



MOUNT FRANKLIN FOODS

BY: MATTHEW BRAXTON, SERGIO TELLEZ, PAUL HINOJOS, ZACHARY SOSA

TEAM

**Matthew
Braxton:
Project Lead**

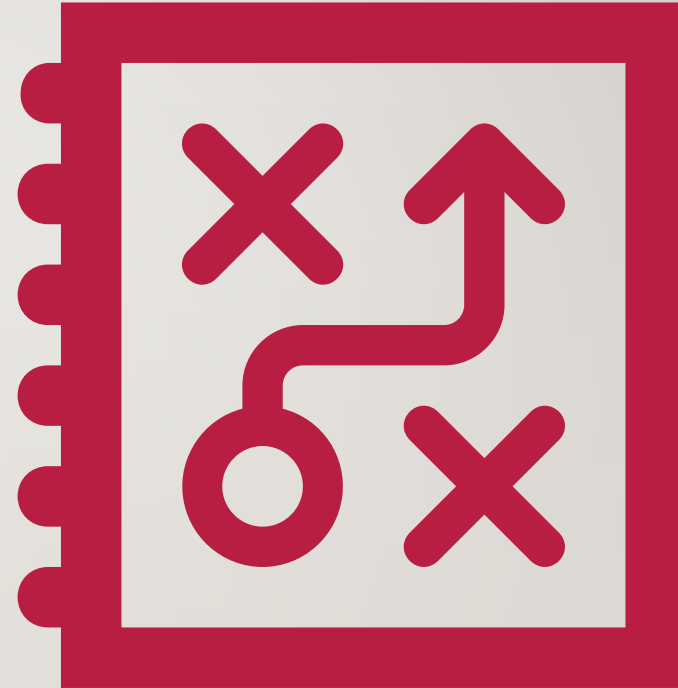
**Sergio Tellez:
Data Analyst**

**Paul Hinojos:
Data Analyst**

**Zachary
Sosa: Scrum
Master**



DEFINE



BACKGROUND

- Mount Franklin Foods is a local manufacturer and supplier for packaged goods. They import products from across the borderland region, ensuring each product is properly packaged, and stored at their distribution center before finally shipping them out to customers
- They take pride in using the latest quality control standards to achieve their goals, including Lean Six Sigma, S&OP, etc.



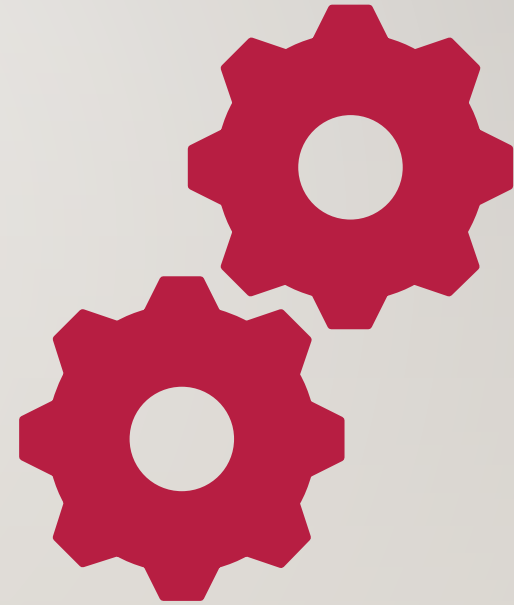
PROBLEM

- The distribution center isn't shipping enough goods on time to meet their expectations. Based on their internal KPI's, they only meet around 65-70% of the target goal on average per week. This results in approximately \$15,000 lost each week due to late fees .
- We have been tasked to raise the target percentage to 85-95% of the target goal, while also drafting the solution based on Lean 5S Methodology.



PROPOSED SOLUTION

- Create a Flex Sim simulation of an improved process that meets the target metric, follows Lean 5S methodology, and is easily accessible to stakeholders to review and improve.
- Data used will be collected on and analyzed on site using material & methods from the IMSE curriculum.



ASSUMPTIONS

- Project must be implemented without significant disruption to facility output
- Project must meet current company certification standards
- We will have to meet with contact once a week to ensure project iteration meets stakeholder needs
- We need to use software like Flex Sim and AutoCAD to draft designs and model current operations



CONSIDERATIONS

QUALITY

SAFETY



How will our project affect current company standards?



How will our project meet current industry standards?



How will our project efficiently meet desired KPI's?



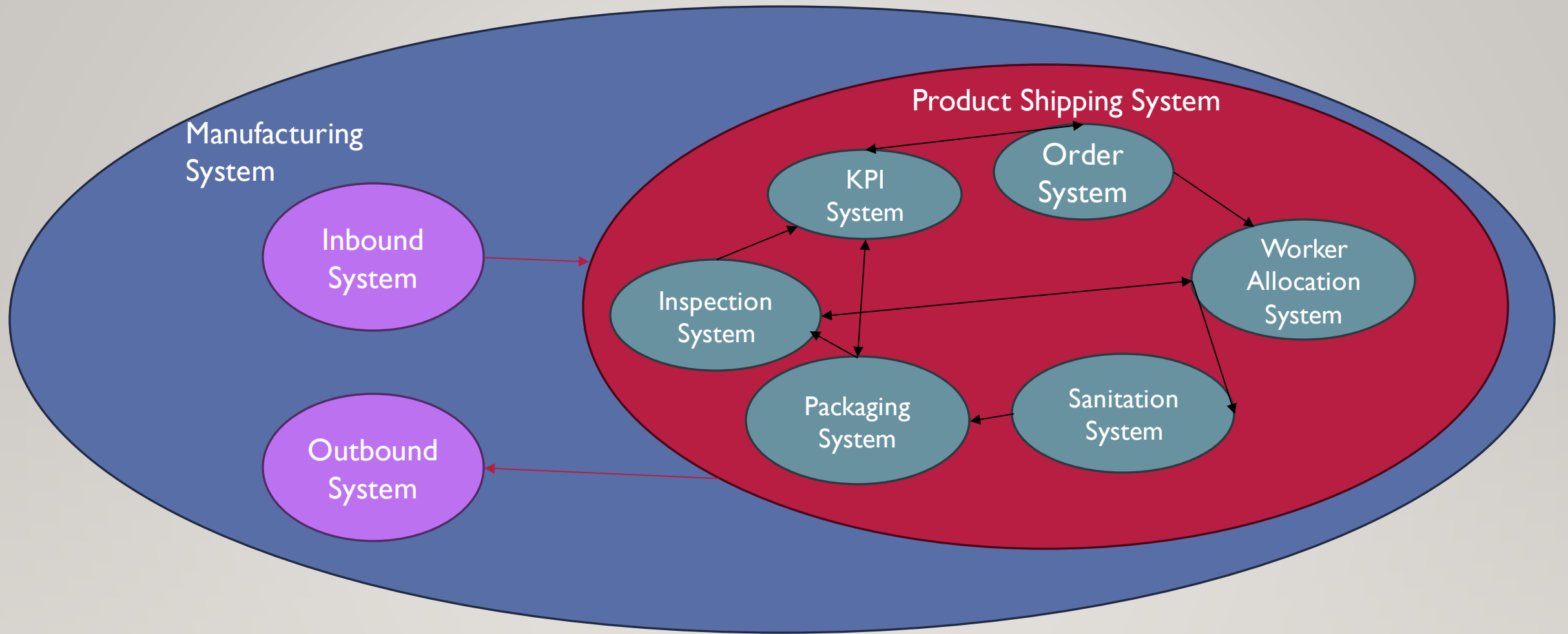
Will our project require the adoption of additional safety procedures?



