



Modern Continuous Improvement Methods to Improve Seaport Velocity and Productivity

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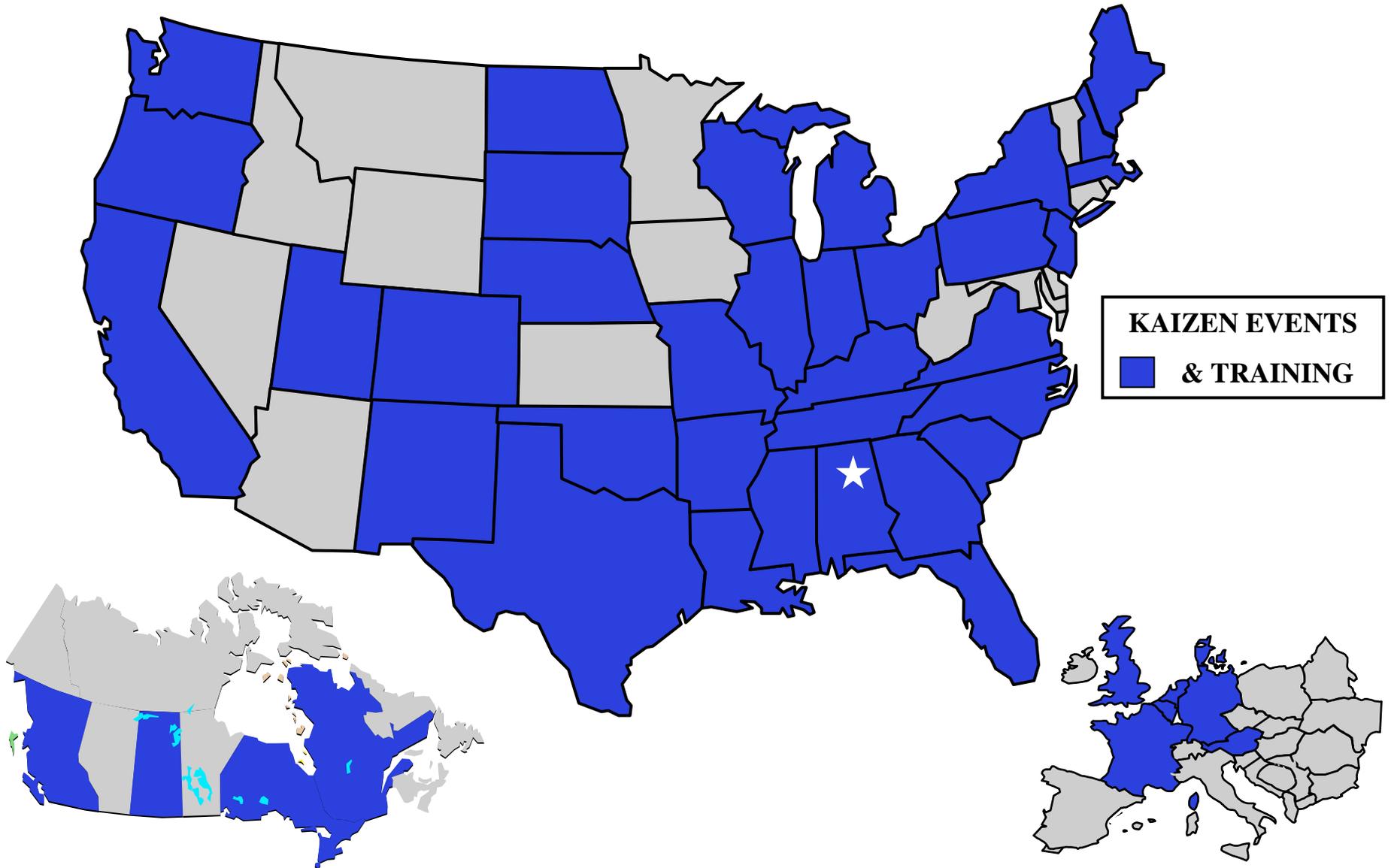
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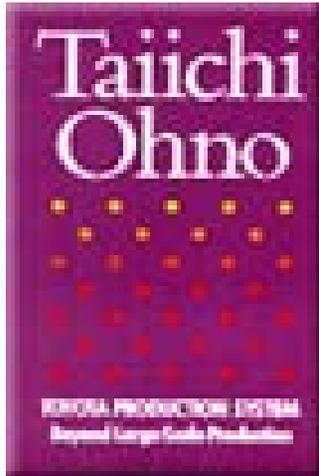
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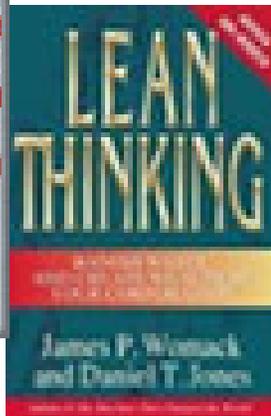
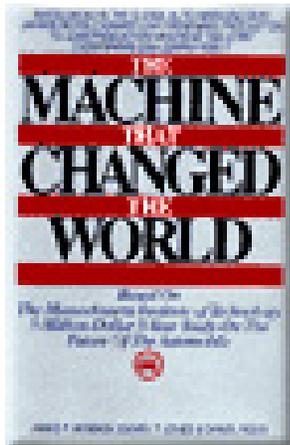
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Where Did “Lean” Come From?



The Toyota Production System by Taiichi Ohno

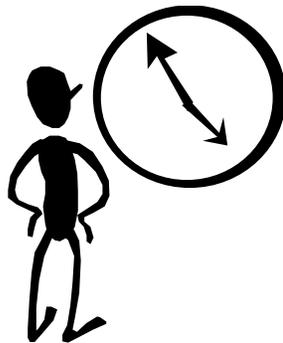


The Machine That Changed the World and Lean Thinking by Jim Womack and Dan Jones

Lean Enterprise Objective

*All we try to do is “reduce the timeline from the moment a customer places an order to the point the customer receives what they want (and the company collects cash) by removing non-value-added activities (or waste)”– Taiichi Ohno, *The Toyota Production System**

SATISFY THE CUSTOMER BY...



COMPRESS TIME



IMPROVE QUALITY



REDUCE COST

The Case for Port Improvement:

The need for efficient travel and transfer of goods between overseas ships and domestic trucks, trains, and barges has accelerated due to:

- Increase in world population
- Nations increasingly becoming more industrialized
- Heavier reliance on world trade

The Case for Port Improvement:

The Data:

- Foreign trade accounts for 22% of the U.S. Gross Domestic Product
- 95% of this trade is moved by ships (*USDOT*)

Trends:

- North American port volumes have increased by an average of 7% per year since 1990
- It is estimated that most major ports are already operating near capacity, and some reports are predicting port volumes to double by 2020

(Transportation Journal)

Why Lean at Ports?

To increase port capacity without significant investment in new resources, we must:

■ **Flow material through at a faster rate**

- Unload more efficiently when it arrives
- Manage material more efficiently while we store it
- Load more efficiently when it departs

Why Lean at Ports?

Past: Price set by provider

$$\text{Operating Cost} + \text{Profit} = \text{Price}$$



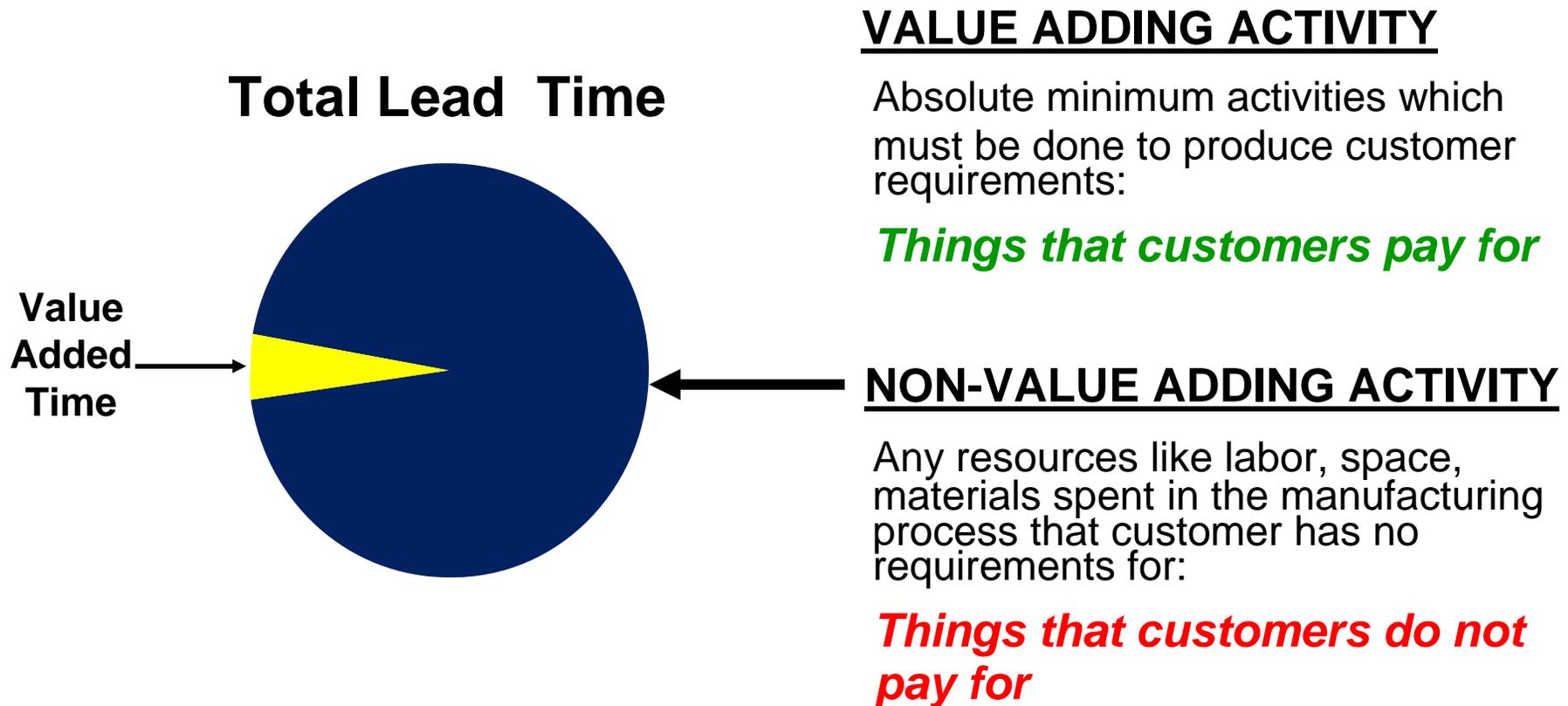
Today: Price set by market

$$\text{Price} - \text{Operating Cost} = \text{Profit}$$

The key to truly reducing operating cost is to simplify processes by eliminating non-value-added steps (waste)!

“Learning to See”

Every process has wastes...the key lies in seeing it



Typically 95% of Total Lead Time is Non-Value Added!

