

IMPROVE PHASE



DMAIC Methodology

Define

➤ **IDENTIFY OPPORTUNITY**



Tollgate Review

Measure

➤ **DESCRIBE AS-IS CONDITION**



Tollgate Review

Analyze

➤ **IDENTIFY KEY CAUSES**



Tollgate Review

Improve

➤ **PROPOSE & IMPLEMENT SOLUTIONS**



Tollgate Review

Control

➤ **SUSTAIN THE GAIN**



Tollgate Review

Validate & Replicate Changes



Learning Objectives: Improve Phase

- Understand the Lean Principles of value, value stream map, flow, pull and perfection.
- Improve workspace by implementing 5S.
- Identify opportunities for Mistake Proofing.
- Understand the importance of Standard Work within a process.
- Identify and implement visual controls in your workspace.

“Improvement usually means doing something we have never done before.” - Shigeo Shingo



Review: Triple Constraints of Projects

Triple Constraints of Projects

- Quality (Better)
 - Clear and Specific
- Time (Faster)
 - Amount of time to complete process tasks
- Cost (Cheaper)
 - Money and Effort
- Prioritizing Constraints
 - Should be based on the view of the customer.



Lean Principles



What is Lean?

Tools and Methodology to:



Eliminate Waste

**WAR
ON
WASTE!**



Improve Flow

By using:

Mistake Proofing

Batch Reduction

Pull/Kanban

**Standard
Work**



Lean Toolbox

**Set Up
Reduction**

**Point of Use
System**

Visual Controls

5S + 1

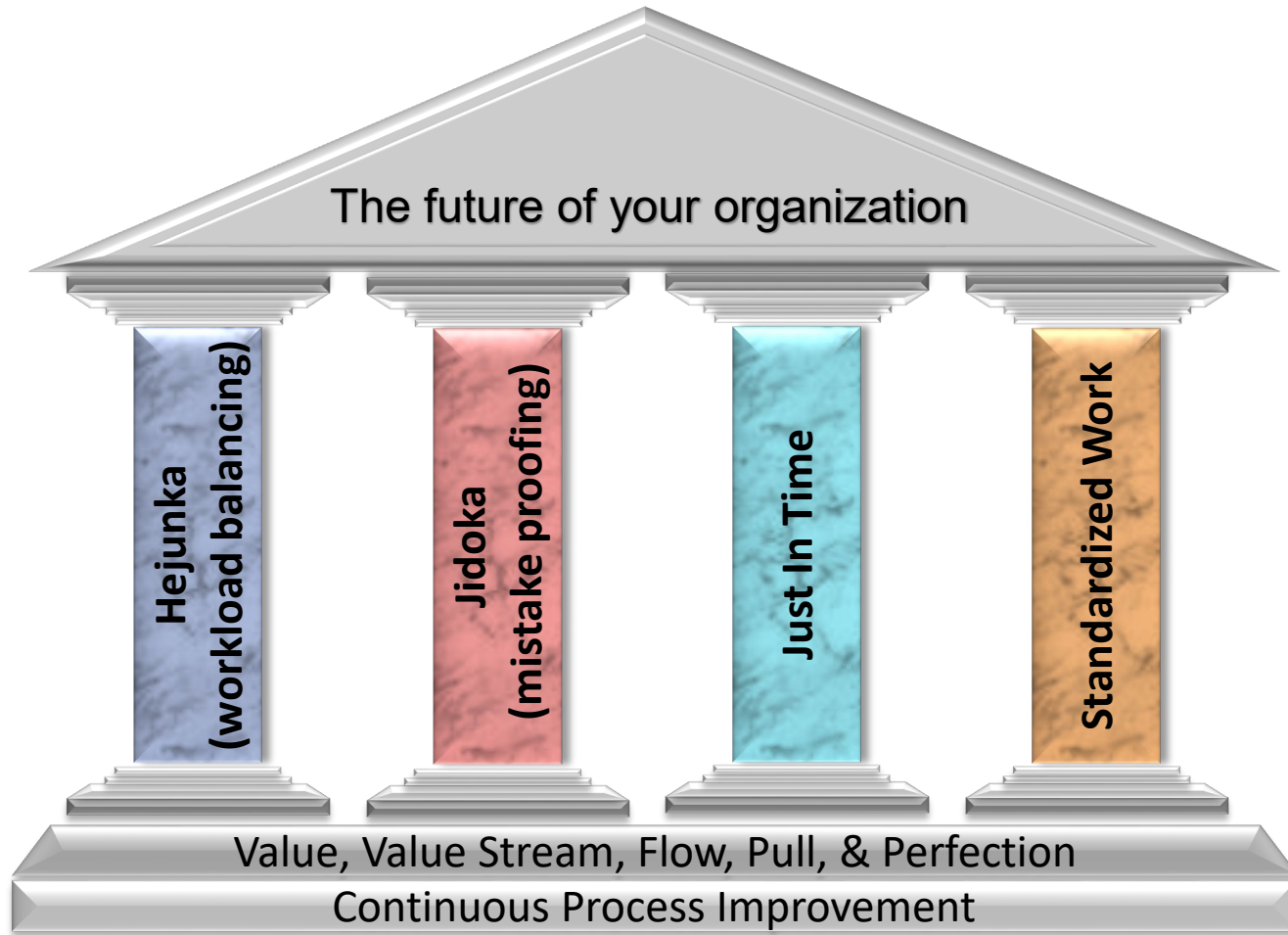
Cellular Flow

**Value Stream
Mapping**



House of Lean

House of Lean identifies the major concepts incorporated within Lean (TPS).



Lean Principles

There are 5 Lean Principles

1. **Value** specified from the customer's perspective.
2. The **Value Stream** has been identified for each service.
3. The product/service **Flows** without interruptions.
4. The customer can **Pull** value through the process.
5. Continuous pursuit of **Perfection**.



Lean Principles – Value

- Critical starting point for Lean.
- **Can only ultimately be defined by the customer.**
 - NO two customers define Value identically.
- Critical questions we must ask ourselves.
 - Do we truly understand Value from our customer's perspective?
 - Are we truly focused on providing that Value?
 - What are the barriers & obstacles preventing us from focusing on and providing that Value?

$$\text{Value} = \frac{\text{Features} \times \text{Performance} \times \text{Quality}}{\text{Cost} \times \text{Time}}$$



Definition of Waste (Muda)

Those elements of a process that **Do Not Add Value** of a Product *as perceived by the Customer*, but **increases Cost and Cycle times.**

Anything other than the **minimum** amount of:

- Equipment
- Materials
- Parts
- Space
- Worker's time

Which are absolutely essential to **add value** to the product.

“The most dangerous kind of waste is the waste we do not recognize.” – Shigeo Shingo



Eight Types of Waste

IDENTIFY TO REDUCE AND/OR ELIMINATE THESE WASTES:

Types of Waste:

- T** Transportation
- I** Inventory (Excess)
- M** Motion
- W** Waiting
- O** Over-Production
- O** Over-Processing
- D** Defects
- U** Under utilization of employees



Transportation



Waste caused by **unnecessary** movement of material or product.

Primary Causes:

- Inefficient Facility Layout
- Multiple Storage Location
- Batch (Push) Mentality
- Lack of Right-Sizing
- Long Setup Times
- Lack of Multi-Skilled Workers



8 Wastes - Inventory

Waste of materials, parts and assembled goods, when purchased or produced **in advance** of customer requirements.



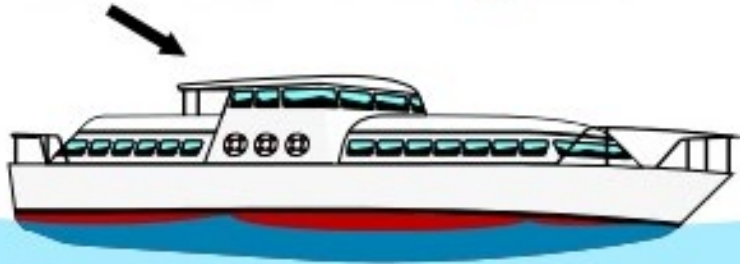
Increases Cycle Time & Process Lead Time



8 Wastes - Inventory

Inventory Hides Problems!

Boat = Production System



Water Level = Inventory Level



Rocks = Hidden Problems (Uncovered as Inventory is Reduced)



8 Wastes - Motion



Caused by **non-value added movement** of workers and / or production machines.

Primary Causes:

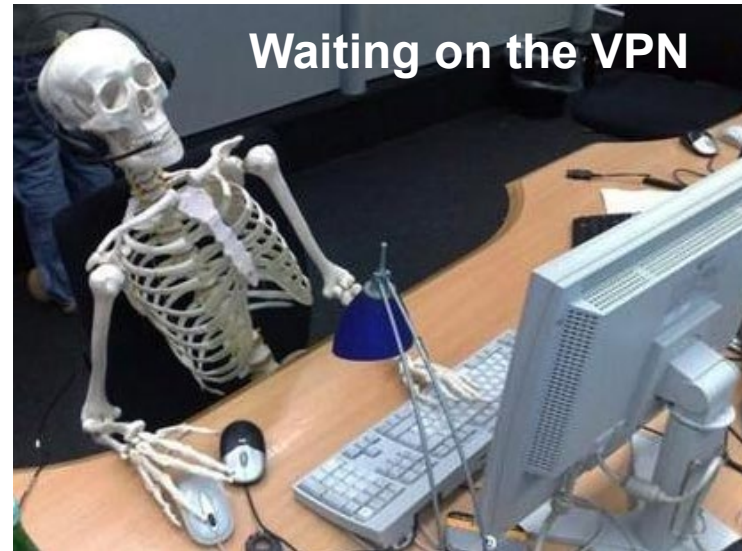
- Inefficient workplace layouts
- Inefficient tools and / or fixtures
- Lack of Standard Work causing inconsistency
- Batch movement of product



8 Wastes - Waiting & Over-Production

WAITING

Occurs whenever the hands of an employee are idle.



OVER-PRODUCTION

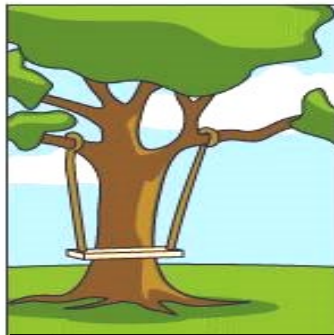
Caused by producing more than the customer needs (Push) and leads to excessive inventories.

8 Wastes – Over-Processing

The Waste of **Unnecessary** or Non-Optimized Processes and/or Operations.



How the customer explained it



How Project Lead understood it



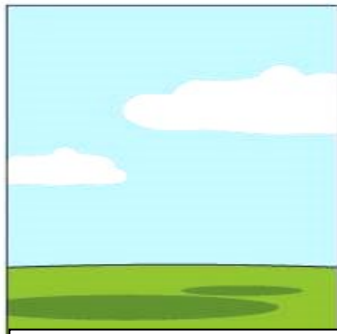
How Analyst designed it



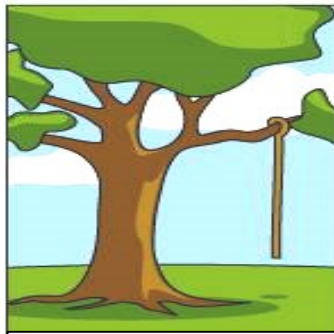
How Programmer wrote it



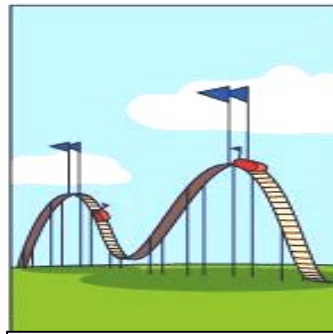
How Consultant described it



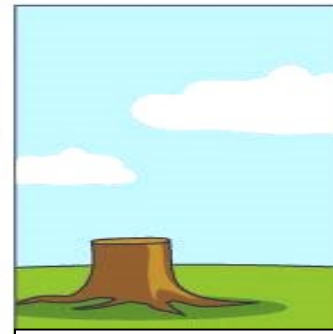
How Project was documented



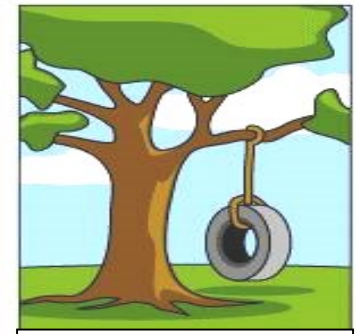
What operations installed



How Customer was billed



How it was supported



What Customer really needed

“There is nothing so useless as doing efficiently that which should not be done at all.” - Peter Drucker

*“Stop Trying to Delight Your Customers”, By Dixon, Feeman & Toman, Harvard Business Review, 2010



Defects / Rework

Waste that occurs when a process, product, or data **does not conform** to customer specifications. The result could cause product rework, scrap, or the escape of a defect to the customer.



What Causes Defects?

- Poor procedures or standards.
- Non-conforming materials.
- Worn or out of tolerance tooling.
- Human mistakes.



8 Wastes – Under Utilization of Employees

ULTIMATE WASTE

Waste of a person's time

Long Lines

- DMV
- DEERS
- Chick-Fil-A



Give me a call!



8 Wastes - Examples

Type of Waste	Physical Process	Example	Ways to Eliminate
Transporting	Parts Moving to Warehouse and Back	Movement of Goods	Make the distance over which something is moved as short as possible
Inventory (Excess)	Excessive completed work or supplies	Supplies in a Warehouse that aren't being used, taking up space	Produce or maintain only enough to satisfy the work requirements of the customer
Motion	Retrieving Parts, Tools, Information	Poor Office Lay-Out	Arrange your files, parts, or tools so you can easily retrieve them
Waiting	Out of supplies, Lack of Information	Meetings, Approval, System Down Time	Prepare agendas, standardize required signature approval process, make a plan for outages
Over-Processing	Performing Unneeded Operations	Approvals (Too Many Sign-offs)	Eliminate signature requirements where possible
Over-Production	Working Ahead of Schedule	Printing Paper Too Soon	Establish a workflow sequence for the production
Defects	Scrap or Rework	Drawing or Planning Errors, Rework	Establish standardized work procedures
Under utilization of employees	Workload is not balanced	Favoritism among workers, too much work given to star players	Spread tasks evenly among employees



Lean Principles

There are 5 Lean Principles.

1. **Value** specified from the customer's perspective.
2. The **Value Stream** has been identified for each service.
3. The product / service **Flows** without interruptions.
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5. Continuous pursuit of **Perfection**.



Value Stream Mapping

- A “VISUAL” planning tool used to identify non-value added activity (NVA) and develop plans to eliminate the waste.
- Includes the entire set of activities running from requirement to finished product for a specific product or service.
- Seeks to optimize the whole from the standpoint of the final customer.
- Value Stream Analysis is the key to all improvement activities. Three Designations for Value (Measure Phase).
 - **Value Added**
 - **Business Value (Non-Value Added but required)**
 - **Non-Value Added (Waste)**



Review: Value Stream 12-Step Process

- 1: SIPOC
- 2: BOUNDARIES
- 3: VOICE OF THE CUSTOMER
- 4: GATHER APPROPRIATE INFORMATION

See the Process...

- 5: WALK THE PROCESS
- 6: CREATE CURRENT STATE MAP
- 7: SPAGHETTI MAP / CIRCLE DIAGRAM
- 8: VALUE ANALYSIS

See the Waste...

- 9: CREATE IDEAL STATE MAP

Visualize the Perfect State...

- 10: DEVELOP FUTURE STATE MAPS
- 11: DEVELOP ACTION PLAN
- 12: IMPLEMENT THE PLAN

Lead the Way toward it...



Lean Principles

There are 5 Lean Principles.

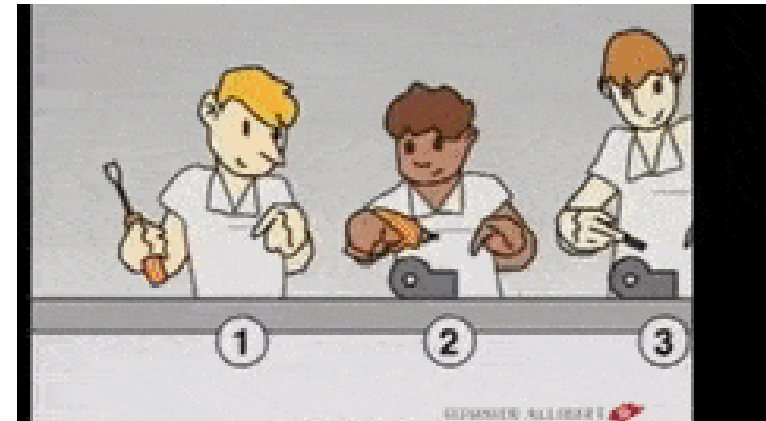
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What is Flow?

The continuous, progressive adding of Value in the eyes of the customer.

- Starts at receipt of customer request.
- Ends at delivery to customer.
- Flow utilizes the fewest number of steps with **no interruptions**.
- Eliminates waste.

