

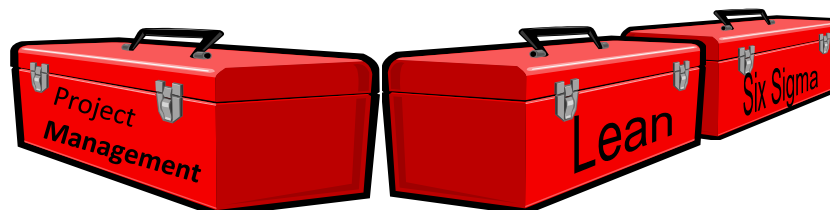
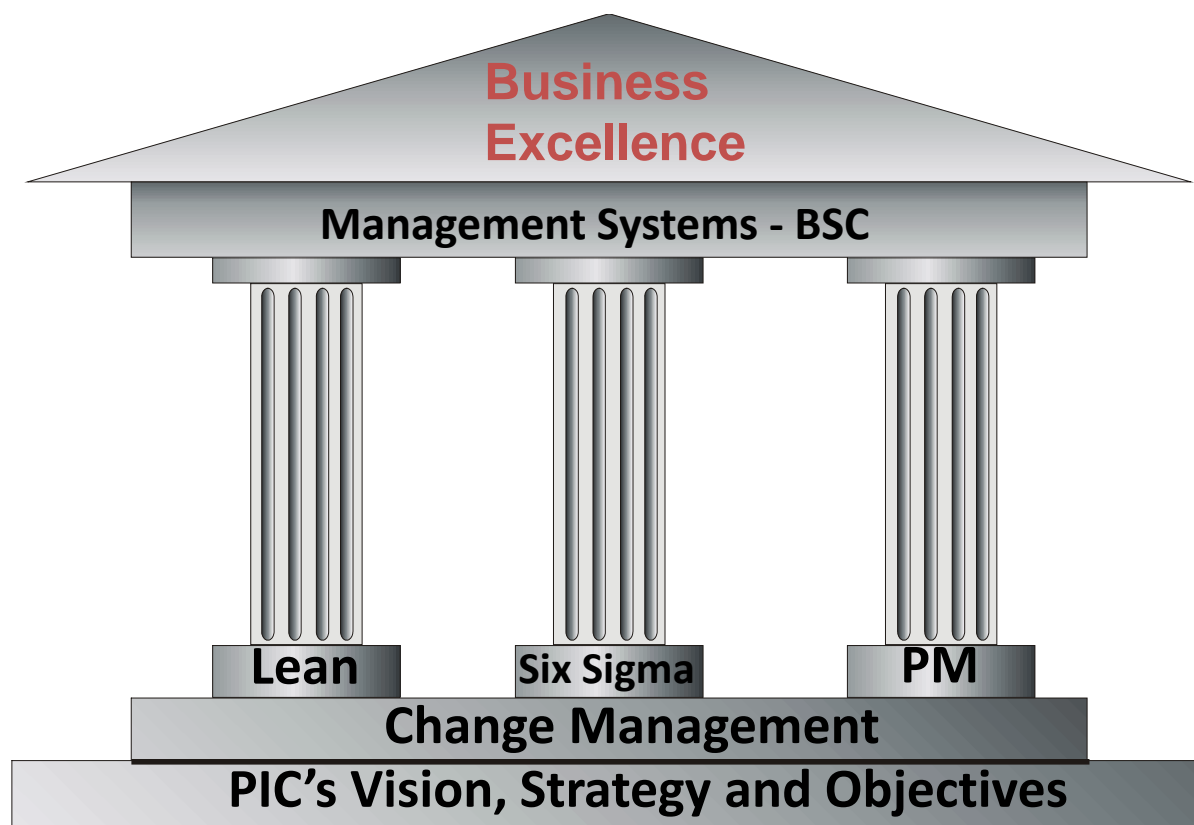
PIC's Road To Business Excellence



Lean Six Sigma
Workshop



Movenpick Dead Sea Resort Nov. 4th- 6th, 2014



PIC's Road To Business Excellence

Lean Six Sigma Training

Nov. 4th- 6th, 2014



شركة صناعة الكيماويات البترولية (ت.م.ك.)

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Arab Fertilizers Association
Since 1975

This Module is developed by PIC's BPDT specifically targeting PIC's affiliates as key audience.

It is an attempt to explain the main concepts and elements of Change Management and Lean Six Sigma methodology while focusing on PIC's deployment module.

In this Module we will define the methodologies and tools used by PIC to transform the culture and achieve corporate objectives.

We will also explain how these methodologies are put to work in a top management driven discipline that governs the continuous improvement aspect of the business across all sectors

PIC is proud to be one of the first organizations in the country to successfully deploy this major improvement initiative and look forward leveraging the knowledge it acquired through many years of successes and achievements Driven by the engagement of PIC's management.