8 Deadly Wastes

- **D**efects
- **O**verproduction
- **W**aiting
- **N**ot Utilizing People's KSAs
- **T**ransportation
- **I**nventory
- **M**otion
- **E**xcess Processing



Waste of Defects



Waste of Defects



Waste of Overproduction



Waste of Waiting



Waste of Waiting



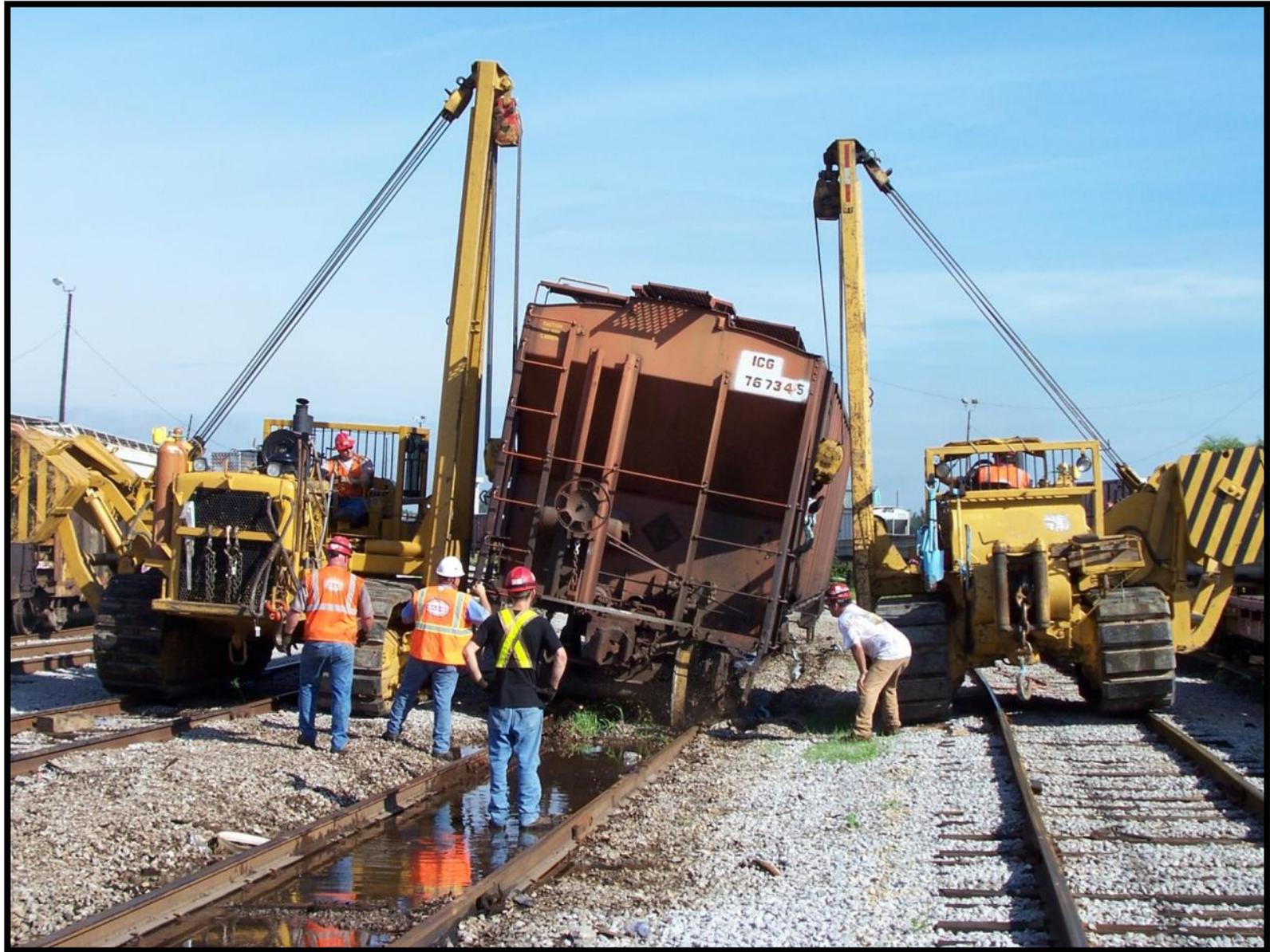
Waste of Waiting



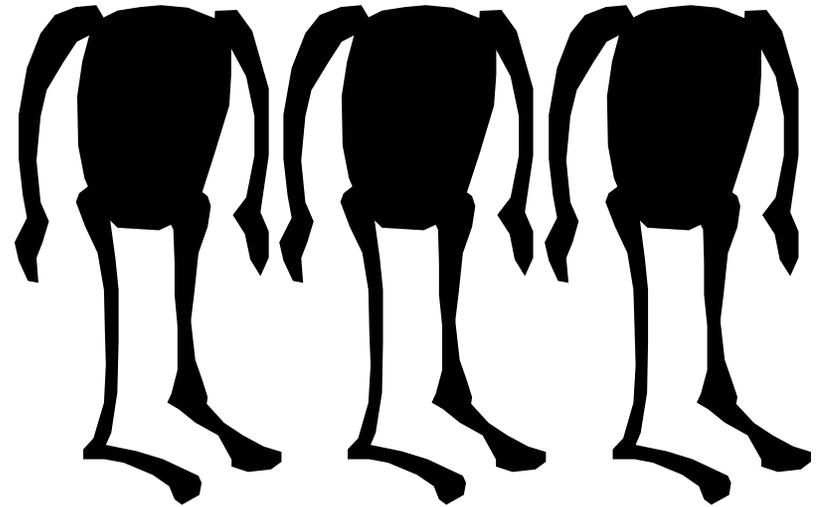
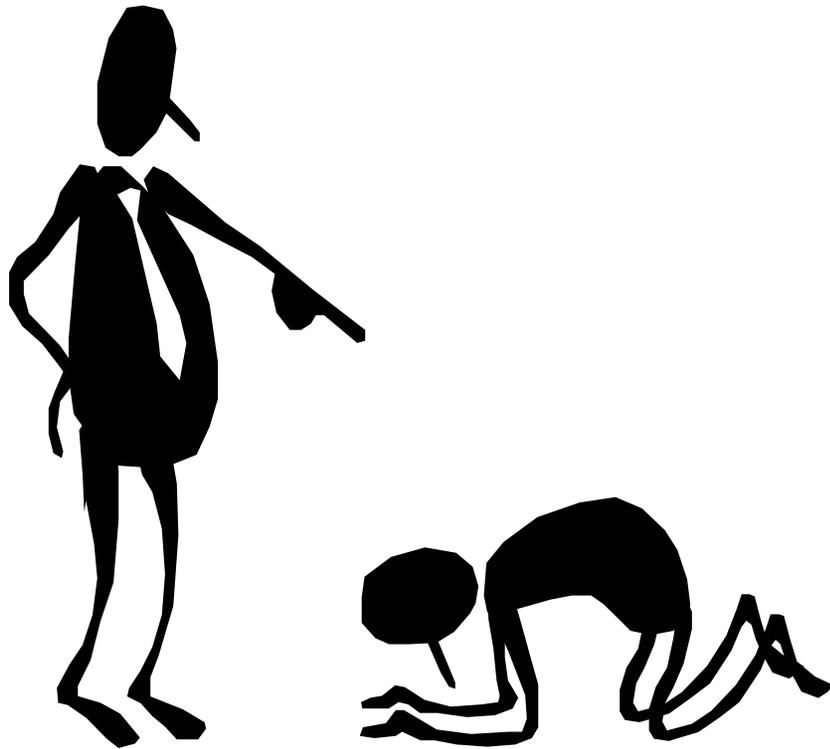
Waste of Waiting



Waste of Waiting



Waste of Not Using People's KSAs



Waste of Transportation



Waste of Transportation



Waste of Transportation



Waste of Inventory



Waste of Inventory



Waste of Inventory



Waste of Inventory



Waste of Inventory



Waste of Motion



Waste of Motion



Waste of Motion



Waste of Motion



Waste of Motion



Waste of Excess Processing



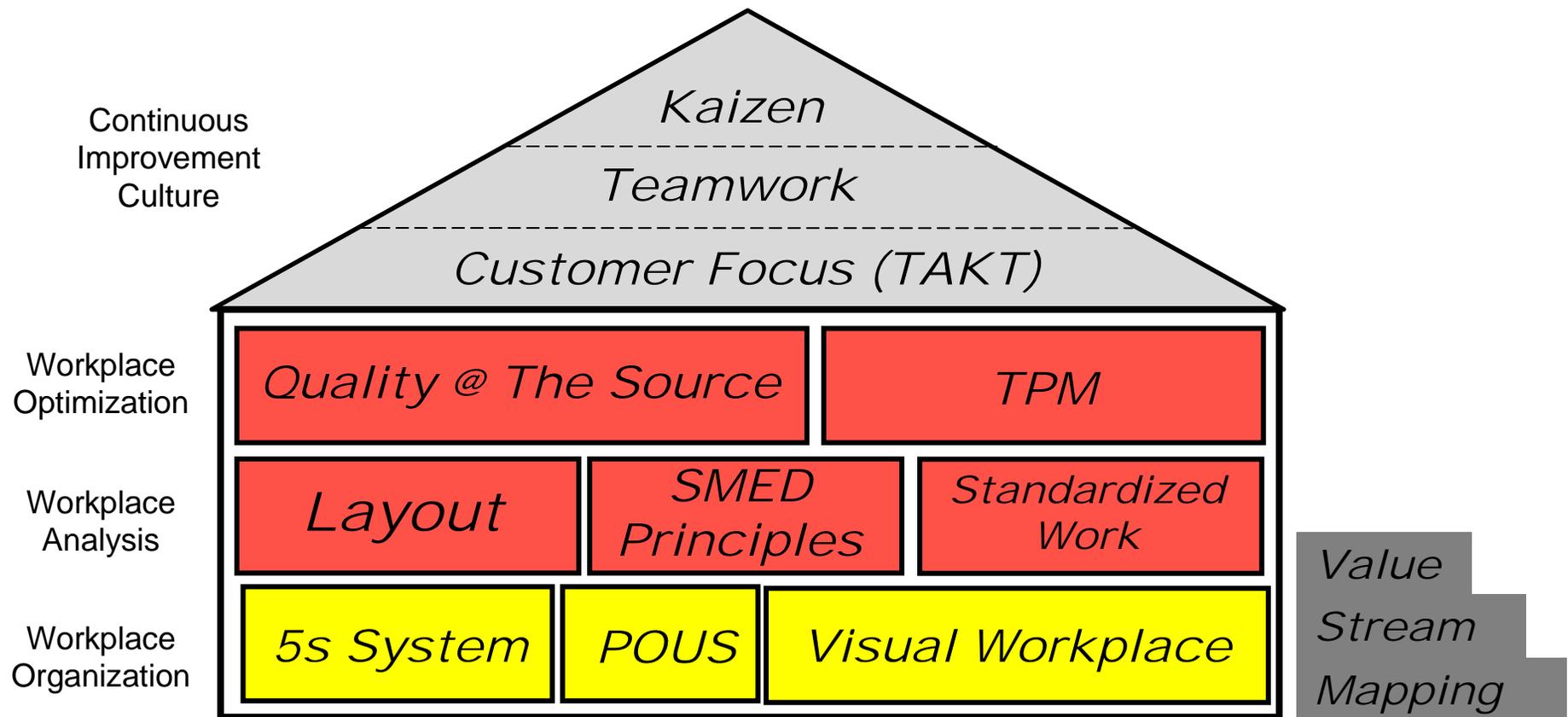
Waste of Excess Processing



Waste of Excess Processing



UAH Lean Enterprise for Port Operations



Workplace Organization Tools

■ **5S**– (**S**ort, **S**et-in-Order, **S**hine, **S**tandardize, **S**ustain)

- A safe, clean, neat, arrangement of the workplace provides a specific location for everything, and eliminates anything not required

■ **Point-of-Use-Storage (POUS)**

- Locate items necessary to perform job activities *where they are used* (Tools, materials, supplies, equipment, and information)

■ **Visual Workplace**

- Simple, self-explanatory signals that give immediate and accurate understanding of a situation or condition