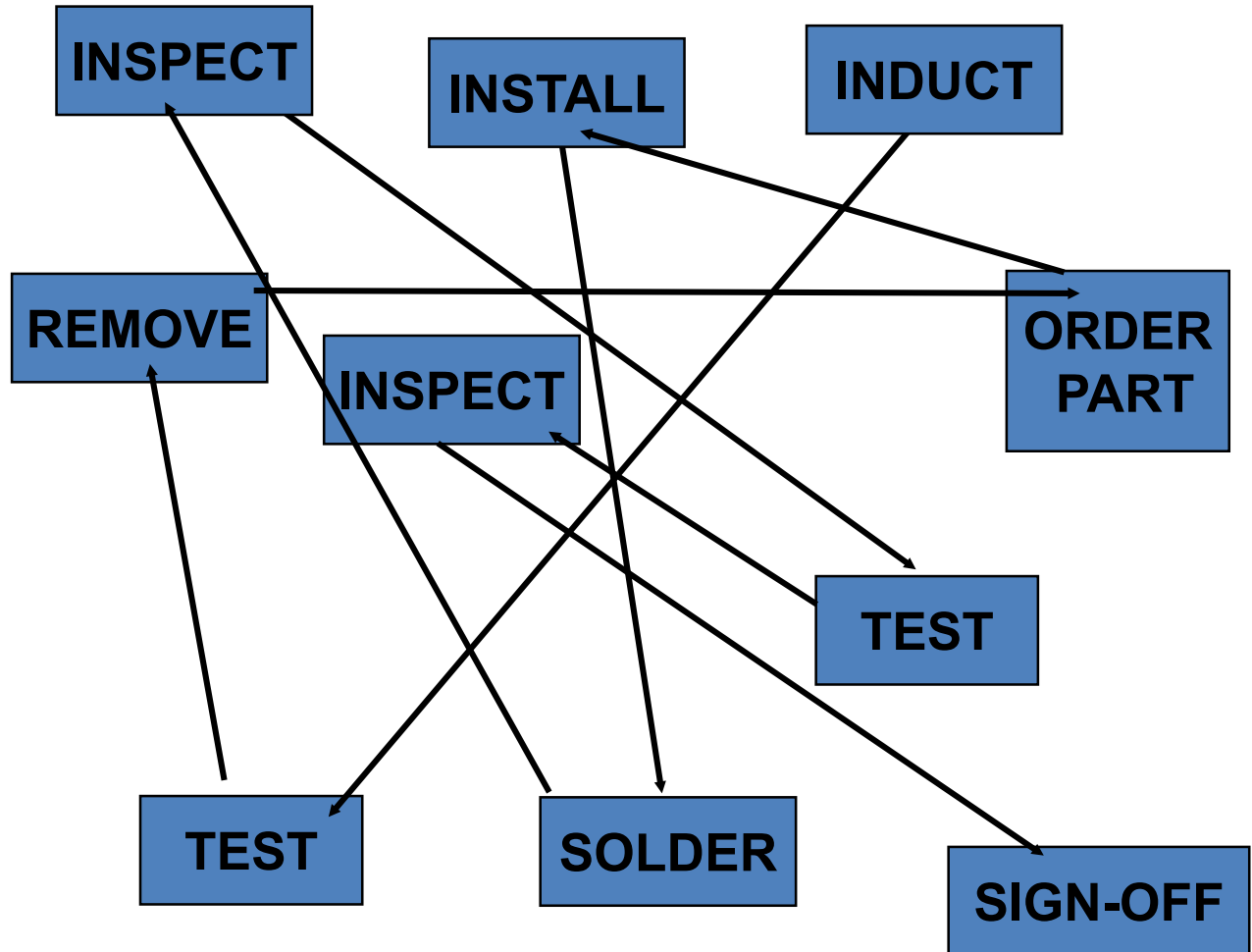


**People always working on the product
and the product always being worked on.**

Typical Flow – Before Improvements

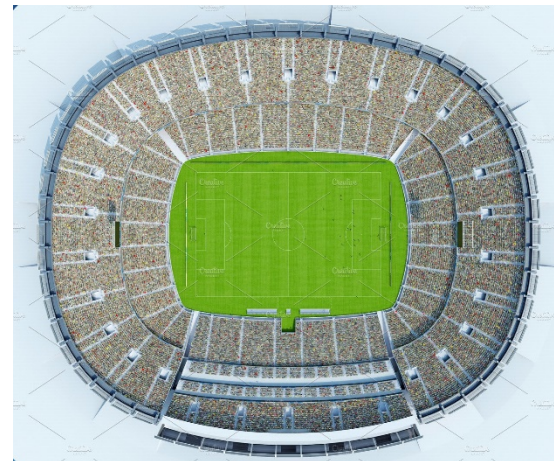
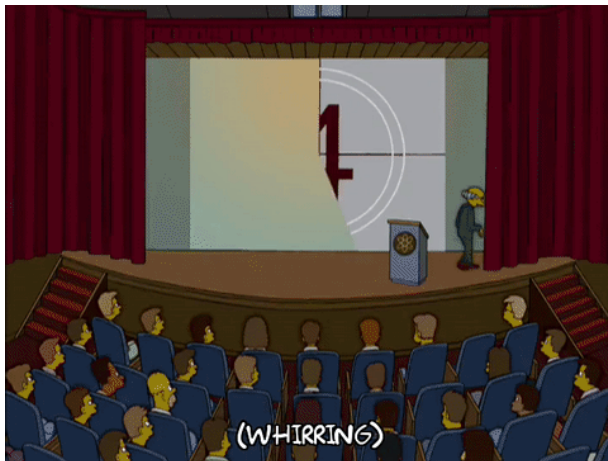
Workplace Layout

- **Batch operations**
- **Isolated processes**
- **Unknown status**



What is a Batch?

- Batching: Production of large lots of identical items to meet **anticipated demand**.
 - Production is to schedule, not to demand.
- Makes great efficiencies possible for equipment amortized over large quantities.
- Increases inventory and cycle times.



Examples of Batching

➤ Examples of Batching

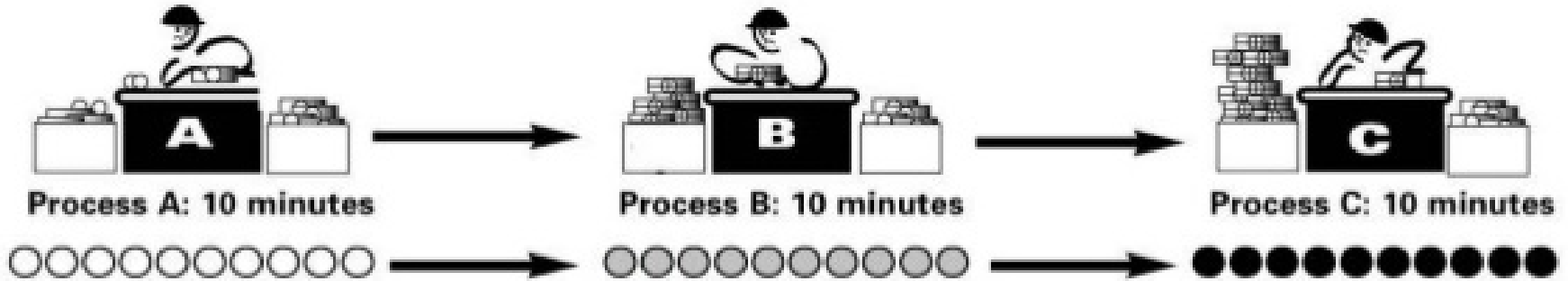
- Waiting for a table at a restaurant (Table for 4).
- Waiting at IPAC to get CAC.
- On the telephone when on hold.

➤ Batching may be required in some instances

- Providing a product / service to a specific group / crowd.
- Examples: In-class training, Base tours, Award presentations, Carpooling, etc.



Batch Processing



Process Example

- Make 10, Move 10
- Cycle Time: 1 minute per item

Process Metrics:

- Lead Time (Total Process Time) for Above Process: 30 minutes
- First Piece Output: 21 minutes
 - 10 minutes (Process A) + 10 Minutes (Process B) + 1 Minute (First Completed Item for Process C)



What is Value Flow?

One Piece Flow (Ideal Batch Size)

- Focuses on completing the production of one piece from start to finish with as little work in process inventory between operations as possible.
- Items flow non-stop (no piles between steps).
- One item is completed for each item started.
- **“One” does not need to be taken literally.**
 - Should be based on customer demand
 - Could be one unit of order.

Only process:

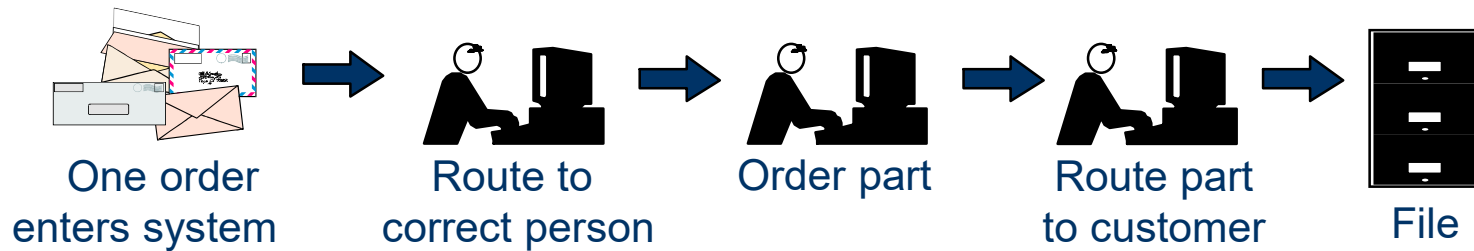
- What the customer wants,
- In the quantity the customer wants,
- When the customer wants it.



One Piece Flow

The Ideal State:

Produce and move one piece at a time.

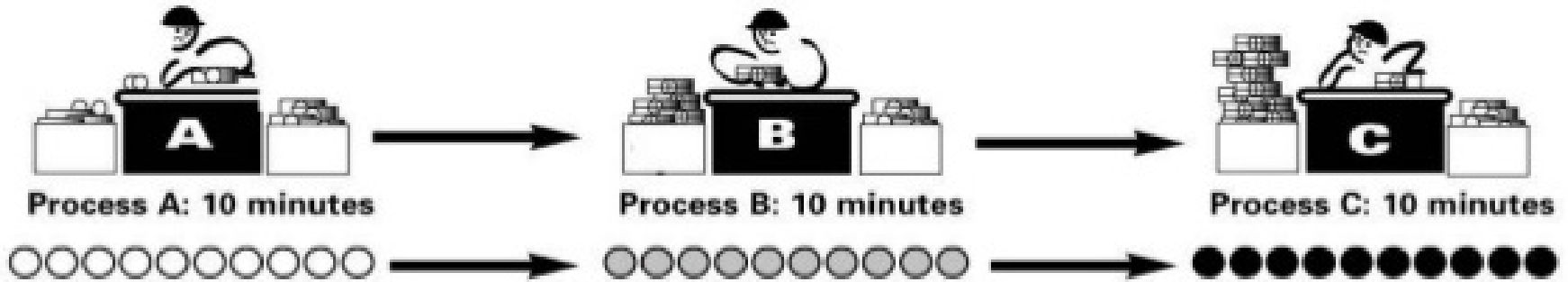


Segregate excess WIP away from the improved process; develop a plan to eliminate it.

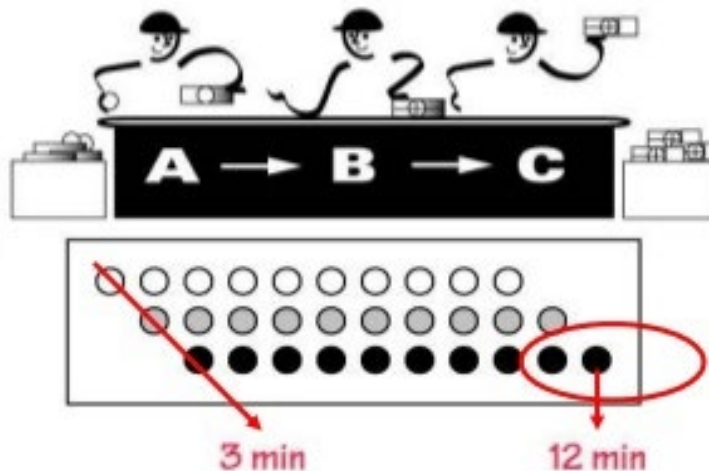


Continuous Flow Example

Batch Processing



Continuous Flow Processing



Batch-and-Queue Process

- Make 10, Move 10
- Cycle Time: 1 minutes per/item

Process Metrics:

- Lead Time: 30 minutes
- First Piece Output: 21 minutes

Waste Identified:

- Waiting, Inventory (Excess)

Continuous Flow Process

- Make 1, Move 1
- Cycle Time: 1 minutes /item

Process Metrics:

- Lead Time: 12 minutes
- First Piece Output: 3 minutes

Waste Reductions:

- Wait Time, Work-In-Process Inventory

One Piece Flow vs. Batching

If One-Piece Flow is best – then why do we batch?

One reason is
SET-UP TIME

The amount of time taken to change over from the completion of the previous process to the beginning of the next process ... “clock time” not labor time.



Set-Up Reduction or SMED

Taiichi Ohno / Shigeo Shingo found the real challenge was to create continuous flow in "small-lot" production.

Ohno achieved small lot continuous flow by:

- Aligning equipment & resources to the Value Stream.
- Physically locating machines / people close together.
- **Driving down batch sizes.**
 - Single Minute Exchange of Die (SMED).
 - Splitting and right-sizing of operations.
- Cross Training.
- Simple production control processes – Pull / Kanban.
- Aggressive root cause analysis.
- Application of Lean tools such as Kitting, Point of Use Systems (POUS), and visual controls.



Set-Up Reduction Example



You drive a car / truck

Your vehicle needs:

- 1) Four new tires,**
- 2) Full tank of gasoline, and**
- 3) You need a drink of Gatorade.**

QUESTION:

How long will it take you to accomplish these three tasks?



Set-Up Reduction: NASCAR Pit-stops



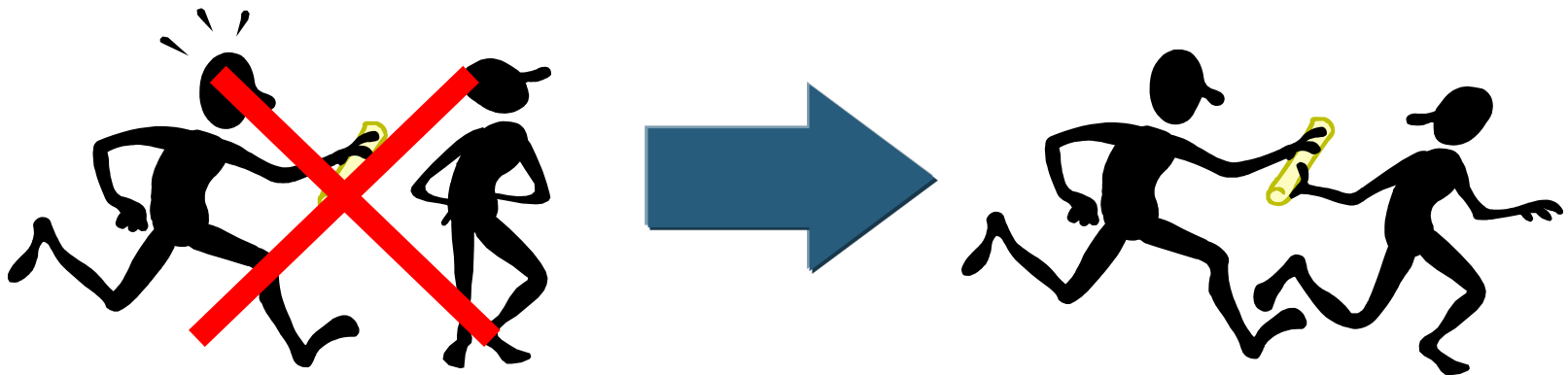
Set-Up Times and Lot Sizes Interact

- **Lot sizes** are made large because set-ups take a long time.
 - Attempt to increase total throughput.
 - Ignores underlying issues.
- **Set-ups** take a long time because they are not done often.
- The cycle repeats endlessly.
 - It's best to improve set-ups first.
 - Set-up reduction “feels” contradictory and so it is often ignored; spend effort improving NVA to improve VA.



Why Address Set-Ups?

- Improve flow by reducing cycle times.
 - Allows smaller lots.
 - Resources are spent on VA activities.
- Reduce costs.
 - Reduces WIP and carrying costs.
- Resource flexibility
 - Increases ability to change products or services in a timely manner.



Ways to Streamline Set-Up

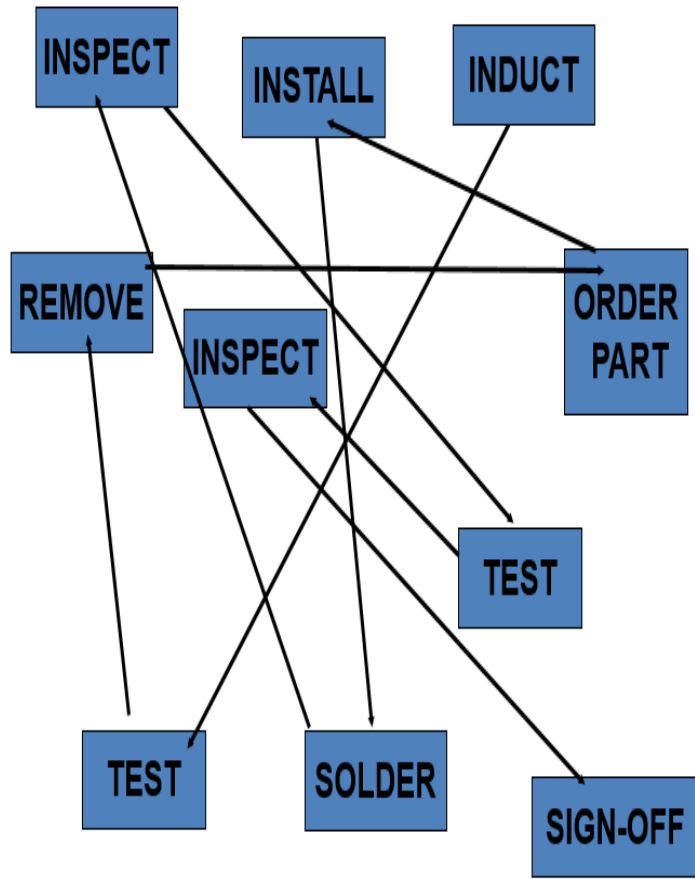
- Change tasks: Reduce/eliminate, combine, re-sequence, put in parallel
- Fix settings, eliminate adjustment
- Eliminate threads
- Unit tool changes
- Reduce hand tools
- Focus storage
- Plan and stage
- Use casters & rollers
- Standardize