Will there be additional PPE required to used upon implementation of our project?



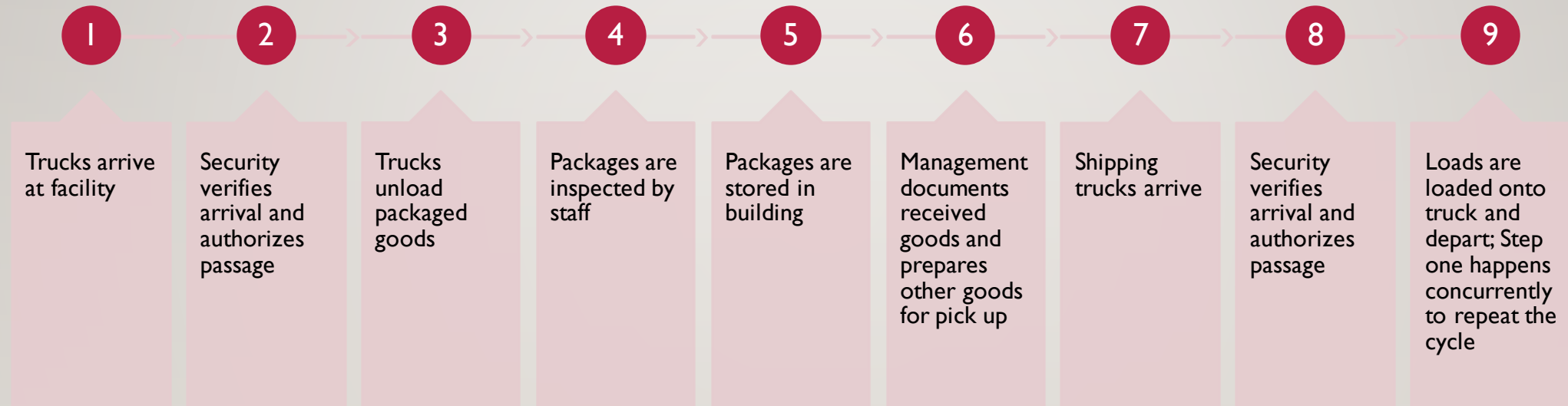
How will our project meet OSHA standards?



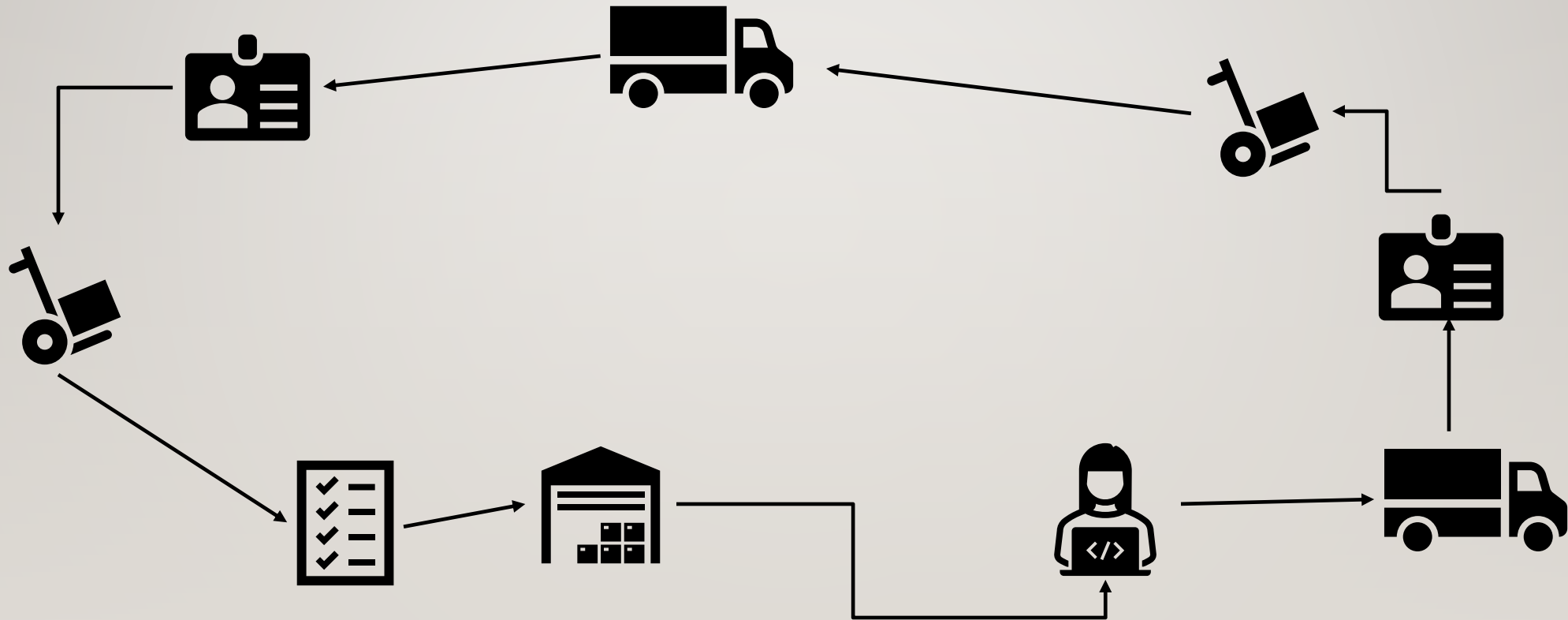
SYSTEM OF SYSTEMS



CONOPS: SEQUENCE OF EVENTS



CONCEPT OF OPERATION: DISTRIBUTION



OPSCON

MANAGEMENT

DELIVERY



Facility management uses necessary tools to document delivery of goods



Management uses necessary tools to calculate important KPI's to keep track of performance



Management inspects and authorizes goods to be shipped off to customers before loading