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Logistics & Ground Rules



- We shall have Two sessions per day with Two 15-30 minutes breaks
- We must start and finish each session on time
- We are 100% committed to this training day (No cell phones/emails)
- We will practice active listening (No side conversations)
- We shall share our opinions and ideas to add value



GUIDELINES FOR USE OF TRAINING MATERIALS

You have received materials that describes PIC's Lean Six Sigma Deployment.

Please follow these guidelines in handling the training materials:

1- Do not copy large or entire sections of training materials. You may copy individual pages as needed to explain the forms and their use to persons who will use them. Be sure to preserve the "PIC Restricted" designation and the copyright notices on any copies that you make.

2- Use ordinary caution not to lose training materials. Do not leave them unattended in public places. Do not download them onto any computer.

3- Do not publicly display Training materials outside of your organization facilities.

4- Do not make modified or adapted versions of training materials.



Workshop Facilitators

Facilitator Name: Aref Alawadi

Job title & Experience: Senior Process Development Specialist, Certified Master Black Belt, Project Management Professional (PMP) certified by Project Management Institute. Facilitated over 600 hours Lean Six Sigma Training and provided coaching for over 400 successful improvement projects.

Session Title: PIC's Road To Business Excellence

Session Description: Explaining the main concepts and elements of Change Management and Lean Six Sigma methodology while focusing on PIC's deployment module.

Facilitator Name: Mahdi Alajmi

Job title & Experience: Senior Inventory Administrator, Certified Green Belt Project Leader, trained as Black Belt. Completed 11 projects using DMAIC, Implement methodology and 5S technique.

Session Title: Kaizen Concept and technique

Session Description: Kaizen concept, definition and Kaizen phases. Explain the Kaizen Technique by going over a real project example.

Facilitator Name: Saud Almajedi

Job title & Experience: Senior Area Maintenance Engineer, Certified as Black Belt, trained as Master Black Belt. Completed 14 projects using DMAIC & Implement methodology and Kaizen and 5S technique.

Session Title: 5S technique case study

Session Description: 5S definition and roadmap, 5S stages. Explain the 5S by going over a real project implementation.

Facilitator Name: Shafi AlAjmi

Job title & Experience: Business Development Team Leader, Certified Black Belt. Completed 11 projects using DMAIC, Implement methodology and Kaizen technique.

Session Title: Lean Six Sigma Applications in Planning Department

Session Description: Six Sigma Applications in Corporate Planning Department and how the six sigma methodology improves the business processes and reduces defect in the Department.





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PIC Among KPC Subsidiaries



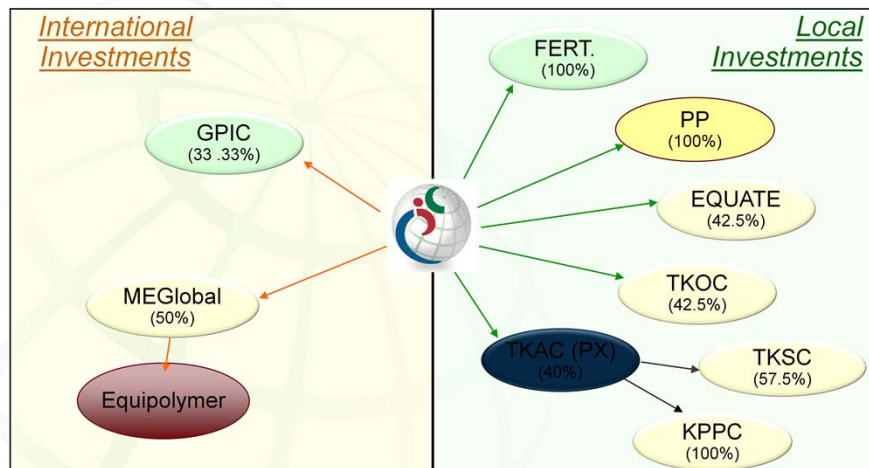
PIC
is the petrochemical arm of
Kuwait Petroleum Corporation



