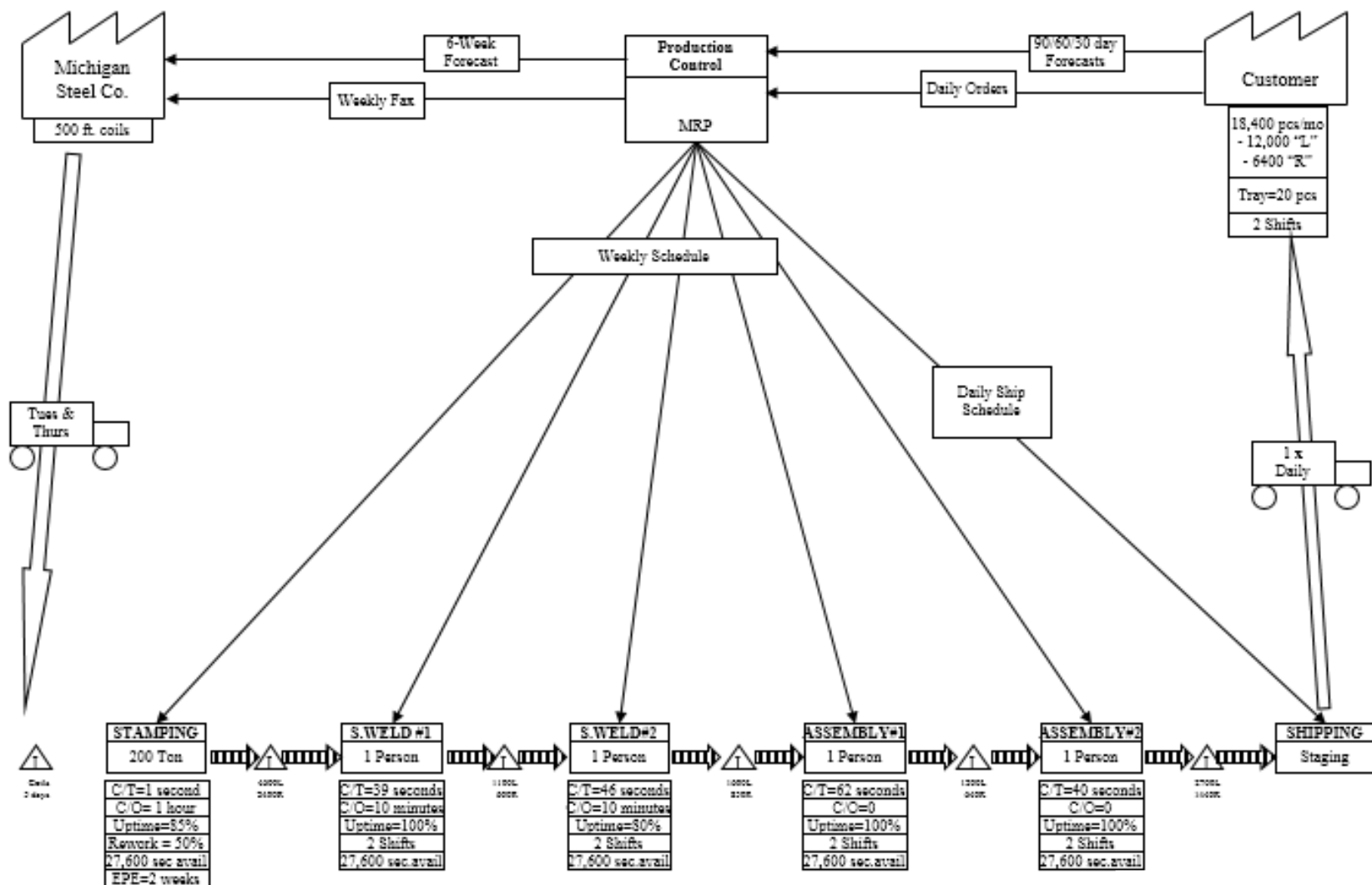
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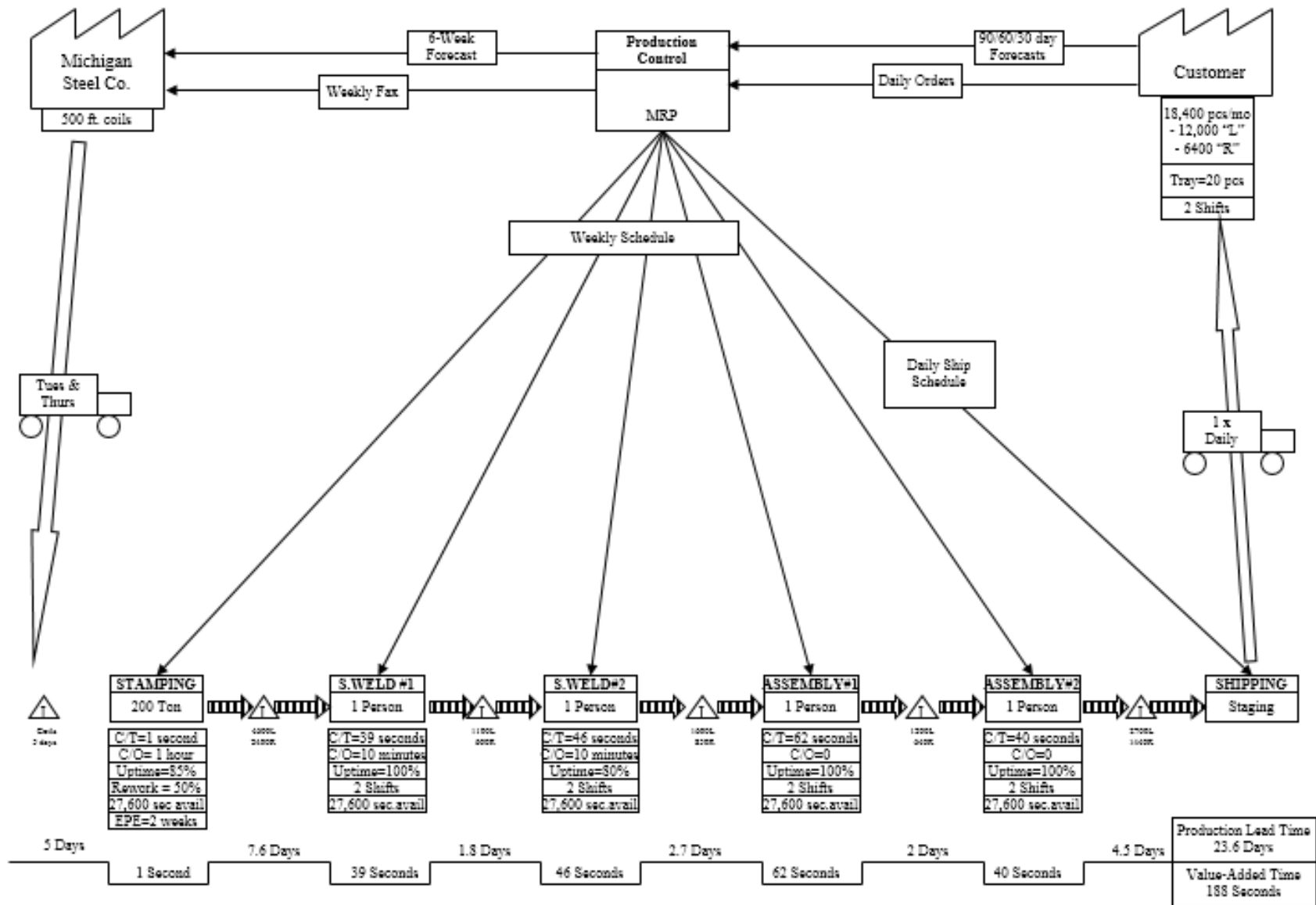
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DEFINE

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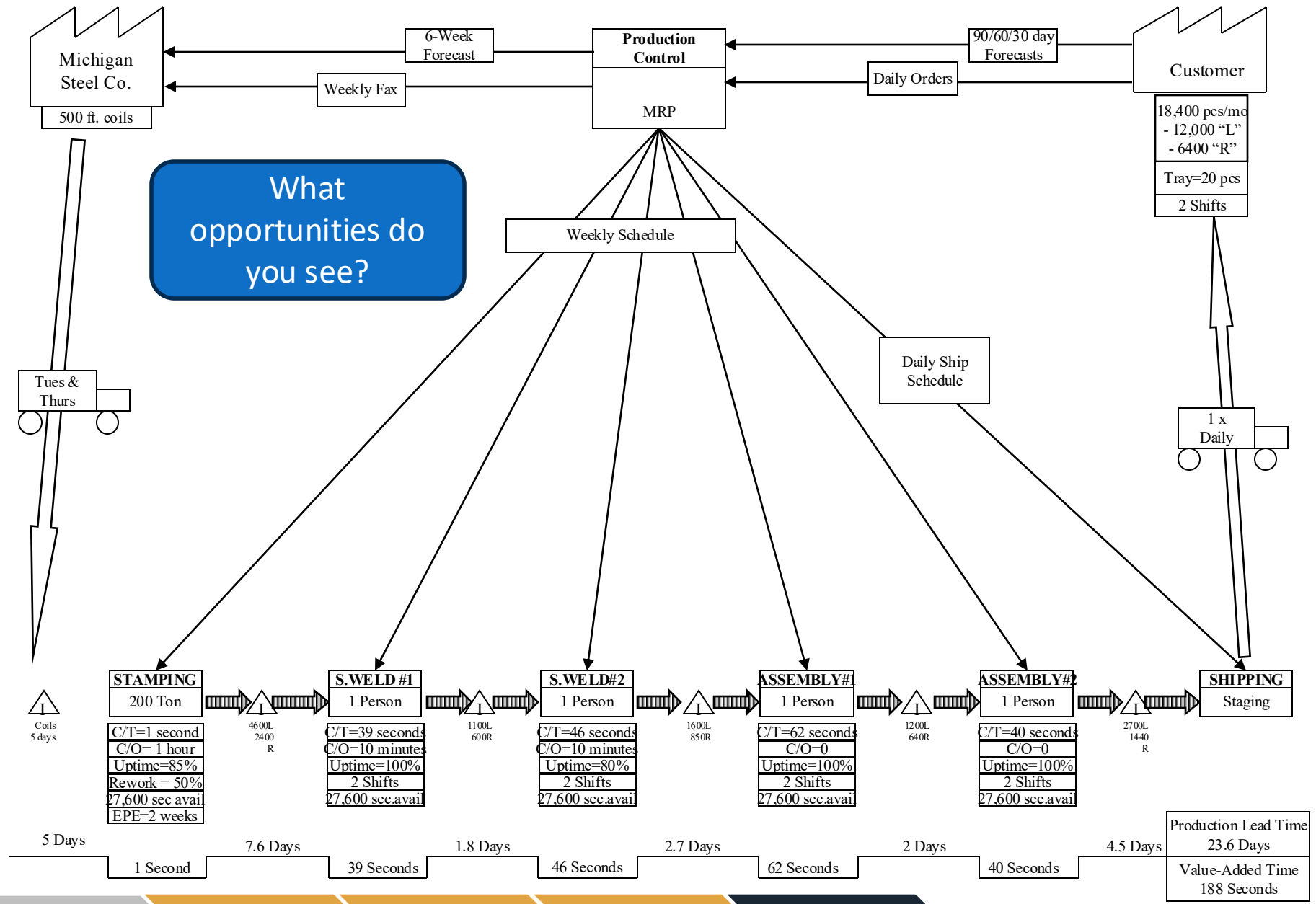
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CURRENT STATE MAP



