

Lean Yellow Belt Certification

LEAN SOLUTIONS LS

Meet Your Instructor

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



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AGENDA

- Roles and Responsibilities of Belts
- What is Lean & Six Sigma?
- 8 Wastes
- Voice of the Customer (VOC) and CTQs Process
- 5S
- Standard Work
- PDCA
- Kaizen
- Continuous Flow
- Process Mapping
- Visual Management
- Jidoka/Poke Yoke
- SMED

HOMEWORK & YELLOW BELT EXAM

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BODY OF KNOWLEDGE

Yellow Belt

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

Lean Green Belt

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

Six Sigma Geen Belt

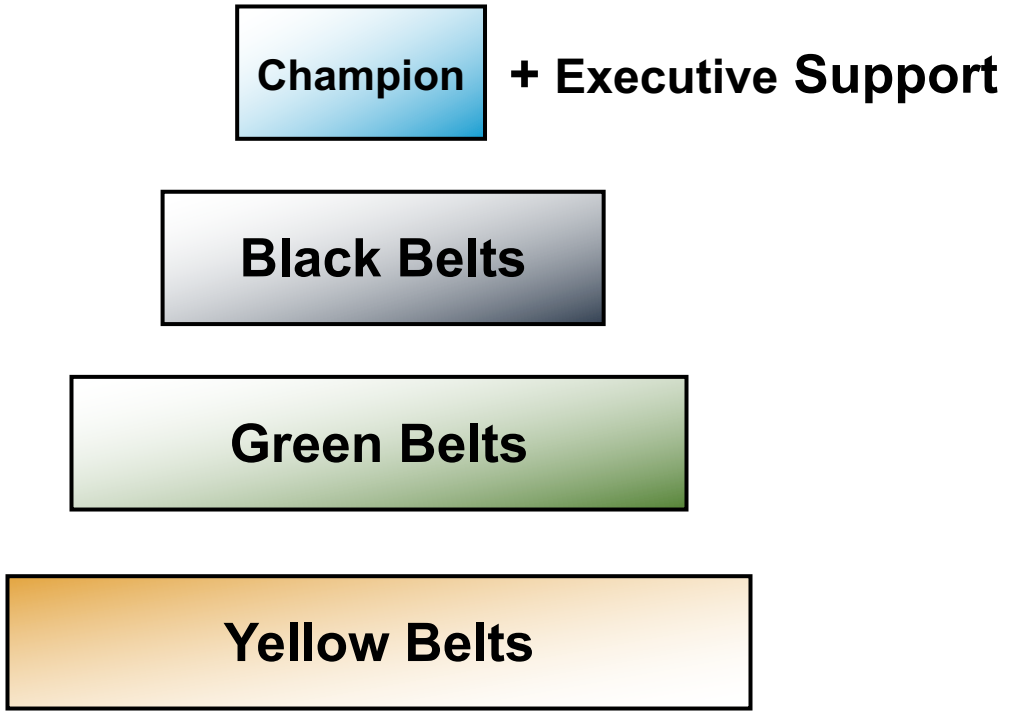
Six Sigma Statistics	Correlation and Regression
Measurement Systems Analysis	Introduction to DOE
Process Capability	Hypothesis Testing

Black Belt

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

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LEAN SIX SIGMA ROLES & RESPONSIBILITIES



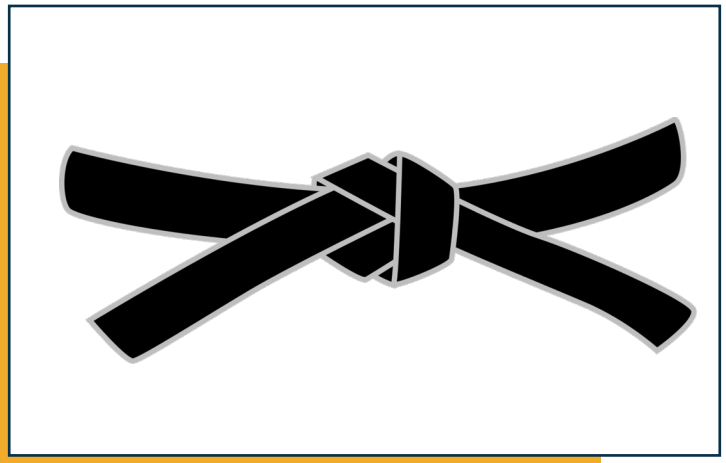
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CHAMPION/ PROCESS OWNER

Champions help to identify and select the most important projects to work and break down political barriers and roadblocks for Lean Six Sigma to succeed

- Assist with Project selection and initiation
- Obtain needed project resources and eliminate roadblocks
- Participate in project review meetings
- Provide Governance / Ask the right questions
- Set up a training programs

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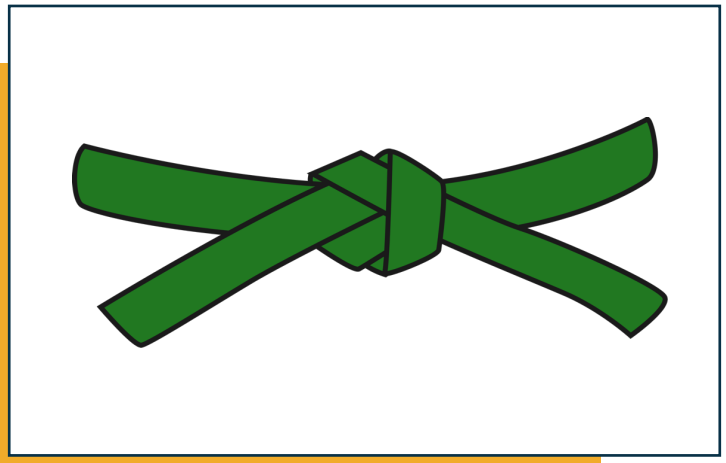


BLACK BELT

Black Belts are Lean Six Sigma process experts, think strategically and lead larger projects within the business.

- Approx 1 Black Belt every 50 - 100 employees (1%)
- Dedicated to process improvement 100% of time
- Project team leader for larger / high profile projects
- Facilitates project teams and helps Green belts
- Thinks strategically and towards Enterprise level goals
- Works cross-functionally

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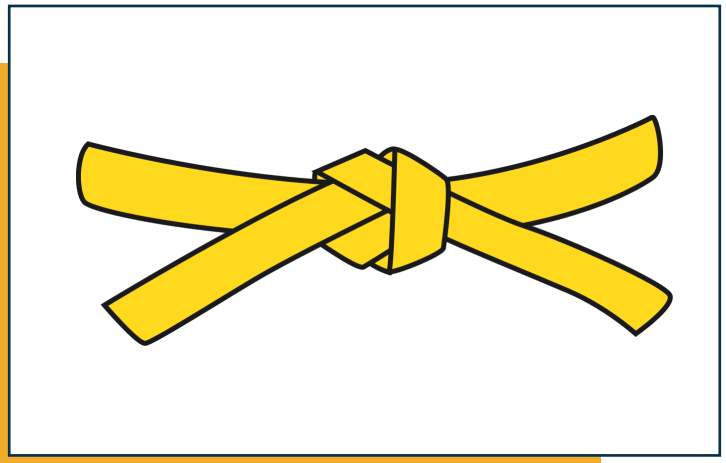


GREEN BELT

Green Belts are practitioners of Lean Six Sigma improvement and lead small/medium projects or support larger Black Belt Projects.

- Approx 1 Green Belt for every 10-30 employees (5%)
- Involved approx 50% time on projects
- Typically works projects within their functional area
- Team members for larger projects
- Team leaders for small / medium projects

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YELLOW BELT

Yellow Belts are Workers and Functional Specialists and apply the Lean Six Sigma Methodology to their own work and serve on project teams on a part-time basis.

- As many as possible (target is 100% of workers)
- Functional workers, Subject Matter Specialists. Team members
- Provide support to Black Belts and Green Belts as needed
- Team members on project teams
- Supporting projects with process knowledge and data collection

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What is

Lean & Six Sigma?

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LEAN & SIX SIGMA TIMELINE

Guinness Brewery



Walter Shewhart
Introduces SPC Statistical Process Control

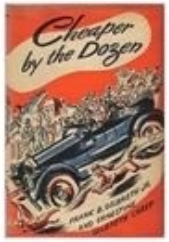


W. Edwards Deming

Joseph Juran

1900 1930 1950

Ford Assembly Line



Gilbreth,
•Management Theory
•Industrial Engineering

Toyota Production System

Taiichi Ohno
Shigeo Shingo
Kaoru Ishikawa

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LEAN & SIX SIGMA TIMELINE



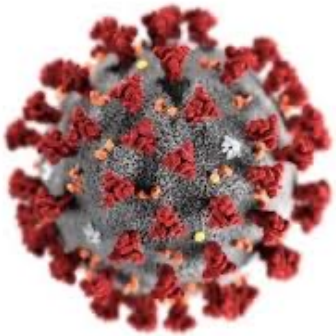
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LEAN & SIX SIGMA TIMELINE

Shift in Focus

2008 Financial Crisis

Covid-19





Cost Cutting
Automation
Down-sizing
'*Do More with Less*'

Survival
Innovation
Adapting
Re-structuring
Re-designing

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INFLUENTIAL LEADERS

IN LEAN & SIX SIGMA PRINCIPLES

The evolution of Lean & Six Sigma was heavily influenced by American and Japanese engineers, statisticians and quality control experts 1950-1980.



Walter Shewhart
(SPC and Control Charts)



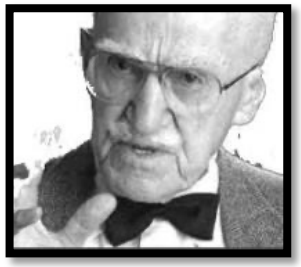
W. Edwards Deming
(Quality Management
PDCA Plan, Do, Check, Act)



Shigeo Shingo
SMED, Poka Yoke



Lillian Gilbreth
Process Flow
Ergonomics



Joseph Juran
(Quality Planning, Quality Improvement
Quality Control)



Taiichi Ohno
7-Wastes, Gemba-Walk



Kaoru Ishikawa
7-Quality Tools

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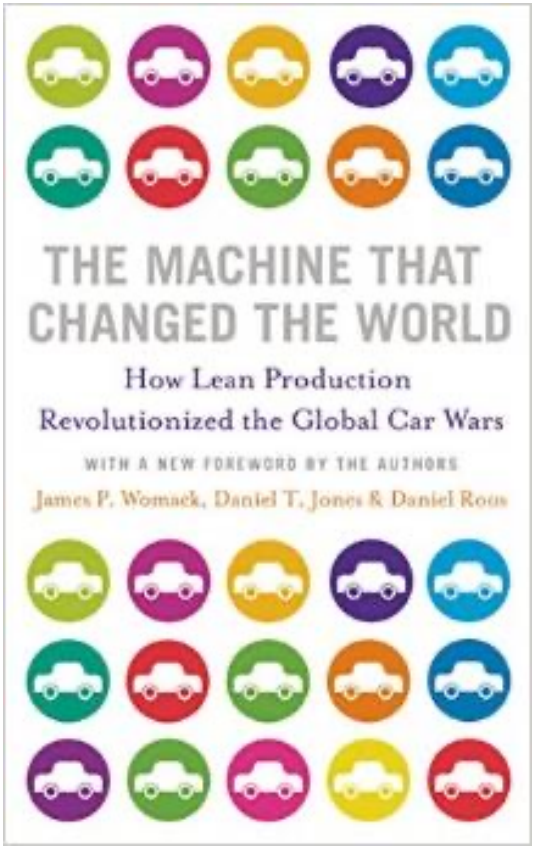
Toyota Production System (TPS)

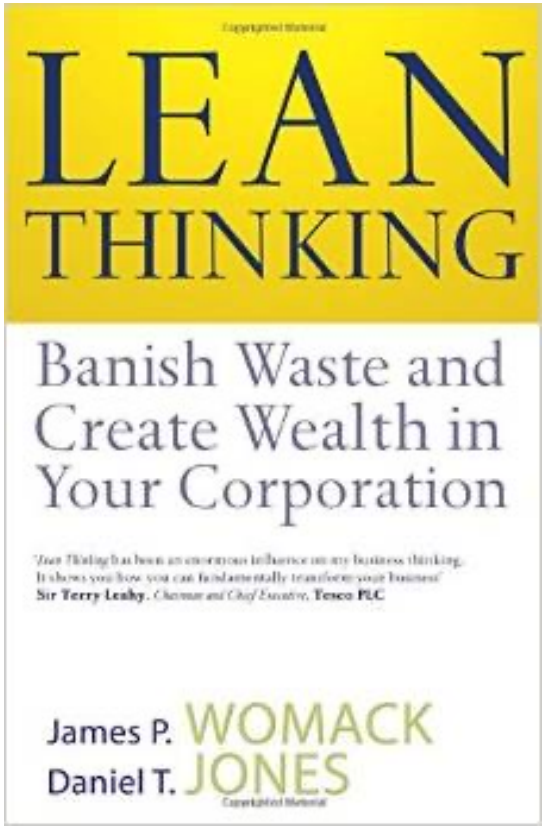
HOUSE OF LEAN



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“The Machine that Changed the World” 1990





“Lean Thinking” (1993)

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ORIGINS OF SIX SIGMA

MOTOROLA & GENERAL ELECTRIC (GE)

MOTOROLA
intelligence everywhere

Bob Galvin: CEO of Motorola 1980's





1985 Bill Smith coins the term "Six sigma"



1987 Motorola trademarks the term "Six Sigma"

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ORIGINS OF SIX SIGMA

MOTOROLA & GENERAL ELECTRIC (GE)



Jack Welch : CEO of GE 1981-2001

Jack Welch (CEO) made Six Sigma the management and corporate culture of General Electric 1981 – 2001.

- Every manager was trained as at least a Green Belt level.
- During his tenure at GE, the company's value rose 4,000%.

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WHY IS IT CALLED SIX SIGMA?

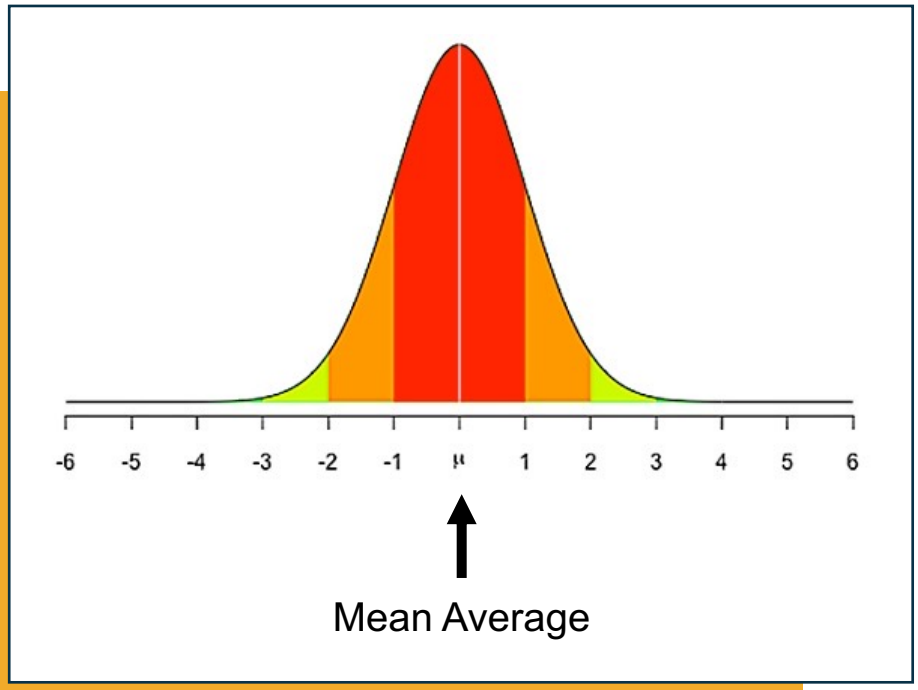
σ, *sigma*

'Sigma' is a Greek Symbol to signify the mathematical concept called **Standard Deviation**. This is an important measure of **Variation** in a process.

$$\sigma = \sqrt{\frac{\sum_{i=1}^{N} (X_i - \mu)^2}{N}}$$

You don't need to remember or even understand this equation…Its just 'behind the scenes'!!

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SIX SIGMA

Six Sigma refers to a process having 6 Standard Deviations (Sigmas) between the mean average of the process (center) and the closest customer specification limit.

***LSL = Lower Specification Limit**
***USL = Upper Specification Limit**

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DEFECTS VS PROCESS SIGMA LEVEL

Process Sigma Level	Defects per Million Opportunities (DPMO)
1	691,500
2	308,500
3	66,800
4	6,200
5	233
6	3.4

DEFINITION :
A “Six Sigma Process” is one that produces no more Than 3.4 defects per million opportunities for defects

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3.4 DPMO

A “Six Sigma Process” is often described one that produces no more than **3.4 Defects Per Million Opportunities for defects**

3.4 DPMO (Defects Per Million Opportunities)

0.00034 % Defects

99.99966 % Correct

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WHAT DOES A 0.1% DEFECT RATE LOOK LIKE?

What is 99.9% Quality?
…Or 0.1 % Defects?

- 1 unsafe plane landing per day at JFK International Airport
- 100 wrong drug prescriptions per day in US
- 10,000 Houses without electric / day in US
- 100,000 wrong bank transfers per day
- 1 million e-mails sent incorrectly per day

This is why we need Six Sigma processes!

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Lean & Six Sigma
Complement Each Other

Lean can work alone



Six Sigma can work alone



But…they work really great together!

