



# Operational Excellence (Kaizen) Management System

DMAIC

TRADE

8D

PDCA

Webinar 3 — Project Approaches

**Pendekatan projek  
kecemerlangan operasi**

7 July 2020 (11am-1pm)

Bersama Moderator:  
EN. NORHIZAM SELAMAT

Register at:

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**Sharing Session  
with Dr Edly Ramly**



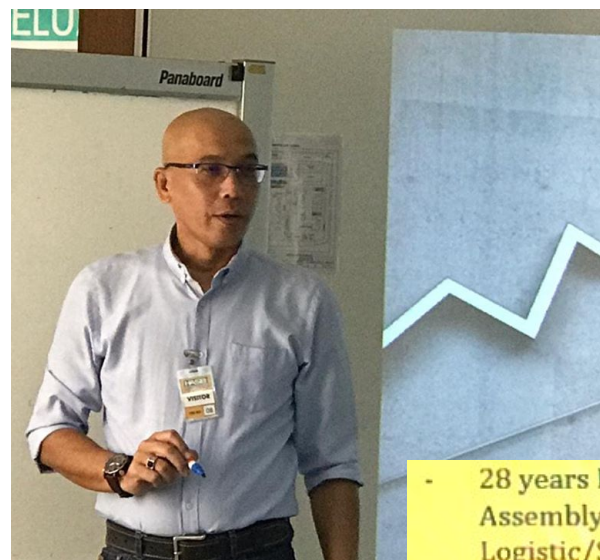


Sharing Session  
with Dr Edly  
start at 11am

See you



Bersama Moderator:  
EN. NORHIZAM SELAMAT



DMAIC

TRADE

8D

PDCA

Webinar 3 — Project Approaches

/  
**Pendekatan projek  
kecemerlangan operasi**

7 July 2020 (11am-1pm)

- 28 years MANUFACTURING experience in Assembly, Plastic Injection Molding, Logistic/Subcon, Store/Warehouse, Admin and EHS Deputy Management Representative
- HRDF Certified Trainer
- HSE & Radiation Safety Advisor, Trainer & Practitioner
- Former Senior SHO/HSE Manager in MNC
- Former DOSH/DOE/AELB Competent Person
- MARPA Radiation Safety Speakers/Panelist
- ISO14001 IEMA Lead Auditor
- OHSAS 18001, ISO9001 & TS/IATF 16949 Auditor and EICC/RBA Associate Auditor
- Certified LEAN Black Belt Program





Session start at  
2pm

See you



Operational  
Excellence  
TEAMWORK

# Operational Excellence Management System

Adoption of “Kaizen”  
initiative in systematic  
way

Free Webinar:  
18 May 2020  
2:00-3:00pm

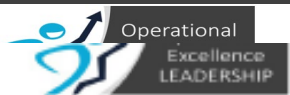
Sharing by:

**Dr. Edly Ramly**

*Fellow Industrial Engineering  
Operation Management  
Society, US*







Sharing Session  
with Dr Edly  
start at 10am

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LEADERSHIP



Operational  
Excellence  
TEAMWORK

# Operational Excellence (Kaizen) Management System

Webinar 1 - Development of Operational Excellence  
(Kaizen) Program/

**Pembangunan Program  
Kecemerlangan Operasi**

19 June 2020 (10am-12am)

**Moderator: En Hood Atan**

*Principal Exergy*

*Management Consultant*

*IATF Auditor*



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# Operational Excellence (Kaizen) Management System

Webinar 2 - Determining and Selection of  
Operational Excellence Project  
(Kaizen Event/ Kaikaku/ Kakushin)  
/

**Mengenalpasti dan memilih  
projek kecemerlangan operasi**

25 June 2020 (11am-1pm)

**Bersama Moderator:  
EN. NORHIZAM SELAMAT**



Section 1:

# Operational Excellence

Project

Approaches



# Operational Excellence Project

“Project that support the  
improvement culture”

## Common Approaches

- DMAIC
- PDCA
- TRADE
- 8-D



# Special/ Common cause

What you are dealing with:

Common Cause (Random)  
Variation

Special Cause  
(Assignable)  
Variation

Choices for action:

Change the system to try to improve future results      React to, investigate search for root cause, remove if necessary

Disappointment (make matters worse)	Correct action
Correct action	Disappointment (make matters worse)





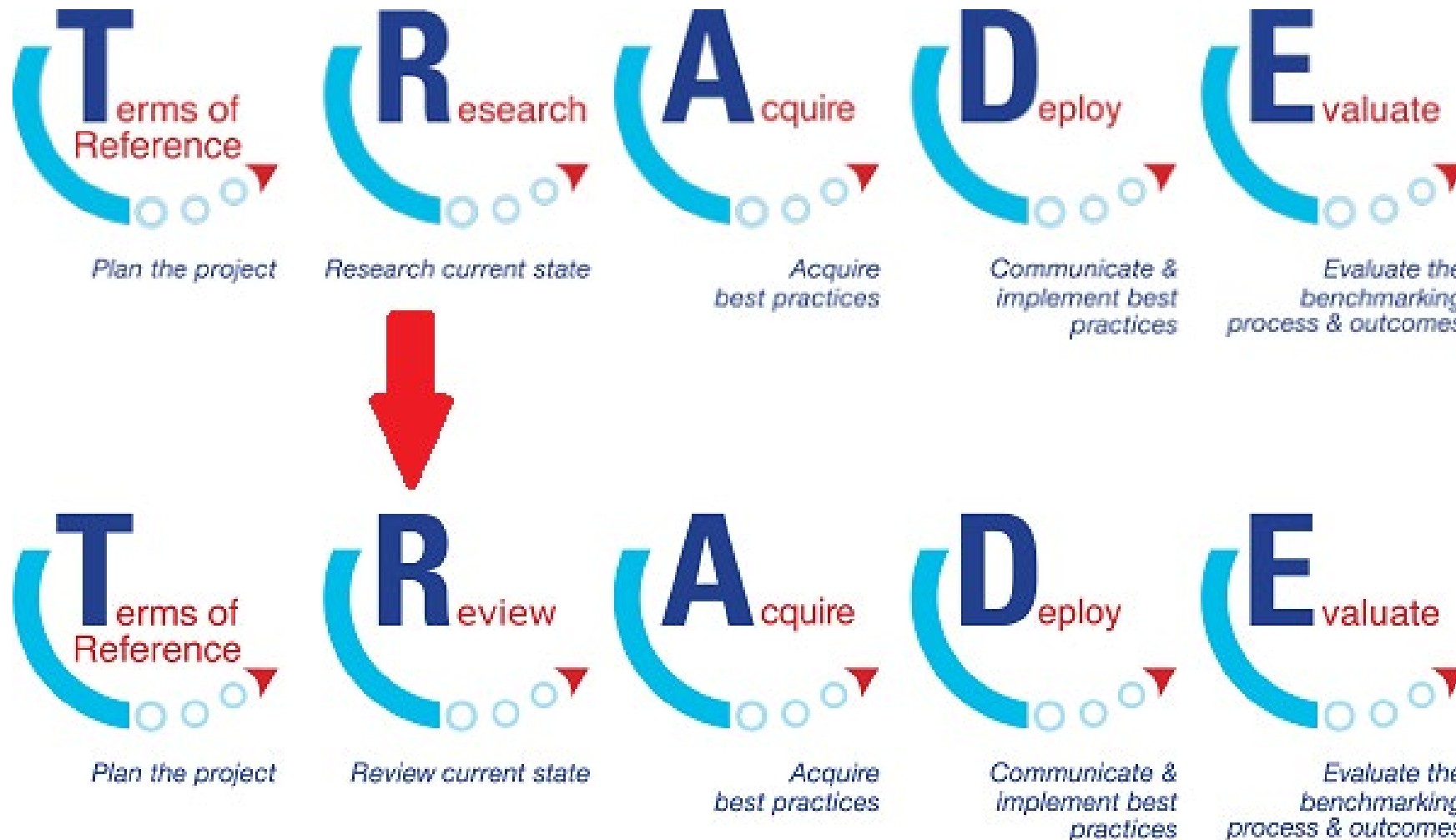
# Evaluate – Common or Special

Special	Common
<b>Corrective Action Request, 8-Discipline,</b>	<p>Kaikaku, Detail Six Sigma DMAIC methodology, (For Breakthrough).</p> <p>Kaizen Event i.e. ICC, Small group PDCA activities, Lean workshop, TRADE</p> <p>Kakushin i.e. IR4.0 project, product development, machine innovation etc.</p>

# DMAIC Approaches



# TRADE Approaches



# TRADE use in DGEP

Click to save a picture to:

Hazza Alneaimi

Ab Rahim Yusoff

## DGEP Role at a Glance


Measure and Assess

Set Aims, Develop Criteria and Initiatives

Awareness, Training and Support

Reward & Recognize

Learn and Share Knowledge





# PDCA & 8-Disciplines

1. Define the problem and its impact
2. Understand the facts
3. Contain the problem
4. Measure the data
5. Find the root cause to the problem

**PLAN**

6. Implement the corrective action

**DO**

7. Check the data after the correction, to ensure its worked

**CHECK**

8. Standardise the process or new way of working to support what you've learned
9. Recognise and provide positive feedback

**ACT**

**1D**

- Team formation

**2D**

- Problem Description

**3D**

- Interim Containment Actions

**4D**

- Root Cause Analysis

**5D**

- Corrective Actions

**6D**

- Validate Corrective Actions

**7D**

- Identify & Implement Preventive Actions

**8D**

- Team & Individual Recognition



# Summary

Planning

Cause Analysis

Implementation

Verify Effectiveness



## 4 Problem Solving Strategies



Section 2:

Example

Operational

Excellence

P-C-I-V





# OPERATIONAL EXCELLENCE

## SIMPLE APPROACHES

PLANNING

CAUSE

IMPLEMENT

VERIFY



Approaches	Project Planning Stage	Example of Tools and Techniques
Lean/ Six Sigma - <b>DMAIC</b>	Define	Project Charter, VOC, VSM current stage/ SIPOC
<b>TRADE</b> Benchmark	Term of reference and review current state	TOR
8-Discipline	D1 team formation and D2 problem description	8D form, 5W2H, similarity analysis



## **Application Examples 1: Invoicing Process**

### **Problem Statement :**

**About 30% of payments are received later than 60 days after invoices were issued.**

### **Goal Statement :**

**To reduce the percentage of late payments to less than 5%.**

### **Financial Benefit :**

**Successful completion of this project will result in an estimated financial benefit of US\$ 50,000.**





## **Data Collection Plan**

**Critical To Quality: Payment received on time**

**Measure: Cycle time from date of invoice issued to date of payment received (days)**

**Specification: Not more than 60 days**

**Process output unit: An invoice**

**Data source: Account department**

**Data collection method: Pre-exist data**

**Sample frame: Three months period from January to March**

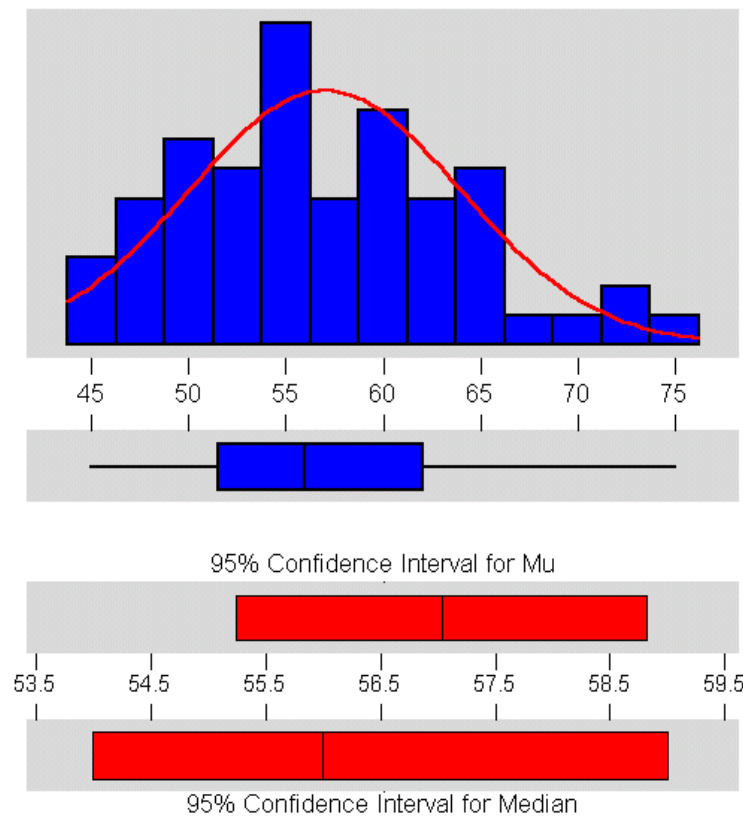
**Sampling method: Random sampling**

**Number of samples: 60**



# Measure Process Output Variability

## Descriptive Statistics



Variable: Day

Anderson-Darling Normality Test

A-Squared:	0.402
P-Value:	0.349
Mean	57.0328
StDev	6.9832
Variance	48.7656
Skewness	0.491647
Kurtosis	-1.0E-01
N	61
Minimum	45.0000
1st Quartile	51.5000
Median	56.0000
3rd Quartile	62.0000
Maximum	75.0000
95% Confidence Interval for Mu	
	55.2443 58.8213
95% Confidence Interval for Sigma	
	5.9267 8.5016
95% Confidence Interval for Median	
	54.0000 59.0000

From a sample of 61 invoices:

1. The histogram describes the central tendency and variability of data.
2. The mean time taken to pay the invoice is 57 days and the median is 56 days.
3. In term of variability, the standard deviation is about 7 days and the range is 30 days.



Operat  
Excell  
TEAM

#### Process Data

USL	60.0000
Target	*
LSL	*
Mean	57.0328
Sample N	61
StDev (Within)	7.38771
StDev (Overall)	7.01239