Management interacts with stakeholders to keep track of current partners, scheduled appointments, and changes in company policy



Trucks are given specific bays to unload to not conflict with goods to be shipped



Employees interact with truck drivers to verify delivery and unload goods



Employees unload goods for inspection and storage in the warehouse



SECURITY



Company management compiles a list of current partners, stakeholders, and employees to determine who needs access to distribution center



Company management issues necessary documentation for security guards so they are aware of who they should expect



Personal Identification is required by partners, stakeholders, and employees so security can verify if they were given proper access

SHIPPING



Trucks arrive at specified times to facility for pick up



Security verifies identity and sends them to loading bay



Employees communicate with shipping trucks for final verification and loading



Loading is conducted so goods can be shipped to final customers



Employees validate are goods are loaded to ensure quality control standards

STAKEHOLDERS AND THEIR INTERESTS



Gustavo Fierro- Director of Logistics & Warehouse:
Oversees daily operations and approves the implementation of projects



Jorge Valenzuela- Senior Process Engineer; Point of Contact:
Ensures students and sponsor are aware of current project deliverables, progress, risks, budget, etc.



Dr. Eric Smith-Professor
Ensure students are using past and current class material to design and present a project that meets sponsor needs



Alberto Reyes- Continuous Improvement Engineer; Point of Contact:
Ensures students and sponsor are aware of current project deliverables, progress, risks, budget, etc.



SYSTEM REQUIREMENTS

ABET CRITERION 2



The system shall be applicable to all shipping partners



The system shall follow company Key Performance Indicators



The system shall conform to LEAN Five methodology



The system shall be easily accessible to key stakeholders within the company



The system shall follow applicable laws



STAKEHOLDER REQUIREMENTS

ABET CRITERION 2



System must conform to company safety standards



System must conform to company quality standards



System must be adaptable to future company needs



System must be constructed using concepts from LEAN Methodology, Work Design, Systems Engineering, and Statistical Quality Control



System must meet KPI's by 85-95% on a weekly basis



CONTROLLING SYSTEMS

ENABLING SYSTEMS



PROCESS CONTROL SYSTEM



TIME MANAGEMENT SYSTEM



FEEDBACK SYSTEM



PACKAGE TRACKING SYSTEM



HUMAN RESOURCE SYSTEM



WORK MANAGEMENT SYSTEM



INFORMATION RESOURCE SYSTEM



TRAINING SYSTEM



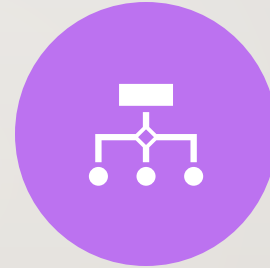
EQUIPMENT SUPPORT SYSTEM



SYSTEM VERIFICATION



Does the system follow safety and quality standards set by Lean 5S?



Are the system requirements specific and easy to follow?

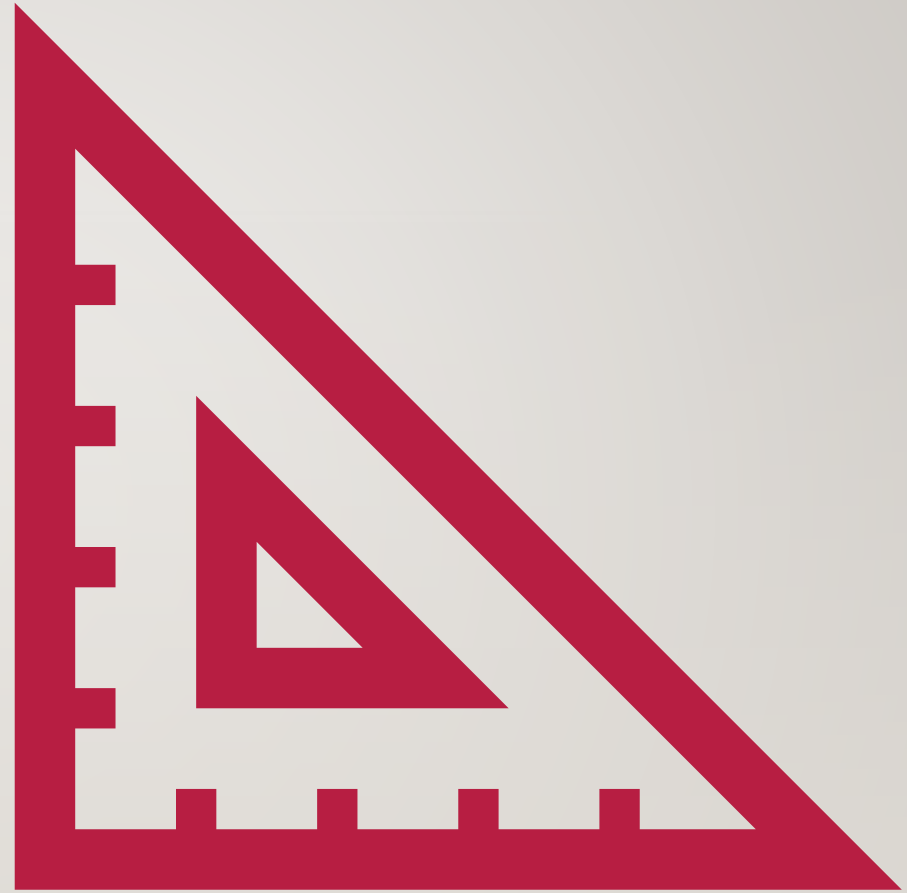


Are system requirements relevant to the problem we're trying to solve?



Does the system consider current and future company needs?

MEASURE



LEAN 5S METHODOLOGY

ABET CRITERION 7

- A systematic approach to workplace organization; emphasizes efficiency, competitiveness, and survival
- Originally developed by Hiroyuki Hirano for manufacturing companies in Japan, the principles of 5S translate well to the laboratory, the repair facility, and even the corporate office
- Implementation of 5S can lead to lower costs, better quality, improved safety, increased productivity, and higher employee satisfaction



PILLARS OF LEAN 5S



Sort: The process of removing all the items not needed for current production from the workspace.



Set in Order: The process of putting everything in a place that is easy to get to.



Shine: Removing all the dirt and grime and keeping the workplace clean on daily basis.



Standardize: Creates a system of tasks and procedures that will ensure the principles of 5S are performed daily.



Sustain: Gives staff the commitment and motivation to follow each step, day in and day out.



TIMWOODS

ABET CRITERION 7

- An acronym to represent the 8 wastes of lean.
- It aims to remove all different types of waste in work processes.
- Lean defines waste as an activity that the customer is not willing to pay for.