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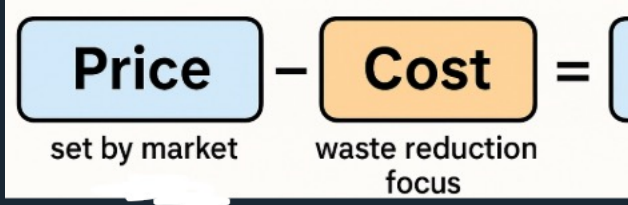


LEAN
PRINCIPLES

1. Understand the **Value** in the product or service
2. Identify the **Value Stream** in each product or service
3. Make the product or service **Flow**
4. **Pull** value from the downstream (just in time delivery)
5. Continuous Improvement towards **Perfection**
6. Involve workers and **Respect Workers** opinions

NOTE: *Only the first 5 Lean Principles were taught. Many books and videos still refer to the '5 Lean Principles'*

**Source: Lean Thinking by James P. Womack and Daniel T. Jones*



Cost, Profit and Price

PRICE − **COST** = **PROFIT**

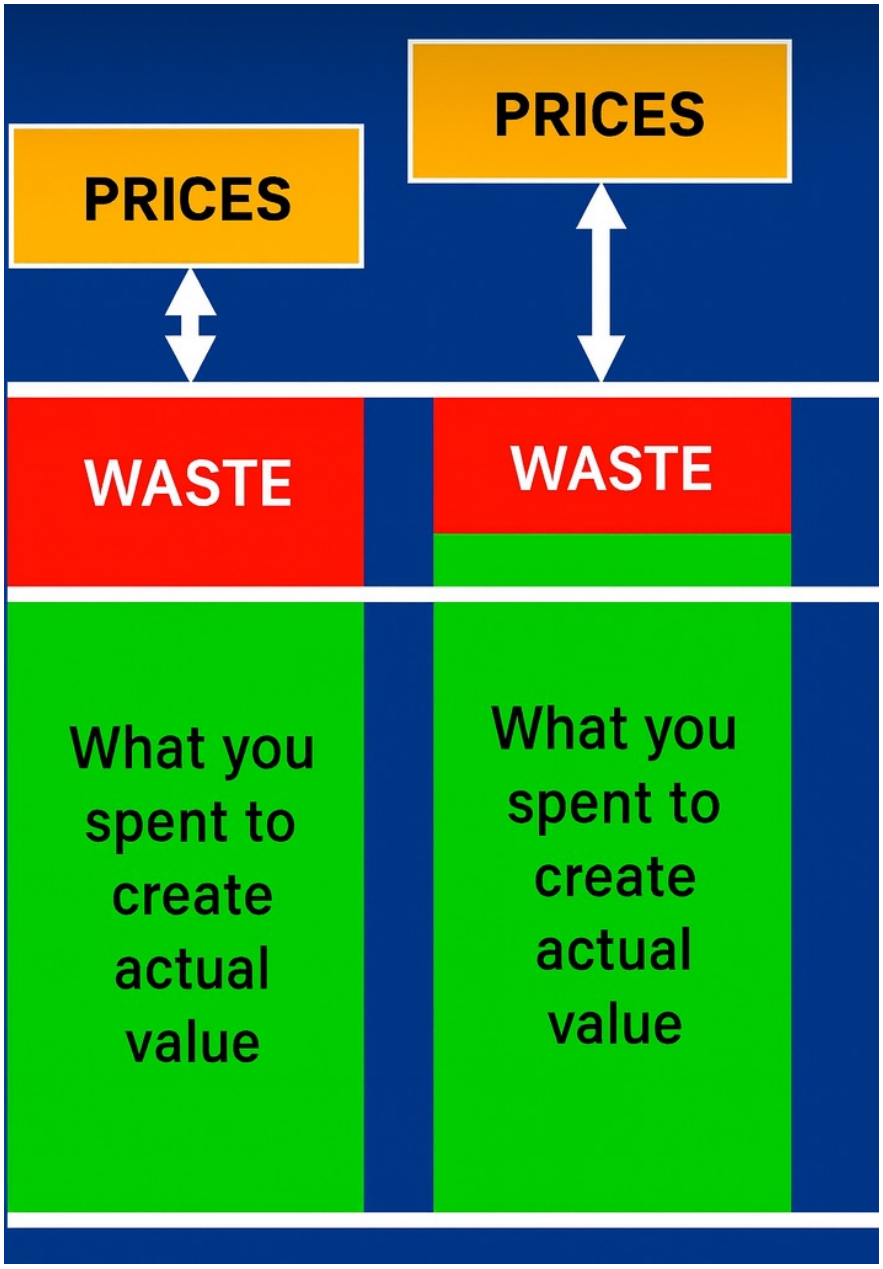
Set by market

Waste reduction focus

Outcome

- Price is set by the customer → market decides what they'll pay
- Cost is controllable → reduce waste, not people
- Waste elimination → lowers costs, improves value, strengthens competitiveness
- Sustainable advantage → continuous improvement drives long-term profit

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Lean focuses on increasing value share: increase the proportion of spending that goes toward value-adding activities.

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SIX SIGMA

PRINCIPLES

1. **Reduce Variation** and you will reduce Defects / Errors
2. **Root Cause Analysis of problems**
3. **Use Data** for Decision making (instead of guessing!)
4. Use of **Statistical Analysis** tools and charts
5. Process **Optimization** using Designed Experiments and Regression Analysis, Predictive Modelling. Hypothesis Tests
6. Improvement projects using the **DMAIC** Framework

We Use Lean & Six Sigma For

Process Improvement

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Increase Value

Traditional View of Our Processes

Inputs

Operations

Outputs



Customer

Raw Materials
Raw Data
Manpower
Energy

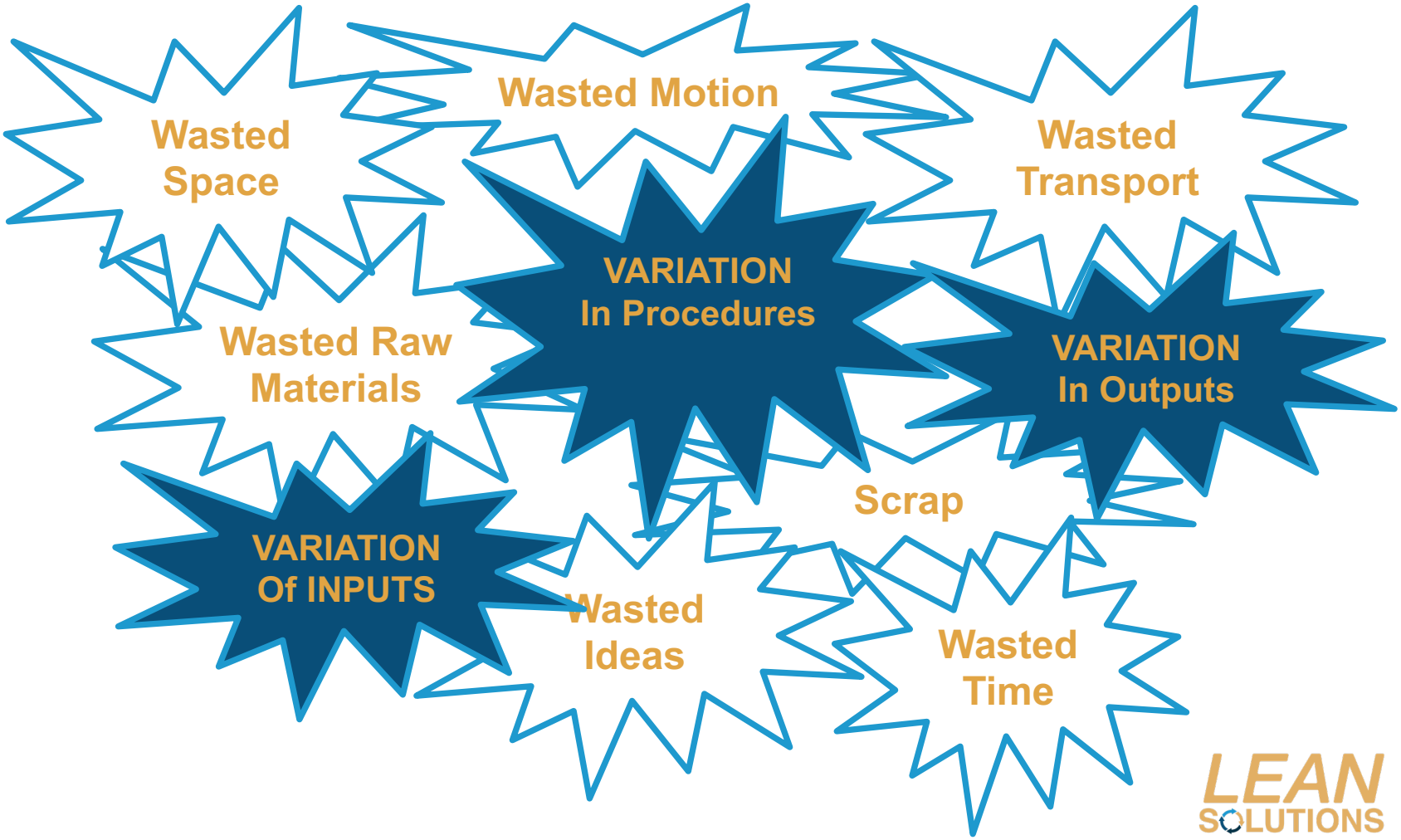
Finished Goods
Refined Materials
Information
Services

Lower Value → **Higher Value**

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Waste & Variation

What Our Processes Actually Look Like



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Increase Value

Lower Value → **Higher Value**

Inputs → **Our Business Process** → Outputs



Customer

- Safer
- Easier
- Better Quality (less defects & rework)
- Faster (on time)
- Lower Cost



Shigeo Shingo

'*There are four purposes of improvement:* ***easier, better, faster, and cheaper.*** *These four goals appear in order of priority. Hence the first is to make the work easier for workers while improving the fruits of their labour.'*

'Intensifying the work should never be undertaken even if the same working hours are maintained.'

Non-Stock Production : The Shingo System of Continuous Improvement', (1988)

***Shigeo Shingo* was a primary architect in the development of the Toyota Production System.**

SQDC

1. Easier and **Safer** for workers (S)
2. Produce Better **Quality** Outputs for customers (Q)
3. **Deliver** the Outputs on Time (D)
4. Lower the **Cost** of Production (C)

The **SQDC** model of Production

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Sales & Operations Planning 4-Step Process



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SUMMARY

At This Point You Should Be Able To…

- Describe the defined roles of Lean & Six Sigma belts
- Describe the goals of our Process Improvement
- Understand the origins of Lean & Six Sigma
- Describe the principles of Lean
- Describe the principles of Six Sigma

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QUIZ:

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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

QUIZ:

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6. 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.

7. What is the role of a Green Belt in an organization ?
    - A GREEN BELT IS A PROJECT TEAM LEADER FOR SMALL AND MEDIUM SIZED PROCESS IMPROVEMENT PROJECTS.

8. What is the role of a Black Belt in an organization ?
    - 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 ORGANIZATION.

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VALUE & WASTE

Lean focuses on identifying which activities add value, and which do not...

Value Added Activity

- Transforms or shapes (for the 1st time) material or information to meet customer requirements
- Anything the customer is willing to pay for ONE TIME ONLY

Non-Value Added Activity (Waste)

- Anything else that consumes resources or is related to rework or scrap

- Incidental Non-Value
  - Serves you or the company but the customer doesn't value it

WHAT DO YOU
WANT TO PAY FOR?

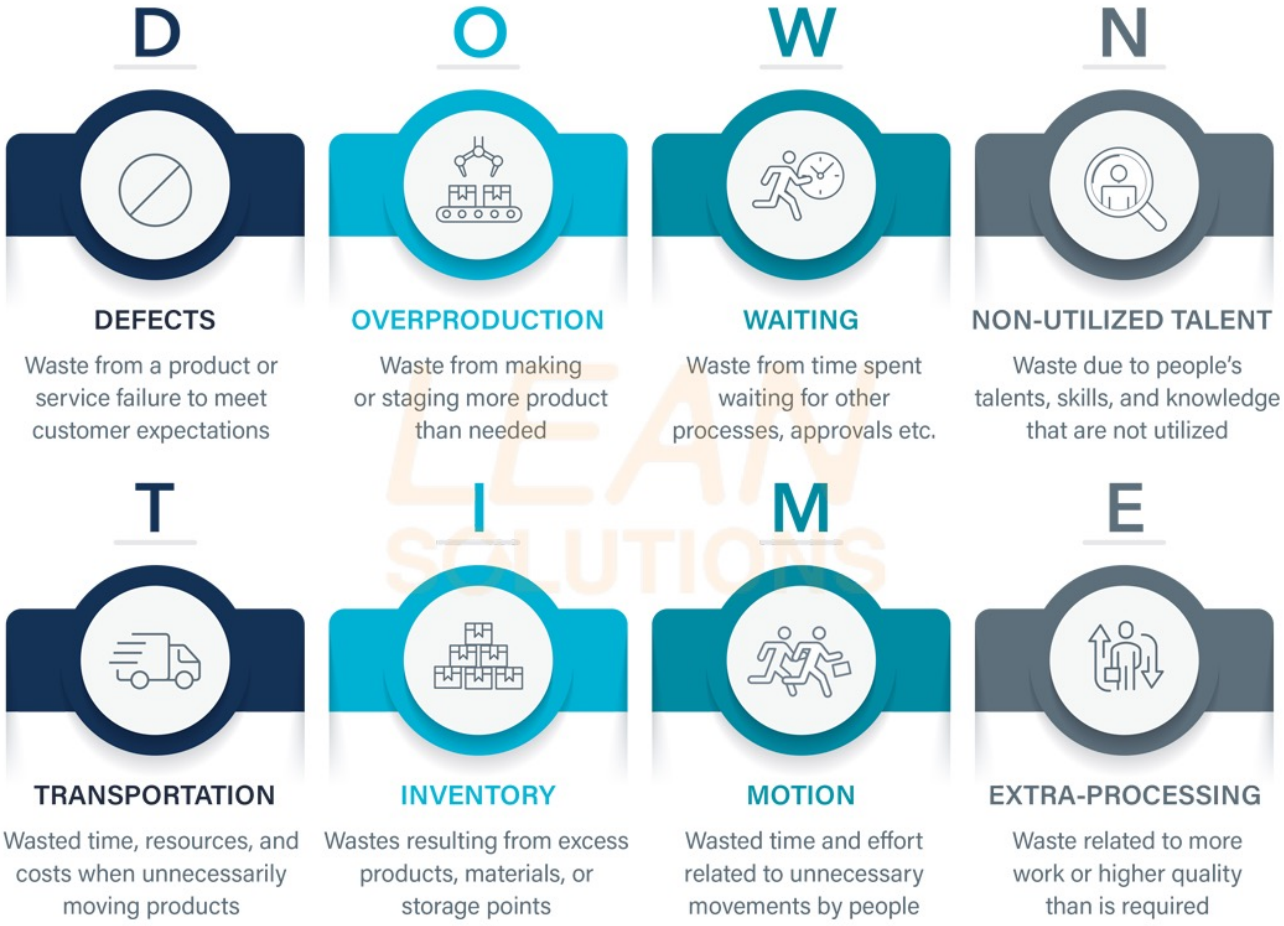
If you were the patient, what would you be willing to pay for?

Value Added steps are those the customer is willing to pay for – all else is a form of Non-Value Added or Waste.

Doctor Visit	
Making appointment	10 min
Driving to the doctor's office	30 min
Filling out insurance and health history forms	10 min
Waiting in the reception area	20 min
Walking to the vitals room	2 min
Nurse taking your blood pressure and weight	4 min
Walking to the exam room	2 min
Waiting in the exam room for the doctor	15 min
Exam by doctor	15 min
Checking out at the front desk	3 min
Driving home	30 min
TOTAL	141 min

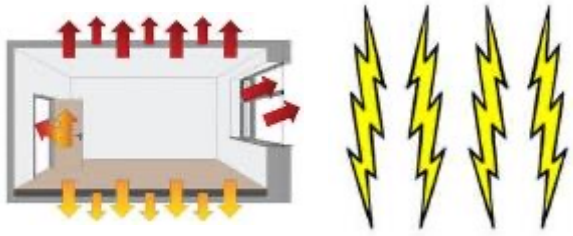
Recognizing Waste

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‘Non-Traditional’ Categories of Waste



Utility/Energy (Heat/Electrical) Losses



Miscommunications



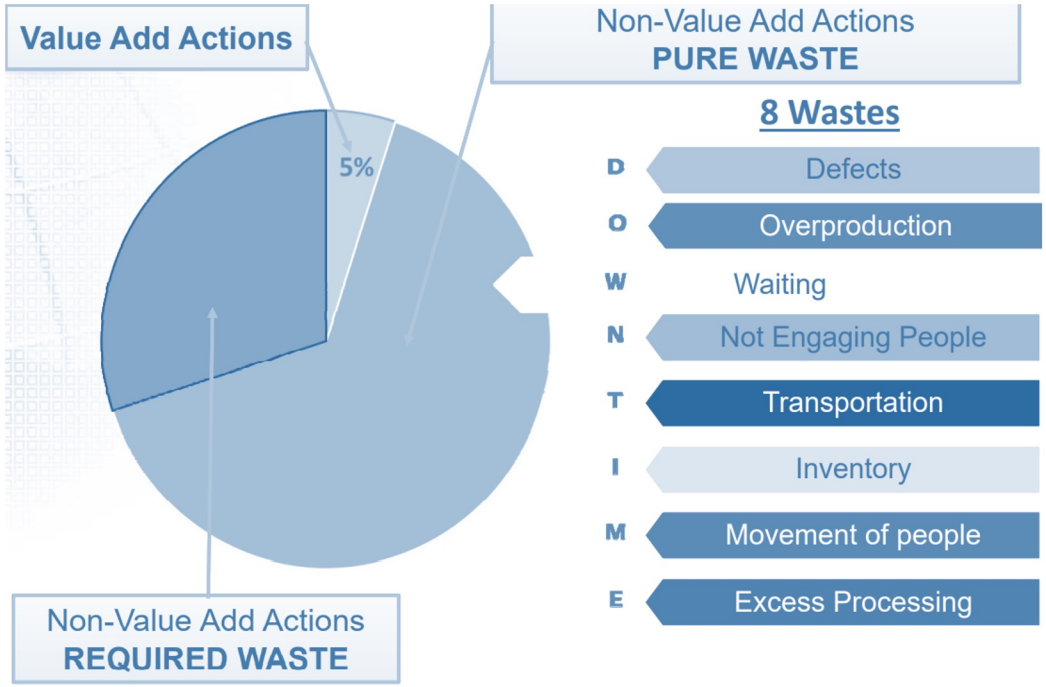
Over - Communications



Skilled Staff Losses

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CATEGORIES
OF ACTION



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Office Waste Examples

Waste Category	Office Examples
Overproduction	Printing paperwork out before it is needed, purchasing items before they are needed, processing paperwork before the next person is ready for it
Inventory	Filled in boxes, office supplies, sales literature, batch processing transactions and reports
Waiting	System downtime, system response time, approvals from others, information from others
Extra Processing	Re-entering data, extra copies, unnecessary or excessive reports, transactions, expediting, travel expense reporting
Correction	Order entry errors, design errors and engineering change orders, invoice errors, employee turnover
Excess Motion	Walking to/from copier, central filing, other offices
Transportation (Movement of Paperwork)	Excessive email attachments, multiple handoffs, multiple approvals
Underutilized People	Limited employee authority and responsibility for basic tasks, management command and control, inadequate business tools available

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WASTE
WALK

A planned visit to where work is being performed to observe what's happening and to note the waste.

