

# Webinar: Lean Warehousing



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Distribution Operations Analysis and Design (DOAD) Certificate

## Lean Warehousing

[www.scl.gatech.edu/leanwh](http://www.scl.gatech.edu/leanwh)

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# Our Presenter: Brad Bossence



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**LeanCor Supply Chain Group**  
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**Instructor, Georgia Tech Supply Chain and  
Logistics Institute (GTSCl)**



## **Career Focus:**

Nearly 20 years of third party logistics and consulting experience with a specific focus in Lean and Japanese production system environments, including contract and operations management positions across the globe

## **Currently Responsible For:**

Leading supply chain consulting projects for LeanCor customers in a wide array of sizes and industries. These have included lean warehousing implementation, warehouse layout and design, and ROI assessments

## **Industry Group Speaker:**

AME, CSCMP, WERC, GTSCl, Institute of Industrial Engineers, Lean Enterprise Institute, Georgia Center for Logistics, Honda Lean Network



- Lean Quest and LeanCor have formed a partnership, bringing our logistics and supply chain and warehousing experience together to bring this class to you
- Our professional roots are in Toyota. There we learned how to apply the Toyota Production System (TPS) from Toyota Experts from Japan
- During the last 20 years we've implemented and taught Lean to 100's of operations around the world. Some of our clients are shown below.





# What is Lean?

## Toyota's Purpose Statement:

“To eliminate waste and satisfy customer needs at the lowest possible cost with consideration and respect for humanity of employees.” - *T. Ohno*

## What Does That Mean?

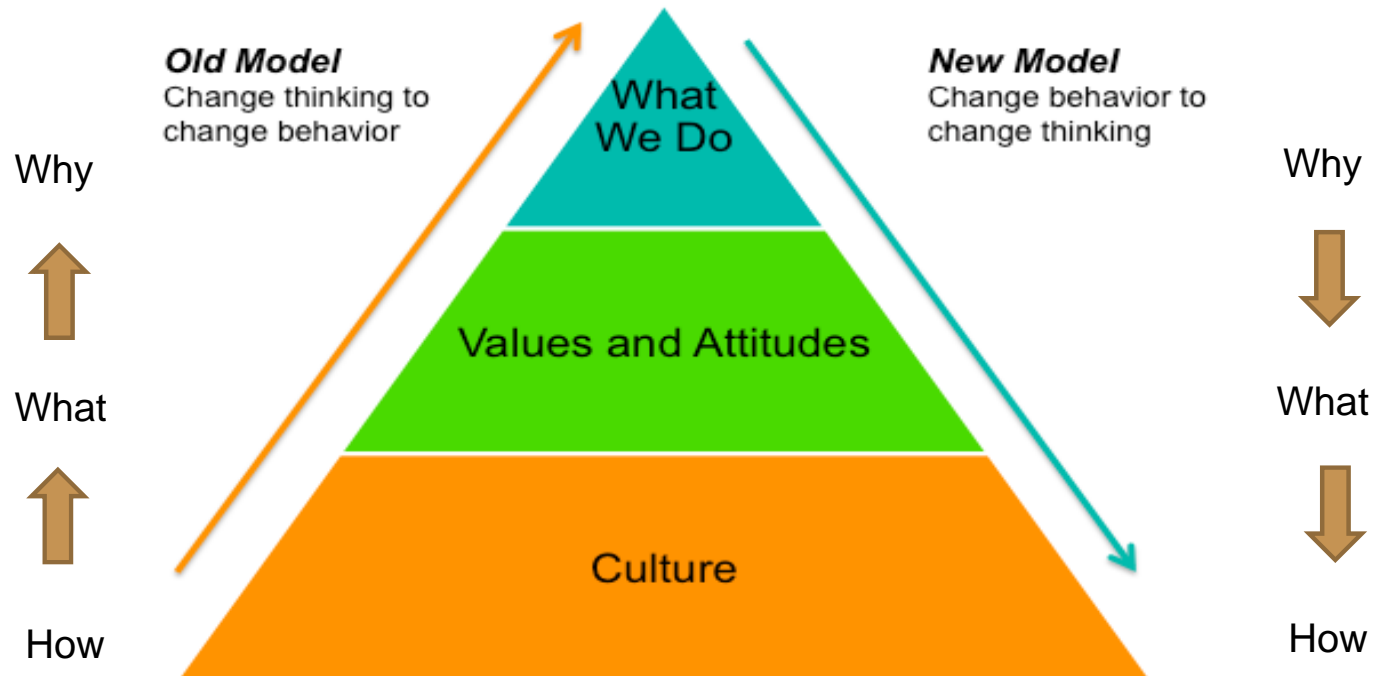
- We will embrace common principles to drive a problem solving culture
- We will teach our people how to identify and eliminate the root cause of wasteful processes