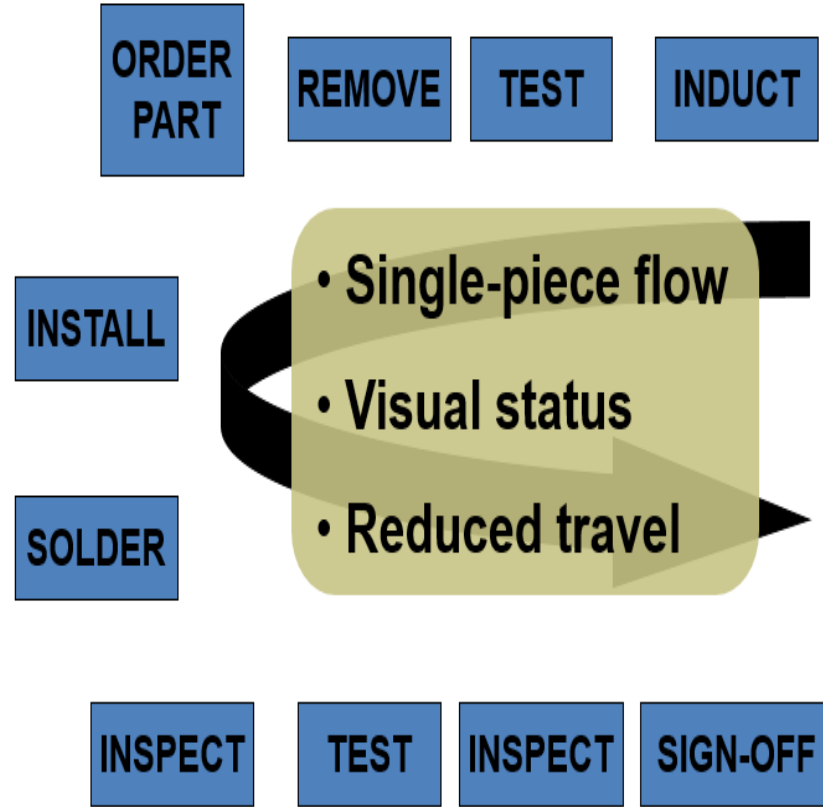
Typical Flow – Before and After

Workplace Layout

- Batch operations
- Isolated processes
- Unknown status



BEFORE



- Single-piece flow
- Visual status
- Reduced travel

AFTER

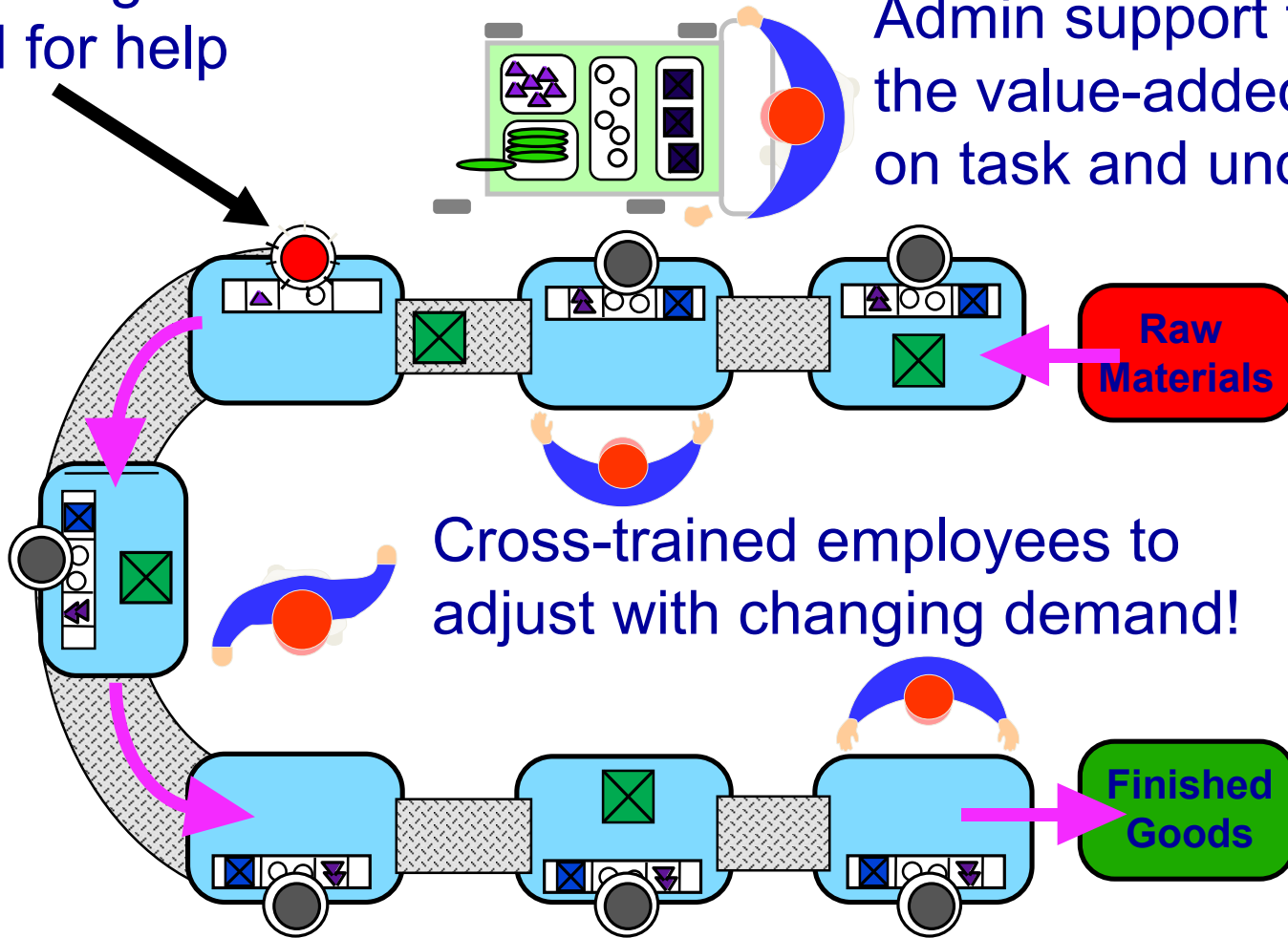


Work Place Layout

Work Cell or Office Space?

Andon signals
need for help

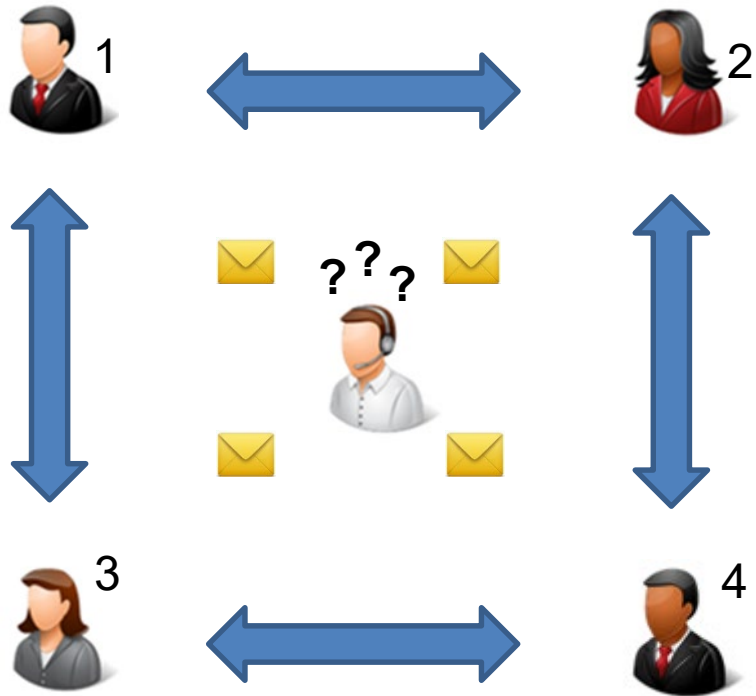
Admin support to keep
the value-added workers
on task and undistracted!



Cross-trained employees to
adjust with changing demand!



Lean Flow In the Office



Before Lean
Shotgun Email Method

Problems:

- Confusing
- Wasted Time
- Increased Costs

Combining two documents into one with Tracked Changes takes a **MINIMUM** of **15** steps to complete.

In this example, you are combining 4 documents which means you would need to complete the combine process 3 times:

Document 1 + 2

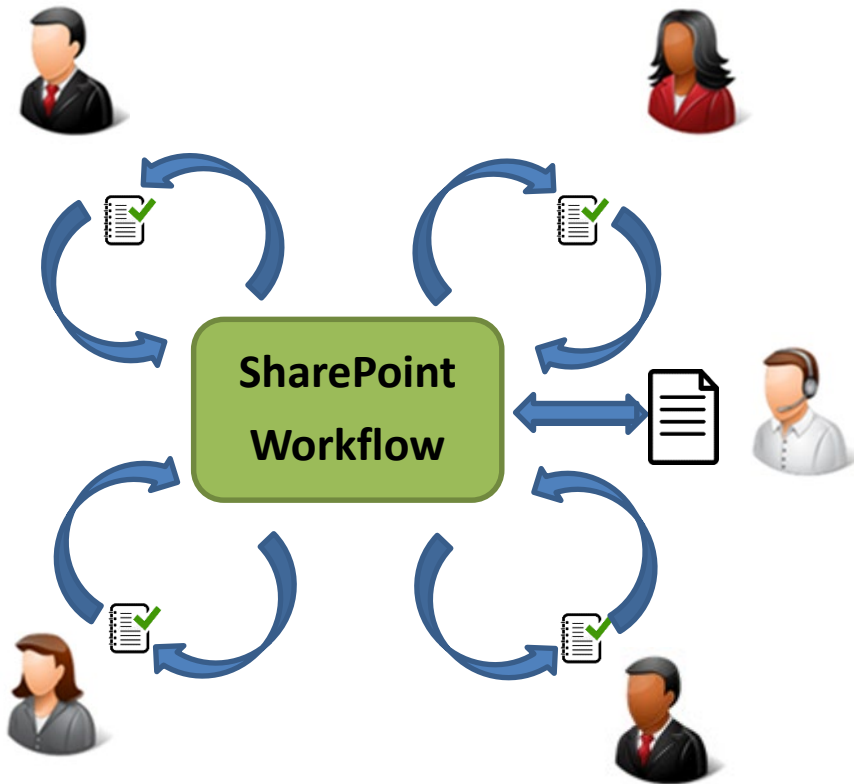
Document (1 & 2) + 3

Document (1 & 2 & 3) + 4

TOTAL MINIMUM STEPS: **45**



Lean Flow In the Office



After Lean
SharePoint Workflow

Benefits:

- Reduce Errors
- Improved flow, less confusion
- Decreased Costs

All changes are in ONE DOCUMENT with Tracked Changes. Processing this document now takes a **MINIMUM** of **5** steps to complete.

Before:

TOTAL MINIMUM STEPS: **45**

After:

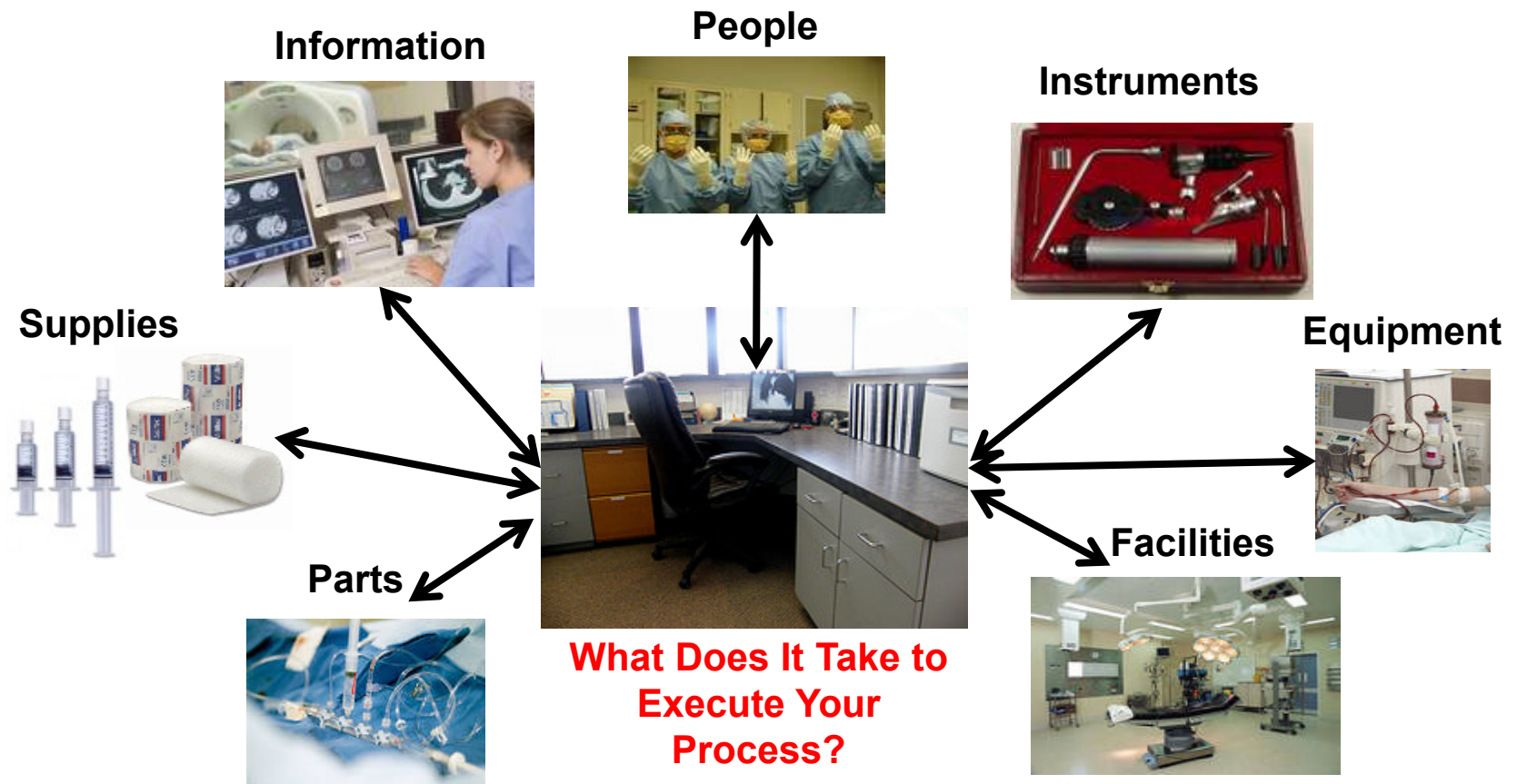
TOTAL MINIMUM STEPS: **5**

Total Reduction: 89% reduction

Point of Use Systems (POUS)

POUS is a practice that ensures that the right information, parts, tools, equipment & people are available where & when needed.

Are your workers treated like doctors in an operating room?



POUS/Kitting Examples



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Just-in-Time (JIT)

Just-in-Time (JIT) is a methodology aimed primarily at reducing flow times within a system as well as response times from suppliers and to customers.

JIT methodology includes:

- Don't produce something unless the customer has ordered it (**Pull**).
- Level demand so that work may proceed smoothly throughout the workspace (**Heijunka**).
- Link all processes to customer demand through simple visual tools (**Kanbans**).
- Maximize resource flexibility.



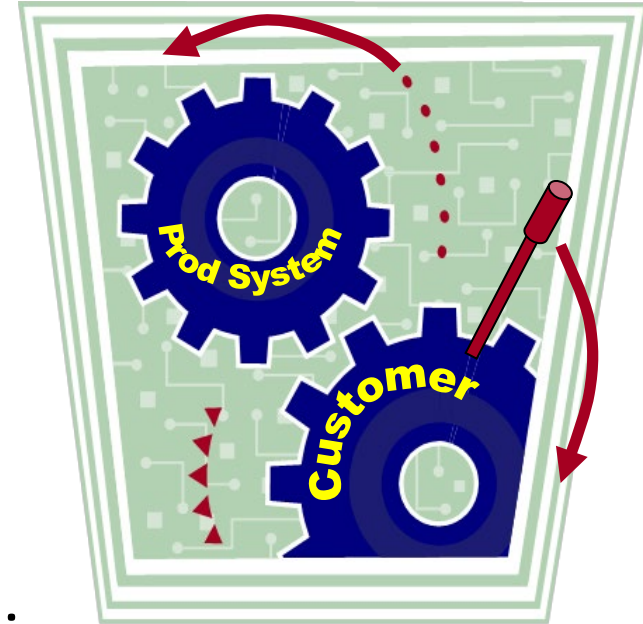
Push vs. Pull

Push:

Work is pushed into the system or process based on forecasts or schedules.

Pull:

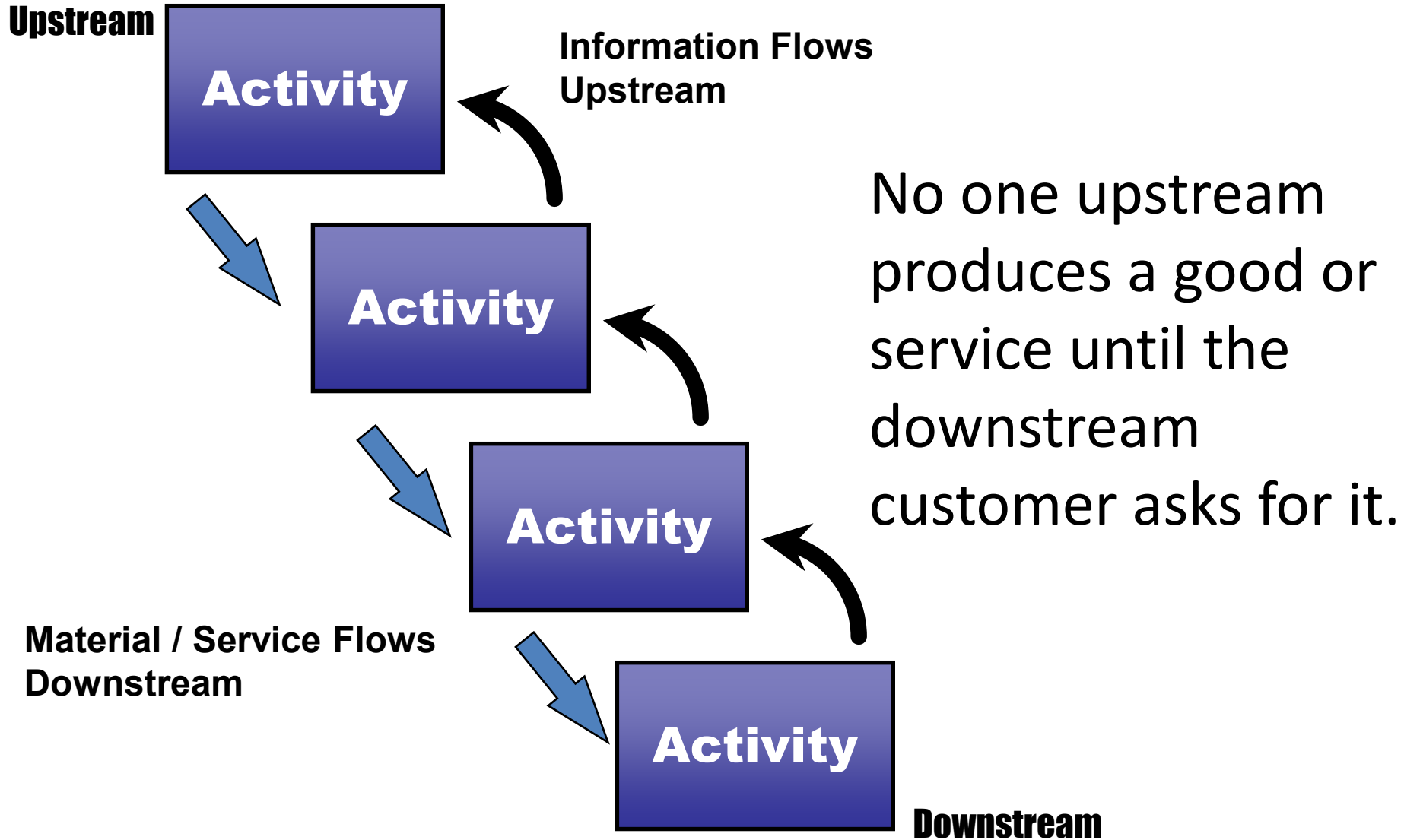
A customer-driven system that produces and moves a product/service *only* when the customer needs it.



