Error Proofing

Practical Meaning of 99% in Life

- 20,000 lost articles of mail per hour
- More than 300,000 babies accidentally dropped by doctors and nurses each year
- Unsafe drinking water nearly 15 minutes per day or four whole days each year
- 5,000 incorrect surgical operations per week
- Two short or long landings at most major airports each day
- No electricity for almost seven hours each month

Percent	DPMO	Sigma
93%	66,807	3.0
98%	22,750	3.5
99%	6,210	4.0
99.87%	1,350	4.5
99.977%	233	5.0
99.9997%	3.4	6.0

Preventable Errors

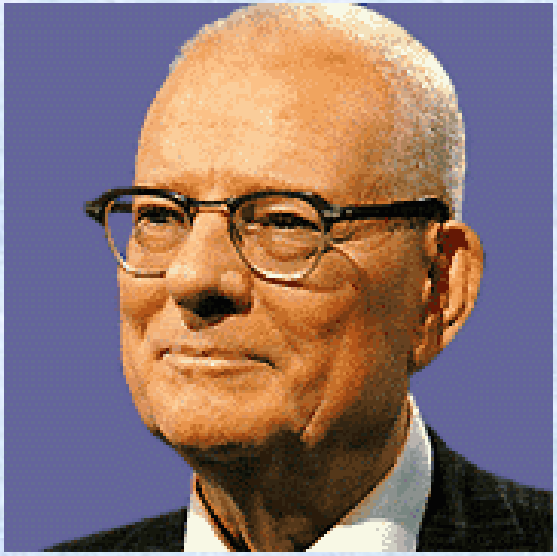
- Medication Error/Overdose
  - Wrong Drug
  - Wrong Dose
  - Wrong Patient
- Hospital Acquired Infections
  - Central line infections
  - IV infections
  - MRSA spread by contact
- Patient Care Errors
  - Falls
  - Bed Sores
  - Infusion Pump Data Entry Error
- Surgical Errors
  - Wrong Site
  - Foreign Bodies
  - Anesthesia Errors
- Lab Errors:
  - Transfusion Reaction
  - Lab Specimen Mis-labeling
  - Lost Specimen / Delayed Reporting
- Standard Pathways Errors
  - Not giving aspirin to patient presenting with heart attack symptoms
  - Triage failures

“Be Careful”

- Managers typically assume errors are due to carelessness or sloppiness
- Therefore, if employees would just be careful, errors would drop

Right?

W. Edwards Deming



"Management is quick to assign blame to an individual when the problem, is in fact, a fault in the system."

"Performance does not come from the individual. It comes mostly from the system that he works in, or the lack of a system, the environment that he works in. That determines quality of output, output, and results more than anything."

- Deming (1900-1993)

Deming on the System

- "…in an organization, the problems come from poor systems … not bad people."
- "If you pit a good performer against a bad system, the system will win almost every time. We spend too much time fixing people who are not broken and not enough time fixing organizational systems that are broken."
- "Only leadership has the power and responsibility to change the systems."

But don’t we have to hold people accountable?

Types of Errors

- Person was doing everything right, but a negative outcome occurred
- Person thought they were doing everything right, but negative outcome
- Person knew they weren't following the process, and management implicitly encouraged it
- Person knew they weren't following the process, but for a good reason
- Person knew they weren't following the process and should have anticipated negative outcome

Approaches to Quality

1. Make it impossible for the error to occur
2. Make it harder to create the error
3. Make it possible to reverse the error
4. Make the process so it tolerates error
5. Make it obvious that the error has occurred
6. Warn people about the potential for error

Error Proofing

Inspection

“Be Careful”

The Problems With “Be Careful”

- We are all Human
  - We get tired
  - We get distracted
  - We get overburdened (too busy)

- Signs and Warnings can be ignored
  - Poor training doesn’t emphasize or explain why
  - Employees pressured into taking shortcuts

Signs Do Not Prevent Errors

Signs Do Not Prevent Errors

Signs can be ignored

Effective Error Proofing Cannot Be Ignored

If We Use Warnings:

- Make sure the wording is unambiguous
- Explain “why”
  - What is the impact of NOT following the warning?
  - Impact on safety, quality, downtime, cost?
    - Will I get hurt?
    - Will the machine get broken?
    - Will results be inaccurate?
  - “Respect for People” says we should treat employees as adults and not just give “do as I say” warnings

Inspection

- Old “mass production” mindset was that Quality came through Inspection
  - Hence, belief that higher Quality costs more

Effectiveness of Inspection

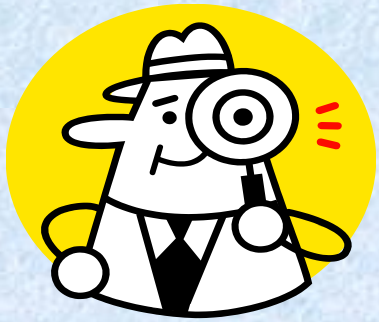
- Why not just inspect / test out defects?
- No test or inspection is 100% effective in finding defects within a product. If you doubt this, then try this experiment:
  - Count the number of times the letter “e” appears on this page.
  - Once you have counted the number of times that “e” has been used, write your answer on a sheet of paper.

Problems with Inspection

- Inspection is often not 100% effective
  - Often “sampling” the process
  - Even 100% inspection isn’t 100% effective
- Having two different people inspect might be LESS effective
  - “When two inspectors are on the job, neither has a job.”
  - Each assumes the other will catch mistakes, guard goes down

What is Error Proofing?

The creation of devices or methods that either ***prevent*** the special causes that result in defects or to ***inexpensively inspect*** each item produced to determine whether it is acceptable or defective.



“Poka Yoke” and “Baka Yoke”

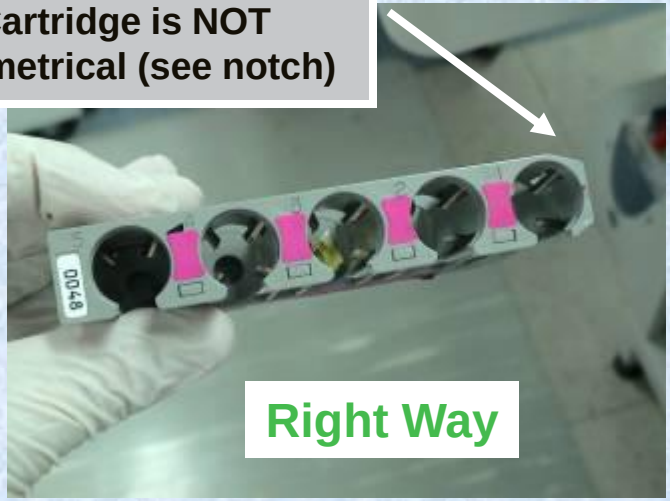
- Acceptable:
  - Mistake Proofing
  - Error Proofing
- Not Acceptable
  - Dummy Proofing
  - Fool Proofing
  - Idiot Proofing

We need to focus on the Error,
not assign blame to people

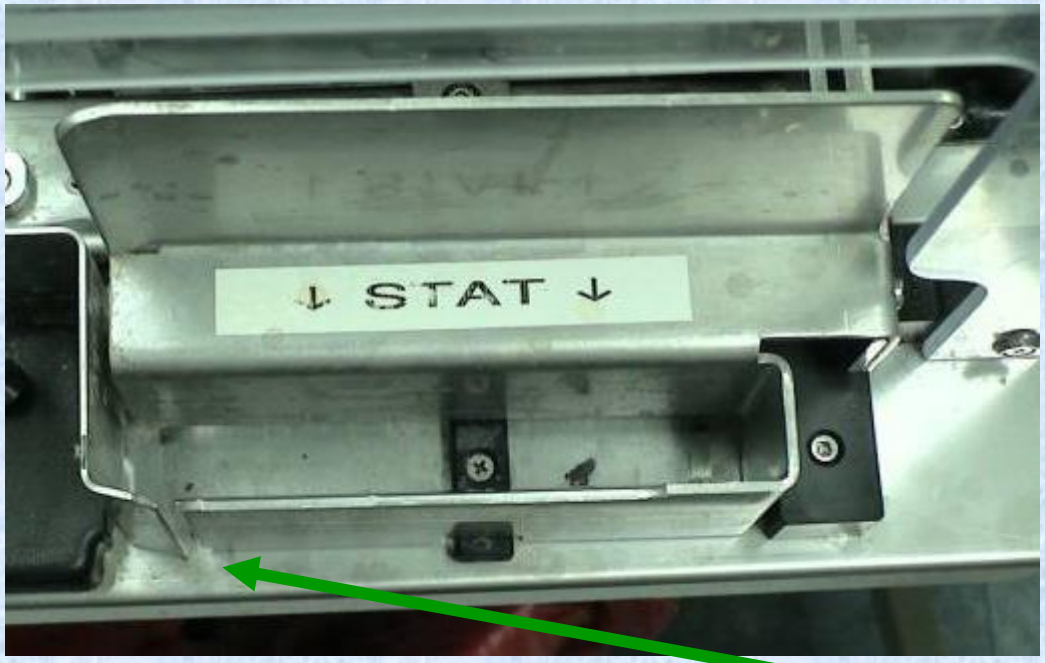
Poor Error Proofing

Potential Error:
There is a danger that a cartridge could be loaded backward

Cartridge is NOT symmetrical (see notch)



Different Instrument, SAME Vendor



This instrument has an error proofing device. It can be loaded only the right way.
The notch must line up on the left side. It does not fit “backwards.”
Level 1 Error Proofing (Error CANNOT occur)

Making Errors Obvious (5)

Color => Subject; Number => Order

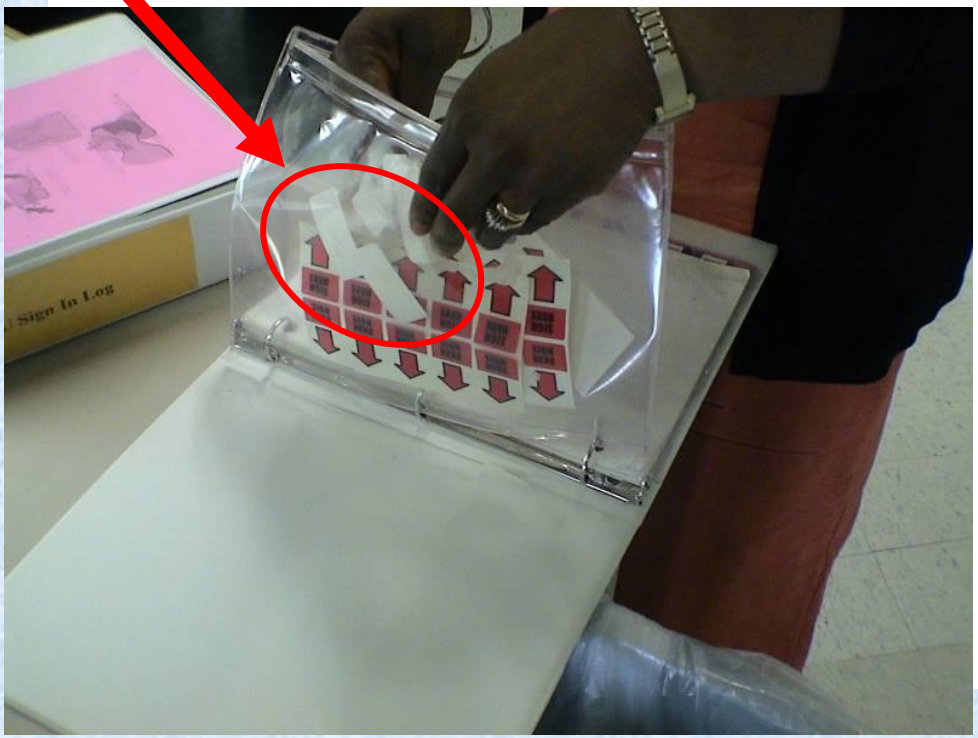
Error Proofing

- Eliminate problems that cause wasted motion each and every day

How can you error proof this?

