LeanCor
SUPPLY CHAIN GROUP

LEAN WAREHOUSING

Cutting waste and improving warehouse efficiencies with the proven principles of lean management.

Georgia Tech Supply Chain & Logistics Institute
Stewart School of Industrial & Systems Engineering

LeanCor
SUPPLY CHAIN GROUP

Your Presenter

Brad Bossence

Regional Vice President
LeanCor Supply Chain Group

Supply Chain Consultant, Educator

bbossence@leancor.com

Career Focus Areas:

Entire career committed to third party logistics. Over 17 years of third party logistics experience with a specific focus in Japanese production system environments such as Toyota USA, Toyota Canada, Toyota Europe, Kubota, Yamaha, Suzuki, and Subaru.

Vice President, LeanCor Supply Chain Group:

LeanCor is a trusted supply chain partner that delivers operational improvement and measureable financial results. Unlike other 3PL providers, LeanCor offers a unique combination of training, consulting, and outsourced logistics services. "We *Teach*. We *Consult*. We *Do*."

Lean Supply Chain Instructor:

Georgia Tech Supply Chain and Logistics Institute

Cross-Industry Experience:

Automotive, Consumer Goods, Industrial Manufacturing, Retail, Food and Beverage

Lean Warehousing Assessment Results

Assessment participants rated themselves on a scale of 1-3-5 on 27 statements:

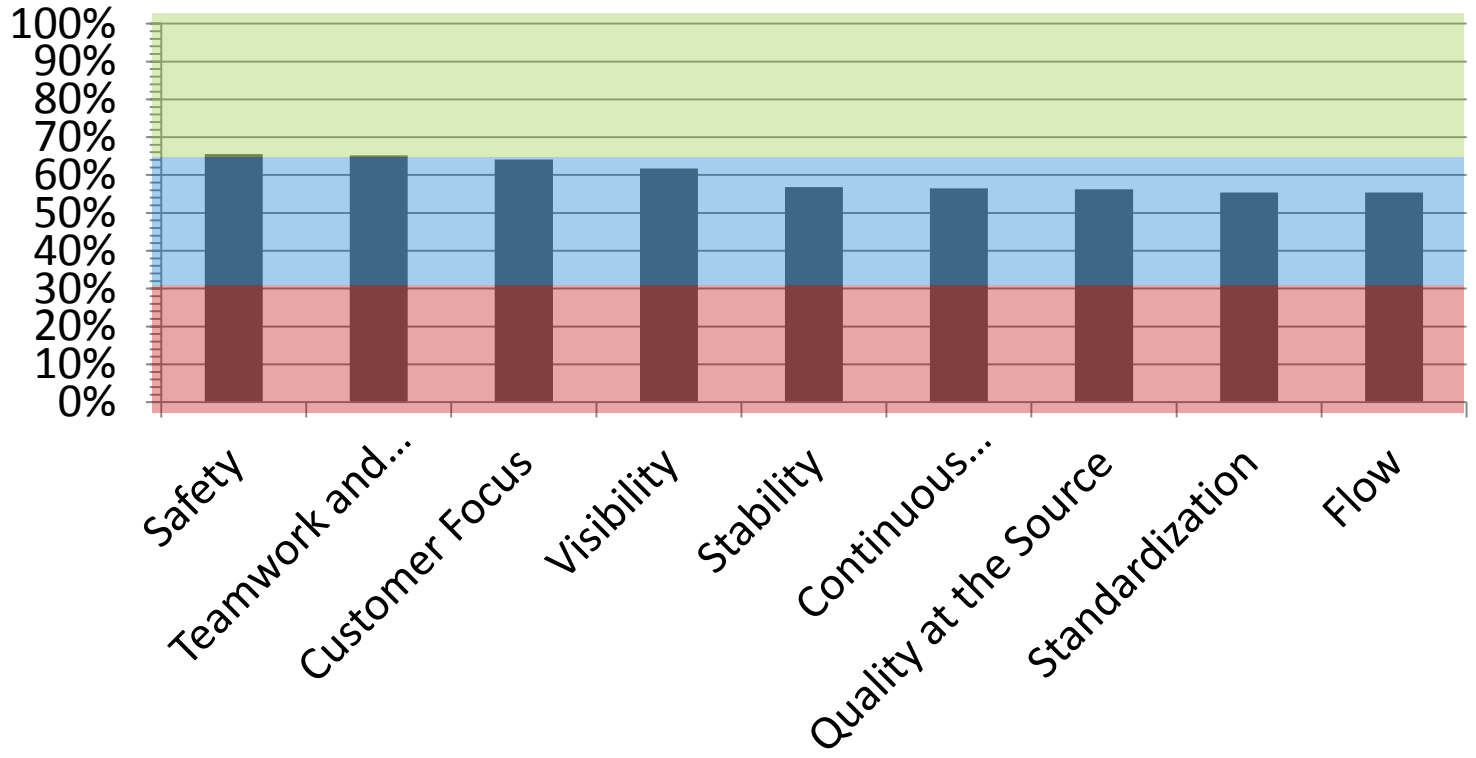
1 — **UNSTABLE** – No formal process or expectation in place