FOCUS AREAS OF TIMWOODS

- Transport- Moving the product around unnecessarily is a waste of time, effort, and increases the likelihood that it will be damaged.
- Motion- The “wear and tear” on the equipment or the people involved in the process. If you are transporting the product around unnecessarily, you are also wasting the motion of the trucks, forklifts and warehouse workers.
- Waiting- Time that the product is sitting there – not being transported or processed. Or the time that people are simply waiting for the product to arrive. The largest and most frustrating waste.




IE CONCEPTS USED

SOFTWARE USED


ABET CRITERION 3



VARIABLES TO MEASURE

 Load Times(Minutes)


 Cycle Times(Minutes)

 Standard Times

 Types of orders

 Waste of motion analysis per cycle

 Order Volume (by pallet)

 Resource Utilization(%)

 Inventory Location(Feet)



CURRENT PARAMETERS



Facility Operating Time: 24 hours



Shift per worker: 10 hours



Forklift speed: 4.5 mph



Total capacity per trailer: 36,000 lbs.



Average weight of pallet: 692.31 lbs.



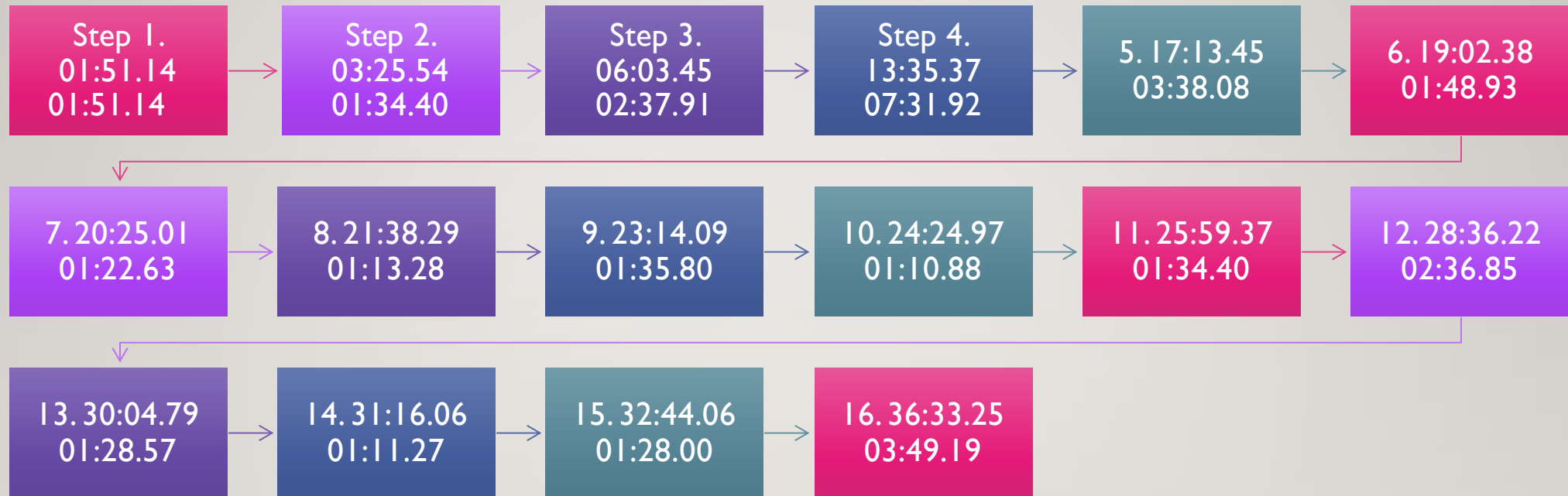
Average loads shipped: 63 loads per day; **UCL:75 loads ; LCL: 50 loads**



LOADING PROCESS

1. Loader is assigned bay to load; preps dock for loading
2. Loader locks trailer and verifies order is in correct bay
3. Loader retrieves forklift to load pallets
4. Pallets are scanned and picked; process repeats until load is complete
5. Trailer is unlocked and released

Average time to load: 2 hours for 52 pallets; **UCL: 2.5 hours, LCL: 1.5 hours**



SAMPLE: 03/13/2024 PROCESS TIMES



ANALYZE



PRELIMINARY RESULTS

Sample Number	Avg. Time C<(Minutes)	Avg. Time CT(Minutes)	Avg. Time P&S(Minutes)	Avg. Time LP(Minutes)	Avg. Time UT(Minutes)	Pallets	TT	PR
1	3.38	1.8	1.88	1.5	2.16	34	79.237	1.069576082
2	3.3	1.73	1.89	1.2	2	27	60.622	1.398007324
3	3.5	1.75	1.95	1.15	2.34	38	58.939	1.437927349
4	3.2	1.82	2	1.33	2.07	48	66.5125	1.27419658
5	3.24	1.76	1.85	1.4	2.23	25	69.598	1.217707405
6	3.35	1.9	1.88	1.43	2.11	53	71.06	1.192654095
7	3.41	1.3	1.95	1.25	2.3	45	62.866	1.348105494
8	3.21	1.67	1.98	1.29	2.14	20	64.668	1.310539989
9	3.56	1.85	1.96	1.34	2.05	48	67.235	1.260504202
10	3.45	1.78	1.76	1.75	2.7	24	85.5865	0.990226262
11	3.67	1.67	1.85	1.62	2.3	27	79.6705	1.063756346
12	3.12	1.7	1.5	1.55	2.2	1	75.752	1.118782342
13	3.03	1.83	1.45	1.34	2.12	43	66.3935	1.276480378
14	3.56	1.9	1.76	1.6	2.16	34	78.693	1.076969997
15	3.44	2.14	1.54	1.45	2.34	29	72.131	1.174945585
16	3.32	1.85	1.47	1.56	2.21	31	76.4745	1.108212541
17	3.4	1.69	1.73	1.52	2.23	36	74.8765	1.131863802
18	3.56	1.83	1.82	1.65	2.75	23	81.396	1.041205956
19	3.34	1.72	1.92	1.41	2.47	30	70.3545	1.204613777
20	3.54	1.5	1.91	1.52	3.5	27	76.0665	1.114156692