## Results?

- We will improve efficiencies by driving out preventable costs
- We will improve revenues by achieving outstanding customer service (Quality, Delivery, Cost)

## How Does this Connect to Warehousing??

# Cultural Perspectives



*Respect for:*  
**Purpose, People, Process, Problem Solving, Results**

# Why Do We Need Warehouses?

## What is Our Purpose?

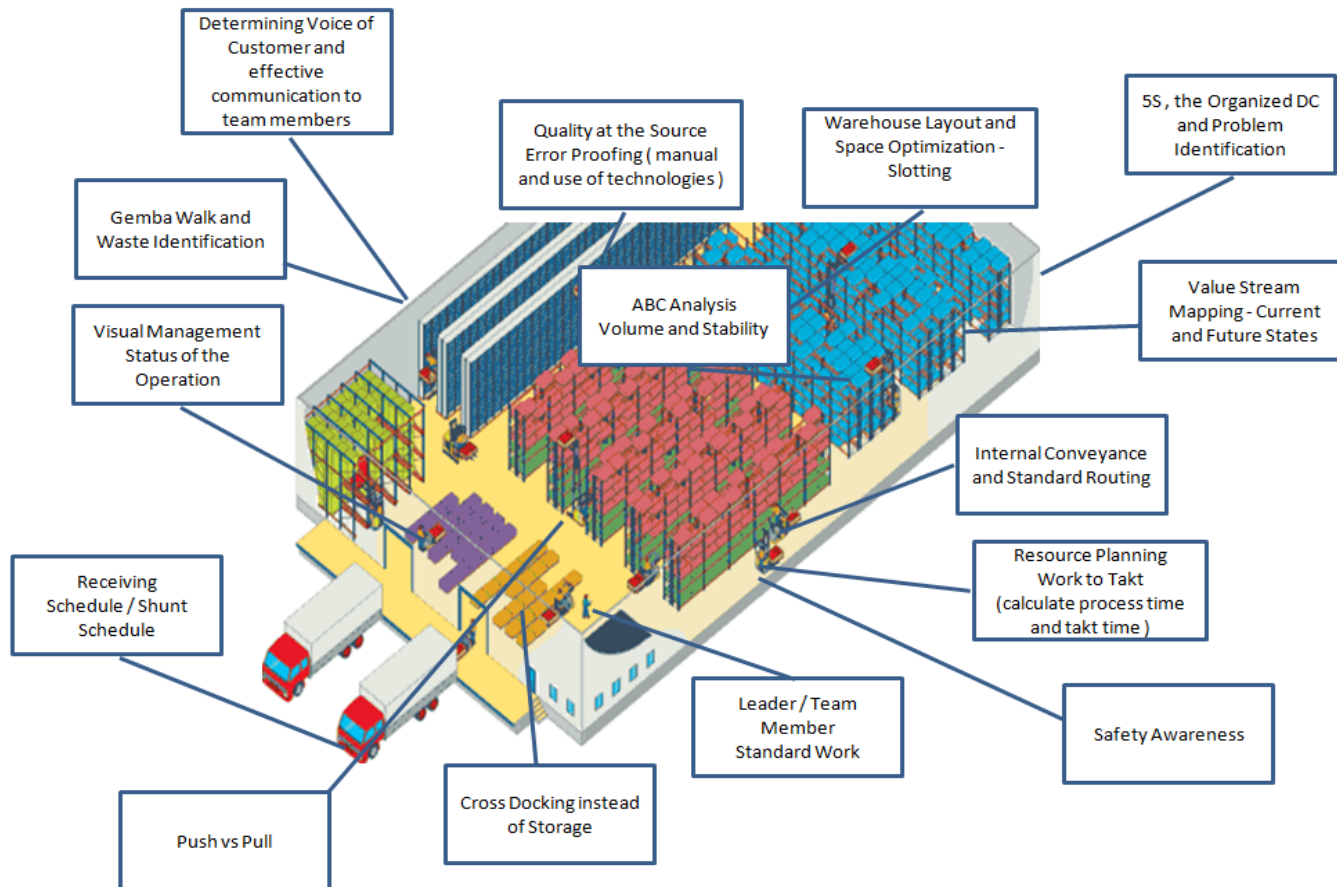
1. Customer Service – Fill Rate Policies
2. Production Lot Sizes
3. Transportation Economies
4. Purchasing Economies & Hedging
5. Demand Variability: Seasonality, Spikes, New Product Launches
6. Cycle Stock ; Buffer Stock: Safety Stock: Raw Material: WIP: FG
  - a) Lead Time
  - b) Supplier Dependability
  - c) Transportation Dependability
  - d) Customer Dependability