FUTURE STATE VSM



8 Point Criteria



Takt Time – Ensure that can meet the takt time



Finished Good Strategy – Make to Stock or Make to Order



Continuous Flow- Where can 1 pc flow be put into place



FIFO – If no 1 pc flow, where can FIFO and what size of FIFO



Pull – if can't flow, need to pull



Scheduling only 1 point – typically pacemaker

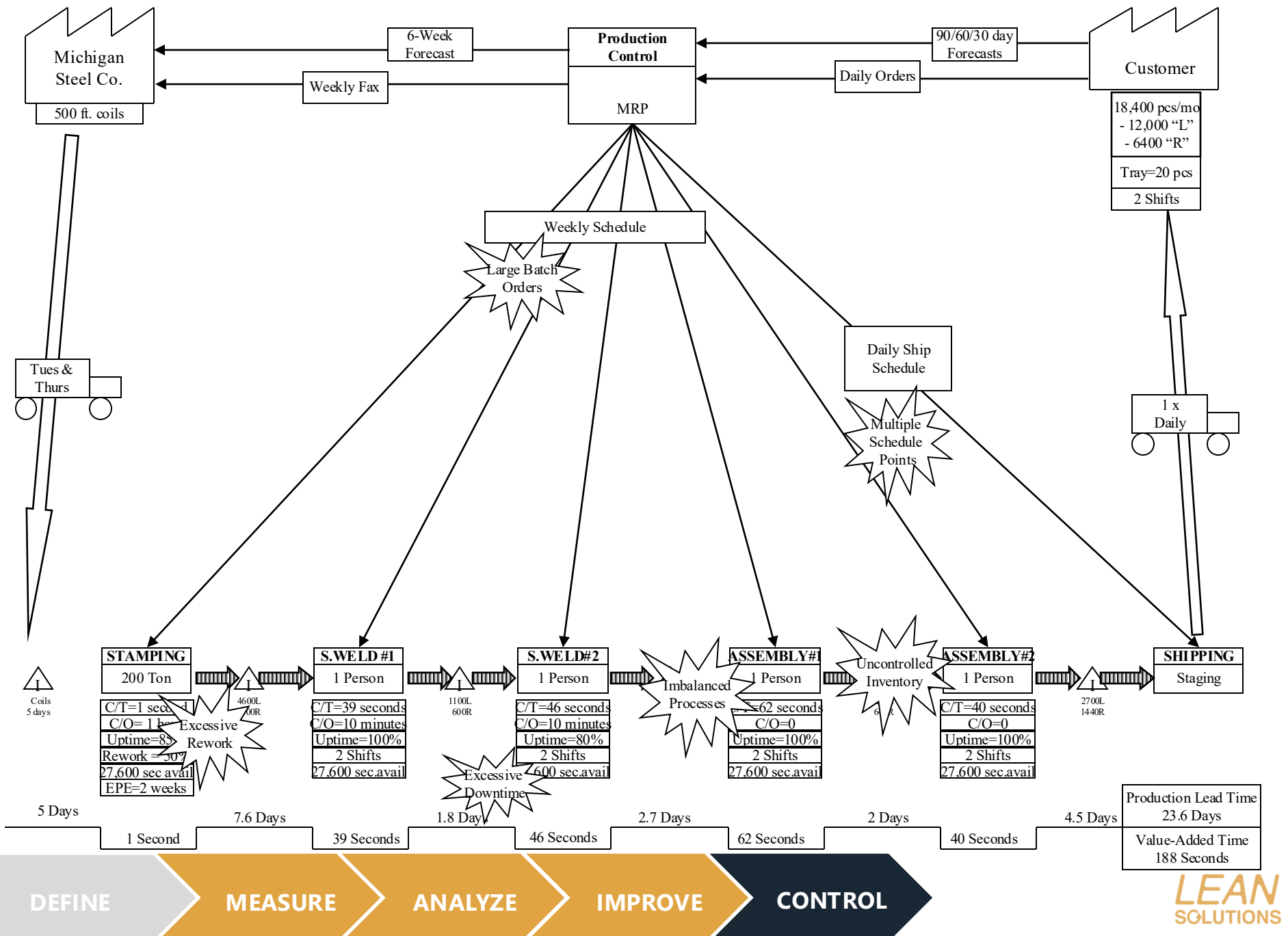


EPEI – Interval (how often run through every regular product)

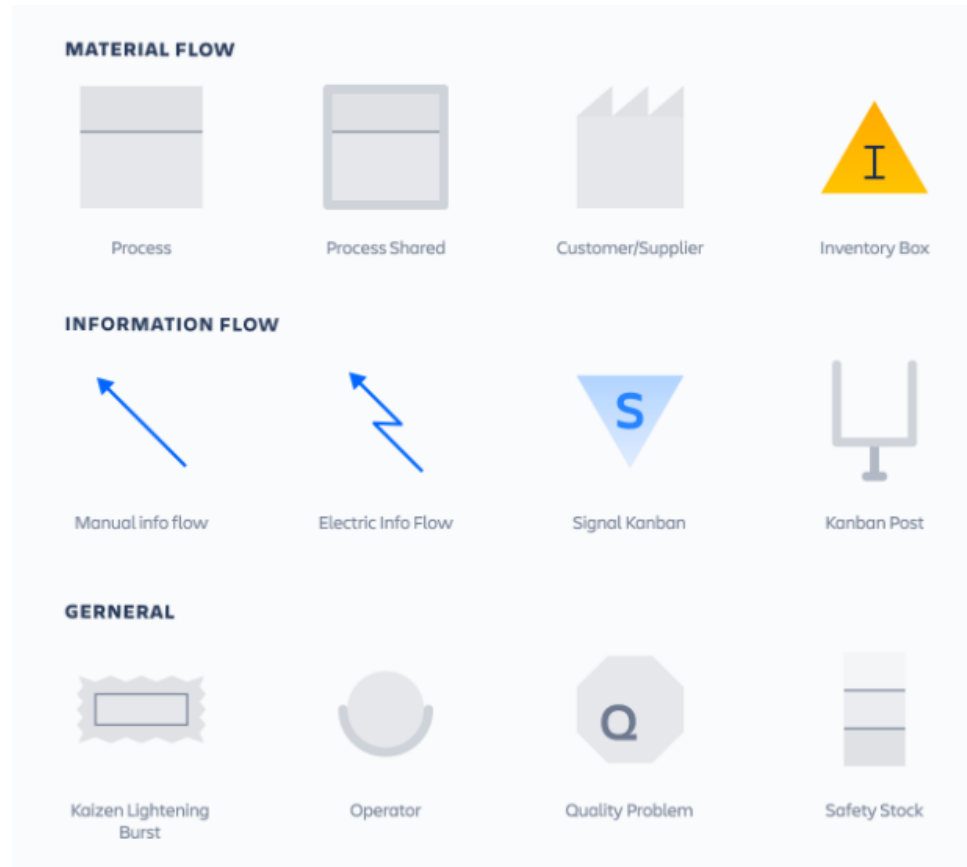


Pitch – How often release and take work away from pacemaker

CURRENT STATE MAP



VALUE STREAM SYMBOLS



DEFINE

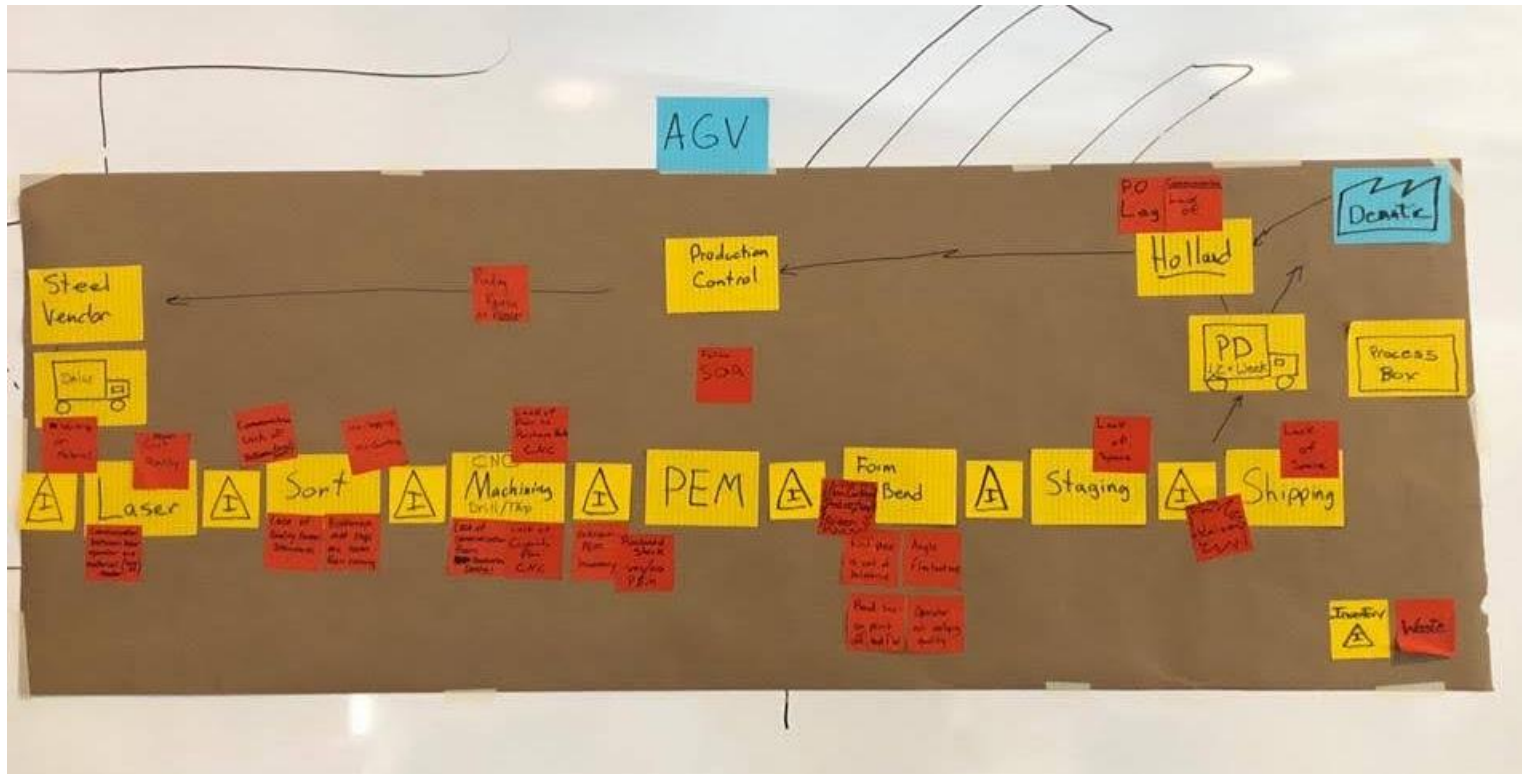
MEASURE

ANALYZE

IMPROVE

CONTROL

VALUE STREAM MAP EXAMPLE



VALUE STREAM MAP EXAMPLE



DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

VALUE STREAM MAP EXAMPLE



DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL



LET'S CREATE ONE TOGETHER!

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

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SOLUTIONS



VSM or Process Map?

Feature / Use Case	Value Stream Map (VSM)	Process Map
Scope	Broad – entire value flow across departments	Narrow – specific process or subprocess
Focus	Flow of materials and information	Sequence of tasks and decisions
Purpose	Identify delays, inventory, and handoffs	Understand steps, roles, rework, and variation
Time-based metrics	Yes – includes lead time, process time, takt time	Optional – usually focuses on step sequence
Cross-functional use	Yes – shows interaction across teams	Often used within a single function
Best used when...	Improving end-to-end delivery or lead time	Standardizing or improving a local process

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

Update the A3

A3				
Project Title:	Project Champion:	Project Manager:	Core Team Members	Original Creation Date:
	0	0	0	
	Process Owner(s):			Rev Date/ Rev #
	0			
Problem Statement			Measure	
What is the problem to be solved (use a metric), when and where is it occurring, what is the requirement and who is affected.				
Business Case			Analyze	
Why should we work on solving this problem now, why is it important to the business.				
Scope			Improve	
In Scope		Out of Scope		
Include both what is in scope and out of scope. SIPOC can help with this				
Goal			Project Champion Approval	
What is the goal of this project (x to y by when)? What are the process characteristics of the project in addition to the metric change (for example, one piece flow)? Note: this should not be the solution.				
Define			Control	

- For everything you have learned during the Measure Phase update the A3



Remember, the Goal of the Measure Phase was to:

Evaluate the “As-Is” Capability of the
Process.

DEFINE

MEASURE

ANALYZE

IMPROVE

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ANALYZE PHASE

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL



The Analyze Phase is

The Analyze Phase is for determining the ROOT CAUSE of the problem that we are trying to solve.

