

# UB Package Delivery System

Lean Six Sigma

IE 409 Final Presentation

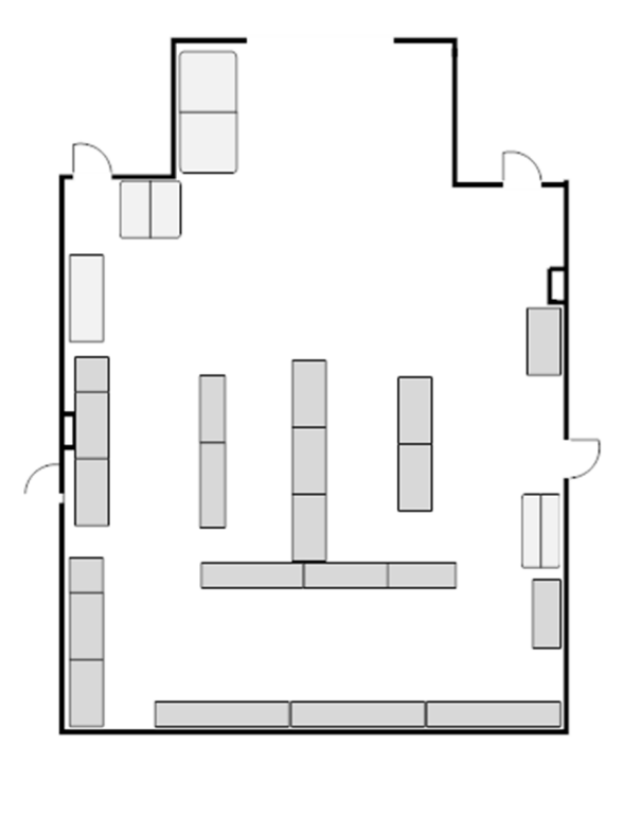
Group members: Joseph Brown, Thomas Darlington, Nicholas Delgobbo,  
Udara Dharmasena, Christopher Diaz, Michael Marra, Bin Ken Pang,  
Kwangil Suh, On Tao Tiong, & Fallon Waxman

# Overview

- ▶ The project goal was to examine and make possible improvements to the Package delivery system at UB.
- ▶ Our project team of 10 individuals broke into smaller teams of 3-4 to work with the Ellicott, South Lake, and Governors mail rooms.
- ▶ Each sub team examined the mail rooms' layouts, applied 5s when able, and examined process queuing data.
- ▶ It was found that there was an obvious lack of communication between the mail rooms, and that generally processes could be improved through 5s practices and layout improvements.

# Ellicott Packaging Center- Overview

- ▶ The mailroom that has the most throughput of packages at the University at Buffalo
- ▶ The reason for the high amount of throughput is because the Ellicott complex serves over half of the total students that live on campus at the University at Buffalo
- ▶ This causes long lines at the opening of the mailroom, higher worker utilization, and repetitive movements of the employees.
- ▶ For this project our group only looked at the packages coming into and out of the mailroom and did not consider regular envelope mail because that category of mail is placed directly into the students' mailbox when received.



# Ellicott Packaging Center-Define System

1. The packages are received from USPS, UPS, Fed Ex, or DHL before 2 P.M. every day that the respected package carrier delivers.
2. The packages are logged into the computer software system and assigned a package number based on sequential order of input. When the packages are input into the system, the system sends an email to the student that they have a package in the mailroom.
3. A package identification slip is printed for each of the incoming packages and placed on one end of the package.
4. The package is then placed onto a storage shelf within the mailroom, sorted by the dorm that student lives in, and the size of the overall package. The size categories are small, medium, large and very large.
5. A blue package notification slip is placed into the students mailbox, the student needs this slip to pick up their package.
6. The student takes the blue package notification slip to the window during business hours and signs for the package in a log book. The mailroom employee then retrieves the package from the shelf representing what dorm the student lives in.
7. The mailroom employee logs into the package system that the student has picked up the package. This step is important because the database gives the mailroom employees an idea of the quantity of packages currently in holding.