Tools and Equipment at the Point of Use

Tools and equipment located exactly where needed



Materials and Supplies at the Point of Use

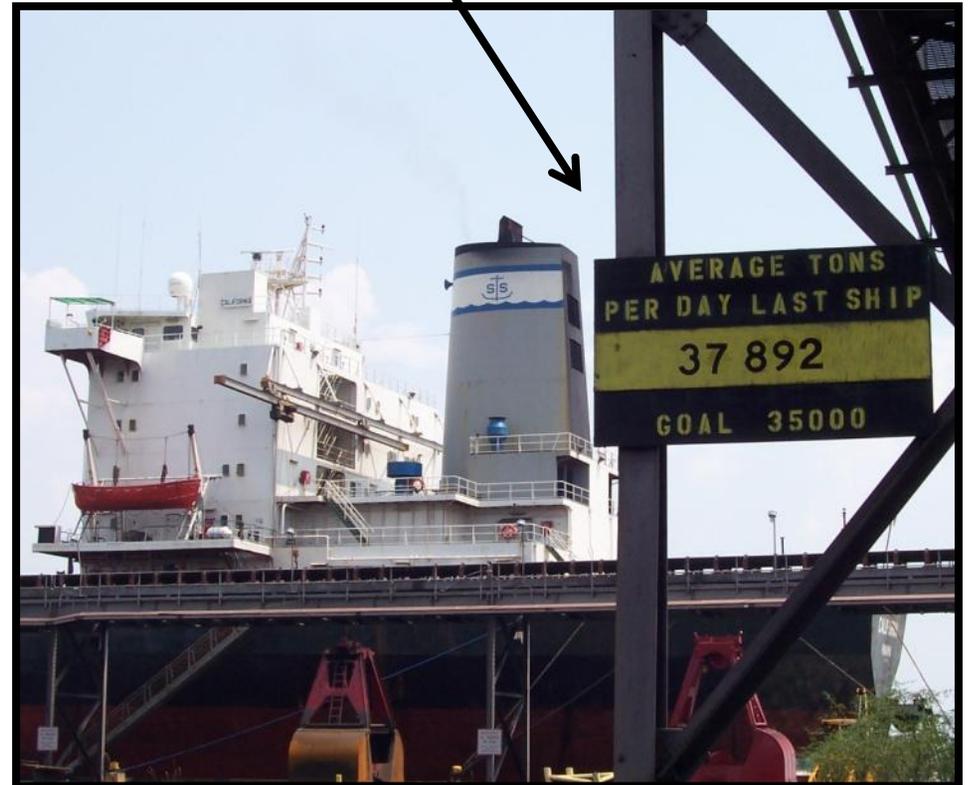


Information at Point of Use



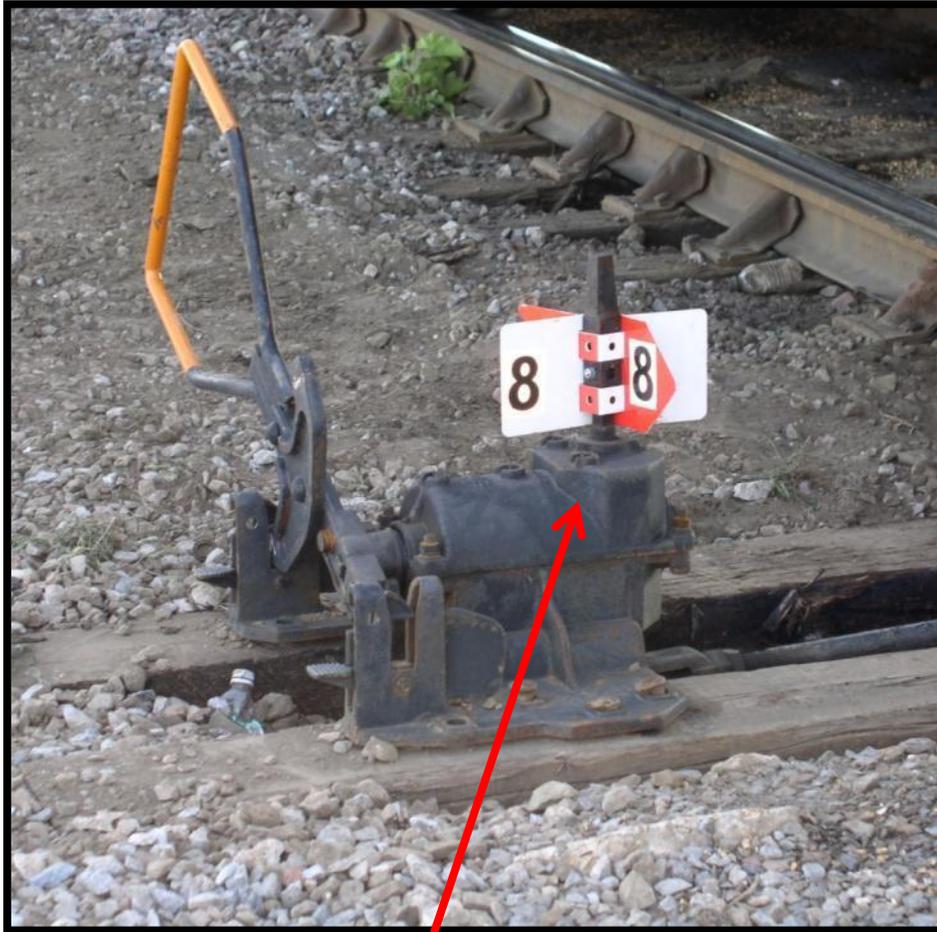
Work Instructions

Ship unloading status



AVERAGE TONS
PER DAY LAST SHIP
37 892
GOAL 35000

Visual Identification



Equipment
Identification

Product
Identification



Visuals: Outlining and Labeling



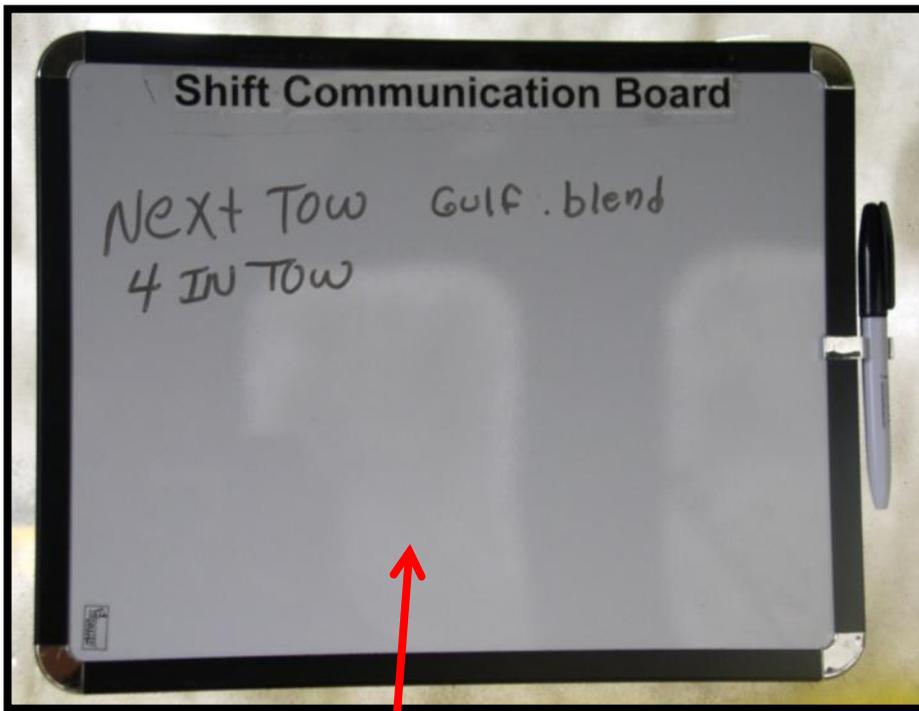
Painted parking locations to ensure adequate space for loading

Outlined location with labeling

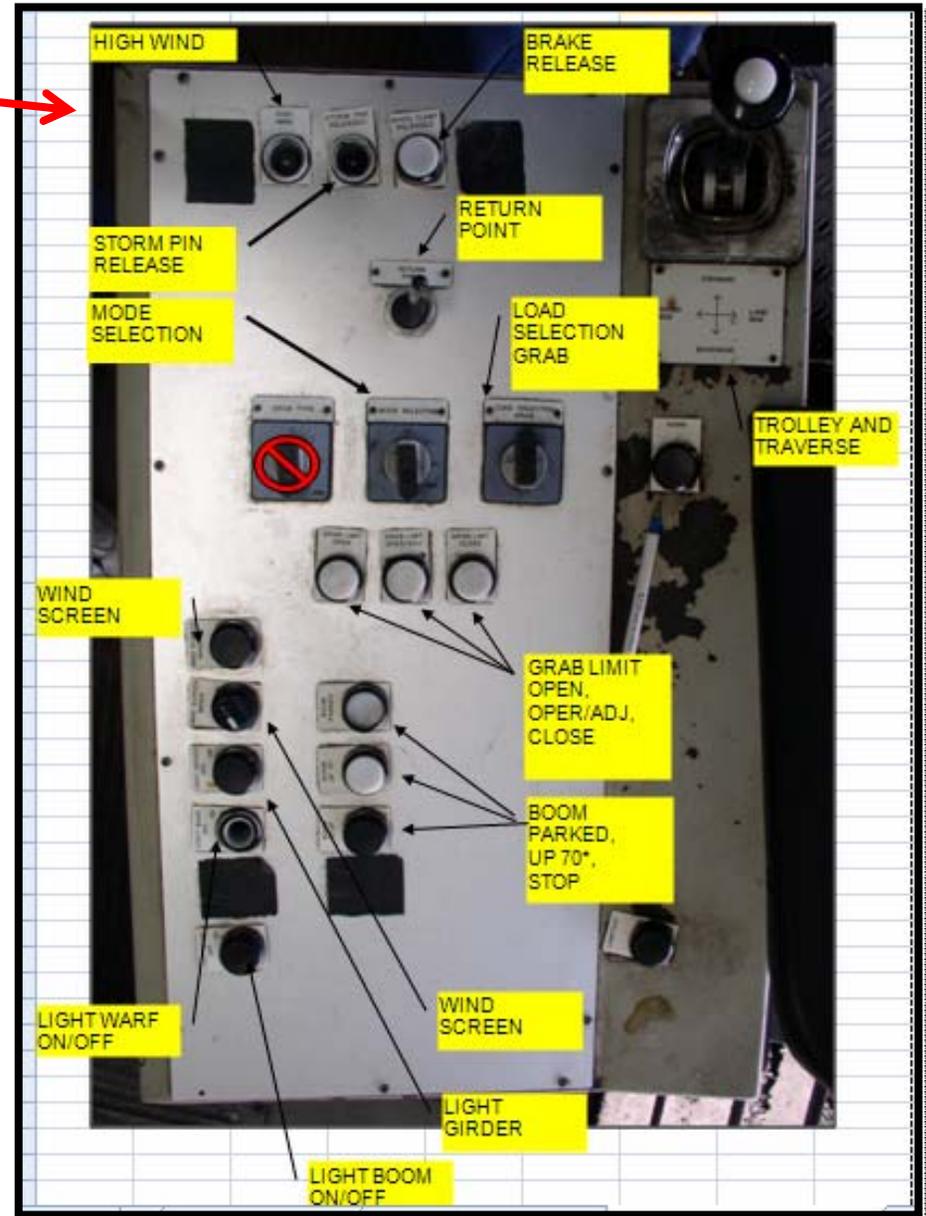


Visual Communication

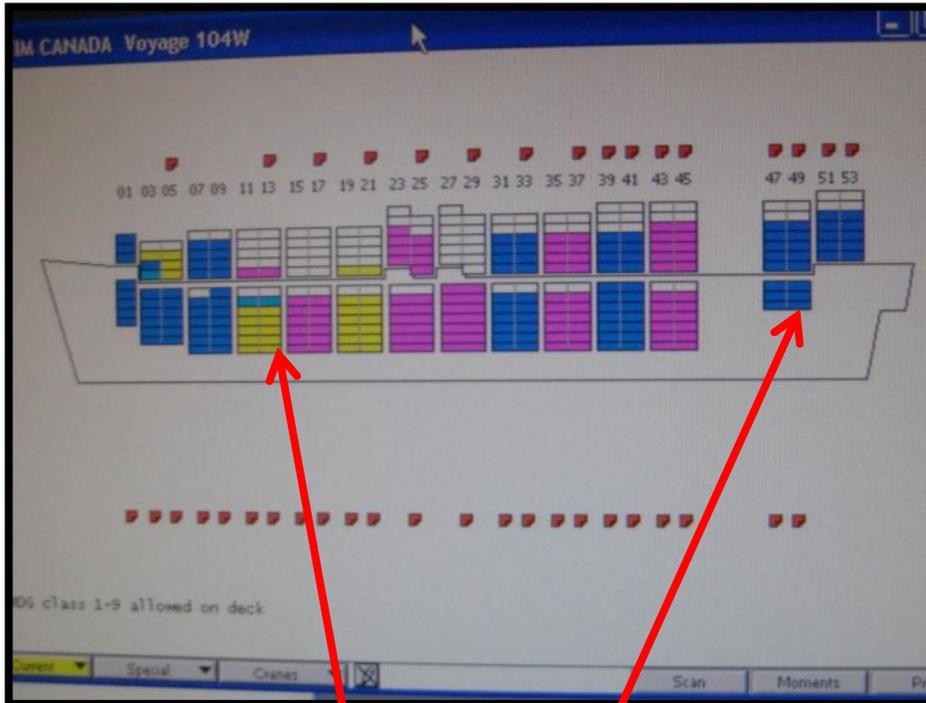
Visual aids for crane controls



Visual communication board

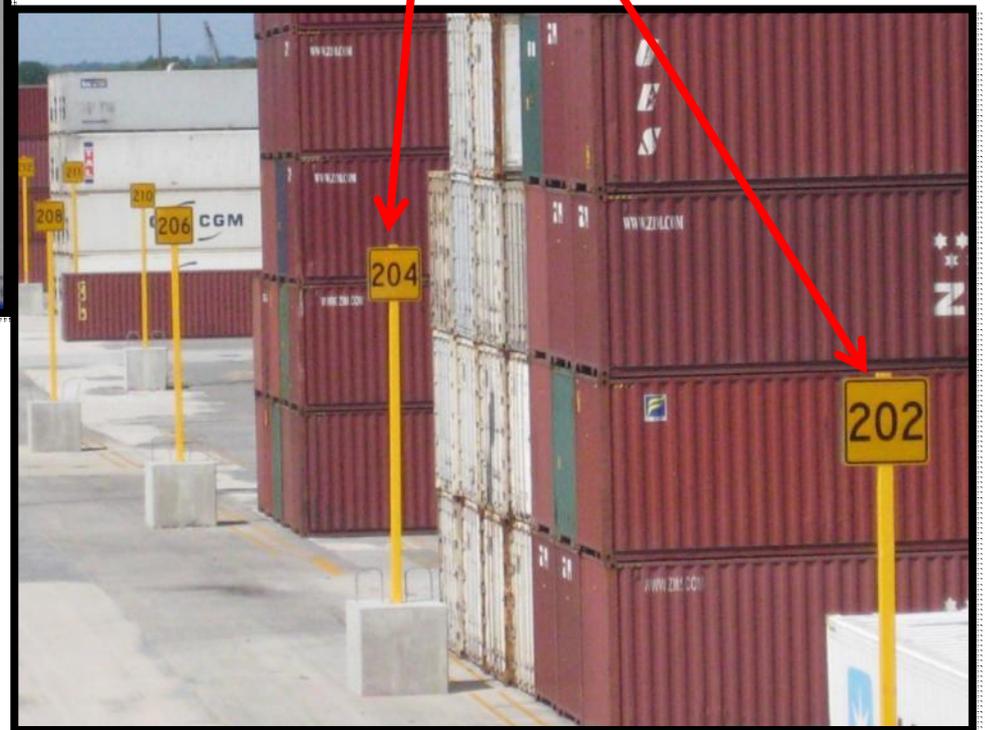


Visual Workplace



Color-coding cargo by destination

Clearly marked yard locations



Truck Loading Procedures

8. When loading is complete do a load check verifying: correct product was loaded, load is tight and can be transported safely, loaded in proper order to minimize customer movement. **Note:** on Roll tight trailers roll canopy from front to back ensuring there are no obstructions interfering with canopy movement