- Explain to the people in the area of observation what you are doing
- Study the area for 20-30 minutes
- As you see work that appears to be waste, jot down the example you see
- Take action immediately if possible or develop a plan to remove waste

Waste Walk Form

Date: xx/xx/xx
Location/area: Main Production
Observer: Craig T.

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Type of Waste	Definition	Observations
Defect/Rework	Product that does not meet customer requirements	Excessive amount of Hoods in Repair Bay, 4 Racks at 20 per rack
OverProduction	Producing more than is required	There are 35 Left Hand Rockers but only 7 Right Hand Rockers, These ship as sets of one each
Waiting	Delays in the process, waiting for next step to occur	Paint Line is full of parts waiting to be loaded
Non-Utilization of Talent and/or Resources	Not utilizing people's skills properly	Lay up operators are being used to hang parts on the paint line
Transportation	Unnecessary movement of material from one location to another	Material Handler is required to move parts From lay-up, To bonding, To sanding, and To paint.
Inventory	More supplies/equipment than required to service customer	275 Hood outer panels are held at bonding
Motion	Movement that does not add value to the work being completed	Left and Right Hinges are removed From boxes and put in Totes To be staged at bonding cell
Excess-Processing	More work is done than required by the customer, or things are made more complicated than necessary	Hood outer panel is getting sanded in areas that are no longer used To bond To inner panel

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QUIZ :

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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 that 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**

Lean Principles & Tools

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6 FUNDAMENTALS OF LEAN

- Value
- Value Stream
- Flow
- Pull
- Perfection
- Respect for People

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WHO IS YOUR CUSTOMER?

IN LEAN SIX SIGMA…

- Value is always viewed “Through the eyes of the Customer”
  - Who is our customer ?
  - What is The Voice of our Customer (VOC) ?
  - What is Critical to Quality (CTQ) to our Customer ?

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WHO IS YOUR CUSTOMER?

‘Internal Customers’ VS ‘External Customers’

- An internal Customer could be a different department or operation. It could be the next downstream operation in the process.

- Can you name some different types of ‘Internal/External Customers’?

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WHAT IS A CTQ?

Critical to Quality (CTQ's) are measures we use to capture VOC properly.

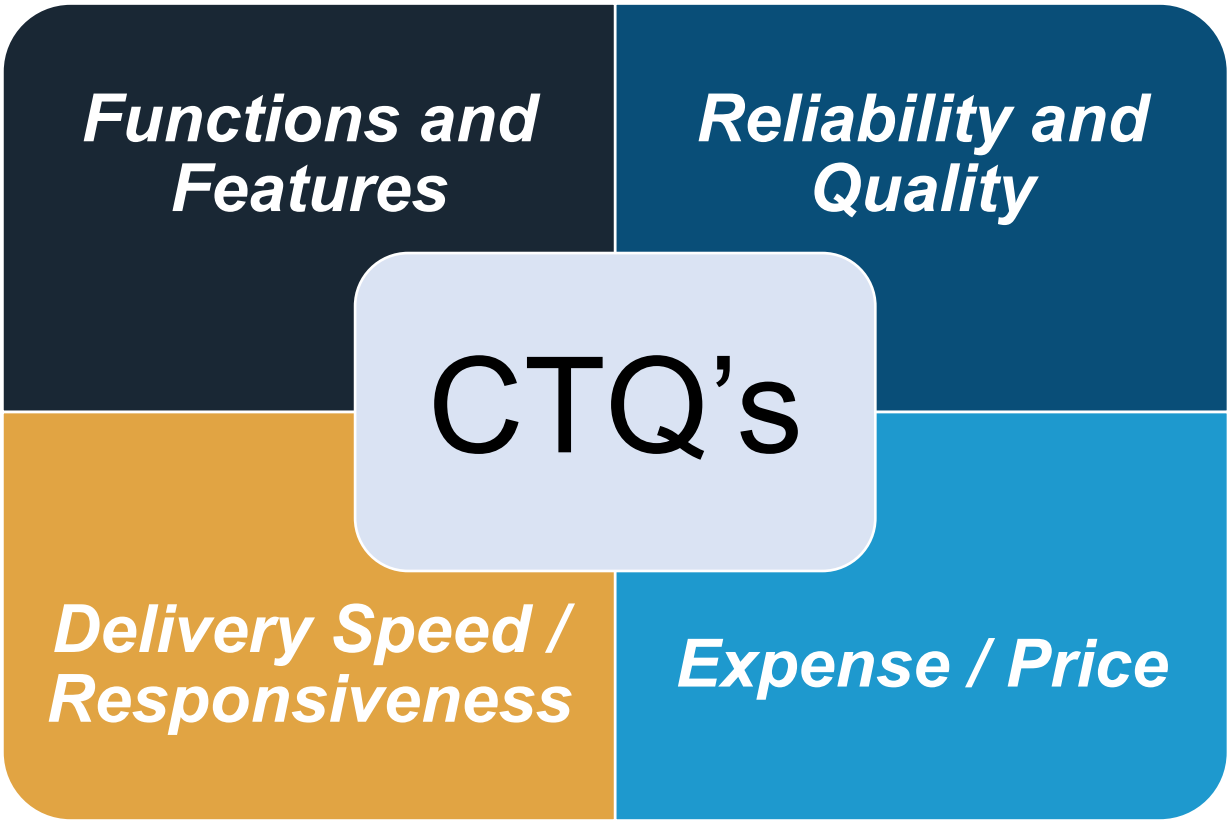
- Also referred to in some literature as :
  - CTC's – Critical to Customer
  - CTS's – Critical to Satisfaction
  - CTQC - Critical to Quality Characteristics

- CTQ's are a tool to help to break down VOC into well defined and measurable terms.

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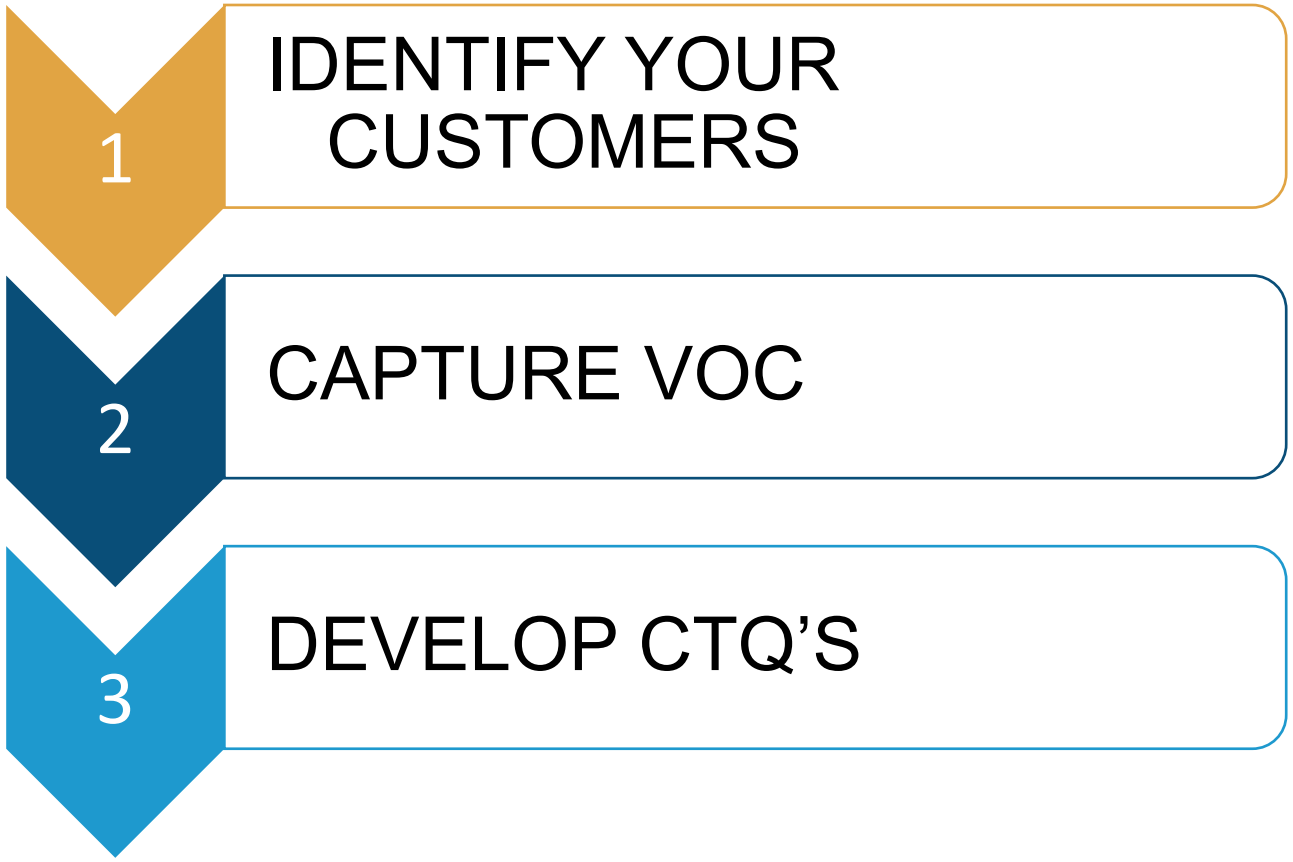
DEFINING CTQ'S

Customer CTQs usually fall into one of 4 categories :



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DEVELOPING CTQ'S



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SPECIFICATION LIMITS

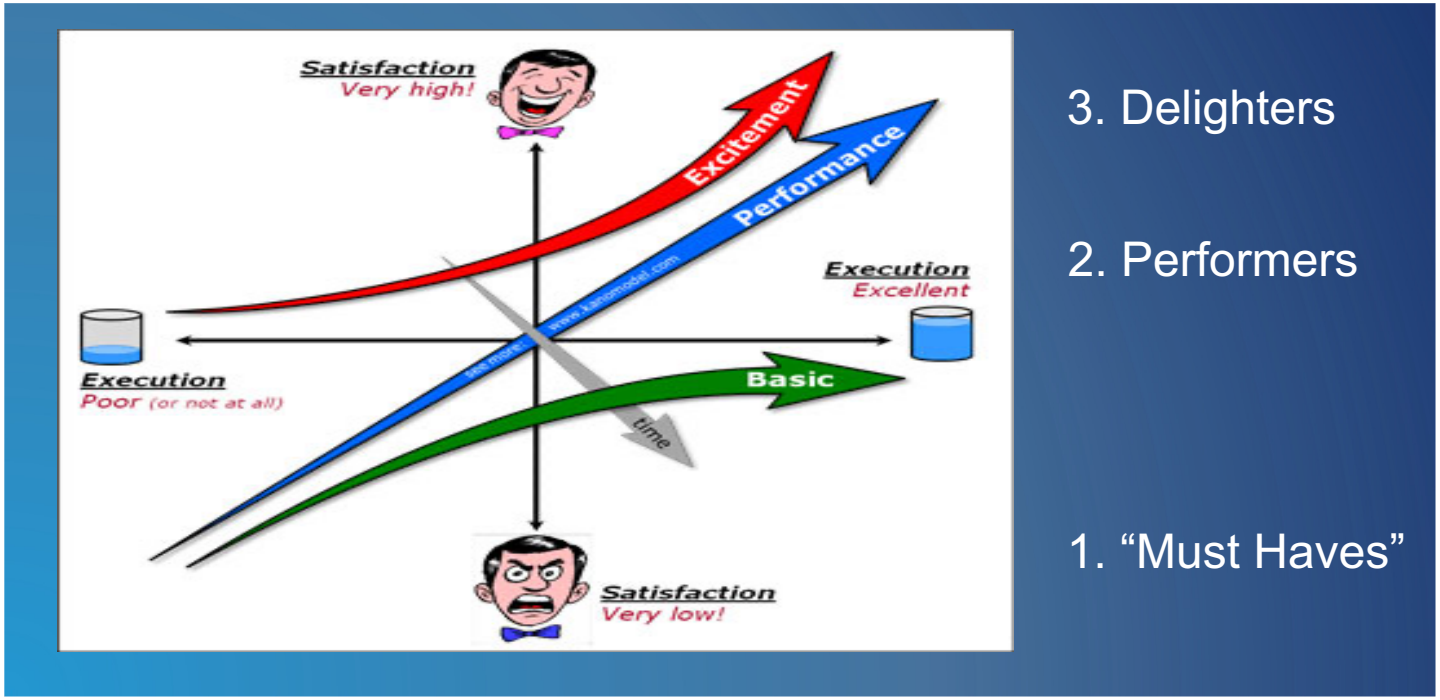
"Specification Limits" are Lean Six Sigma's way of defining your customer expectations

USL = Upper Specification Limit

LSL = Lower Specification Limit

Also called 'Tolerance limits' in some businesses

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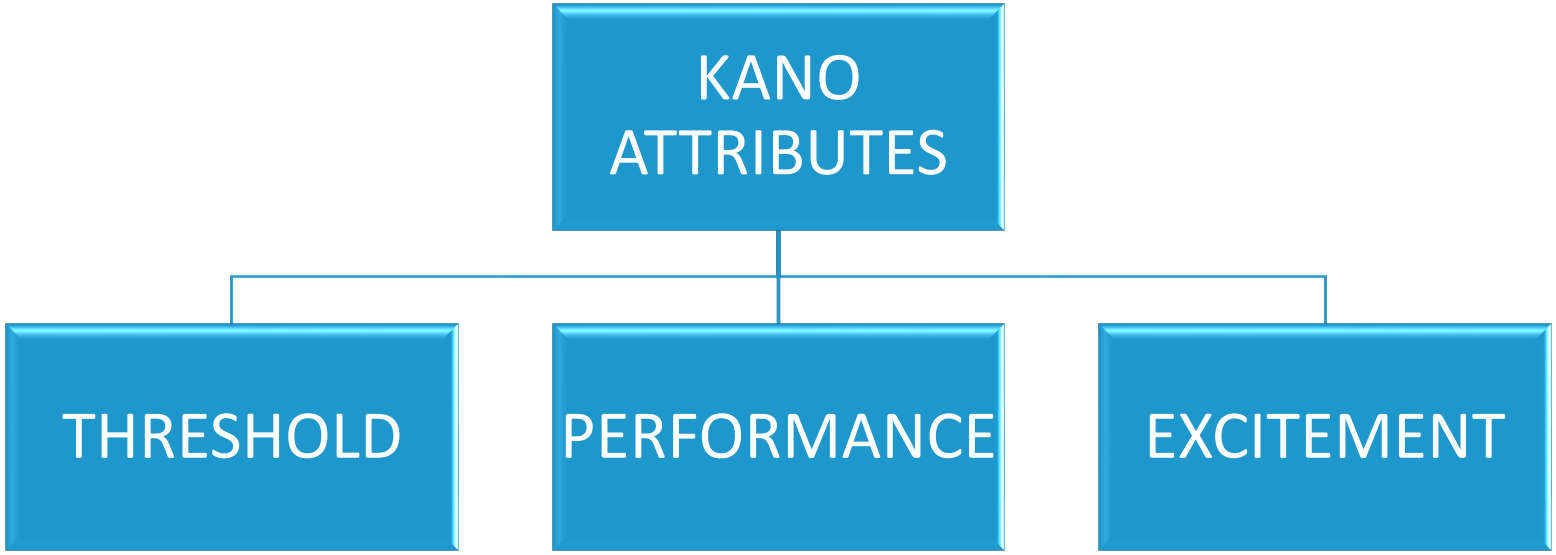
KANO ANALYSIS

Developed in the 1980s by Professor Noriaki Kano, which classifies customer preferences into three main categories

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KANO ANALYSIS

The Kano Model has three main categories of attributes:



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QUIZ:

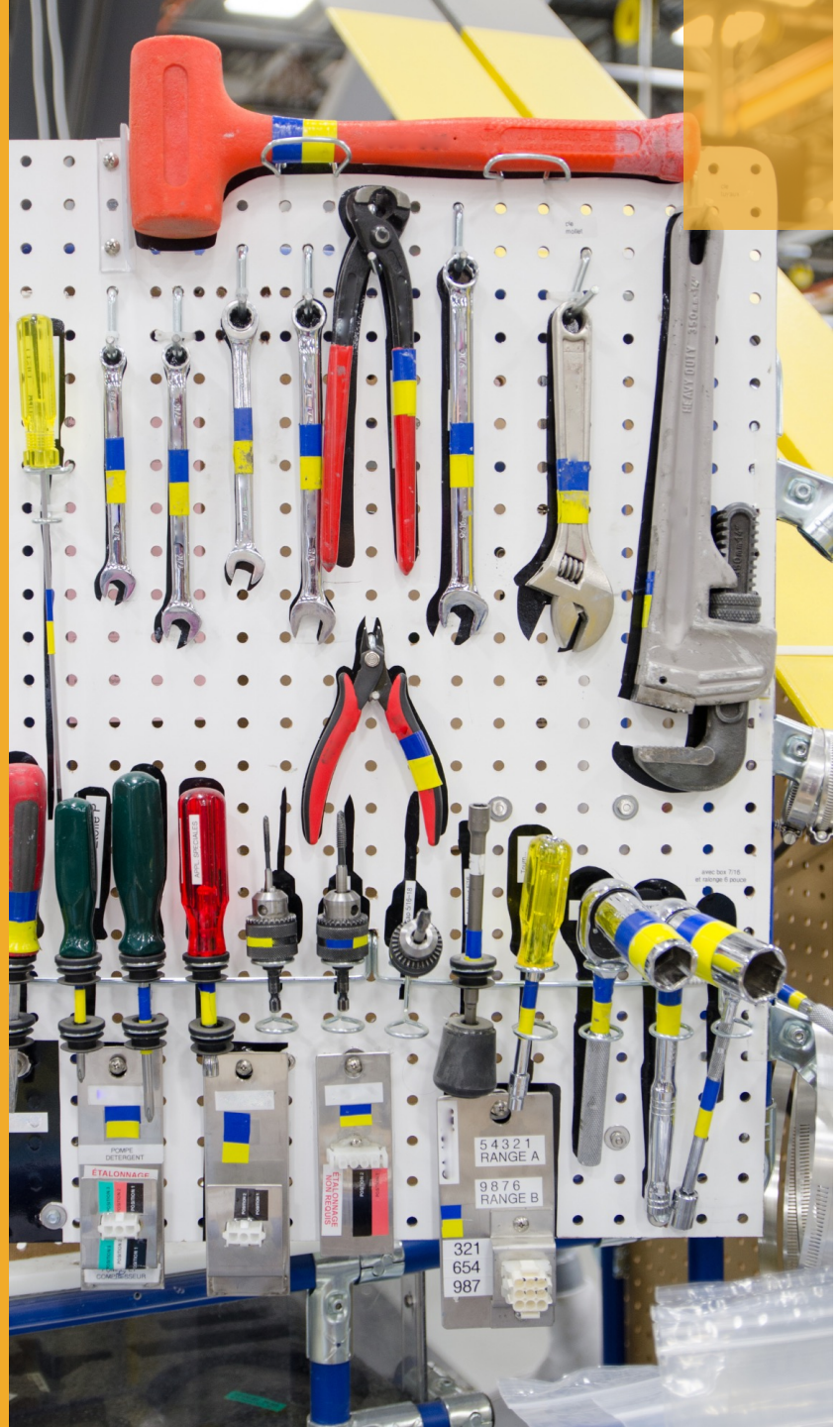
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1. What Tool is used to understand what is Critical to Quality (CTQ) by Forming 3 categories: *threshold, performance,* and *excitement*?
   - **KANO ANALYSIS**