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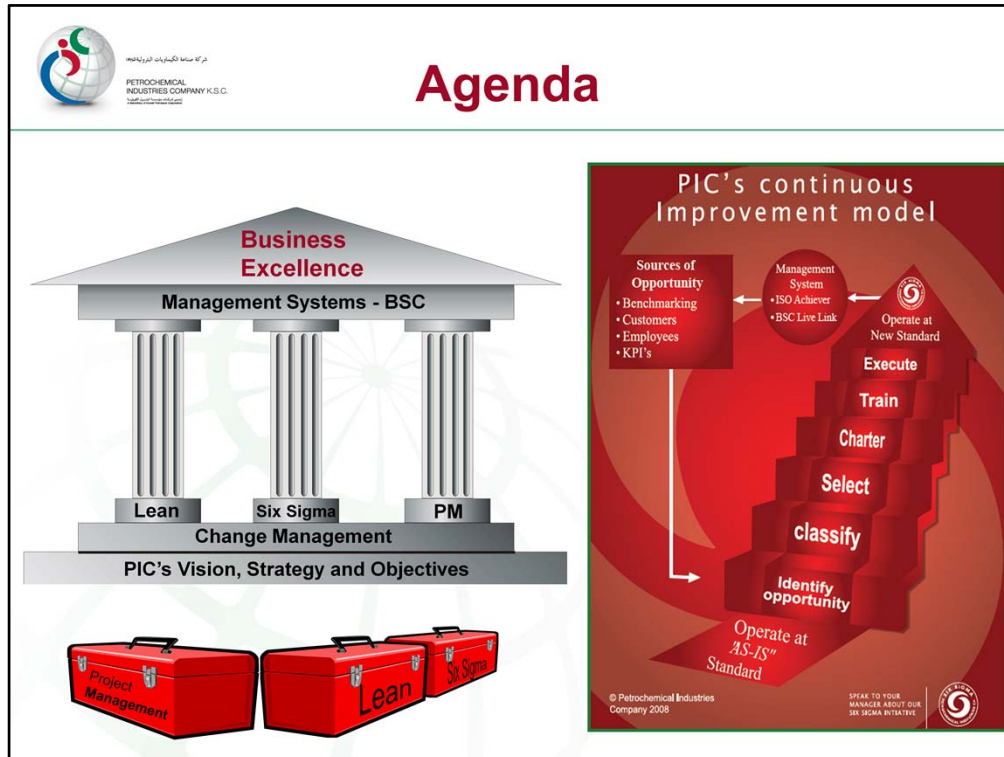
PIC's Investments

PIC has diversified its position as a significant player in Petrochemicals, with local and International investments



PIC's Products – Design Capacity

Strategic Business Unit	Company Name	Product/Capacity (^{'000} Tons/year)
Fertilizer	PIC Fertilizer	<ul style="list-style-type: none"> Ammonia : 620 Urea : 1040
	GPIC	<ul style="list-style-type: none"> Ammonia : 500 Urea : 600 Methanol : 400
Aromatics	TKAC - KPPC	<ul style="list-style-type: none"> Benzene : 390 Paraxylene : 820
	TKAC - TKSC	<ul style="list-style-type: none"> Styrene : 450
	Equipolymers	<ul style="list-style-type: none"> PET : 340
Olefins	PIC Polypropylene	<ul style="list-style-type: none"> PP : 150
	MEGlobal	<ul style="list-style-type: none"> MEG : 1000
	Equate	<ul style="list-style-type: none"> PE : 900 MEG : 400
	TKOC	<ul style="list-style-type: none"> MEG : 600



This model will attempt to explain PIC's Lean Six Sigma initiative in Three main sections:

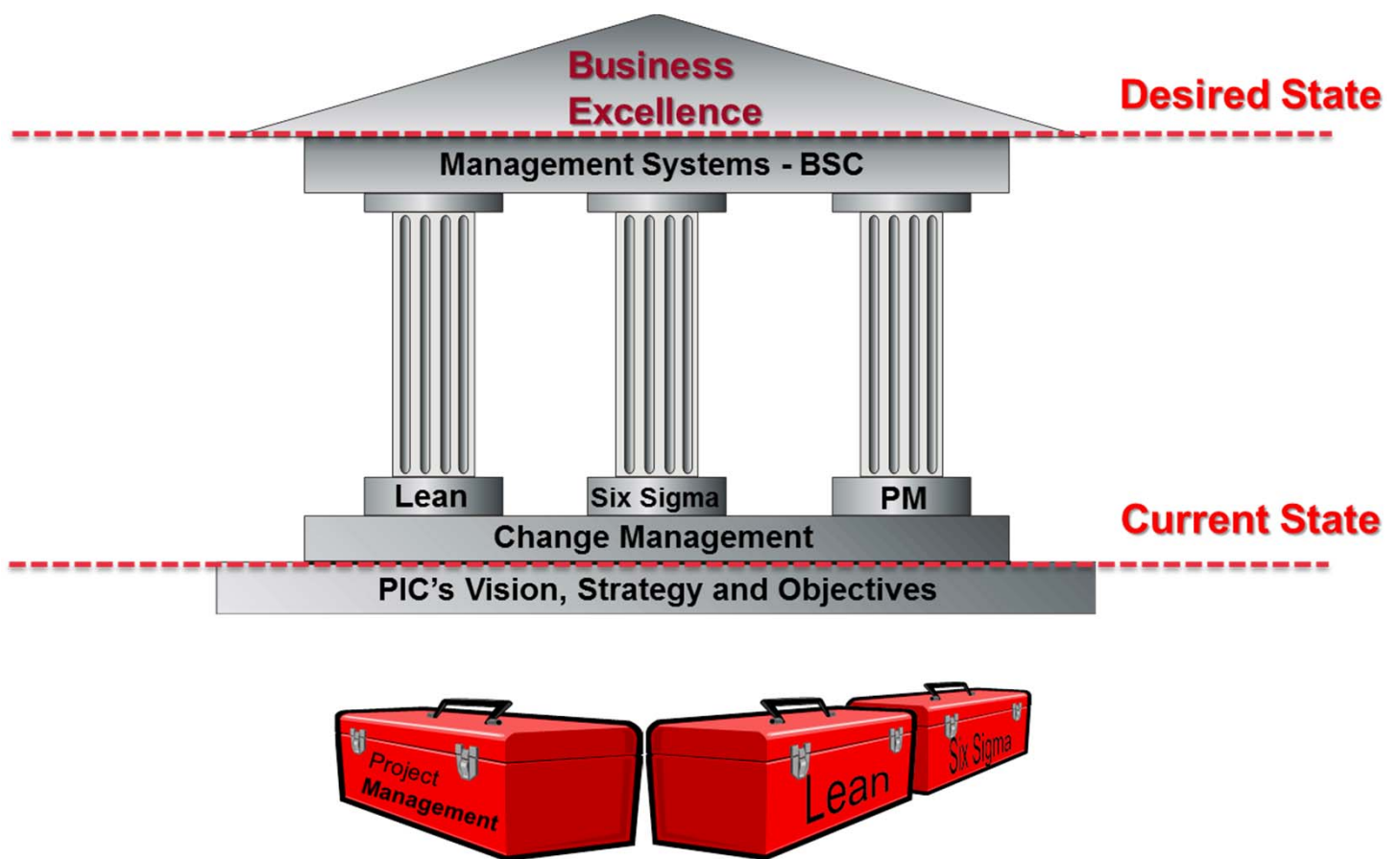
1. Tools for Excellence
2. Deployment Roadmap
3. Executing the Change