DEFINE

MEASURE

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METHODS USED TO ANALYZE THE DATA



Pareto



Brainstorming



Fishbone, Cause and Effect, or Ishikawa Diagram

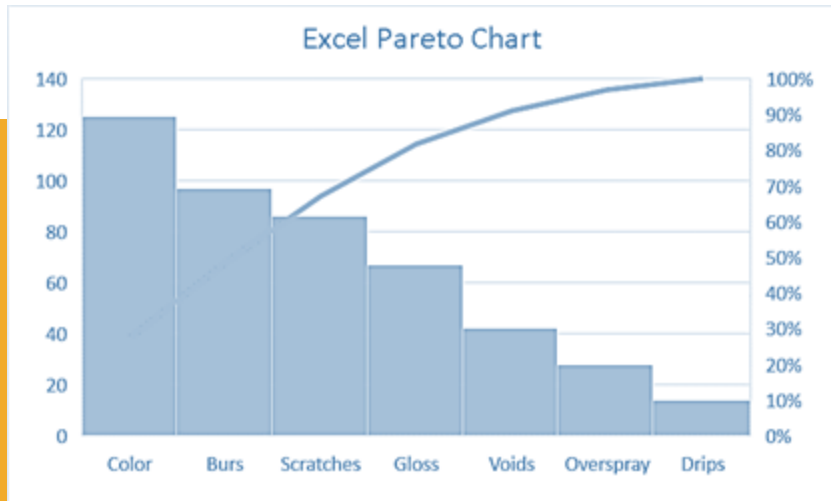


5 Whys

THE PARETO PRINCIPLE

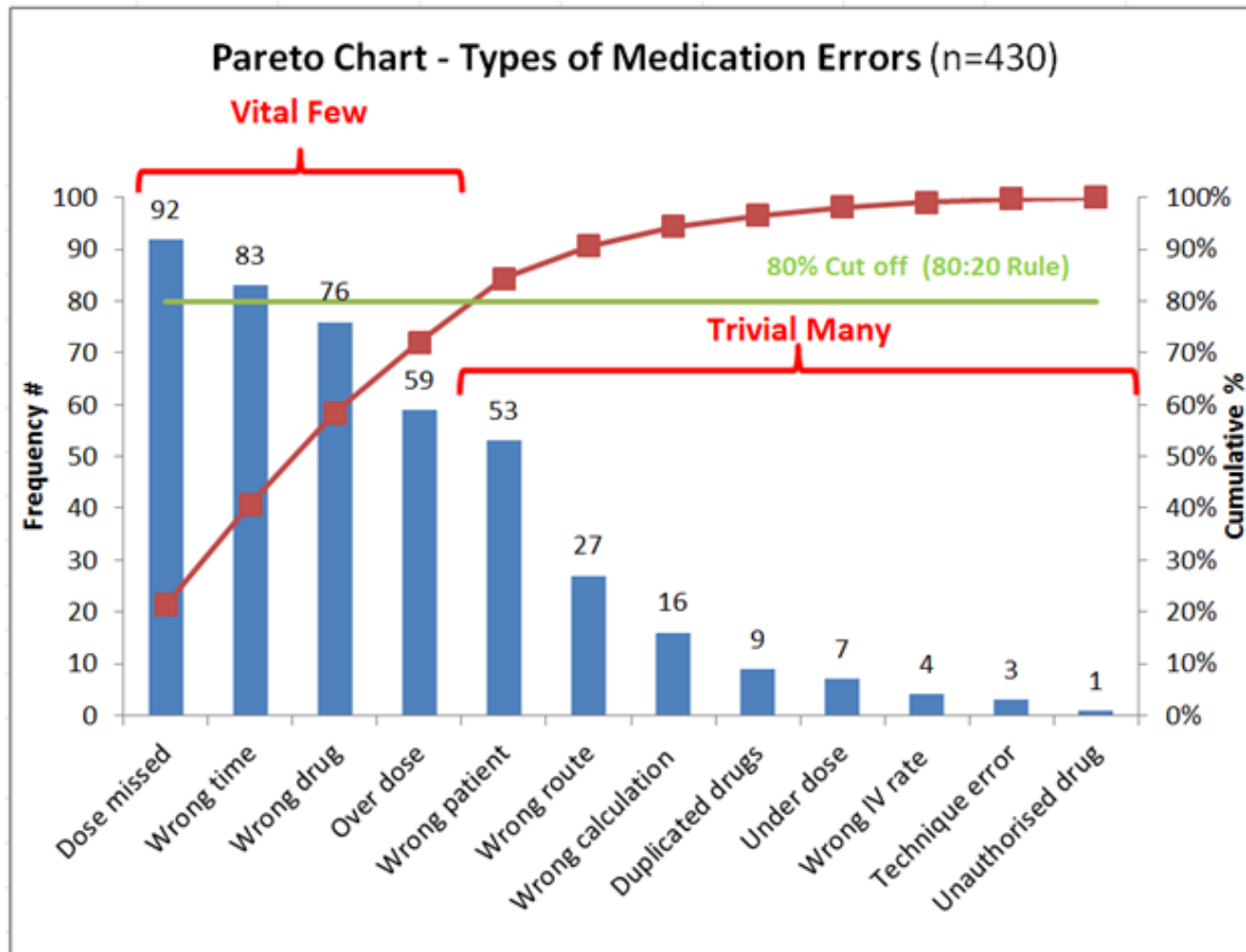
- The Pareto Principle was first developed in 1906 by Italian economist, Vilfredo Pareto, who observed that 20% of the population owned 80% of the wealth.
 - Also called the 80 : 20 rule.
- Joseph M. Juran adapted Pareto's economic observations to business applications.
- Juran stated that “80% of Defects in Process Outputs are as a result of 20% of the total Defective Process Inputs

PARETO CHART



A Pareto Chart is a vertical bar graph in which values are plotted in descending order of frequency from left to right. This classifies problems and defects by type in the order of quantities and illustrates the cumulative percent total as a line graph.

The Pareto principle is also called the 80/20 rule because roughly 80% of the problems come from 20% of the causes.



PARETO CHART EXAMPLE

DEFINE

MEASURE

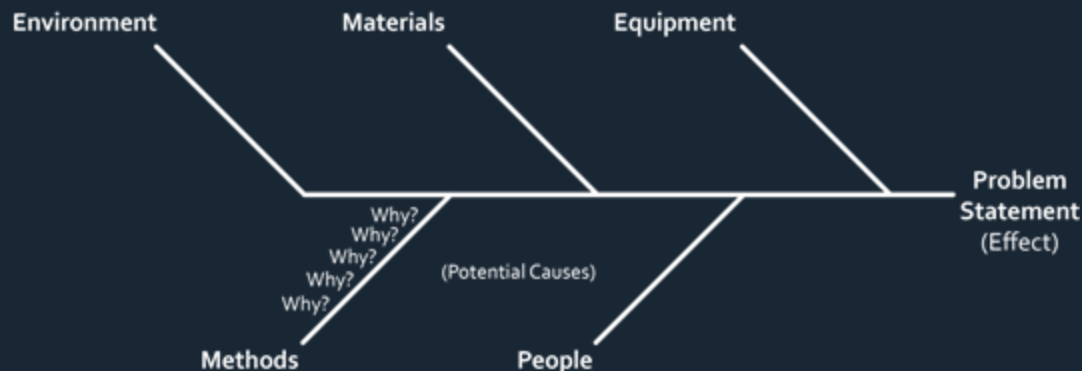
ANALYZE

IMPROVE

CONTROL

CAUSE & EFFECT DIAGRAM

- Also known as Ishikawa or Fishbone Diagram
- Using a Cause & Effect Diagram, consider potential causes in each category.
- Going for quantity of ideas at this point
- Use branches, stems, and twigs on the diagram to display each response.



CAUSE & EFFECT DIAGRAM

Fishbone Diagram			
Man	Method	Mother Nature	
How does interaction with operators, Mgt, potentially cause problem? Look for shift to shift and/or person to person variation	Focus on standard work, work instructions, control plans or the lack of them and how this potentially causes problem.	Focus on environmental causes: time, temperature, location, time, culture.	
potential cause potential cause	potential cause	potential cause	
potential cause potential cause	potential cause potential cause	potential cause potential cause	Problem Statement
How does documents, information, parts, inventory needed by the process potentially cause the problem?	How does equipment, computers, tools etc required to accomplish the work potentially cause the problem?	How does the measurement equipment usage, capability, etc potentially cause the problem?	
Material	Machine	Measurement	

DEFINE

MEASURE

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Develop a Fishbone

In the last 4 days, our coffee maker produced 100% of the coffee with a terrible bitter taste, which my wife and I disliked.

DEFINE

MEASURE

ANALYZE

IMPROVE

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Now that we have ID potential Causes where do we begin?

CLUSTERING METHOD + N/3 METHOD

DEFINE

MEASURE

ANALYZE

IMPROVE

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CLUSTERING

THE DATA



- combine the same/similar possible causes into groups
- pick the top 3-5 biggest groups to move forward with
- Groups indicate that these are common ideas

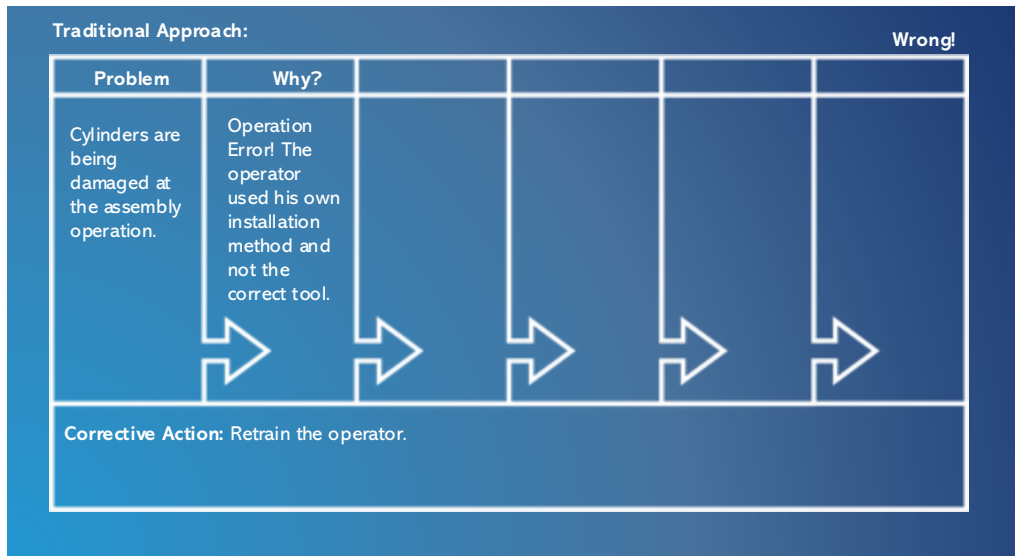


N/3

Multivoting

- This is a method used to “vote” for the most likely causes
- Take the number of people on the team (N) and divide by 3 to give the number of votes each person gets
- For a team of 12 divide by 3 and each person gets 4 votes
- For smaller teams, I would typically give at least 2-3 votes

5 WHY ANALYSIS

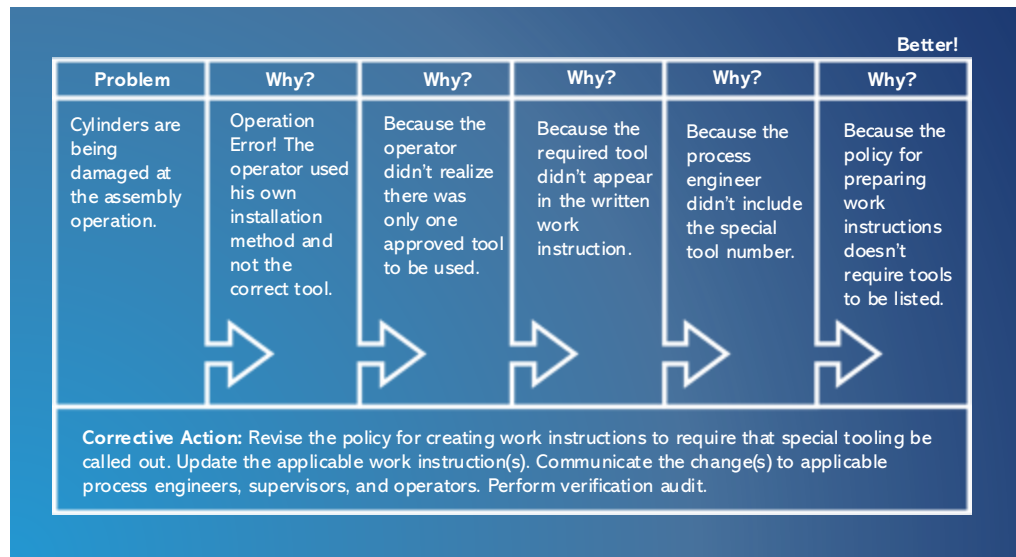


One of the most effective tools in determining root cause is to simply keep asking why something occurs/happened.

The traditional approach usually jumps to a quick conclusion which often results in repeat occurrences of the same or similar kind.