C<: Confirm and Lock Trailer

LP: Load Pallet

UT: Unlock Trailer

PR: Performance

Rating

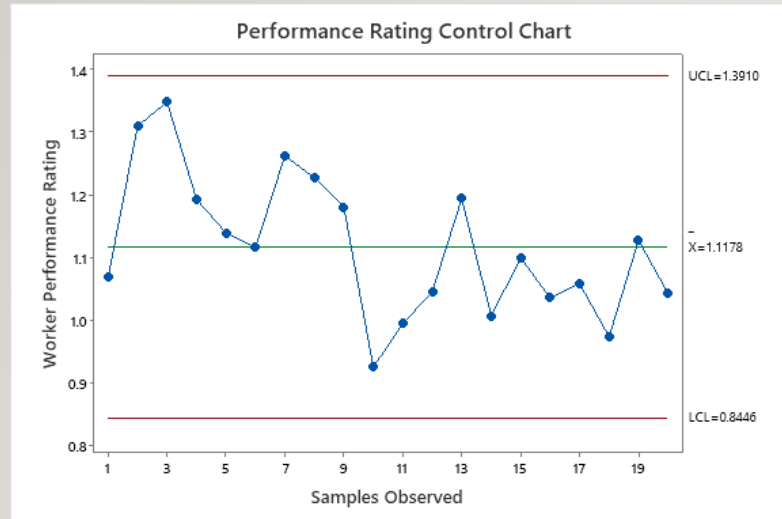
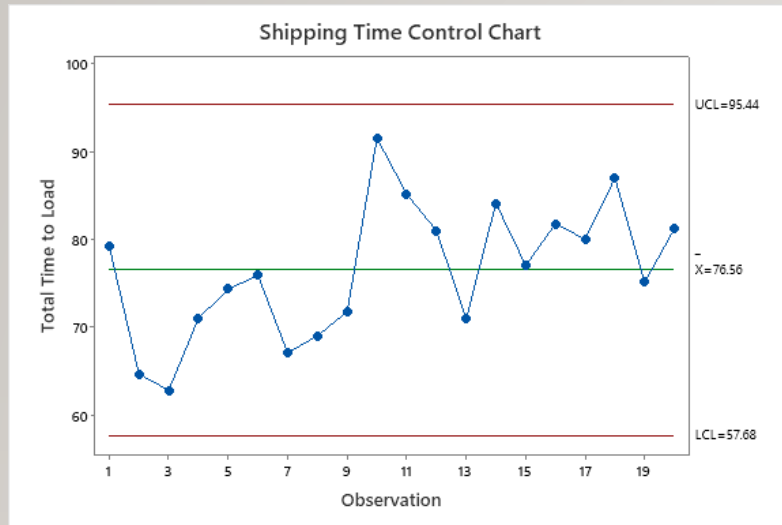
CT: Connect Trailer

P&S: Pick and Scan

TT: Total Time For Process



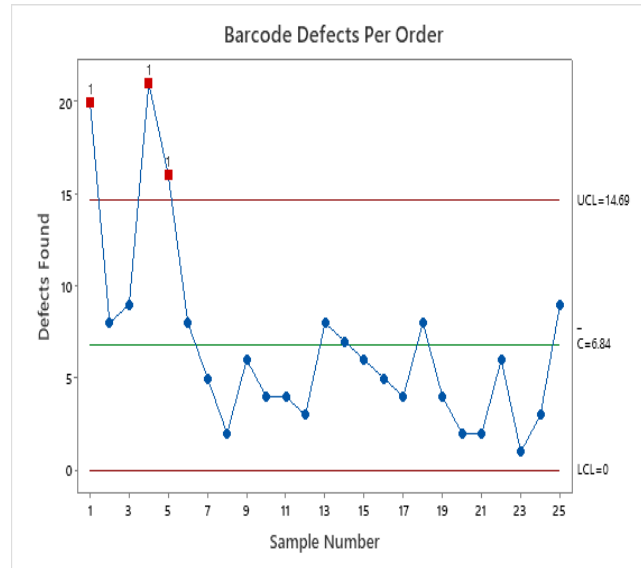
INDIVIDUAL CONTROL CHARTS



- Mean Shipping Times are within acceptable limits.
- Noticeable variation due to loading preference, delays, and unforeseen factors.
- Process is in statistical control; Mean Worker performance is approximately 12% above company expectations.
- Unforeseen factors include faulty scanners, unreadable bar codes, and wrong bay selection from truckers.



Barcodes	Defects
105	20
76	8
16	9
62	21
81	16
63	8
79	5
7	2
96	6
61	4
76	4
42	3
56	8
89	7
48	6
82	5
63	4
75	8
34	4
23	2
76	2
89	6
34	1
56	3
110	9



BARCODE DEFECTS

- At least 20% of order barcodes have some sort of defect.
- 3 out of 25 samples observed were outliers; process is not in statistical control.
- Defects that impacted readability of the code include tears, fading, and improper mounting.



OTHER OBSERVATIONS

- Facility Layout was organized efficiently;no current need to revise
- The same customers would arrive late
- Scanners were outdated or wouldn't work consistently across the facility



IMPROVE



LEAN 5S PROPOSED CHANGES



Update to new scanners.



Print better barcodes (reference appendix).



Make order numbers easier to input.



Force truckers to go to assigned bay.



SORT



**SORT ORDERS BASED ON PROBABILITY
CUSTOMER ARRIVES ON TIME.**



**STAGE ORDER PALLETS BASED ON
PRODUCT COMPLEXITY AND SIZE. LESS
COMPLEX ONES GO IN FRONT, OTHERS IN
BACK.**





SET IN ORDER



SANITIZE



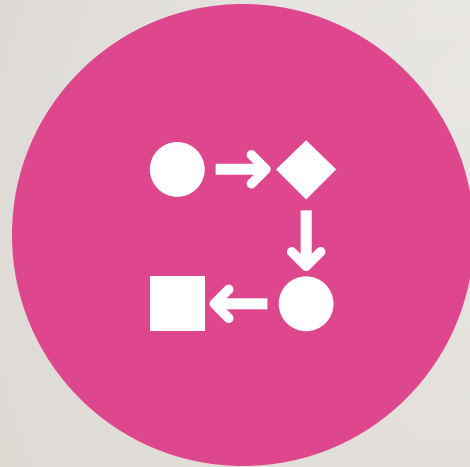
ENSURE AUDITORS ALSO
CHECK THE STAGING AREA IS
CLEAN AND FREE OF DEBRIS.



INVEST IN MORE DURABLE
PALLET FOR IN-HOUSE
OPERATIONS



STANDARDIZE



STANDARDIZE THE LOADING
PROCESS; PICK THE METHOD THAT
WORKS BEST AND STICK WITH IT.



LISTEN TO EMPLOYEE FEEDBACK

SUSTAIN

Continue daily standups

Refresh facility with new banners and signs

Invest Invest in dynamic lighting systems

Continue getting to know employees



EQUIPMENT RECOMMENDED

Zebra LI3678 1D Industrial Cordless Barcode Scanner



Q. More Images

Rugged scanner for shipping and warehouse areas.

- For warehouse and industrial applications.
- Reads dirty, damaged barcodes.
- Bluetooth compatible.
- Includes base, battery, cradle adapter cable and USB cable.