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**

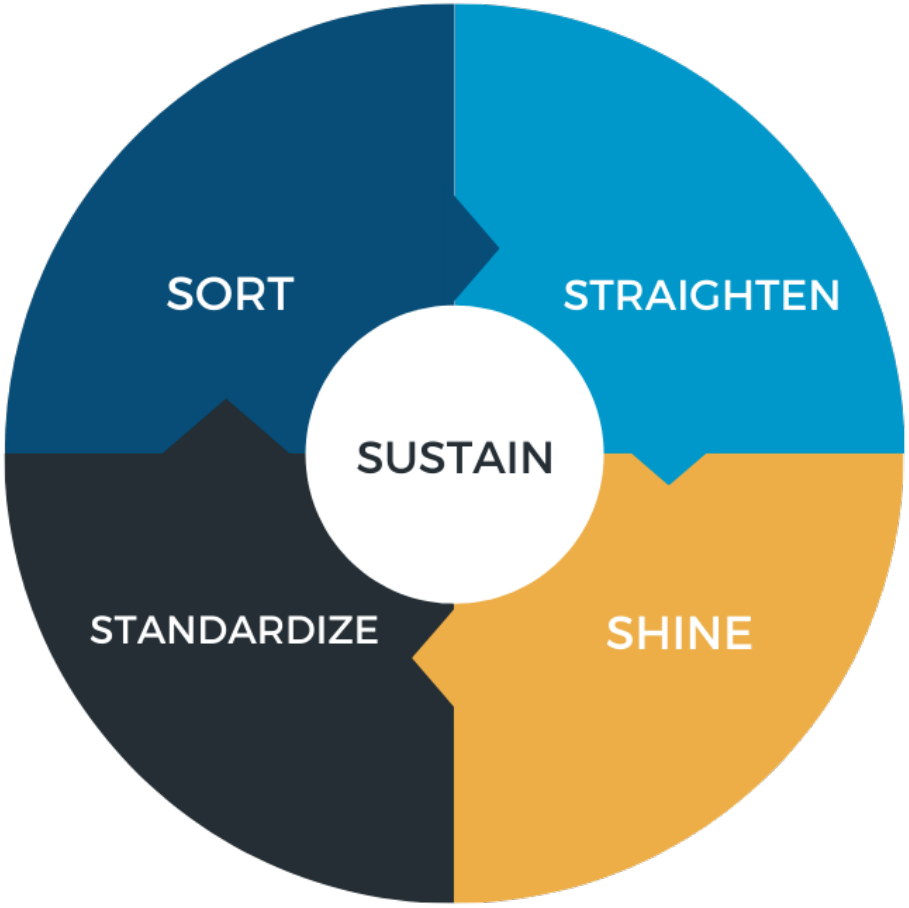


5S

Continuous Improvement should not be just an event

LEAN SOLUTIONS

5S



LEAN SOLUTIONS



WHY 5S?

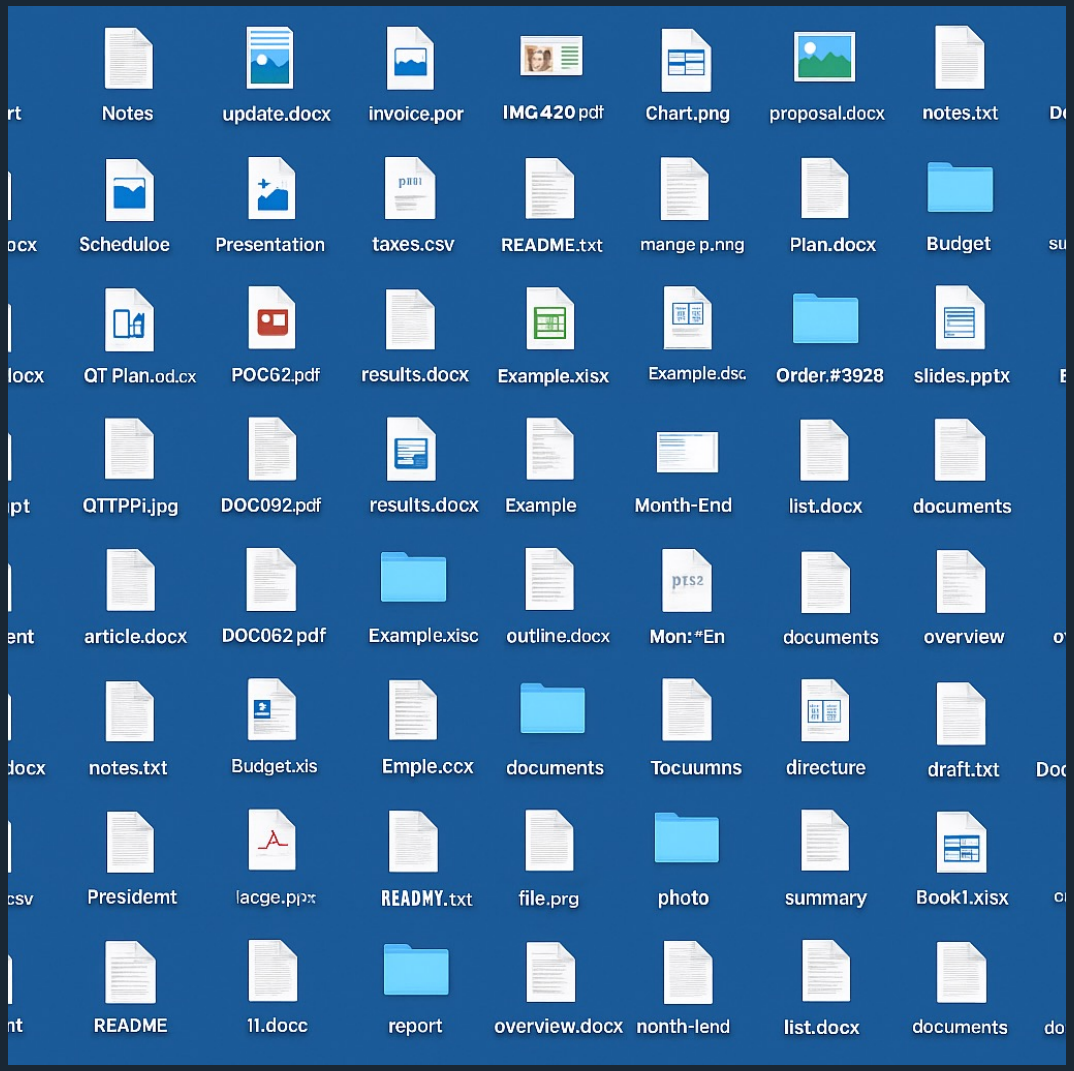
Workplace Organization and Visual Management should be Fundamental to Your Facility

- SAFER!
- Problems Become Visible
- Promotes Culture

Result: Improved Safety, Quality, and Cost

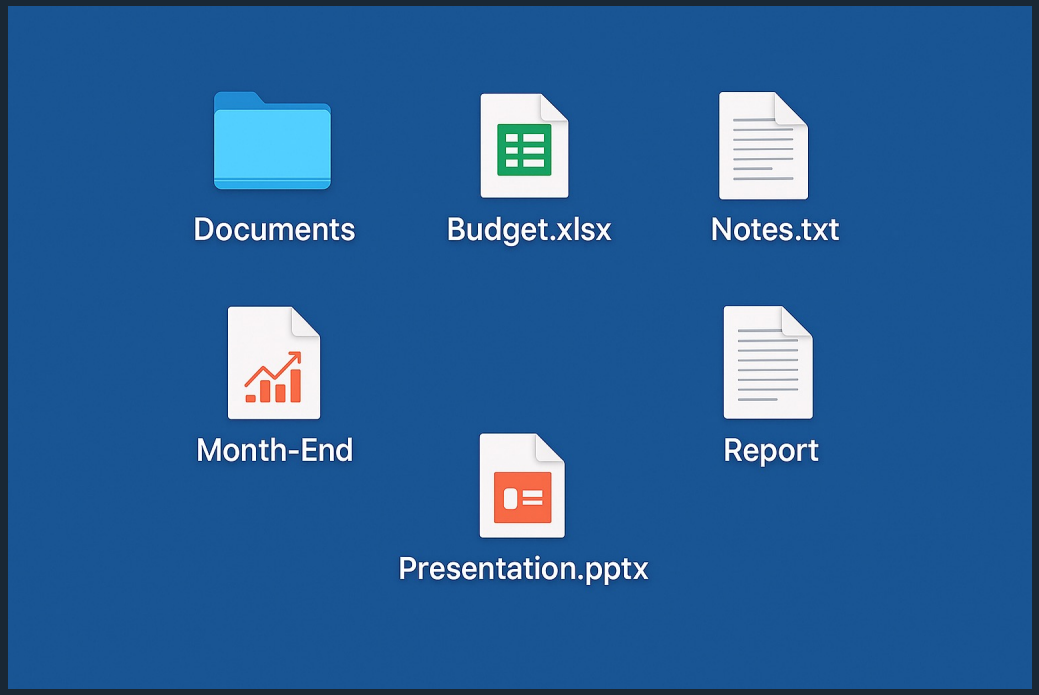
LEAN SOLUTIONS

FIND FILE “Month End”



LEAN SOLUTIONS

FIND FILE “Month End”

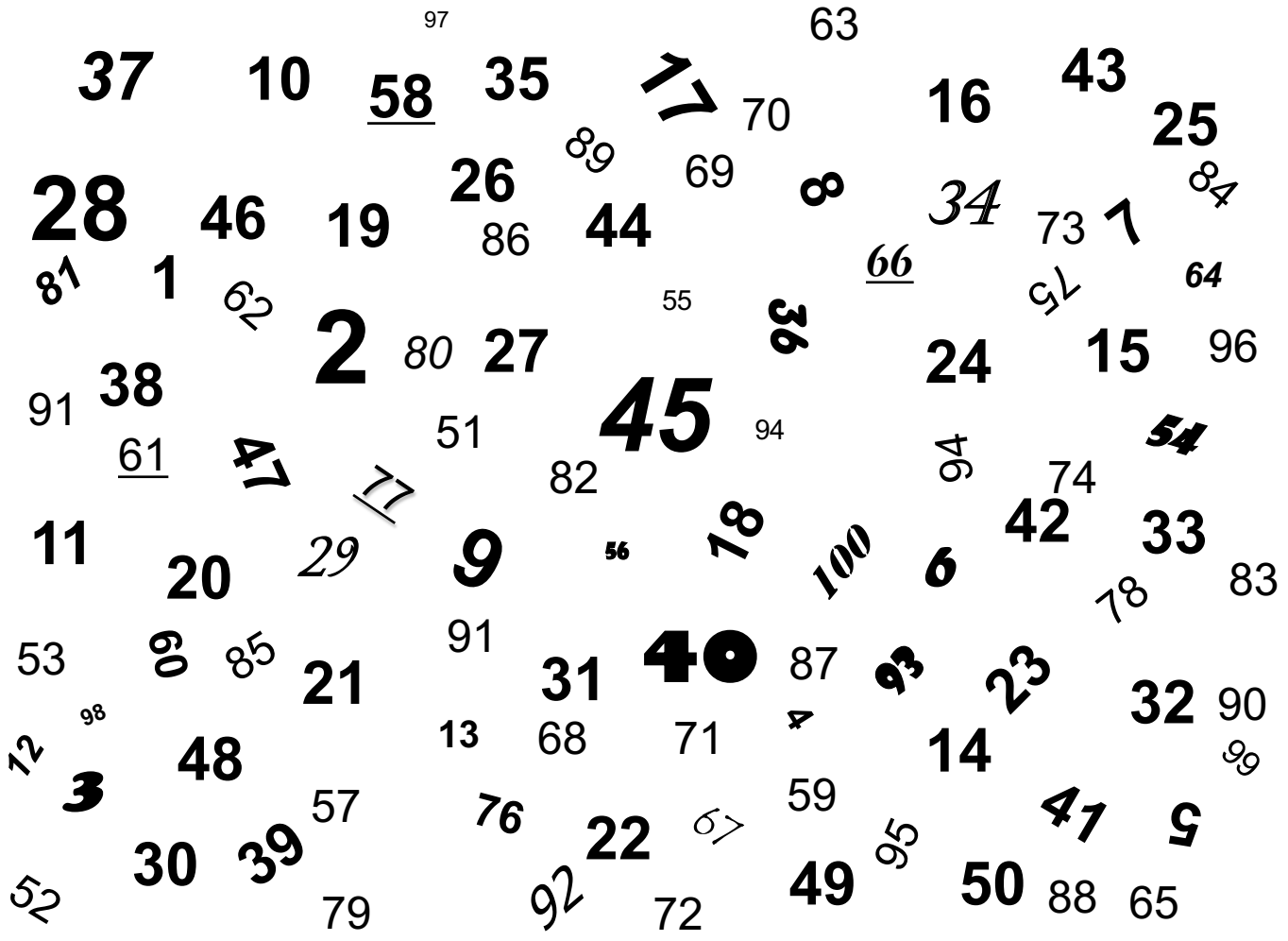


LEAN SOLUTIONS

Exercise #1

LEAN SOLUTIONS

60



LEAN SOLUTIONS

SORT



- Critically examine everything
- Red Tag Process
  - Always use-Have a place for it
  - Sometimes use-Tag and Date
  - Never use-Red tag area
- Members know best what is needed
- Everything in the area should have a purpose
- Ensure following record retention policy

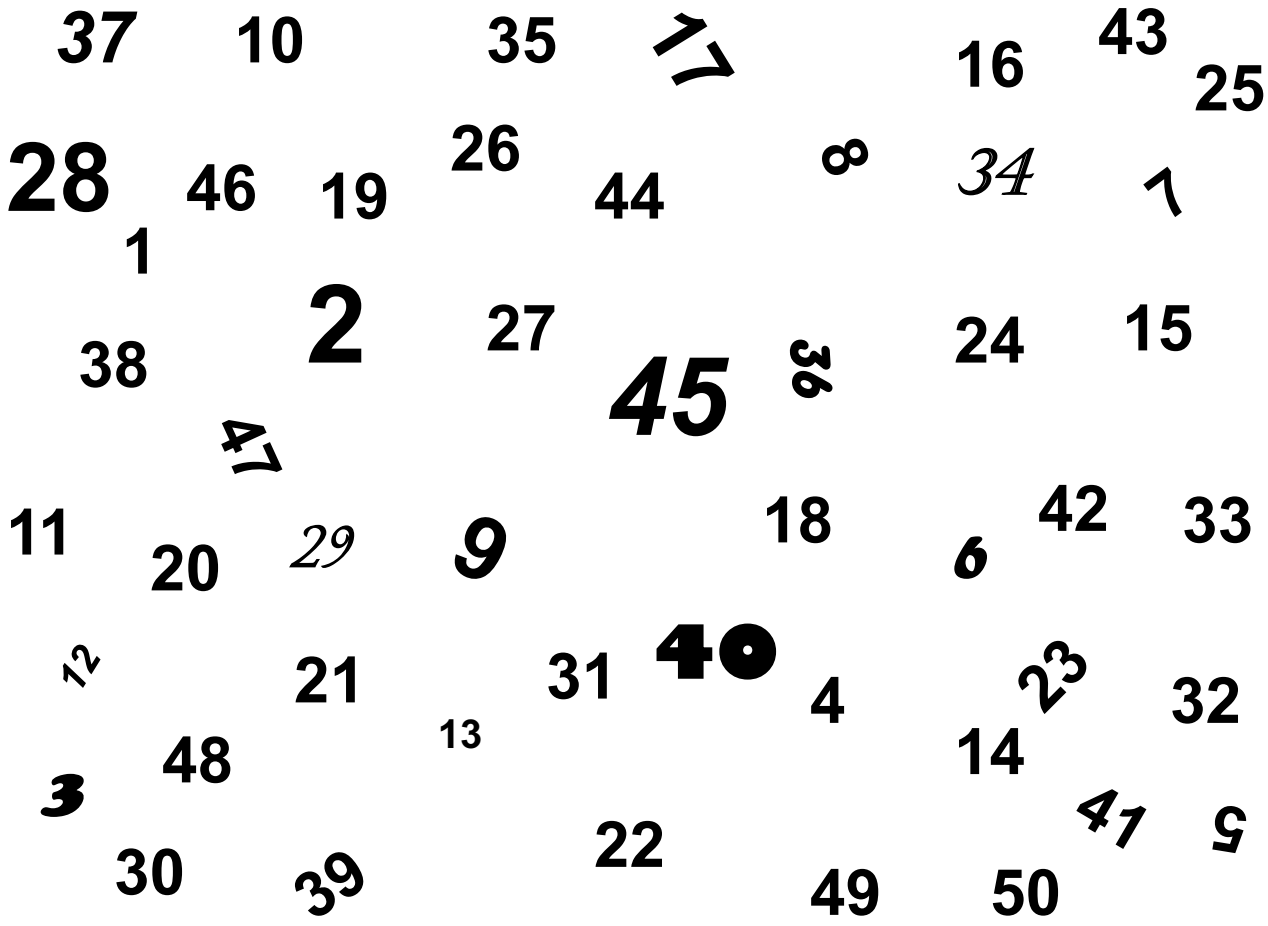


LEAN SOLUTIONS

Exercise #2

LEAN SOLUTIONS

60



LEAN SOLUTIONS

STRAIGHTEN or SET IN ORDER



- For what's left, where does it go?
- Be mindful of frequency of use
- Be Visual
- Arrange so things are easy to find and readily retrieved.
- "A place for everything and everything in it's place."