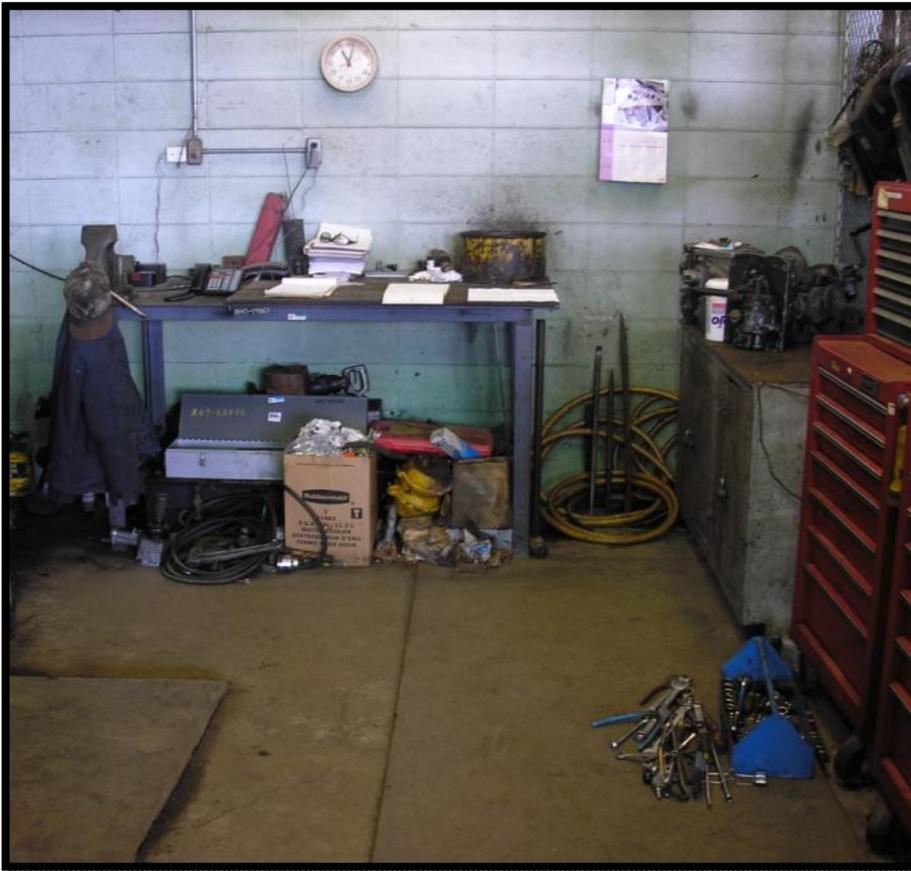


9. Sign paperwork, turn it in to office, and pick up next assignment

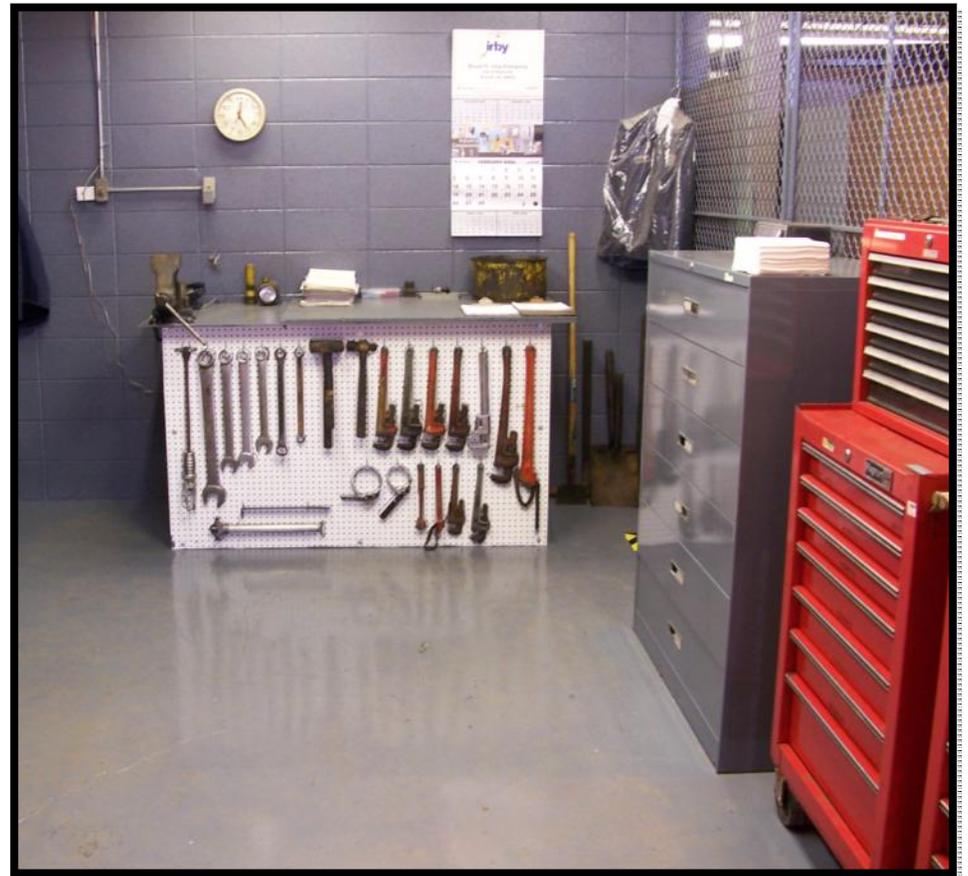
	Raise Bridge	Lower Bridge
1		
2		
3	1 Turn Control Key to an Parition	1 Using Marine radiotele draw bridge in clearing for rail traffic (wait 15 seconds for response)
4	2 Switch Emergency stop to run parition	2 Turn Control Key to an Parition
5	3 Switch Railway signal to stop	3 Switch Emergency stop to run parition
6	4 Switch Machine brake to release	4 Switch machine brake to release
7	5 Switch Span Locks to Pull parition (allow 15 seconds for locks to release)	5 Switch Span Locks to Pull parition (allow 15 seconds for locks to release)
8	6 Switch span operate to raise	6 Switch span operate to lower parition
9	7 Press horn button for 5 seconds	7 Press horn button for 5 seconds
10	8 Press run button and release	8 Press run button and release
11	9 Bridge raises, stops automatically and orange light signals bridge is fully raised	9 Bridge lowers, stops automatically and white light signals bridge is fully lowered
12	10 Once bridge is raised switch Span operate and span locks to neutral parition	10 Switch span locks in the drive parition (allow 15 seconds for locks to engage)
13	11 Switch machine brake to set	11 Switch railway signal to clear (should get green light on top of bridge tower)
14	12 Switch Emergency stop to stop parition	12 Switch Span operate and span locks to neutral parition
15	13 Switch control key to off	13 Switch machine brake to set
16		14 Switch Emergency stop to stop parition
17		15 Switch control key to off