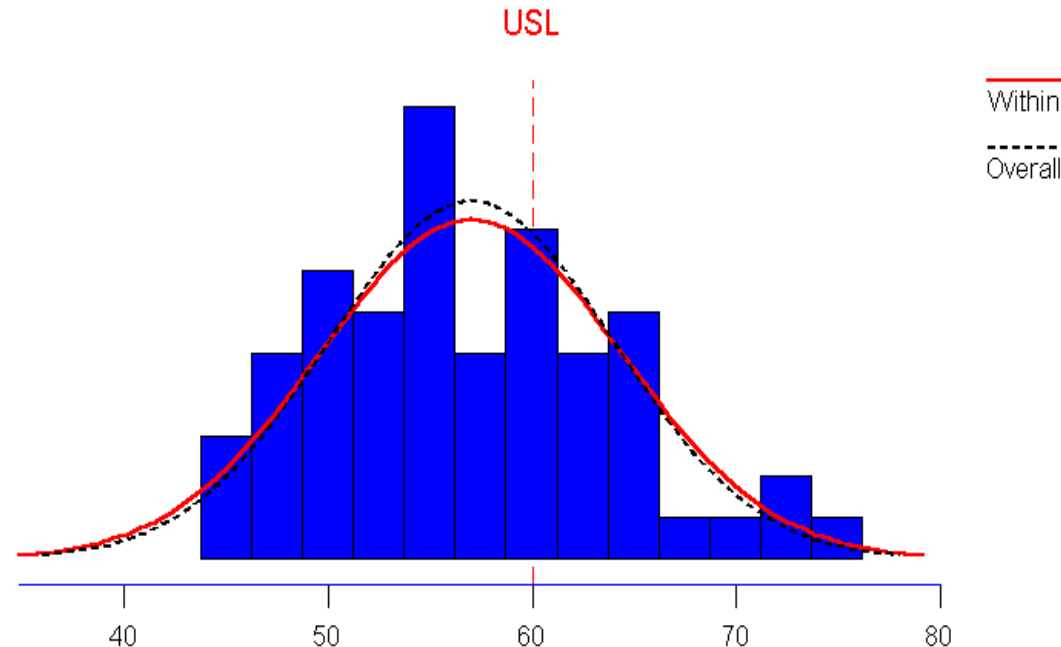
#### Potential (Within) Capability

Cp	*
CPU	0.13
CPL	*
Cpk	0.13
Cpm	*

#### Overall Capability

Pp	*
PPU	0.14
PPL	*
Ppk	0.14

### Process Capability Analysis for Day

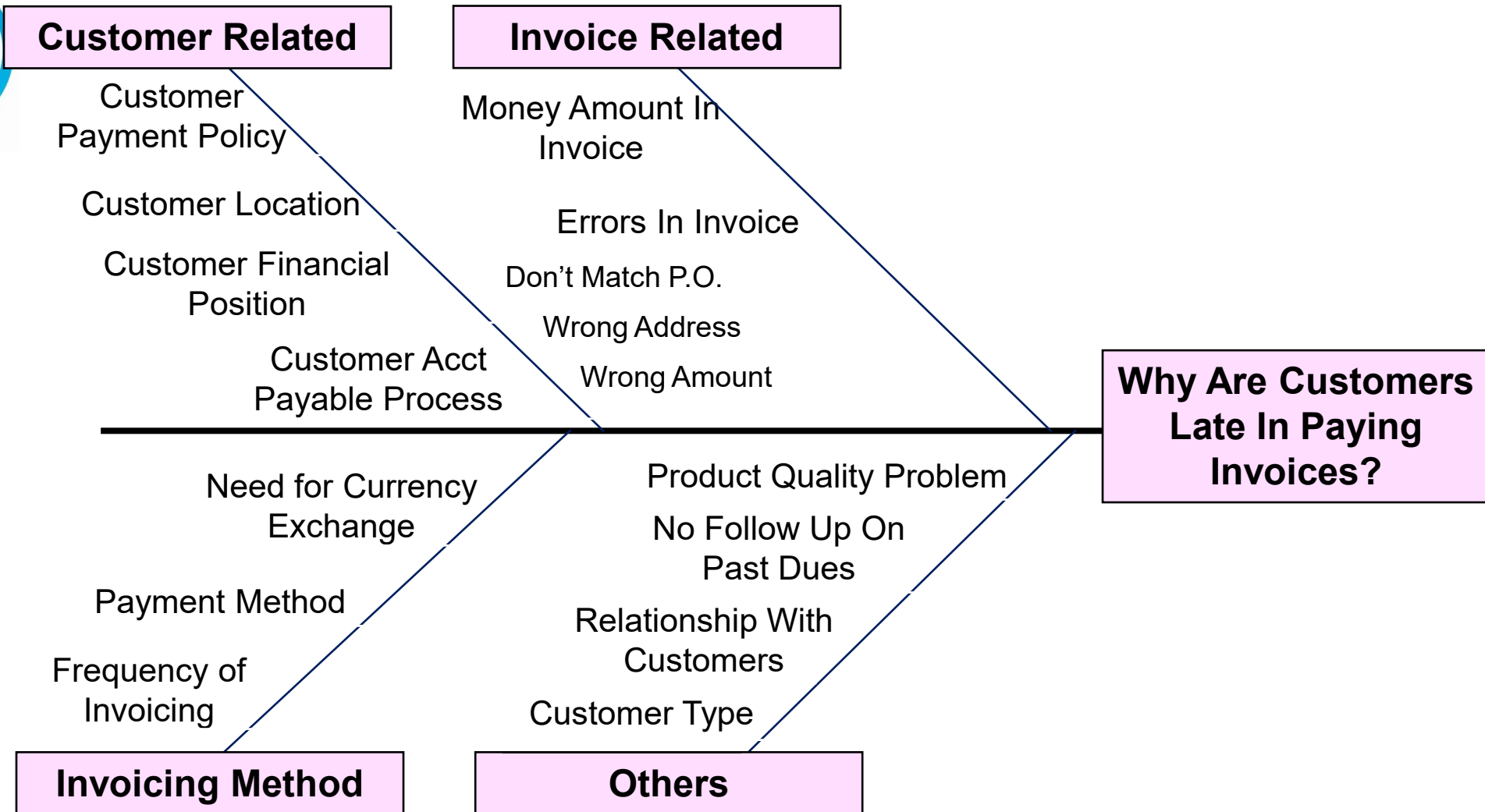


Observed Performance		Exp. "Within" Performance		Exp. "Overall" Performance	
PPM < LSL	*	PPM < LSL	*	PPM < LSL	*
PPM > USL	295081.97	PPM > USL	343973.77	PPM > USL	336097.09
PPM Total	295081.97	PPM Total	343973.77	PPM Total	336097.09

**The Ppk is 0.14 indicating poor capability of the process in meeting the requirement of not more than 60 days.**

**The defect per million is 336,097. The process sigma is about 1.9**

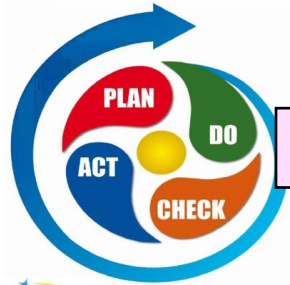
Apply cause and effect diagram to brainstorm the various possible causes.



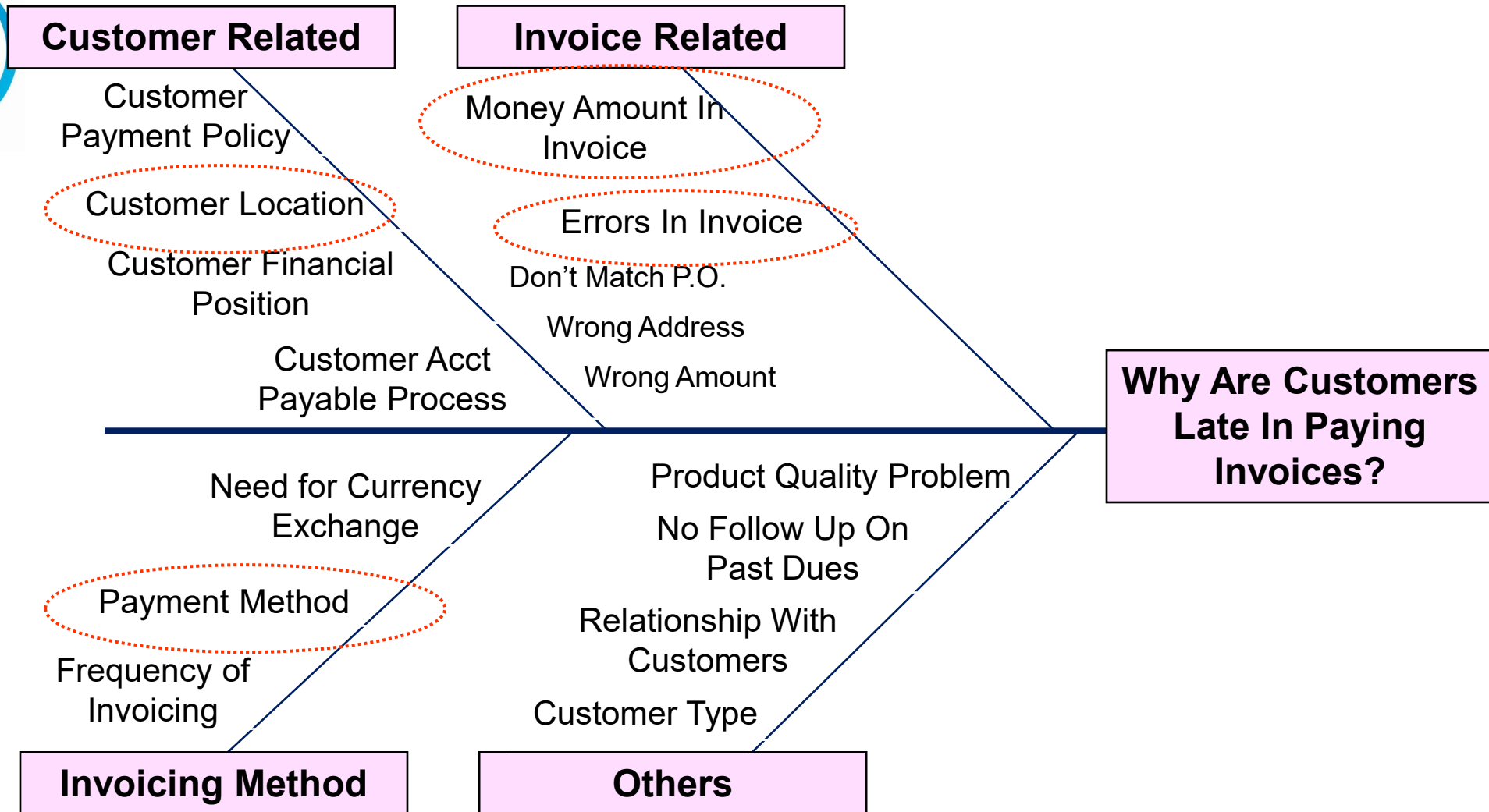


Approaches	Cause analysis Stage	Example of Tools and Techniques
Six Sigma - DMAIC	Measure and Analyse	Capability analysis, pareto chart, hyphothesis testing, DOE
Lean	Process Analysis	VSM, process value added matrix
TRADE Benchmark	Acquire Best Practices.	Benchmarking
8-Discipline	D4 Root cause Analysis	8D form, Cause and Effect diagram





## Use collective experience to shortlist key suspects



## Collect the necessary data to verify key suspects

	Dollar	Payment Mtd	Location	Error	Day
1	20000	TT	1 n		53
2	32000	Cheque	4 n		63
3	25000	EDI	2 n		48
4	28000	TT	2 n		53
5	18000	Cheque	3 n		56
6	36000	EDI	2 y		67
7	23000	EDI	1 n		46
8	24000	Cheque	4 n		62
9	21000	TT	4 n		54
10	26000	EDI	2 n		49
11	23000	Cheque	1 n		58
12	34000	EDI	4 n		51
13	21000	Cheque	3 n		52
14	35000	TT	4 n		58
15	40000	EDI	2 n		59
16	33000	EDI	1 n		53
17	25000	Cheque	1 n		64
18	21000	Cheque	3 n		59
19	25000	TT	2 n		56
20	35000	EDI	1 n		53
21	32000	TT	3 n		56
22	17500	Cheque	3 n		60

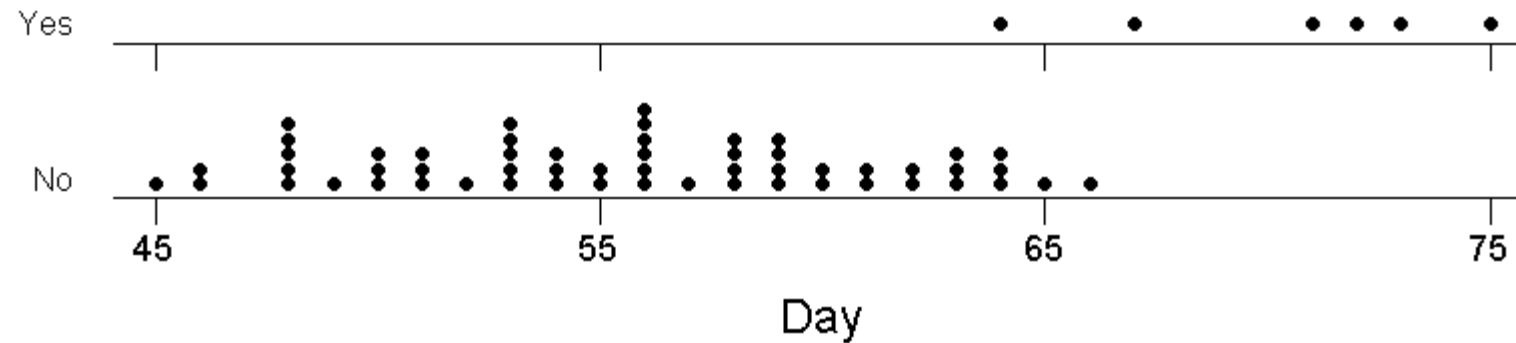
	Dollar	Payment Mtd	Location	Error	Day
41	19000	TT	1 n		50
42	28000	TT	3 n		56
43	28000	EDI	4 n		48
44	26000	Cheque	2 y		75
45	32500	EDI	4 n		48
46	31000	EDI	2 n		54
47	37000	TT	4 n		64
48	22000	Cheque	2 n		63
49	30000	Cheque	4 n		66
50	28500	EDI	3 n		55
51	23000	TT	2 n		50
52	31000	EDI	1 n		50
53	35000	EDI	2 n		56
54	37000	TT	2 n		60
55	33000	TT	1 y		73
56	24500	Cheque	3 n		59
57	27500	Cheque	2 n		64
58	30000	EDI	4 n		48
59	23000	Cheque	1 n		55
60	27000	Cheque	2 n		58
61	30000	EDI	3 n		61