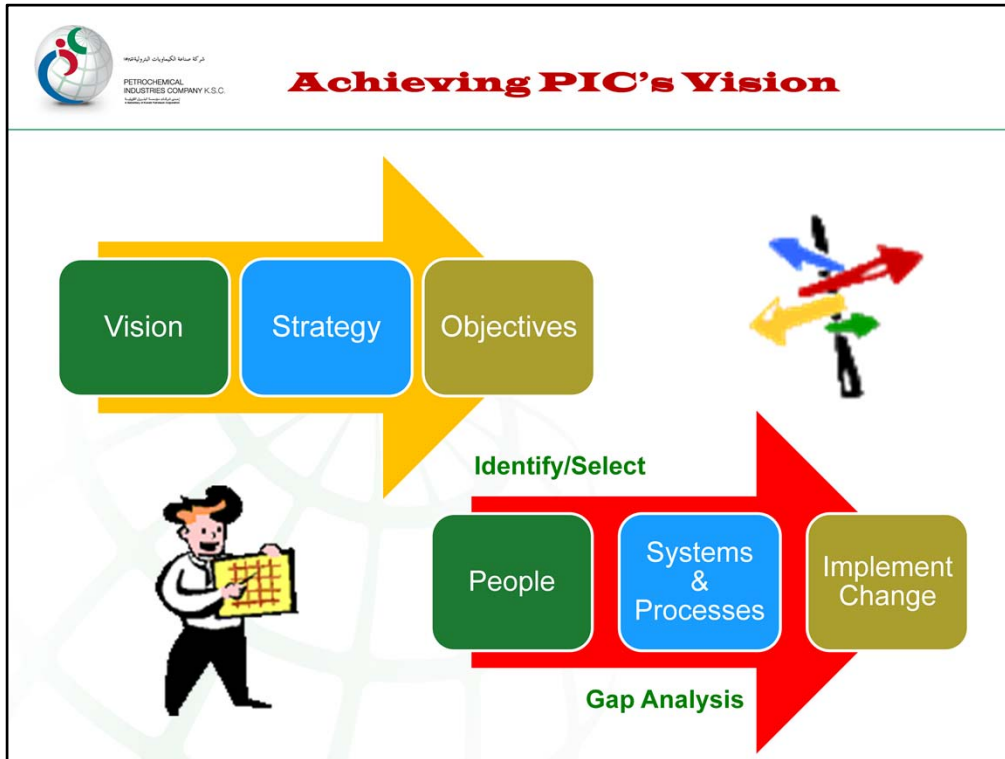
Three case studies are provided in the appendices covering real life examples of successful implementation of Lean Six Sigma:

1. Kaizen Events. Facilitated by Mahdi Alajmi
2. Workplace Optimization (5S). Facilitated by Saud Almajedi
3. Applications in Planning Department. Facilitated by Shafi Alajmi



1. Tools For Excellence





Achieving the vision & objectives of any organization requires a shift in employees competencies and continuous re-engineering of processes and procedures.

Business Processes Development Team main objective is to provide training and coaching on how to implement the needed change using best practice tools and methodologies.

The Lean Six Sigma problem solving methodology provides a common discipline for all sectors in PIC to insure the gradual and continuous improvement of all key processes and personnel. Customer focused and data based improvements that can be **validated**, **sustained**, and **leveraged**



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Business Excellence in PIC:

The collective and continuous endeavor **to achieve PIC's strategic objectives** by having competent professionals working on processes that give the customers of the process exactly what they want.

The collective efforts are organized by mandating a logical and scientific roadmap to achieve corporate objectives.