1D
BARCODE

\$1,010 Each(x15)



English and Spanish Banners
Set of 4 each: \$159



LabelTac® Pro 2 Industrial
Labeling System

\$999 (x5)



Print Ribbon
\$1680 Per Set(x5)

Total Estimated Cost:\$28,868

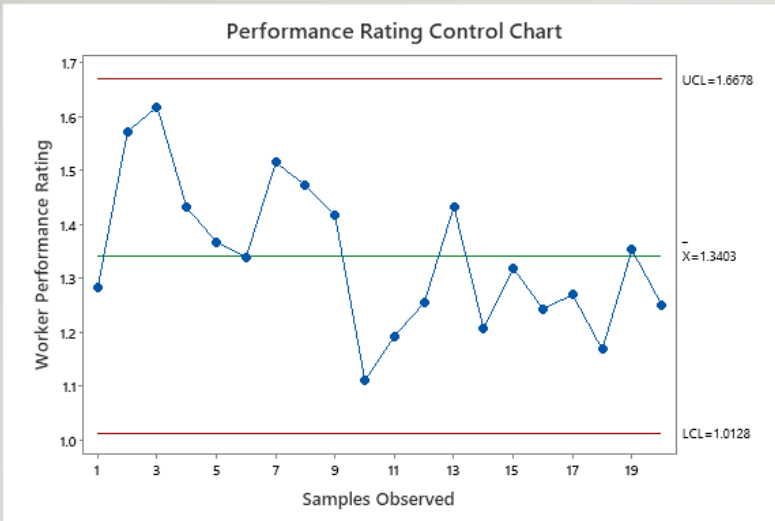
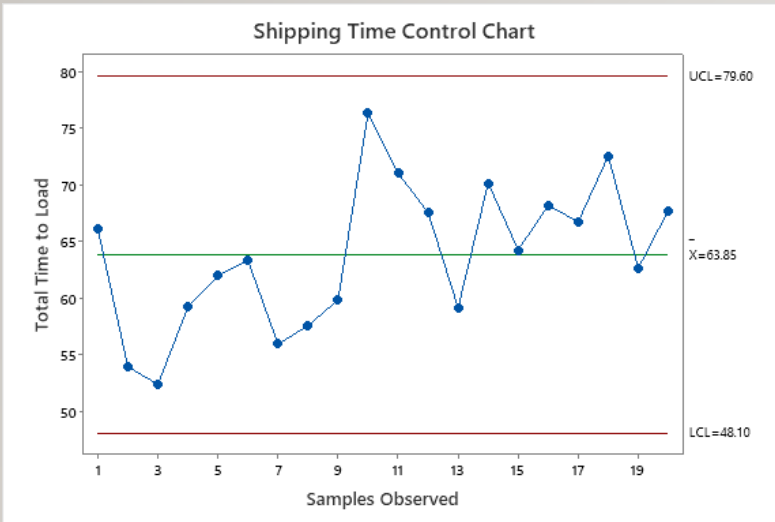


TT(LEAN5)	PR(LEAN5)
66.083658	1.282465326
53.961468	1.57056513
52.416066	1.616870675
59.242773	1.430554238
62.014572	1.366614285
63.318948	1.338461909
55.974744	1.514075705
57.591036	1.471583182
59.873694	1.415479726
76.341441	1.110144096
71.038869	1.193008858
67.572348	1.254211264
59.171883	1.432268093
70.166922	1.207834085
64.268874	1.318678774
68.203269	1.24260906
66.757113	1.269527638
72.563004	1.167950544
62.673849	1.352238635
67.749573	1.250930393

LEAN 5S ADOPTION DATA



LEAN 5S ADOPTION



- At least 16.6% reduction in Total Time.
- Little to no Change in Variation.
- 20% increase in Performance Ratings
- Fulfillment Rate increased to 89%; within the acceptable range.
- To be 99% confident, 60 more samples need to be taken.

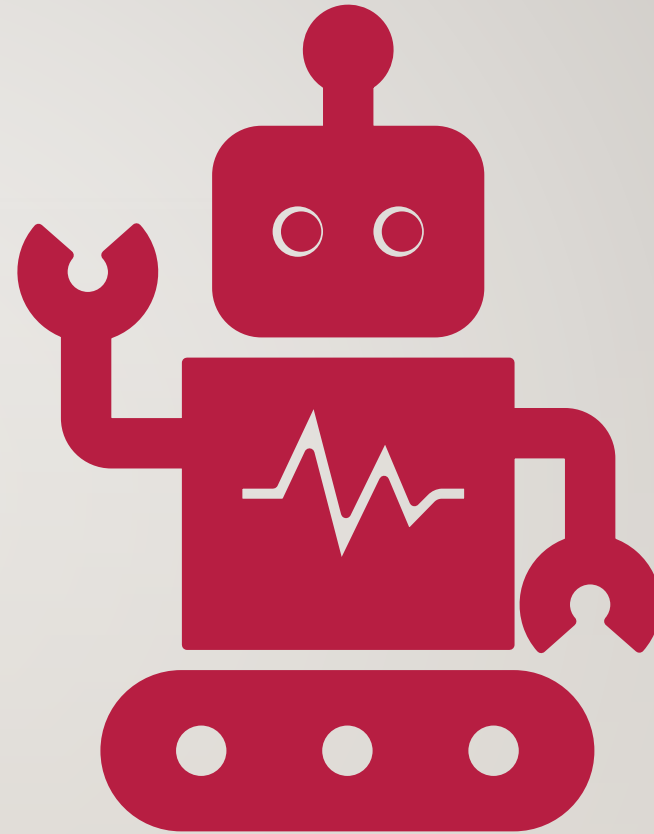


COST BENEFIT ANALYSIS

- Current Cost Losses Per Week: \$15,000
- Maximum Losses after Lean 5S: \$7000
- Cost Savings per Week: \$8,000
- Standard Payback Period: 3.5 weeks



CONTROL



IDEAS

Conduct random time studies to record data and illicit employee feedback.

Assign Auditors with measuring the total number of defects each barcode sticker has.

Ensure scanner software is up to date on a weekly basis.

Continue updating key KPI's on a weekly basis.

Illicit customer and trucker feedback after several orders.