Workplace Organization

Before



After



Workplace Organization

Before



After

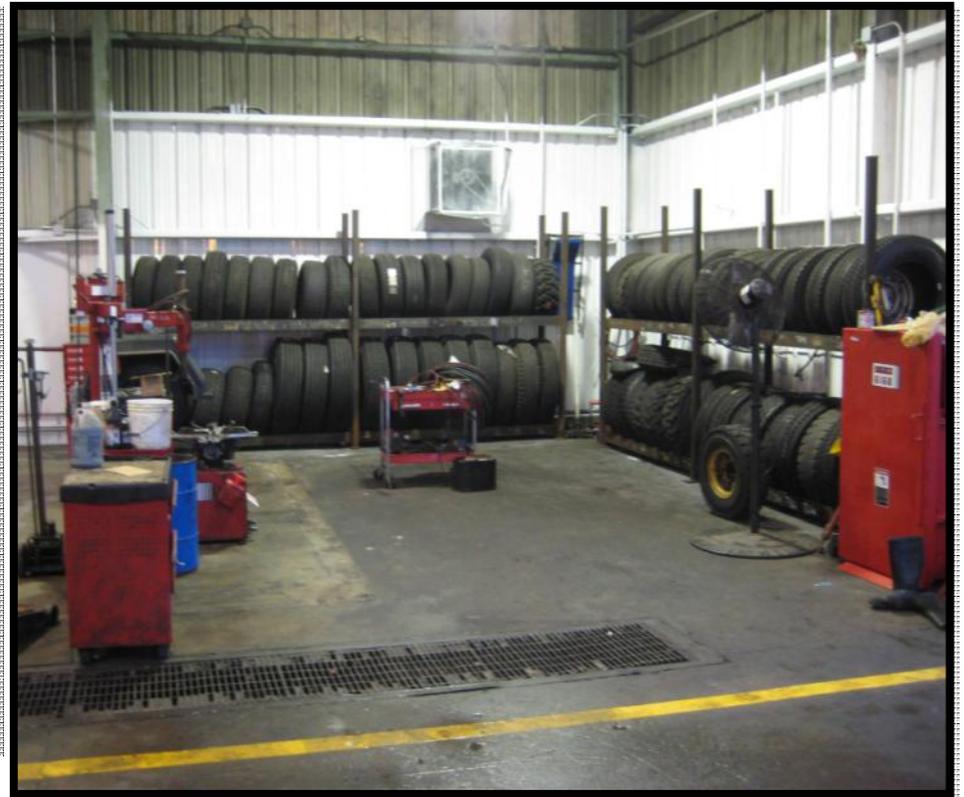


Workplace Organization

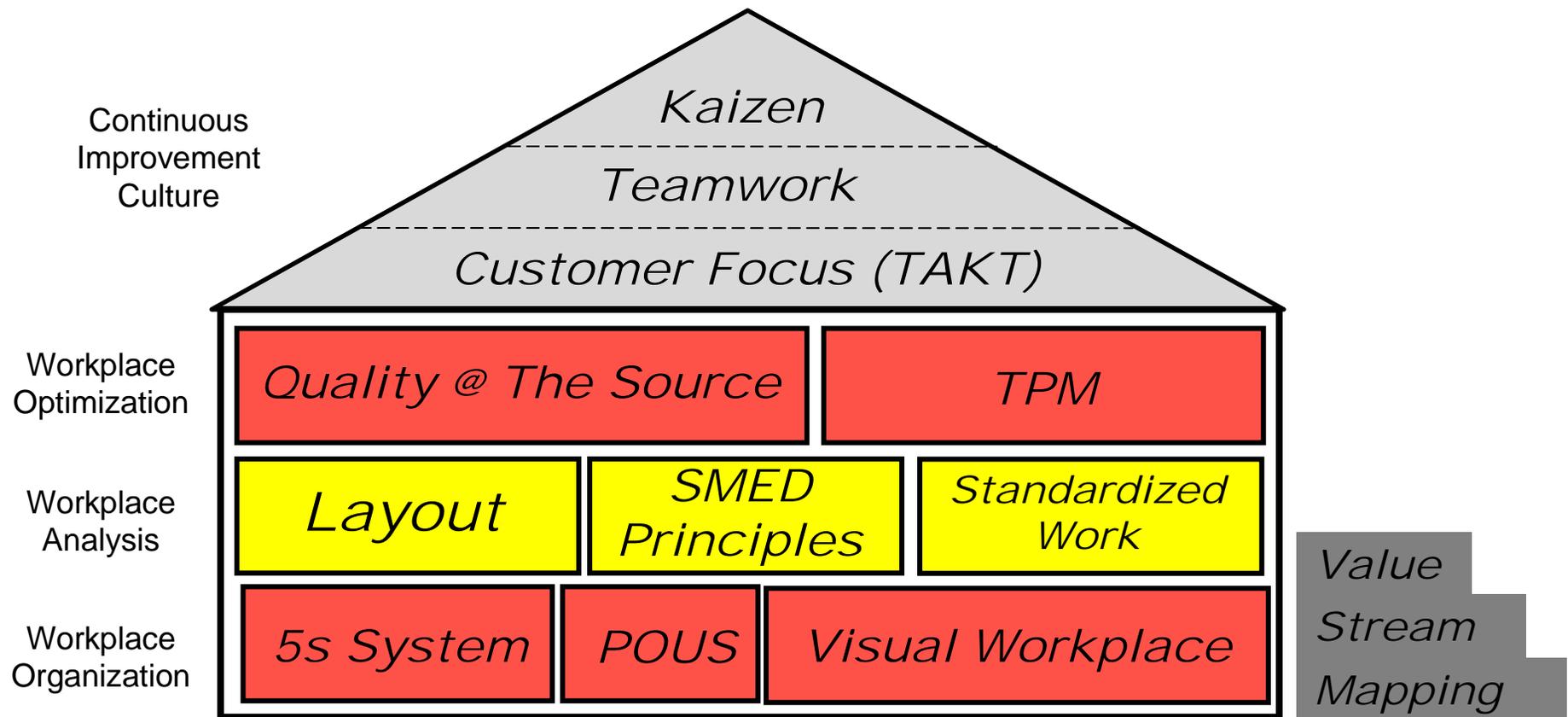
Before



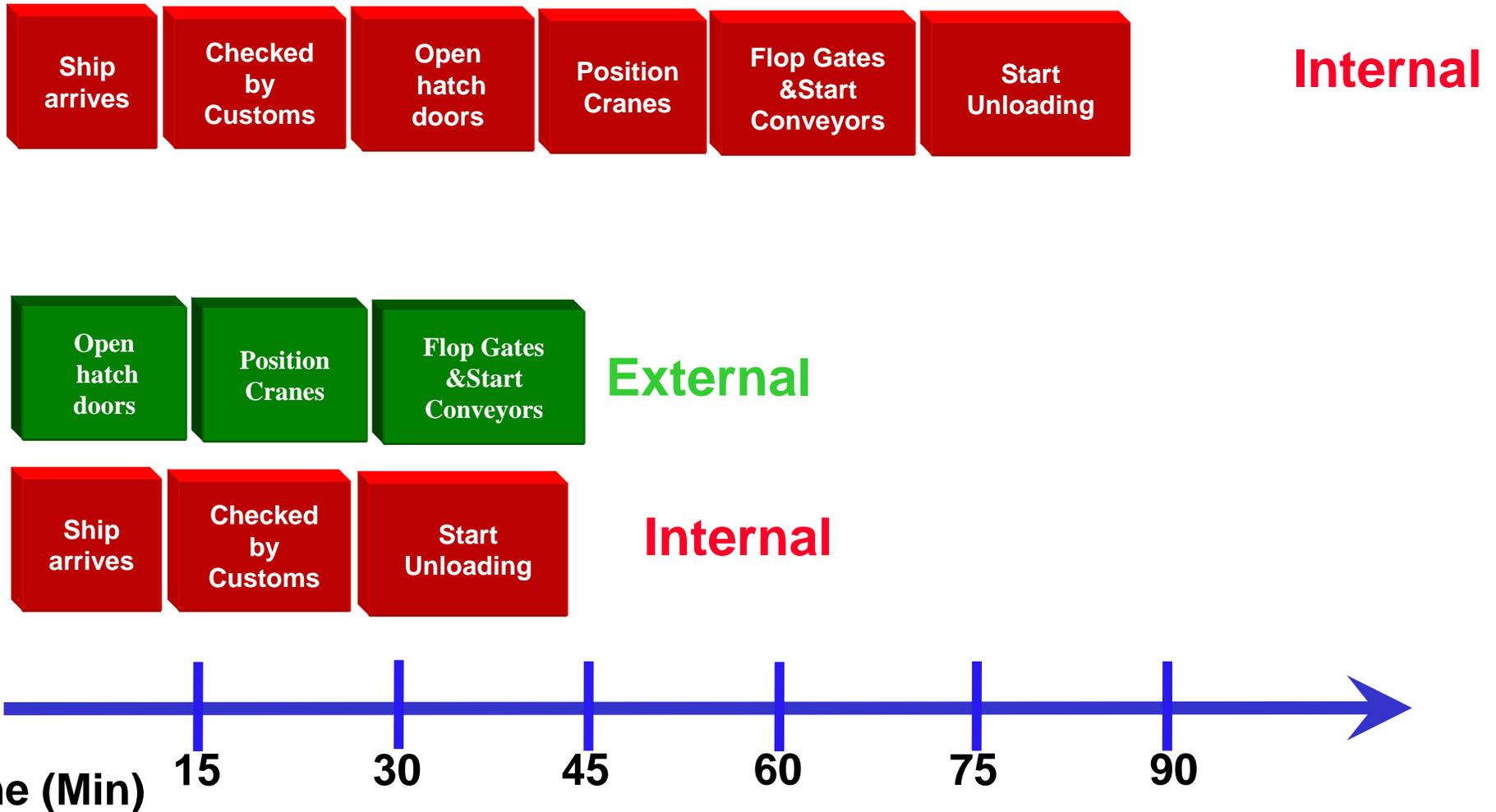
After



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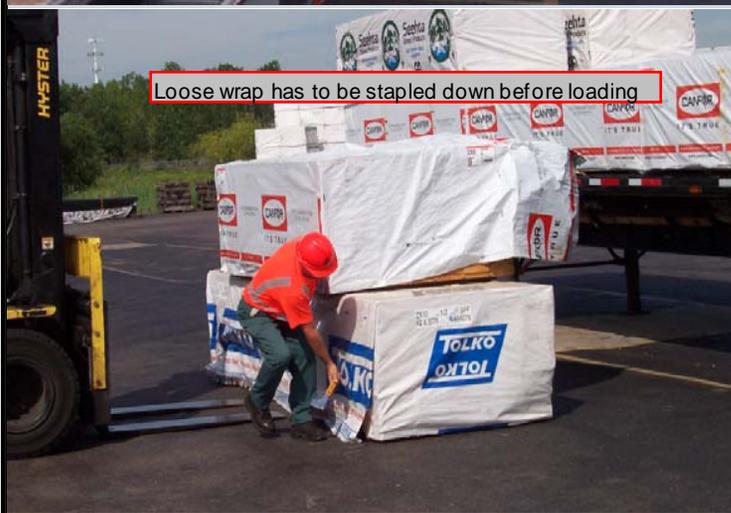
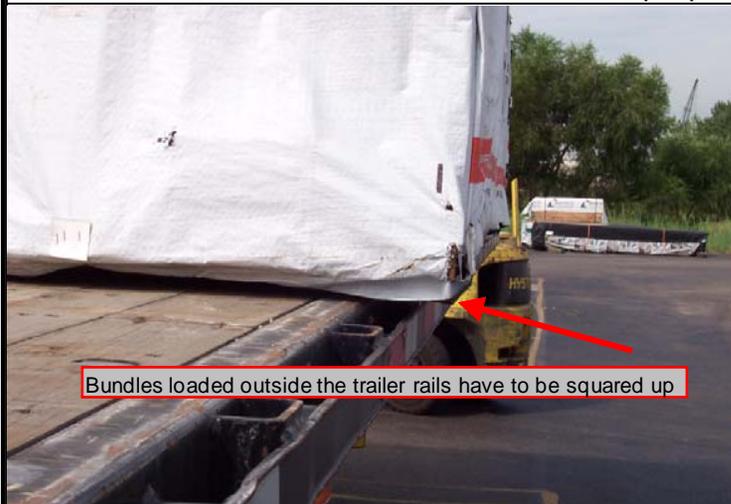


SMED Principles: Internal vs. External Steps



Truck Loading SOP

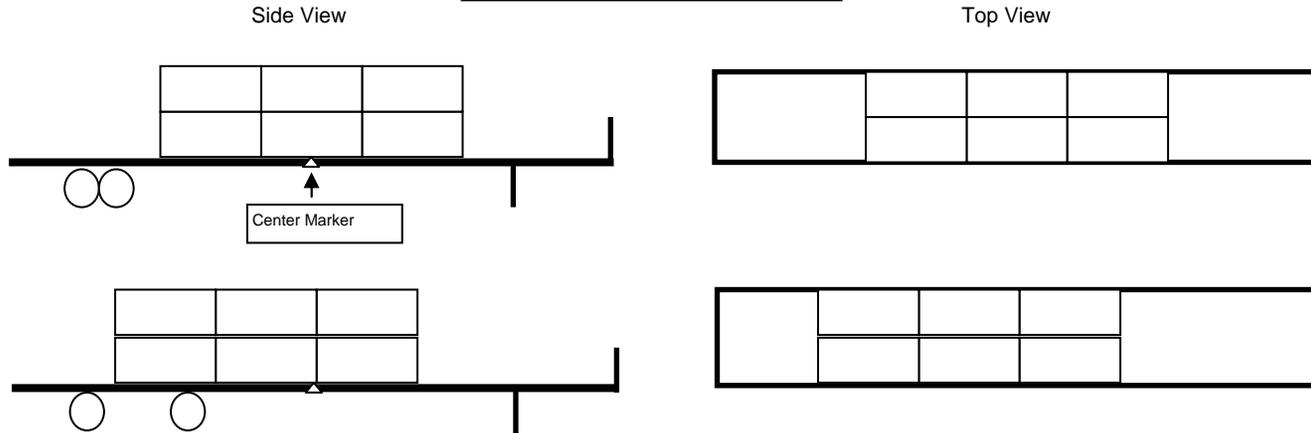
7. Visually inspect load for: items outside the rails of the trailer and square up as needed, blocking is in correct position and adequate to support the load, no loose items or wrappers, all units are tagged properly.