# Ellicott Packaging Center- Measure of System

- ▶ From the data collection a total of 57 data points were taken ranging over a 26 minute time frame.
- ▶ The data was analyzed using Arena's input data analyzer and was found to have a Weibull distribution of:  $11.5 + \text{WEIB}(41.5, 1.98)$ .
- ▶ The average number in queue was taken approximately every 2 minutes.
- ▶ average of 6.89 students in queue

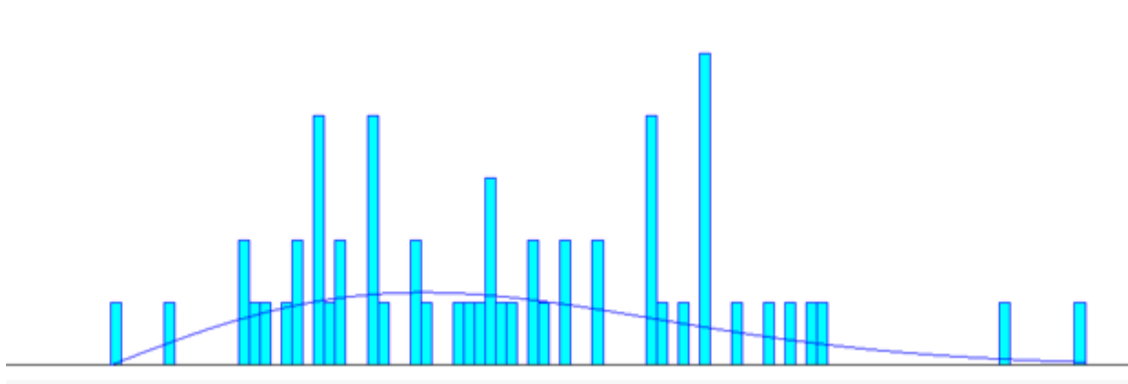


Figure 1: Service times for students picking up packages

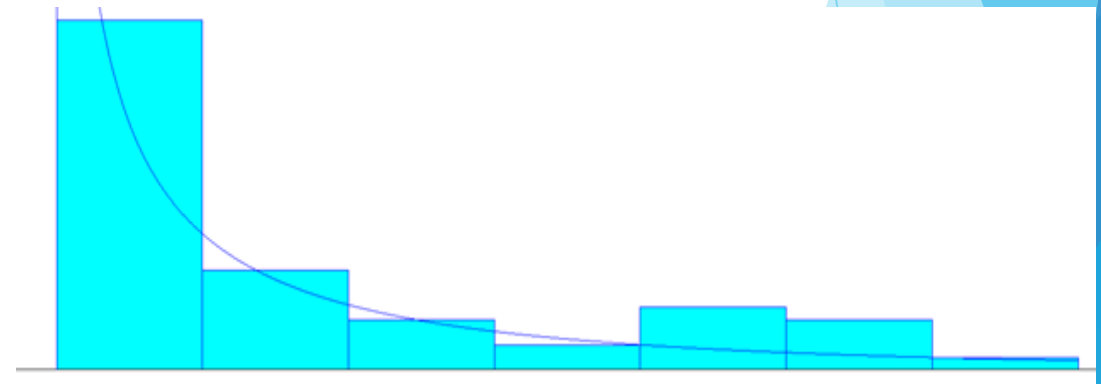


Figure 2: Inter-Arrival time for students picking up packages

# Ellicott Packaging Center- Analyze System

- ▶ Proposed analysis a layout project that would reduce the service time and movement of employees.