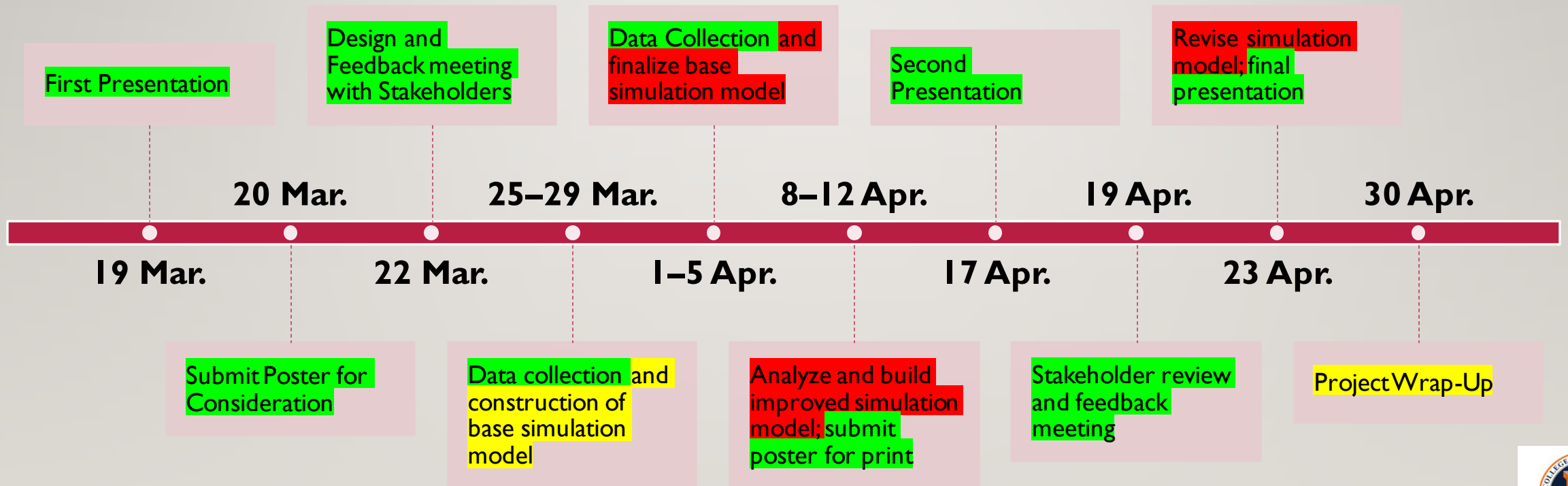
PARTNERSTO REACH OUT TO

- UTEP IMSE Department
- STTE Foundation
(Hackathon)
- UTEP OSCM Department
- Creative Safety Supply



CURRENT AGENDA & MILESTONES

ABET CRITERION 5



REFERENCES

- <https://www.creativesafety.com/content/PPC/5S-poster/index.html>
- Ryan, M., & Wheatcraft, L. (2023, June 1). INCOSE Guide to Writing System Requirements. San Diego; INCOSE.
- Walden, D. D., Roedler, G. J., Forsberg, K. J., Hamelin, R. D., & Shortell, T. M. (Eds.). (2015). *INCOSE Systems Engineering Handbook: A guide for system life cycle processes and activities* (4th ed.). Hoboken, NJ: Wiley.
- Srinivasan, Siddarth, "The impact of 5S on the safety climate of manufacturing workers" (2012). LSU Master's Theses. 396.

ANY QUESTIONS?

APPENDIX

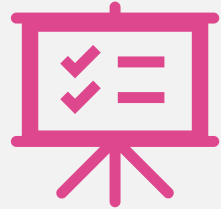


ABET CRITERION 2

- We satisfied this criterion by taking into consideration current and future standards and goals of the company, as well considering the needs of customers and stakeholders.



ABET CRITERION 3



WE ARE CURRENTLY SATISFYING THIS CRITERION BY DOCUMENTING ALL RELEVANT DATA PROVIDED BY THE COMPANY AND THROUGH INDEPENDENT ANALYSIS.



WE HOPE TO FULLY EXPLAIN THE BENEFITS AND SAFETY MEASURES WHEN WE HAVE FINISHED DESIGNING OUR INITIAL SIMULATION

ABET CRITERION 5

- We are currently satisfying this criterion through weekly meetings and through communicating via Microsoft Teams, WhatsApp, emails, etc.