3 — **FUNCTIONAL** – Process exists, but it is loosely followed and rarely improved upon.

5 — **HIGH PERFORMANCE** - Formal process in place that is followed with discipline and continuously improved upon

Lean Warehousing Assessment Results

How Assessment Participants are Performing on Average *Per Category*:



Unstable | **Functional** | **High Performance**

Georgia Tech Supply Chain & Logistics Institute
Stewart School of Industrial & Systems Engineering

LeanCor SUPPLY CHAIN GROUP

Assessment Results

Assessment Area	Average Score
Our warehouse processes operate to the pace of customer demand.	3.9
Team members are encouraged to share best practices.	3.4
We manage a formal, behavior-based safety program.	3.4
Our facility is designed with safety as a priority (including equipment, ergonomics, and processes.)	3.4
Daily stand up meetings for each shift provide visibility to current conditions and learning.	3.4
Leaders spend time on the floor and engage in active problem solving with all team members in the operation.	3.3
We are committed to standard work, starting with leaders and extending to each team member.	3.2
Our KPIs are visible to all and can communicate the status of the operation's performance at any given time.	3.2
We engage in isolating key failure modes (or areas of defects).	3.2
Warehouse functions operate on a pull replenishment method – from the inbound supply base to outbound customers.	3.2
We know asset requirements in terms of facilities, infrastructure, and equipment. We leverage this information to ensure optimal uptime and asset utilization. We consider the impacts of scheduled and unscheduled worker time off in our labor resourcing.	3.1
We have a strong 5S system with regular discipline and floor-wide training.	3.0
We consider the total cost of fulfillment in our decision making.	3.0
Visual management in the facility enables team members to see, know, and act as a group.	3.0

Assessment Results

Assessment Area	Average Score
Customer expectations are visible and understood by all warehouse team members.	3.0
Team members are developed through formal training programs.	3.0
We have developed a quality dashboard from which to monitor performance.	2.9
We have a balanced personnel ratio target allowing flexibility to ramp up and down based on production demands.	2.8
We focus on the standardization of dunnage such as pallets and returnable containers.	2.8
Warehouse functions are connected to the inbound and outbound supply chain processes of the organization; we are focused on flow and speed as opposed to storage and stop-and-go strategies.	2.7
Warehouse strategy is driven by inventory strategy.	2.7
Regular Gemba walks occur to identify waste in the warehouse.	2.7
We use process and takt time to determine the number of resources (people and equipment) for the warehouse.	2.6
All team members engage in a formal problem solving process for continuous improvement	2.5
We level demand over available working time in the warehouse.	2.4
We implement poke yokes to error proof processes and prevent defects from happening.	2.3
We focus on standardization of products such as isolating and eliminating the cost of SKU complexity.	2.3