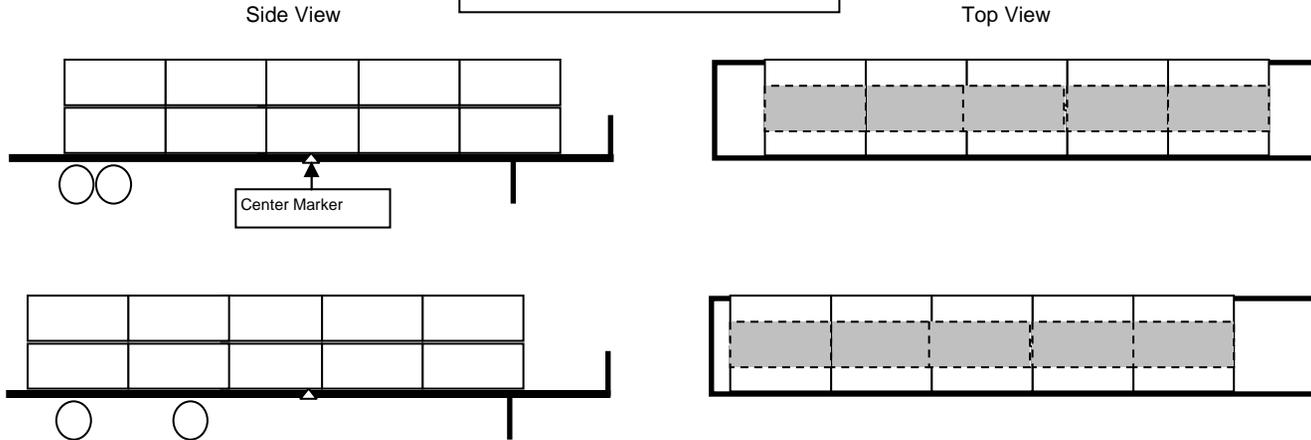
Standardized Work

Load Profiles

12 - 4x8 Bundle Profiles



15 - 4x8 Bundle Profiles



Barge Loading SOP

8 Call loaders to send coal

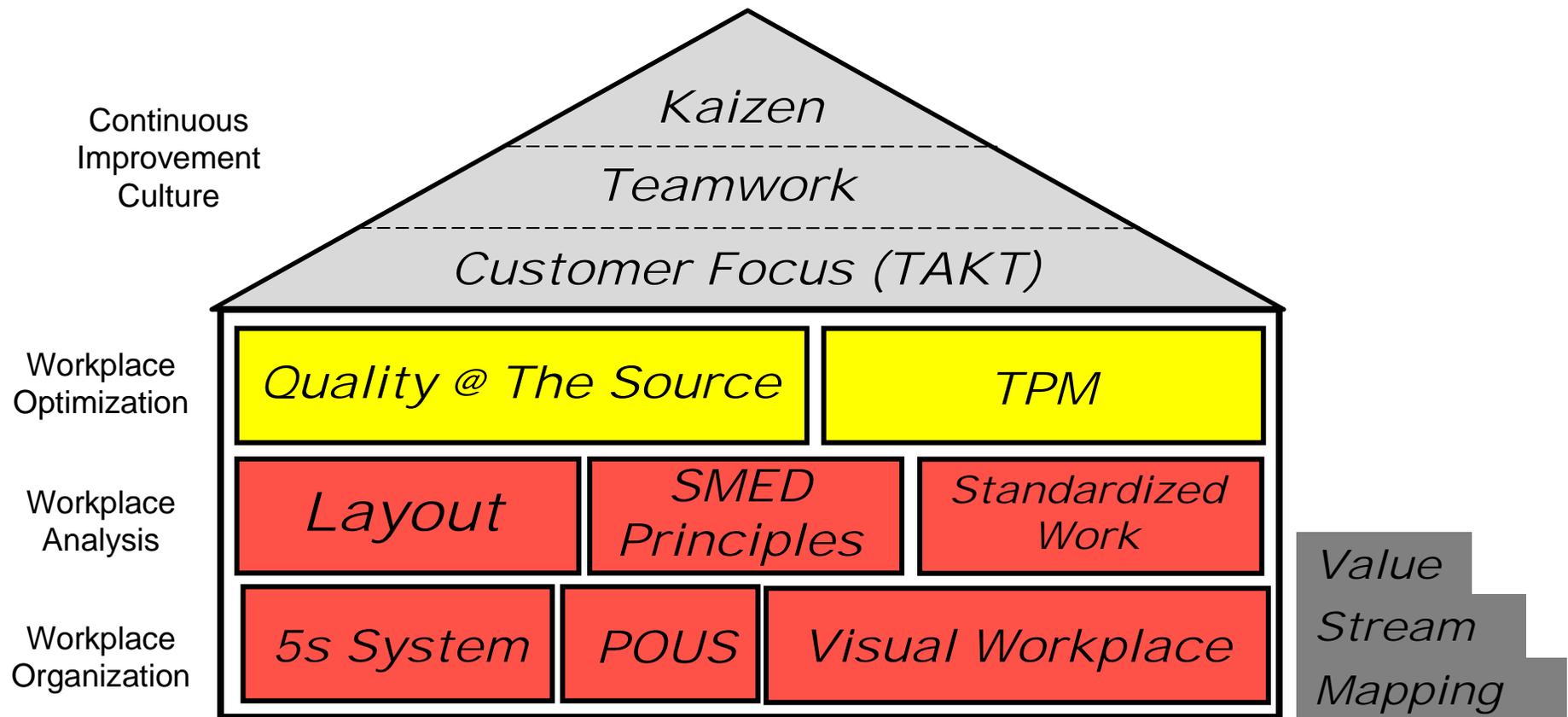


9 Load coal until the bottom of the pile builds up to the weld line on the wall of the barge (Note: Keep coal out of the corners of the bow)

10 Once the first pile is the correct height move the barge north keeping the pile consistent height (Note: Monitor barge list and correct as needed by positioning chute in shore/out shore)



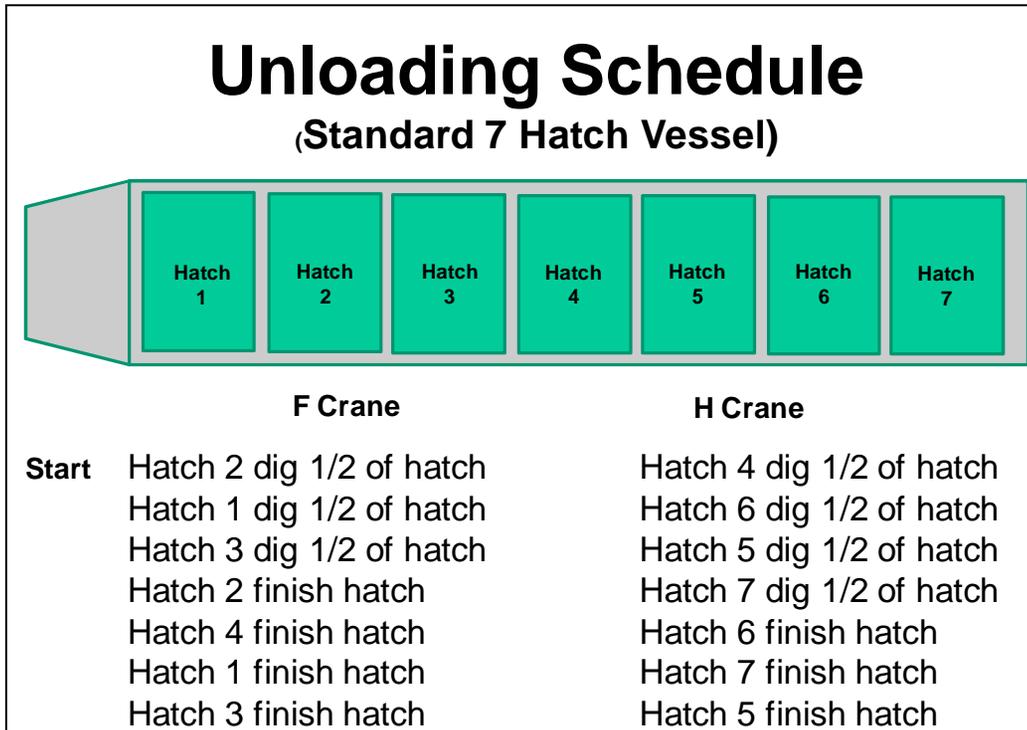
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■ Training to improve quality

Visual training procedures

Mentoring Checklists



TRAINMAN CUB REPORT

PLEASE PRINT LEGIBLY

NAME and JOB # _____

CUB'S PAYROLL # _____

FOREMAN/TRAINMEN _____

ACTUAL TIME SPENT _____
(PERFORMING SWITCHING DUTIES)

WORE SUITABLE CLOTHING, FOOTWEAR, P.P.E'S Yes _____ No _____

MOUNT/DISMOUNT LOCOMOTIVE/EQUIPMENT PROPERLY.
Yes _____ No _____

FOLLOWS PROPER RADIO PROCEDURES. Yes _____ No _____

DURING JOB BRIEFING WERE QUESTIONS ASKED? IF SO WHAT.

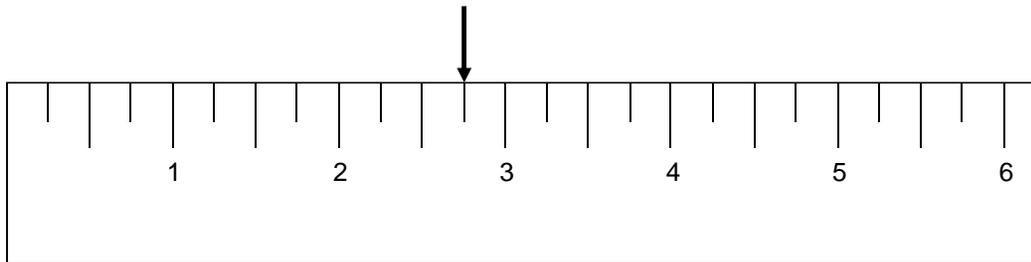
ASK'S FOR 3-STEP PROTECTION BEFORE GOING UNDER OR FOULING
STANDING EQUIPMENT WITH LOCOMOTIVE ATTACHED.
Yes _____ No _____

FOLLOWS SAFETY RULES Yes _____ No _____

PROPERLY POSITIONED HIM/HERSELF FOR TASK BEING
PERFORMED.

■ Hiring practices

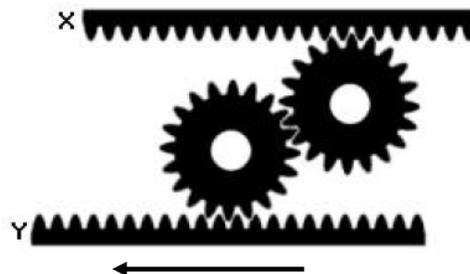
3.



What is the measurement at the arrow?

- a. $2 \frac{1}{2}$
- b. $2 \frac{5}{8}$
- c. $2 \frac{3}{4}$
- d. $2 \frac{11}{16}$

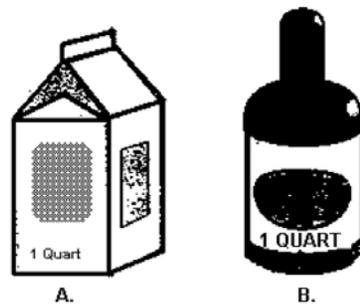
4.



If bar Y moves left at a constant speed, how does bar X move?

- a. Faster than Y
- b. Same speed as Y
- c. Slower than Y

5.



Which container holds more

- a. Container A
- b. Container B
- c. Equal

■ Improving process quality– (mistake-proofing)

Guides to simplify
pick-up of containers



■ Improving process quality– (mistake-proofing)

Required fields are in **BOLD**

Invoice details

Name

Company

Address

City

State or County

Postal or Zip Code

Country

Phone

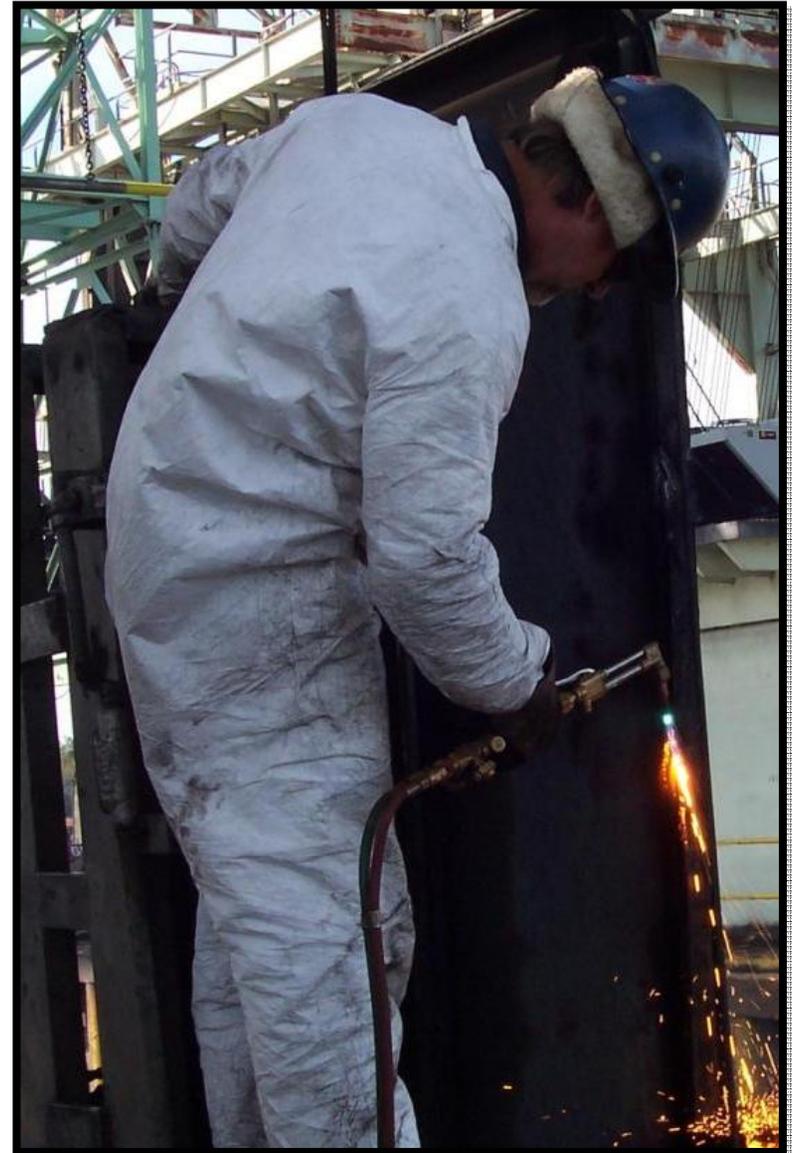
Fax

E-mail

- TPM is a company wide equipment maintenance program that permanently improves the overall effectiveness of equipment with the active involvement of all employees
- Goal is to eliminate/minimize downtime due to breakdown maintenance and to maintain machines at peak performance.

Typical conditions:

- There is often a run-to-failure mentality
- Breakdowns occur regularly
- Temporary repairs are the norm
- Minor stoppages occur frequently
- Processing speed decreases
- No one is accountable for tracking these losses
- Operator training may not be adequate



What's the Impact?