“The slower but consistent tortoise causes less waste and is much more desirable than the speedy hare that races ahead and then stops occasionally to doze. TPS can be realized only when all workers become tortoises.” – Taiichi Ohno

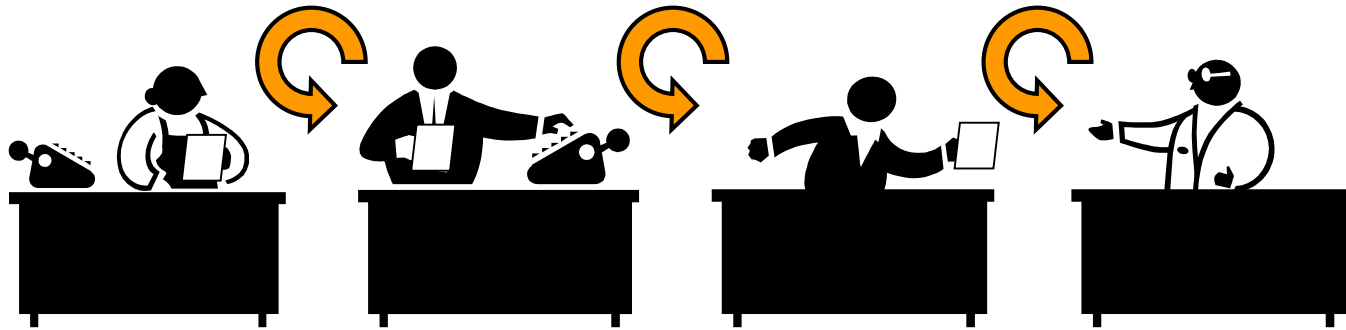


Pull Systems



Pull Systems

Pull



Elements

- Upstream Supplier
- Downstream Customer
- Visual Trigger (Kanban)

Sequenced

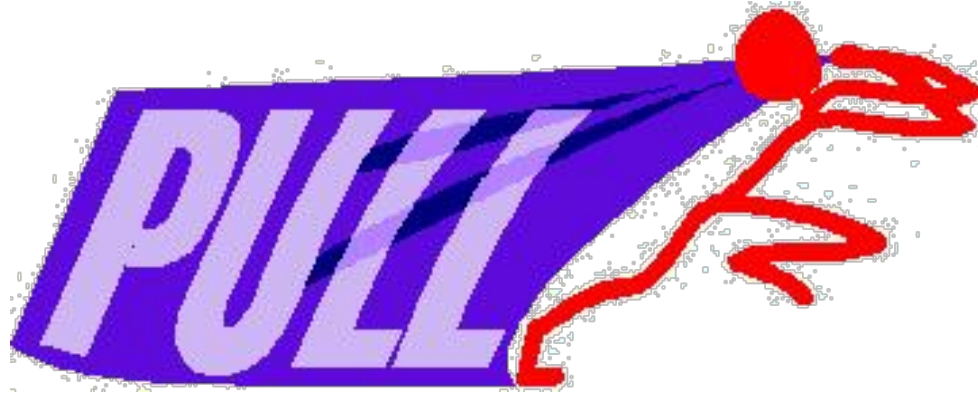
- Use First In First Out (FIFO) lanes

Replenished

- Create supermarkets



Pull System Advantages



- Increases speed to your customer.
- Reduces inventories without creating parts shortages.
- Decreases floor space.
- New thought process: replaces “Ready or not here I come” with “OK, now I’m ready”.



Elements of a Pull System

Heijunka – Workload balancing.

Kanban – system of visual tools that synchronize and provide instruction to suppliers and customers.

Both Heijunka and Kanban in turn depend on:

- Quick changeovers (Set-ups).
- Visual Management.
- Capable processes, including methods, workers, and machines.

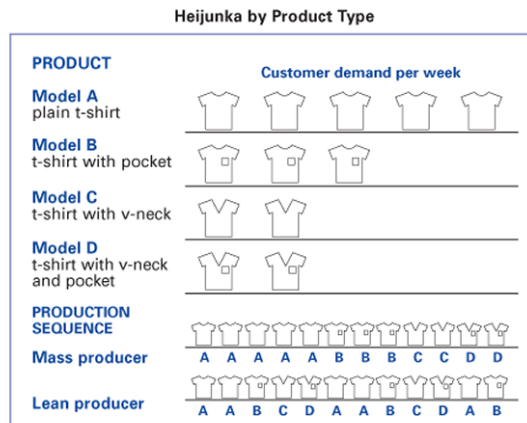
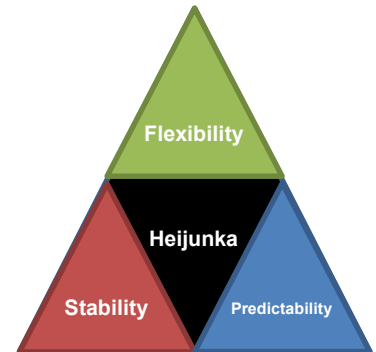


Heijunka (Hi-junk-a)

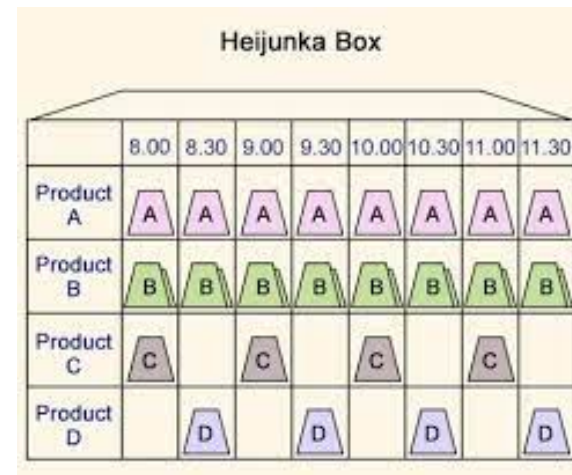
Even distribution of work to meet Takt Time (Workload Balancing), especially for different products from the same process.

To avoid waste (muda), processes need:

- Predictability – Leveling demand.
- Flexibility – Decreasing changeover (set-up) time.
- Stability – Averaging production volume and type over long term.



(Note that this example does not address heijunka by production quantity.)



Heijunka Box

- A Heijunka box helps to:
 - Determine pitch for each product.
 - Create a production sequence.
 - Create a production sequence table.
- A Heijunka box is the schedule of work that includes what things arrive when and when they should be done.



Traditional Production Example – Unleveled

Traditional Production

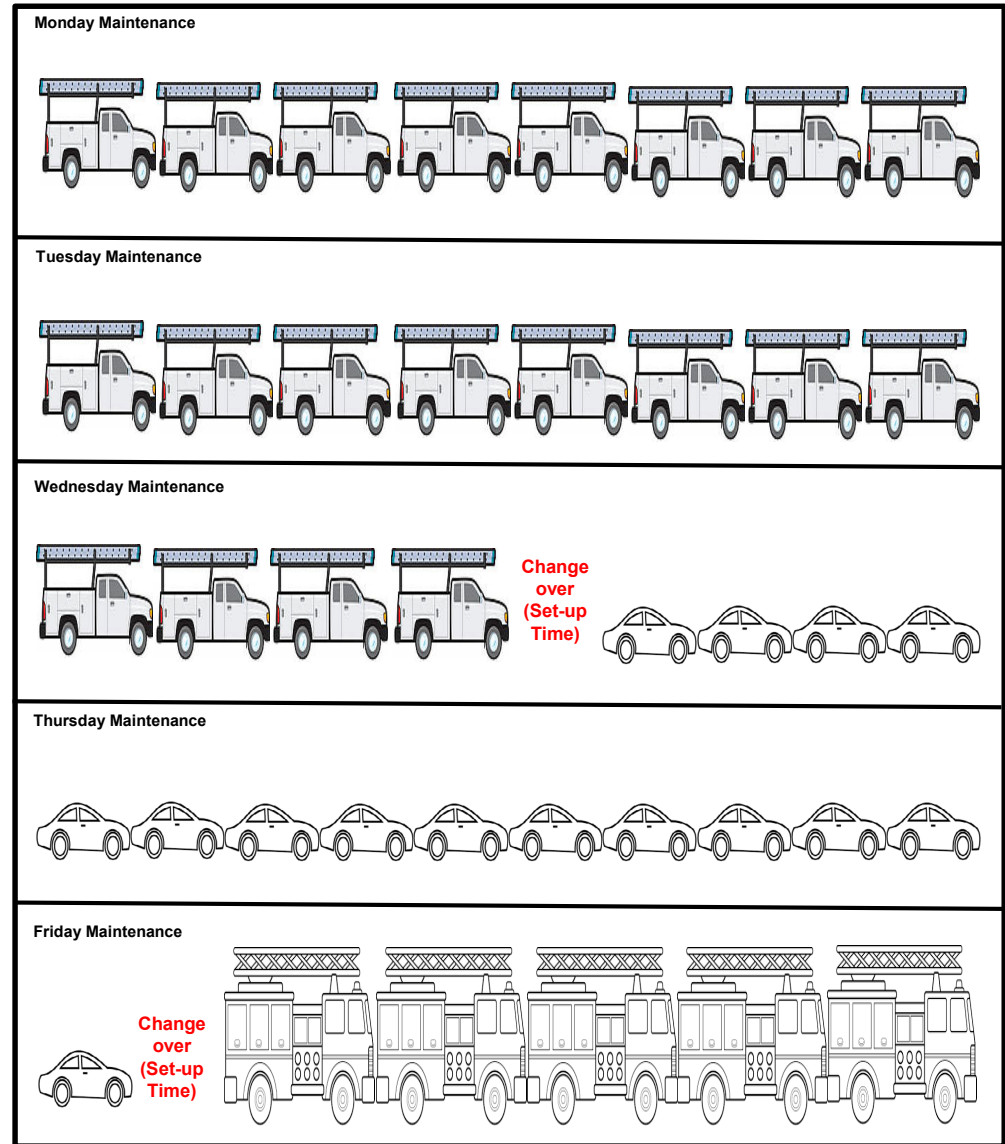
- Maximize use of equipment time.
- Unpredictable work schedules (Muri - Strain)
- Occasional overtime

Produce Large Batches (Mura - Uneven)

- Long Set-up Time

Prevents Value Flow (Muda - Waste)

- Long wait times and excessive inventory



Heijunka Production – Levelled

Levelled Production

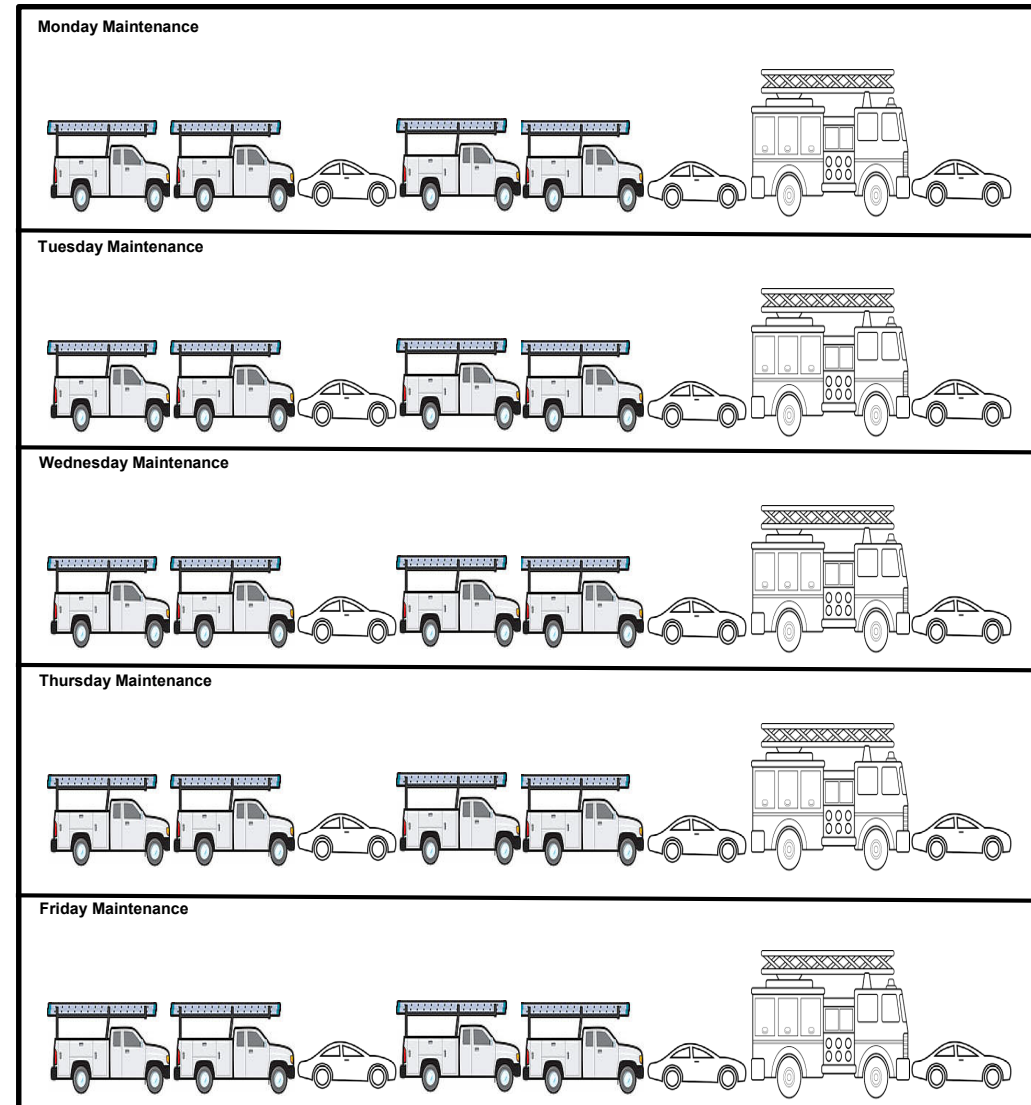
- Predictable work schedules
- Overtime savings

Produce Small Batches

- Minimize set-up time
- Flexibility to meet customer demand

Promotes Value Flow

- Reduced wait time and inventory levels



Kanban

- **Kanban** – system of visual tools (pull signals) that synchronize and provide instruction to suppliers and customers.
- **Kanban Rules:**
 - Never move defective items.
 - The customer withdraws only what is needed.
 - **Produce only the quantity withdrawn by the customer.**
 - Use Kanban to fine-tune (level) production.
 - Stabilize and strengthen the process.



Types of Pull Signals (Kanbans)

Floor Markings



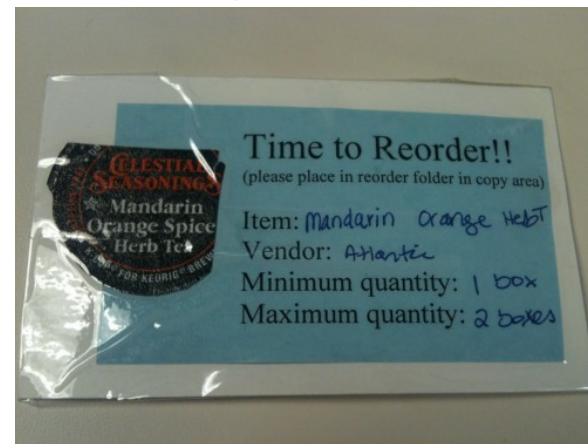
Containers (Kits)



Lights



Cards



Kanban Example

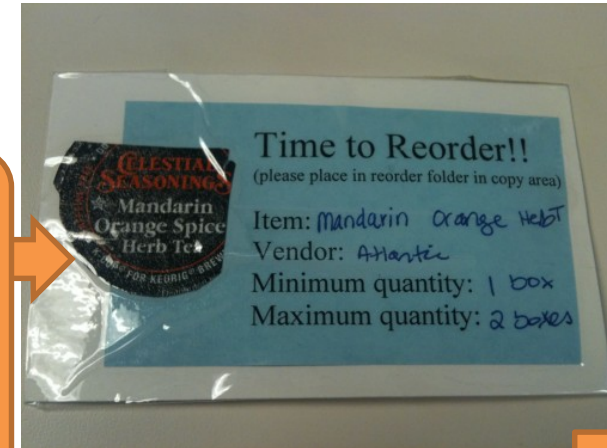
Reordering Office Coffee



Step One: Remove Empty Box



Step Two: Locate New Box



Step Three: Pull Kanban

Step Six: Replace Stock



Step Four: Replace Box



To-Be Ordered

Awaiting Delivery

Step Five: Place Kanban in Reorder Pouch



Lead Time

- The time required to **complete an entire process** (including wait times) from order to delivery.
- Measured in elapsed time (minutes, hours, etc.).
- Lead Time can be *approximated* using Little's Law:

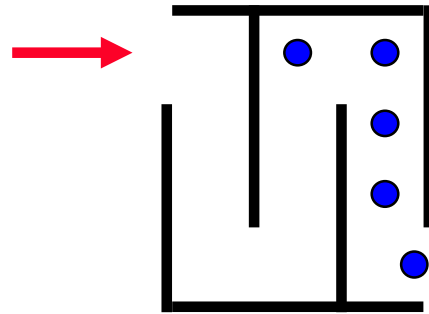
$$\text{Lead Time} = \frac{\text{Work In Process (WIP)}}{\text{Exit Rate (ER)}}$$

- **WIP** is the “number of things in process” at any given time.
- **EXIT RATE** (or Throughput) is the amount of work completed over a given period of time, which should meet customer demand
- Common Synonyms: Throughput Time, Delivery Time, Turnaround Time.