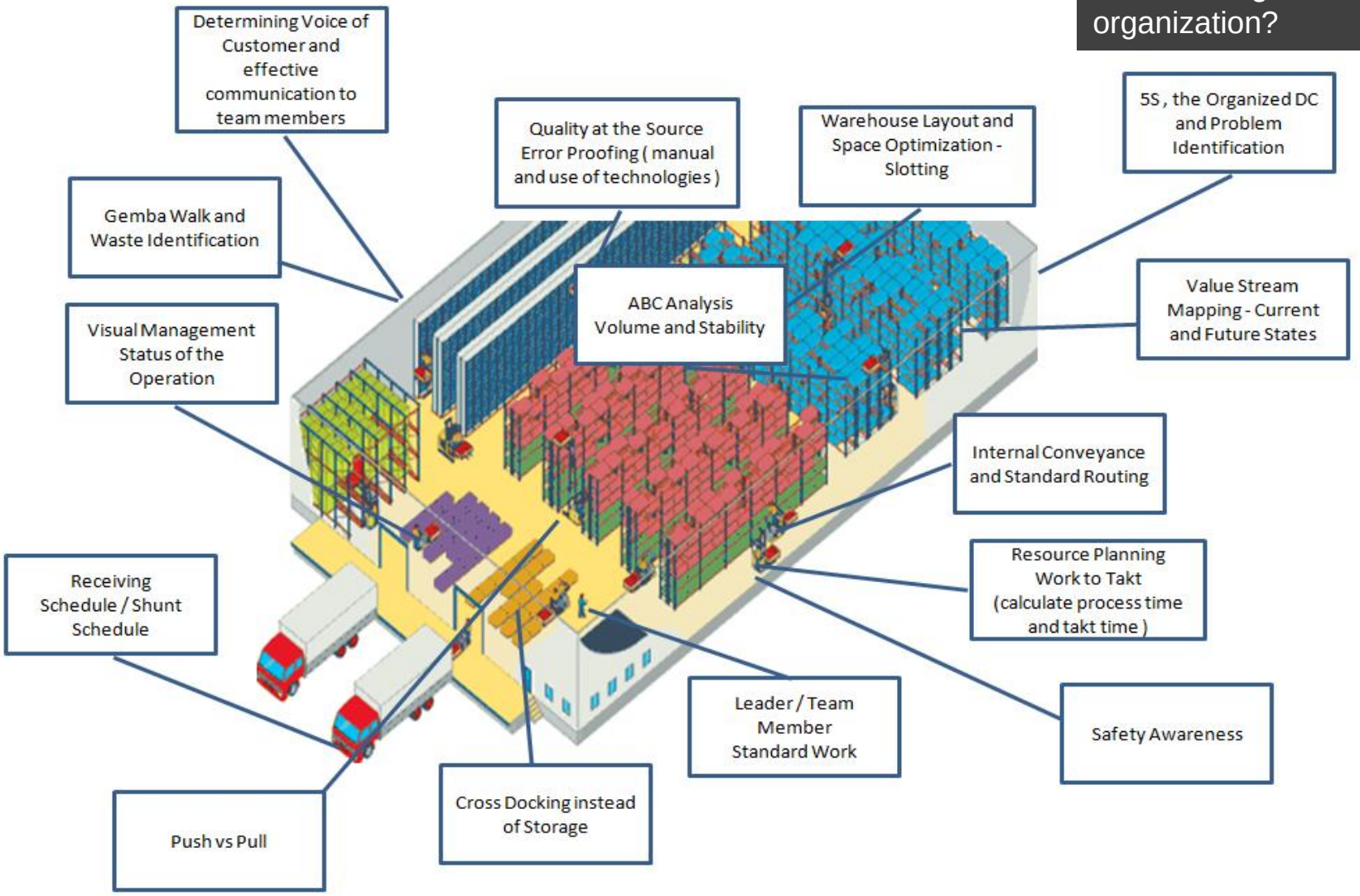
Assessment Results

➔ Out of a total 135 possible points…

LOWEST SCORE	AVERAGE SCORE	HIGHEST SCORE
27	80	135

The Lean Warehouse

Poll: Do you teach Lean and OpEx principles to all members of your warehousing organization?



Georgia Tech Supply Chain & Logistics Institute
Stewart School of Industrial & Systems Engineering

LeanCor SUPPLY CHAIN GROUP

Lean Fulfillment Stream: Guiding Principles

1. Make consumption visible throughout the fulfillment stream
2. Reduce lead time to enable pull and reduce inventory
3. Create level flow to reduce variation and enable stability
4. Use pull systems to reduce complexity and over production
5. Collaborate , solve problems and focus on process discipline
6. Increase velocity to drive flexibility to meet customer demand
7. Lead and make decisions based on Total Cost of Fulfillment

Why? To eliminate all waste so that only value remains for the customer.

Opportunity #1:

“Regular Gemba walks occur to identify waste in the warehouse.”

- To experience a situation first hand where value is being added
- To deeply understand what the customer wants and turn it into a remarkable experience
- To engage with other employees in improving the process and eliminating waste

Average Score:
2.7

Opportunity #2:

"We use process and takt time to determine the number of resources (people and equipment) for the warehouse."