Focusing on People and Processes to do everything
Better, Faster, Cheaper



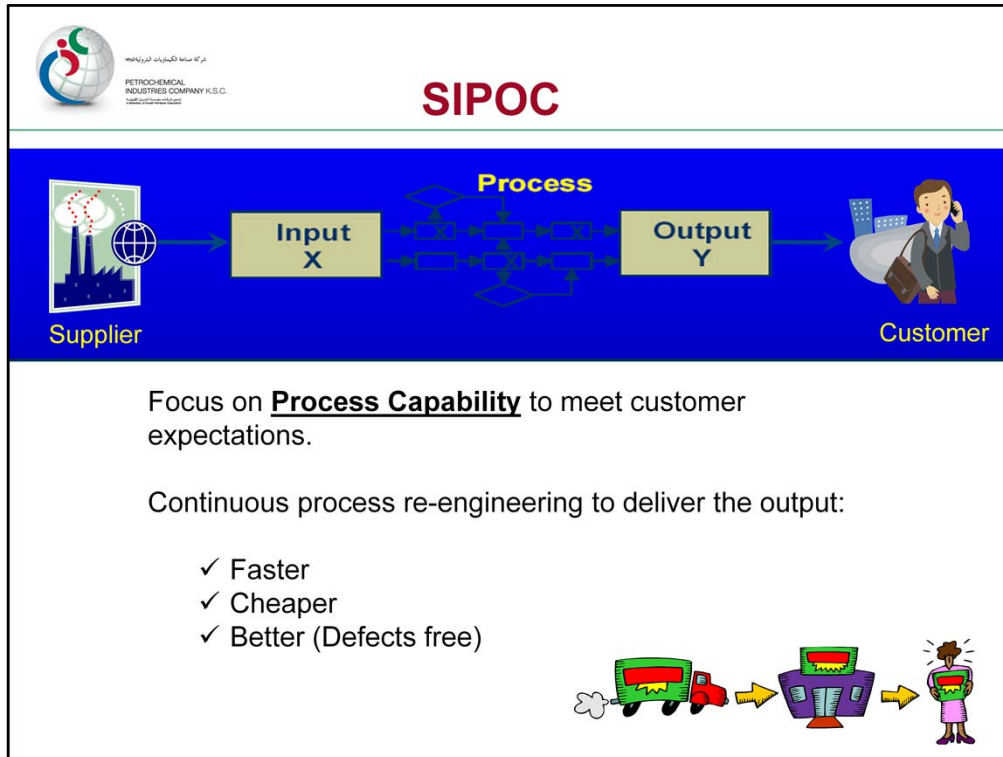
The definition of business excellence suggests that this must be a team effort.

We are after validated and sustainable improvements that are done in a project format as a team,

Validated change means that the output of the process have been improved after implementing the change.

Improvements in outputs can reduce defects (better), reduce cycle time (faster) or reduce the costs associated with the production of the output (cheaper).

Changes for the sake of change with no clear impact on process output can be a form of waste.



One of the Basic fundamentals of business process improvements is Customer focus and process thinking.

We must look at anything we do in terms of the process we are following to produce the targeted result.

We must identify the customers of our processes and understand their requirements.

We must realize that in order for us to be able to meet customer's requirement we must continuously improve process inputs and procedures followed within our process.