Lead Time - Example

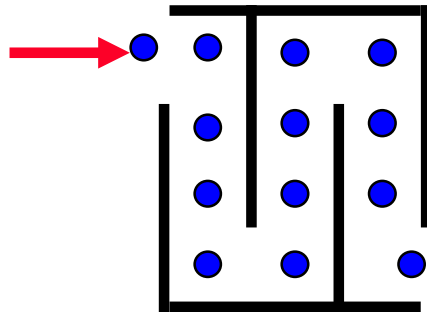
Think about the lines at Disneyland in March...



$$\text{Lead Time} = \frac{\text{WIP}}{\text{Exit Rate}} = \frac{\mathbf{5 \text{ people}}}{\mathbf{1 \text{ person/minute}}}$$

Lead Time = **5 minutes**

...and then think about them in July...



$$\text{Lead Time} = \frac{\text{WIP}}{\text{Exit Rate}} = \frac{\mathbf{13 \text{ people}}}{\mathbf{1 \text{ person/min.}}}$$

Lead Time = **13 minutes**

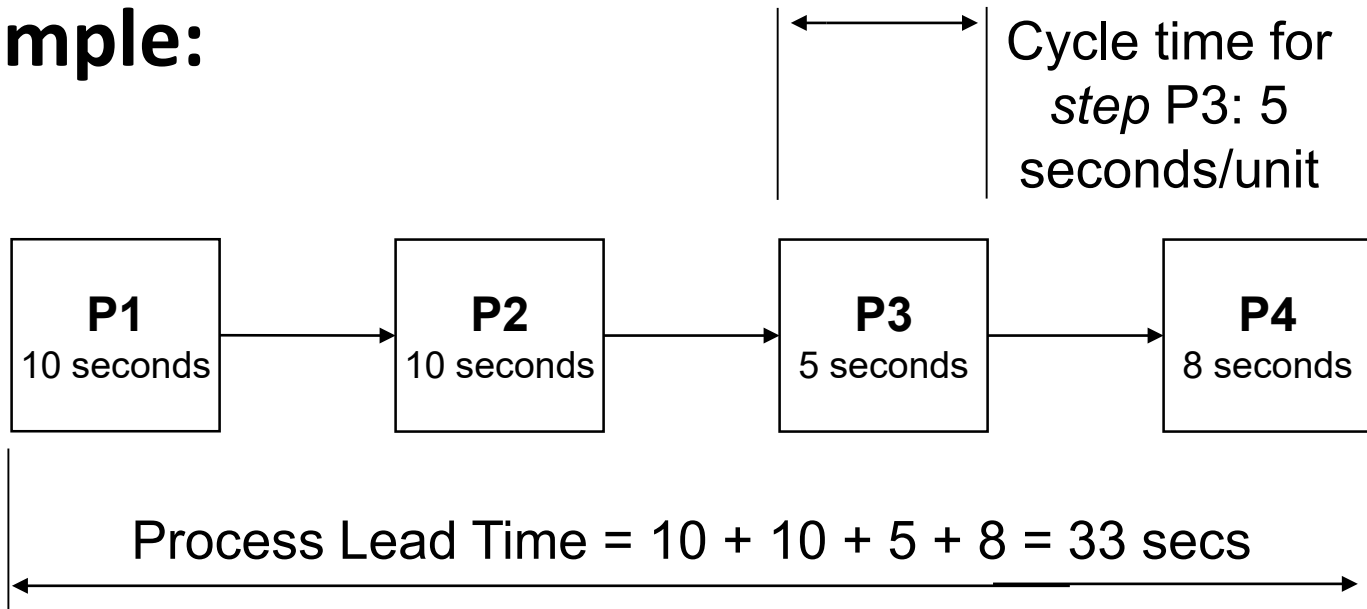
...**Conclusion:** Fixed Capacity (Exit Rate) + Increased People (WIP) = Slower Lead Times!



Cycle Time - Example

- Cycle Time: The time it takes a product to move (cycle) through a step or a process, including queue and move times.
- Measured in time per unit (minutes/batch).
- Cycle Time is the inverse of Throughput (Exit Rate).

Example:



Average Exit Time = 1 unit every 10 secs (bound by the slowest step)



Takt Time and Definitions

Takt Time: The rate at which a product or service needs to be provided to meet customer demand.

$$\text{Takt Time} = \frac{\text{Time available for work in the given time period}}{\text{Customer demand for a given time period}}$$

Process Sequence: The steps necessary to produce a product or service, with some process steps being dependent upon other steps being performed first.

Pitch: Customer configured delivery requirement based on Takt Time (Takt Time x batch quantity).



Takt Time

250 Available Workdays per Year.

- (assuming 5-day work week)

Customer requires 30 Units per Year.

$$\text{Takt Time} = \frac{(250 \text{ days})}{(30 \text{ Units})}$$

$$\text{Takt Time} = 8.3 \text{ days per Unit}$$

- With a Takt Time of 8.3 days, you must induct and sell a unit every 8.3 workdays in order to meet the Customers annual demands.

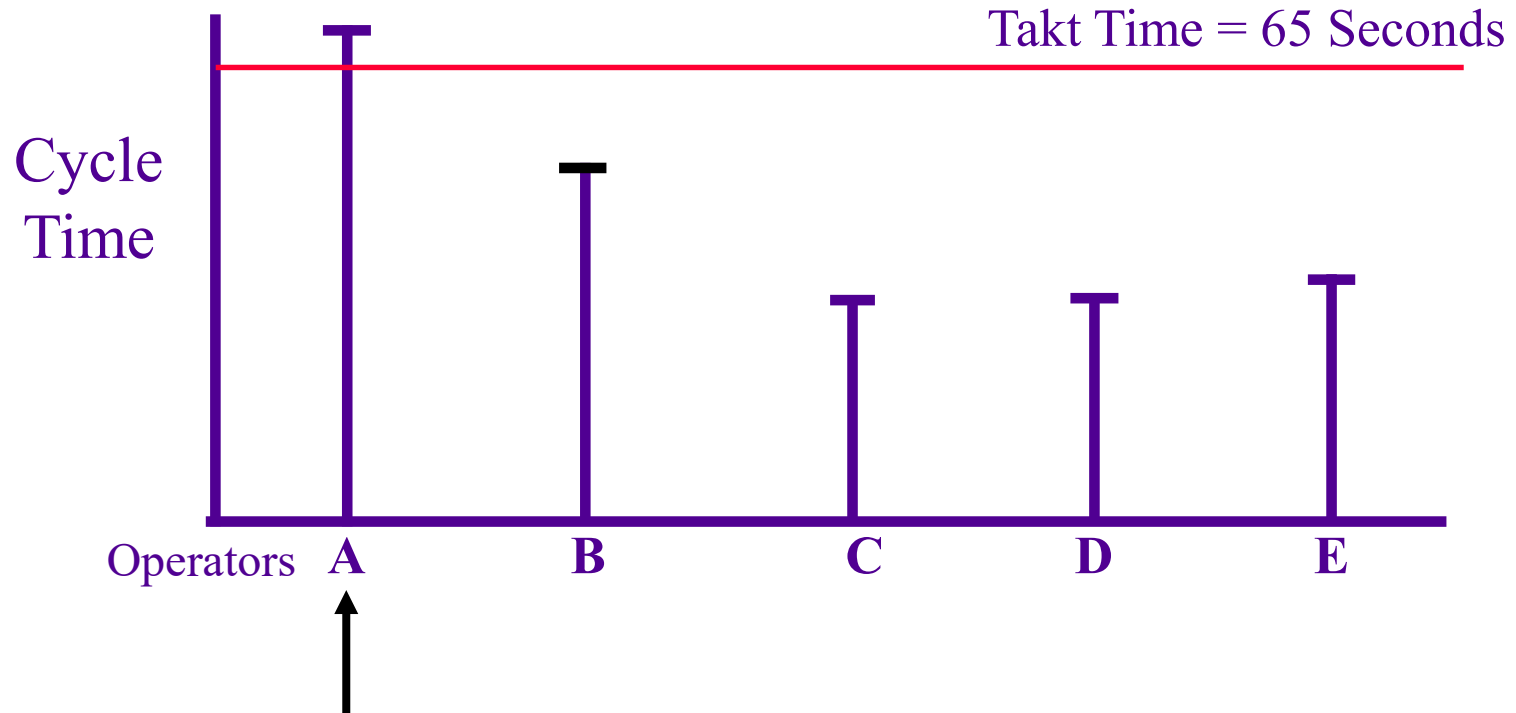


Takt Charts

- A tool to see how the process is performing against the customer expectations.
- **Helps identify constraints / bottlenecks to balance workload (Mura).**
- Data for Takt Charts are drawn from the data blocks of the Value Stream Map, and from customer demand.
- Plot the steps on the horizontal axis using time as your vertical axis.



Takt Charts - Examples

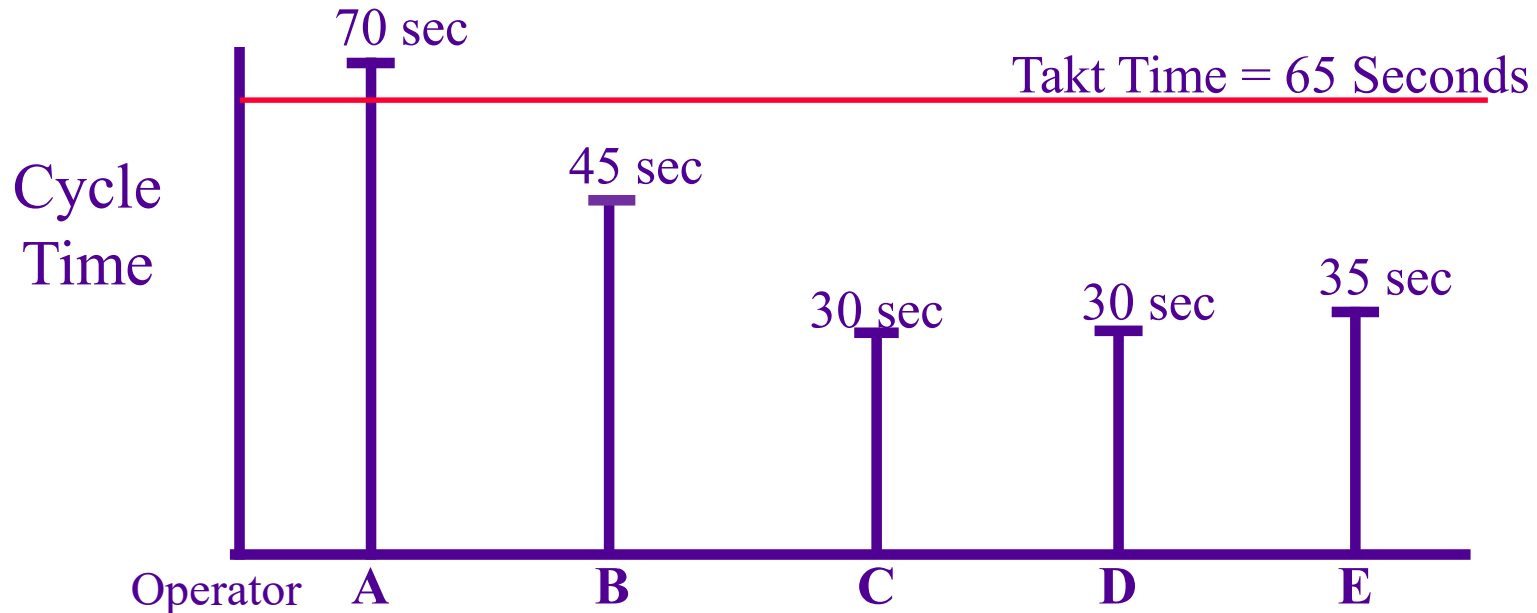


“Operator A” is a constraint because they cannot meet the Takt Time.



Workload Balancing - Takt Chart Example

Chart existing operator cycle times



Can we reduce the cycle time of Operator A as well as reduce manning?



Minimum Staffing

$$* \text{ Minimum Staffing} = \frac{\text{Total time of all tasks for all operators}}{\text{Takt Time}}$$

** If the numerator or denominator changes, staffing must be adjusted and work assignments rebalanced.*

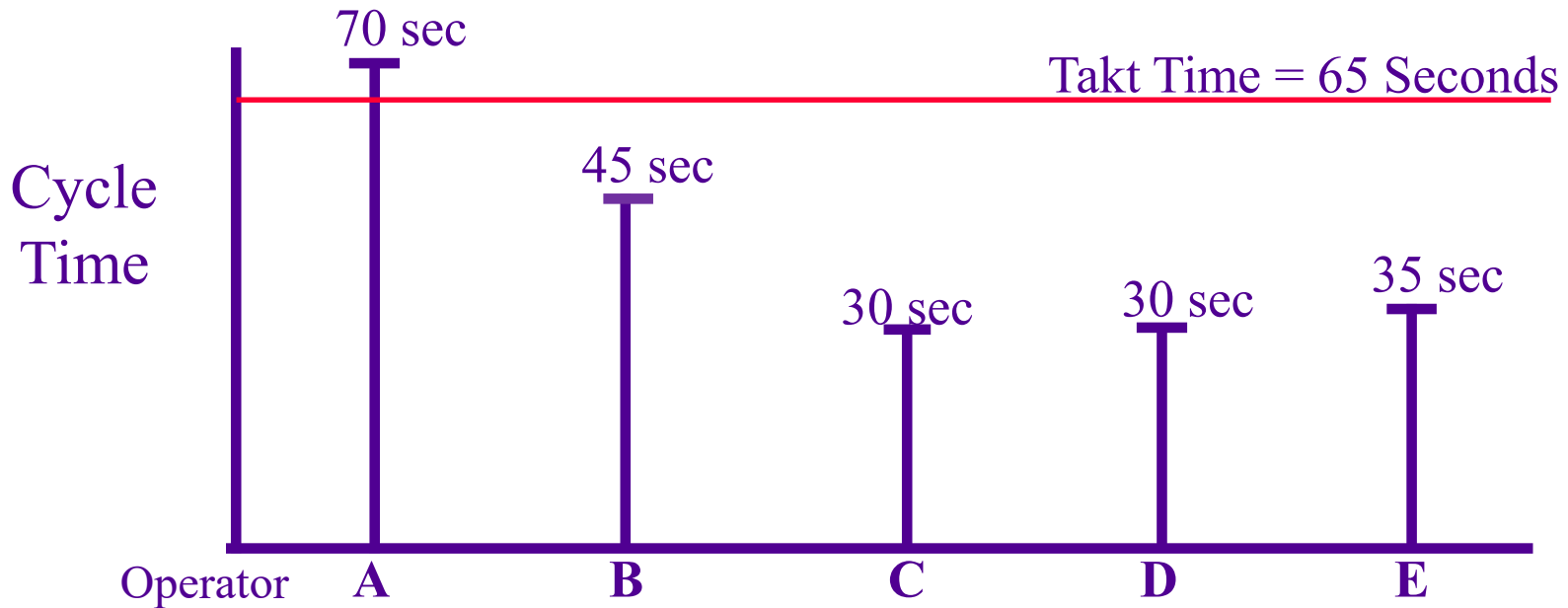
This equation is to be used to identify potential areas for improvement and not a justification for manpower reduction efforts.



Balanced Work

$$\text{Minimum Staffing} = \frac{(70+45+30+30+35) \text{ sec}}{65 \text{ sec}} = \frac{210 \text{ sec}}{65 \text{ sec}} = 3.23 \text{ (round up)} = 4 \text{ oper}$$

Chart existing operator cycle times



By workload balancing we can free up personnel.



Theory of Constraints (TOC)

Theory of Constraints 5 Focusing Steps

1. Identify the constraint
2. Exploit the constraint
3. Subordinate to the constraint
4. Elevate the constraint
5. Re-evaluate, go back to step 1

TOC experts see processes and systems as chains. The strength of the chain is dependent upon the strength of the weakest link.



Drum-Buffer-Rope

- Drum – The pace at which the system is operating
- Buffer – A way to protect the constraint from being “starved”, to ensure the constraint always has work
- Rope – the signaling system that allows work to be put into the system at the appropriate time to support efficient use of the constraint

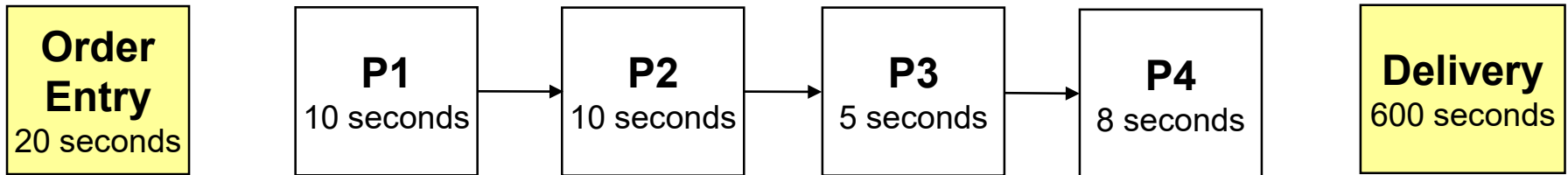
The aim is to protect the constraint, and therefore the system as a whole, against process variation.



Lead Time Example

Consider the following set of processes:

- A customer needs 25 units in 15 minutes (900 seconds).
- Order entry takes 20 seconds.
- Delivery takes 10 minutes (600 seconds).