ABET CRITERION 7

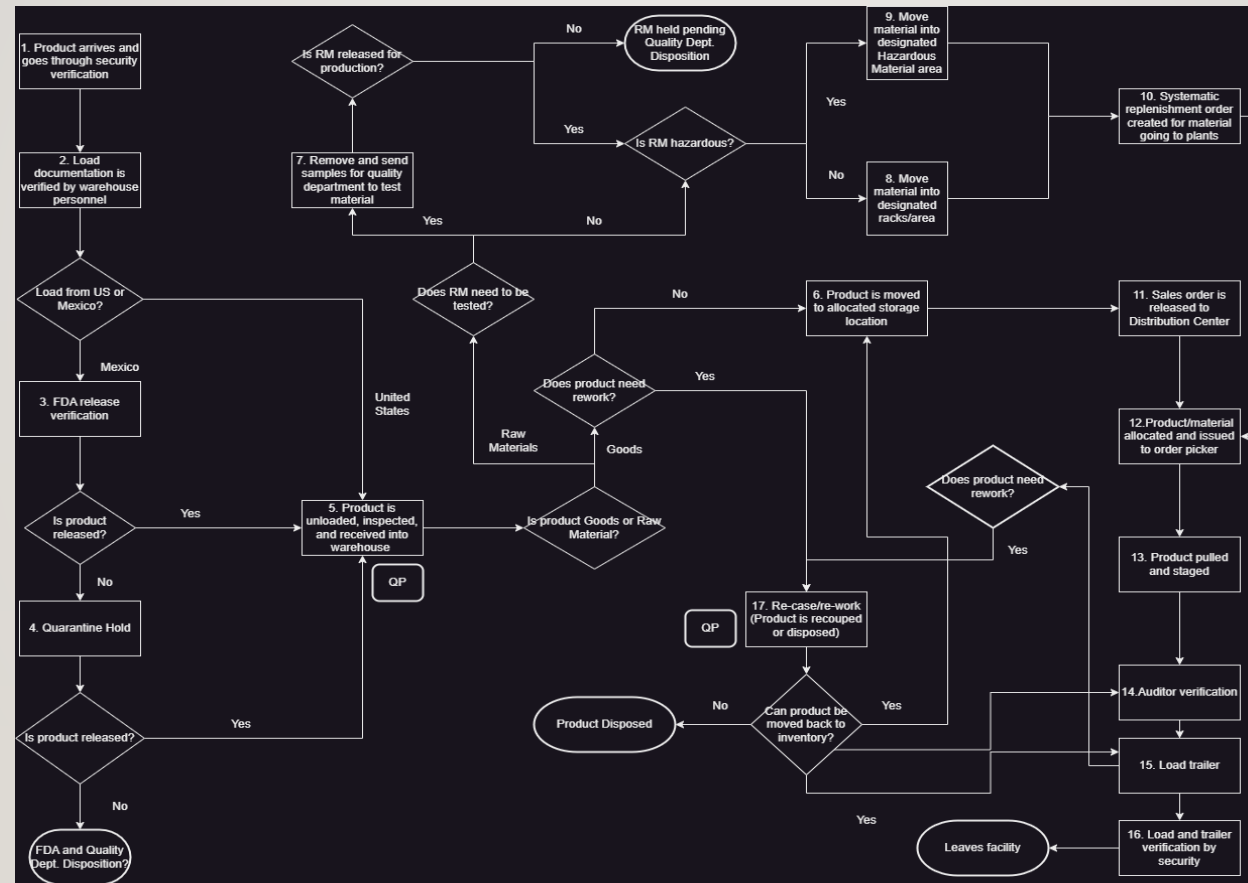


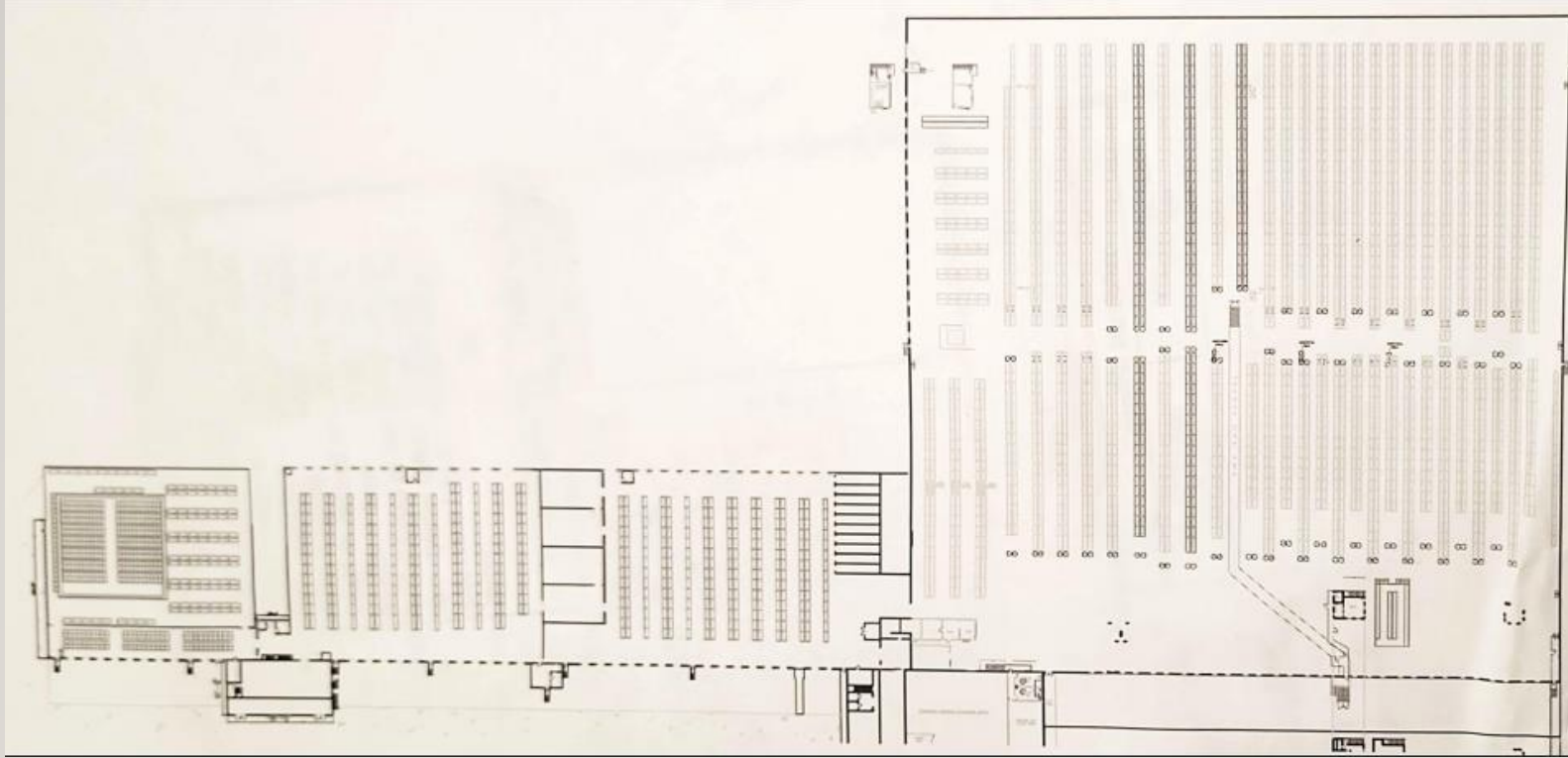
We are currently satisfying this criterion by actively listening to project stakeholders, how they complete their work, and soliciting any relevant data to help us complete our data.



We are also researching how to efficiently design and test our system through online documents, papers, and textbooks from previous coursework.

DC FLOW CHART





FACILITY LAYOUT

SAFETY TAC BROCHURE

FLOOR MARKING GUIDE

Source: OSHA Standard 1910.22
 OSHA regulations require that permanent aisles and passageways must be marked appropriately and in a consistent manner plant-wide.

RECOMMENDED FLOOR MARKING COLORS		LINE WIDTHS
YELLOW	Aisleways & Traffic Lanes; 'Paths of Egress'; Work Cells	For maximum visibility/awareness, the minimum width required for facility aisle and floor marking lines is 2" , any width above that is considered acceptable by OSHA and ANSI. Most applications use tape or painted lines with 2" - 6" widths. Lines wider than 6" are acceptable, but more cost-prohibitive and harder to apply.
WHITE	Production -OR- Racks, Machines, Carts, Benches	
RED	Defect/Scrap Area; Red Tag Area	
ORANGE	Material or Product Inspection -OR- Energized Equipment	
GREEN	Materials & Manufacturing: Finished Goods	
BLUE	Materials & Manufacturing: Raw Materials	
BLACK	Materials & Manufacturing: Works In Progress	
BLACK/YELLOW	Areas which present physical or health risks to employees	2 in ✓ 3 in ✓ 4 in ✓ 6 in ✓
RED/WHITE	Areas to be kept clear for safety reasons	AISLE WIDTHS "Sufficient safe clearances" must be provided where mechanical equipment is used. Aisles for forklift and truck traffic should be wider than aisles for pedestrians. A good average aisle width is 36 inches. Storage rooms containing flammable and combustible liquids must have aisles at least 36 inches wide. For emergency exit access points, 28 inches is the minimum aisle width.
BLACK/WHITE	Areas to be kept clear for operational purposes	

The colors above are commonly used, and comply with OSHA or ANSI standards. These designations are not governed by law. They can be modified to fit the needs of specific facilities. They are intended as a useful starting point for most applications. If modified, display a guide in a conspicuous location where they are used.

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A - B - 01
 AISLE BAY LEVEL

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