Error Proofing Patient ID?

- MICU floor: Old patient ID stickers are sometimes found inside the book for that room
  - Sometimes stuck to the inside of plastic folder, sometimes loose



Is there a way to error proof this?

Make part of formal room change-over checklist?

Don't re-use the plastic sleeve?

Lean Problem Solving

- Don’t start by blaming the individual
- Get to the “Root Cause”
- Be proactive
- Prevent the problem from occurring again
- Don’t wait for major failures to act!

Near Misses as Opportunities

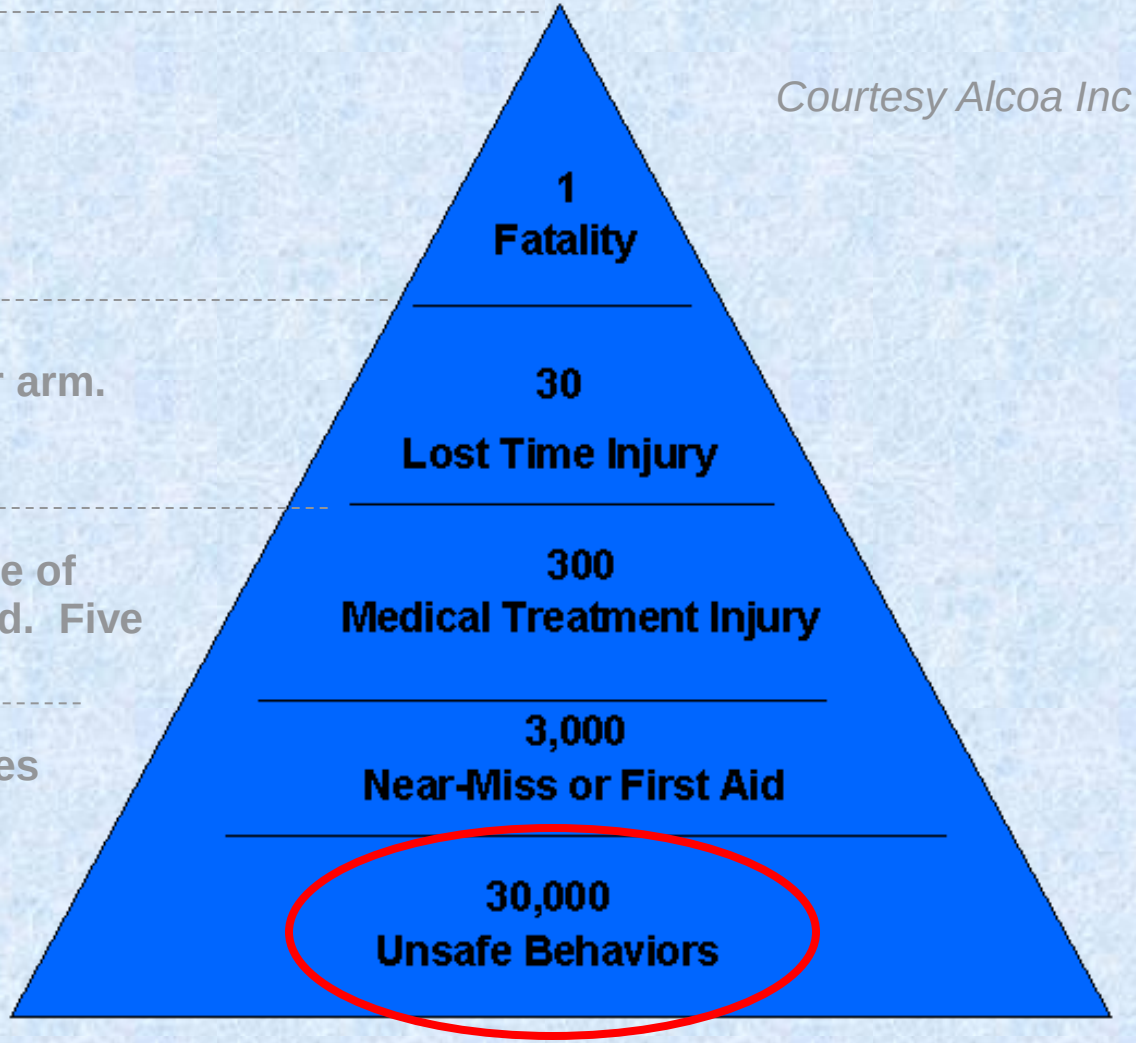
Employee slips on floor hits head and dies.

Employee slips and fractures their arm. Two weeks out of work.

While falling, employee hits a piece of machinery and lacerates their hand. Five sutures.

Employee slips on floor and bruises their hip.

Employee spills water on floor and walks away.



Courtesy Alcoa Inc

Reacting to Near Misses

- "I almost hung the wrong drip on that patient…."
  - Did the system "work" by catching the error? Should it work better?

Blame and Fear

- Why the H*#& did you almost do that??
- Who screwed up?
- Be more careful!
- Don't tell anybody!

Lean Problem Solving

- Thank you for bringing that to our attention
- Why could that have occurred?
- Let's fix the root cause
- We need to let others know to improve our process

Root Cause Problem Solving

- Instead of “Who?” ask:
  - “Why” could that have happened?
  - “What” could have allowed that to occur?
  - “How” could that be prevented next time?

- Toyota → “5 Whys”
  - 5 is Not a hard set rule, get to the root

The Lean Approach

- A number of methods are required to fix these problems:
  - Culture: Removing fear from reporting problems
  - Culture: Shift from workarounds to solving root cause problems
  - Methods: Use “poka yoke” and error proofing methods rather than warnings and cautions
  - Methods: Use “FMEA” to identify where problems could occur
  - Methods: Standardize everything you can, reduce ambiguity

Error Proof the Error Proofing

- Circumventing workarounds

- How can people defeat the system if:
  - Overworked
  - Overstressed

- The best error proofing is hard or impossible to circumvent

Conclusion

- High Occurrence of Errors in Healthcare
- Need to Use Advanced Quality Methods
  - Error Proofing, not “Be Careful”
  - Prevention, not Blame
- Need to Prevent Problems
  - Anticipate What Could Go Wrong
  - Each Problem is an Opportunity

Fundamentals Needed for Error Proofing

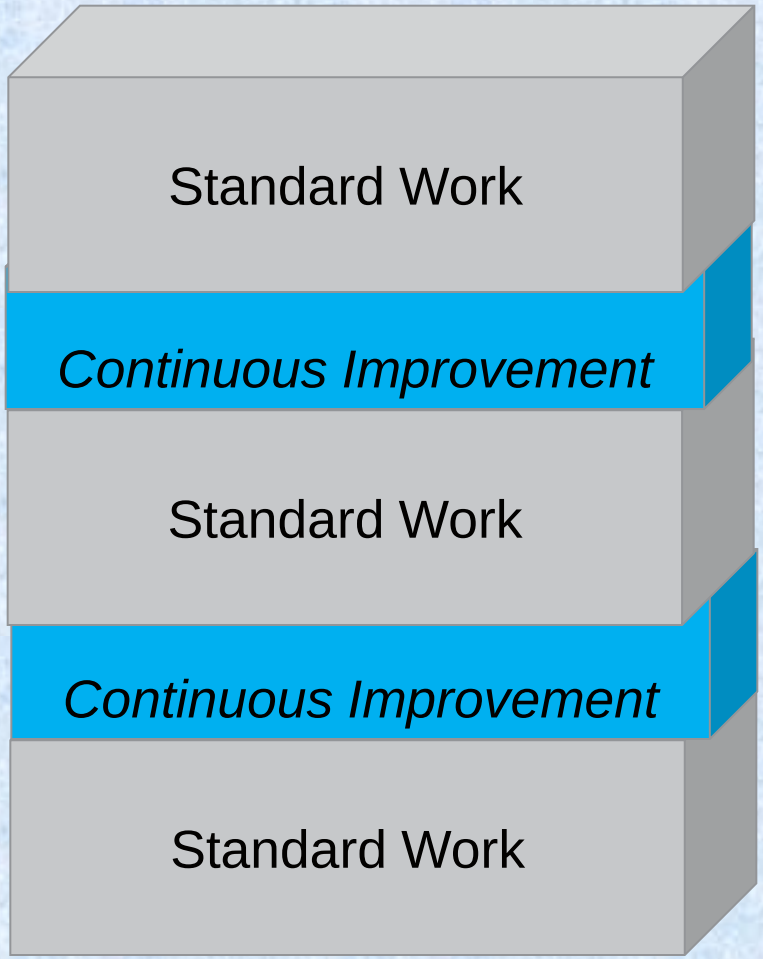
Operation Management and Project Management…Know the difference

- Too often smashed together, leading to a never ending cycle of churn with in the operations.

- Churn limits the effectiveness of standard work, and truthfully often eliminates it

- Ideas (Intellect) are left unfinished time and time again, resulting in a less effective continuous improvement effort, and eventually people stop submitting improvement opportunities

- Without Standard work, continuous improvement is left to subjectivity and preference, not true improvement



Standard Work

What is a Standard?

American Heritage Dictionary:

standard

1. An acknowledged measure of comparison; criterion.
2. A widely known and accepted measure used as a basis for a system of measures.
3. A degree or level of requirement, excellence, or attainment.

But what is standardized work?

Definition & Purpose

Definition

- An agreed-upon set of work procedures (standards) that establish the current one best method to deliver the expected results

Purpose

- Achieve a stable and reliable process in order to systematically improve. It is the basis for daily excellence and Continuous Improvement.

You get what you expect and you deserve what you tolerate

Standard Work

The current one best way to complete an activity

- One best way
  - Assumes there is always a best way
  - Consistent process yields consistent outcomes
  - Safety and quality are mandatory
- Current
  - Standard work is meant to be improved (kaizen)
- Developed by the people who do the work

"…nip common problems in the bud so that staff can focus instead on solving *un*common problems…"

–Bill Marriott

You get what you expect and you deserve what you tolerate

Fixing the Problems

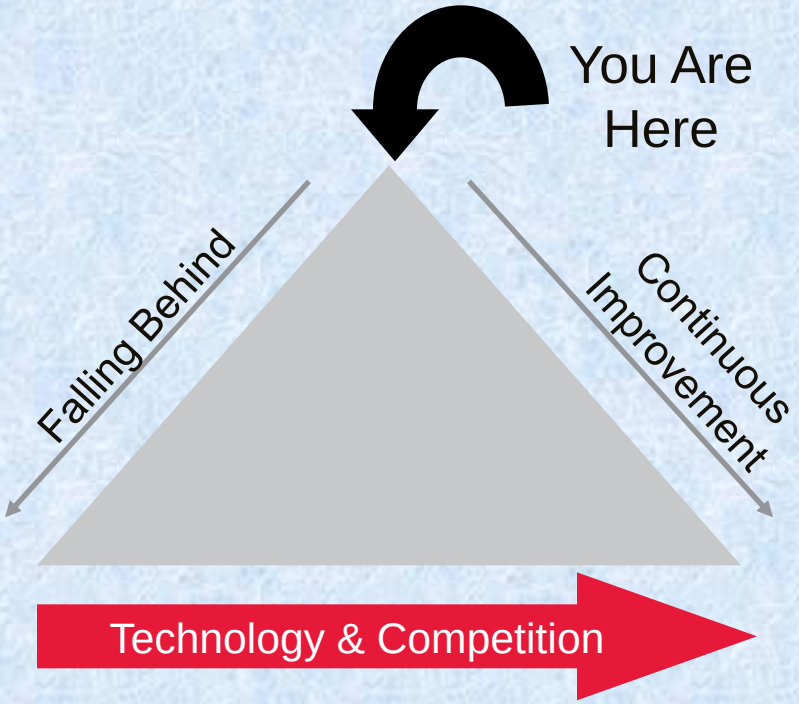
- Great Companies Understand:
  - Importance of Basic Standards
  - Rules for what is acceptable & what is not
    - Practices
    - Processes
    - Product Quality
    - Employee Policies
    - Customer Relationships

Standard Work System

Continuous Improvement:

Technology and competition continue to advance.