Available process time = _____

Customer demand = _____

Takt Time = _____

Process Cycle Time = _____

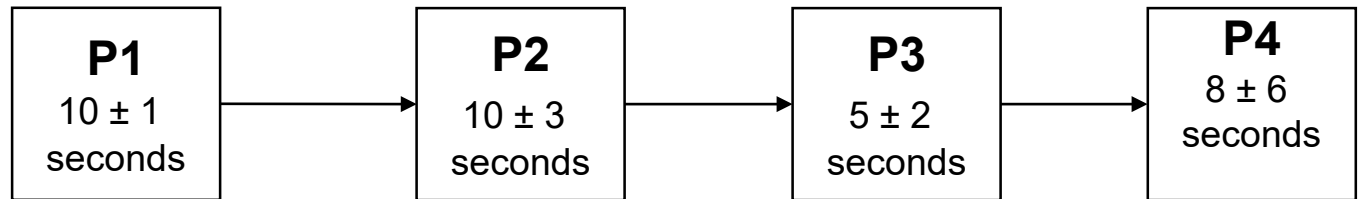
What is our exit rate? _____

Lead Time = _____

Where is the constraint? _____



Variation happens!



Lead Time = _____

Where is the constraint? _____

Exit Rate = _____



Lean Principles

There are 5 Lean Principles.

1. **Value** specified from the customer's perspective.
2. The **Value Stream** has been identified for each service.
3. The product / service **Flows** without interruptions.
4. The customer can **Pull** value through the process.
5. Continuous pursuit of **Perfection**.



Pursuit of Perfection

- Begins with understanding Lean Principles & visualizing the “perfect” process at the outset.
- No matter how much you improve a process to make it leaner, there are always ways to continue to remove waste by eliminating effort, time, space and errors.
- Achieving the “Lot Size of 1”.
- **Achieving Continuous Flow.**
- Achieving a CPI Culture.
 - Using Change Management

“Perfection is not attainable. But if we chase perfection, we can catch excellence.”

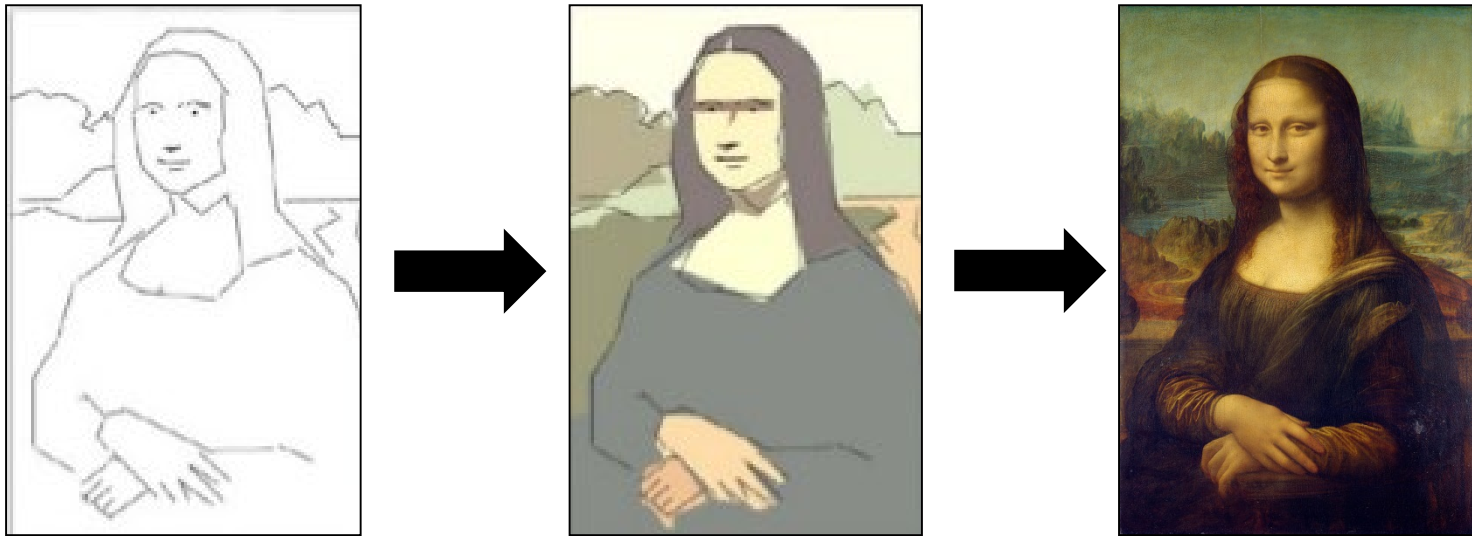
– Vince Lombardi



Pursuit of Perfection

To start your pursuit of perfection, start by:

- Asking small questions.
- Taking small actions.
- Solving small problems.



“A journey of a thousand miles begins with a single step.” – Lao Tzu

You Can't Become Lean without Learning

- **One Million** – That's how many ideas Toyota *implements* each year. Do the math: 3,000 ideas a day.
- But not just any ideas. Mostly tiny ones by employees that view their role not to be simply doing the work, but taking it to the next level...every day, in some little way.
- When an entire organization thinks like that, it becomes unstoppable.



5S



5S: A Tool to Achieve the Future State

5S is a process and method for creating and maintaining an organized, clean, and high-performance workplace.

5S enables anyone to distinguish between normal and abnormal conditions at a glance.

5S is the foundation for continuous improvement, zero defects, cost reduction, and a more productive work space.

5S is a systematic way to improve the workplace, our processes and our products through employee involvement.



5S Workplace Organization

<u>S</u>ort	Clearly distinguish needed items from unneeded items and eliminate the latter.
<u>S</u>implify (Set)	Keep needed items in the correct place to allow for easy and immediate retrieval.
<u>S</u>ystematic cleaning (Shine)	Keep the workplace orderly and clean.
<u>S</u>tandardize	Standardize cleanup. This is the condition we support when we maintain the first 3 S's.
<u>S</u>ustain	Discipline, stick to the rules / continuous improvement of all principle.

...some have added Safety to 5S and called it 6S or 5S + 1.



Office Space without 5S



Sort (Seiri)

Establish criteria for determining what is and is not needed in the area based on:

- Usefulness of the item / equipment.
- Frequency of use.
- Quantity needed.



Red Tag evaluation.

- Keep in existing area.
- Move to different spot within area.
- Hold in red tag area.
- Get rid of it.



Ask the people who use the material / equipment for help – We don't want to throw anything out that we actually need!



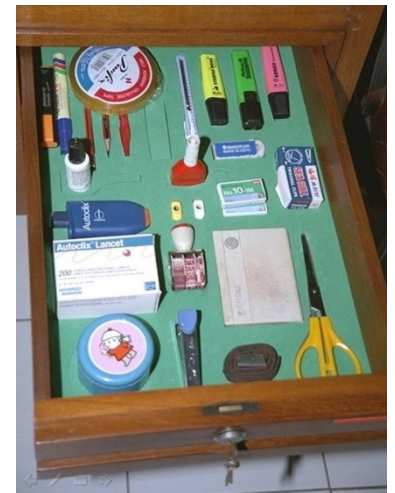
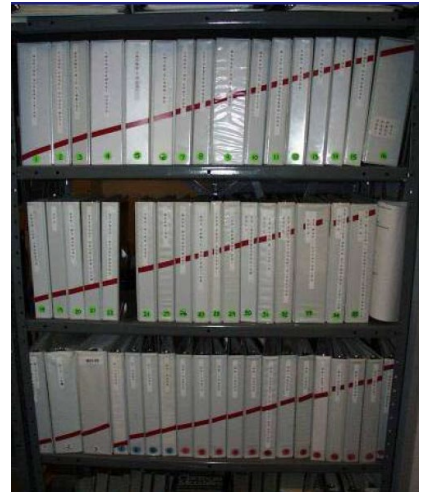
Simplify or Set (Seiton)

Determine the location for needed items and how they should be kept.

- Consider how to store tools and jigs.
- Consider principles of motion waste.

Identify best locations.

- Labels, signboards, maps, shadows.
- 5S Map: shows location of equipment in the area.
- Color-Code Strategy: distinguish use of tools / parts by color.
- Outlining work areas and locations.



**Creating a place for everything and everything in its place!
Make it obvious at a glance!**



Systematic Cleaning or Shine (Seiso)

Determine Target

- *What needs to be cleaned?*

Determine Assignments

- *Who is responsible?*

Determine Methods

- *How will it be done?*

Determine Tools

- *What is needed?*

Implement Shine

- Everyone's responsibility.



Create and maintain a neat and clean environment.
Make it a habit!



Standardize (Seiketsu)

- Establish guidelines for sort, set and shine conditions.
- Bring the condition of the area up to those standards.
- Make the standard guidelines visible.
- Maintain and monitor first 3S's.
- Assign responsibilities and monitor through self audit and evaluation.



Create a consistent way to carry out tasks and procedures.



Sustain (Shitsuke)

- Development of new awareness and skills.
- Support from management.
- Ongoing, company wide communication.
- Making 5S standards part of daily work.
- Total employee involvement.
- Implement Sustainment Checklist.

Managers Committed



Training



"Buy-in" from all workers



Sustain to maintain success!



5S Scorecard - Examples

P&I 5S Audit Form					
Purpose: To audit administrative supply areas ensuring workplace organization and standards are being met.					
Who should fill it out: LSS Specialist or P&I Leader					
Directions: The best way to use this tool is to follow these steps:					
1. For each statement, circle the appropriate score.					
2. Total the score, review with the process worker and/or departmental manager.					
Area: P&I		Audit Date:		Auditor:	
Sort	Very Poor	Poor	Good	Very Good	Excellent
1. Are supply areas clear of excess supplies?	1	2	3	4	5
2. Are supply areas clear of out-of-date forms, lists, maps or checklists?	1	2	3	4	5
3. Are supply areas clear of excess personal items?	1	2	3	4	5
4. Are records file cabinets clear of out-dated records?	1	2	3	4	5
5. Is the LSS supply area free of unused items?	1	2	3	4	5
Total Sort:					
Set					
1. Are supplies located in correct location?	1	2	3	4	5
2. Are supplies properly identified and labeled?	1	2	3	4	5
3. Are Records properly stored?	1	2	3	4	5
4. Are all LSS training cases properly labeled and stored (if not in use)?	1	2	3	4	5
5. Are all supply items provided a completed Supply Reorder Cards?	1	2	3	4	5
Total Set:					
Shine					
1. Are supply areas clean and neat, free from clutter?	1	2	3	4	5
2. Is the LSS training case area clean and neat, free from clutter?	1	2	3	4	5
3. Are easels stored neatly in the conference room?	1	2	3	4	5
4. Is printer paper staging area stocked? (At least one ream present?)	1	2	3	4	5
5. Are all Records properly labeled with a information provided?	1	2	3	4	5
Total Shine:					
Standardize					
1. Is the Paper Records Index up-to-date? (Within one month of audit)	1	2	3	4	5
2. Are blank 5S Audit Sheets and Supply Reorder Cards available?	1	2	3	4	5
3. Are supply cabinet maps up-to-date?	1	2	3	4	5
4. Are supply, records, and LSS SOPs reviewed regularly? (Check 1)	1	2	3	4	5
5. Are 5S Rules posted and clearly visible?	1	2	3	4	5
Total Standardize:					
Sustain					
1. Are 5S audits being conducted on a regular basis? (Monthly)	1	2	3	4	5
2. Is the Records Management SOP being followed?	1	2	3	4	5
3. Is the Office Supply Procurement SOP being followed?	1	2	3	4	5
4. Are supplies with no current inventory in process of being reordered?	1	2	3	4	5
5. Can each employee explain the value of 5S? (Ask 1)	1	2	3	4	5
Total Sustain:					
Total of all 5 categories:					
100 - 125: Great. Doing Well. 75 - 99: Caution. Could Do Better <75: Concern: Minimal Effort Shown					
Last Update: 11/17/2016					

Item No.	Description	Rating Scale: 0-5 (0 = No 5S Evident, 5 = Out of the Box)	Score (0-5)
1	Unnecessary items are not stored in the area	5 - No unnecessary items are in the work area 1 - Personal items are mixed with and may interfere with accomplishment of required work	
2	Storage of cleaning material	5 - All required cleaning material is stored, visually marked, readily available 1 - Cleaning material is shared between multiple work areas	
3	General tidiness of work area	5 - Work area is kept clean at all times 1 - Work area is cleaned once a shift	
4	Bulletin Boards	5 - Bulletin Boards are current and have no outdated material on them 1 - Bulletin Boards have outdated or torn or soiled material on them	
5	Emergency Exits	5 - Emergency Exits marked and exit plans posted 1 - Emergency Exits not clearly marked or exit plans outdated, missing or soiled	
6	Process layout	5 - General items carts, movable fixtures, etc required to perform work are labeled, have assigned places and are stored in those places when not in actual work 1 - No apparent storage location for movable items	
7	Aisle marked	5 - Aisle clearly marked 1 - Aisle are not marked or markings are worn-out	
8	Aisle maintained	5 - Aisle are kept clean and free of clutter, use for transportation of material or personnel and not as a storage place 1 - Aisle are not kept clean or used as extended work area	
9	Storage of tools	5 - All tools have clearly marked locations with positive control 1 - Not all tools have clearly marked locations limited control over access	
10	Storage of technical manuals	5 - Technical manual or publications are stored close to normal point of use and in a manner that quickly allows for inventory at anytime 1 - Technical manuals or publications are not stored close to point of use and/or required more than 30 seconds to verify all are present	
11	Equipment / Tooling cleanliness	5 - Equipment / Tooling are kept clean at all times 1 - Equipment / Tooling are not cleaned after each use or maintenance cycle	
12	Equipment / Tooling maintenance	5 - Periodic maintenance requirements are clearly understood, and a means of recording maintenance actions is utilized 1 - Periodic maintenance requirements are not know by the user	
13	Equipment / Tooling Controls ID	5 - Operating restrictions or instructions if required are clearly marked all operators are licensed 1 - Operating restrictions are not posted unlicensed operators are using items	
14	Shelves, Benches, Desks Arrangement	5 - Work area is organized in a manner that allows for flow and are clearly marked as to work performed in the area 1 - Work area is not organized in a manner that promotes flow	
15	Shelves, Benches, Desks Control	5 - Kept clear of unnecessary materials 1 - Work surfaces are clutter or have items not required for maintenance	
16	5S Control and Sustainment Plan	5 - Visual controls are in place to facilitate maintaining organization Check sheets are available and utilizes to maintain 5S process 1 - Visual controls or check sheets are not available or used or maintained	



Safety

- Include Safety in all your Improvement Projects.

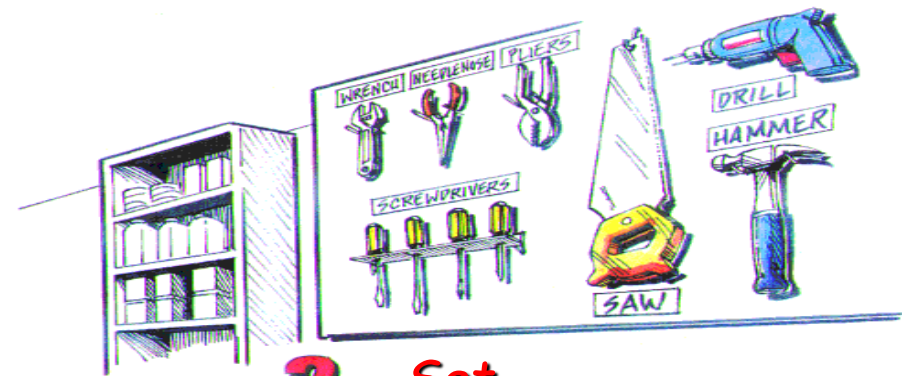
Can you identify the safety issues?



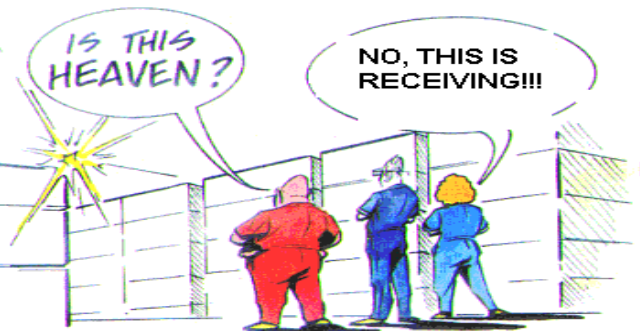
Workplace Organization (5S)



1. Sort



2. Set

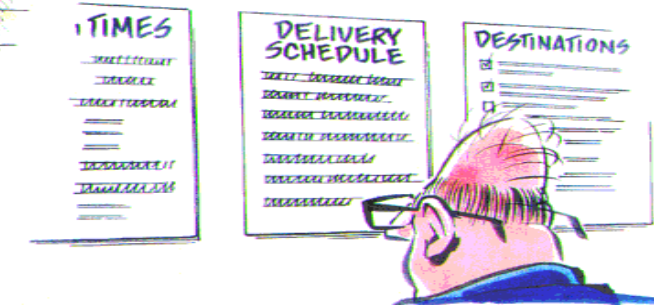


5. Sustain

5 S's



3. Shine



4. Standardize



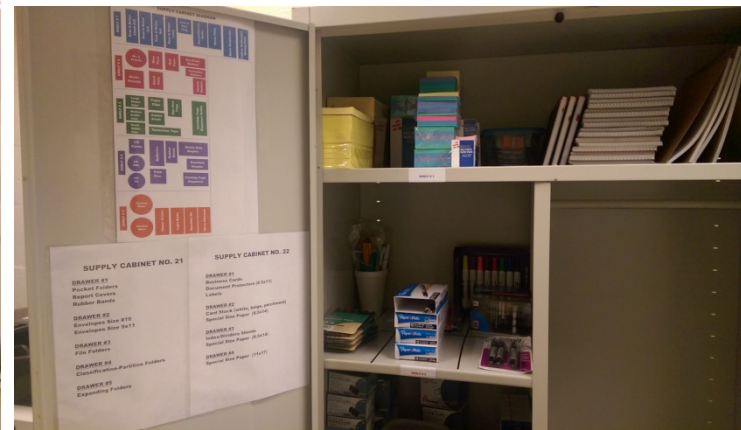
5S Examples Industrial & Office



5S Example – G-7 Supply Cabinet



BEFORE



AFTER



Other MCB Quantico (Lending Locker)

Before



After



Other MCB Quantico (Lending Locker Con't)

“Make your workplace into a showcase that can be understood by everyone at a glance” - Taiichi Ohno

- Items sorted by location and item type for easy access.
- List also includes Qty on Hand for easy accountability
- Shelving clearly marked