5 WHY ANALYSIS

On the other hand, continually asking 'why?' generally gets to the underlying root causes

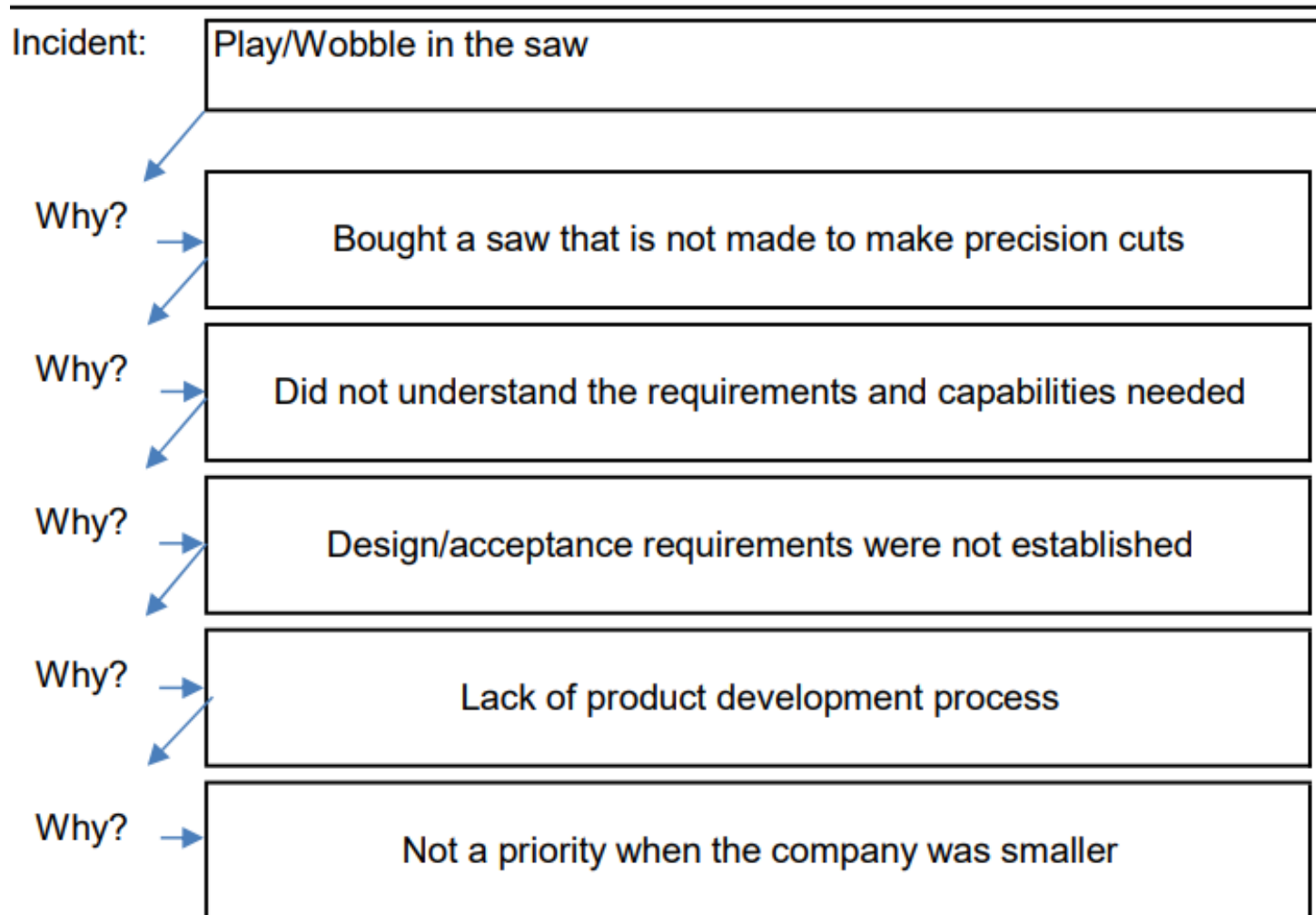


THEREFORE TEST

After you reach the potential root cause using the “5 why’s”, check the rationale using the “therefore test” to verify the resulting cause/effect relationship. Does it make sense?

Therefore	Therefore	Therefore	Therefore	Therefore	Issue
Cylinders are being damaged at the assembly operation.	Operation Error! The operator used his own installation method and not the correct tool.	Because the operator didn't realize there was only one approved tool to be used.	Because the required tool didn't appear in the written work instruction.	Because the process engineer didn't include the special tool number.	Because the policy for preparing work instructions doesn't require tools to be listed.
←	←	←	←	←	

5-Why Example





5-Why Practice

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

Update the A3

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Scope			Improve	
In Scope		Out of Scope		
Include both what is in scope and out of scope. SIPOC can help with this				
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Define			Control	

- For everything you have learned during the Analyze Phase update the A3

IMPROVE PHASE

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL



The IMPROVE Phase is

For developing, testing and implementing solutions that address the identified root causes.

DEFINE

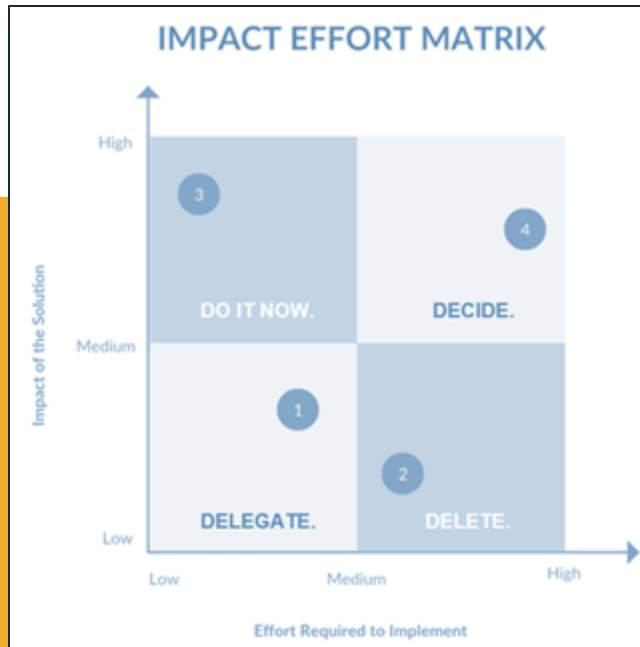
MEASURE

ANALYZE

IMPROVE

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SOLUTIONS



IMPACT EFFORT MATRIX

- Brainstorm alternative solutions.
- Ensure that solutions address root causes.
- Impact / Effort matrix
- Perform trials or pilot tests.
- Don't get caught in "paralysis by analysis."

DEFINE

MEASURE

ANALYZE

IMPROVE

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FMEA (RISK ANALYSIS)

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS



WHY CREATE A FMEA?

Failure Modes and Effects Analysis
(FMEA) is a methodology to manage...

RISK!!!

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

THE FMEA MATRIX

[illegible]

Provides structure to capture and quantify risks of failure points.



Let's Practice!

FMEA															
#	Process Function (Step)	Potential Failure Modes (process defects)	Potential Failure Effects (Y's)	SEV	Potential Cause of the Failure (x's)	OCC	Current Process Controls	DET	RPN	Recommended Actions	Responsible Person & Target Date	SEV	OCC	DET	RPN
1	Add Water								0						0
2	Add Coffee Grounds								0						0
3	Turn on Machine								0						0
4	Pour Coffee								0						0

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

POKA YOKE

What can you do with your solutions to make sure that we prevent mistakes/defects as opposed to correcting them?

Poka Yoke = Mistake Proofing

TRIALS

- Now that the team has identified potential solutions, you need to verify if it is able to turn the problem on/off
- Look for simple, safe ways to mimic the solution that ideally are cheap/free to test

TRIALS

Trial Title:	
What is the Trial?	How will we run it?
How will we measure?	What do we expect?
What did we get?	What did we learn?
Conclusion / Recommendation	

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

UPDATE GANTT CHART

For each step that must be completed in the improve think through:

Typical Gantt Fields

1. Who?
2. What?
3. When?
4. Where?

Additional

1. How?
2. How Much?

Make preparations to present it to the appropriate decision makers:

1. Project management tools
 1. Cost vs Benefits Analysis
 2. Milestone Charts



GET GUIDANCE & SUPPORT FROM

LEADER, PROCESS OWNER, CUSTOMER, &
OTHER STAKEHOLDERS. AVOID FALSE STARTS!

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS



IMPLEMENT SOLUTION

- Brief all people involved about the plan so that they have ownership in its success.
- Use a Gantt chart to track all actions
- Remember that even a great plan will fail if not executed properly.
- Ask the leadership team to help remove roadblocks as needed.

Project Management Tools

1. Milestone Charts (High Level)
2. Task Lists (Detail Level)

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Define		Control		

- For everything you have learned during the Improve Phase update the A3

QUIZ 3:



1. What is the purpose of the MEASURE Phase in DMAIC?
 - **TO UNDERSTAND THE CURRENT STATE (AS-IS) OF THE PROCESS THAT CONTAINS THE PROBLEM.**

2. Detailed Process Understanding is required in the Measure Phase ? Who are the People to involve to gain a better understanding of the process and problems ?
 - **THE PEOPLE WHO WORK ON THE PROCESS. THE WORKERS AT THE GEMBA**

3. Another name for an Ishikawa diagram is the _____ diagram.
 - **FISH BONE**

4. To ask your team '*Why does this happen ?*' more than once in order to understand the Root Cause is called the _____ method.
 - **5 WHYS**

5. What is another name for the 80/20 Principle ?
 - **PARETO PRINCIPLE**

QUIZ 4:



1. How do you calculate Takt Time?
 - **Effective working time per time period / Customer demand per time period**
2. What is the difference between special cause and common cause variation?
 - **Common cause is expected while Special cause is unexpected.**
3. What is the goal of the measurement phase?
 - **Evaluate the “As-Is” capability of the process**



HOMEWORK REVIEW

(Open Computers and Log into your Portal)





END OF DAY 2



LEAN
SOLUTIONS
ACADEMY

A group of five professionals (three men and two women) in business attire are huddled together, smiling and looking down at something they are holding in their hands. The background is a blurred office or industrial setting. The image is framed by a blue geometric overlay.

Lean & Six Sigma Training Green Belt Certification

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CONSULTING

CLASS SCHEDULE

Day 1

- Yellow Belt Class Refresh
- DEFINE
 - Introduction to DMAIC
 - Charters
 - SIPOC
 - Gantt Charts
- MEASURE

Day 2

- Green Belt Project Review
- ANALYZE
 - Fishbone Diagram
 - 5 Whys
 - Value Stream Mapping
- IMPROVE
 - Impact/Effort Matrix (Affinity Diagram)
- Facilitating a Kaizen Event

Day 3

- Green Belt Project Review
- CONTROL
 - Control Plan
 - Layered Audits
- Strategy Execution/ Hoshin Kanri
- Change Management



PROJECT CHECK-IN'S

- What is your Problem Statement?
- What are your measures of success?
- What is your timeline? Milestones?
- Do you have any roadblocks? Do you need help with anything?
- What are your next steps?



CONTROL PHASE

LEAN SIX SIGMA CONTROL

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

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METHODS USED TO MEASURE THE OUTCOME

-  Be Consistent, Don't Fall Back To The Old Ways
-  Be Visible
-  Measure Team Satisfaction
-  Follow Up With Team Concerns



MONITOR, MEASURE & CONTROL

- Remember that just because you have executed your plan does not mean that the problem is solved.
- You must verify your results and continually or periodically monitor results.
- If performance deteriorates, you must repeat the process.

Quality Tools

- Graphs
- Histograms
- Control Charts

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

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SOLUTIONS



METHODS USED TO SUSTAIN THE GAINS



Auditing The New Standard



Add Monitoring To Your Leader Standard Work



Visual Management Controls



Schedule Next Kaizen Event

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

EXAMPLE OF CONTROLS

- Control Plan
- Control Chart
- Other Tracking Charts
- Standard Work
- Recurring and Documented Training
- Audit

WHAT IS A CONTROL PLAN?