Is a retail store a warehouse?  
Imagine if everything we buy is built to order....  
No grocery store, no box store...  
How would this effect our daily lives?





# The Lean Warehouse and Operational Excellence

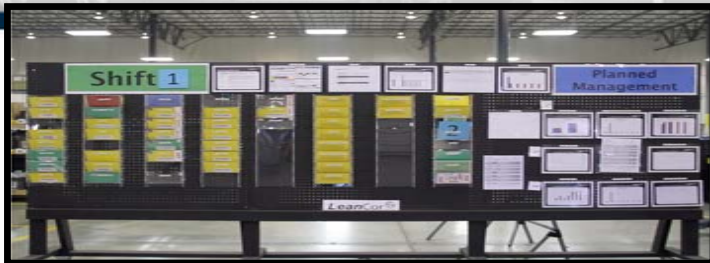


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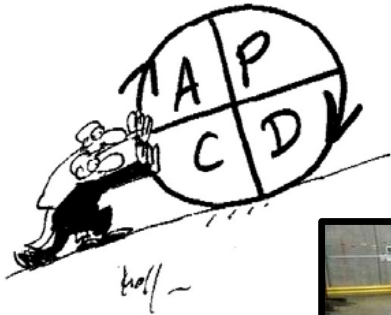




# Lean Thinking 101: Entropy and Plan-Do-Check-Adjust



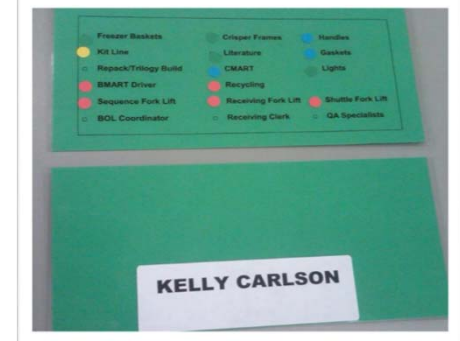
Becoming a Diamond:  
It Takes a Lot of  
Pressure



**We Must Add Pressure to Make Problems Visible**  
**1<sup>st</sup> in 10, Do it Again**



# Everything Starts with a Plan





# Leveled Flow Tool: Heijunka

- Consistently levels demand by short time increments and mix (i.e. ensures that product D and E in the example are produced in a steady ration with small batch sizes).