Unload Takt Time & Work Planning Calculation Takt Time = Available Time / Demand		
Daily Demand - Trailers	**100**	Trailers
Shift Statistics		
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**
Takt Time = Available Time / Demand	**8.4**	**Minutes / Trailer**
Standard Work Process Times		
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
Standard Work - Process Time	**50**	**Minutes**
Total Resource Calculations		
Optimal Number of Team Members per Shift	6.0	Team Members

- Stabilize demand flow
- Stabilize process times
- Level out activity throughout the day
- Requires visibility to activities outside of the 4 walls

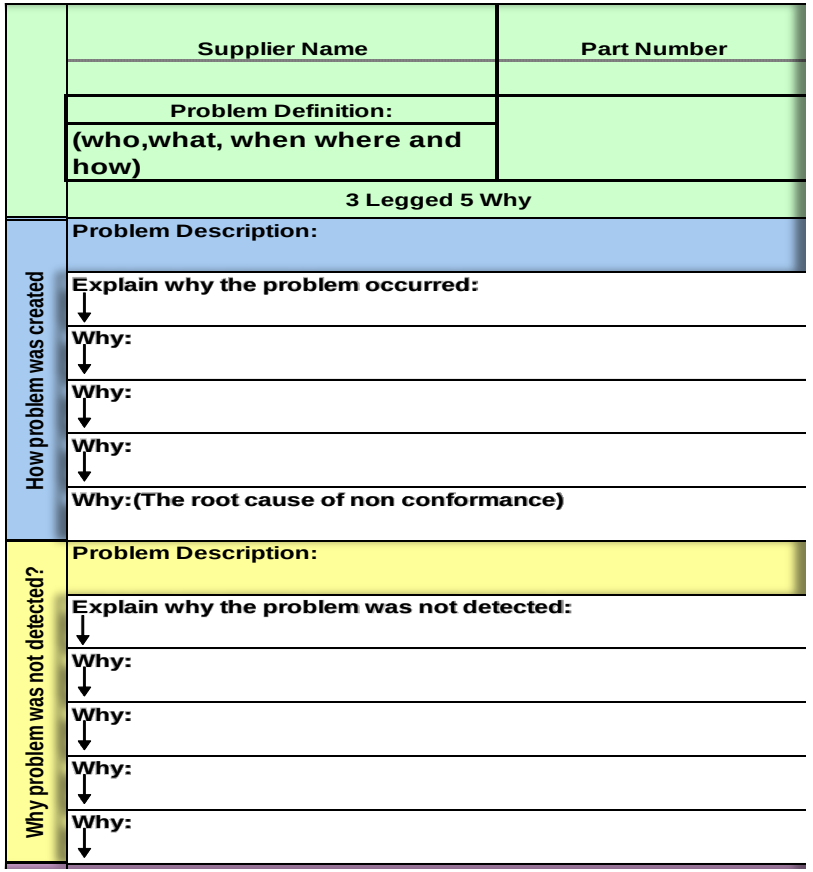
Average Score:
2.6

Opportunity #3:

"All team members engage in a formal problem solving process for continuous improvement."

- Drives operational initiatives forward
- Lean Leaders: respect for people
- Investment in people builds a strong foundation for the future
- Improvement projects can yield major returns and elevated customer service