- A written summary describing systems used for monitoring/controlling process or product variation
- A Living document to be updated as new measurement systems and control methods are added for continuous improvement
- Often includes concise operator instructions (SOPs , SWIs, OCAPs)
 - OCAP = Out of Control Action Plan
 - SWI =Standard Work Instructions
 - SOP = Standard Operating Instruction
- Made in conjunction with the final project report
 - Lessons Learned
 - Actual Gains vs Planned Gains

CONTROL PLAN ELEMENTS

4 Elements of a Control Plan

1. Training
2. Documentation
3. Monitoring
4. Response

CONTROL PLAN- TRAINING

Standard Work Training

- Train staff on updated SOPs, checklists, and job aids
- Provide hands-on practice to ensure correct execution

Control Plan Training

- Teach what metrics to monitor and how often
- Clarify roles: who measures, who reviews, who acts
- Review response plans when process drifts

Process Owner & Leader Training

- How to monitor KPIs and dashboards
- Role of Leader Standard Work in sustaining improvements
- Escalation and accountability processes

Knowledge Transfer

- Handoff from project team to process owners
- Explain root causes and why the solution works
- Highlight risks if old habits return

Reinforcement & Change Management

- Recognition of correct behaviors
- Quick reference guides / refresher sessions
- Embed training into onboarding where relevant

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

CONTROL PLAN - DOCUMENTATION

Standard Work/Work Instructions/ Job Aids

- Update to reflect new process steps
- Ensure version control is applied

Checklists

- Revise to match improvements

Visuals

- Update existing visuals to new process
- What new visuals are needed?

CONTROL PLAN ELEMENTS

Monitoring

Standard Work Audits

5S Audits

Results Monitoring

DEFINE

MEASURE

ANALYZE

IMPROVE

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AUDITING STANDARD WORK

AUDIT PURPOSE

- Check understanding of the standard
- Discover individual difficulties
 - Did lack of training lead to the problem
 - Kaizen: to take away difficulty

Standard Work audits are NOT meant to be punitive

STANDARD WORK **AUDIT AGENDA**



Member trained & documented?



Work area layout correct?



Work in progress within allowance?



Step sequence followed?



Within time?



Results discussed with member?

5S AUDITS

Determine Appropriate Audit Type

Layered Audit

Full 5S Audit

What "GOOD" Looks Like...

The Area Does Look Like This.

Date Audit Completed:

Spreading & Cutting Area

Layer 1

What "GOOD" Looks Like...

The Area Does NOT Look Like This Because...

Owner Initial When Addressed:

Date Audit Completed:

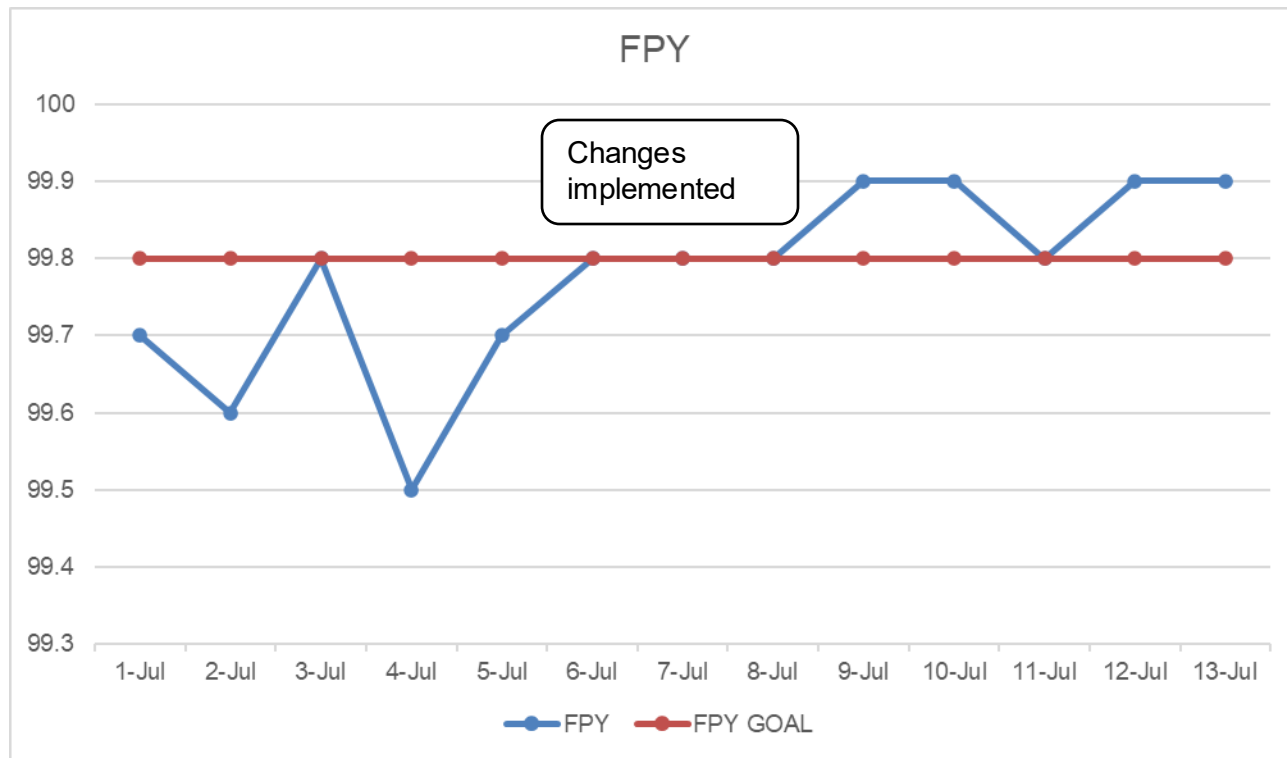
Spreading & Cutting Area

Layer 1

Category	Audit Criteria	Notes	Score (1-5)
Set (Determine what is needed and what is not)	No items shall be present in area without having a designated location. This includes personal belongings, parts, furniture, etc.		
	All air lines and electrical cords are neatly organized, secured and not touching the floor. Tools in good condition and unmodified.		
	Aidways are clear and clean without obstructions, trip hazards, etc...		
Set in Order (A place for everything, everything in its place)	No items / documents posted in area without a designated location. Including Team boards if applicable.		
	All necessary items in work area have a designated place and the item/s are in their places. (includes paperwork on Team Boards if applicable, equipment signage)		
	WIP standards and inventory quantities are visible and being followed.		
Shine (Cleaning and looking for ways to keep clean & organized)	All part racks and part containers are labeled with proper identification.		
	All equipment, racks, tools, mats, documents, containers, etc. are in their designated locations (unless in use). Items are not askew or touching lines. Replacement items are available to ensure use and proper changeover (PPE, knife blades, etc)		
	All surfaces, floor to ceiling are free of dirt, dust, oil and grease; "Hospital Clean" standard. This includes ceiling beams, overhead piping, fans, walls, etc.		
Standardize (Maintain, Monitor, Adherence)	Equipment, furniture, fixtures, walls and floor markings are well maintained and free of excessive wear, chips in paint, damage, etc...		
	No debris can be found in area bigger than a dime (including screws) on work surfaces, floor, under conveyor, etc.		
	Cleaning materials and supplies are available and clearly marked in designated locations.		
Sustain (Self-discipline, stick to the rules)	5S standards (i.e. standard work), 5S boundary map, and 5S record, safety information (LOTO and PPE) are posted in area in designated locations and are being adhered to.		
	All labeling, boundary lines, corners, equipment, walls, piping, etc. adhere to WFO standards.		
	All recycle containers adhere to WFO standards, and are in their designated location.		
	WIP levels and inventory limits are known and adhered to.		
	Records of required 5S activities are dated, initialed and current.		
	Team has documented action plans on team WOI to correct non-conformances from previous audits.		
	Team has documented action items on team WOI to improve workplace organization, reduce clutter, reduce/eliminate sources of clutter/debris.		
	All members have training/understanding of 5S principles and expectations.		

RESULTS MONITORING

Track the same metric and use the same type of chart to track results



DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

CONTROL PLAN ELEMENTS

Response

What is the response plan if something does go wrong?

Who is responsible for that response?

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

CONTROL PLAN

Project Title Customer Order Process		Project Manager 0		Project Start: Thu, 7/31/2025		SIMPLE GANTT CHART by https://www.vertex42.com																			
		Display Week: 1		Jul 28, 2025 28 29 30 31 1 2 3		Aug 4, 2025 4 5 6 7 8 9 10																			
				Aug 11, 2025 11 12 13 14 15 16 17																					
TASK	ASSIGNED TO	PROGRESS	START	END	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
CONTROL PHASE																									
Control Plan			date	date																					
Chart with results			date	date																					
Task 3			date	date																					
Task 4			date																						
Task 5			date																						

Create a separate control plan or update the Control Phase section of your Gantt Chart

Item #	Subject	Control Description	Typical	Control Control	Control Owner	Status	Reference / Other
1	Monitor compliance to the new Operator SOP	Train personnel on new SOP Track parts per hour & downtime/lost time and take action on repeat issues Respond to operator challenges of new design to sustain the improvements	Training Pn & Tool Monitoring	Daily Daily Weekly review at production mgt.	Don Krueger Brian Buchanan John Stewart (John J)	Training completed on _____ Spreadsheet not provided Ongoing	SOP #12345 Fault Tracking Log
2	Monitor compliance to the new Load Setup SOP	Train personnel on new SOP Track reasons for being pulled off work and take action on repeat issues Respond to test challenges of new design to sustain the improvements	Training Pn & Tool Monitoring	One time Daily Weekly review at production mgt.	Don Krueger Brian Buchanan John Stewart (John J)	Training completed on _____ Spreadsheet not provided Ongoing	SOP #12345 Tracking Log
3	Provide Plan for Load Setup	Train personnel on new response plan	Training	One time	Don Krueger	Training completed on _____	
4	Monitor compliance to the new Parking Lot SOP	Train personnel on new SOP	Training	One time	Don Krueger	Training completed on _____	
5							

Control Plan Approval and Acknowledgment

Process Owner / Date

Approver

Control Owner Action Acknowledgment

Name and Date

Name and Date

Name and Date

Name and Date

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS



KAIZEN

FACILITATING A KAIZEN EVENT

WHAT IS A KAIZEN EVENT?

A Kaizen Event (different than Kaizen as a mindset) is a focused team activity with a specific, aggressive breakthrough objective aimed toward solving a well-defined problem.

You can expect to accomplish huge results in a very short time frame (usually 2-5 days).



KAIZEN FACILITATOR

Role

- Guide the team through the improvement process
- Keep the group focused on the objective
- Manage time, pace, and participation
- Neutral perspective — focus on process, not content
- Support consensus and sustain positive energy



PRE KAIZEN WORK

Largest portion of kaizen success based on prep work



LEAN SOLUTIONS Kaizen Short Form

KAIZEN INFORMATION	
Kaizen Title:	Kaizen Pre-Work/ Data Collected ☐ Check if Complete
Kaizen Description:	
Kaizen Goals/Objectives:	
1)	
Kaizen Scope:	
Kaizen Sponsor:	
Process Owner(s):	
Team Leader:	
Team Members:	
Kaizen Date(s)/Times:	
Kaizen Report Out Date:	
KAIZEN CHECKLIST	
Pre Event Recommendations	
Establish measurable goals/objectives and success criteria for kaizen.	
Gather necessary current state data that quantifies the problem/pain being experienced	
Develop a SIPOC that defines the current state of the process (make sure to highlight opportunities as "starbursts").	
Define full team and ad hoc team members based on SIPOC customers and suppliers.	
Meet with Champions : Request for Resources & Calendar Invites	
Event Execution	
Train Kaizen Team and Establish Ground Rules	
Identify Current State Condition calling out rework loops, hidden factories etc.	
Gather data on current state condition such as:	
- Takt time	
- Number of process steps	
- How much time does each step take (value added and non value added)	
- Value added percentage	
- Total lead time etc	
Define Opportunities for Improvement	
Select and Prioritize Improvements	
Create the Future State	
Design Improvements to Achieve the Future State	
Live Test with a Real-Time Process if Feasible	
Modify the Improvement Based on the Test Results and Feedback	



LEAN SOLUTIONS

Finalize the Improvement	
Gather data on future state condition such as:	
- Takt time	
- Number of process steps	
- How much time does each step take (value added and non value added)	
- Value added percentage	
- Total lead time etc	
Assign Process Ownership	
Define Process for Monitoring Process Performance	
Create the Sustainability Plan	
Complete the Kaizen Report	
Hold Management Presentation	
Schedule weekly status meetings (for a minimum of 4 weeks post – event) to track progress and determine if additional action is required	
Post-Event Activity	
Observe Process and Measure Performance. Make real-time adjustments if necessary	
Train the Workforce on the New Process	
Thank Team and Communicate Results Throughout Organization	
Submit and/or Update Formal Documentation if Controlled Processes were Changed	
Comments:	
KAIZEN MATERIALS LIST	
Calculator	Masking/Duct tape
Digital Camera	Stop Watch
Laptop	Blank Time Study forms
Projector and Speakers	Pencils/Pens/Markers/Dry Erase Markers
Training Materials	Erasers
Flip Charts with sticky backing (large 3M Post-Its)	Scissors
Ruler	Butcher Paper
Multi-colored Post-It Notes	Name Tents
Extension Cord	

Pre Event Recommendations

- Establish goals/objectives
- Gather Necessary Current State data
- Develop SIPOC
- Define full team and support needed
- Meet with champions – request resources and determine timing

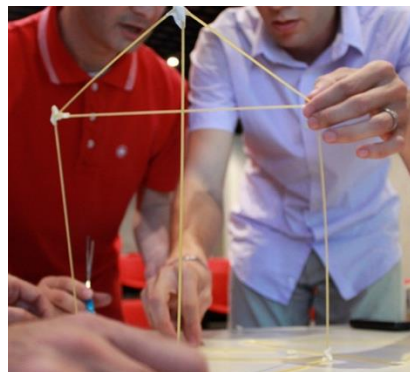
KAIZEN KICK OFF

Ground Rules

- 
- 1 person speaks at a time
 - Electronics Down
 - Be Open Minded
 - Silence = Agreement
 - Be Solution Oriented
 - Other Ideas?