one row per  
product type

	7 <sup>am</sup>	7 <sup>am</sup>	7 <sup>am</sup>	8 <sup>am</sup>	8 <sup>am</sup>	8 <sup>am</sup>	9 <sup>am</sup>	9 <sup>am</sup>
type A	A	A	A	A	A	A	A	A
type B	B	B	B	B	B	B	B	B
type C	C		C		C		C	
type D	D	D		D	D		D	D
type E			E		E		E	

kanban

# Takt Time

- ➔ Takt time is the drum beat to the process. Each process should be delivering product at this set time, acting in a rhythm that is synchronized with customer demand.

$$\text{Takt Time} = \text{Daily Operating Time} / \text{Required Qty Per Day}$$

## Example:

- Resources: 1 person on each shift
- Demand: Unload 100 trucks per day
- Operating Time: 2 shifts per day
  - 1 shift = 420 working minutes (excludes breaks)
- Process Time to Unload a Truck: 50 minutes
- What is the takt time?
- How many people do we need per shift?



# Resource Allocation

Unload Takt Time & Work Planning Calculation		
Takt Time = Available Time / Demand		
Daily Demand - Trailers	100	Trailers
<b>Shift Statistics</b>		
Schedule Work Minutes / Shift	480	Minutes
Number Shifts Per Day	2	Minutes
Lunch Minutes	30	Minutes
Breaks	30	Minutes
Total Working Time / Day	840	Minutes
<b>Takt Time = Available Time / Demand</b>	<b>8.4</b>	<b>Minutes / Trailer</b>
<b>Standard Work Process Times</b>		
Review shipping documents	5	Minutes
Unload trailer	10	Minutes
Inspect material and check to Bill of Lading	5	Minutes
Move material to storage location	25	Minutes
File paperwork	5	Minutes
<b>Standard Work - Process Time</b>	<b>50</b>	<b>Minutes</b>
<b>Total Resource Calculations</b>		
Optimal Number of Team Members per Shift	6.0	Team Members

# Visual Management & Associate Engagement

## Outbound Productivity



## Receiving Productivity



## Make Takt Time Visible





# ABC Analysis – Traditional vs. Flow

Traditional ABC				
SKU	Quarterly Volume	Percent of Total	Cumulative Percent	Stratification
I	4800	48%	48%	A
D	1400	14%	61%	A
B	900	9%	70%	A
G	900	9%	79%	B
A	660	7%	86%	B
F	630	6%	92%	C
C	600	6%	98%	C
E	120	1%	99%	C
H	72	1%	100%	C
Totals	10082	100%		

Flow ABC				
SKU	Quarterly Volume	Coefficient of Variation	Flow Stratification	Traditional ABC
C	600	0.0	A	C
G	900	0.0	A	B
H	72	0.1	A	C
E	120	0.2	B	C
F	630	0.3	B	C
A	660	0.8	B	B
B	900	1.0	C	A
D	1400	1.5	C	A
I	4800	2.3	C	A
Totals	10082			

	A's - By Volume - Cumulative 70% of volume
	B's - By Volume - Cumulative 70 % to 90% of volume
	C's - By volume - Cumulative 90% to 100% of volume

	A's - Continuous Flow - C of Variation < .0.2
	B's - Pull - C of Variation > 0.2 and < 1.0
	C's - JIT - Make to Order - C of Variation > 1.0

# Lean Thinking 102: Inputs and Outputs

- The Lean Problem Solver needs to be a **process thinker**.
- If we have a “problem”, or our Y is not meeting the standard, then we need to review our inputs (x’s) to understand which is the true driver (or root cause).