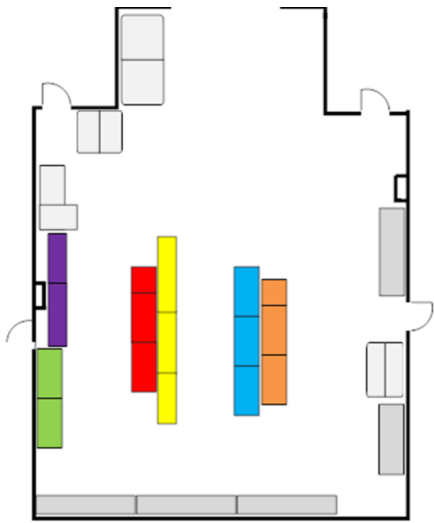


Figure 4: Proposed Layout One

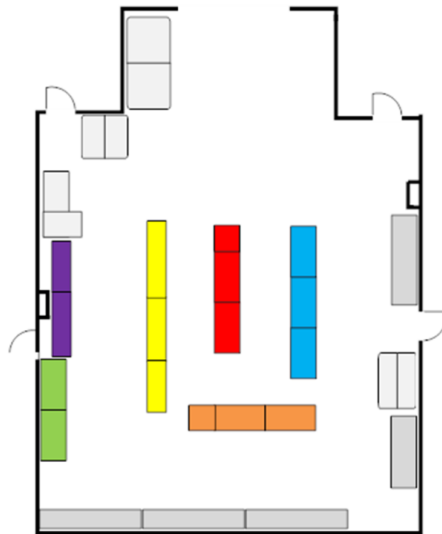


Figure 5: Proposed Layout Two

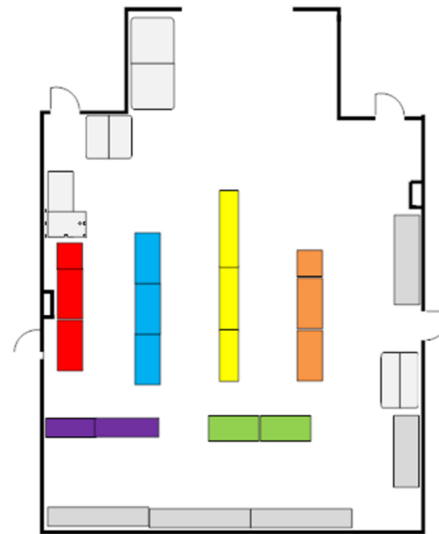


Figure 6: Proposed Layout Three

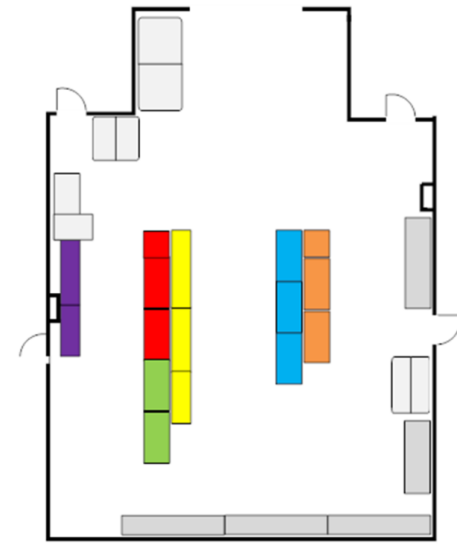


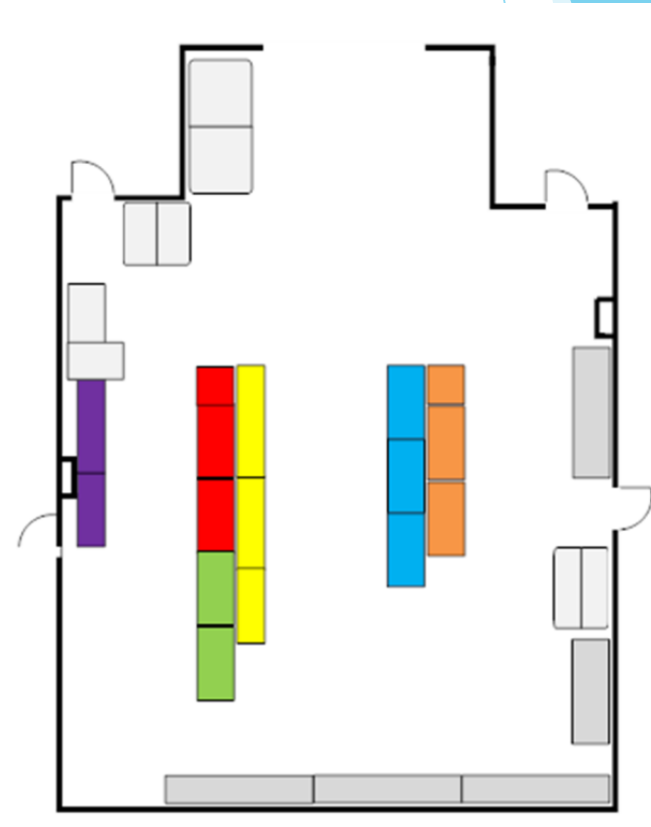
Figure 7: Proposed Layout Four

# Ellicott Packaging Center- Improve System

- ▶ Proposed solution number four was selected by Mr. Bauss for his new mailroom layout.

<b>Layout</b>	<b>Average Service Time (Seconds)</b>
Current	48 Seconds
Proposed 1	46 Seconds
Proposed 2	47 Seconds
Proposed 3	47 Seconds
Proposed 4	45 Seconds

*Table 1: Average Service Time for Each Layout*



*Figure 7: Proposed Layout Four*

# Ellicott Packaging Center- Control System

- ▶ Proposed solution number four was selected
- ▶ Though the implementation will not be completed until summer 2015, because Mr. Bauss and the group agreed that it would be inefficient to complete the implementation immediately due to the volume of packages within the mailroom and the limited time Mr. Bauss currently has because it is a busy time of year for him with the holidays approaching.