If you are not improving, you are falling behind.



Key Elements for Standard Work

1. Demand Data
2. Job Guidance Sheet
3. Required Resource Summary
4. Material Location Plan

Process Demand Data

Institution Name:	EXAMPLE HOSPITAL	Comments Box:
Process Location:	HEMATOLOGY	
Work Process:	In Cycle Process A & B - Midnight	
Operator Title:	Lab Tech	
Date Last Revised:	May 19, 2007	
Allocated Time:	Seconds	21600
	Hours:Minutes:Seconds	6:00:00

Process #	Process Name:	Required Quantity During Allocated Time:	Takt Time	Descriptions / Comments
1	Count Verify Tech	249	87	
2	Opti Tech	14	1543	
3	Sed Rate	14	1543	
4	UA Tech	22	982	
5	Fluid Count Tech	4	5400	
6	Slide Review	46	470	
7				
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20				

1

Institution Name: EXAMPLE HOSPITAL
Process Location: HEMATOLOGY
Work Process: In Cycle Process A & B - Midnight
Operator Title: Lab Tech
Date Last Revised: May 19, 2007
Developed by: Ortho-Clinical Diagnostics, Inc., ValuMetrix Services

Job Guidance Sheet

PROCESS #	JOB STEP	DESCRIPTION OF JOB CONTENT	Analysis Information: CODE	Analysis Information: ESTIMATE (Sec)	Analysis Information: Number of Units or Cycles Between Periodic Occurrences	Operator Time: Seconds per unit or cycle	Operator Time: Hr.Min.Sec per unit or cycle	Operator Time: Hr.Min.Sec per demand period	Tools or Supplies Used During Job Step	Key Quality and Safety Points
4	77	Tech focuses microscope	TL	4	2	2	0:00:02	0:00:44		
4	78	Tech scans accession in computer	Comp	1	2	0	0:00:00	0:00:11		
4	79	Tech perform urine microscopic review, interpretation & manual verification	YA	86	2	43	0:00:43	0:15:46	Workstation	
4	80	Tech discard Kova tube urine aliquot	Man	5	2	3	0:00:03	0:00:55		
5	81	Tech acquires hemacytometer	PT	2		2	0:00:02	0:00:08	Hemacytometer	PPE Required
5	82	Tech acquires cover slip	PT	2		2	0:00:02	0:00:08	Coverslip	
5	83	Tech affixes cover slip onto hemacytometer	PT	6		6	0:00:06	0:00:24		
5	84	Tech acquires glass test tube	TL	1		1	0:00:01	0:00:04	Glass test tubes	
5	85	Tech labels glass test tube	Man	3		3	0:00:03	0:00:12		
5	86	Tech racks labeled glass test tube	MAN	1		1	0:00:01	0:00:04		
5	87	Tech opens refrigerator	MAN	2		2	0:00:02	0:00:08		
5	88	Tech acquires albumin reagent	PT	3		3	0:00:03	0:00:12		
5	89	Tech shuts refrigerator	MAN	1		1	0:00:01	0:00:04		
5	90	Tech drops albumin reagent into labeled glass test tube	PT	6		6	0:00:06	0:00:24		
5	91	Tech sets aside albumin reagent	PT	2		2	0:00:02	0:00:08		
5	92	Tech acquires petrie dish	TL	1		1	0:00:01	0:00:04	petrie dish	
5	93	Tech opens petrie dish	TL	1		1	0:00:01	0:00:04		
5	94	Tech places hemacytometer onto petrie dish	TL	1		1	0:00:01	0:00:04		
5	95	Tech [illegible]	TL	1		1	0:00:01	0:00:04		
5	96	Tech [illegible]	TL	4		4	0:00:04	0:00:16	glass pipette	
5	97	Tech acquires specimen on the rocker	PT	1		1	0:00:01	0:00:04	Rocker	

2

Institution Name: EXAMPLE HOSPITAL
Process Location: HEMATOLOGY
Work Process: In Cycle Process A & B - Midnight
Operator Title: Lab Tech
Date Last Revised: May 19, 2007
Developed by: Ortho-Clinical Diagnostics, Inc., ValuMetrix Services

PROCESS #	PROCESS NAME	LABOR RW (Seconds)	LABOR VA (Seconds)	MACHINE VA (Seconds)	OTHER VA (Seconds)	MACHINE NVA (Seconds)	PURE WASTE (Seconds)	TOTAL LABOR TIME (Seconds)	HEAD COUNT	CUMM. HEAD COUNT	Parallel Work Channels	NECK
1	Count Verify Tech	20	0	35	0	0	0	20	0.2	0.2	0.6	
2	Opti Tech	117	8	100	0	0	0	125	0.1	0.3	0.1	
3	Sed Rate	48	40	360	0	0	0	88	0.1	0.4	0.3	
4	UA Tech	105	67	1200	0	0	0	172	0.2	0.5	1.4	M
5	Fluid Count Tech	191	102	90	0	0	0	293	0.1	0.6	0.1	
6	Slide Review	22	148	120	0	0	0	170	0.4	1.0	0.6	
7	0	0	0	0	0	0	0	0	0.0	1.0	0.0	
8	0	0	0	0	0	0	0	0	0.0	1.0	0.0	
9	0	0	0	0	0	0	0	0	0.0	1.0	0.0	
10	0	0	0	0	0	0	0	0	0.0	1.0	0.0	
11	0	0	0	0	0	0	0	0	0.0	1.0	0.0	
12	0	0	0	0	0	0	0	0	0.0	1.0	0.0	
13	0	0	0	0	0	0	0	0	0.0	1.0	0.0	
14	0	0	0	0	0	0	0	0	0.0	1.0	0.0	
15	0	0	0	0	0	0	0	0	0.0	1.0	0.0	
16	0	0	0	0	0	0	0	0	0.0	1.0	0.0	
17	0	0	0	0	0	0	0	0	0.0	1.0	0.0	
18	0	0	0	0	0	0	0	0	0.0	1.0	0.0	
19	0	0	0	0	0	0	0	0	0.0	1.0	0.0	
20	0	0	0	0	0	0	0	0	0.0	1.0	0.0	

3

Institution Name: EXAMPLE HOSPITAL
Process Location: HEMATOLOGY
Work Process: In Cycle Process A & B - Midnight
Operator Title: Lab Tech
Date Last Revised: May 19, 2007
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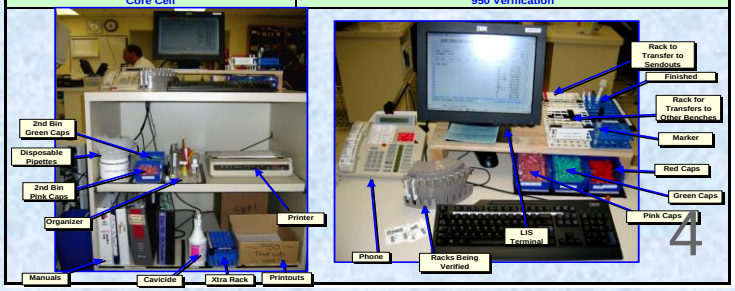
MATERIAL LOCATION PLAN

PROCESS NAME	STATION DESCRIPTION
Core Cell	950 Verification



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How People React to New SW

- Cooperation
  - "OK, show me the new way"
- Questioning
  - "Why do I have to do it this way?"
- Disdain
  - "You idiots, this new way is stupid"
- Resistance
  - "I don't want to do it this way"
- Passive Aggressiveness
  - "Ok I'll do it" (proceeds to not do it)

How do we Prepare for These situations?

Resistance to Standardized Work

- Standard Work is not always a popular idea
- Why not?
  - People do not want to be told what to do
    - Developed by the people that will use it – doesn't mean everyone will agree
  - People have pride in their old way
    - Might have put a lot of effort into figuring out their own way
    - Might mean giving up something they are proud of
    - Need to convince people the benefits outweigh the perceived "loss"
  - People may be afraid they will have trouble learning new process quickly
  - People may a notion that oversight and standards = "micromanagement"
  - Some people prefer chaos to consistency
- What strategies do we need to counter this?

Helpful Hints for the Supervisor

- Clearly display the Job Standardization Package in the area
- Create an atmosphere that encourages adherence to the Job Standardization Packages
- Take swift and effective action on ideas generated by the team
- Establish the importance of Job Standardization through education, practice, and accountability
- Use videotape analysis to verify adherence to the standard
- Build a library of videotapes and use them as training aids

Revision of Job Standardization Packages is one of the most important jobs of the supervisor

Summary

- Set appropriate standards and develop them through a team approach
- Establish an environment where success is assured
- Organize operations based on takt time
- Job Standardization Packages are variable and incomplete at all times
- Without Job Standardization, it is impossible to systematically improve

Cultural Shift

- Traditional Approach:
  - "Naming, Shaming, and Blaming"

- Lean Approach:
  - Supports open reporting of mistakes
  - Root cause problem solving process

Visual Management and 5S

What's the Message?

A Visual is Worth a Thousand Words

Is this what you pictured?

Visual Management

Visual Workplace

A Lean working environment is typically very visual**;**

information is displayed and clearly visible to

EVERYONE

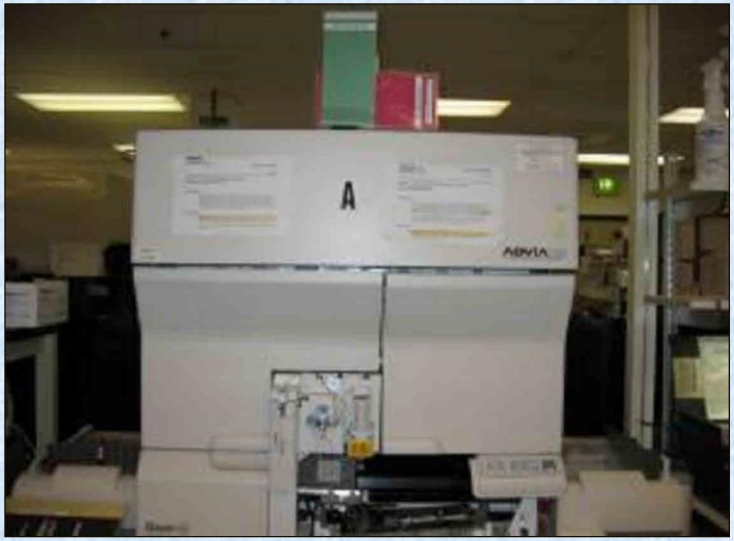
The Visual Workplace Vision

- **No waste (nothing extra in the work area)**
- **The workplace is clean, safe and organized**
- **Standards are easily recognized (visible)**
- **Abnormal conditions are easily controlled**
- **Performance and progress are visually apparent**

Visual Workplace in Action

- Use of labels, borders, boards, color coding, etc., to make it easier to find things and keep the area neat
- Use of storyboards to display and update relevant performance information for an operation, a department, or the business so everyone knows what has to be done and the progress in achieving it
- Use of visual aids to communicate standard work elements and operation specific status
- Use of visual aids to communicate scheduling requirements

A Visual Workplace in Action



Even at Home! – Julia Child

Each [pot and pan] was outlined with marker so it could easily be returned to its designated spot… She recommends a pegboard to anyone who enjoys cooking. "You want to be able to find and stash everything easily," she says.