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Principles



Supplier

Input
X

Process

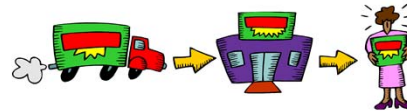
Output
Y



Customer

1. Customer Focus
2. Process Approach
3. Continual Improvement

4. Factual approach to Decisions
(Must measure variables)
5. Everyone is involved
6. Effective Leadership



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PIC's Successes



Supplier

Input
X

Process

Output
Y



Customer

Inputs

GB & BB Training

Annual Leadership Training

Annual Awareness
Sessions

Quarterly Opportunity
Identification Workshops



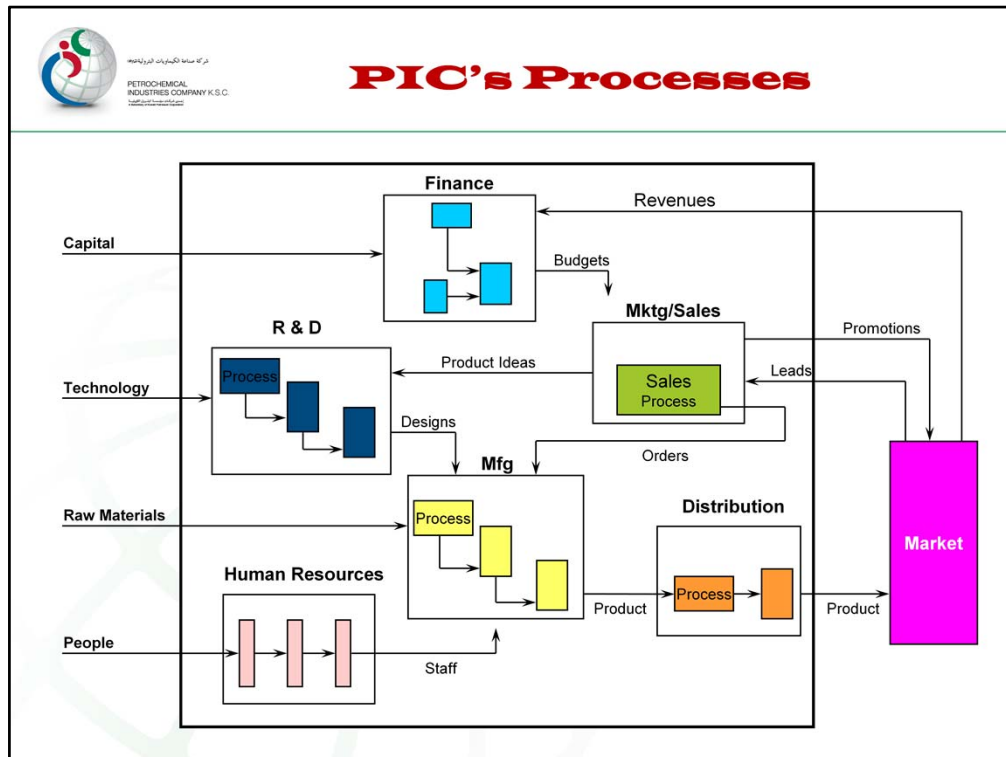
Outputs

154, Million Dollars
Savings

476 Successfully Completed
Projects

80 Certified Projects
Leaders

Competencies and
Culture Transformation



Every thing we do is a process that takes resources (inputs), we perform some function on them (process) , and deliver them in changed form (outputs) to the customer of the process.

They can also be thought of in terms of $y = f(x)$: the inputs are the X's, the function is the process, and the Y's are the outputs.

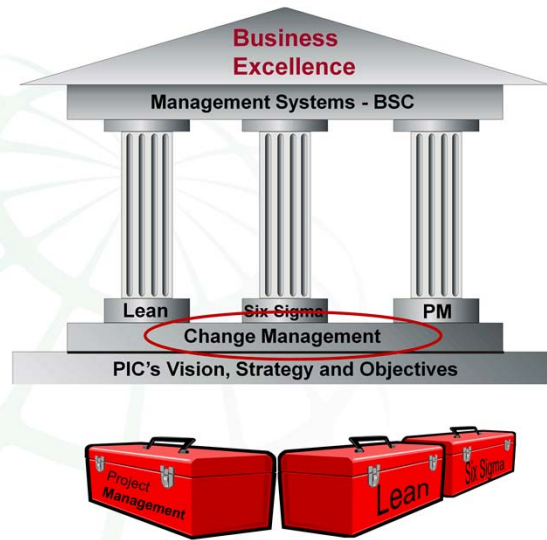
Inputs are the raw materials, capital, forms, assignments, customer requirements, systems and procedures, and other resources that are converted into the products and services (outputs)

Outputs are the products and services that are produced by a process or set of processes

BUT HOW DO WE GAGE THE QUALITY OF THESE OUTPUTS



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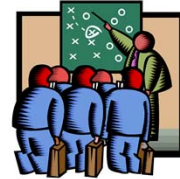




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Change Management

- The concept of **change management** describes a structured approach to transitions from a present to a desired state, in individuals, teams, organizations and societies.