# South Lake Packaging Center- Define System

- ▶ Defining the process at the South Lake complex is a packing center that handles the mail, packages and office supplies for 16 buildings.
- ▶ The package exchange procedure is as follows:
  1. A student comes into the packing office, shows the worker his/her UB ID card and states their room number.
  2. The worker goes to the packaging room and identifies the package in the corresponding building shelves.
  3. The worker then returns to the counter and has the student sign out the package.
  4. The student has to sign for the package, verify the package number, record the amount of packages picked up, the date of pickup and the time of the pickup.

# South Lake Packaging Center-Measure System

- ▶ The packaging storage room was measured to be 14' long by 6' wide by 10' tall, for a total area of 840 ft<sup>2</sup>.
- ▶ The label font was measured at 36 for the package number in the current label layout, with 16 font for the name, building number and shipping type/company. Lastly the time and date of arrival was in 10 point font

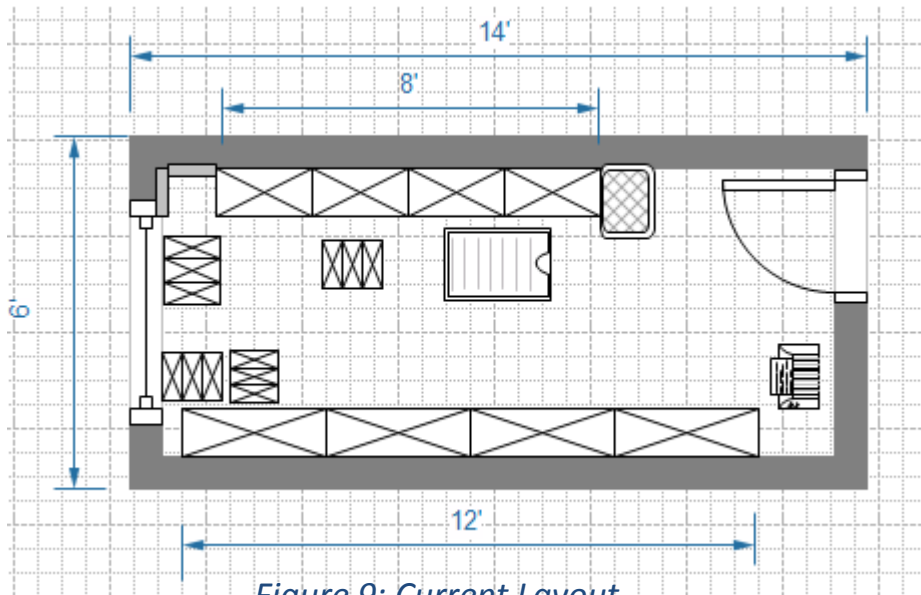


Figure 9: Current Layout

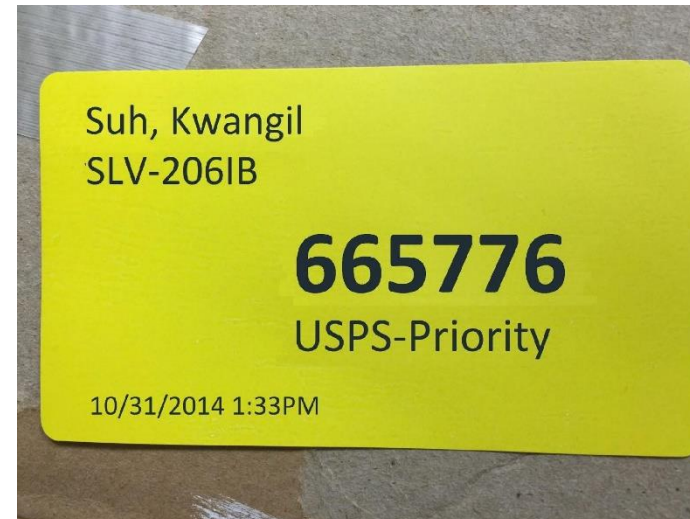


Figure 8: Current Label

# South Lake Packaging Center-Measure System

- Measurement of the right and left Shelving Units and highlighted problem compartment areas