SHINE

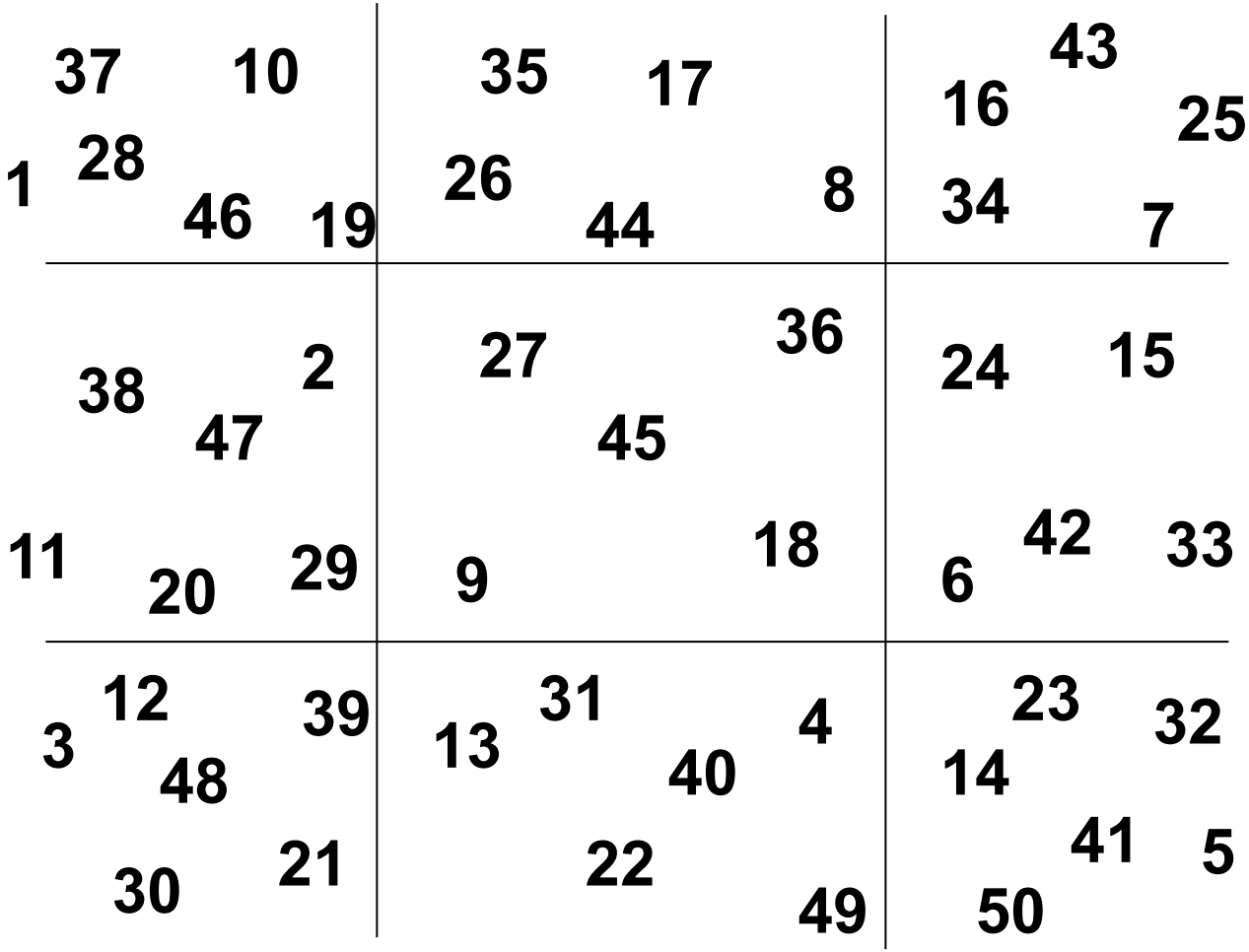
- Clean the area (desks, keyboards, phones, monitors, printers, conference rooms)
- Implement regular housekeeping so that any out of place item is easily detected
  - In offices, conference rooms, print rooms
- Always use your 5S Color Standards

LEAN SOLUTIONS

Exercise #3

LEAN SOLUTIONS

60

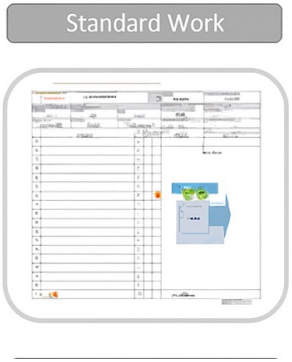


LEAN SOLUTIONS

STANDARDIZE

- Implement 5S Board
- Take a picture of the area
- Assign an area owner
- Develop standard work for regular housekeeping
- Implement Daily End of Shift Checks







LEAN SOLUTIONS

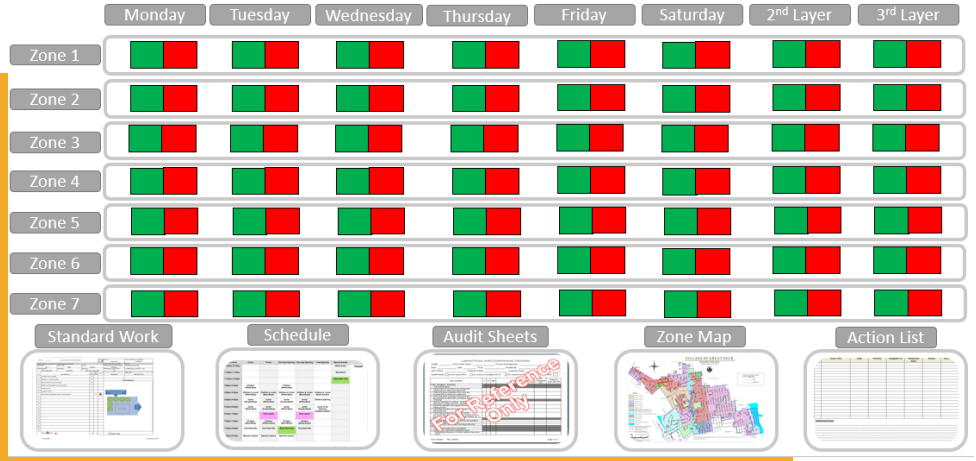
Exercise #4

LEAN SOLUTIONS

60

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

LEAN SOLUTIONS



SUSTAIN

- Implement Layered Process Audits in order to sustain improvements

LEAN SOLUTIONS

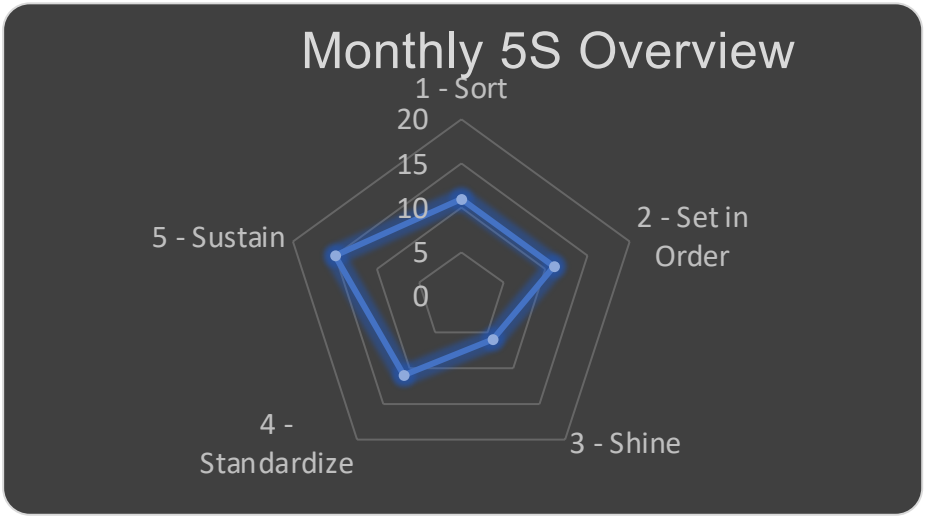
5S Audit & Results

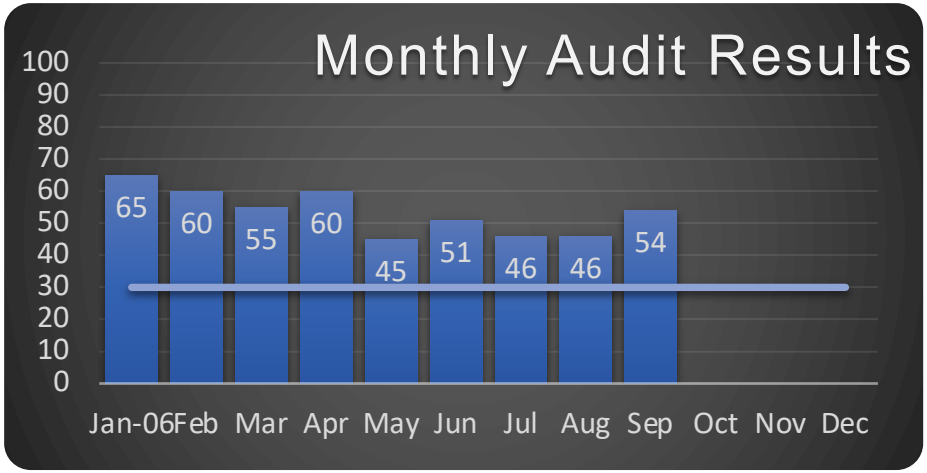
5S Workplace Scan Checklist

Department: | Date: | Scored By: | Place an "x" in the appropriate box based on number of issues observed.

		Number of Observations >>	0	1-2	3-4	5-6	>6
Sort	**Distinguish between what is needed and not needed**						
1	Unneeded equipment, tools, furniture, etc. are present				x		
2	Unneeded items are on walls, notice boards, etc				x		
3	Items are present in walkways, stairways, corners, fire exits etc.					x	
4	Unneeded inventory, supplies, parts, or materials are present					x	
5	Safety hazards (water, oil, chemical, machines) exist			x			
		Subtotal >>	0	1	4	6	0
Set in Order	**A place for everything and everything in it's place**						
1	Correct places for items are not obvious				x		
2	Items are not in their correct places				x		
3	Walkways, workstations, equipment locations are not indicated					x	
4	Items are not put away immediately after use					x	
5	Height and quantity limits are not obvious			x			
		Subtotal >>	0	1	4	6	0
Shine	**cleaning, and looking for ways to keep it clean and organised**						
1	Floors,walls stairs, and surfaces are free of dirt, oil, and grease				x		
2	Equipment is not kept clean and free of dirt, oil, and grease				x		
3	cleaning materials are not easily accessible			x			
4	Lines, labels, signs, etc are not clean and unbroken		x				
5	Other cleaning problems of any kind are present			x			
		Subtotal >>	0	2	4	0	0
Standardize	**Maintain and monitor the first three categories**						
1	Necessary information is not visible				x		
2	All standards are not known and visible				x		
3	Checklist don't exist for all cleaning and maintenance jobs					x	
4	All quantities and limits are not easily recognizable					x	
5	How many items can't be located in 30 seconds			x			
		Subtotal >>	0	1	4	6	0
Sustain	**Stick to the rules**						
1	How many workers understand the 5s principals						x
2	How many times last week was daily 5s not performed						x
3	Number of times that personal belongings are not neatly stored					x	
4	Number of times job aids are not available or up to date					x	
5	Number of times last week daily 5s inspection were not performed			x			
		Subtotal >>	0	1	0	6	8
		Total >>	0	6	16	24	8

Grand Total 5S Score	**54**





LEAN SOLUTIONS

5S Your Computer Hard/Shared Drive

5S Principle	Description
Sort	• Check all your files and software, and get rid of any that are unnecessary
Set In Order	• Organize your files and optimize the use of file folders • Keep in mind how often you need them and how much time you need to store them • Create specific shortcut icons for the most used files or programs
Shine	• Eliminate any files under deleted items, sent items and the recycle bin
Standardize	• Establish procedures for maintaining your computer 5S system
Sustain	• Include hard drives in 5S audits • Focus on how people maintain files and program organization, and the time they spend ding so

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5S IN YOUR COMPANY

DISCUSSION

- What areas of your work could do with 5S?
- Who do you need to get involved?
- When are you going to try 5S?

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QUIZ :

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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**



STANDARD WORK

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ONE OF FOUR

RULES OF TOYOTA

All work shall be highly specified as to content, sequence, timing and outcome.

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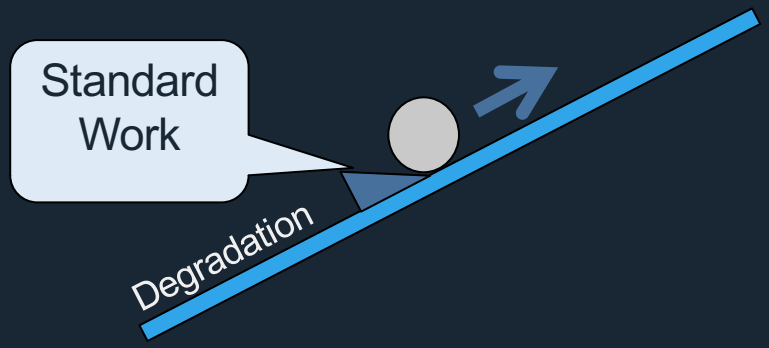
WHAT IS STANDARD WORK

- Detailed work sequence of the operator
- Provides a routine for consistency of an operation
- Details the best process we currently know
- Is the basis for improvement by defining the normal

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WHY STANDARD WORK?

- Prevents backsliding
- Makes problems obvious
- Removes ambiguity
- Makes managing schedules/resources easier
- Agree to work together/agree to change together



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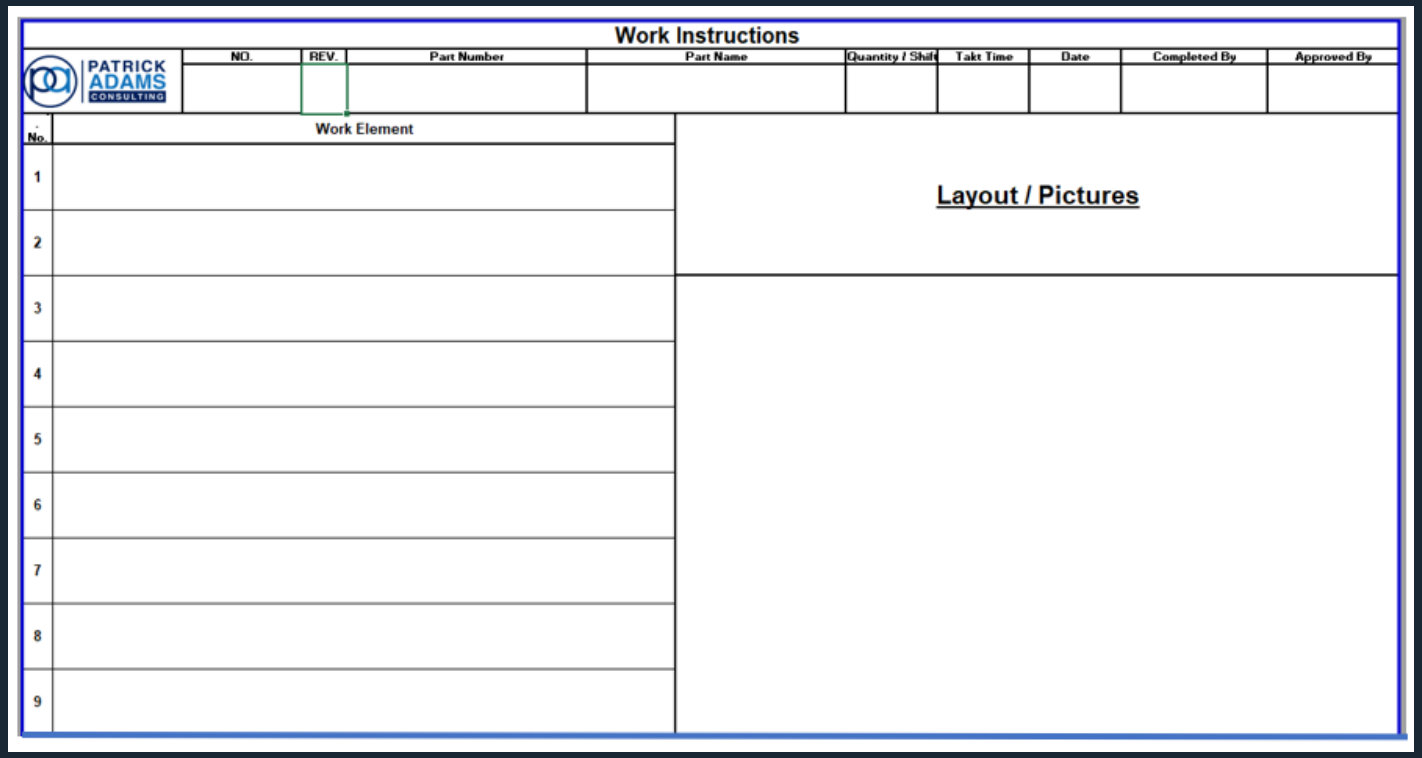
Draw a Pig Exercise

Customer Expectations

- Happy pig, with smile
- Curly tail
- Nose with two nostrils
- One eye
- 4 legs
- 2 ears
- “Plump”

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STANDARD WORK DOCUMENT



Work Instructions

PATRICK ADAMS CONSULTING

NO.	REV.	Part Number	Part Name	Quantity / Shift	Takt Time	Date	Completed By	Approved By

No.	Work Element	Layout / Pictures
1		
2		
3		
4		
5		
6		
7		
8		
9		

LEAN SOLUTIONS



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
- Identify waste in process

Standard Work audits are NOT meant to be punitive



WHY AUDIT

STANDARD WORK?