$$E = Q \times A$$

Change
Effectiveness

Technical
Solution

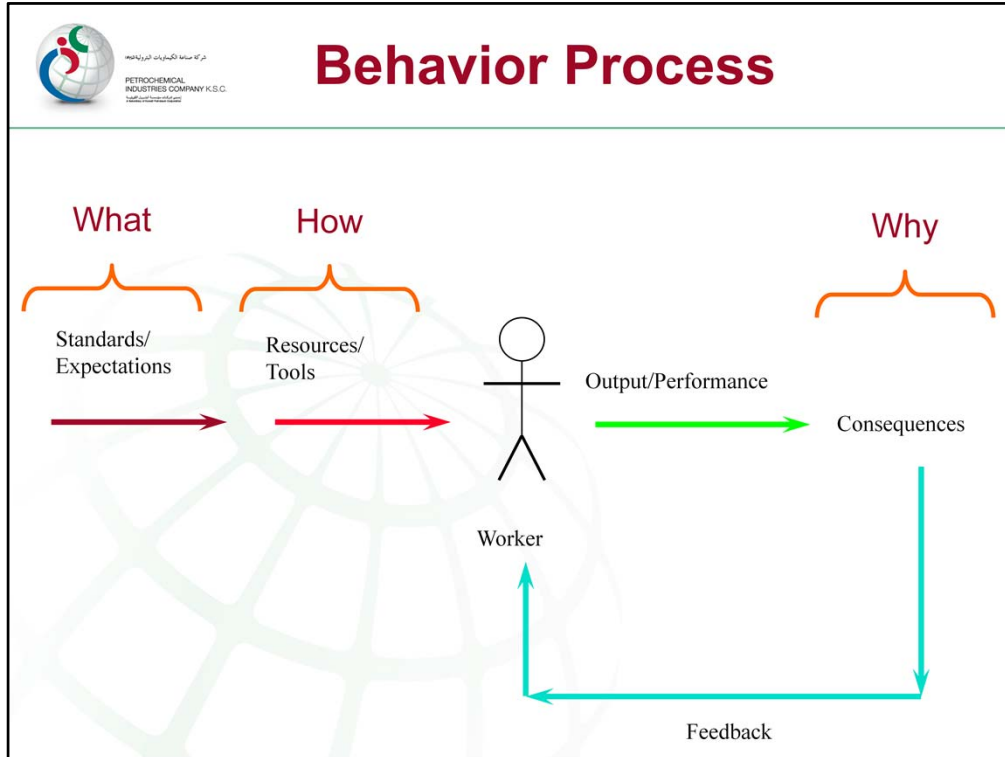
Solution
Acceptance

The Acceptance of a solution is as important as its technical Quality

With every Improvement to our processes, we become closer to achieving our vision.

But every improvement requires a change in what we do or how we think. That makes change management a crucial factor for success.

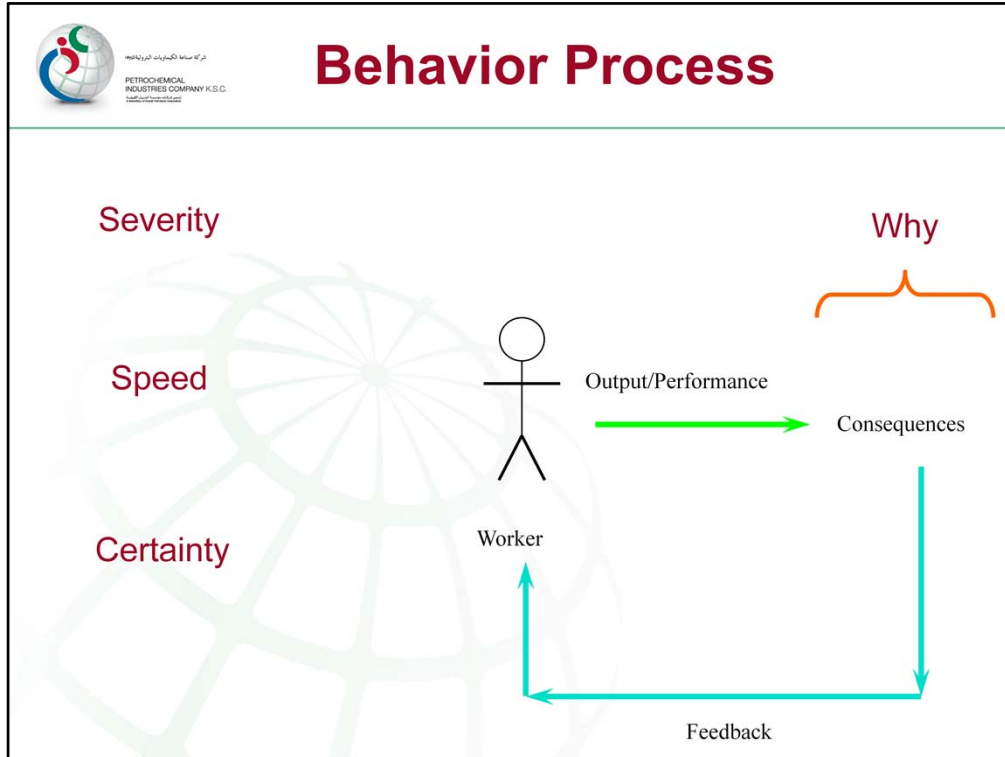
Without managing the change in the people who are responsible for the process, process changes can be very hard to achieve, and even if they were achieved, they would be impossible to sustain without applying proper change management.



Just like a business process, human behavior (the output) can be optimized by a number of inputs.

The individual's behavior can be optimized if he knew exactly **what** to do, **how** to do it and most importantly, **why** should he do it.

It is the leaders role to provide an adequate incentive and feed back that is timely, accurate and constructive.