Board Games (18" x 12")	Miscellaneous (18" x 12")	Office Supplies (18" x 12")	Resident Folder (18" x 12")	Office Supplies (18" x 12")	Empty Storage (18" x 12")
Office Supplies (36" x 12")	Mailboxes (36" x 24")		Newspapers (36" x 12")		
Board games (36" x 12")			Office Supplies (36" x 12")		
Board games (36" x 12")	Mailboxes (36" x 12")		Office Supplies (36" x 12")		
Office Supplies (36" x 12")	Office Supplies (36" x 12")		Office Supplies (36" x 12")		
Office Supplies (36" x 12")	Office Supplies (36" x 12")		Office Supplies (36" x 12")		

Figure 10: Current Right Shelving Layout (Highlighted is Problem Areas)

Resident Folders (18" x 12")	Resident Folders (36" x 12")	Resident Folders (18" x 12")	Resident Folders (18" x 12")	Resident Folders (18" x 12")	Resident Folders (18" x 12")	Resident Folders (18" x 12")	Empty Storage (18" x 12")
Resident Folders (36" x 12")		Office Supplies (36" x 12")		Resident Folders (36" x 12")		Miscellaneous (36" x 12")	
Mail Bldg. 201 (36" x 12")		Mail Bldg. 202 (36" x 12")		Mail Bldg. 203 (36" x 12")		Mail Bldg. 204 (36" x 12")	
Mail Bldg. 205 (36" x 12")		Mail Bldg. 206 (36" x 12")		Mail Bldg. 207 (36" x 12")		Mail Bldg. 208 (36" x 12")	
Mail Bldg. 209 (36" x 12")		Mail Bldg. 210 (36" x 12")		Mail Bldg. 211 (36" x 12")		Mail Bldg. 212 (36" x 12")	
Mail Bldg. 213 (36" x 12")		Mail Bldg. 214 (36" x 12")		Mail Bldg. 215 (36" x 12")		Mail Bldg. 216 (36" x 12")	

Figure 11: Current Left Shelving Layout (Highlighted is Problem Areas)

# South Lake Packaging Center-Analyze System

- ▶ After a few visits and observation of the South Lake package room, it became clear the package room is lacked proper organization.
- ▶ For example, some stationery and unrelated items were found in a packages rack



*Figure 12: South Lake Stationery in packages rack*

# South Lake Packaging Center-Improve System

- ▶ Increase name and building number on labels
- ▶ Redesign the current layout to minimize objects in the aisle way