"Unless, of course, you're one of those people who like to live in a mess."

- Real Simple Magazine

http://www.realsimple.com/realsimple/gallery/0,21863,1532046-16,00.html

Is Your Workplace “Visual”?

- Can a reasonably intelligent outsider come to your department and identify what is going on?
- Are there clear and unambiguous signals?
- Are exceptions easy to identify?
- Are the right measures in place, visible to all, and trended over time to measure improvement?

“How do I help?”

Visual Management - Purpose

- To enable any individual to immediately recognize the standard (and any deviation from it) and manage the process.

What is right

What is wrong

What is done

What is left to be done

Delays

Resources

Tools and equipment

Materials

Standards

Methods

Good visual controls **clearly and immediately notify management and workers when a state of abnormal condition has or is about to occur.**

Visual Control Types

Visual Control Type	General Purpose
Storyboards	To share information about process performance, projects or improvements; to educate and motivate
Signboards	To share vital information at point of use
Maps	To share actual processes, standard operating procedures, directions, etc.
Kanbans	To control the withdrawal of inventory in and out of warehouse, storage rooms or cells; it can also be used to regulate orders from the department to the suppliers
Checklists	To provide an operational tool that facilitates adherence to standards, procedures, criteria, etc.
Indicators	To show correct location, item types, amount, direction, or proper motion by building that information into the workplace
Andons/Alarms	To provide a strong or unavoidable sign when there is an abnormality or action to be taken
Error-Proofing	To prevent abnormalities or problems from occurring or from moving to the next process or step

Visual Control – Storyboard Example

- Create a central communication center
- Posting in public means everyone can help drive accountability
- Daily updates = daily responses
- Color code for visual management

“No problems” = BIG problem

Visual Control – Storyboard Example

"Kaizen Wall of Fame" used to share information about projects and improvement ideas

- **Documentation of changes (before and after)**
- **Recognize improvement teams**
- **Sharing ideas across departments**

Visual Control – Signboard Examples

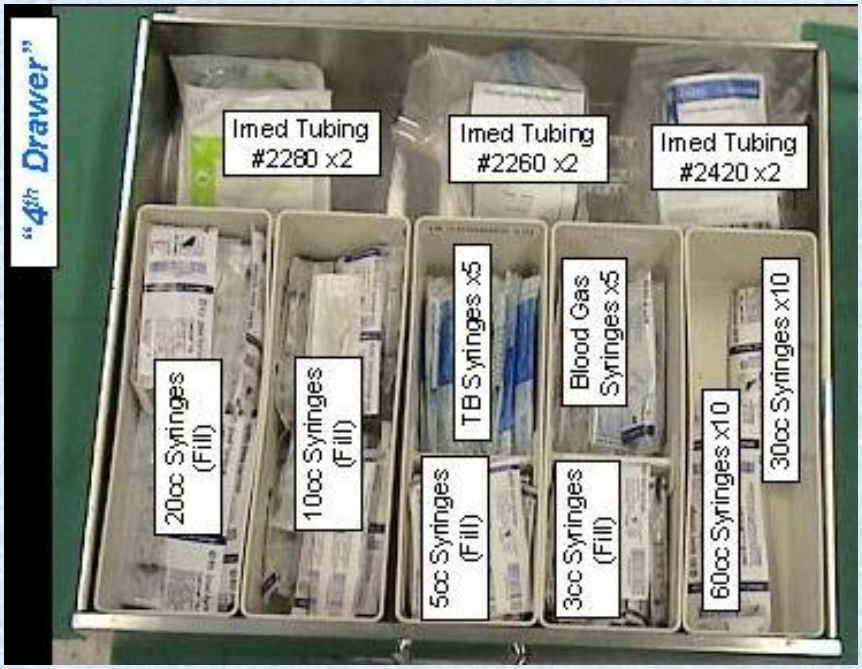
Pharmacy robot

Cabinet content

Clean sink

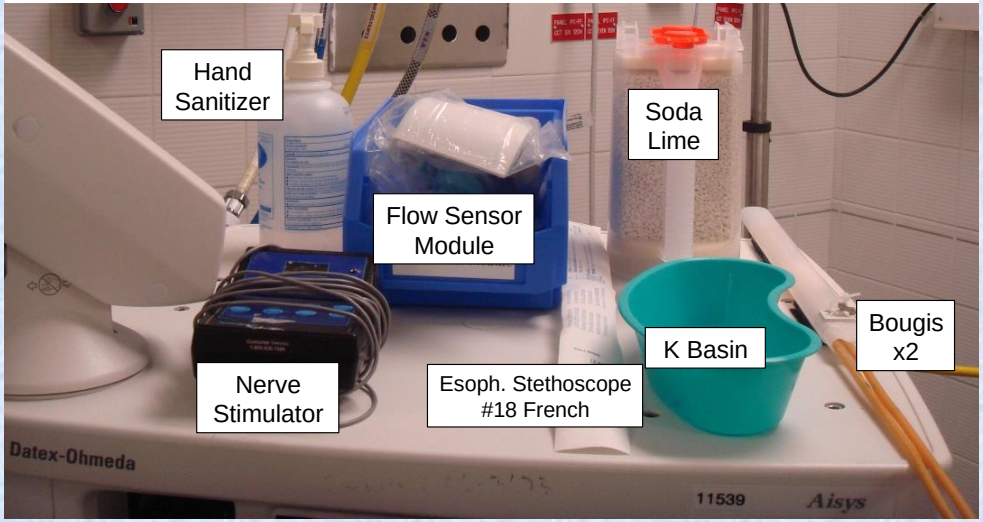
Visual Control – Map Example

Laminated and labeled photos attached to anesthesia supply locations



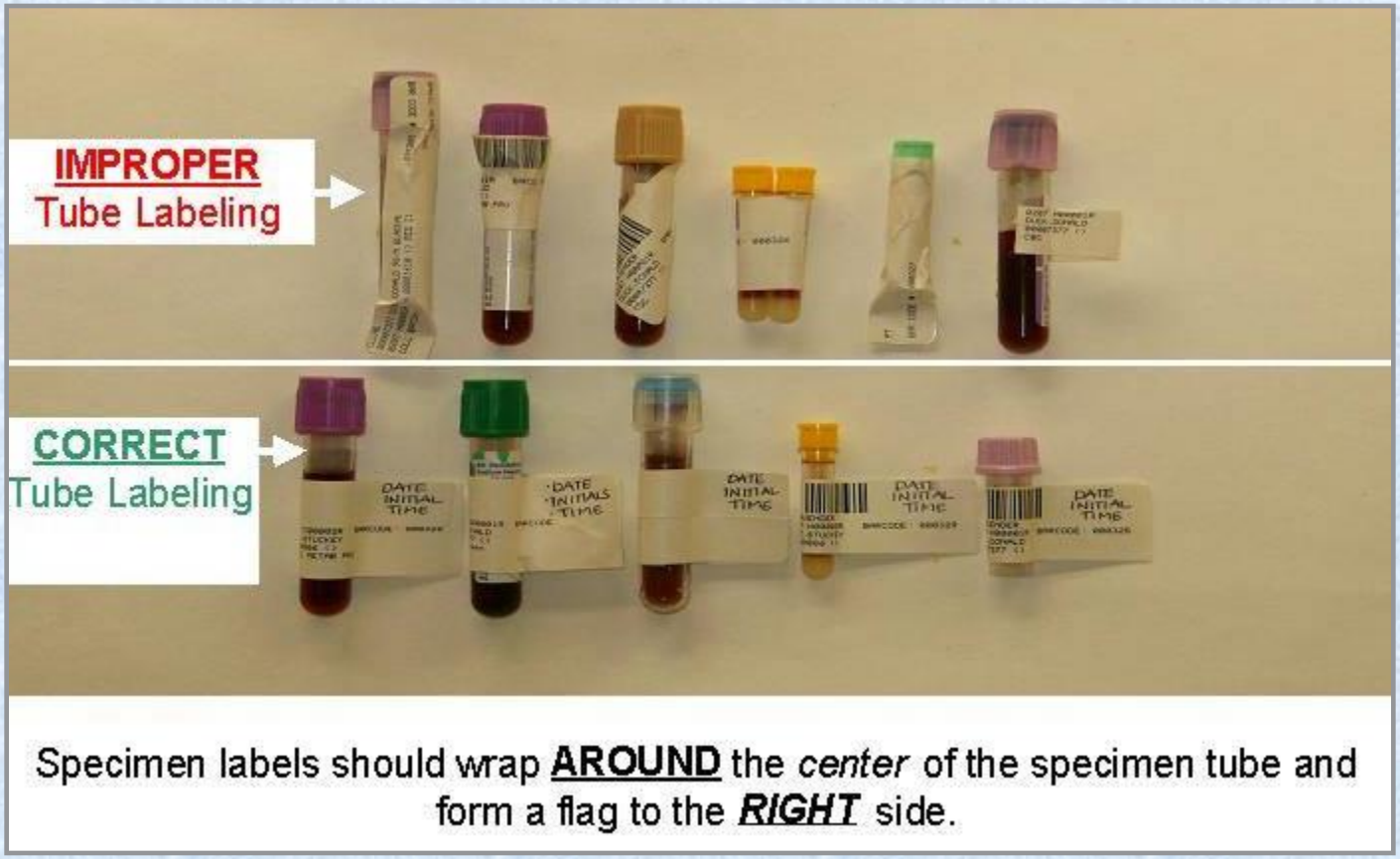
- Photo
- Name
- Location
- Quantity
- Stock List

"Top of Gas Machine"



Visual Control – Indicator Example

Visual aid illustrating the proper way of tube labeling



Visual Control – Andon Example

- Visual aid indicating the status of an instrument; green signals that the instrument is running normally; red signals that the instrument is down

How to Create Visual Controls

- Identify the information you want to convey or the mistakes you want to prevent
- Design a simple, visual way of displaying and controlling
- Test the method; seek feedback from those involved
- Train everyone to ensure they are able to understand and use the visual displays and controls
- Regularly review and improve—Keep updated!

How to Create Visual Controls

- **Recommendations for Process Controls**:
  - Examples of color coding for locations and/or containers:
    - Green area for “Ready to Go”
    - Red area for “Hold for Process Step”
    - Yellow area for “In Process”
    - White area for “To be Transported”
    - Black area for “Testing Complete”

- **Recommendations for Material Management Controls**:
  - Kanban card system or two bin replenishment systems
  - Floor and hang-down signs for material locations
  - Material location labels in storage areas

Benefits of Visual Management

- Information readily available to everyone allowing individuals to see the effect of their contribution to the overall performance
- Standardization of visual metrics and data displays enhances understanding of process performance
- Clear, unambiguous visual controls improve communication of what needs to be done or not done
- Indicators (signals) advise if something has not been done which should be done, or if something has been done which should not have been done

Visual Workplace Summary

- The essence of the visual workplace is just-in-time information
- Visual displays and controls are part of all Lean activities
- The visual workplace begins in the first minute of Lean planning and implementation and keeps on throughout continuous improvement
- Be diligent about using all types of visual controls in the workplace

How Are We Doing Today?

First **Second** **Third**

Prerequisites of Visual Management

- Housekeeping
- Organization
- Standardization
- Performance measures

5S

5S

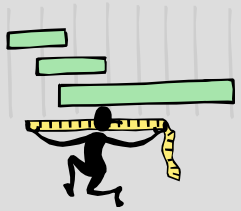
5S creates the foundation for a visual workplace

5S

Sort

Set in Order

Shine



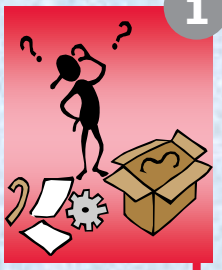
Standardize

Sustain

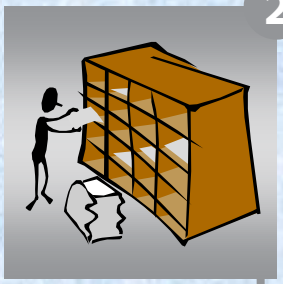
A Lean manufacturing tool focused on creating and maintaining an organized, clean and high performing work environment by eliminating non-value-added activities such as searching around for tools and moving around in clutter.
It is the foundation for continuous improvement, zero defects, cost reduction and a **safe work area**.