ICE BREAKER ACTIVITIES

A Few Examples we have done



The Challenge

Build the Tallest Free-Standing Structure



+



+



+



20 Sticks of
spaghetti

1 yard tape

1 yard string

One
marshmallow



TRAIN ON LEAN & SIX SIGMA TOOLS



Value Stream Mapping



Root Cause Analysis



5S



Gemba



Kaizen



Poka-Yoke



Kanban



Statistical Process Control

FACILITATION TECHNIQUES

- Active Listening: Paraphrase and summarize to confirm understanding
- Open-Ended Questions: Encourage deeper thinking
- Timeboxing: Keep activities on schedule
- Parking Lot: Capture off-topic ideas without losing them
- Equal Participation: Invite quieter voices, manage dominant voices



TOOLS FOR ENGAGEMENT



- Brainstorming: Divergent thinking before convergent decision-making
- Affinity Grouping: Organize similar ideas visually
- Multi-Voting/Dot Voting: Prioritize solutions quickly
- Visual Management: Use process maps, charts, boards to keep focus
- Go See (Gemba): Take team to the process for direct observation

COMMON CHALLENGES

- Side Conversations: Politely redirect back to group discussion
- Conflict/Disagreement: Use facts and data to refocus
- Low Engagement: Rotate spokespersons, use round-robin input
- Scope Creep: Re-ground team in the kaizen charter and objectives

FACILITATOR MINDSET



- Be neutral: focus on process, not solutions
- Be flexible: adjust tools or pace as needed
- Be positive: encourage creativity and celebrate small wins
- Be structured: follow the kaizen agenda while allowing collaboration
- Be observant: read body language and energy levels



METHODS USED FOR A VIRTUAL KAIZEN



Virtual Facilitation Dos & Don'ts



Virtual vs. In-Person Facilitation



Engagement Tools & Techniques

VIRTUAL FACILITATION



DO's and DON'Ts

Do's

- Camera's On
- Stay Muted
- Set expectations on how to share (raise hands)
- Practice use of tools

Don'ts

- Use overly complex tools
- Don't schedule for too long
- Don't ignore non-verbal cues
- Multi-task



VIRTUAL FACILITATION

Techniques



Gemba walk with Video



Virtual Whiteboards



Duration of Time



Engagement through Interaction



VIRTUAL FACILITATION

Engagement Tools & Techniques



Interactive Icebreakers



Built in polls



Break out rooms



What is Culture?

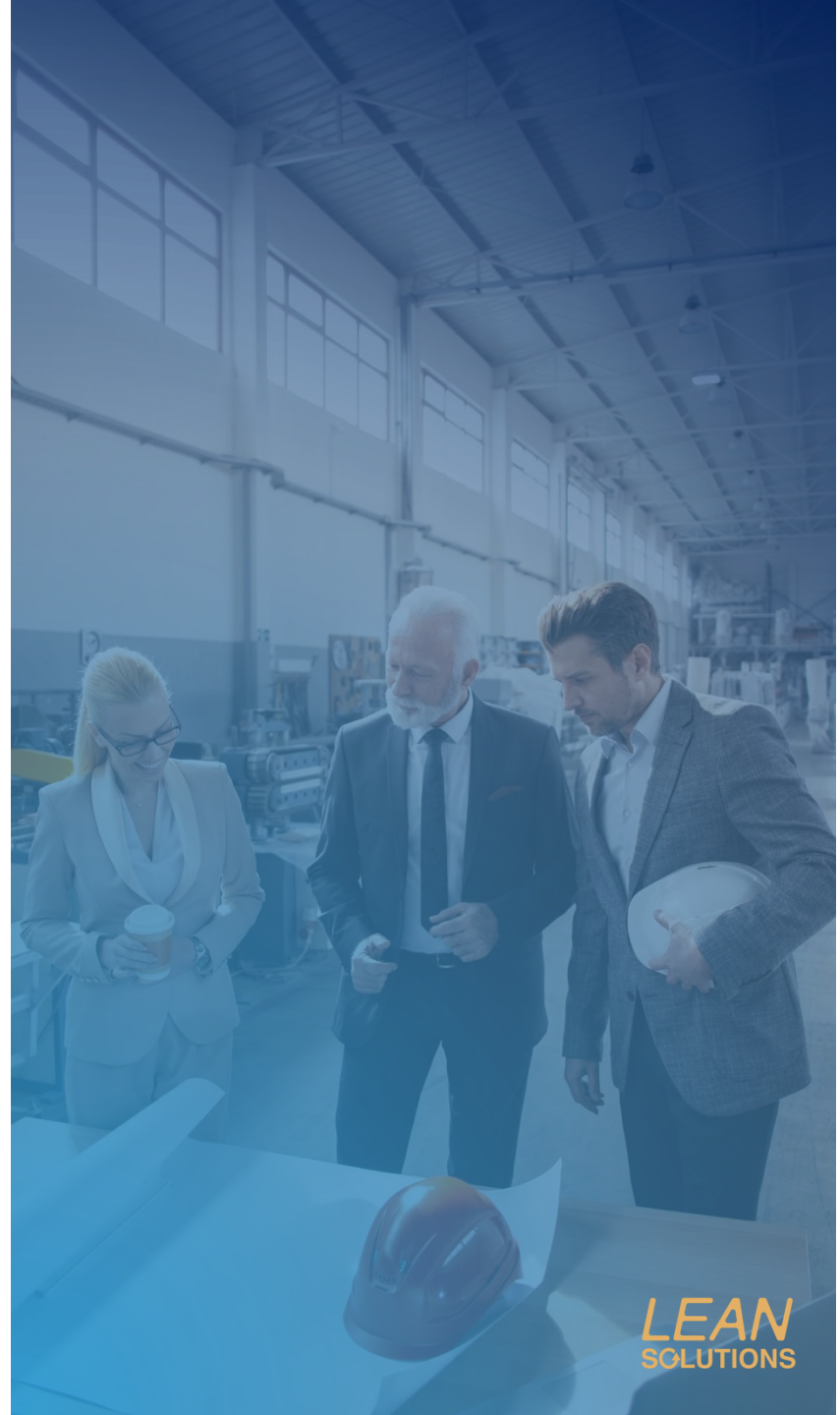


**Process Improvement
+
Culture Improvement
+
Leadership Improvement**



Different Business = Different Leadership System

WHAT DOES A GOOD LEADER DO?



WE HAVE A PROBLEM...

- 50% of people who leave their jobs do so to get away from bad leaders
- 70% of employees are not engaged at work
- A study of over 2,000 managers found that 51% are not engaged and 14% are actively disengaged.

Gallup Study: Amy Adkins



Defining Lean Leadership



WHAT IS LEADERSHIP?

Leadership is the art of motivating a group of people to act towards achieving a common goal.



LEADERSHIP VS MANAGEMENT

Leadership is not management. Leadership should compliment management, not replace it.

Management	Leadership
Planning and Budgeting	Direction Setting
Organizing and Staffing	Aligning constituencies
Controlling and problem -solving	Motivating and Inspiring

Traditional Leadership

- Leader plans
- Staff meets goals set by leader
- Leader produces metrics and feeds back when not met
- Rigid enforcement of rules and regulations
- Information controller
- Sole problem solver
- Technical expert
- Assigner of work
- Performance appraiser



Lean Leadership

- Direction setter
- Ensures team goals support vision
- Monitors and audits team's metrics
- Sets expectations
- Information conduit
- Facilitates 'root cause' analysis
- Technical resource
- Provider of forward workloads
- Appraises team performance to team goals

WHAT IS LEAN LEADERSHIP?

Lean Leaders embrace and champion continuous improvement throughout their organization.



5 LEAN LEADERSHIP ACTIONS

1. Leaders must be Teachers
2. Build Tension, Not stress
3. Eliminate Fear and Comfort
4. Lead through visible participation, not proclamation
5. Build Lean into Personal Practices

THE HEART OF A SERVANT

What is Servant Leadership?

Hard-to-Learn Characteristics

- Calling, Empathy, Healing, Stewardship

Learnable Skills

- Listening, Awareness, Persuasion, Foresight, Growth, Team Building



7 CHARACTERISTICS OF SUCCESSFUL COMPANY CULTURE

1. A purpose-driven company culture
2. Effective communication patterns
3. A culture of feedback
4. Embracing diversity
5. Teamwork
6. Engagement and loyalty
7. Growth and development

7 CHARACTERISTICS OF SUCCESSFUL COMPANY CULTURE

1. A purpose-driven company culture

- Shift resources to achieve goals
- Inspiration driver for engagement
- Drive performance



7 CHARACTERISTICS OF SUCCESSFUL COMPANY CULTURE

2. Effective communication patterns

- Clarity
- Courtesy
- Proactivity

7 CHARACTERISTICS OF SUCCESSFUL COMPANY CULTURE

3. A culture of feedback

- Receptive to give and receive
- Internal and external
- Any aspect of organizational life

7 CHARACTERISTICS OF SUCCESSFUL COMPANY CULTURE

4. Embracing diversity

- Tolerance and acceptance of others
- Aware about difference
- Evaluate impact of differences

7 CHARACTERISTICS OF SUCCESSFUL COMPANY CULTURE

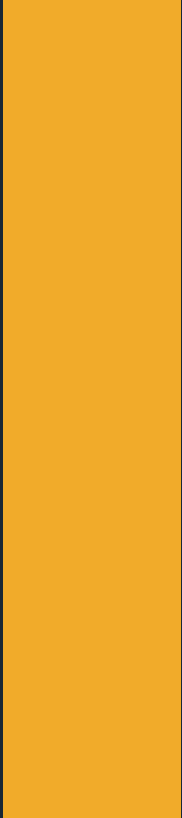
5. Teamwork

- Mutual understanding
- Focus on team accomplishment
- Fast, better and more efficient