Figure 13: Proposed Label

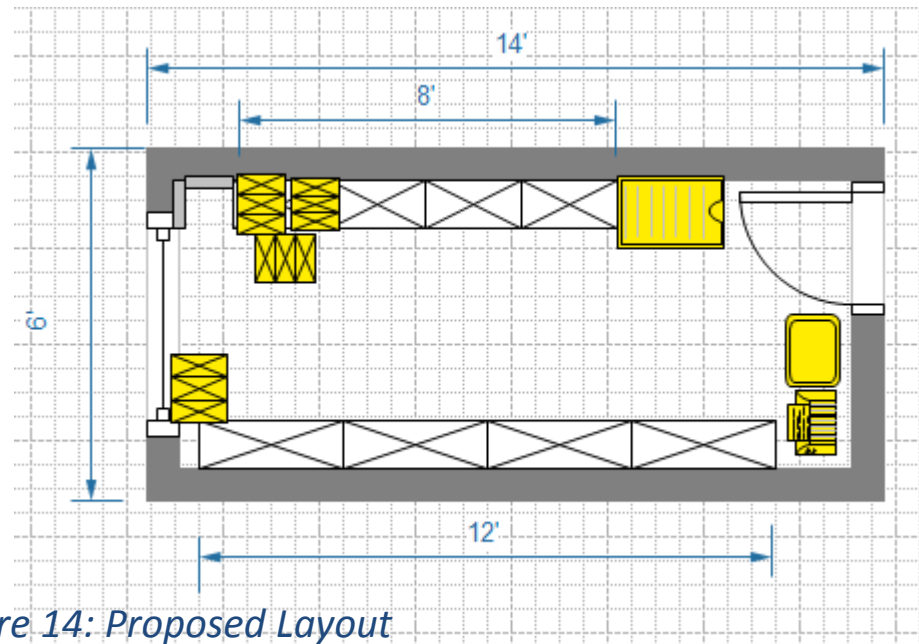


Figure 14: Proposed Layout

# South Lake Packaging Center-Improve System

- ▶ Reorganize the Shelving layouts to section similar compartments together

Board Games (18" x 12")	Board Games (18" x 12")	Board Games (18" x 12")	Miscellaneous (18" x 12")	Miscellaneous (18" x 12")	Miscellaneous (18" x 12")
Board Games (36" x 12")		Mailboxes (36" x 24")		Newspapers (36" x 12")	
Vacuums Step Ladders Trolley (36" x 48")				Office Supplies (36" x 12")	
		Office Supplies (36" x 12")			
		Office Supplies (36" x 12")			
		Office Supplies (36" x 12")			

Figure 15: Proposed Right Shelving Layout (Green highlighted are improved areas)

Resident Folders (18" x 12")	Resident Folders (36" x 12")	Resident Folders (18" x 12")	Resident Folders (18" x 12")	Resident Folders (18" x 12")	Resident Folders (18" x 12")	Resident Folders (18" x 12")	Resident Folders (18" x 12")
Office Supplies (36" x 12")	Office Supplies (36" x 12")		Office Supplies (36" x 12")	Office Supplies (36" x 12")		Office Supplies (36" x 12")	
Mail Bldg. 201 (36" x 12")	Mail Bldg. 202 (36" x 12")		Mail Bldg. 203 (36" x 12")	Mail Bldg. 204 (36" x 12")		Mail Bldg. 205 (36" x 12")	
Mail Bldg. 206 (36" x 12")	Mail Bldg. 207 (36" x 12")		Mail Bldg. 208 (36" x 12")	Mail Bldg. 209 (36" x 12")		Mail Bldg. 210 (36" x 12")	
Mail Bldg. 211 (36" x 12")	Mail Bldg. 212 (36" x 12")		Mail Bldg. 213 (36" x 12")	Mail Bldg. 214 (36" x 12")		Mail Bldg. 215 (36" x 12")	
Mail Bldg. 216 (36" x 12")	Mail Bldg. 217 (36" x 12")		Mail Bldg. 218 (36" x 12")	Mail Bldg. 219 (36" x 12")		Mail Bldg. 220 (36" x 12")	

Figure 16: Proposed Right Shelving Layout (Green highlighted are improved areas)

# South Lake Packaging Center-Control System

- ▶ Just as a start for the packaging storage room to be able to control any type of organization they will have start cleaning compartments to avoid debris and dust from collecting.
- ▶ Our next recommendation for sustaining these changes that were propose is to regularly complete a workplace checklist
- ▶ Additional improvements that can be made could be to color coordinate the compartments, and sort through stagnate office supplies that is wasting space



# Governors Packaging Center- Define System

- ▶ Residents who live in Governors complex, receive their packages through the Governors mail room located in Lehman Hall.
- ▶ This facility provides services to more than 400 students
- ▶ In the facility there is one employee who does the package retrieving process per shift.
- ▶ Occasionally, the employee would slow down due to the disorganization of the room.
- ▶ It was apparent that this portion of the project would focus more on the organization and proper space utilization of the room rather than the overall process.
- ▶



# Governors Packaging Center-Measure System

- ▶ The size of the room is 27' x 18', each of the shelves that were used to hold the packages were 4'x3'x2'.
- ▶ We also collected the arrival rate per hour with a total number of packages picked up per week equaling 152.