- An estimated \$200 billion spent each year on wasteful maintenance-related activities.
- Average equipment efficiency < 50%



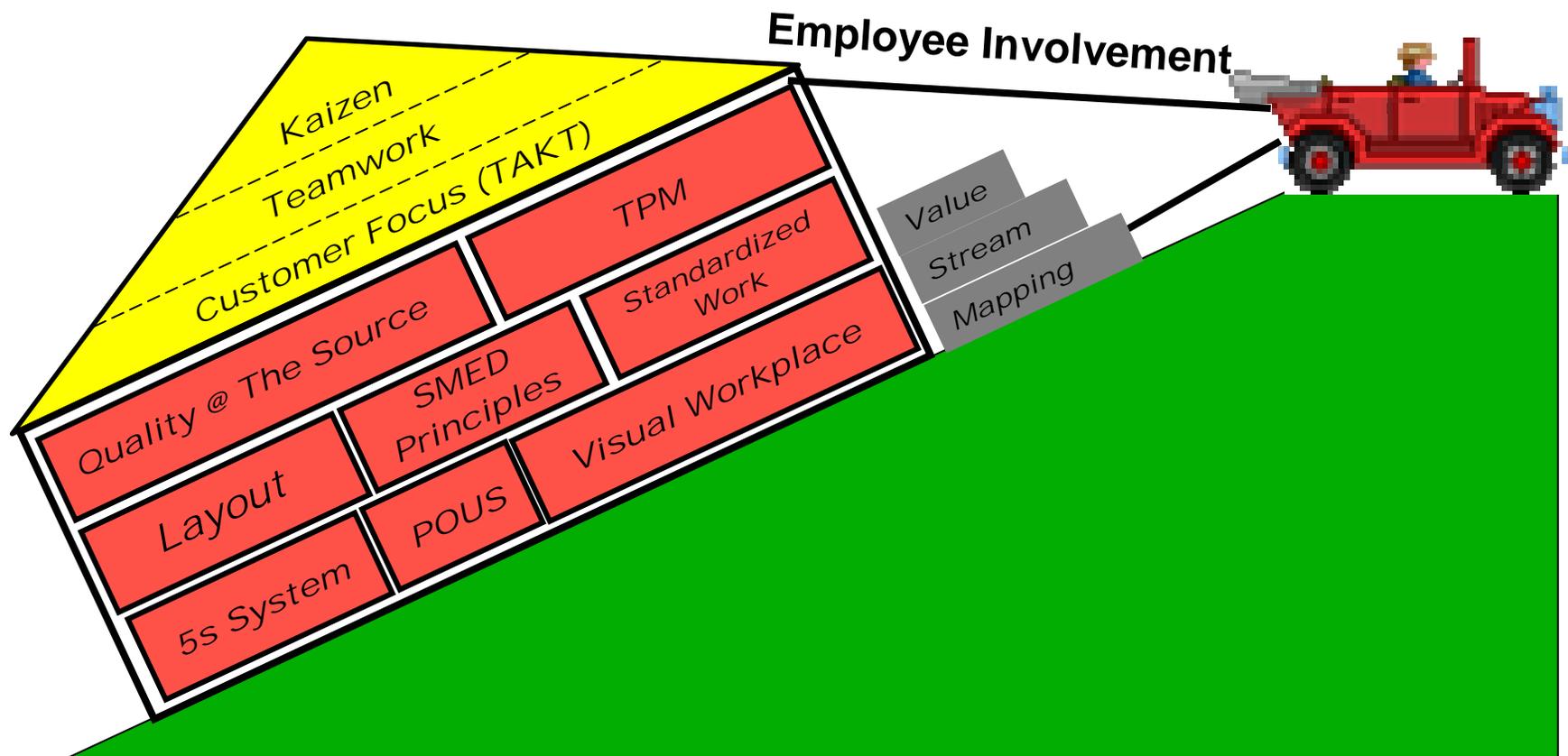






Kaizen and Lean

Kaizen is the vehicle of implementation for Lean tools



■ **Kaizen is the process of:**

- Identifying & eliminating waste
- as quickly as possible
- at the lowest possible cost

■ **Kaizen requires:**

- Continuous, gradual, persistent improvement
- by all employees and management



■ **Kaizen utilizes:**

- Cross functional team
- Focused scope
- Aggressive goal



T - Together



E - Everyone



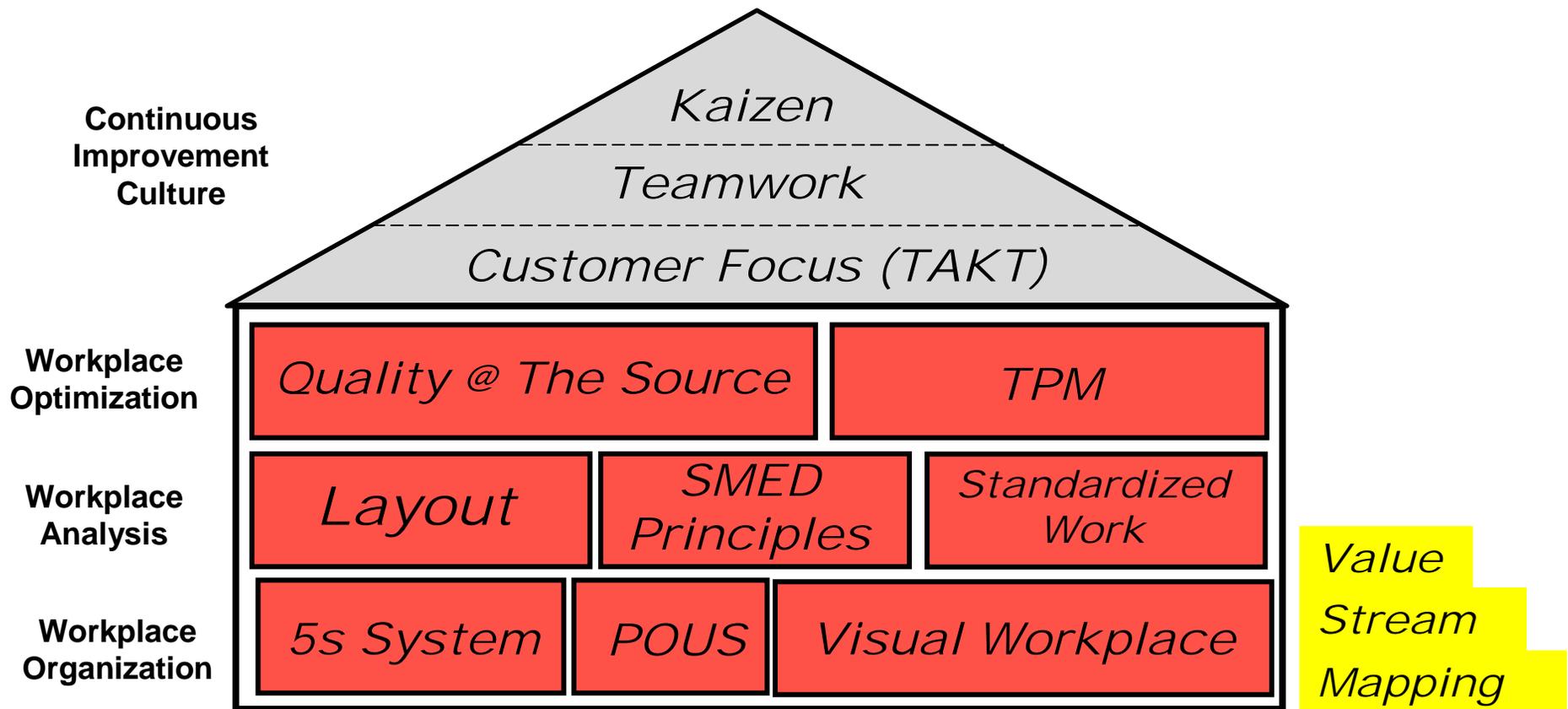
A - Achieves



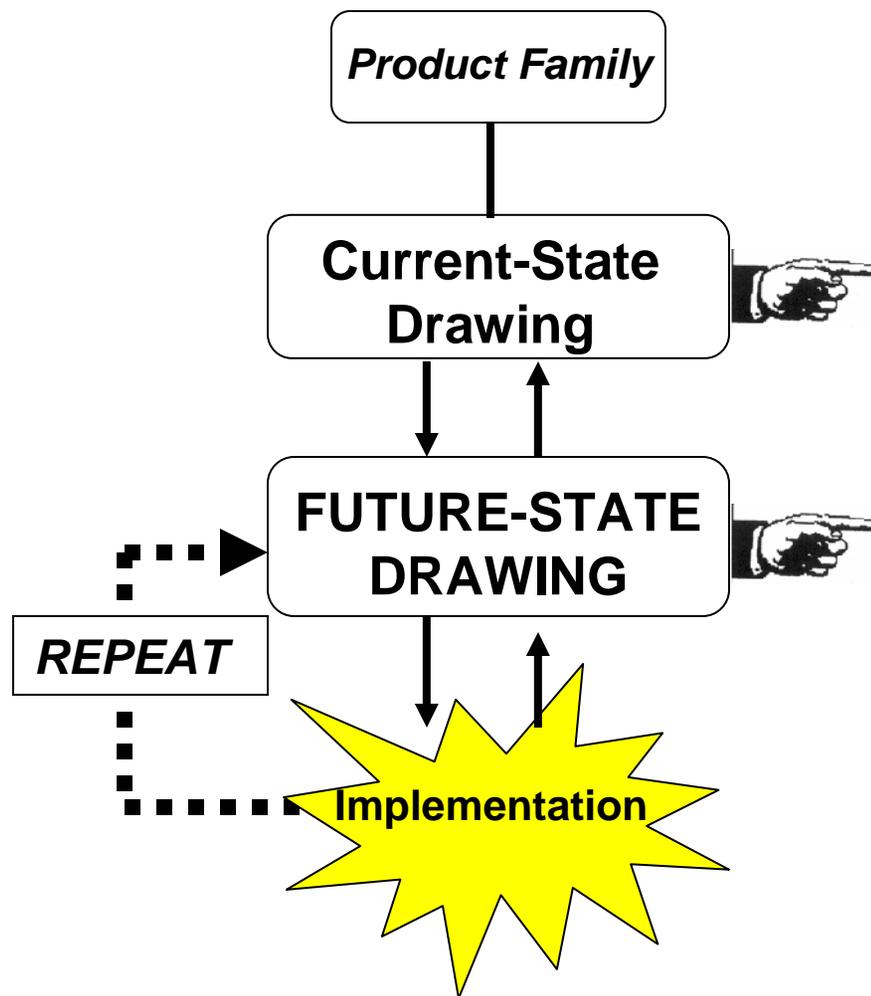
M - More



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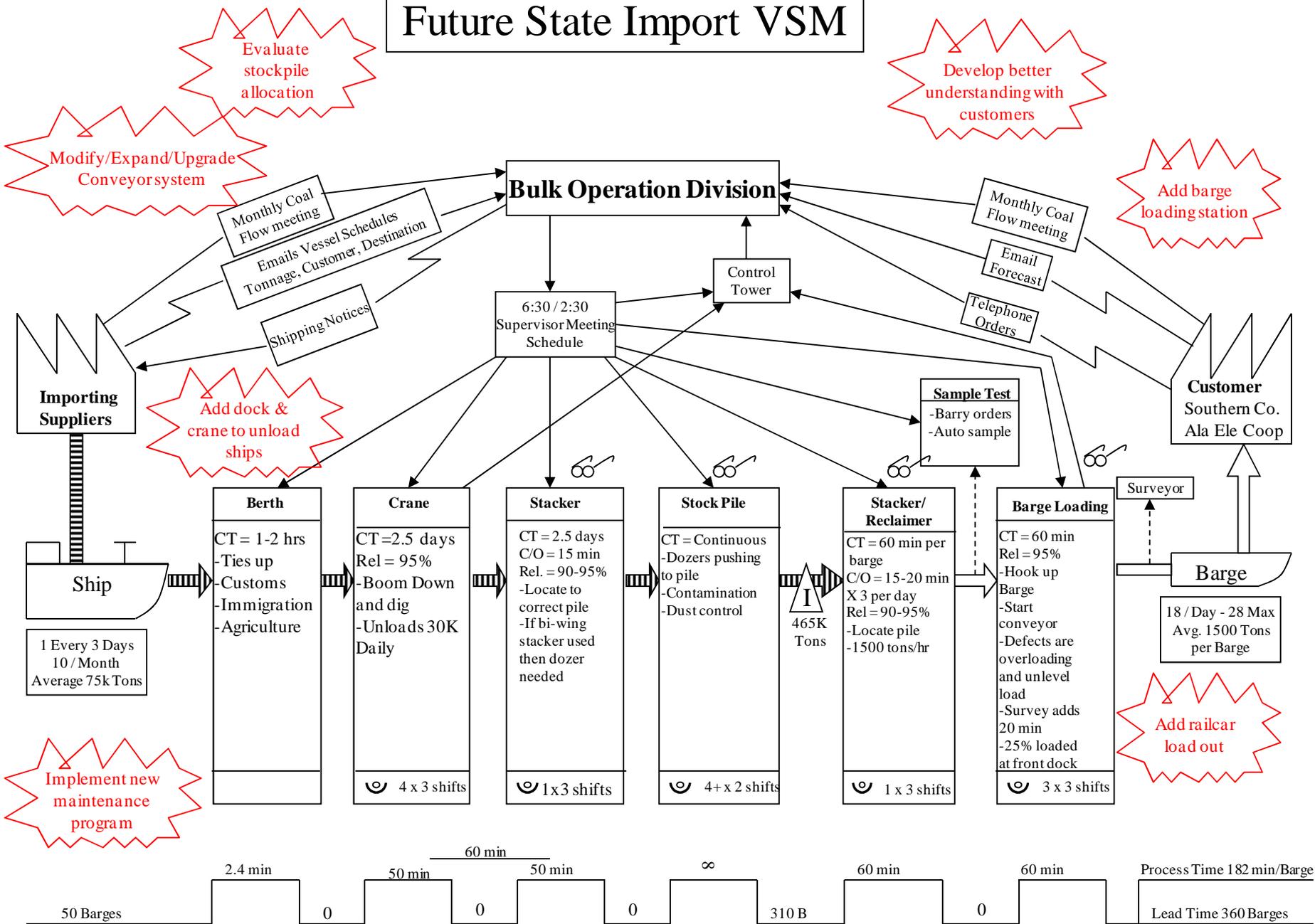