- Go to Gemba
- Establish standards if not in place
- Kaizen day after day, even the small things
- Kaizen creates basis for larger change
- Developing people
- Encourage team work

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?

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What to do if someone is not following the standard?

ASK WHY

They're not following the standard

RESPOND TO

The reason they indicate

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STANDARD
WORK SUMMARY

- Every facility must implement and maintain Standard Work
- Applying Standard Work demonstrates how methods to improve quality, increase operational speed, and reduce costs are all interconnected
- Standardized Work establishes the foundation for all productivity, quality, safety, and cost improvements of the future



STANDARD

WORK SUMMARY

- Standard Work - The BEST combination of people and assets while using the minimum amount of materials, equipment and space
- We need to test out possible improvements by changing only one thing at a time.
- Standard work should be developed by those who perform the tasks. They to know how to do it well and are the experts.



QUIZ:

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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**

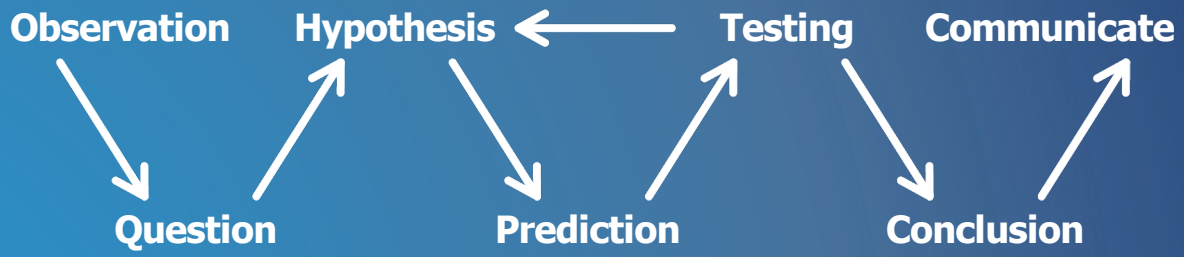
4. Discussion: Why is it so important to audit standard work?



PDCA

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SCIENTIFIC METHOD



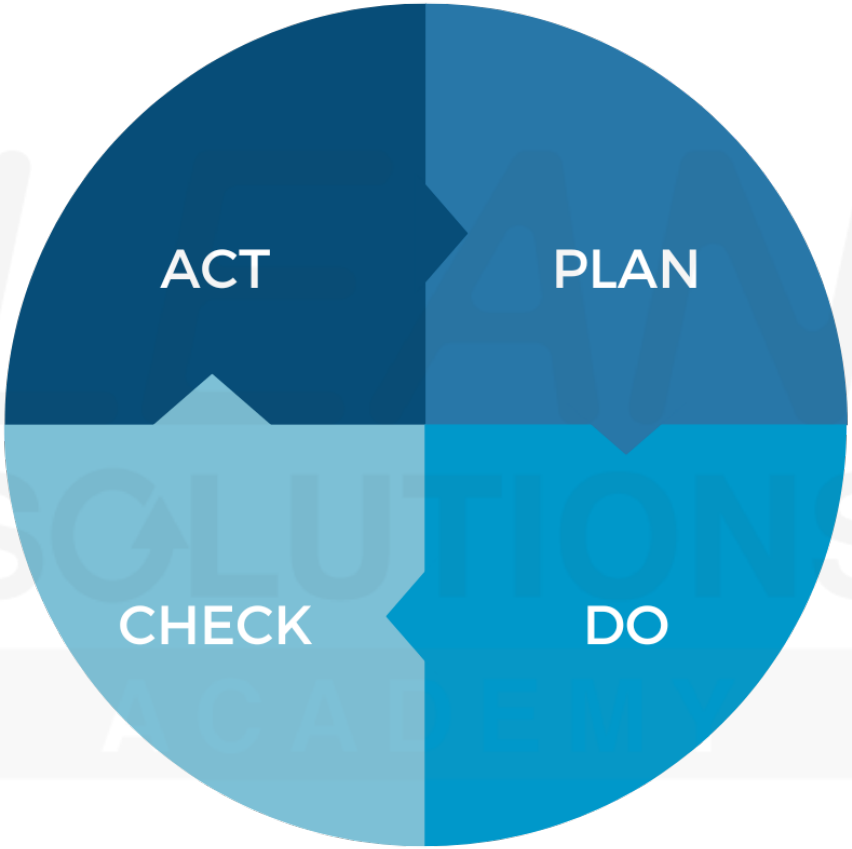
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BALL TOSS ACTIVITY



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PDCA cycle



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KAIZEN &

CONTINUOUS IMPROVEMENT

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WHAT IS KAIZEN?

- Kaizen is a Japanese word made up of two distinct characters:
- Small changes for the better = Continuous Improvement
- Managing daily improvement (part of Lean Management System)
- Continuous Improvement Projects

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WHAT IS A
KAIZEN EVENT?

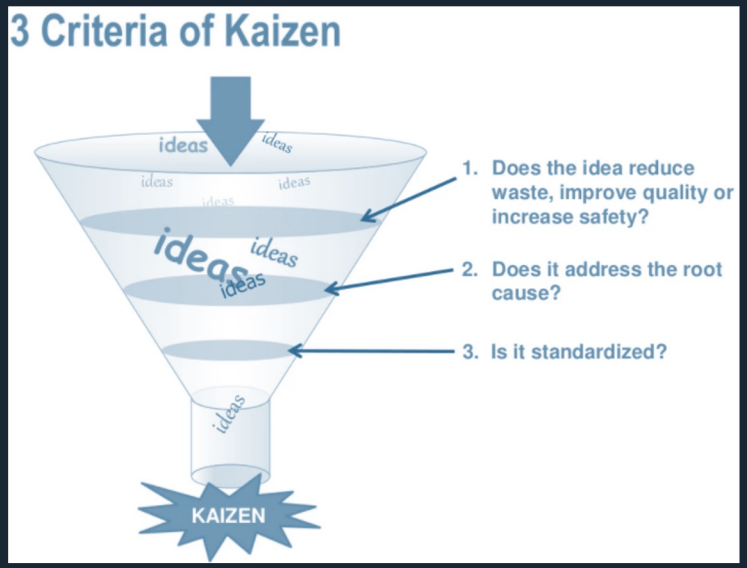
A Kaizen Event (different than Kaizen as a mindset) is a focused team activity with a specific, aggressive breakthrough objective aimed toward solving a well-defined problem.

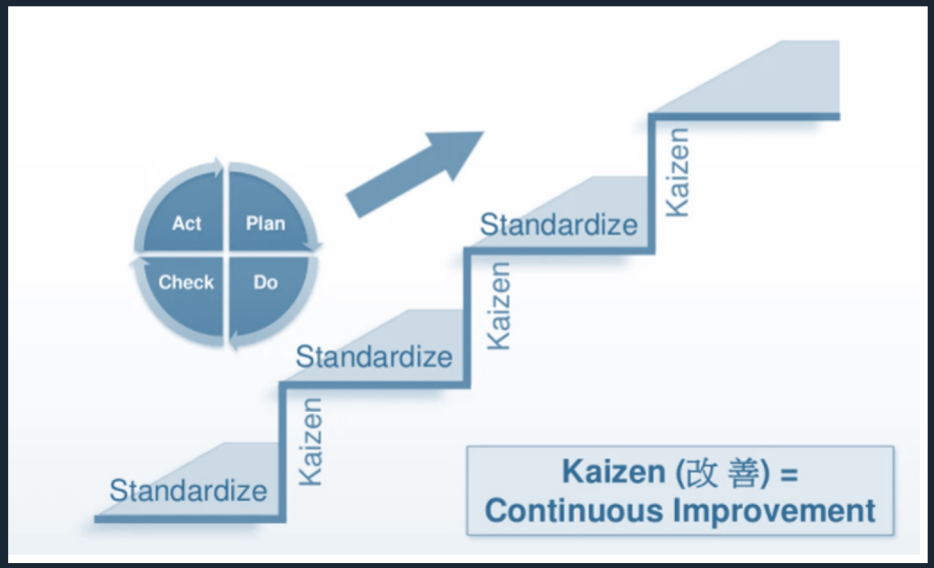
You can expect to accomplish huge results in a very short time frame (usually 2-5 days).



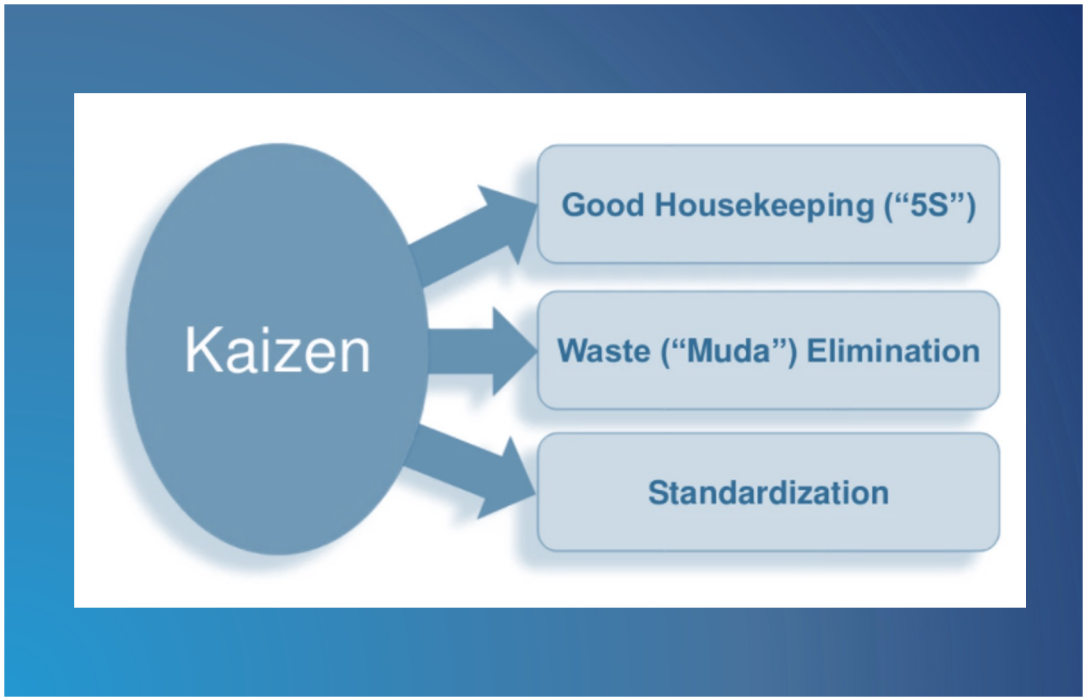
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KAIZEN IS A CONTINUOUS PROCESS





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VARIETIES OF KAIZEN METHODS

Individual (1-2 people) Versus Teamed (5-9)

Day-to-Day (2 second- improvements) Versus Special Event

Limit the hours spent on the project
The project scope must be considered when limiting available time





Kaizen	Innovation
Un-dramatic	Dramatic
Low Cost	High Cost
Low Risk	High Risk
Human Effort	Technology
No Brainer	More Thought

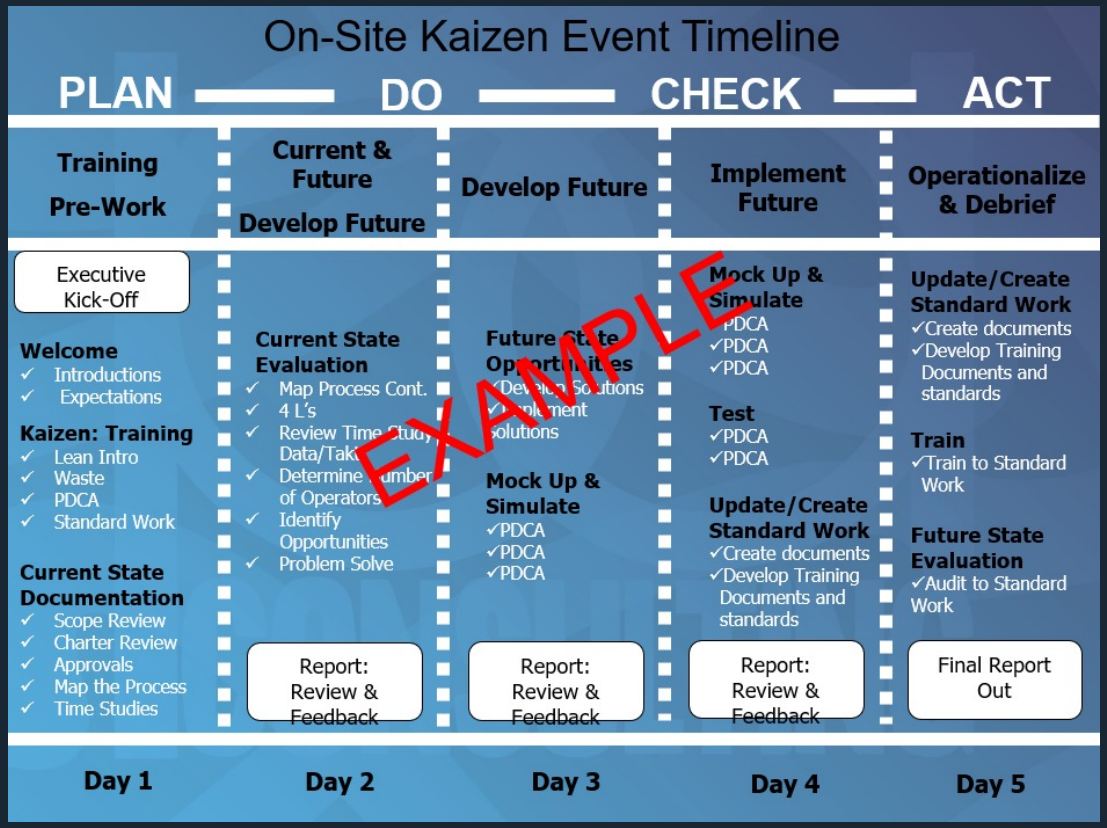
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BENEFITS
OF KAIZEN

- Empowers employees, enriches the work experience & brings out the best in everyone
- Promotes the growth of the Employee & the Company
- Improves quality, safety, cost, delivery, environments, throughput & customer service/satisfaction
- Provides guidance from employees & serves as a barometer for leadership



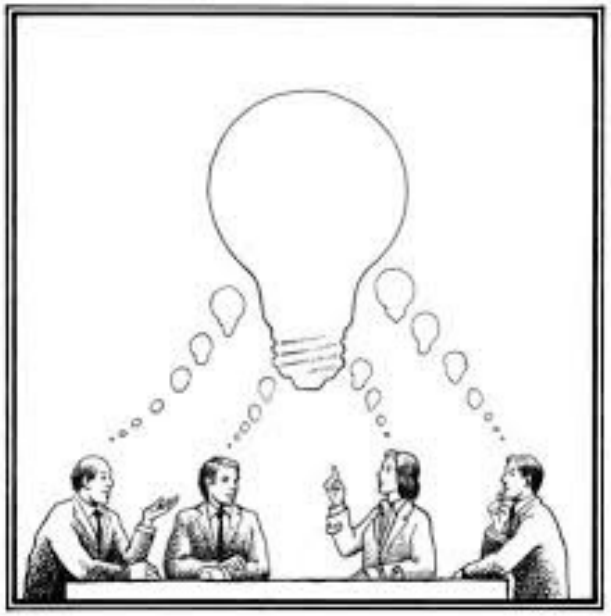
WHAT'S IN A WEEK – A LOT



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WHAT CAN WE DO DIFFERENTLY?





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SUGGESTED
KAIZEN PROCESS

1. Employee identifies a problem and writes it down
2. Idea is written up on a simple form
3. Discuss the idea with his or her supervisor
4. Supervisor reviews the idea within 24 hours
5. If possible the employee implements the idea
6. Supervisor posts the form to share with everyone

LEAN SOLUTIONS

CAPTURE THE IDEAS

Continuous Improvement Idea

Name: Shift: Dp #: 3016- Date:

Which of the seven wastes does this idea reduce? (Circle One)

Over-Production Transportation Motion Waiting Inventory Defects Over-Processing

Which measure does this impact on the team board? (Circle One)

Safety Quality Schedule Cost Culture Environment

Continuous Improvement Idea ***(Attach additional information, as required.)***

Improvement Results ***(Attach additional information, as required.)***

Reviewed	Accepted	Not Accepted	Implemented	Complete	Implemented = Completed by mbr Complete = Recognized by mgmt	Award given/amount: Date:
☐	☐	☐	☐	☐		

:pe 02/11/2019 WHITE: HMS YELLOW: Team Leader/Supv PINK: Member

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GEMBA WALKS

LEAN SOLUTIONS



WHAT IS A GEMBA WALK?

The Gemba walk is an essential part of the Lean management philosophy.

- Its purpose is to allow managers and leaders to observe the actual work process, engage with employees, gain knowledge about the work process and explore opportunities for continuous improvement.
- A Gemba Walk is also an opportunity for managers and leaders to coach and receive coaching.

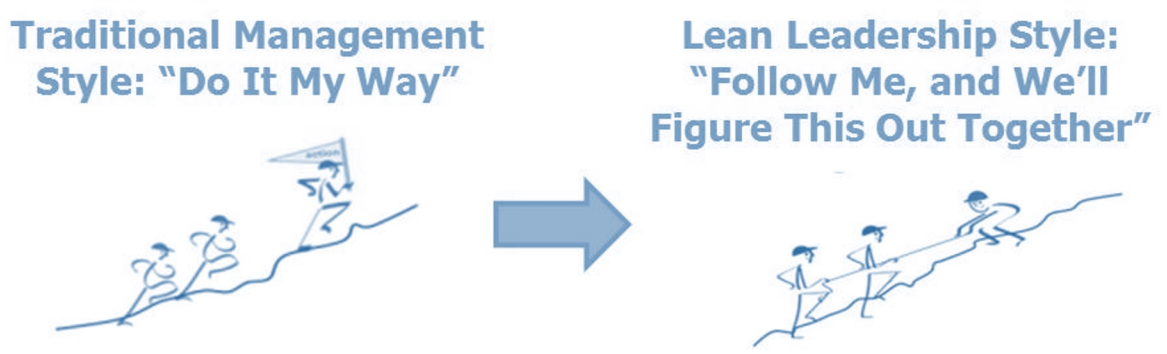
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GEMBA WALKS

ARE NOT DONE ALONE

Gemba walks are meant to be coaching opportunities.