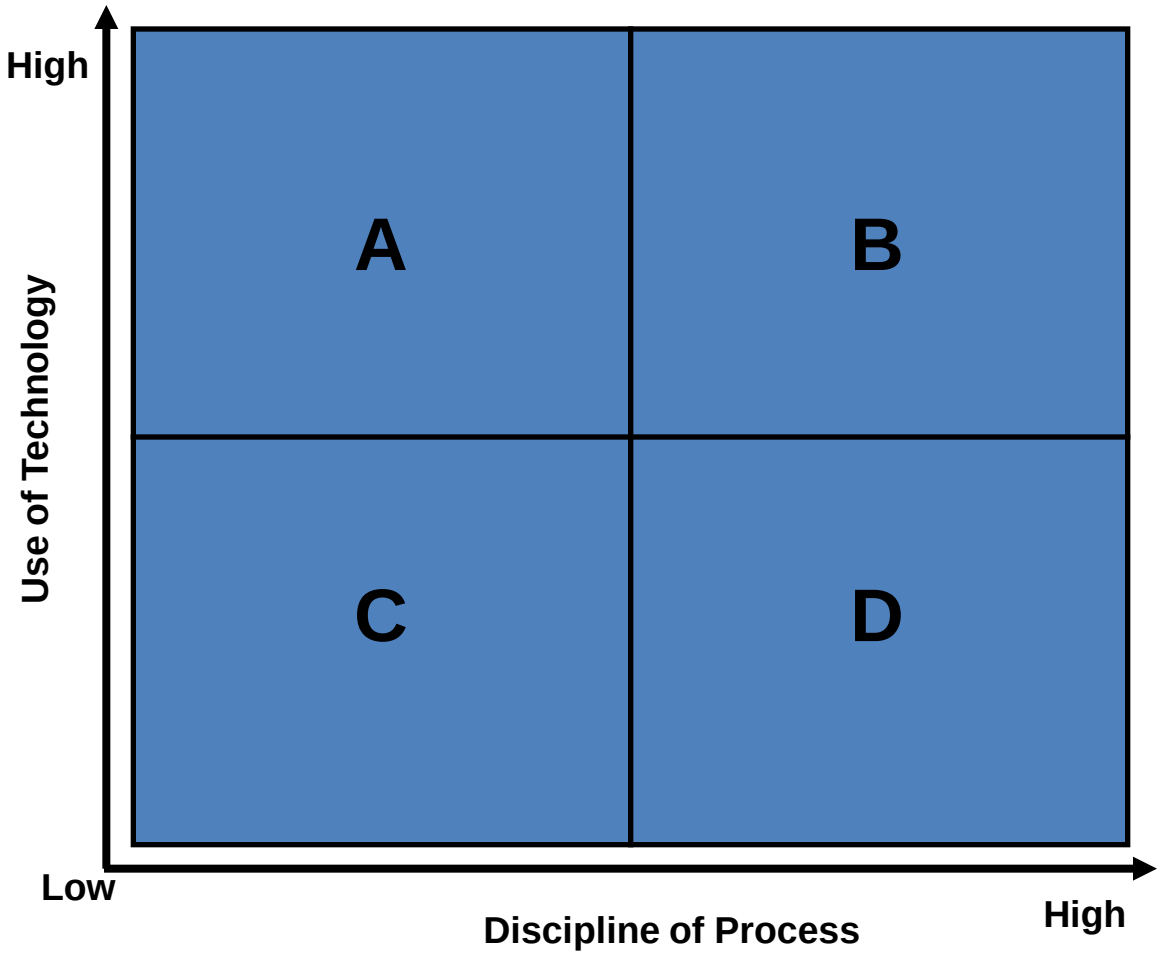
Average Score:
2.5



Georgia Tech Supply Chain & Logistics Institute
Stewart School of Industrial & Systems Engineering

LeanCor SUPPLY CHAIN GROUP

Technology vs. Process Discipline



Highest Performance

Lowest Performance

Poll: Which is the lowest performance operation?

Opportunity #4:

"We level demand over available working time in the warehouse."

Unload Takt Time & Work Planning Calculation

Takt Time = Available Time / Demand

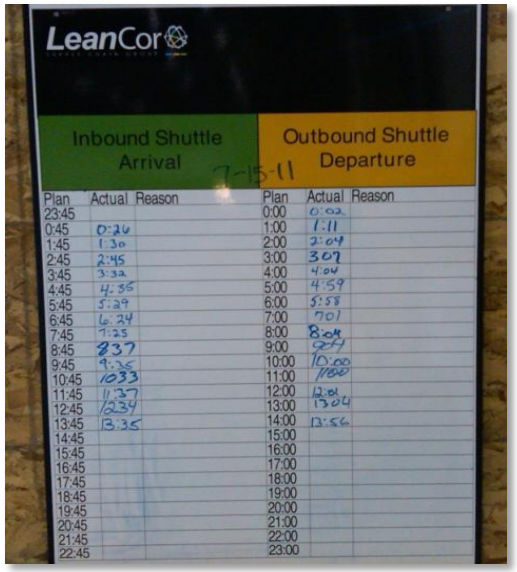
	Demand		What if ?		
	Demand		Demand	Demand	Demand
Daily Demand - Trailers	**40**	Trailers	**60**	**60**	**80**
Schedule Work Minutes / Shift	480	Minutes	480	480	480
Number Shifts Per Day	2	Minutes	2	2	2
Lunch Minutes	30	Minutes	30	30	30
Breaks	30	Minutes	30	30	30
Total Downtime Per Shift	60	Minutes	60	60	60
Total Working Time / Day	*840*	*Minutes*	*840*	*840*	*840*
Takt Time - Trailer Unloading	**21**	**Minutes Per Trailer**	**14**	**14**	**10.5**
Standard Work - Trailer Unload Process Time	**45**	**Minutes**	**45**	**30**	**60**
Total Work Demand Minutes - Per Day	1800	Minutes	2700	1800	4800
Avialable Time Per Team Member - Per Shift	420	Minutes	420	420	420
Optimal Number of Team Members	4.3	Team Members	6.4	4.3	11.4
Optimal Team Members Per Shift	2.1	Team Members	3.2	2.1	5.7
# Unloading Doors Required	2.1	Doors	3.2	2.1	5.7
# Lift Trucks Required	2.1	Lift Trucks	3.2	2.1	5.7