What Is 5S?

"A Place for Everything and Everything in Its Place"

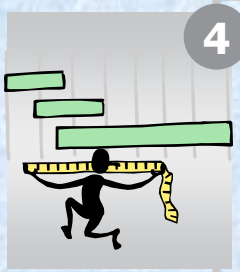


Sort (SEIRI)
Segregate and Eliminate
Segregate necessary items from unnecessary items and eliminate what is not needed.

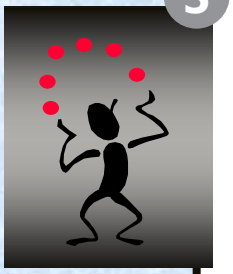


Set in Order (SEITON)
Arrange and Identify
Arrange items so that they can be found quickly by anybody.

Shine (SEISO)
Daily Cleanup Process
Create a spotless workplace…swept and clean.



Standardize (SEIKETSU)
Constant Adherence to the First Three Steps and Safety
Standardize cleanup activities so that these actions are specific and easy to perform. Create and maintain a safe work environment. Ensure compliance to procedures.



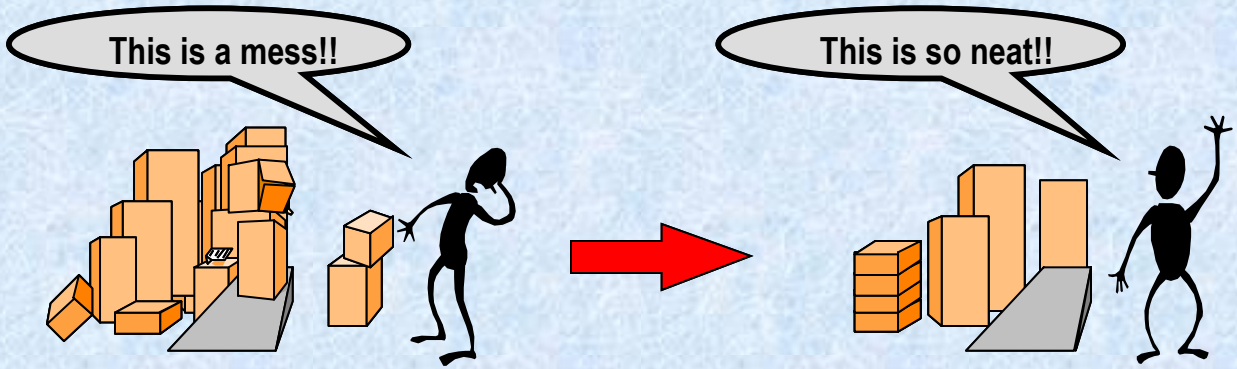
Sustain (SHITSUKE)
Motivate to Achieve Habitual Compliance
Promote adherence to maintaining a high performance, high quality and safe work environment. Use visual performance measurement tools. Make a habit of maintaining established procedures and ensuring they are followed.

Benefits of 5S

"A stimulating and efficient workplace"

- Improves safety and ergonomics
- Promotes flow
- Reduces searching
- Reduces unplanned downtime
- Improves quality
- Encourages visual control
- Enhances teamwork

- Improves productivity
- Eliminates distractions
- Reduces inventory and space
- Instills the discipline to follow standard work
- Exposes problems
- Tackles waste
- Enhances self-management



Before and After 5S

Before

After

Before and After 5S

Before

After

Specimen receiving personnel follow FIFO methodology once courier drops off specimen.

Before and After 5S

Before

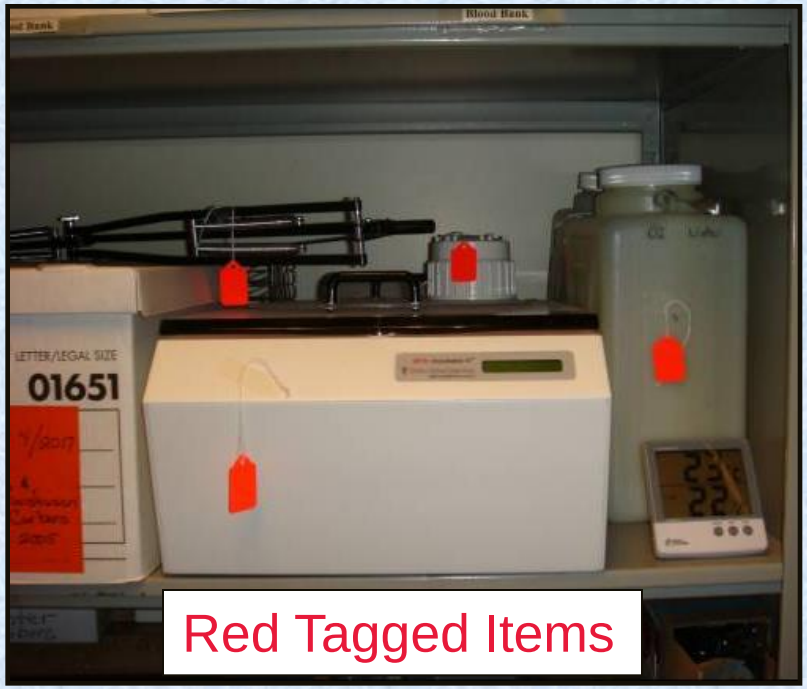
After

Before and After 5S

Before

After

Example of *Sort*



Red Tagged Items

Band-Aids?

Red Tag Holding Area

Examples of Set in Order

Border…

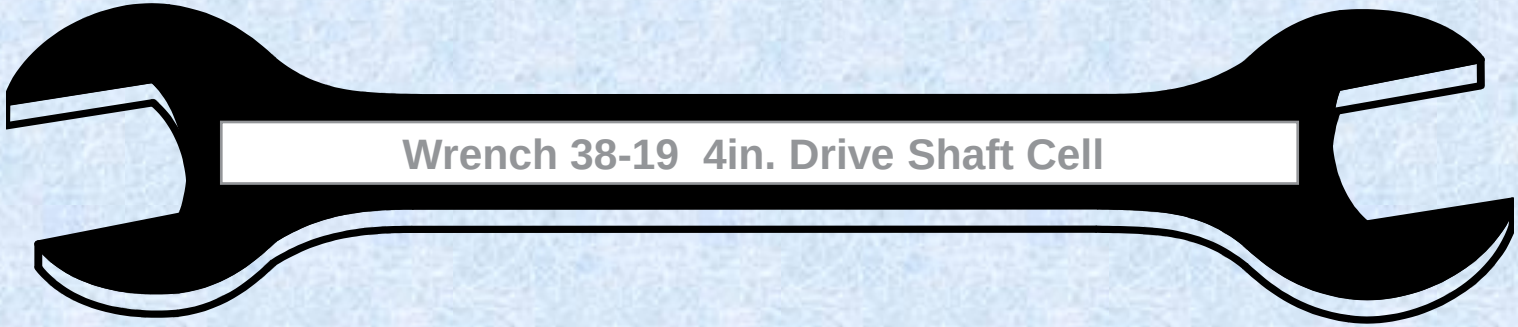
- A line around an item to identify its area/boundary.
  - Traffic lanes
  - Stationary items
  - Walkways
  - Tool outline
  - Kanban areas
  - Hazardous areas

Home Address

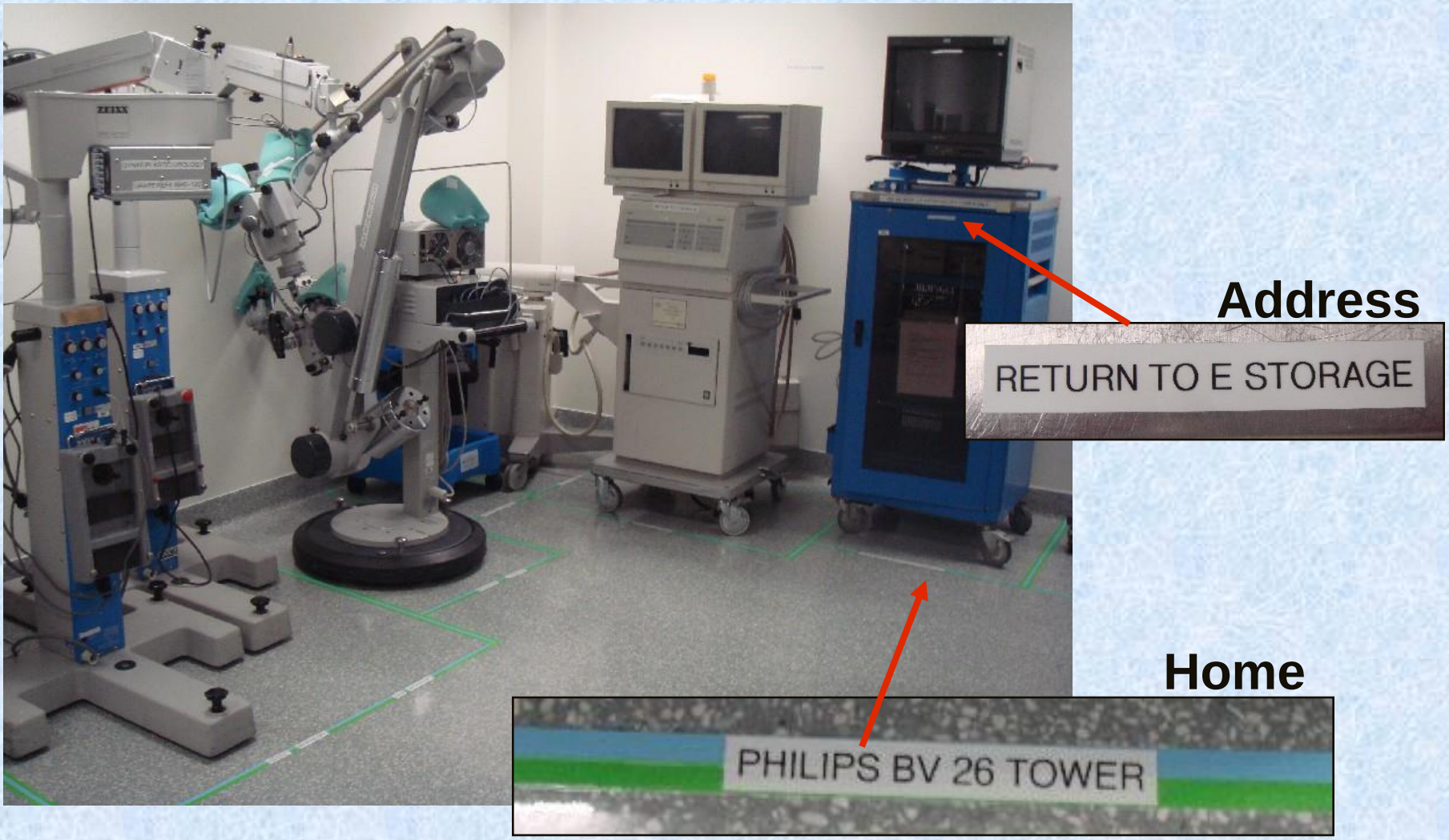
- A sign at the item's home. It should include:
  - Item name
  - Location
  - Picture/silhouette of item (opt.)