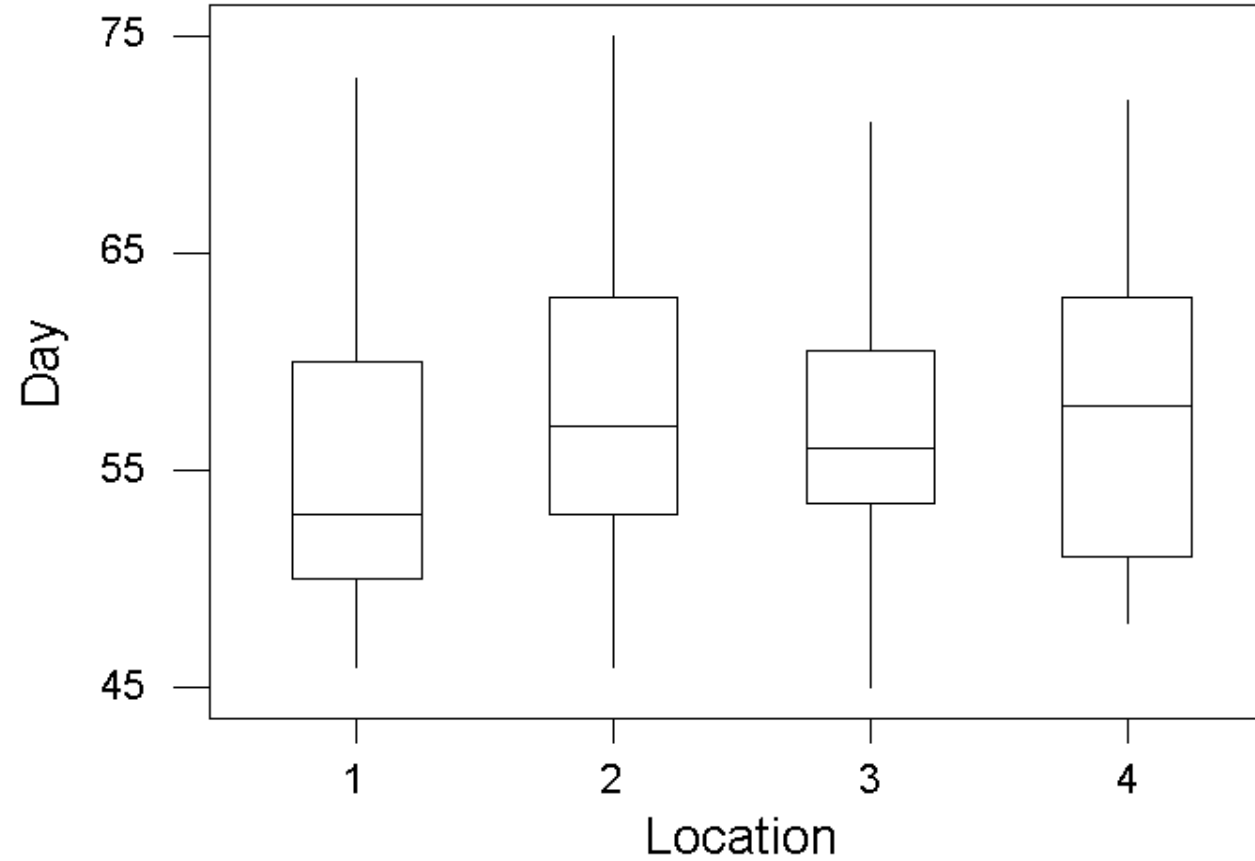
Use dot plot to check if presence of errors will cause longer payment days

Dotplot for Day

Errors



**Stratify the data according to locations and use box plot to check if there is difference between locations.**



# One-way ANOVA: Day versus Location

## Analysis of Variance for Day

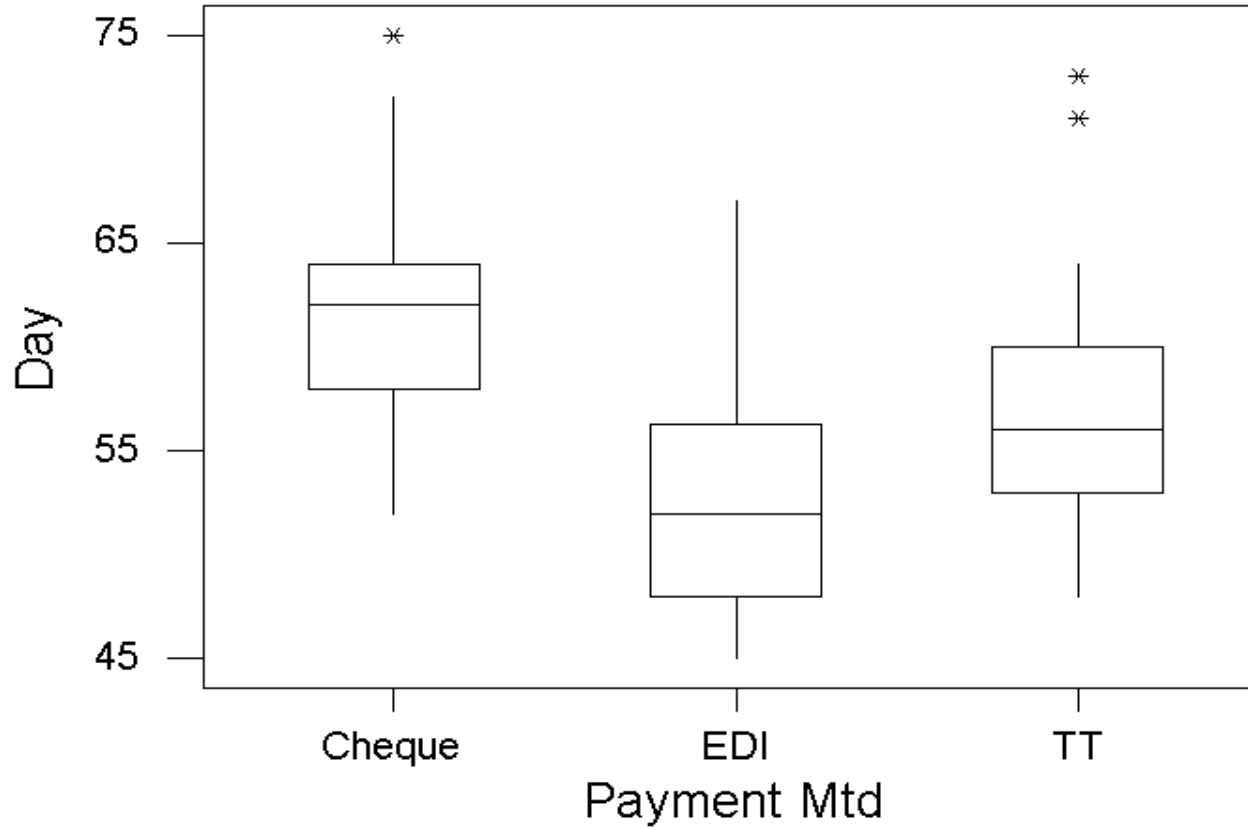
Source	DF	SS	MS	F	P
Location	3	41.3	13.8	0.27	0.846
Error	57	2884.7	50.6		
Total	60	2925.9			

## Individual 95% CIs For Mean Based on Pooled StDev

Level	N	Mean	StDev	
1	13	55.462	7.378	(-----+-----+-----+-----)
2	20	57.550	7.200	(-----+-----+-----+-----)
3	13	57.308	6.382	(-----+-----+-----+-----)
4	15	57.467	7.357	(-----+-----+-----+-----)
Pooled StDev = 7.114				54.0 57.0 60.0



**Stratify the data according to payment methods and use box plot to check if there is difference between payment methods.**





Analysis of variance shows that there is a significant difference in the means of three types of payment methods.