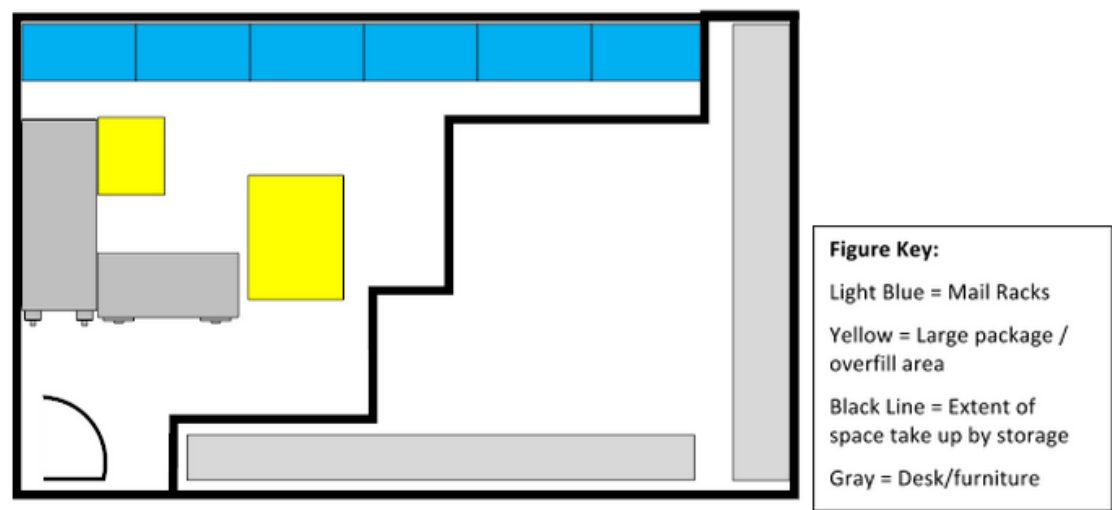


Figure 17: Original Layout

Customers Arrival rate per hour

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Time
	# Packages picked up	# Packages picked up	# Packages picked up	# Packages picked up	# Packages picked up	# Packages picked up	
4:00 - 5:00	14	12	20	10	15	6	2:00 - 3:00
5:00 - 6:00	8	10	6	5	4	7	3:00 - 4:00
6:00 - 7:00	3	1	4	3	2	3	4:00 - 5:00
7:00 - 8:00	5	2	4	1	5	1	5:00 - 6:00
Total	30	25	34	19	26	17	

Total number of packages picked up per week =152

Table 3: Governors Customer Arrival Rate

# Governors Packaging Center-Analyze System

- ▶ Most of the root causes for the issues the package center was experiencing is due to the lack of 5s implementation.
- ▶ 56 problem occurrences in the distance to P-Z (storage interference)

#	Problem	Occurance	%
1	Distance to packages P - Z (storage interference)	56	0.500
2	No specific place to keep larger packages	34	0.304
3	Package misplaced (not in the corect storage area)	10	0.089
4	Unclear labels (Rechecking package labels)	7	0.063
5	Packages not available when the customer arrives	3	0.027
6	Errors made when entering information to the computer	2	0.018
TOTAL		112	100%

Table 4: Governors Causes for Delay

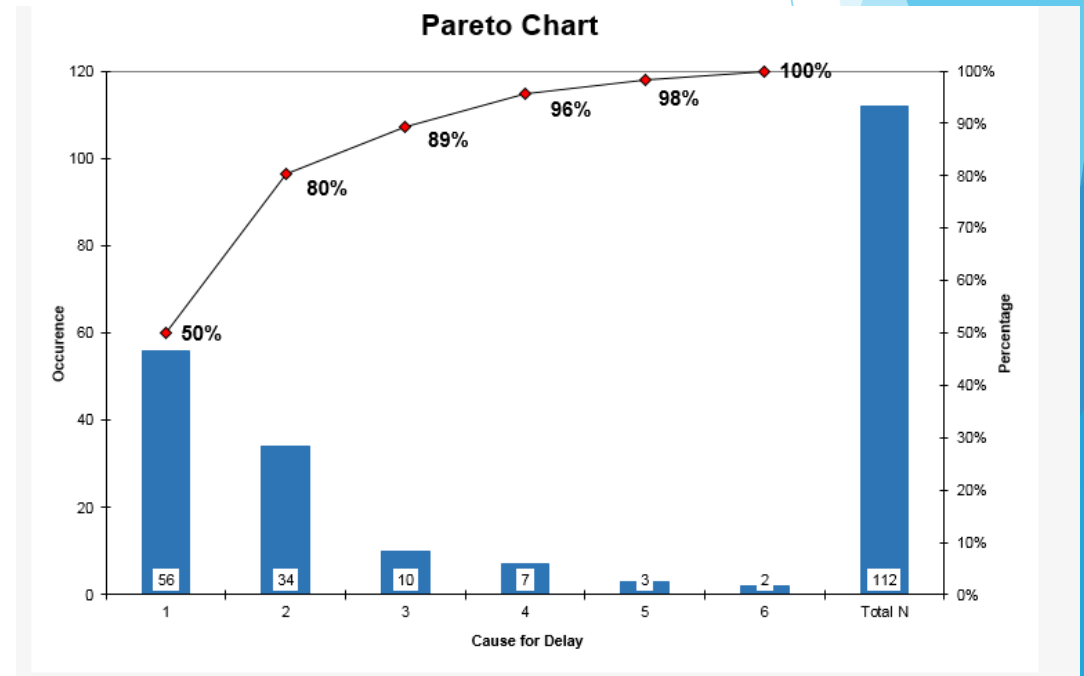


Figure 18: Governors Causes for Delay Pareto Chart

# Governors Packaging Center-Improve System

- ▶ A Pareto chart was created with the problems that were identified at the original state of the package center.
- ▶ The chart suggested that 89% of the process delays were due to the interference that occurred when retrieving packages from the back of the room (P-Z packages).
- ▶ After reorganizing and improving the layout, the total efficiency of the system will improve.