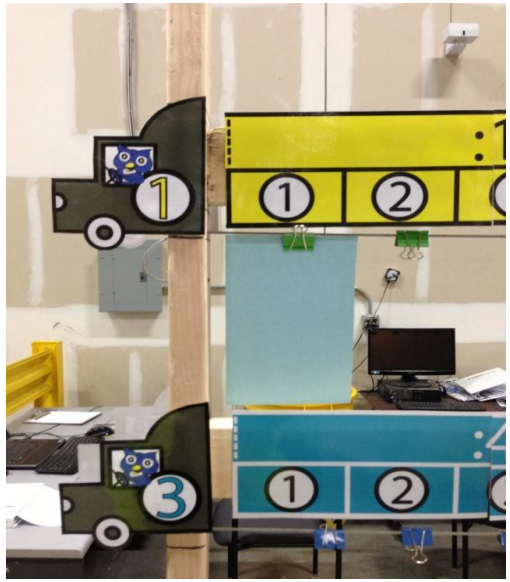
Average Score:
2.4

Georgia Tech Supply Chain & Logistics Institute
Stewart School of Industrial & Systems Engineering

LeanCor SUPPLY CHAIN GROUP

Shipping Schedule As The Pace Setter





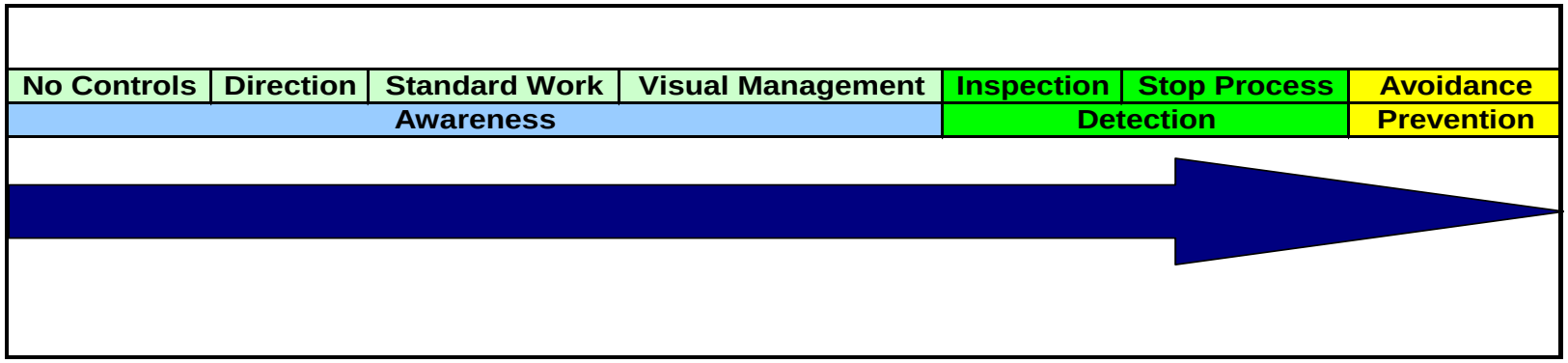
Disciplined Yard Management

Yard Spot	Suppliers				5:30	6:00	6:30	7:00	7:30	8:00	8:30	9:00	9:30	10:00	10:30	11:00	11:30	12:00	12:30	13:00	13:30	14:00	14:30	15:00	15:30	16:00	16:30	17:00	17:30	18:00	18:30	19:00	19:30	20:00	20:30	21:00	21:30	22:00	22:30	23:00	23:30	0:00	0:30	1:00	1:30	2:00	Trailer Return
MR01	Sup1	Sup2	Sup3			A								D	UL	R																														H - 210
MR02	Sup4	Sup5	Sup6	Sup7			A								D	UL	R																														H - 211
MR03	Sup8	Sup9	Sup10						A									D	UL	R																											H - 212
MR04	Sup11	Sup12								A									D	UL	R																											H - 213
MR05	Sup13	Sup14	Sup15											A								D	UL	R																							H - 214
MR06	Sup16	Sup17	Sup18	Sup19												A							D	UL	R																						H - 215
MR07	Sup20	Sup21	Sup22															A								D	UL	R																		H - 216
MR08	Sup23	Sup24	Sup25	Sup26															A								D	UL	R																	H - 217
MR09	Sup27	Sup28																			A									D	UL	R														H - 201
MR10	Sup29																					A									D	UL	R													H - 202
MR11	Sup30																							A										D	UL	R										H - 203
MR12	Sup31	Sup32	Sup33																								A																			H - 204
MR12	Sup31	Sup32	Sup33																								A											D	UL	R						H - 205
MR13	Sup35	Sup36																																			A					D	UL	R		H - 206