SORTED BY LOCATION	
1A	
Cleaning Supplies	
High Chair	5
2A	
Play Pen	10
Strollers	
Coffee - Pot	12
Toaster	12
3A	
Toys - Assorted Puzzle	171
Toys - YOYO	90
Toys - Assorted Animals	50
Toys - Smiley Face Bendable	150
Toys - Bracelets	225
Toys - Bouncy Balls	100
Coloring Books w/ Crayons	96
Toys - Rubber Duck	19
Pencils w/ Erasers	41
Stress Pigs	208
Light Up Bracelets	26
flash light keychains	98
Dry erase pens	110
FMEAP military spouse magnets	95
Germx hand sanitizer	297
Clamp ID holder	190

SORTED BY ITEM		
Item	Qty	Location
10 steps to Federal Job Booklet	50	1C
2019 Financial Planning Guide	100	1C
2019 Quantico Guide	100	5C
3 tab folders	126	1E
5160 address labels (sheets)	400	1E
Additional Letters for Display Sign		5C
Additional Paper		2E
Bluetooth speaker	1	4E
Clamp ID holder	190	3A
Cleaning Supplies		1A
Clear flyer protector	2	6C
Coffee - Folgers	2	2E
Coffee - Pot	12	2A
Coffee Creamer	3	2E
Coffee Creamer - Coffee mate	2	2E



Five Levels of Excellence

	Sort	Simplify	Systematic Cleaning	Standardize	Sustain
Level 5 Focus on Prevention	Employees are continually seeking improvement opportunities.	A dependable, documented method has been developed to provide continual evaluation, and a process is in place to implement improvements.	Area employees have devised a dependable, documented method of preventive cleaning and maintenance.	Everyone is continually seeking the elimination of waste with changes documented and information shared.	There is a general appearance of a confident understanding of, and adherence to the 5S principles.
Level 4 Focus on Consistency	A dependable, documented method has been established to keep the work area free of unnecessary items.	A dependable, documented method has been established to recognize in a visual sweep if items are out of place or exceed quantity limits.	5S agreements are understood and practiced continually.	Substantial process documentation is available and followed.	Follow-through with 5S agreements and safety practices is evident.
Level 3 Make it visual	Unnecessary items have been removed from the workplace.	Designated locations are marked to make organization more visible.	Work and break areas and machinery are cleaned on a daily basis. Visual controls have been established and marked.	Working environment changes are being documented. Visual control agreements for labeling and quantity levels have been established.	5S agreements and safety practices have been developed and are utilized.
Level 2 Focus on Basics	Necessary and unnecessary items are separated.	A designated location has been established for items.	Work and break areas are cleaned on a regular, scheduled basis. Key items to check have been identified.	Methods are being improved but changes haven't been documented.	A recognizable effort has been made to improve the condition of the workplace.
Level 1 Just Beginning	Needed and not needed items are mixed throughout the work place.	Items are randomly located throughout the workplace.	Work place areas are dirty, disorganized and key items not marked or identified.	Work place methods are not consistently followed and are undocumented.	Work place checks are randomly performed and there is no visual measurement of 5S performance.



Jidoka & Poka-Yoke

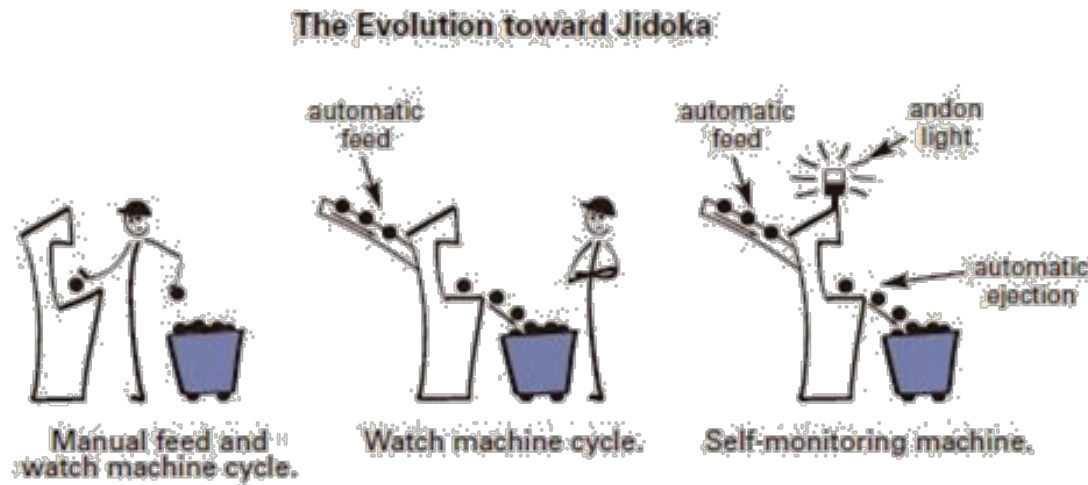


Jidoka

Sakichi Toyoda first introduced the Japanese concept of Jidoka (pronounced jee-DOH-kah).

In conjunction with Poka-Yoke, comes the concept of Jidoka.

- Jidoka has been defined by Toyota as “**automation with a human touch.**”
- It implies intelligent workers and machines identifying errors and taking quick countermeasures.
- No product moves into the next step of the process if it contains errors (AKA: quality at the source).



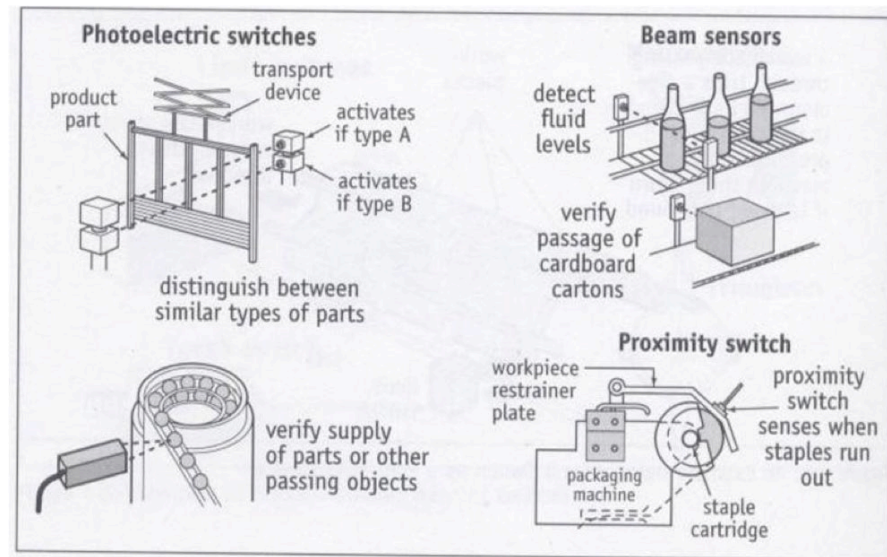
Jidoka Examples

Office Examples:

- SharePoint Workflow (rejected workflow stops automatically).
- Circuit Breakers / GFCI (closes circuit if overloaded / short).
- Copier / Printer (notifies when out of paper / ink / jammed).
- Deletion Prompt (Ask user if they are sure they want to delete).

Manufacturing Examples:

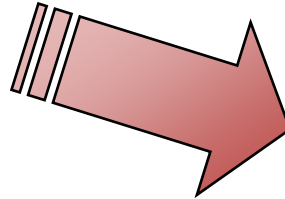
- Use of switches and sensors to stop machines.
- Automatic ejection



Mistake vs. Defect

MISTAKE

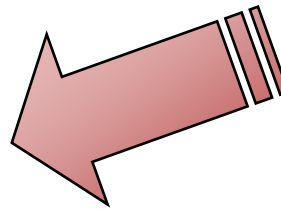
An incorrect, unwise, or unfortunate act or decision caused by bad judgment or a lack of information or care.



DEFECT

A failing, or flaw, especially one that still allows the affected item to function, however imperfectly.

\$\$\$



Mistakes, however small, can lead to defects which lead to rework or scrap and increased cost.



Cost of Poor Quality (COPQ)



PREVENTION

Before it Happens



IN-PROCESS DETECTION

*Before It
Escapes Your
Process Step*



END OF PROCESS INSPECTION

*After the Fact
Before it Gets to Your
Customer*



CUSTOMER REJECTION

Too Late

- The sooner we can catch errors, the easier and less costly it is to fix them.
- CPI helps minimize COPQ.
- A method to reduce COPQ is to develop standard work / processes.



Poka-Yoke

- Shigeo Shingo invented the Japanese concept called **poka-yoke** (pronounced POH-kah YOH-kay).
- Poka (Inadvertent Errors) Yoke (Avoid) means to mistake proof the process.
 - The essential idea of poka-yoke is to design your process so that mistakes are impossible or at least easily detected and corrected.



Shigeo Shingo

Used to be called fool-proofing (Baka-Yoke), but Toyota employees got upset that they were considered a fool.



Mistake Proofing

Benefits

- Easy to do the right thing the first time.
- Makes it easy to do the right things in the right order in the right way.
- Prevents accidentally doing the wrong things in the wrong order in the wrong way.

Results

- Eliminates defects
- Improves quality
- Reduces variation
- Improves on-time delivery
- Reduces or eliminates accidents
- Improves morale

“Amateurs work until they get it right. Professionals work until they can’t get it wrong.” - Anonymous



First Poka-Yoke Device

Shingo suggested a solution that became the first Poka-Yoke device.

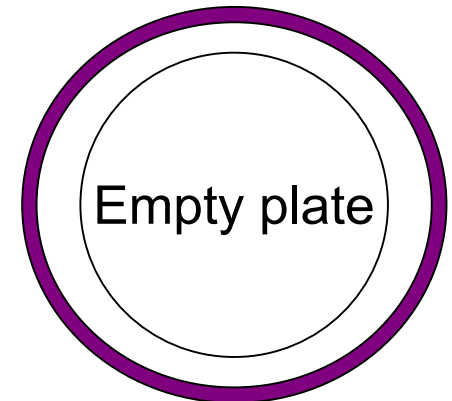
- In the old method, a worker began by taking two springs out of a large parts box and then assembled a switch.
- Problem: Sometimes the worker failed to put both springs in the switch.



First Poka-Yoke Device

- In the new approach, a small plate is placed in front of the parts box and the worker's first task is to take two springs out of the box and place them on the plate.
- Then the worker assembles the switch. If any spring remains on the plate, then the worker knows that he or she has forgotten to insert it.

The new procedure completely eliminated the problem of the missing springs.

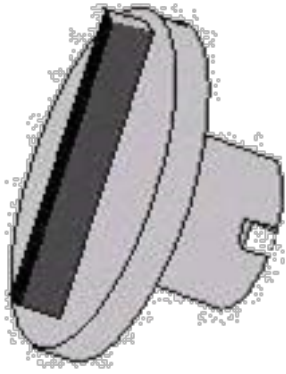


Mistake Proofing Discussion

What are some examples of Mistake Proofing?

Before

Gas cap is lost when driver forgets to reinstall after refueling.



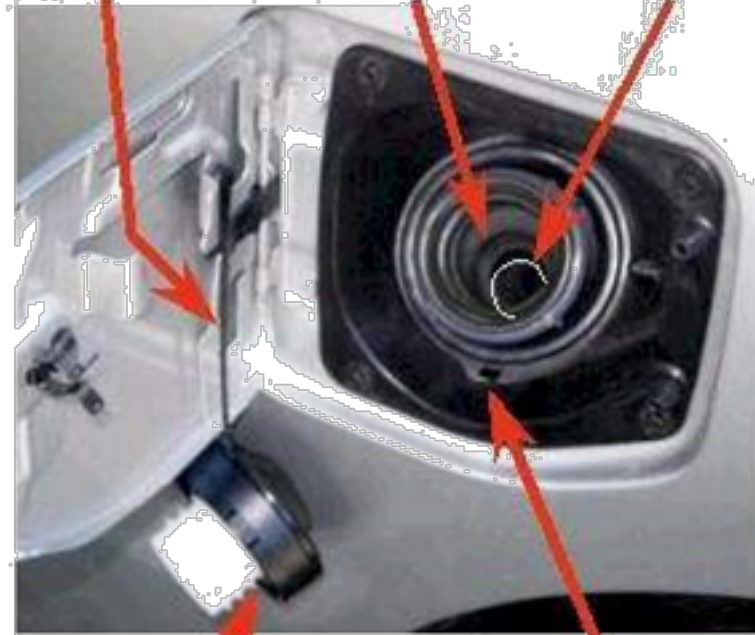
Older Style Gas Cap

After

Cord prevents lost cap

"Cone" guides nozzle insertion

Nozzle Restriction:



Ratchet limits torque

Drain prevents paint damage



Other Poka-Yoke Examples



Gas pumps are equipped with hose couplings that break-away and quickly shut-off the flow of gasoline.



Light sensors turn sink off when not needed.

Office Poka-Yoke Examples

Forms

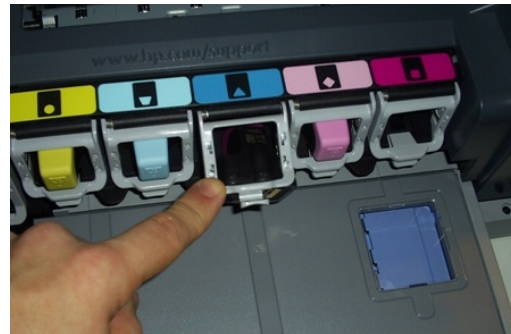
- Provides specific options for each field.
- Telephone Number Formatting (ex. (XXX) XXX-XXXX).
- Limits zip codes to 5 or 9 digits.

Technology

- Cable ends (computers)
- SD Card Shape
- Printer ink cartridges

Recreational

- Golf swing trainers



Recognizing Mistake-Prone Situations

Definition:

A mistake-prone situation exists when it is possible to err during the performance of work because the process being used is unreliable, unstable or prone to human error.

Examples:

- Critical specification or dimensional requirements.
- Ineffective standard procedures and processes.
- Multiple parts, processes, or steps.
- Repetitive, fast-paced operations.
- Short-cuts and work-arounds.
- New products, processes, or people.
- Multiple suppliers.



Standard Work



What is Standard Work ?

Standard Work is.....

- A prescribed sequence of production steps.
- Assigned to a single person.
- Balanced to the Takt Time.



What is meant by “Standard Work”?

The principles, tools, and techniques used to ensure process standardization in a JIT environment.

- Developed by the people who do the work.
- Focused on efficient use of resources through waste elimination.
- Establishes the foundation for CPI.

“Where there is no Standard, there can be no Kaizen.”
- Taiichi Ohno

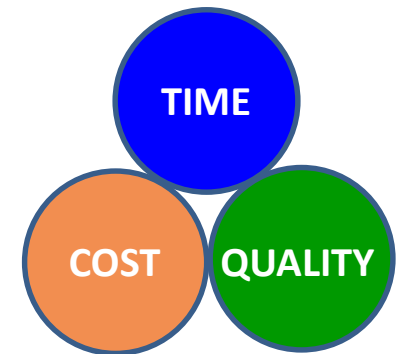


Why Do We Need Standardized Processes?

Quality: Standard processes produce
(Better) predictable results due to
the documentation of best practices.

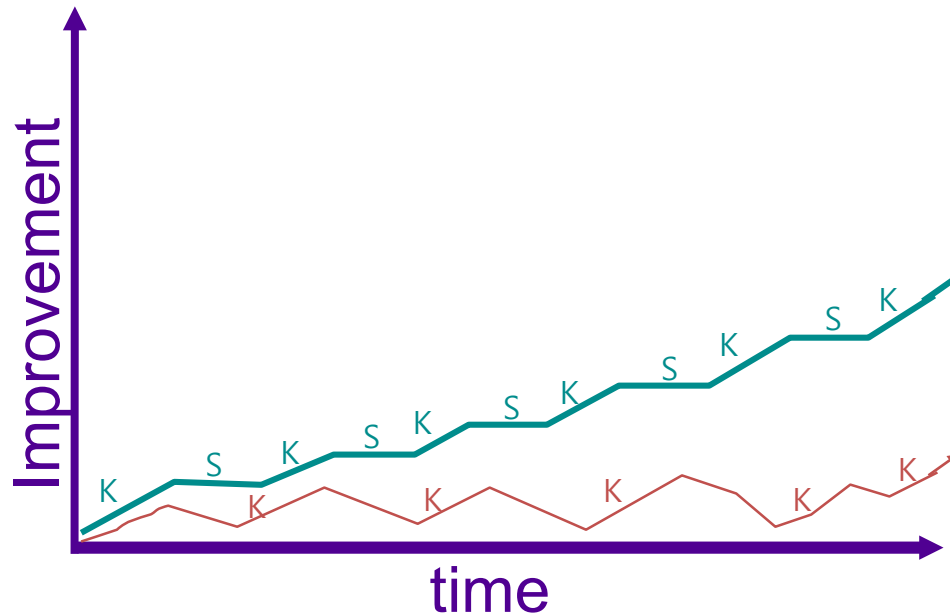
Time: Documented process reduces
(Faster) confusion and mitigates bad habits.

Cost: Best practices minimizes defects
(Cheaper) and unnecessary rework.



Standard Work

Locks in improvement and establishes a new baseline.



K = Kaizen
S = Standardization

Without Standard Work, improvements tend to dissipate over time!