One-way ANOVA: Day versus Payment Mtd

Analysis of Variance for Day

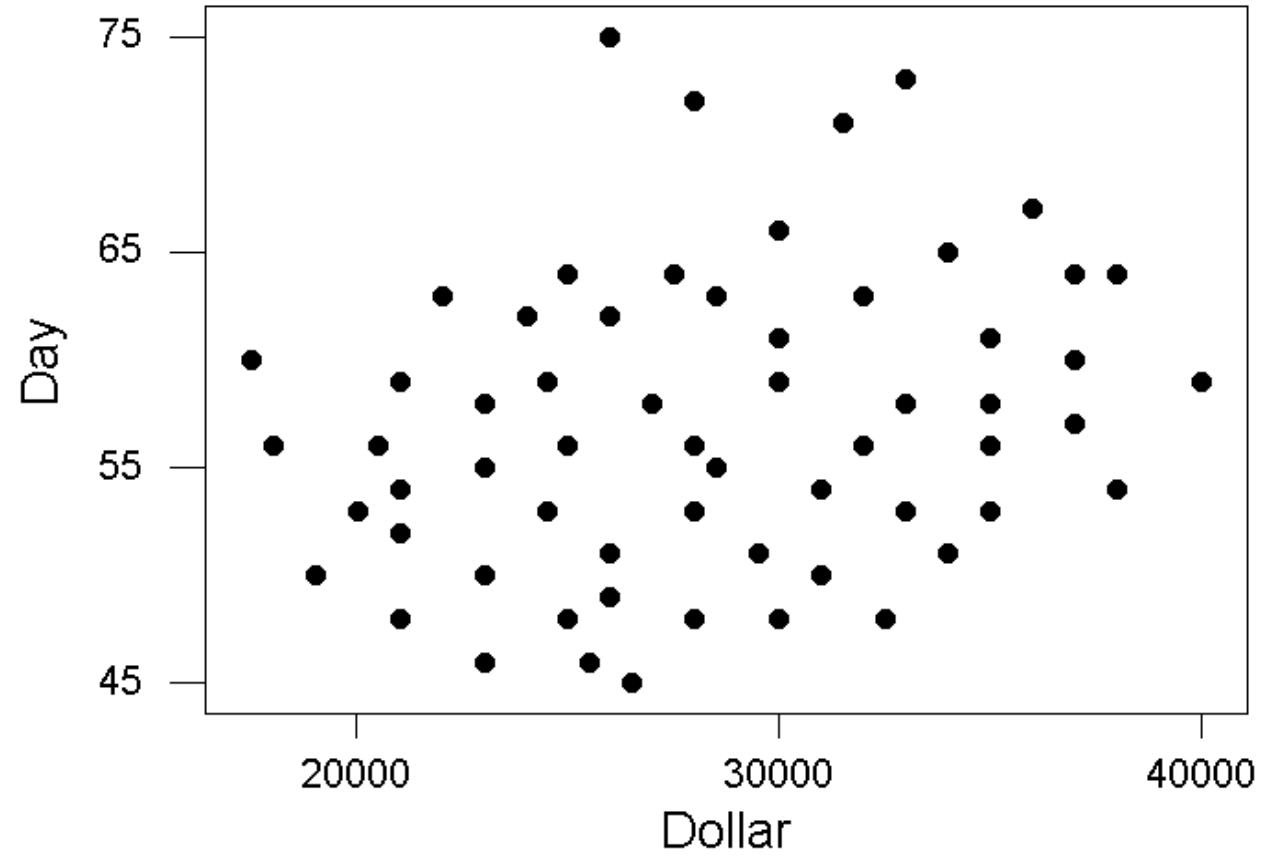
Source	DF	SS	MS	F	P
Payment	2	799.6	399.8	10.91	0.000
Error	58	2126.3	36.7		
Total	60	2925.9			

Individual 95% CIs For Mean  
Based on Pooled StDev

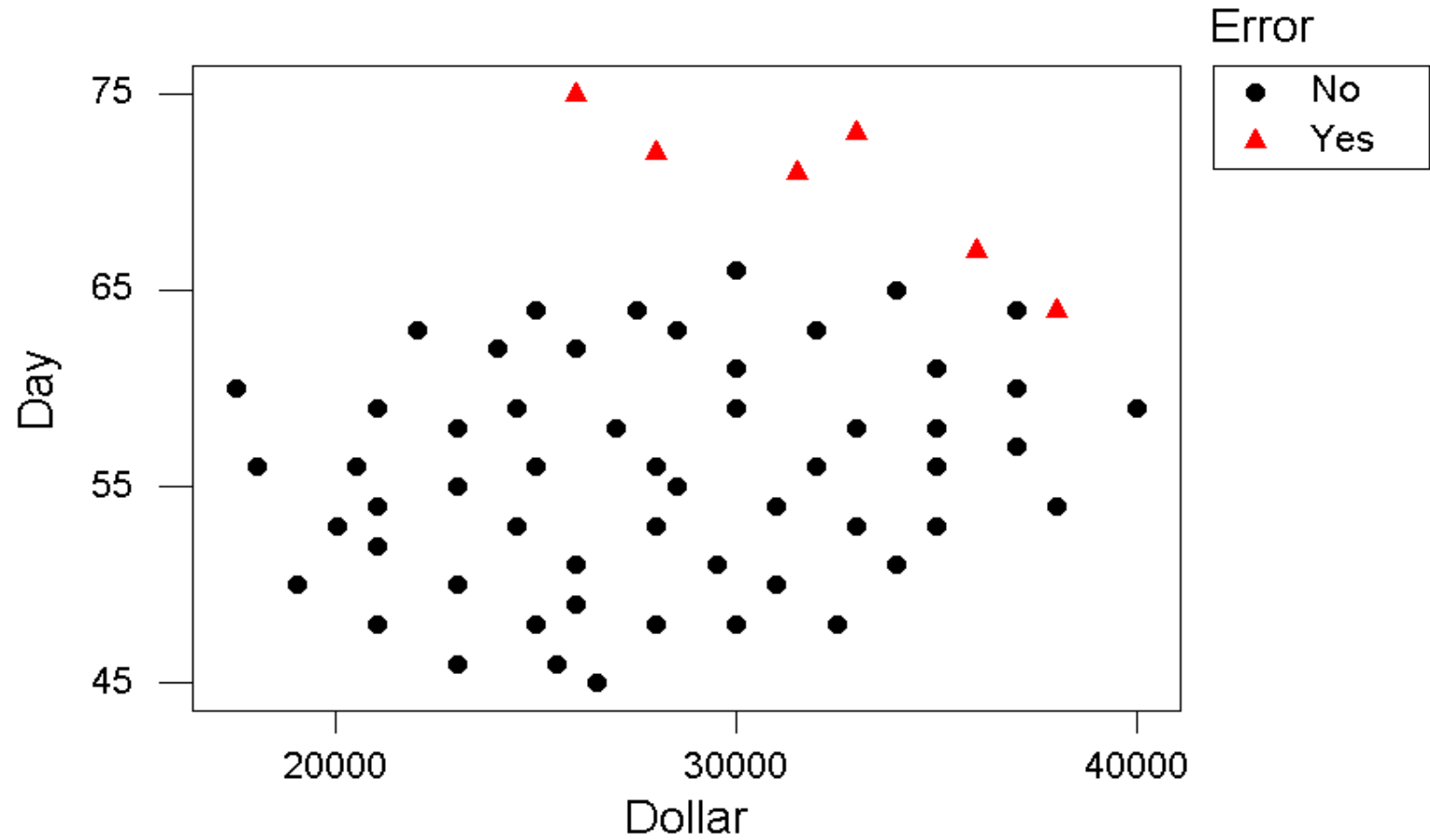
Level	N	Mean	StDev	
Cheque	20	61.600	5.510	(-----*-----)
EDI	22	52.864	5.947	(-----*-----)
TT	19	57.053	6.696	(-----*-----)
Pooled StDev = 6.055				-----+-----+-----+-----+-----
				52.0 56.0 60.0 64.0



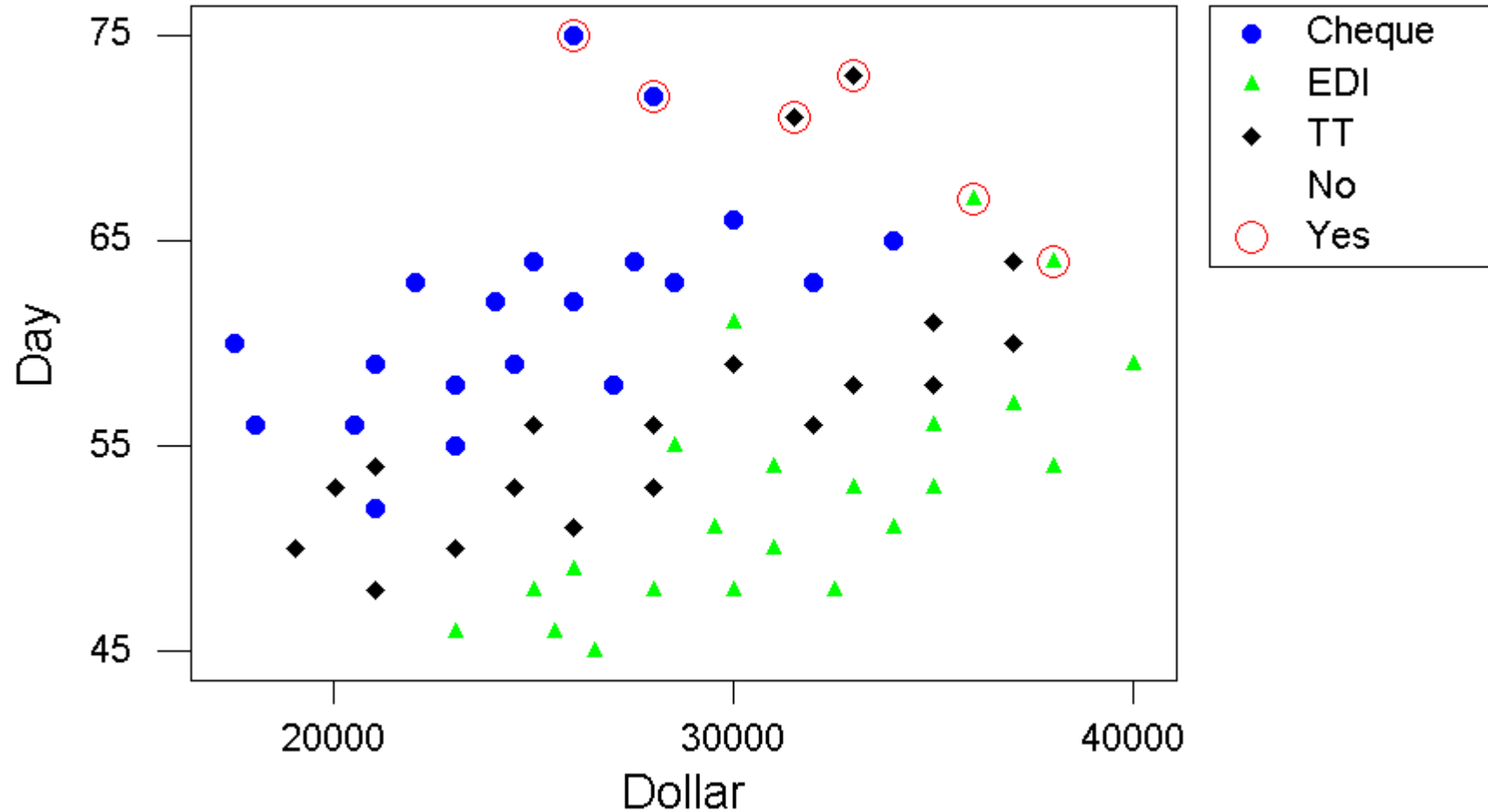
**Use scatter diagram to check if there is a correlation between money amount and day.**