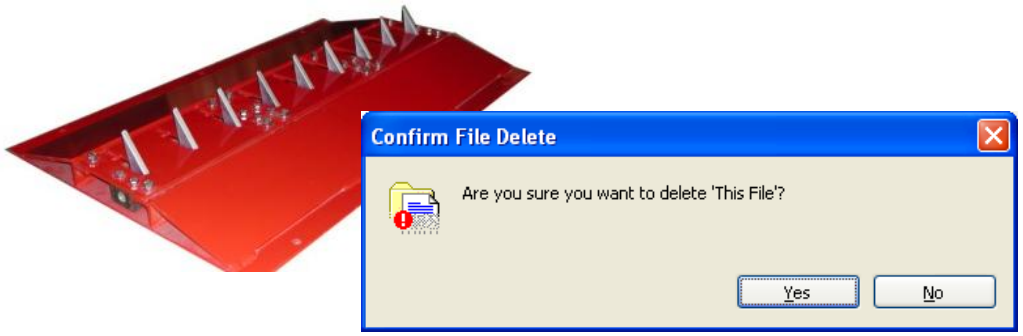
Key		
	A	Route Arrival
	D	Deliver Trailer to Dock Door
	UL	Unload Trailer
	R	Return Trailer to Yard

Opportunity #5:

"We implement poke yokes to error proof processes and prevent defects from happening."



- To error is human…all humans!
- People want to have quality in their work
- Errors turn into defects only if they are passed on
- Only 100% inspection will drive 100% error free
- People cannot accomplish 100% inspection



Average Score:
2.3

Opportunity #6:

"We focus on standardization of products such as isolating and eliminating the cost of SKU complexity."

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%		

- 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

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			

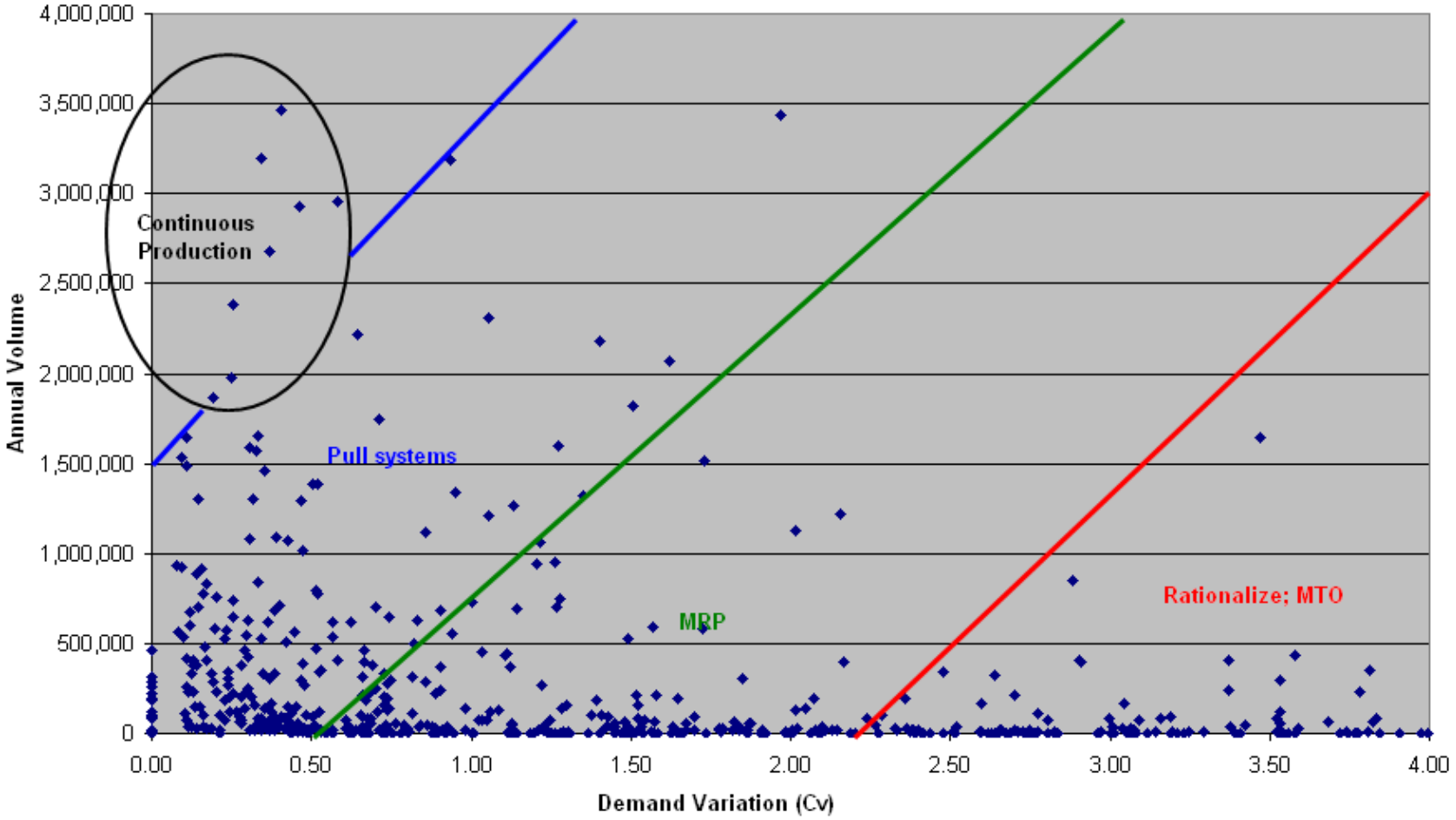
- A's - Continuous Flow - C of Variation < .0.2
- B's - Pull - C of Variation > 0.2 and < 1.0
- C's - JIT - Make to Order - C of Variation > 1.0