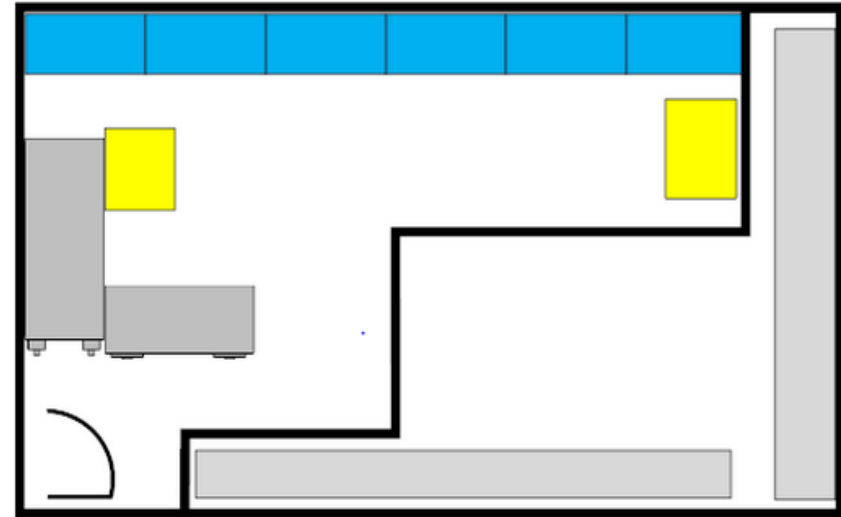


Figure 19: First Improved Layout

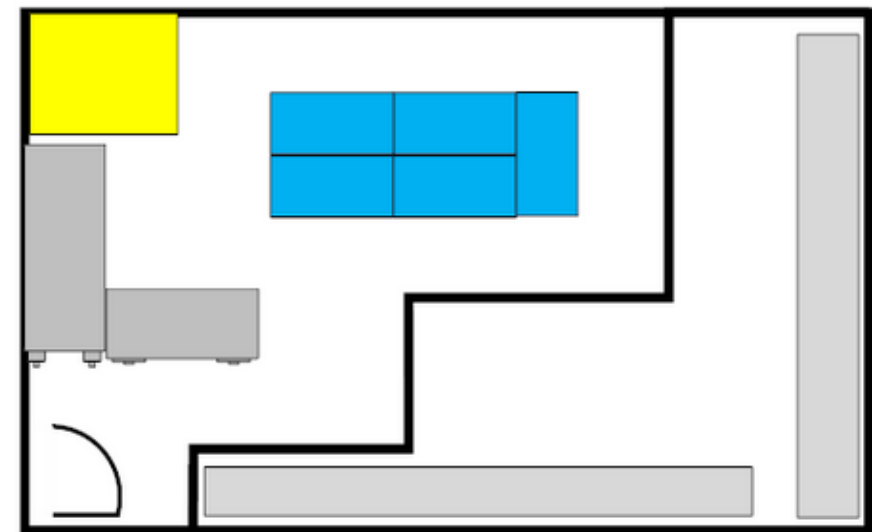


Figure 22: Second Improved Layout

# Governors Packaging Center-Control System

- 5s is a methodology that organizes and maintains systems while identifying and eliminating waste that decreases the efficiency of the entire system or a process in a system.
- The 5s' stand for Sort, Set in Order, Shine, Standardize, and Sustain. Each phase of the 5-step method will help to reduce waste and to improve the process.

# Packaging Centers Conclusion

- Ellicott
- Use of Improved layout designs helped reduce average student wait times to improved satisfaction for the student and the worker.
- South Lake
- Improved label design, redesign of layout and reorganization of shelving units to fully utilize space and improve worker task completion times and reduce student wait times.
- Governors
- Improved layout design can help reduce the number or error occurrences happening in the packaging system