Item Label

- A sign on the item. It should include:
  - Name of item
  - Item's home location



Example of Home Address and Labels



SHINE (SWEEP)

Benefits of *Shine*

- Defects are easier to see in a well lit and clean environment
- A work area clean of debris is less likely to cause a tripping hazard
- Machines that are clean and maintained work more efficiently and breakdown less often
- A clean work area promotes improved morale

Shine...

Continuous upkeep and control of work area identifies problems and unacceptable conditions.

- ***SAFETY*** **- clear traffic lanes, mark hazardous material, report unsafe conditions, clean-up spills**
- ***WASTE*** **- empty overflowing trashcans, remove excess supplies on workbench**
- ***CLEANLINESS*** **- tools in designated spots, sweep floors**

Definition of *Standardize*

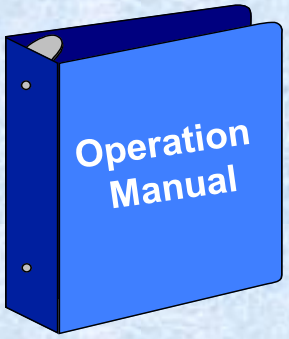
- Creating consistent work benches, work areas, containers, colors, documents and forms, etc. where the work or the purpose of use is the same.
- Creating a consistent way of implementing the tasks that are performed on a daily basis including “Sort,” “Set in Order,” and “Shine.”
- “Do the right things the right way, every time!”

Standardization is the foundation for continuous improvement

Standardize...

Defines how a task should be done and explains the best way to perform it.

- Document the methods, processes and guidelines for sort, set in order and shine
  - Visual controls guidelines
  - Item quantity requirements
- Document the schedule in which they are to be completed and reviewed
  - Housekeeping standards
  - Workplace arrangement methods



SUSTAIN

Definition of Sustain

- Sustain means that the 5S mentality is ingrained in everyday work life and procedures
- Sustain means that the 5S program has a discipline that ensures its continued success
- Sustain involves making a habit of maintaining correct methods and procedures

Don’t let 5S become another “flavor of the day.”

5S Summary

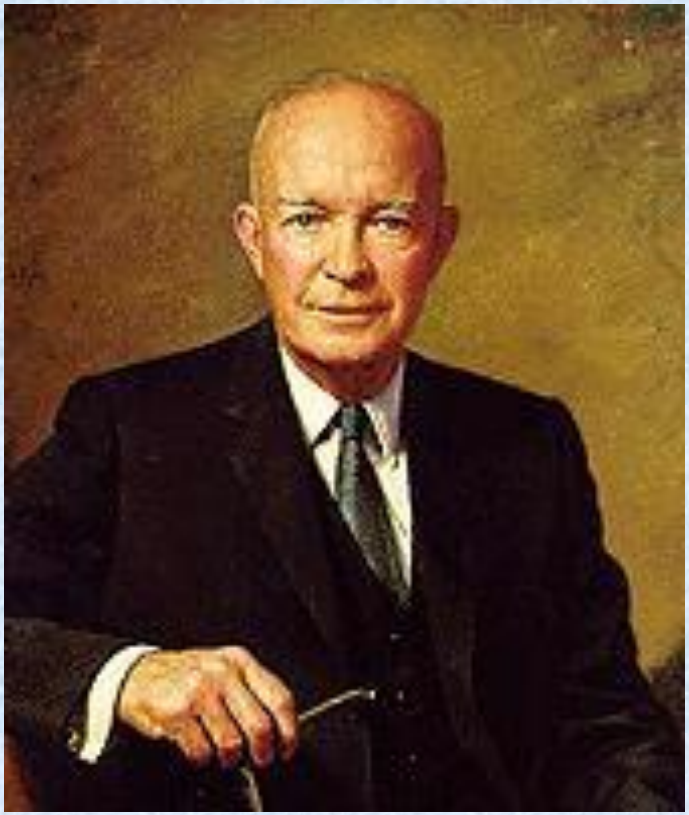
- 5S provides a systematic method for creating and maintaining an organized, clean, and high performing workplace.
- 5S is the foundation for continuous improvement, zero defects, cost reduction, and a safe work area.
- 5S enables anyone to distinguish between normal and abnormal conditions at a glance.
- 5S is a team oriented process between the members of the work area.
- 5S is accomplished by following all of the steps. DON’T SKIP A STEP!

Gemba and Lean Management

Go to the Process

"Farming looks mighty easy when your plow is a pencil and you're a thousand miles from the corn field."

- President Dwight D. Eisenhower



Roles in Driving Improvement

- Executive
- Middle Management
- Front Line Managers/Supervisors
- Support Functions
- Value Adding Employees

Leader Standard Work – *EXAMPLE*

Beginning of Shift	/ /	/ /	/ /	/ /	/ /	**Key Notes, Issues**
Daily Review **(beginning of each shift w/ outgoing Sup. & Support)**						
-Review process metrics *[quality, downtime, productivity]*						
-Review top Downtime and Quality issues and action items						
-Any critical material or equipment issues?						
-Staffing *[record initials of any staff out]*						
1st Floor Walkthrough						
- Verify all equipment running and downtime / quality logs in place						
- Verify all parts and tools in correct location per Material Location Plan						
Review T&A, Voicemails, Emails						
Hourly *(provide coaching / correction as needed)*						
Complete Standard Work Audit						
Are Quality and DT properly recorded and being addressed?						
Staff maintaining single-piece flow and following standard work?						
5S review (parts and tools correctly located and identified)						
End of Shift						
Review coaching forms completed by Seniors						
Update Process Metrics and review with support team						
Update Master Task List with support team						
Email Daily Status Summary to Management						
Weekly						
Crew meeting & metrics review with all staff						
Safety Team Meeting						

Supervisor Coaching Form – *EXAMPLE*

Standard Work Analysis - Coaching For Improvement
OR Cart Decontamination

Operator: _____ **Coach:** _____ **Date:** _____

Instructions

1.) Make sure the operators are doing the right steps in the right order and are working in one piece flow. Correct any deviations.
2.) Record the location and amount of any work in process inventory. If more than one in each location, determine why.
3.) Make sure all parts and tools are in the correct location per the Material Location Plan.
4.) Record the total time the operator spent performing the work. Walking time is included in the total standard time.

5.) Let the operator know their cycle time compared to standard. Tell them where and why they are faster or slower than standard. If an inspection step is faster than standard, let the operator know they need to take the time necessary to properly inspect and clean and can spend more time if needed.
6.) If the operator is slower than standard, determine if they are doing steps in the wrong order, adding extra steps, or if they are spending too much time on one particular step. Work with the operator to bring each step into standard time.
7.) Give feedback and encouragement!

OR Instrument Decontamination

Step	Description	Time	Total
1	Get cart and remove cover	21	21
2	Collect items for hand washing and set aside, place disposables into recycle bin	96	117
3	Move first tray to "T" and throw away any garbage	3	120
4	Inspect insturments and set any dirty or cannulated into right-hand sink	30	150
5	Place pan into left-hand sink, agitate, and remove any floating debris	5	155
6	Repeat steps 3-5 for 2nd tray	38	193
7	Brush / Flush items from right-hand sink and place into pan in left-hand sink as cleaned	0	193
8	Load pans onto 444 rack	0	193
9	Repeat steps 3-8 for remaining pans (2 pans at a time if they fit in sink together)	0	193
10	Load 444 rack onto washer conveyer	0	193
11	Load rigids onto cart wash rack and load cart wash	0	193
12	Wipe down cart, fill sinks, push cart out, and record output on DBTH paper	0	**193**

What if Standard Work is not being followed?

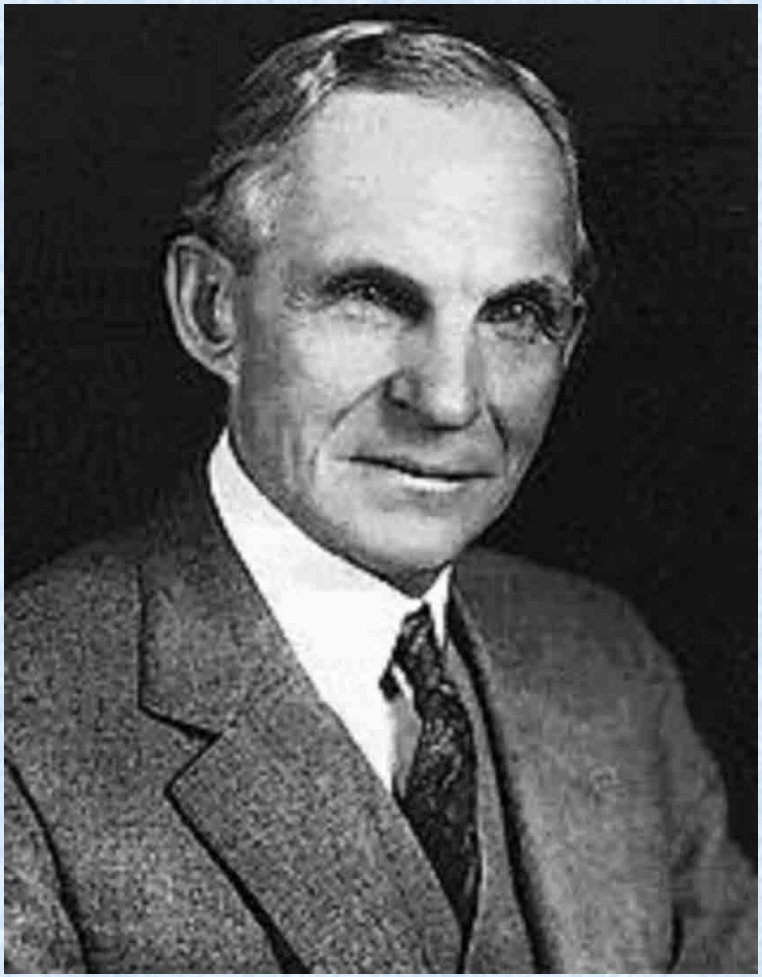
- Is the standard work appropriate?
- Are the right tools, equipment, and materials in place and of appropriate quality?
- Is the person following the steps and sequence?
- Has the person had adequate practice in the operation?
- Is the person physically unable to meet the standard? (Can't or won't do it?)

Testing New Boundaries

- People will test new concepts and leadership's commitment
- Some challenges will not be immediately visible beyond the front-line
- Give team leaders a measure of authority
  - Ensure that team leaders have the interpersonal skills to handle conflict
  - Team leader must be calibrated to Supervisor's expectations
  - Team leader's feedback must be sufficient grounds for Supervisor to administer discipline without having had direct observation
  - Supervisor must follow up on team leader's comments

Leadership is Key

- Success requires aligned and supportive leadership
- Leaders must:
  - Own and champion the new process; demonstrate visible, public, and active sponsorship
  - Invest their personal time and attention to follow through on actions to ensure success
  - Be known as advocates; take initiative and challenge the status quo
  - Act as role models of new behavior



“The burden of it all is on the shoulders of management. Labor works along under any system.”

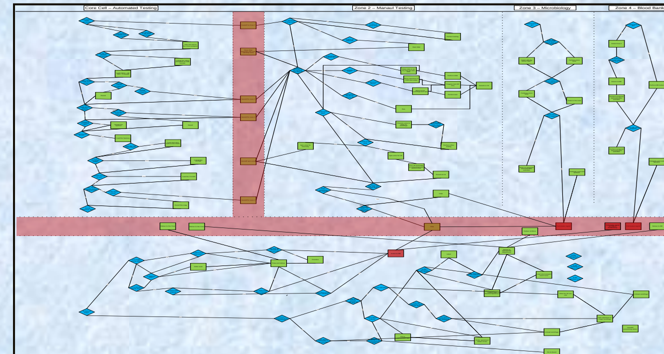
Process Change How to get there…

Where to start with standard work

Decision Tree

Myth: Lean will make me robotic

Similar to a process flow diagram, but with a greater focus on the intellect of the front line staff members. Drive for a system that would allow the same decision to made, given the same education and available information



Turn the staff intellect into quantifiable expectations

Job Guidance Sheets

Each decision results in action. Actions can be quantified into expected time for completion. The required actions to perform an operational process enables standard work and the corresponding time needed.