Use your LSW to establish a day/time and stick to your schedule. Make it routine!



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DEFINE
THE PURPOSE

Define ‘purpose’ for walk – why doing it?

Define scope for walk – where headed?

Coach appropriate behaviors to participants:

- One conversation at a time.
- Show respect. Listen more than you talk.
- Make no on the spot judgements, seek to understand.

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TYPES OF GEMBA WALKS

- Customer Experience
- 5S
- Waste – Waste Walk
- Process Flow
- Communication & Colloboration

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What to Do on GEMBA WALKS

Type	Purpose	Example
Process Flow	Identify delays, handoff problems, or redundant steps	Walking through expense approval process to see delays
Customer Experience	Understand pain points in service delivery	Observing call center workflow and response times
Technology & Systems	Spot inefficiencies, duplicate work, or poor system usage	Reviewing how staff input data into CRM systems
Communication & Collaboration	Identify wasted time in ineffective meetings or unclear communication	Observing a weekly staff meeting or workflow handoffs
Standard Work	Ensure consistency and compliance while spotting improvements	Reviewing how invoices are processed compared to procedure
5S	Eliminate clutter and create an environment that supports productivity	Checking file storage, desktop organization, and supply areas
Continuous Improvement (Kaizen)	Encourage idea sharing and problem solving at the source	Asking employees what frustrates them and capturing ideas

TIPS & POINTS
TO REMEMBER

- Gemba walks are a crucial observational method
- Checklists are an easy, quick tool for adding structure
- Stick to your plan

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QUESTIONS

TO ASK

Simple 3 Question Summary:

1. What is Working?
2. What Is NOT Working?
3. Given That, What Will You Do Differently Going Forward?

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GEMBA CHECKLIST



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QUIZ:

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?
   Process Flow, Customer Experience, Technology & Systems, Communication & Collaboration, Standard Work, 5S, Continuous Improvement (Kaizen)

LEAN SOLUTIONS

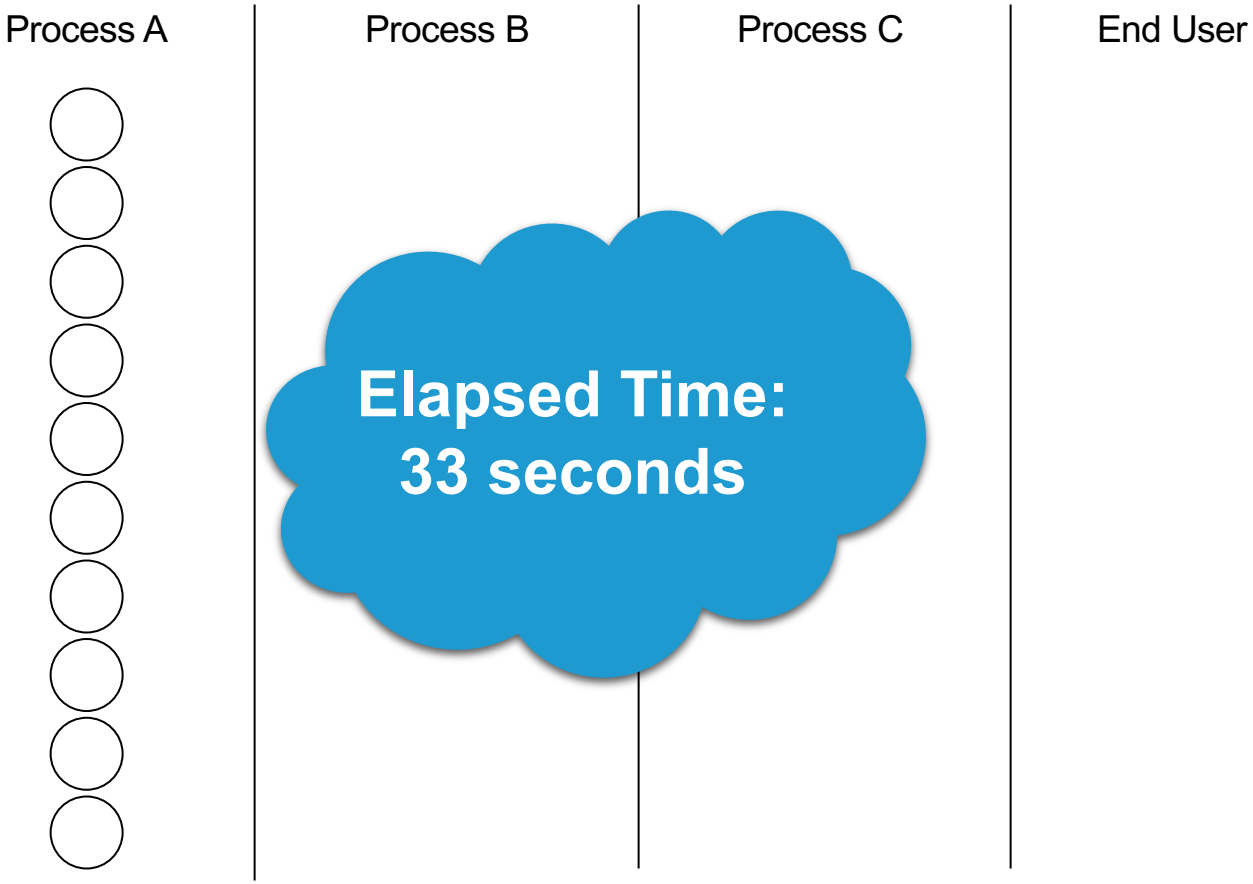


6 FUNDAMENTALS OF LEAN

- Value
- Value Stream
- Flow
- Pull
- Perfection

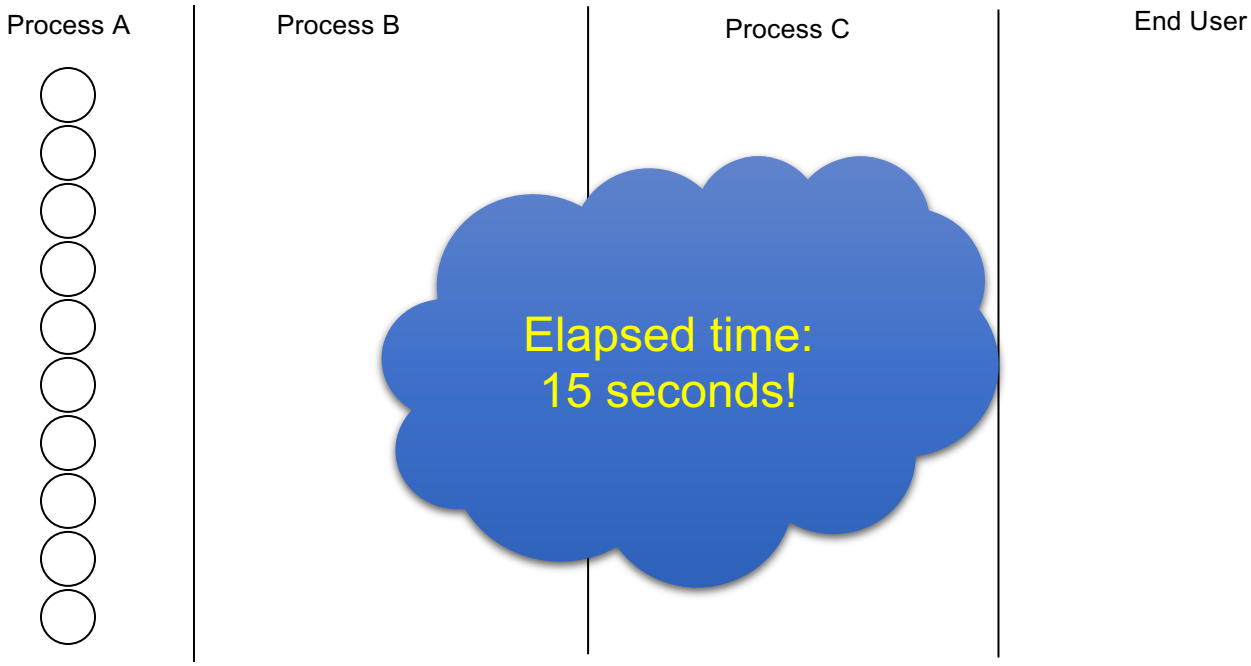
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BATCH & QUEUE



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SINGLE PIECE FLOW



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Upstream (suppliers)



Downstream (customers)

"The ideal arrangement for Flow production should resemble a watershed: the river being the main assembly track, fed by tributaries in the shape of sub-assembly lines which, in turn, would be supplied by streams representing the machine lines fed by brooks typifying the material conveyors. Each part should flow continuously forward … ultimately to the sea - the customers."

Frank Woollard, *Principles of Mass and Flow Production*, 1954

LEAN SOLUTIONS

FLOW & PULL

Flow first, if you cannot flow then Pull.
NEVER PUSH

Flow	Pull	Push
Work moves smoothly, step by step without interruptions, delays, bottlenecks.	Work triggered by actual demand from the next process step or the customer.	Work released based on forecasts or schedules, regardless of the next step's actual need.
IDEAL LEAN STATE	Nothing is made or moved until it is needed.	Upstream "pushes" work downstream.

FLOW & PULL

Enablers for Flow

1. Use Single Piece Flow or Smaller Batches
2. Total Productive Maintenance (TPM)
3. Line Balancing (Cycle Times and Takt Times)
4. Theory of Constraints
5. Mistake Proofing (Poka Yoke)
6. Jidoka
7. SMED (Quick Change Over)

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BATCH VS SINGLE PIECE FLOW



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LINE BALANCING

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Understand the TAKT TIME and CYCLE TIMES of the operations in your process and BALANCE your line. The goal is :

CYCLE TIMES = TAKT TIME

Definitions:

TAKT TIME = Demand Time = Time needed to produce each unit of product or service in order to keep up with customer demand

CYCLE TIME = Actual time taken for production of each unit or service

Note: Always be aware for the specific definition of Cycle Time in your work or business because there can be subtle differences between companies

LINE BALANCING EXAMPLE

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Demand is 4,800 units per month. Assuming 30 days per month and 8 hours per day.

Therefore TAKT TIME in minutes is:

Total time period in minutes ÷ total number units demanded

(30 x 8 x 60) ÷ 4800 = 3 minutes

QUIZ 6:

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1. What is the Japanese name used for ‘Mistake Proofing’ of a process step ?
   - **POKA YOKE**

2. FLOW is critical to any process. What needs to Flow in an Airport or Hospital ?
   - **PEOPLE, INFORMATION, LUGGAGE, EQUIPMENT**

3. **SMED** is an acronym used in Lean Manufacturing. What is another name for SMED?
   - **QUICK CHANGE OVER**

4. A fundamental concept of any Lean Process is that it has no delays, constraints, waiting or bottlenecks. This Lean concept is called _____.
   - **FLOW**



6 FUNDAMENTALS OF LEAN

- Value
- Value Stream
- Flow
- Pull
- Perfection

LEAN SOLUTIONS

Pull

Downstream Demand
Driven Production

LEAN SOLUTIONS

Pull is Sometimes Referred to as

‘Just-In-Time Production’

LEAN SOLUTIONS

JUST IN TIME

LEAN SOLUTIONS

"PULL" and "KANBAN" are fundamental for…a JUST-IN-TIME process

- WHAT is needed
- HOW MUCH is needed
- WHERE it is needed
- (WHEN it is needed)

Note: 'WHEN' is usually not necessary because it assumed it is needed ASAP

KANBAN

LEAN SOLUTIONS

Kanban is the Japanese word for ‘card’ or ‘ticket’

The Kanban card was an authorization for materials to be moved from an Upstream location to a Downstream location. The card had printed on it What was needed How much was needed and Where it is needed.

A sequence of Kanbans pulls material through the process

Electronic signals are generally used today, but the system is still called a Kanban

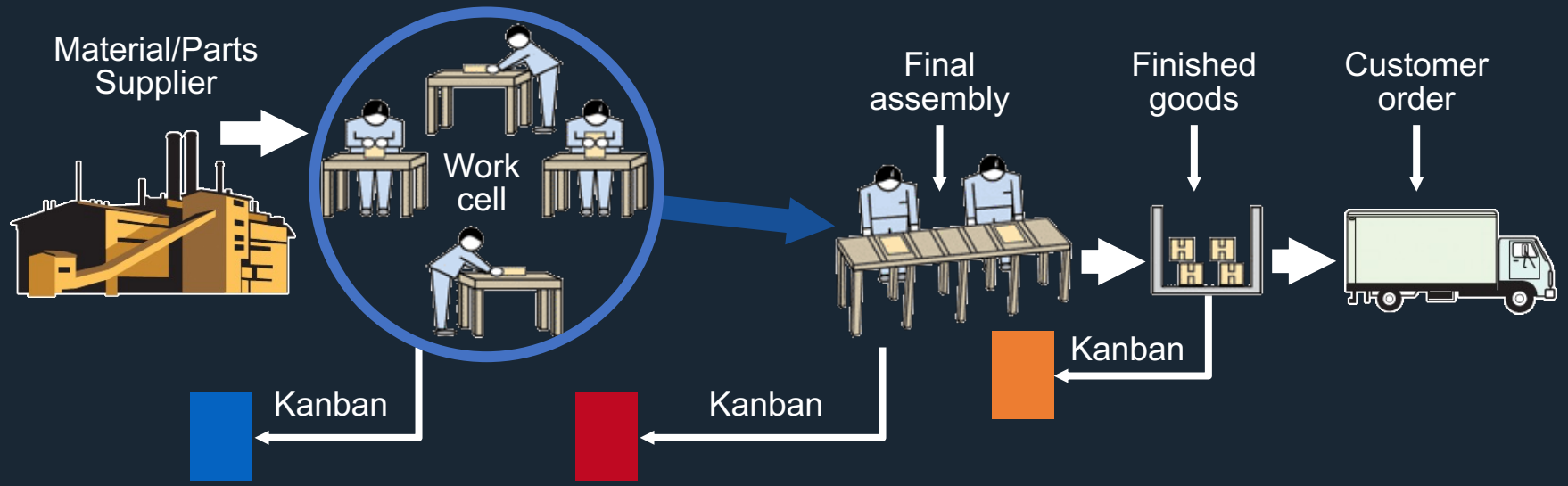
KANBAN CARD EXAMPLE



LEAN SOLUTIONS

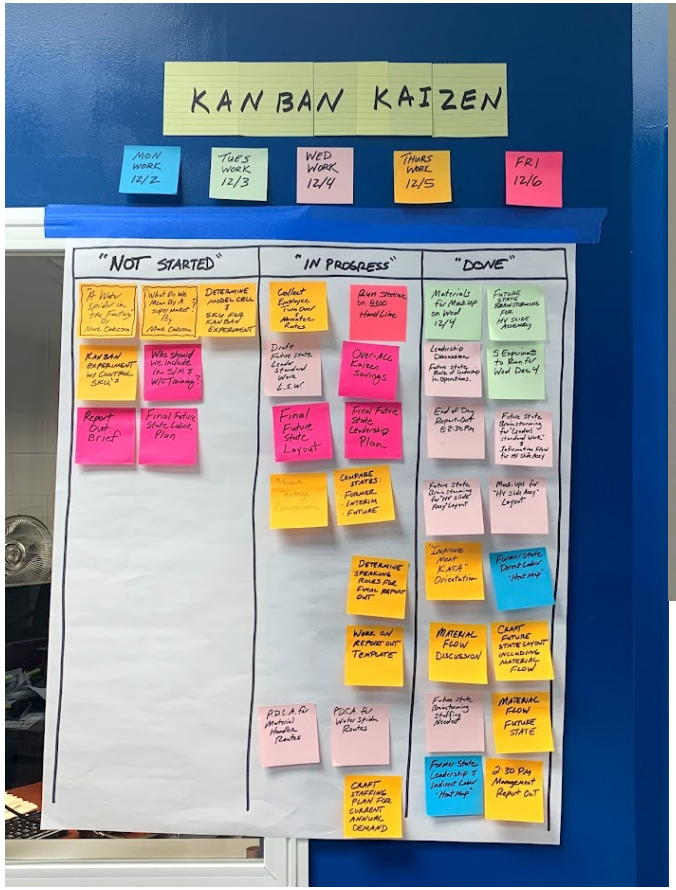
KANBAN

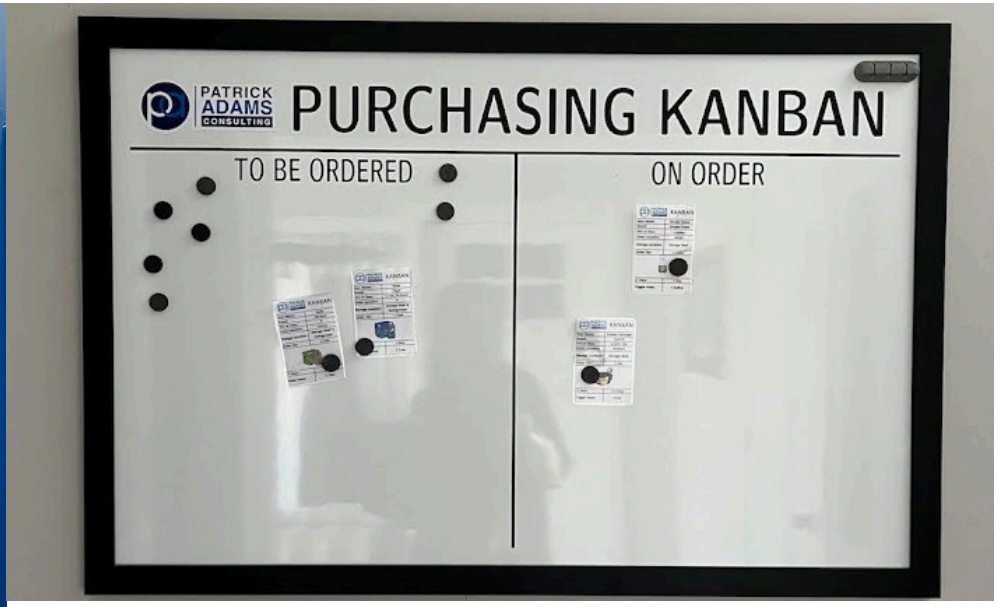
Good Kanban Systems Help to Minimize Inventory & WIP



LEAN SOLUTIONS

KANBAN BOARD EXAMPLES





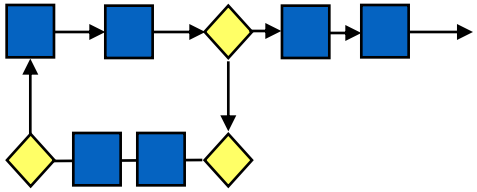
LEAN SOLUTIONS

PROCESS MAPPING

There are usually 3 view of a process:

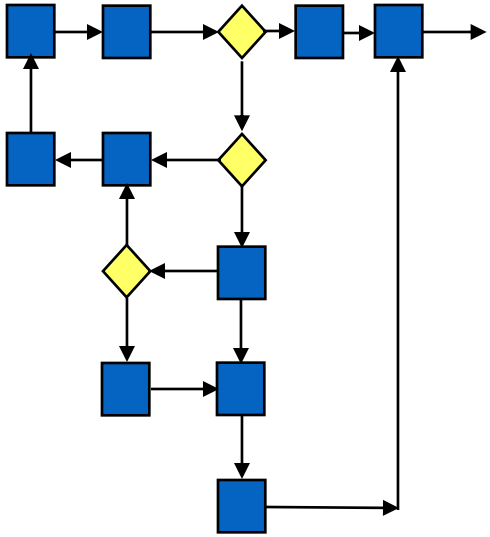
1

What people *THINK* it is..