## No correlation observed when invoices with errors are excluded from correlation analysis



**Presence of correlation between money amount and day is observed when data is stratified according to payment methods.**





**Regression analysis indicates that money amount, payment methods and errors are significant in affecting payment days. Location is not.**

Predictor	Coef	SE Coef	T	P
Constant	50.521	3.353	15.07	0.000
Dollar	0.00060623	0.00008626	7.03	0.000
Cheque	6.7039	0.9789	6.85	0.000
EDI	-5.9142	0.9551	-6.19	0.000
Loc 1	-0.258	1.187	-0.22	0.829
Loc 2	0.228	1.010	0.23	0.822
Loc 3	0.200	1.180	0.17	0.866
No Error	-11.987	1.328	-9.02	0.000

S = 2.933

R-Sq = 84.4%

R-Sq(adj) = 82.4%



Approaches	Implementation stage	Example of Tools and Techniques
Lean/ Six Sigma - DMAIC	Improve	Risk analysis
TRADE Benchmark	Deploy	Decision making
8-Discipline	D5 Corrective Action	8D form





## 1. Errors

Error proof the invoicing process.

## 2. Payment Methods

Make arrangements with customers to use payment methods other than cheques.

## 3. Dollar Amount

For invoices with high dollar value, give incentive (such as rebate) if customers pay on time.

(Force field analysis, potential risks assessment and stakeholder analysis need to be applied on the above improvement solutions.)



Approaches	Verify effectiveness Stage
Lean/ Six Sigma - <b>DMAIC</b>	Control
<b>TRADE</b> Benchmark	Evaluate
8-Discipline	D6: Validate corrective action D7: Prevent Recurrence D8: Congratulate team



## **Application Examples 2: Delivery Process**

### **Problem Statement :**

**The total time taken from the moment the production is completed to delivery is 2 days. Some urgent orders require products to be delivered in 1 day.**

### **Goal Statement :**

**To reduce the turn-around-time time to 1 day.**

### **Financial Benefit :**

**Successful completion of this project will result in an estimated financial benefit of US\$120,000 from additional sales.**