7 CHARACTERISTICS OF SUCCESSFUL COMPANY CULTURE

6. Engagement and loyalty

- Psychological meaningfulness
- Psychological safety
- Availability



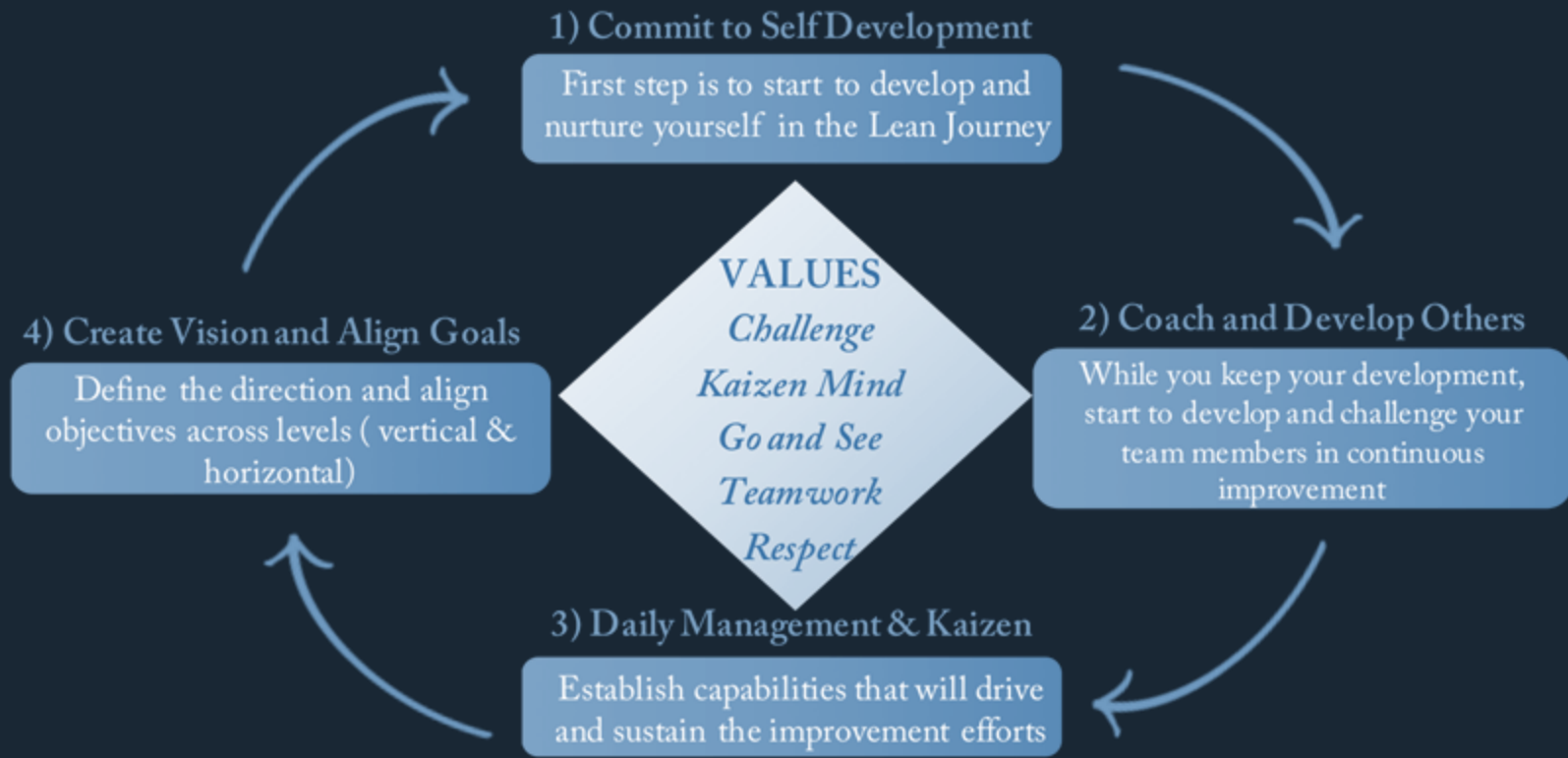
7 CHARACTERISTICS OF SUCCESSFUL COMPANY CULTURE

7. Growth and development

- Position-based growth
- Professional growth
- Financial growth

LEADERSHIP REQUIREMENTS

- The majority of people, if given leadership, respect, opportunities for satisfaction and worthwhile goals, will attempt to excel.
- As leaders, we need to have a set of beliefs, expectations, and direction, that focuses everyone in the organization on critical objectives in an effective manner.





CHANGE MANAGEMENT



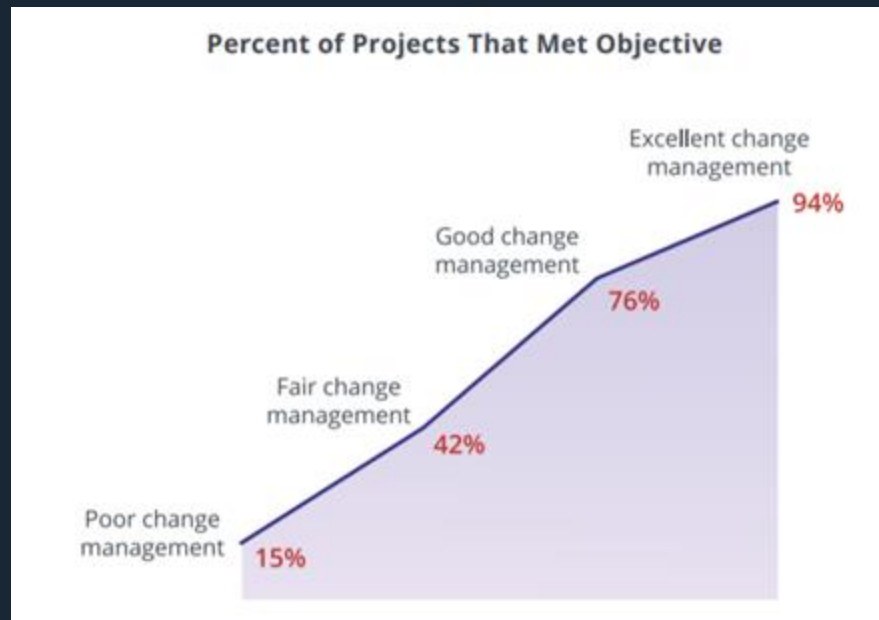
What is Change Management?

INTRODUCTION TO CHANGE MANAGEMENT

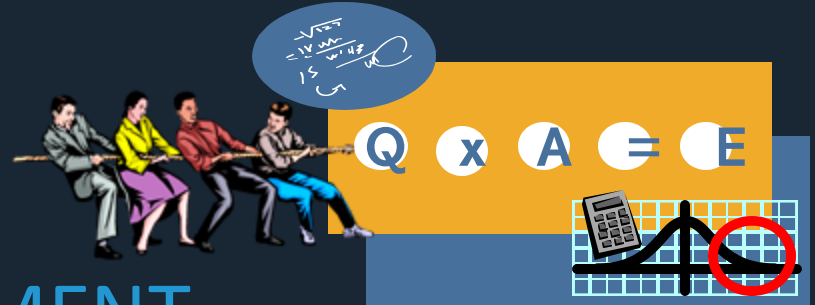
- Change Management is discipline that guides how we prepare, equip and support individuals to successfully adopt change in order to drive organizational success and outcomes
- Change management is proactively managing the people side of change, to achieve the desired business results
- Research shows that Change Management is the #1 success factor for any initiative



JUST HOW IMPORTANT IS CHANGE MANAGEMENT TO YOUR PROJECTS?



EFFECTIVE CHANGE MANAGEMENT



- **Effectiveness = Quality of Change x Acceptance** by your Stakeholders
- If you have a Change with Quality at 90% and only 10% on Acceptance, then your EFFECTIVENESS = 9%
- Good acceptance of your change drives high effectiveness in Change Management

MANAGING THE CHANGE

Change Management is helping
people become...

READY: Ensuring that people know what will happen, when it will happen, and how it will happen

WILLING: Gaining buy-in or at least acceptance of the change

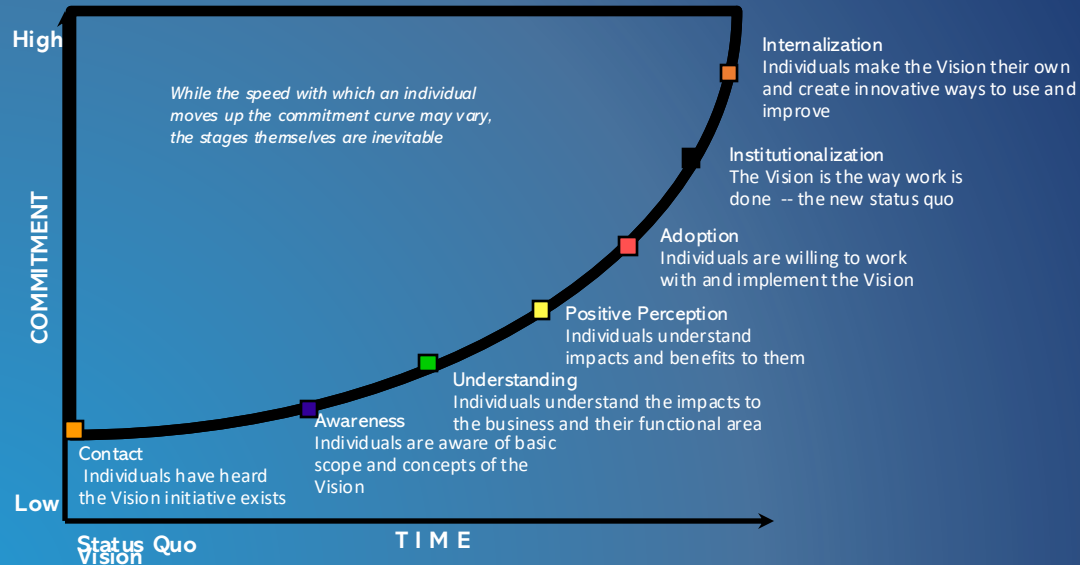
ABLE: Providing the information and tools necessary for people to be successful in the new work environment



UNDERSTANDING THE CHANGE

The Commitment Curve

People travel up a "commitment curve" that defines the stages for building personal commitment to change



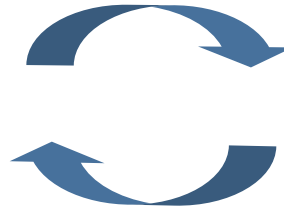
PSYCHOLOGY OF CHANGE

Every change can be viewed from the perspective of a sender and a receiver

SENDER



Business issues &
need to change



RECIEVER



Personal implications & risk

What a sender says and what a receiver hears can be 2 different messages!

PSYCHOLOGY OF CHANGE

EXPLAIN

- Why the change is necessary
- How the change affects them
- How the change impacts their group
- How this changes the day-to-day

PRACTICES

- Repeat key messages multiple times
- Use face-to-face communication
- Answer WIIFM (what's in it for me?)
- Use a question and answer format

*Immediate supervisors
are the preferred senders
of messages related to
personal impact*



SENDER



CHANGE MANAGEMENT & LEAN LEADERSHIP TOOLS

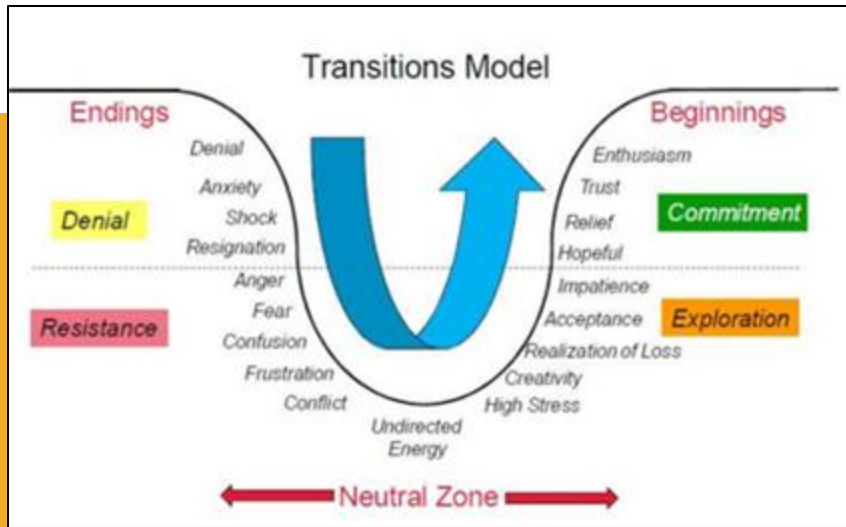


CHANGE

MANAGEMENT TOOLS

Taking charge of change

- Transition Grid
- Stop – Keep – Start
- Decision Quadrant
- Process Mapping
- ADKAR Analysis
- Metrics and Data Collection

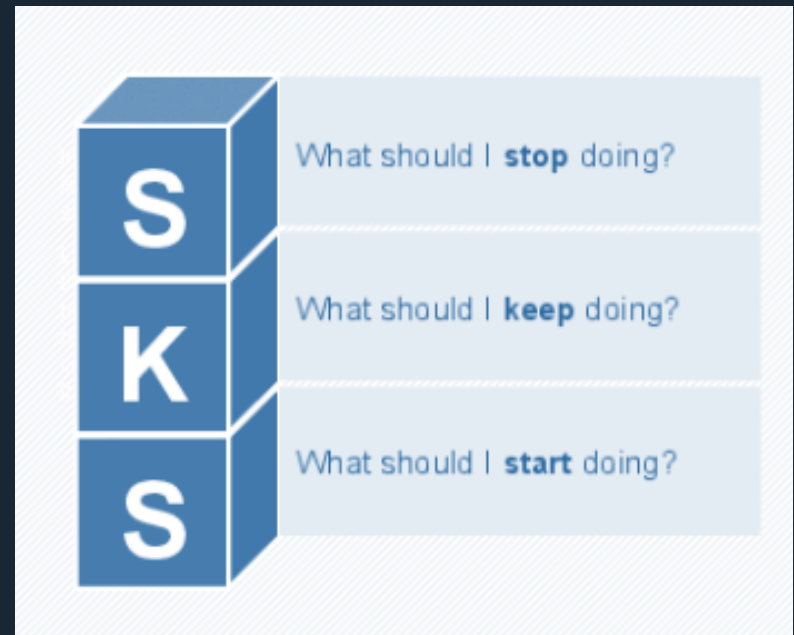


TRANSITION GRID

- Push problem solving / responsibility down the lowest levels via the work systems
- Work systems change behaviors, behaviors change attitudes, attitudes change values
- Change Management Tool:
 - The Transition Grid

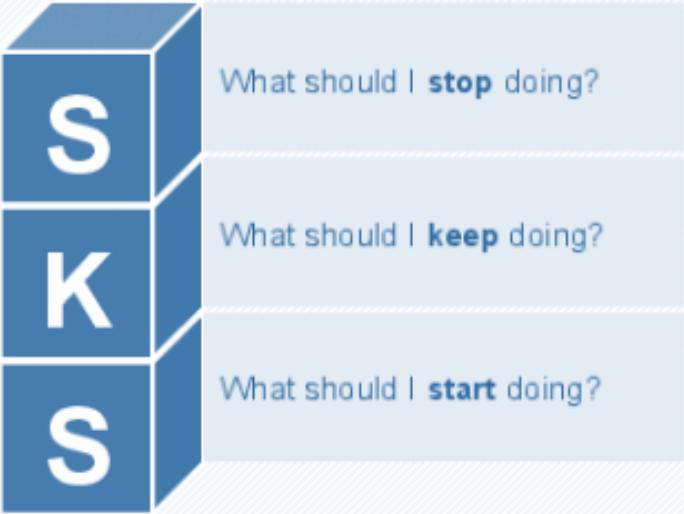
STOP-KEEP-START

- Ask to realize, why change?
- Change Management Tool:
 - Start-Keep-Start (SKS)
- What does the data tell us?