Standard Work Example

LSS Green Belt Training Set-Up – Standard Work

Preparation

- Review Checklists
- Collect & Stage Supplies / Equip.
- Load & Transport to Training Site

Set-up (Daily)

- Furniture Layout
- Hook-up Computer & Projector (Cable & Exercise Bag) – First Day Only
- Layout Name Tents & Terminology Sheets
- Tape (Painters) signs on entry doors

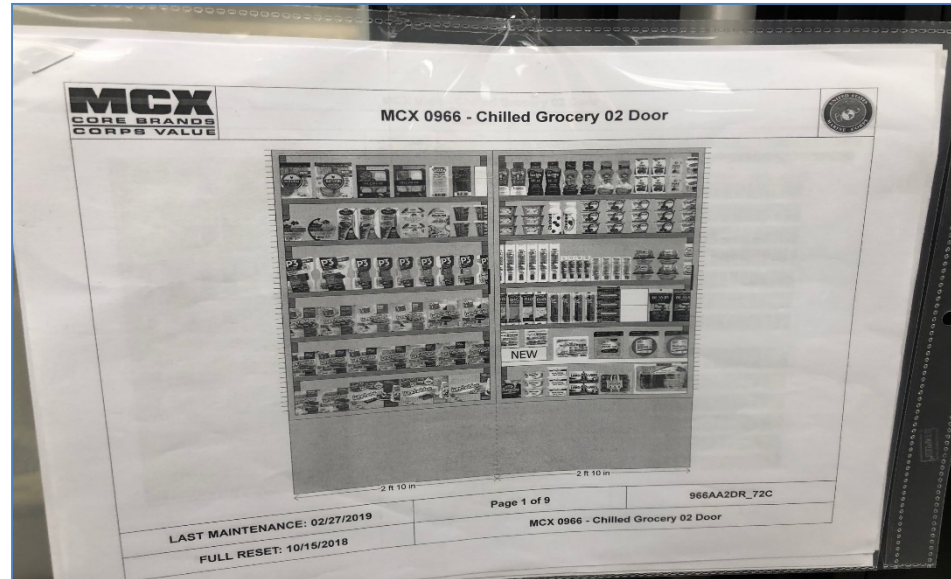
Set-up (Cont)

- Tape Door Lock (VEC)

Set-up (Future)

- Exercise Prep

Lean Six Sigma Green Belt Training Exercises - Standard Work Instructions



Statapult Simulation Round 1 – Standard Work

Preparation

Quantity	Groups
10-14	2
15-19	3
20-24	4
25-29	5
30-34	6

- Determine Number of Groups.
- Stage Training Aides (Statapult & Handout Case).
- Rearrange training space (tables).

Preparation (Continued)

- Layout Supplies.
- Layout Exercise Aides.
- Prepare Handouts (Round 1).

Execution

- Review Slides.
- Conduct Baseline Shoot (10 Minutes).
- Review Example Process Layout.
- Distribute Round 1 Handouts.
- Allow 5 Minutes to Learn Roles.
- Start Simulation (Approx. 30 Minutes).
- Record Data on Data Collection Sheets.
- Clean-up.
- Input Data into Statapult Excel Spreadsheet.
- Review Summary Data.

Review

- Conduct What Went Wrong Exercise

Lean Six Sigma Green Belt Training Exercises - Standard Work Instructions

Excel Quick Start Guide

New to Excel? Use this guide to learn the basics.

Quick Access Toolbar
Keep favorite commands permanently visible.

Explore the ribbon
See what Excel can do by selecting the ribbon tabs and exploring available tools.

Discover contextual commands
Select tables, charts, or other objects in a workbook to reveal additional tabs.

Find whatever you need
Look up Excel commands, get Help, or search the Web.

Share your work with others
Invite other people to view and edit cloud-based workbooks.

Switch or create sheets
Select the # next to these sheet tabs to switch between workbook sheets or to create new ones.

Insert and edit functions
Use the formula bar to view or edit the selected cell or to insert functions into your formulas.

Customize charts
Select a chart to quickly add, change, or remove any existing chart elements and formatting.

Show or hide the ribbon
Select the pin icon to keep the ribbon displayed, or hide it again by selecting the arrow.

Change your view
Select the view bar buttons to switch between view options, or use the zoom slider to magnify the sheet display to your liking.



Standard Work Example

Multiple Door Work Pallet



Pictures that demonstrate each step on how to pack and unpack doors

Clearly written instructions that tell you what to do

Visual Workplace



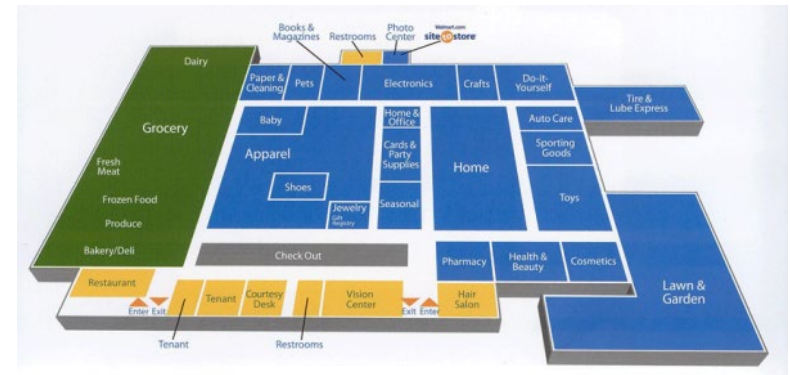
What is a Visual Workplace?

When anyone can walk into a workplace and visually understand:

- The current situation.
- The work process.
- Ahead, behind or on schedule.
- When there is an abnormality.

Use signals, lights, diagrams, charts and signs to:

- Clearly **define** the **normal** condition or a **required action**.
- **Expose** the abnormal undesired condition - **real time**.



Visual Controls

Visual Controls are communication devices used in the work environment that tell us at a glance how work should be done.

- Communicate information quickly and clearly.
- Locate things and places.
- Highlight defects, over-production and / or under-production.
- Provide instruction.
- Spotlight abnormal conditions.
- Communicate status to all.



Types of Visual Controls

- Red Tags - identify items to be scrapped.
- Signs / labels - to position tools, inventory, etc.
- White Lines - mark pathways, inventory locations.
- Alarm Lights - alert team members / supervisors.
- Kanbans - “pull production”, minimize WIP.
- Production boards - show required / actual output.
- Standardized Work Charts - process maps.
- Defective Item Displays - display defects, information on defect cause and solution.



Examples of Visual Controls

Display – Broadcast data



Signals – Grab your attention!



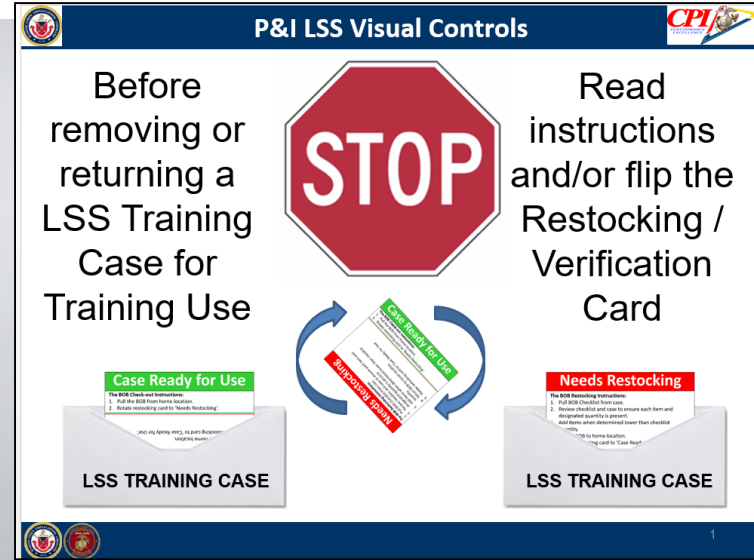
Controls – Limit behavior



Guarantees – Allows for correct response.



Visual Controls - Example



Needs Restocking

The BOB Restocking Instructions:

1. Pull BOB Checklist from case.
2. Review checklist and case to ensure each item and designated quantity is present.
3. Add items when determined lower than checklist quantity.
4. Return BOB to home location.
5. Rotate restocking card to 'Case Ready for Use'.

The BOB Check-out Instructions:

1. Pull the BOB from home location.
2. Rotate restocking card to 'Needs Restocking'.

Case Ready for Use

5 seconds or less – what is out of place and missing?



Production Control Boards

- Tell how many people are needed.
- Tell who does what.
- Makes problems visual.
 - Ahead or behind Takt Time.
 - Quality issues.
 - Missing parts, materials, information, people.
 - Down time.
- Triggers the problem solving process.



Production Control Boards

- Low maintenance.
- Easy to understand.
- Information visible at a glance.
- Priorities are readily apparent.
- Bottlenecks and WIP levels are obvious.
- Actual status of production vs. plan is evident.



Production Control Board

A screenshot of a SharePoint web page titled "Support Agreement Status". The page displays a table with columns for agreement details and status. The table is as follows:

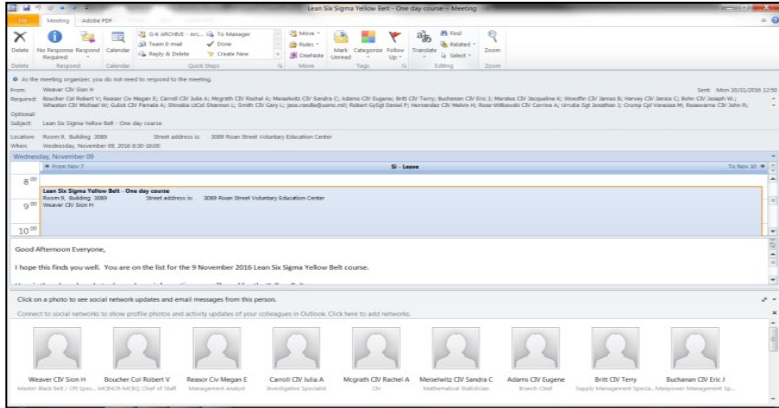
Libraries	Site Page	Support Agreement	OPR	AGREEMENT TYPE	MR	REUSABLE	DATE SIGNED	EXPIRATION	INDUSTRY	NEXT TRIENNIAL REVIEW	LAST TRIENNIAL REVIEW	NEXT TRIENNIAL REVIEW	AGREEMENT STATUS	REVIEW STATUS	ACTION REQUIRED	ASSIGNED	ADDITIONAL
		Federal Bureau of Investigation (FBI) Washington Field Office (WFO)	MCNCR	MOU	No	No	1/17/2012	1/17/2017	No	Yes		1/16/2013	4 - Currently Working	PLAN (IDENTIFY)		Dobson, C. Kelly E.	10/16/16 - FBI all in
		Federal Bureau of Investigation Academy (FBI)	MCNCR	MOU	No	Yes	12/6/2014	8/6/2015	No	Yes		11/5/2017	5 - Agreement in Place			Dobson, C. Kelly E.	COMPLETED and posted SharePoint
		Federal Bureau of Investigation Academy Critical Incident Response Group National Section FBI CRG TS	MCNCR	MOU	No	No	11/9/2016	10/10/2015	No	Yes		11/9/2016	5 - Agreement in Place	N/A		Dobson, C. Kelly E.	Agreement
		Fire Field Teamsters Club	MCNCR	MOU	Yes	No	9/10/2013	9/10/2018	No	Yes		9/10/2018	4 - Currently Working	PUBLISH ROUTE APPROVAL, ETC.		Dobson, C. Kelly E.	11/16/16 - customer to be notified

Electronic Control Board



Production Visual Controls Examples

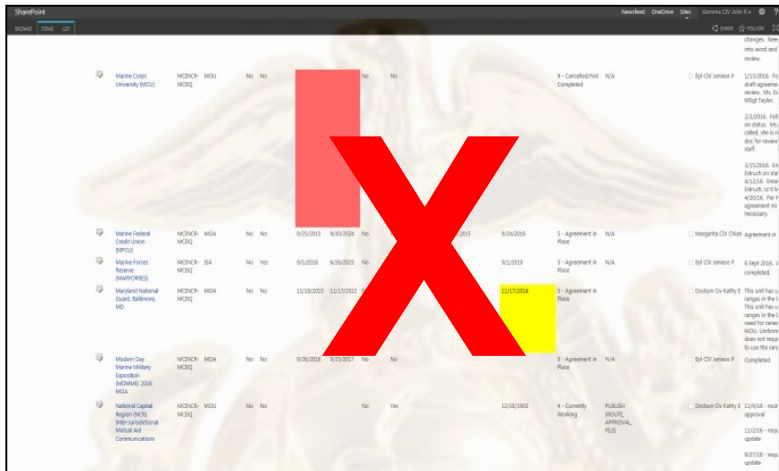
Outlook Meeting Notice. Helps to control and ensure maximum attendance.



Support Agreement Status on SharePoint – Uses Status Data to develop up-to-date metrics on performance.



Updated		11/18/2016				
AGREEMENT STATUS (Multiple Items)		Support Agreements Signed by Year/Status/SAM				
Support Agreements Completed by Year/Mont		Support Agreements Signed by Year/Status/SAM				
Fiscal Year Signed	Quantity	Year Signed	SAM 1	SAM 2	SAM 3	Grand Total
New	10	New	3	3	4	10
FY17	1	FY17			1	1
FY16	36	FY16	14	14	8	36
FY15	24	FY15	12	8	4	24
FY14	6	FY14	1	2	3	6
FY13	4	FY13	1	1	2	4
FY12	6	FY12	1	2	3	6
FY11	4	FY11	2	2		4
FY10	2	FY10		2		2
FY09	2	FY09	2			2
FY08	1	FY08		1		1
FY07	1	FY07		1		1
FY06	2	FY06	2			2
FY05	2	FY05	1	1		2
FY04	3	FY04		2	1	3
FY02	1	FY02		1		1
Grand Total	105	Grand Total	39	40	26	105



Support Agreement Status on SharePoint – Color-coding identifies missing data or required action.



Importance of Visual Controls



Can you distinguish between normal and abnormal conditions in the above photos?

Abnormal conditions should be visually obvious in 5 seconds or less!

Effective Visuals

Create a work environment that is...

Self – explaining

- Shows all aspects of process.

Self – ordering

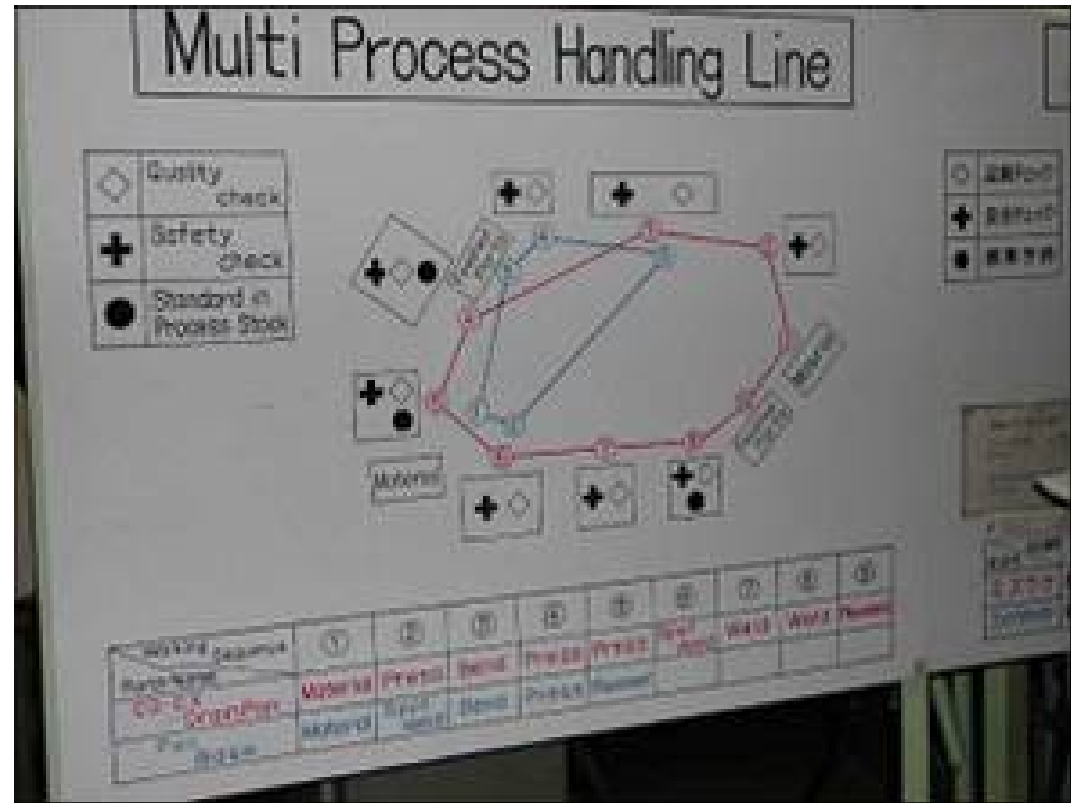
- Shows process layout

Self – regulating

- Displays quantity of work in process

Self – improving

- Shows where waste can be eliminated



Daily Board Walk

- Managers review as employees update.
- Issues are identified, addressed, and corrective actions established.
- Exceptions can be identified clearly (priorities).
- Targets must be clearly defined.



Weekly Meetings

- A venue for the cell to discuss general operational issues and continuous improvement.

Agendas

- Keeps a meeting focused on its purpose.
- Allows participants to prepare.



Implementation



Purpose of the Pilot

Pilots allow us to:

- Test run the solution in a small part of the organization.
- Evaluate the process measures for the improvement.
- Improve the proposed solution.
- Increase organizational buy-in.

Mitigate Unintended Consequences:

- See where possible failure points exist.
- Validate and refine cost and benefit estimates.
- Modify the implementation plan.

Overall benefit is a better solution with fewer surprises



Pilot Planning

- **What** – Needs to be piloted.
- **Where** – Will the pilots be run.
- **Who** – Will be involved.
- **When** – (How long) will the pilots run.
- **How** – Will the pilots be conducted.



Implementation Details

Pilot Implementation Plan.

- Run pilot trials.
- Monitor set-up times and idle times closely.
- Don't let large transportation lots throw away the benefits of smaller process lots.

Piloting Improvement.

- Develop a good work release plan.
- Monitor interactions with lot sizing.



Tips During the Pilot

Make careful observation of all activities, effects, and interactions during the pilot and continue pilot long enough to establish reliable baseline.

➤ **Manage expectations and perceptions.**

- Customers
- Management
- Staff

➤ Refine the improvement if the pilot demonstrates any weaknesses.

- Often the pilot will show a few opportunities for improvement.



Lessons Learned

At the completion of the pilot, capture what worked and what needed improvement.

Include lessons learned in the full roll out of the new process:

- Compile lessons learned.
- Categorize by type; by defect type, key analysis used, key words, problem / opportunity statement, root causes, etc.
- **Communicate lessons learned to others.**



What We Have Covered: Improve Phase

Improve Phase Tools

- Lean Principles: Value, Value Stream Map, Flow, Pull and Continuous Perfection.
- 5S in your workspace.
- Identification of Mistake Proof opportunities.
- Standard Work within a process.
- Visual controls in your workspace.
- Pilot of Improvements/Implementation.



Questions

What questions do you have about any area of the Improve Phase?