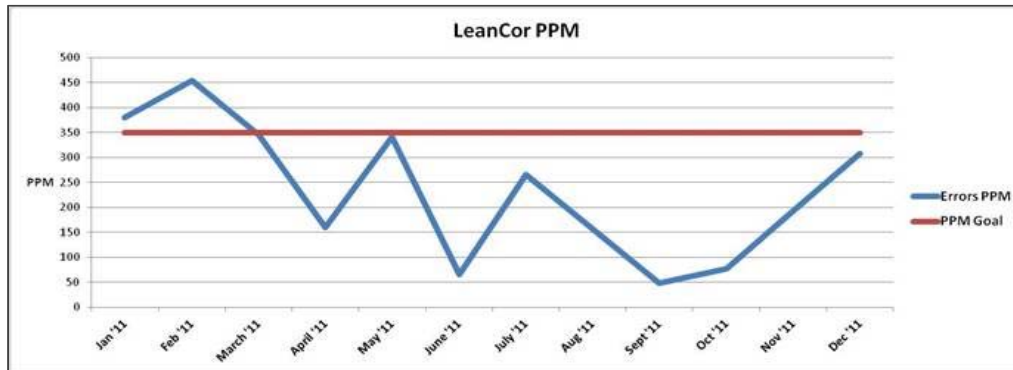
$$Y = f(x)$$

.... What is a Principle?

....Are Principles “Inputs”?

...What are your examples of Lean Warehousing Principles?

# Lean Leaders “Go See and Do”



# Problem Solving is a Language

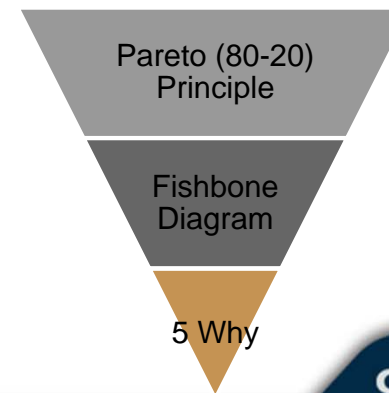
Operate	<b>Do the Work &amp; Identify the Problem</b>
	Plan & perform the work. Identify gap between plan vs. actual condition.
Review	<b>Define the Problem</b>
	Document & validate current state. Develop a clearly defined problem statement.
Learn	<b>Determine Root Cause</b>
	Identify all possible causes to the problem. Isolate critical few root causes to the problem.
Optimize	<b>Identify Solutions</b>
	Develop solutions that address the root causes to the problem. Ensure the solutions support the entire value-stream.
Execute	<b>Implement &amp; Sustain the Solution</b>
	Communicate, train, and Implement the solution. Measure and monitor the impact of the solution.