## **Measure Current Process**

**Make the process visible by creating the process maps.**

**Common process mapping methods:**

**Linear flowchart**

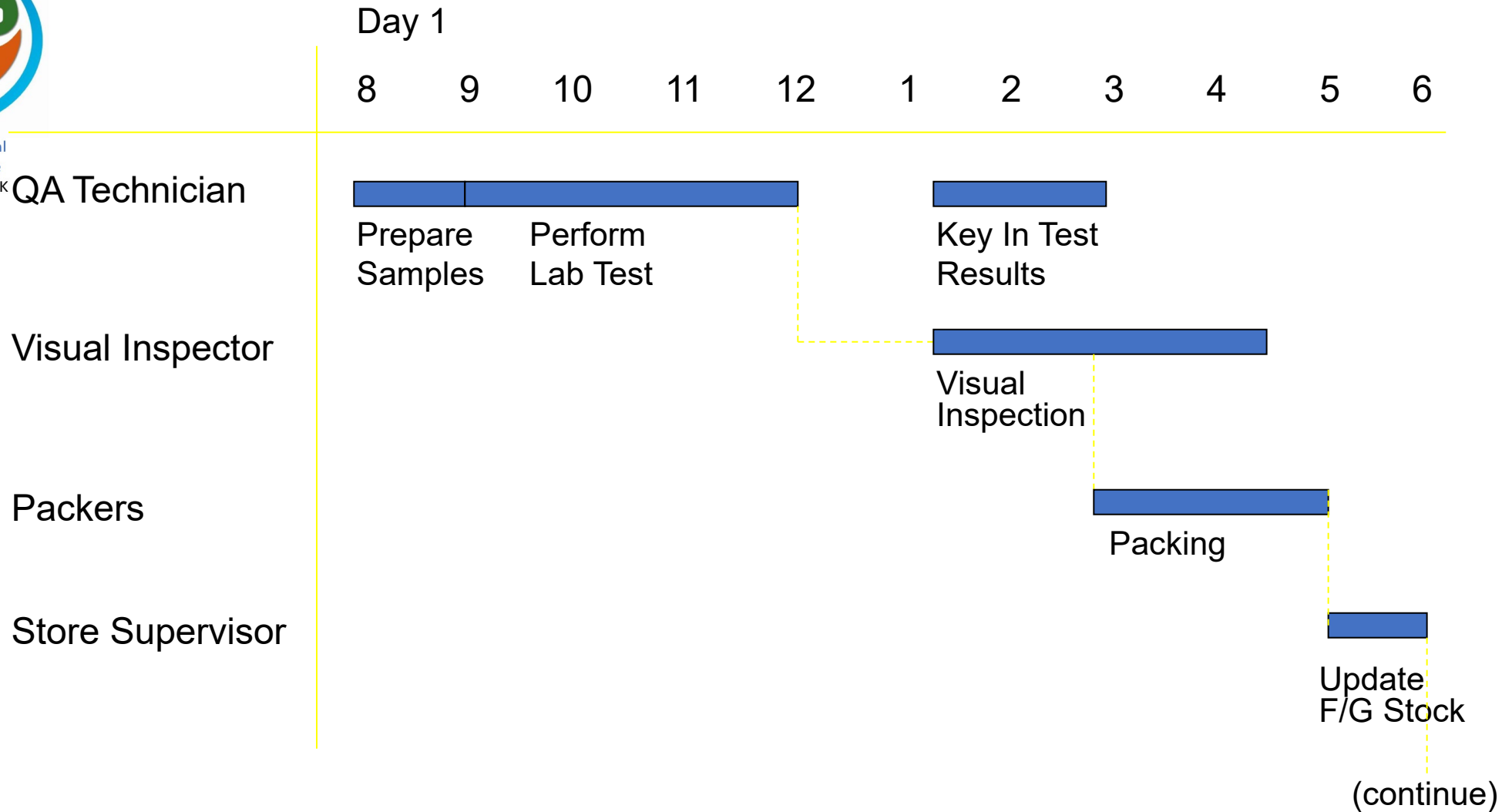
**Cross functional map**

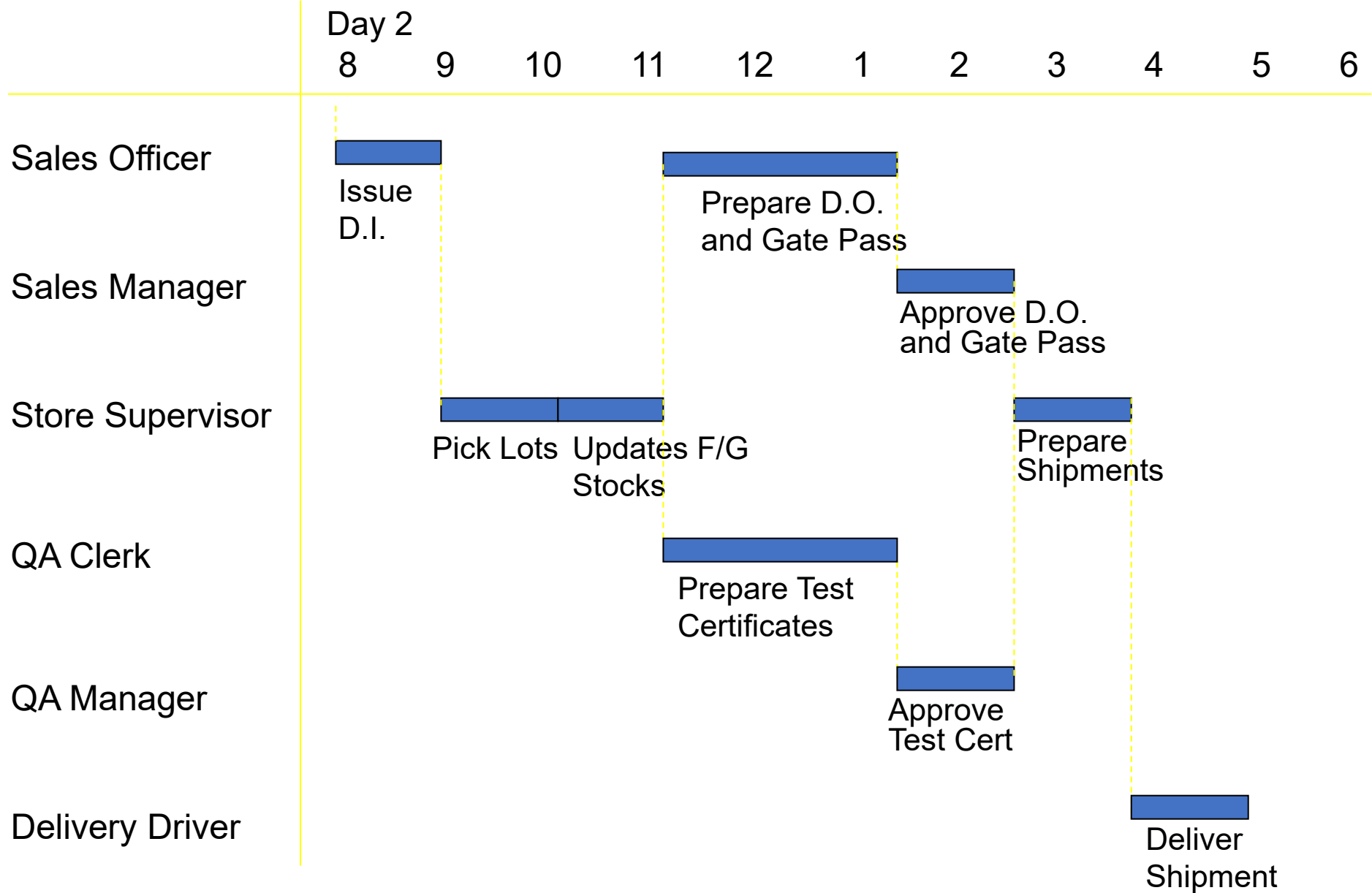
**Relationship map**

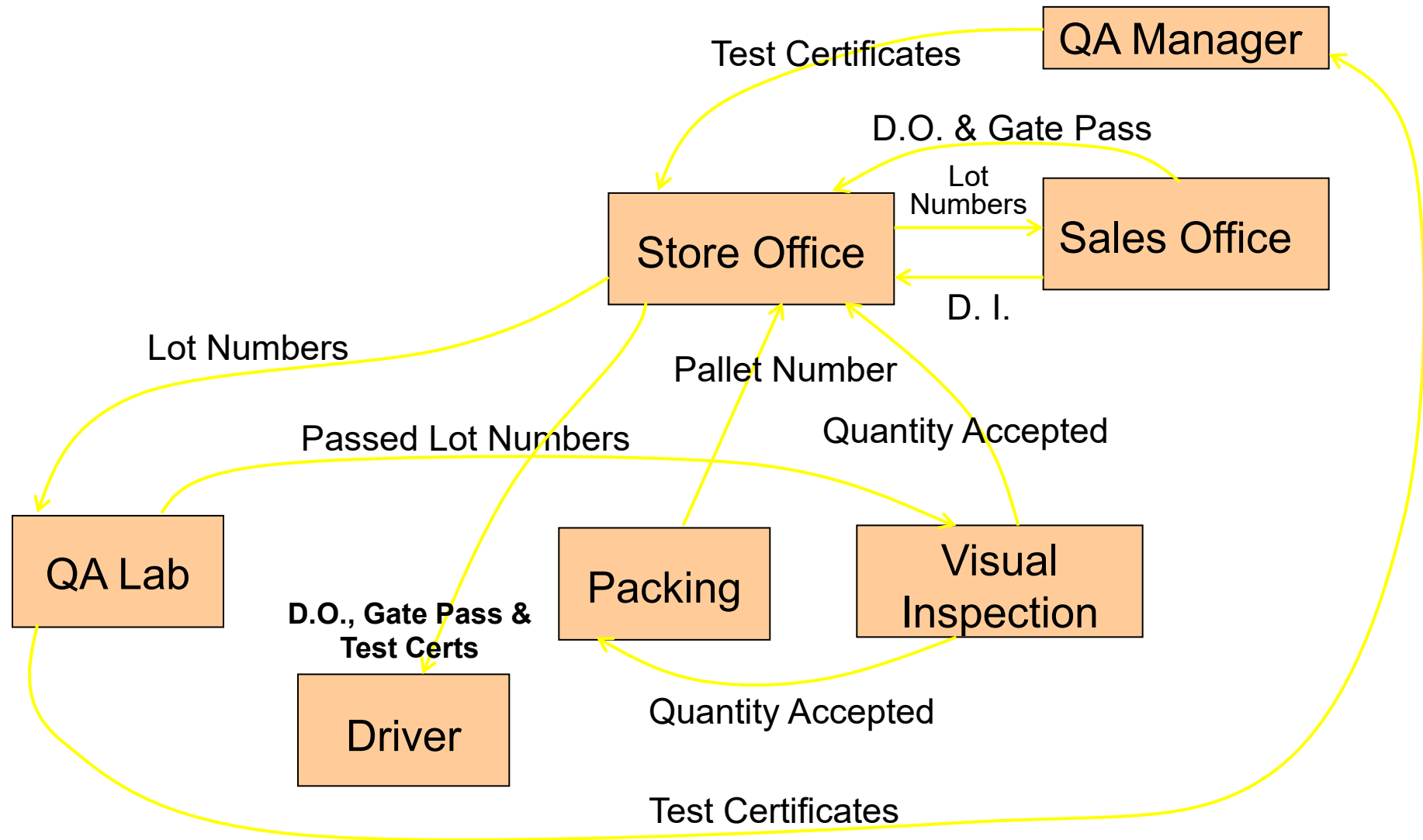
**Validate the maps created by walking-through the process and collect the necessary data.**



# Delivery Process Cross Functional Map (As-Is)









# Analyse Current Process (CAUSES)

**Discover flaws in the current process.**

**Examples of process flaws:**

**Waiting**

**Duplication**

**Non-value added activity**

**Unnecessary check / approval**

**Error**

**Re-do**





# Analysis Summary

## A] Waiting

- Visual inspection will not start before laboratory tests have been completed.
- Store supervisor has to wait for the test certificates before he can prepare the shipments.

## B] Duplications

- Packers record product names, lot numbers and quantities and send these information to store. Store supervisor key in the same information into the finished goods inventory system.

## C] Non-value Added Activities

- Unnecessary movements involved in sending information or documents around.



## **Identify Improvement Solutions**

### **A] Reduce waiting.**

**Laboratory tests and visual inspections to be performed concurrently.**

**Store supervisor prints test certificates from computerised workflow system.**

### **B] Reduce non-value added activities & duplications.**

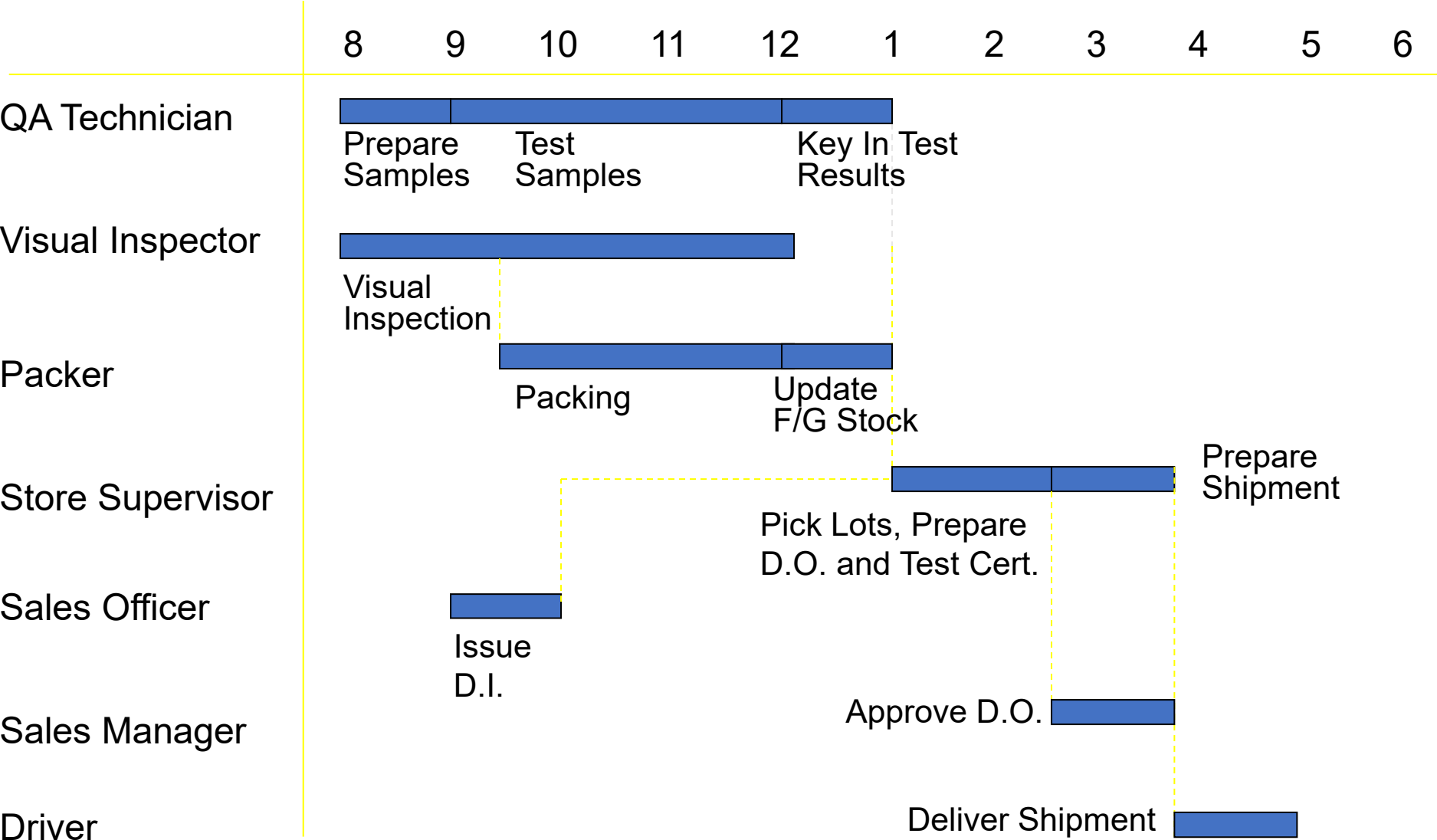
**Packers key in product information into finished goods inventory system.**