Institution Name:	Example Hospital	[illegible]	1/8/2007
Institution Location:	Main Street	Current Revis[illegible]	Base
Process Description:	Core Lab	Previous Revision Le[illegible]	n/a

JOB GUIDANCE SHEET

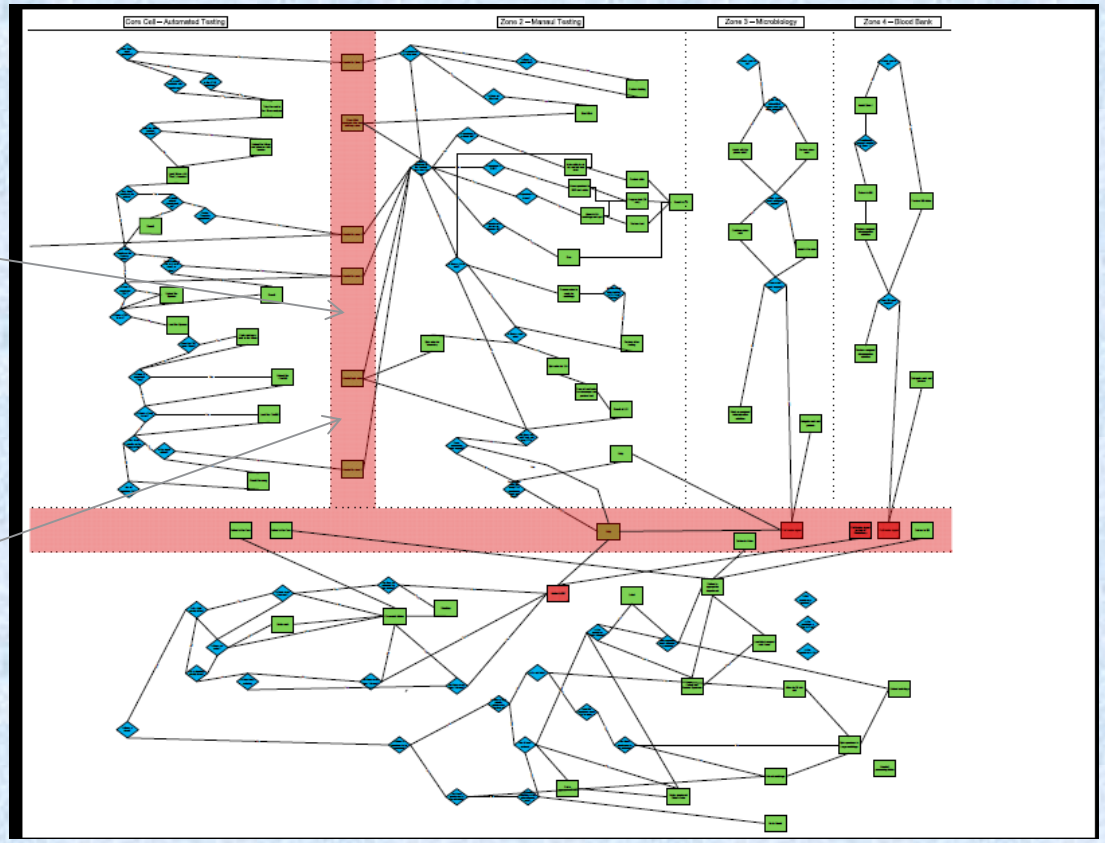
Station #	JOB STEP	DESCRIPTION OF JOB CONTENT	CODE	ESTIMATE	Number of Units and/or Cycles Between Periodic Operations	Seconds per unit or cycle	Hr:Min:Sec per unit or cycle	Hr:Min:Sec per demand period	Tools, or Supplies to be Used During Job Step	Key Quality and Safety Pointes	Labor RW	LABOR VA	MACHINE VA	OTHER VA	MACHINE NVA	PURE WASTE (PW)	NECK
PROCESS TYPE			Analysis Information (Process Type, Estimated Time, and Frequency)			OPERATOR TIME: Cumulative Operator Time			PROCESS CATEGORY		BASIC TIME REQUIREMENTS						
											Sec	Sec	Sec	Sec	Sec	Sec	
											836	226					0
											0:13:56	0:03:46					
1	1	UNLOAD TRAY FROM FUSION	UL	4		4	0:00:04	1:20:24			4						
1	2	PUT TRAY ON BENCH	MH	2		2	0:00:02	0:40:12			2						
1	3	UNLOAD SAMPLES FROM TRAY	MAN	15		15	0:00:15	5:01:30			15						
1	4	CAP SAMPLES	MAN	7		7	0:00:07	2:20:42			7						
1	5	FILE SAMPLES IN RACK	MH	10		10	0:00:10	3:21:00			10						
1	6	RECEIVE SAMPLE	MH	2		2	0:00:02	0:40:12			2						
1	7	PICK UP SAMPLE FROM RACK	MH	2		2	0:00:02	0:40:12			2						
1	8	INSPECT SAMPLE	I	5		5	0:00:05	1:40:30			5						
1	9	UNCAP SAMPLE	MAN	3		3	0:00:03	1:00:18			3						
1	10	DISCARD CAP	MAN	1		1	0:00:01	0:20:06			1						
1	11	LOAD SAMPLE ON RACK	MAN	5		5	0:00:05	1:40:30			5						
1	12	LOAD RACK ON FUSION	LD	4		4	0:00:04	1:20:24			4						
1	13	PRESS START	CYCLE	3		3	0:00:03	ew			3						
1	14	WALK TO CRT	WK	4		4	0:00:04	1:20:24			4						
1	15	VERIFY RESULTS	VA	12		12	0:00:12	4:01:12				12					
1	16	WALK TO FUSION	WK	10		10	0:00:10	3:21:00			10						
1	17	CHECK SAMPLE STATUS ON FUSION	COMP	12		12	0:00:12	4:01:12			12						
1	18	DAILY MAINTENANCE AND QC	MAN	600	1000	1	0:00:01	0:12:04			1						
1	19	WEEKLY MAINTENANCE	MAN	900	6000	0	0:00:00	0:03:01			0						
1	20	MONTHLY MAINTENANCE	MAN	2700	25800	0	0:00:00	0:02:06			0						
1	21	REPEAT SAMPLES	MAN	101	25	4	0:00:04	1:21:12			4						
1	22	CALIBRATIONS (3/WEEK)	MAN	3600	6000	1	0:00:01	0:12:04			1						
2	23	WALK TO CENTAUR DROP OFF	WK	4		4	0:00:04	0:09:04			4						
2	24	UNLOAD FROM CENTAUR	UL	3		3	0:00:03	0:06:48			3						
2	25	WALK TO BENCH	WK	8		8	0:00:08	0:18:08			8						
2	26	UNLOAD SAMPLES FROM RACK	UL	5		5	0:00:05	0:11:20			5						
2	27	RECAP AND FILE SAMPLE IN DONE RACK	PT	24		24	0:00:24	0:54:24			24						
2	28	PICK UP NEW SAMPLE FROM RACK	MH	3		3	0:00:03	0:06:48			3						
2	29	UNCAP SAMPLE	MAN	11		11	0:00:11	0:24:56			11						
2	30	INSPECT SAMPLE	I	10		10	0:00:10	0:22:40			10						
2	31	DISCARD CAP	MAN	1		1	0:00:01	0:02:16			1						

Decision Tree

Decisions result in actions – The actions can be standardized and quantified for measurement. Measures are needed for improvement to be realized.

Identifies process handoff areas – Most common place for error to occur

Handoff points are key areas for a visual cue



Preparation of the Job Standardization Package using the actions identified in the Decision Tree

- Setting the Stage:
  - Based on an experienced, proficient operator (NOT Average)
  - Developed through a team approach
    - Operators
    - Supervisors
    - Engineers
- Building the Package
  - Validate the Decision tree. Determine Job Steps and sequence
  - Categorize each Job Step by code and estimate the time for each Job Step from analysis
  - Identify if the step requires special tools or parts
  - Describe key quality and safety points
  - Provide diagrams or pictures as necessary

Evolution of Standard Work

- Analyze current state
- Draft Job Standardization Package
  - Steps, Sequence, Times, Quality & Safety Points
  - Material Location Plan (Parts, Tools, & Equipment)
  - Verify against observation, experience, and procedures
- Conference Room Pilot
- “Real World” Mock-up
- Full pilot
  - Introduce real product with heightened Quality Assurance during validation
- Full implementation

Review and revise JSP after each step

Standard Work System

- Benefits of Standardized Work:
  - Provides workers a means to define their jobs
  - Provides consistency between operators and shifts
  - Avoids unnecessary motion and wasted effort
  - Assures safety
  - Assures quality
  - Reduces costs
  - Easier to learn new operations
  - Easier to shift to different operations within a process, or to shift to other processes or work areas
  - Easier to see problems and contribute improvement ideas
  - Foundation or baseline for improvement

I’ve got standard work…now what???

5S

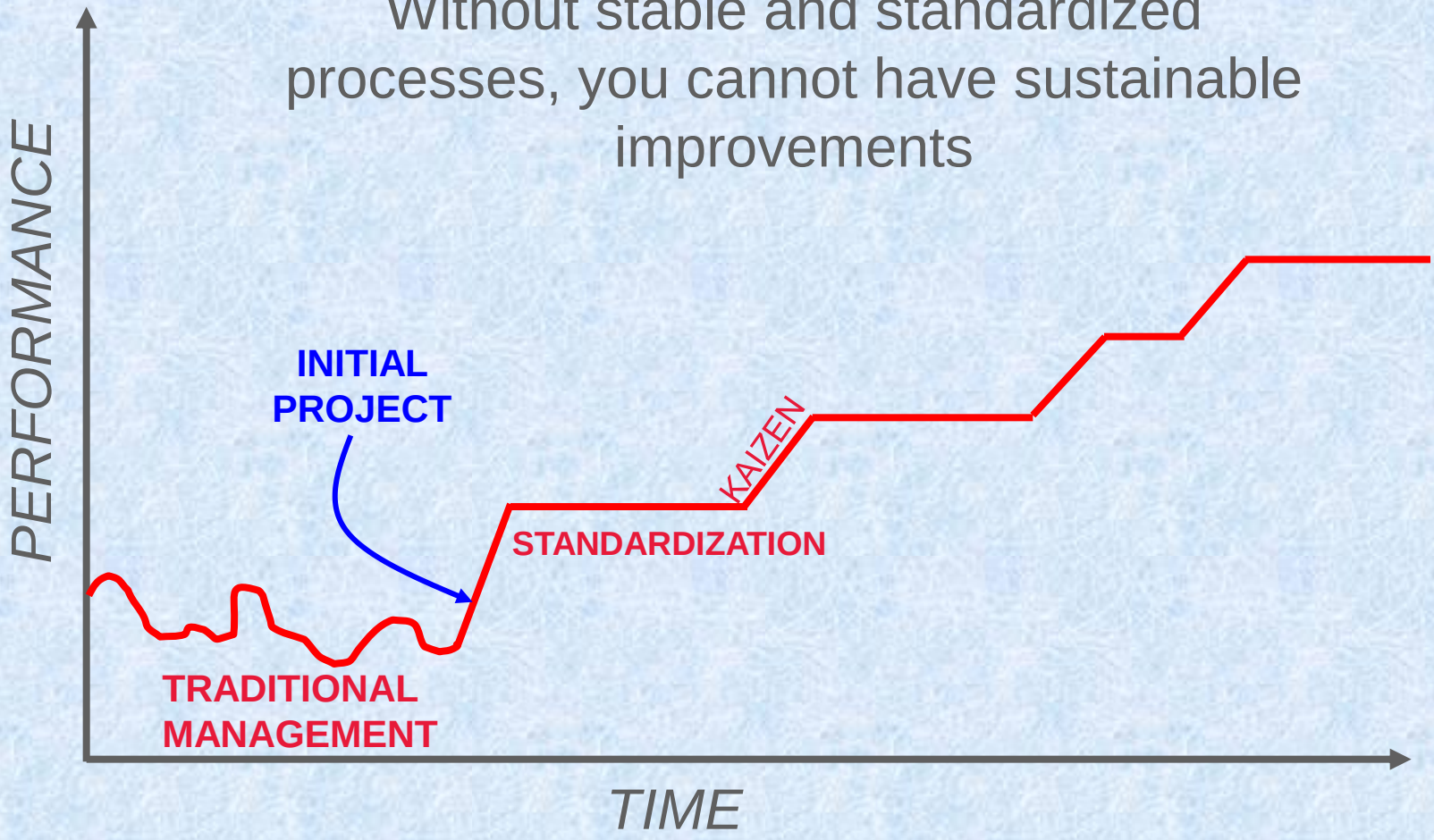
Ensure the laboratory is ready for the standards to be implemented and controlled. Right parts and tools at the right time when needed.