Value Stream Mapping



- **Determining the product families**
- **Understanding how the shop floor currently operates. (Foundation for future state.)**
- **Designing a lean flow & how to get there.**
- **Do IT!**

Future State Import VSM



Evaluate stockpile allocation

Modify/Expand/Upgrade Conveyor system

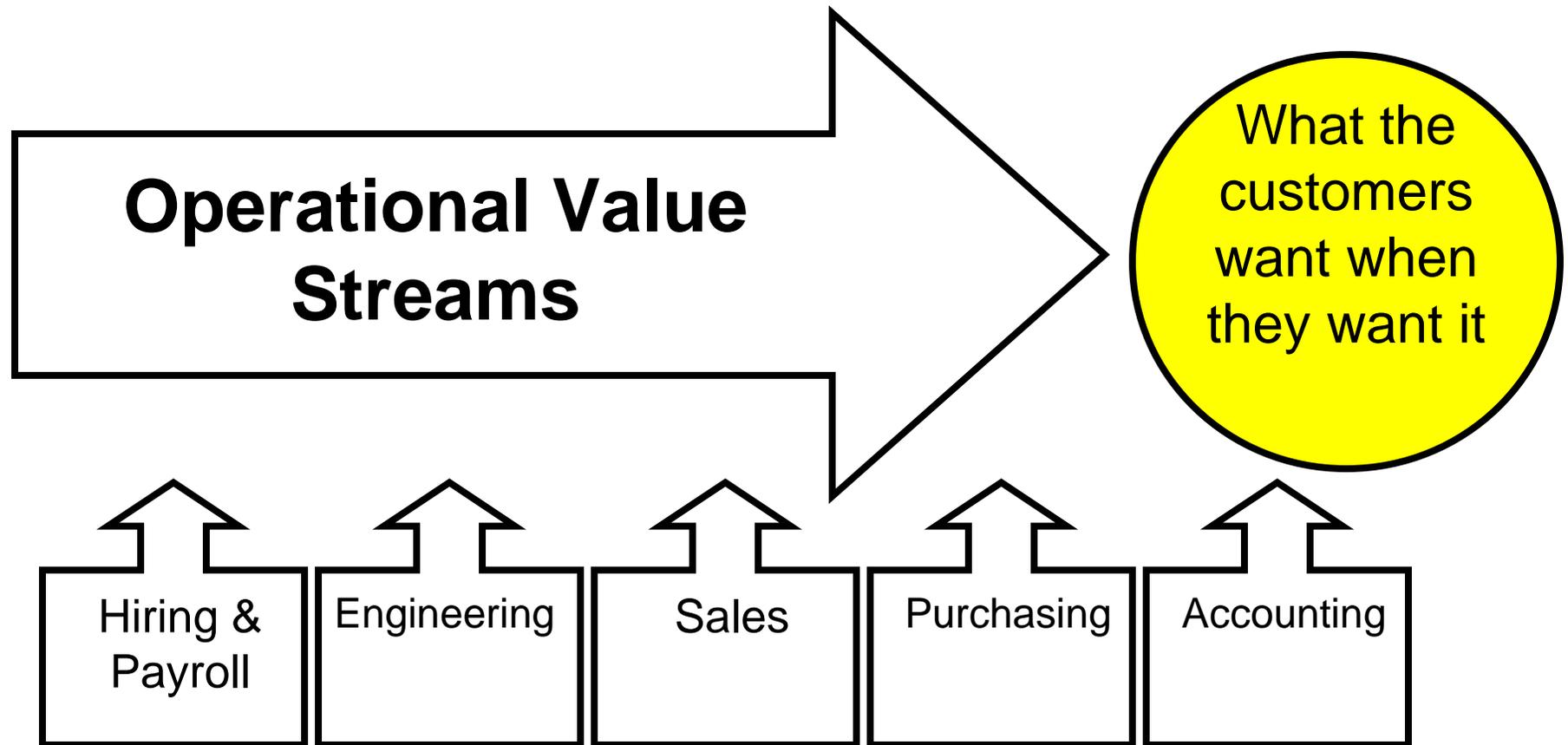
Develop better understanding with customers

Add barge loading station

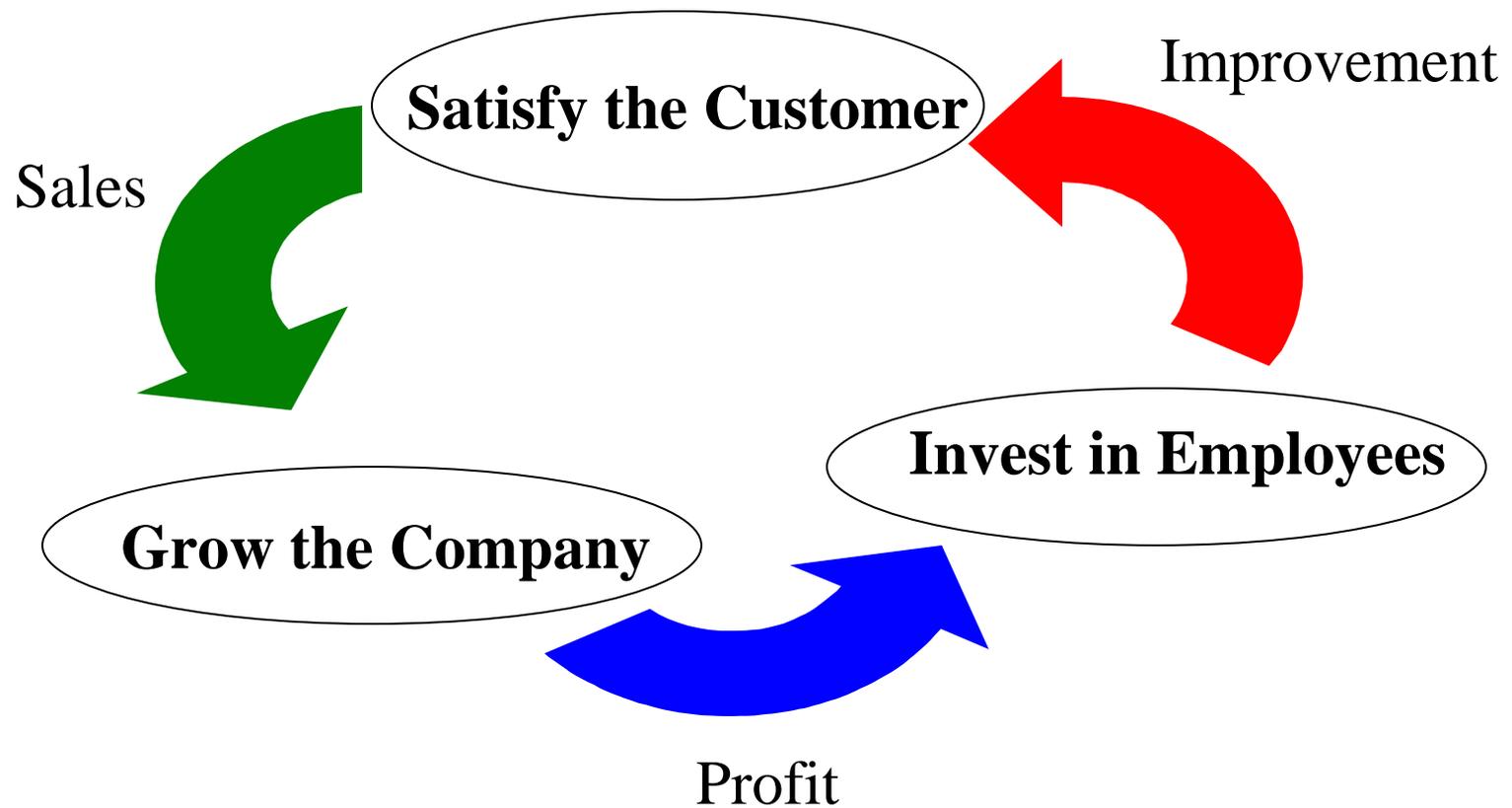
Add dock & crane to unload ships

Implement new maintenance program

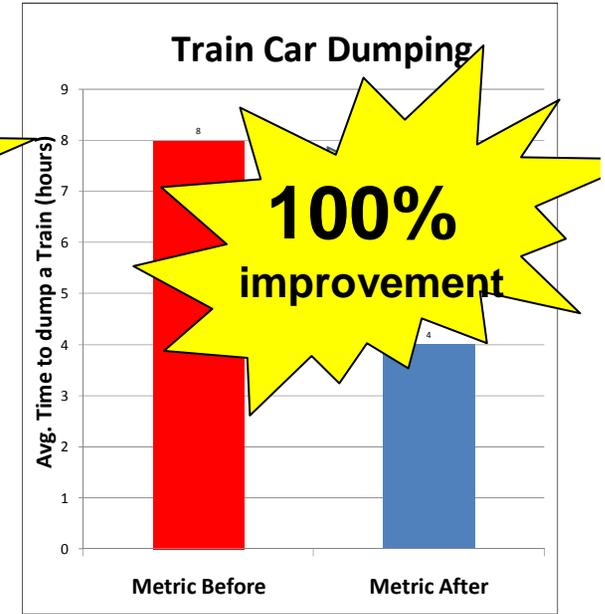
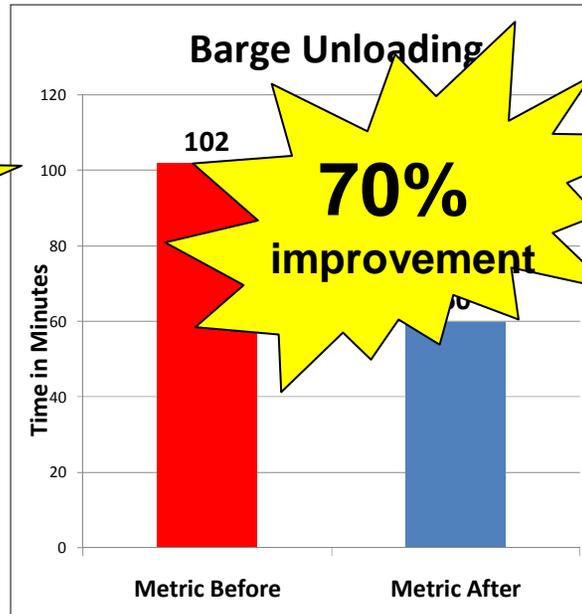
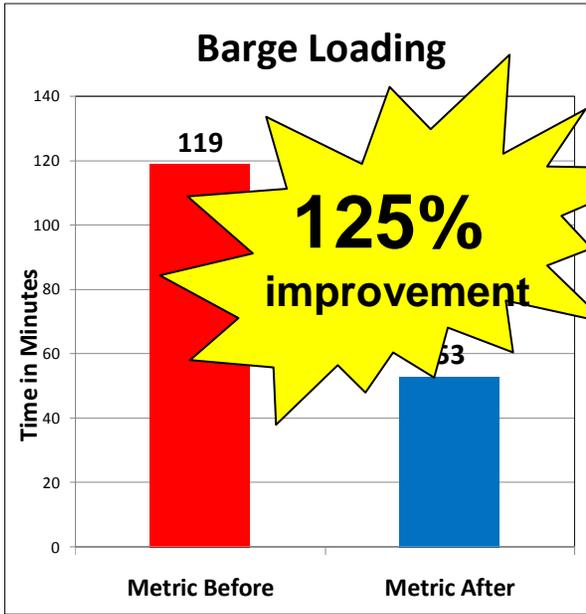
Add railcar load out



Support Processes - These processes only create value for internal customers, but are currently necessary to run the business



Benefits of Lean at Ports



- Flexibility
- Documented Procedures
- Involved Workforce
- Visual Management