**Reduce document movements by installing IS systems.**

**Empower QA technicians to decide lots acceptance based on specification.**



# Delivery Process Cross Functional Map (Should-Be)





# OPERATIONAL EXCELLENCE PROJECT REPORTING AND ASSESSMENT

A3 Report

Project  
Assessment

## 48



## Title: What you are talking about

initials

Owner

### Background

*Why you are talking about it.*

- *What is the business reason for choosing this issue?*

### Current Conditions

*Where things stand today.*

- *What's the problem with that, with where we stand?*
- *What is the actual symptom that the business feels that requires action?*

*Show visually – pareto charts, graphs, drawings, maps, etc.*

### Target/Goal(s)

*The specific outcome required for the business.*

- *What is the specific change you want to accomplish now.?*
- *How will you measure success?*

### Analysis

*The root cause(s) of the problem.*

- *Why are we experiencing the symptom?*
- *What constraints prevent us from the goal?*

*Choose the simplest problem-solving tool for this issue:*

- *Five whys*
- *Fishbone*
- *QC Tools*
- *SPC, Six Sigma, Shainin, Kepner Traego, others...*

### Proposed Countermeasure(s)

*Your proposal to reach the future state, the target condition.*

- *What alternatives could be considered?*
- *How will you choose among the options? What decision criteria?*

*How your recommended countermeasures will impact the root cause to change the current situation and achieve the target.*

### Plan

*A Gantt chart or facsimile that shows actions/outcomes, timeline and responsibilities. May include details on the specific means of implementation.*

- *Who will do what, when and how?*
- Indicators of performance, of progress.*
- *How will we know if the actions have the impact needed?*
  - *What are the critical few, visual, most natural measures?*

### Followup

*Remaining issues that can be anticipated.*

- *Any failure modes to watch out for? Any unintended consequences?*

*Ensure ongoing P-D-C-A. Yokoten as needed.*



# A3 – Example for presentation purpose

## 1. Background/ Problem Description

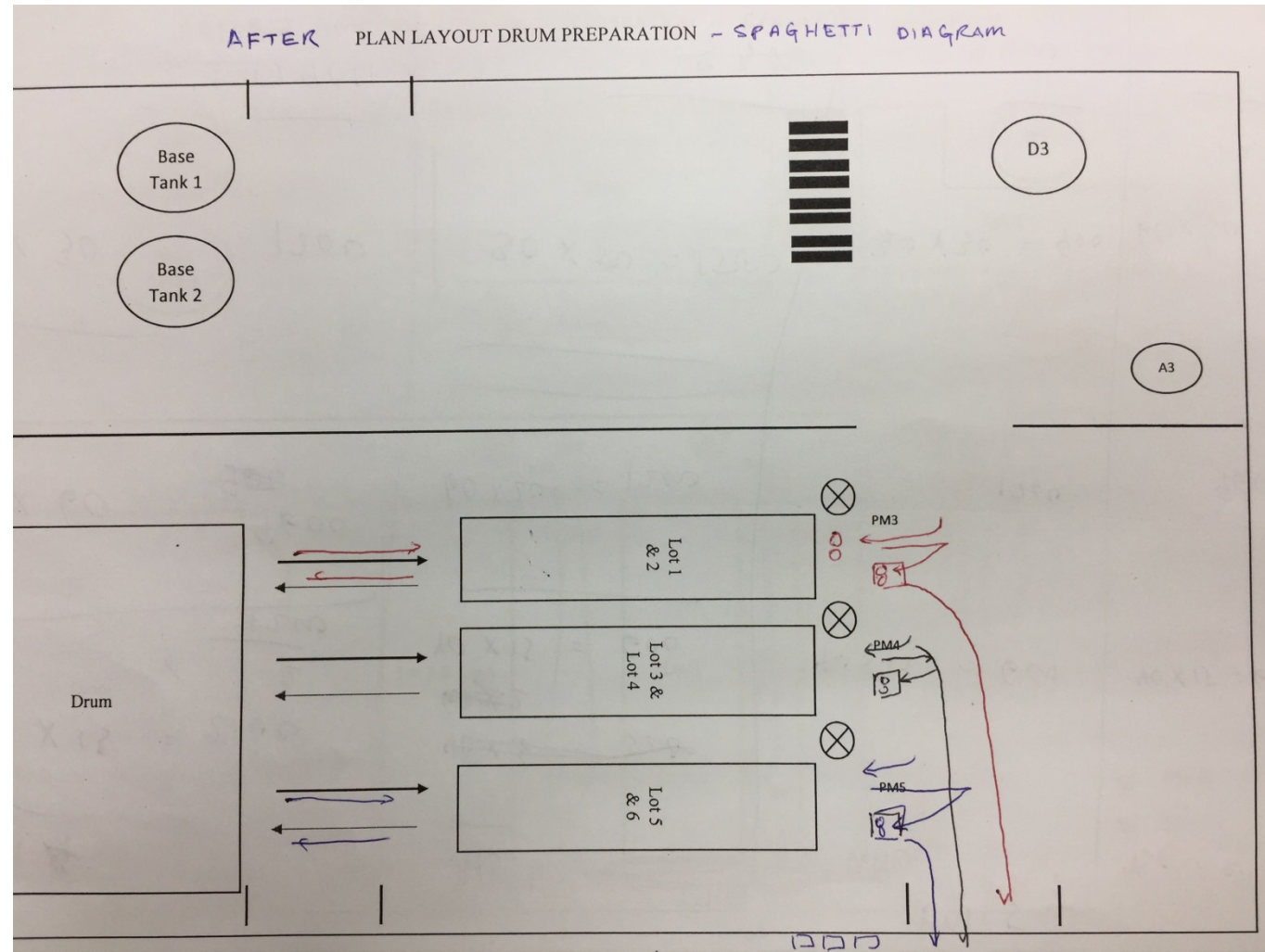
- No clear forklift lane (Safety/ 5S)
  - The forklift need to go through the reactor, dilution & blending tank to move the drums. This will create safety hazard
- Long forklift movement
- There are potential packing error
  - There are no standardized area for drum preparation







# 3. Proposed Layout



## 4. Analysis

Packing Line	Before (ft)	After (ft)	% Improvement
PM 3 (80 drums/ lot)	8400	2320	72%
PM 4 (120 drums/ lot)	15000	3300	78%
PM 5 (120 drums/ lot)	12000	2700	77.5%

- Distance per lot calculated based on:
  - Transport and arrange empty drum (8 drum/ trips)
  - Move 2 drums to pallets
  - Move 8 drums/ trips to store (until store door)





# 6-1 - Action Taken/ Tindakan

#	Tindakan	Siapa	Status
1.	Pemasangan paip baru PM3-5	Yazid	Installation 16 Oct Completed
2.	Diverted pipe to new pipe	Yazid	Installation 24-25 Oct Completed
3.	Jalankan packing proses dgn layout yang baru	Production – Ah Wan	2 Nov



Sistem paip packing yang baru  
Total Investment required:  
RM15,000k



## 6-2 -Result (Penjimatan - Selepas Simulasi)

### Direct Cost/ year

- Driver – RM22500
- Diesel – RM13500

### Indirect Cost

- Forklift Maintenance – 25% from total cost/ year
- Housekeeping -

### Intangible benefit

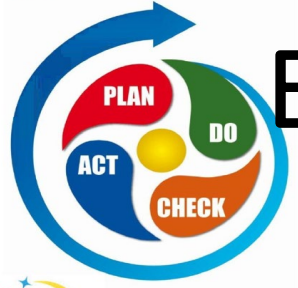
- Safety
- Environment – Reduce CO2 from forklift
  - Cleaner environment



## 7 - Follow up/ Future Project



- Empty drum handling inc JIT drum ordering
- Drum preparation and feeding to packing line
- JIT – local order
- Container loading for export
- Pallet – Damage pallet
- Methanol & Cobalt handling



# Example of assessment (judging) Criteria

No	Criteria	No. of sub criteria	Total Scores
I	Introduction	2	50
II	Project Selection & Definition	3	150
III	Improvement Opportunities Analysis	3	250
IV	Creative & Innovative Solutions / Implementation	4	200
V	Monitoring & Standardization	4	100
VI	Achievement	5	200
VII	Presentation	2	50
	<b>Total</b>	<b>23</b>	<b>1000</b>





# MPC Webinar Series

## Operational Excellence/ Kaizen

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Webinar 1 - **Pembangunan Program** Kecemerlangan Operasi  
19 June 2020 (10am-11am)

<https://efrcert.teachable.com/>

Webinar 2 - **Mengenalpasti projek** kecemerlangan operasi  
25 Jun 2020 (11am-1pm)

Webinar 3 - Pendekatan **perlaksanaan projek** kecemerlangan operasi  
termasuk kaedah laporan dan penilaian  
7 Jul (11am-1pm)

Sharing by:

**Dr. Edly Ramly**

*Fellow Industrial Engineering  
Operation Management  
Society, US*

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# Potential Future MPC Service Advisory – Pre-Assessment - Certification

- PERSONALISED ADVISORY

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OEMS**

**Like 5S certification**

**Self-Assessment of OE  
Operational Excellence Award**

Contact me to join the Pilot  
project for more detail

[edly@efrmanagement.com](mailto:edly@efrmanagement.com)

016-7748331