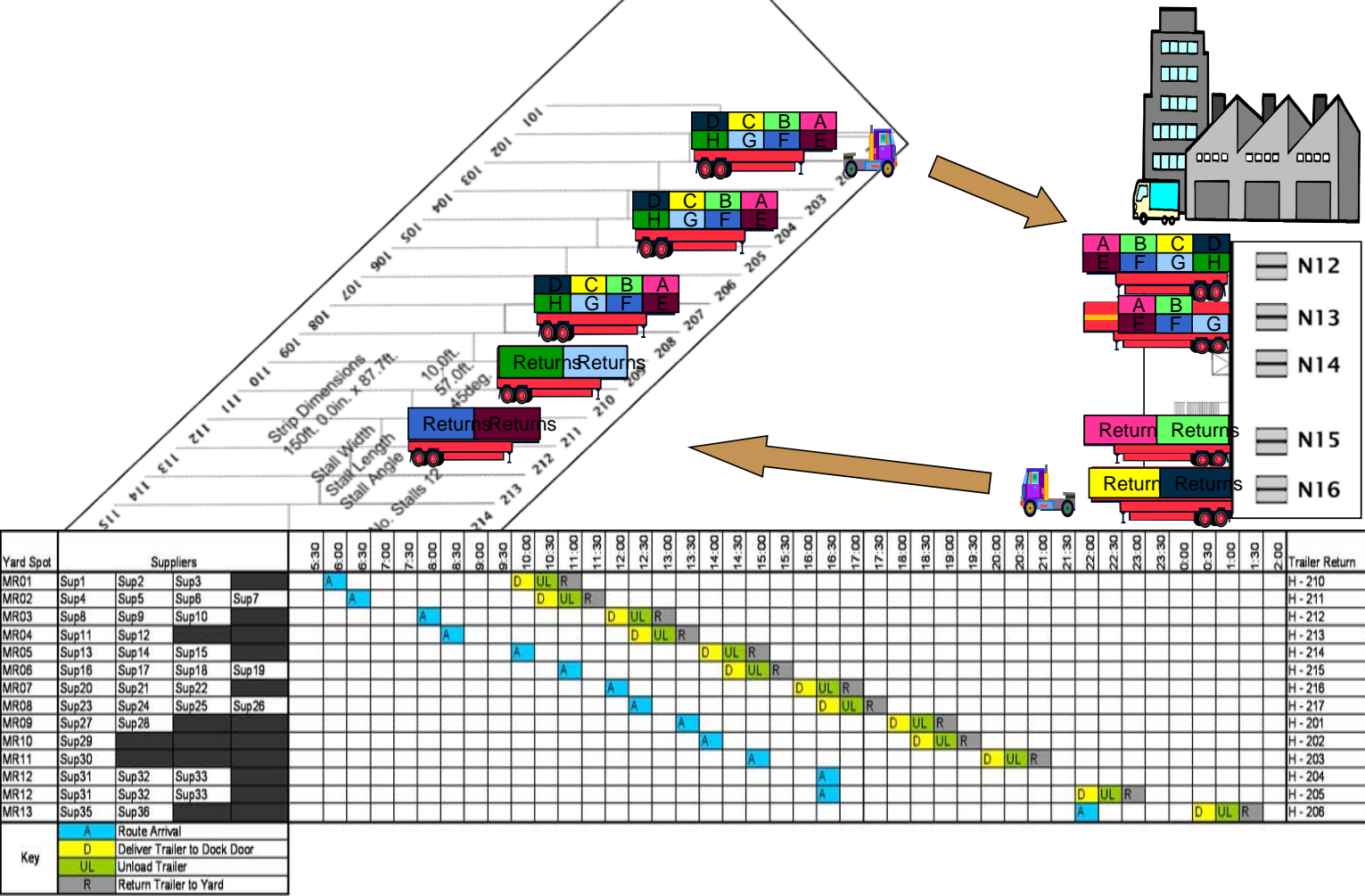
# Mapping the Current State. Teach Everyone to See Waste.