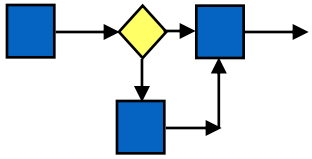
2

What it *ACTUALLY* is..



3

What it *SHOULD* be..



LEAN SOLUTIONS

STANDARD PROCESS MAPPING SYMBOLS

Standard symbols for Process Mapping:

(available in Microsoft Office™, Visio™, iGrafx™ , SigmaFlow™ and other products)



A RECTANGLE *indicates an activity. Statements within the rectangle should begin with a verb*



A PARALLELAGRAM *shows that there are data*



A DIAMOND *signifies a decision point. Only two paths emerge from a decision point: No and Yes*



An ELLIPSE *shows the start and end of the process*

An ARROW *shows the connection and direction of flow*



A CIRCLE WITH A LETTER OR NUMBER INSIDE *symbolizes the continuation of a flowchart to another page*

LEAN SOLUTIONS

PROCESS MAPPING:

COFFEE ACTIVITY



LEAN SOLUTIONS



VISUAL
MANAGEMENT

LEAN
SOLUTIONS



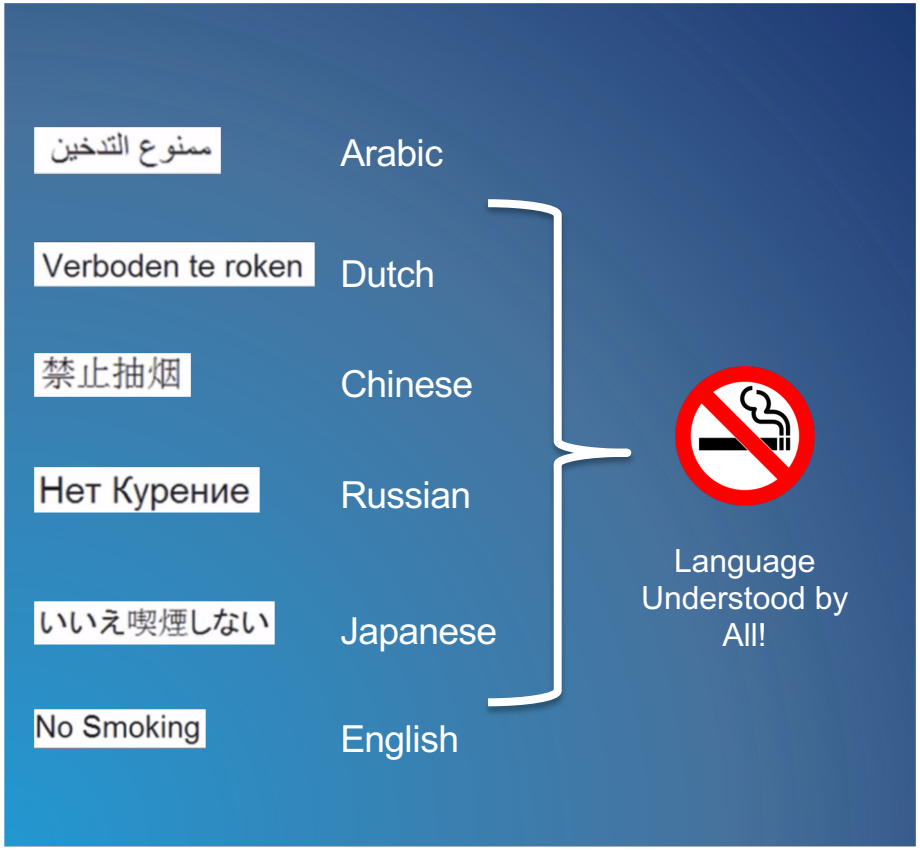
LEARNING
OBJECTIVES

- Understand what is Visual Management
- Understanding why Visual Management is important in a Lean Environment
- Learn how to implement Visual Management that fits in your organization

LEAN SOLUTIONS

What is Visual Management?

LEAN SOLUTIONS



VISUAL

MANAGEMENT

Can you understand what is show on the left?

LEAN SOLUTIONS

WHAT IS
VISUAL MANAGEMENT?

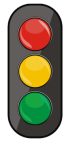


- The ability to manage everything in your business visually



- Managing visually is the ability of a system to quickly show the current status to anyone that stands and observes, within 30 seconds.





- EVERYONE in your business understands and knows how to respond if something is wrong.

LEAN SOLUTIONS

WHAT IS
VISUAL MANAGEMENT?

- Visual Management helps us become more effective problem-solvers by helping us with problem detection, since it helps us identify abnormalities quickly and easily.

- Visual Management helps us manage with our eyes. Done correctly, it helps us see at a glance how we're doing without having to read through reports, look up data, or wait for a briefing.

LEAN SOLUTIONS

4 COMMON TYPES

- **VISUAL SIGNALS**
- Visual Instructions
- Visual Measurements
- Visual Representations



4 COMMON TYPES

- Visual Signals
- **VISUAL INSTRUCTIONS**
- Visual Measurements
- Visual Representations



4 COMMON TYPES

- Visual Signals
- Visual Instructions
- **VISUAL MEASUREMENTS**
- Visual Representations



4 COMMON TYPES

- Visual Signals
- Visual Instructions
- Visual Measurements
- **VISUAL REPRESENTATIONS**





WHY

VISUAL MANAGEMENT

Provide Real Time Information

Reduce Waste and Poor Quality

Empowerment and Ownership

Drive Accountability

Faster Response Time to Problems

WHY

VISUAL MANAGEMENT

Easy to See Processes

Workflow is Clear

Inexperienced Can

Understand

Easier to Manage

LEAN SOLUTIONS



WHY

VISUAL MANAGEMENT

Develop a Routine

Daily, Weekly, Monthly

Show All Areas of the Organization

Should be a Display of Plant Performance

LEAN SOLUTIONS

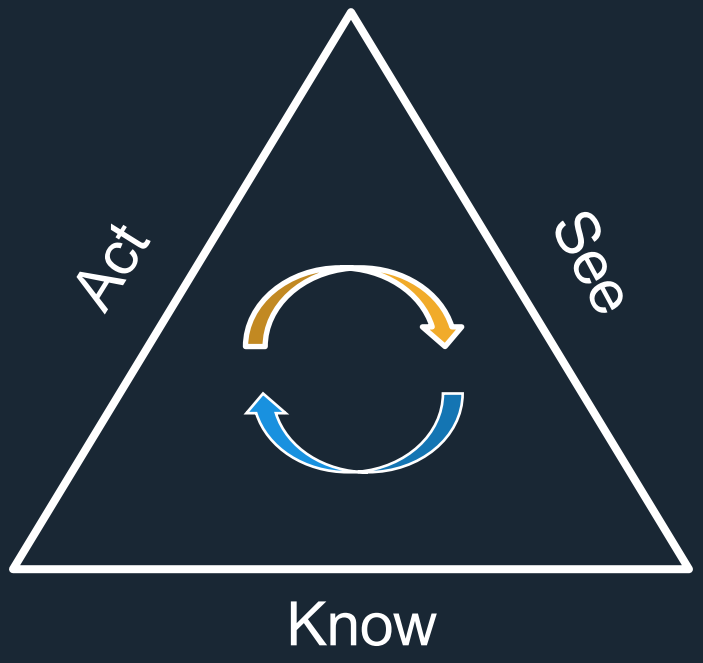
THE VISUAL OFFICE

Make problems visible

Communicate status

Improve productivity

Improve confidence



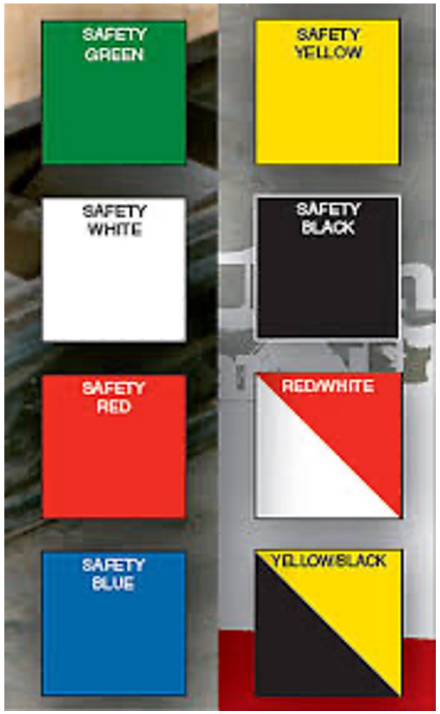
VISUAL MANAGEMENT CYCLE

How do we Implement Visual Management?

LEAN SOLUTIONS

SAFETY

AND SIMPLE IDENTIFICATION



COMMON COLORS

DANGER

WARNING

CAUTION

NOTICE

Fire Dangers

Fire Extinguishers

Chemical Dangers

Storm Shelters

Emergency Shut Off's

Electrical Box

Clearance

High Voltage

Notification

Evacuation

LEAN SOLUTIONS

DESIGNING VISUAL SYSTEMS

- Who is your audience
- Using the right media
- Don’t overdo it

LEAN SOLUTIONS

LEADING CHARACTERISTICS

- Clear and easy to understand
- Team ownership
- Promote team ownership
- Close to the process
- Limit the data displayed

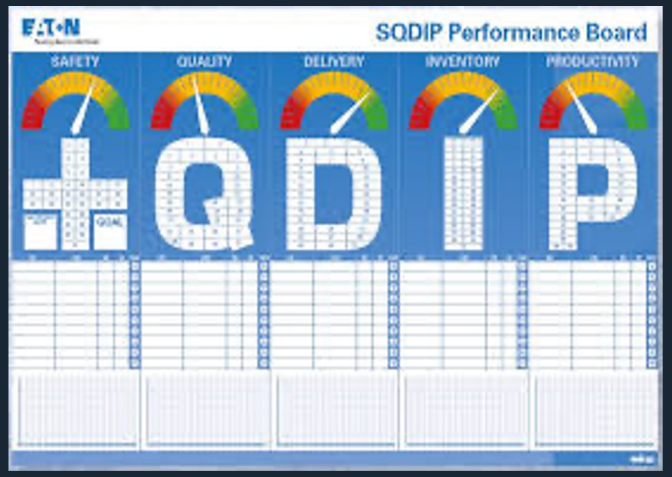
LEAN SOLUTIONS

VISUAL MANAGEMENT

BOARD EXAMPLES



Safety Cross



QDPI Indicators
with Safety 1st

LEAN SOLUTIONS

HOW TO START
YOUR VM JOURNEY

- Go See
- Brainstorming–What problems are you trying to solve?
- Team members understand why VMS are beneficial
- Discuss VMS components
- Create board using the VM board elements
- Try it out! Check and adjust as needed

LEAN SOLUTIONS



POINTS
TO REVIEW

- Keep it Clear and Concise
- Who, What, Where
- Basic Markings First
- Understandable for All

LEAN SOLUTIONS

QUIZ:

LEAN SOLUTIONS

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. A fundamental concept of any Lean Process is that it has well defined and repeatable actions by workers. This concept is call _____work
   - **STANDARDIZED**

Poka Yoke & Jidoka

LEAN SOLUTIONS



POKA YOKE & JIDOKA
PREVENT DEFECTS

- Create no defects / errors
- Accept no defects / errors
- Pass no defects / errors

LEAN SOLUTIONS

JIDOKA

LEAN SOLUTIONS

- Work stops immediately when a problem first is detected.
- The Root Cause of the defect is discovered and corrected before work continues
- This prevents defects being passed on downstream
- This short term disruption to FLOW will improve both FLOW and QUALITY in the long term



POKA YOKE

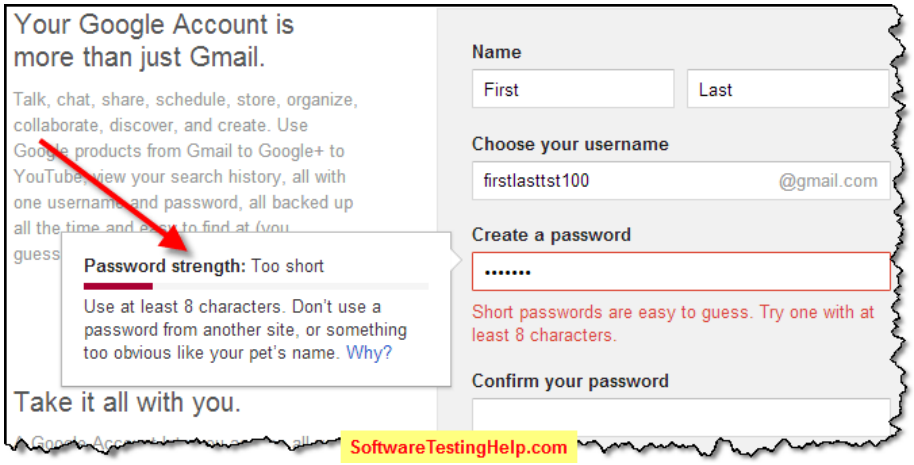
Originally called Baka Yoke (Idiot Proofing) it was changed to Poka Yoke (mistake proofing) by Toyota in 1960's so as not to dishonor anyone to be labeled as an "Idiot".

Poka Yoke = Mistake Proofing

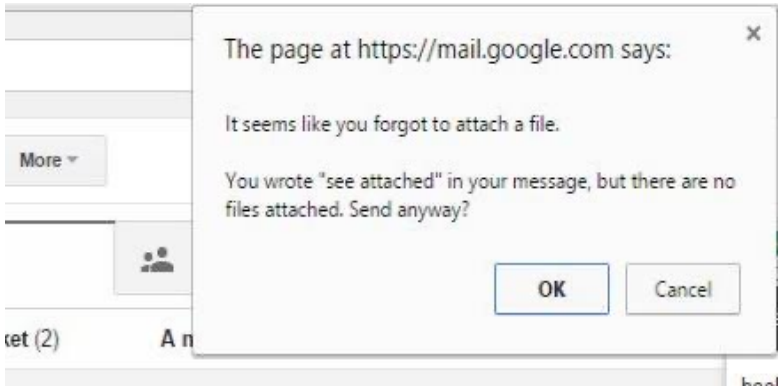
Prevent mistakes rather than correct mistakes
Prevent defects rather than correct defects

LEAN SOLUTIONS

POKA YOKE OFFICE EXAMPLES







LEAN SOLUTIONS

QUALITY AT SOURCE (UPSTREAM QUALITY)

- Quality means meeting requirements of the customer (or next step in the process) and not creating defects.
- We can use tools such as poka yoke (mistake-proofing) and visual control to prevent errors

LEAN SOLUTIONS

POKA YOKE

What are some of the common mistake proofing devices on automobiles?

What are the current mistake proofing devices at your company?

Where might you be able to implement mistake proofing at your company?

LEAN SOLUTIONS

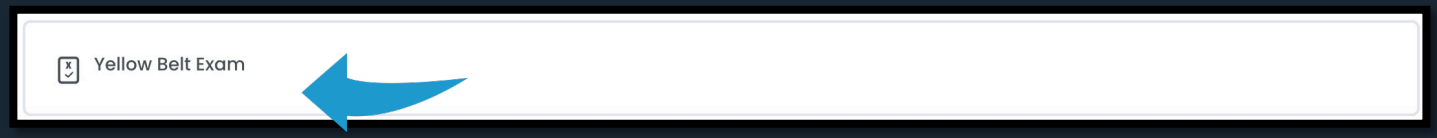
YELLOW BELT
CERTIFICATION EXAM

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

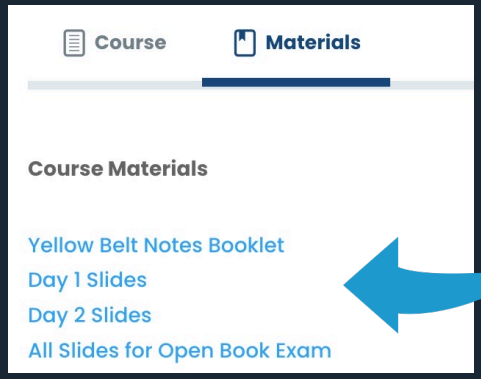
LEAN SOLUTIONS

YELLOW BELT
CERTIFICATION EXAM

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



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



LEAN SOLUTIONS

HOMEWORK REVIEW

(Open Computers and Log into your Portal)

LEAN SOLUTIONS