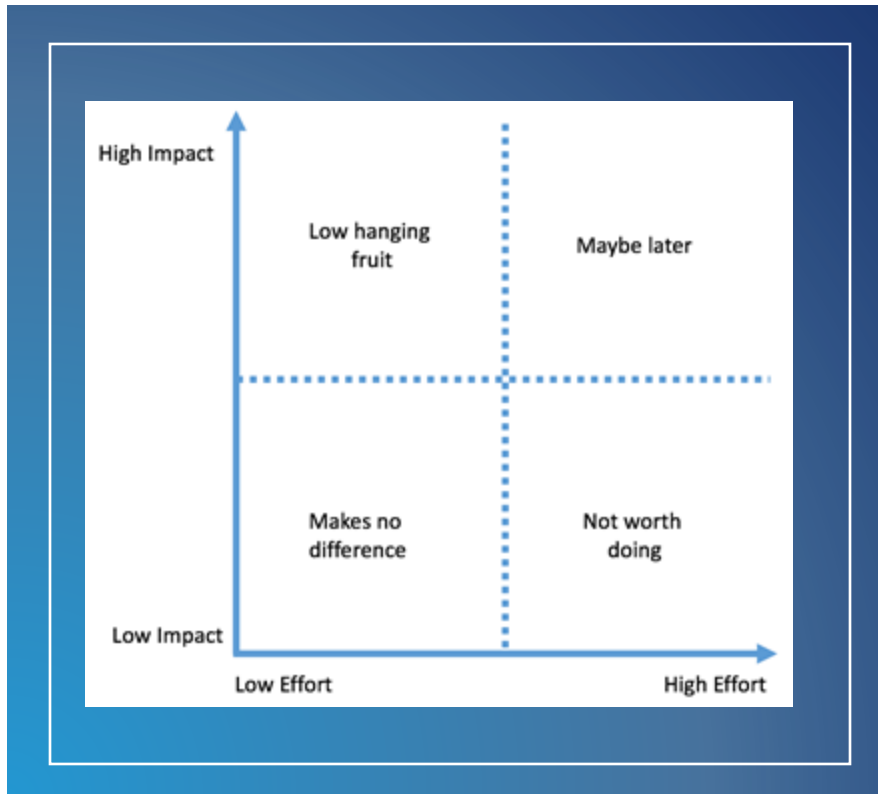


STOP-KEEP-START EXERCISE

Think back on all of the training for Green Belt and let's practice.



S	What should I stop doing?
K	What should I keep doing?
S	What should I start doing?



THE DECISION QUADRANT

Many Variations
Use Low-Hanging Fruit
Modeled after Eisenhower
Matrix

DEFINE

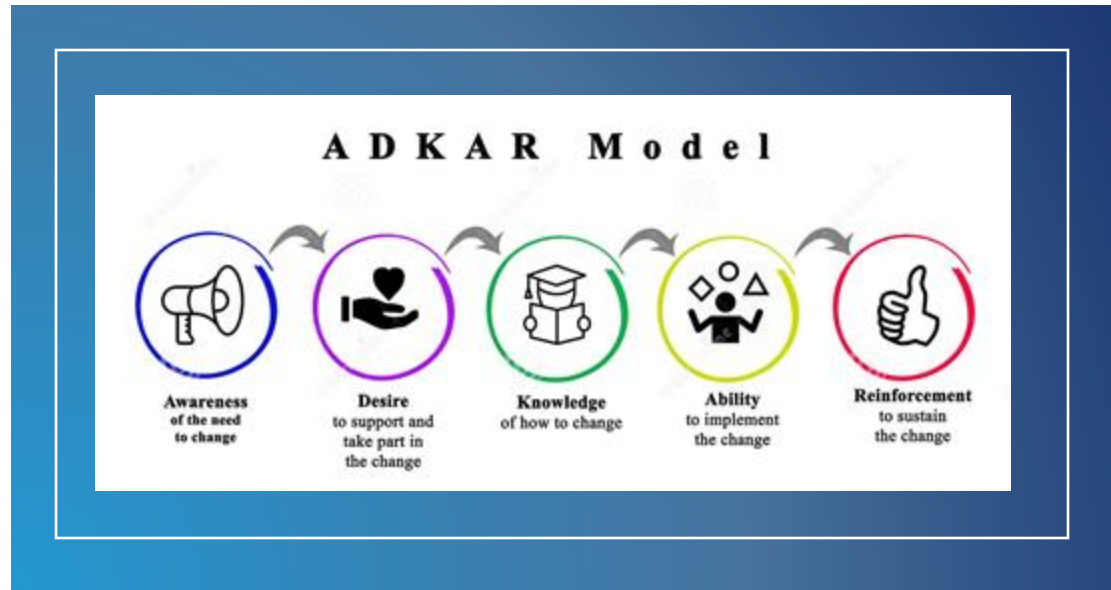
MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS



ADKAR

ANALYSIS

How can we assist individuals to
make personal transitions?

DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL

LEAN
SOLUTIONS

ADKAR EXERCISE

ADKAR Step	Guiding Questions
Awareness	What has been done to explain why the change is needed? What else is needed?
Desire	Who is resisting or embracing the change? Why? How can you increase buy-in?
Knowledge	What training or information is required? Has it been provided?
Ability	Do people have the resources, tools, time, and support to implement the change?
Reinforcement	What systems (rewards, recognition, accountability) are in place to sustain the change?



METRICS

AND DATA COLLECTION

- Start with the end result in mind
- Carefully describe the evidence of that result
 - What would we see, feel, hear, or touch
- Identify the Measure(s)
 - Can we Count or Quantify
- Look at the Bigger Picture
 - Control, Influence, Consequences (good/bad)

DEFINE

MEASURE

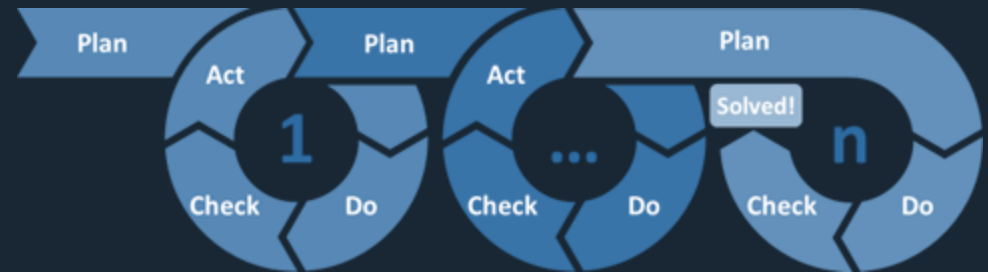
ANALYZE

IMPROVE

CONTROL

THE CHANGE LOOP

- Describe the desired state
- Share the future state
- Identify and eliminate barriers
- Work the PDCA cycle
- Leverage Lessons Learned



DEFINE

MEASURE

ANALYZE

IMPROVE

CONTROL



LEADING CHANGE



Dr. Kotter's

8 STEPS OF LEADING CHANGE



8 STEPS OF LEADING CHANGE

Step 1: Establish a sense of urgency



Actions Needed:

- Potential Crisis
- Untapped Opportunities



Potential Pitfalls:

- Underestimating
- Paralyzed
- No Leadership



8 STEPS OF LEADING CHANGE

Step 2: Forming a powerful coalition

Actions Needed:

- Assemble a Group
- Enough Power
- Teamwork

Potential Pitfalls:

- No Experience
- Team Leadership



8 STEPS OF LEADING CHANGE

Step 3: Creating a Vision

Actions Needed:

- Create a Vision
- Develop Strategies

Potential Pitfalls:

- Vision too Complicated
- You Got 5 Minutes

A silhouette of a person standing in front of a large window with a grid pattern. The person is reaching up with both hands towards the word "VISION", which is written in large, bold, blue capital letters across the upper part of the window. The background outside the window shows a blue sky with white clouds. The floor is a reflective blue surface.

VISION

8 STEPS OF LEADING CHANGE

Step 4: Communicating the Vision

Actions Needed:

- Communication
- “Walk the Talk”

Potential Pitfalls:

- Under Communicating
- Inconsistent Actions



8 STEPS OF LEADING CHANGE

Step 5: Empowering Other to Act on the Vision



Actions Needed:

- Change Structures
- Recognize Contributions



Potential Pitfalls:

- Not Addressing the Naysayers



8 STEPS OF LEADING CHANGE

Step 6: Planning For and Creating Short-Term Wins

Actions Needed:

- Define What is Success
- Short-Term Wins
- Recognize and Rewards

Potential Pitfalls:

- Not Recognizing Improvements



8 STEPS OF LEADING CHANGE

Step 7: Consolidating improvements
and still producing more change



Actions Needed:

- Use Credibility
- Dedicated Employees
- New Projects



Potential Pitfalls:

- Declaring Victory too Soon
- Not Proving a New Process is Repeatable



8 STEPS OF LEADING CHANGE

Step 8: Anchor the new approaches in your organization

Actions Needed:

- Articulate Connections
- Improve Performance

Potential Pitfalls:

- Ignoring the New Normal and Values
- Promoting or Hiring Non-Believers



QUIZ 5:



1. What is necessary for world class 'operational excellence'?
 - **Process Improvement + Culture Improvement + Leadership Improvement**
2. What is the first step in strategic planning (Hoshin Kanri) for an organization?
 - **Establish and agree on the Mission, Vision, and Goals**



Project Report Out



Project Title



DEFINE PHASE

Project Charter

- Put a copy of your project charter



SIPOC



- Put a copy of your SIPOC or high level process map



MEASURE PHASE

VSM or Process Map



- Put a copy of your VSM or Process map – whichever you used
- Highlight a few bullet points about what you learned about the process during this

Current State Data



- Include a copy of your current state data charts – trend chart, control chart, pareto chart (if applicable)
- Add a slide for time studies if applicable
- Don't try to cram too much onto 1 slide, add slides as needed to show all of your current state tools that were used



ANALYZE PHASE

Process Map/VSM



- Put a copy of process map or VSM with waste and issues identified.
- Highlight the key areas that are going to be focused on

FISHBONE



- Put a copy of your Fishbone
- Highlight with bullet points on how narrowed down to the selected causes
- Bullet point or highlight in some way what the selected causes are

5 Why

- Put a copy of your 5 Whys
- Highlight what you identified as the root cause





IMPROVE PHASE

Impact/Difficulty Matrix



- Include an image of the impact/difficulty matrix
- Share how the team identified what to move forward with

Gantt Chart



- Include a copy of your gantt chart (focused on the improvements)

Trials



- Share any trials that the team worked through as improvements were tested

Future State Map



- Include a future state map and or pictures of what was done...



CONTROL PHASE

Results

- Show a chart of the results



Control Plan



- Show a copy of the control plan
- Additionally add slides to show examples of the controls that are completed now



HOMEWORK REVIEW

(Open Computers and Log into your Portal)





CONGRATULATIONS!

You have completed the Lean Green Belt course.

Good Luck in your Exam!

office@findleansolutions.com



Facebook.com/findingleansolutions