Average Score:
2.3

Georgia Tech Supply Chain & Logistics Institute
Stewart School of Industrial & Systems Engineering

LeanCor SUPPLY CHAIN GROUP

Stability and Part Behavior



The Costs of Carrying Inventory

Inventory Carrying Costs			
Raw Materials		$13,000,000.00	ADOH
Work in Process		$ 2,000,000.00	ADOH
Finished Goods		$25,000,000.00	ADOH
Total Average Days on Hand		**$40,000,000.00**	ADOH
	% Of	Avg Days on Hand	
Cost of Capital	7%	of Avg ADOH	$ 2,800,000.00
Administrative Overheads	2%	of Avg ADOH	$ 800,000.00
Excess Transportation	2%	of Avg ADOH	$ 800,000.00
Excess Space	2%	of Avg ADOH	$ 800,000.00
Obsolescence	2%	of Avg ADOH	$ 800,000.00
Shrinkage	1%	of Avg ADOH	$ 400,000.00
Damage	1%	of Avg ADOH	$ 400,000.00
Insurance	1%	of Avg ADOH	$ 400,000.00
Technology - Systems	1%	of Avg ADOH	$ 400,000.00
Taxes	1%	of Avg ADOH	$ 400,000.00
Total Inventory Costs	**20%**	**of Avg ADOH**	**$ 8,000,000.00**

Lean Warehousing: Continue Your Learning!

Webinar Attendees Can Use 20% Discount Code: ***Leanw14***

- **September 23-25** | Georgia Tech Supply Chain and Logistics Institute (Atlanta, GA)
- **Learn how to:**
  - Isolate the key elements of lean thinking to be used in the warehouse
  - Value stream map warehouse operations
  - Utilize lean tools to reduce waste in the warehouse
  - Create a warehouse operation based on visual management and real time problem solving
  - Reduce inventories in warehouse operations
  - Create collaboration between warehousing and other functional areas
- **To use discount code,** call: 404-894-2343
- **Learn more:** http://www.scl.gatech.edu/professional-education/on-campus-courses/course.php?id=leanwh

Georgia Tech Supply Chain & Logistics Institute
Stewart School of Industrial & Systems Engineering

LeanCor SUPPLY CHAIN GROUP

Thank You!

Q&A

bbossence@leancor.com

Learn how to apply lean to your inbound logistics!

Lean Inbound Logistics
Sept. 29-30, 2014
Savannah, GA
Tour the TARGET DC!
http://www.scl.gatech.edu/