Visual Management

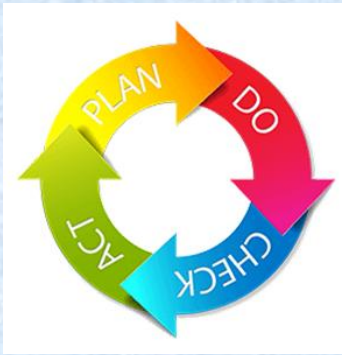
Visual controls need to be clear and apparent to anyone in the lab. The controls will not only support the operation, but be a critical tool to sustain the standard and recognize the variation.

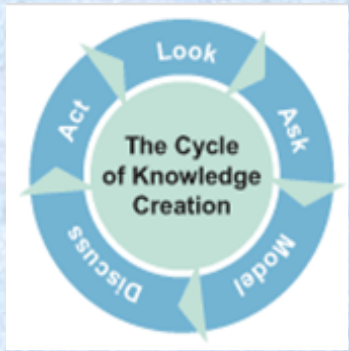
Kaizen: Continuous Improvement

Without stable and standardized processes, you cannot have sustainable improvements



A3 Problem Solving





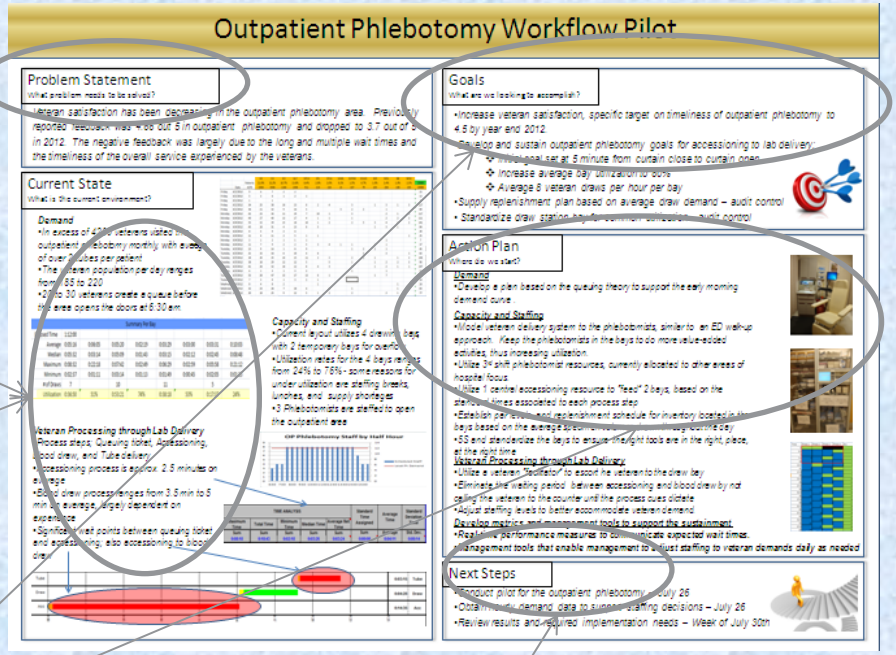
Define the problem...

Measure the current state

Analyze the root cause with supporting data

Improve the process by changing or eliminating the cause

Control the change for sustained gains



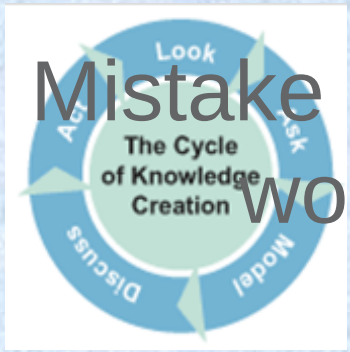
A3 Problem Solving

Don't get hung up on the name of the methodology, but rather the purpose of the thought process…

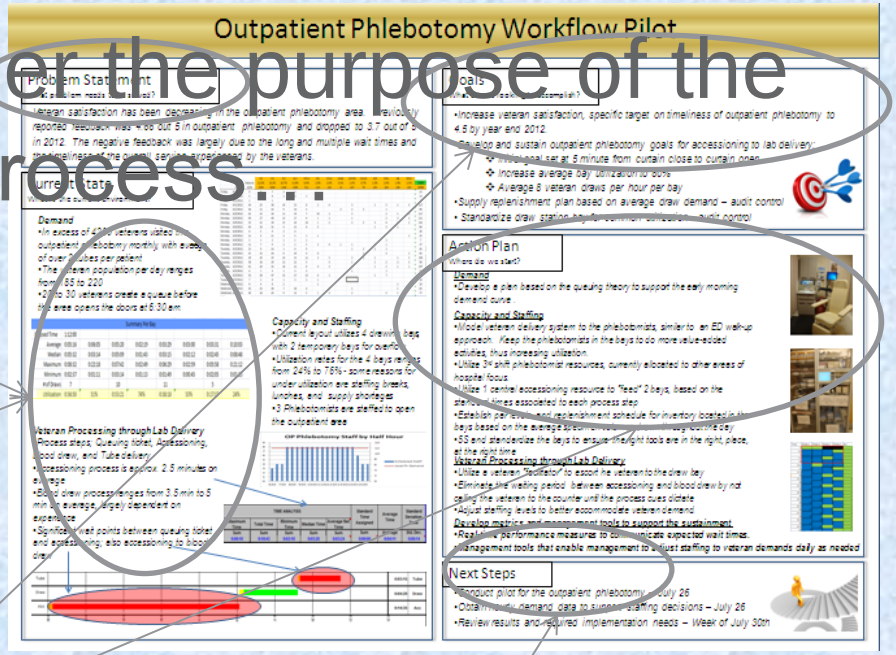
Define the problem…

Measure the current state

Analyze the root cause with supporting data



Improve the process by changing or eliminating the cause



Control the change for sustained gains

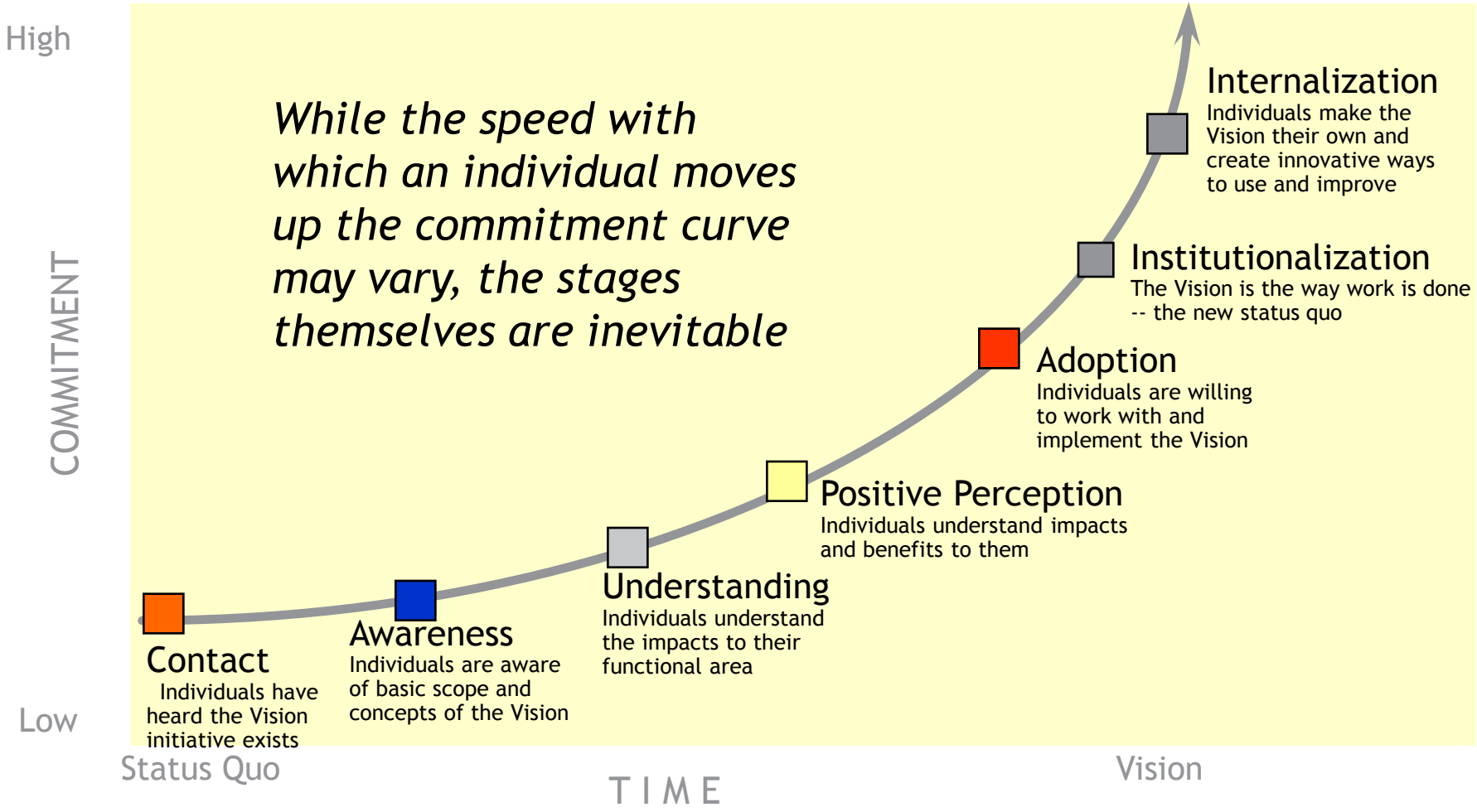
Mistake proofing is possible through standard work and continuous improvement

Kaizen Philosophy

- Everyone must contribute to change
- Most improvements require little or no cost
- Change is necessary to remain competitive
- Many small improvements far outweigh that of a few major changes over time
- Continuous improvement is a long-term cultural change
- *Do not let the pursuit of perfection stop progress*

Commitment Curve

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



As Leaders…

- To encourage kaizen:
  - Encourage people to report problems, waste, and frustrations
  - Challenge them to come up with solutions
  - "How would you fix that?"
  - Ask for root cause solutions
  - Don't be satisfied with surface fixes
    - Ex: Tube is missing, delivered to wrong department
    - Don't just "get the tube" and be done
    - Analyze what went wrong and why
    - Put root cause solution in place
  - Don't respond negatively to ideas, there are no "dumb" ideas
    - Ex: If a suggestion is bad or not practical, acknowledge the effort and ask questions, guide to a better solution

Open Discussion & Questions