..and use simple problem solving tools



# Disciplined Yard Management



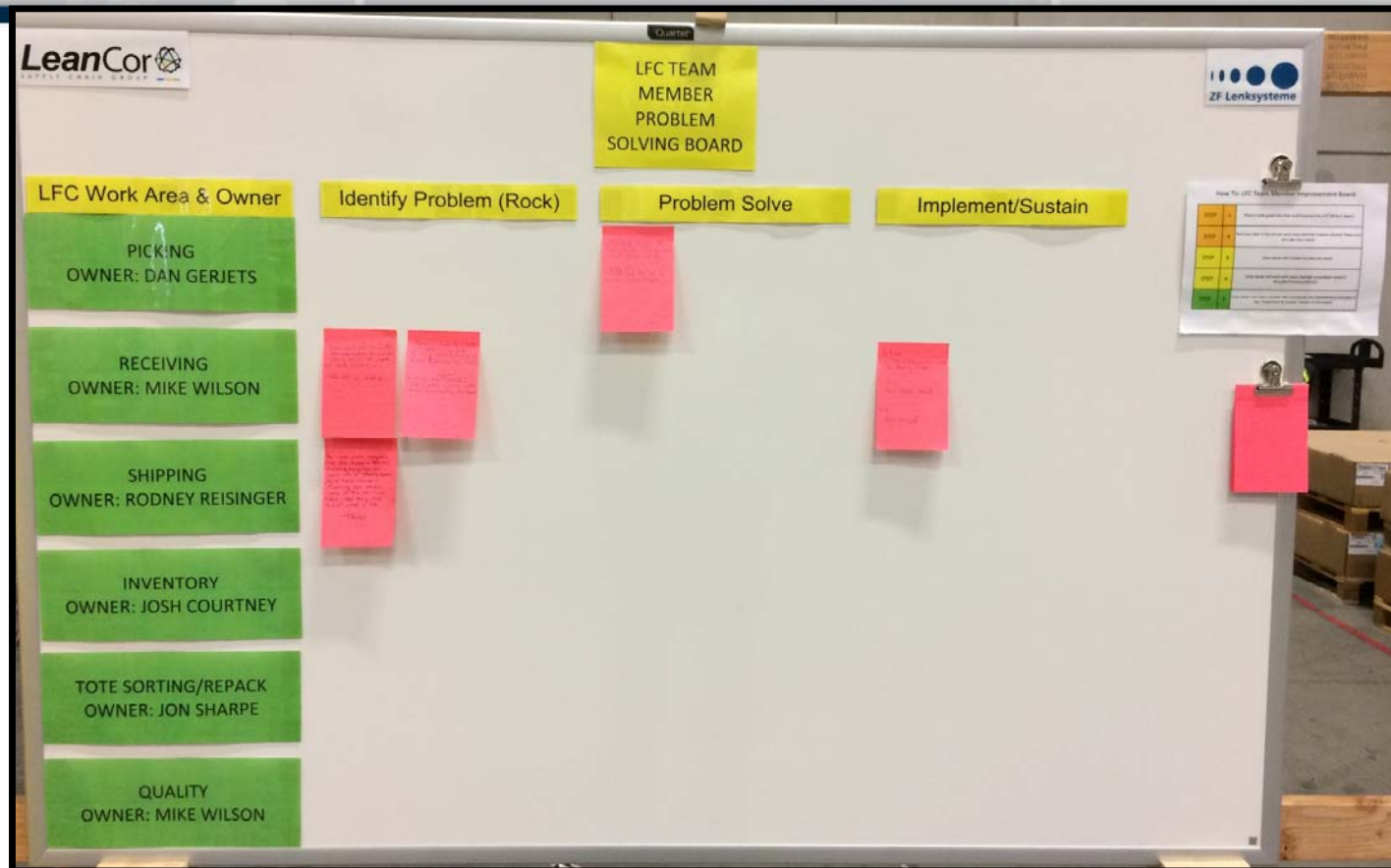


# Measurement System Comparisons

Lean Measurement Systems	Traditional Measurement Systems
Data are real time or very recent	Data are mostly historical – longer in term
Heavy focus on customer expectations	Heavy focus on utilization of resources
Focuses on cross-functional processes	Measures functional silos
Everyone's responsibility	Owned and controlled by silo owners
Improvement focused – better every day	Goal focused – hit it or miss it
Measures are visible to many	Reports are discussed in meetings
Primarily based on process inputs	Primarily based on results
Adapted & customized for the process	Copied from other sources
Gives clear direction to act on	Identifies who to blame or reward
Simple measures managed by operators	Complex measures in sophisticated BIS

**Where does your organization rank: Left or Right?**

# Problem Solving Board / VISIBLE Associate Suggestion System



**What Does This Tell You ?**  
**Do You Think They Will Succeed in the Future State??**



# Thank You! Questions?

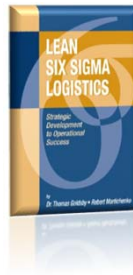


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Let's connect on **LinkedIn**.





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**Thank You**  
for attending

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