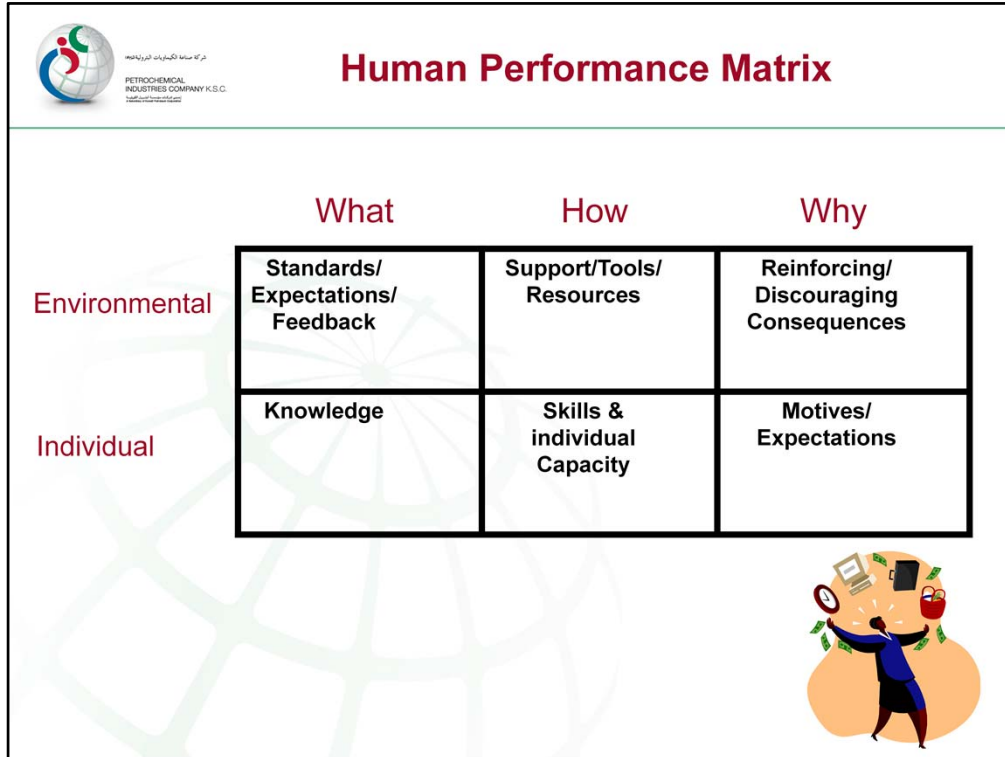
The effectiveness of the consequences in influencing a person's performance depends on three main factors:

1. The severity of the consequence whether it was positive or negative
2. The speed in which it is received. (immediate or Future)
3. The certainty of receiving the consequence (certain or uncertain)



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Movie -- “The Deepest Bin”



The Work Performance Matrix shown in the slide summarizes the factors we must focus on to achieve positive change.

It is a known fact that solving issues in the matrix gets harder when we move to the right of the matrix.

Issues with what to do or how to do it are relatively easy to resolve though awareness or training.

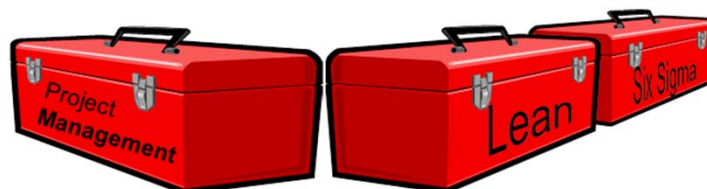
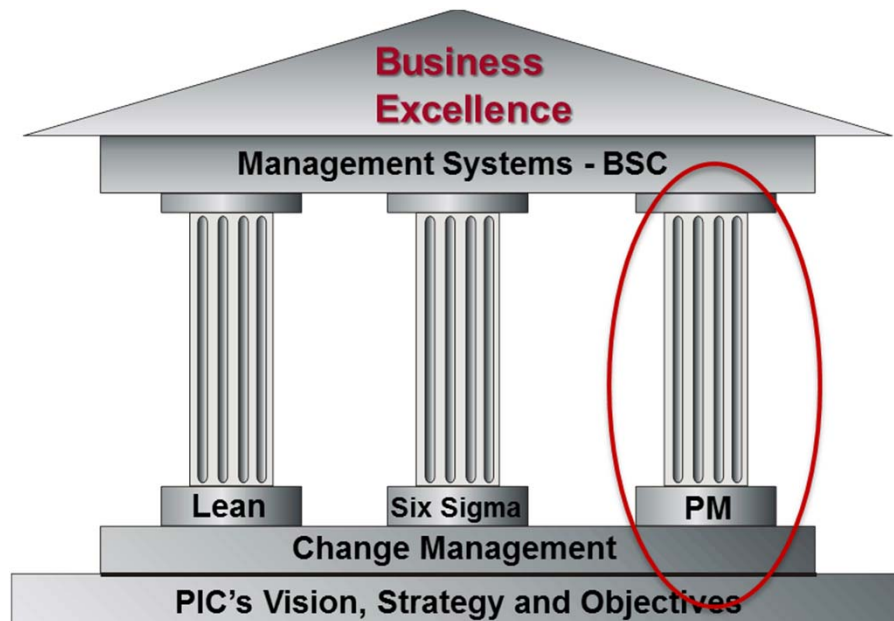
Issues relating to why he should do it however, is a completely different story.



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PIC's Deployment Efforts

- Continuous awareness and knowledge transfer through:
 - ✓ Project progress meetings
 - ✓ Projects gallery walks and certification ceremonies
 - ✓ Social media & printed periodicals
 - ✓ Formal awareness**What**
 - Best in class formal training:
 - ✓ Lean Six Sigma Green Belt
 - ✓ Lean Six Sigma Black Belt
 - ✓ Project Managements
 - ✓ Leadership Training**How**
 - Significant portion of annual Bonus/Incentive must be tied to initiative goals and objectives.
- Why**





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Definitions

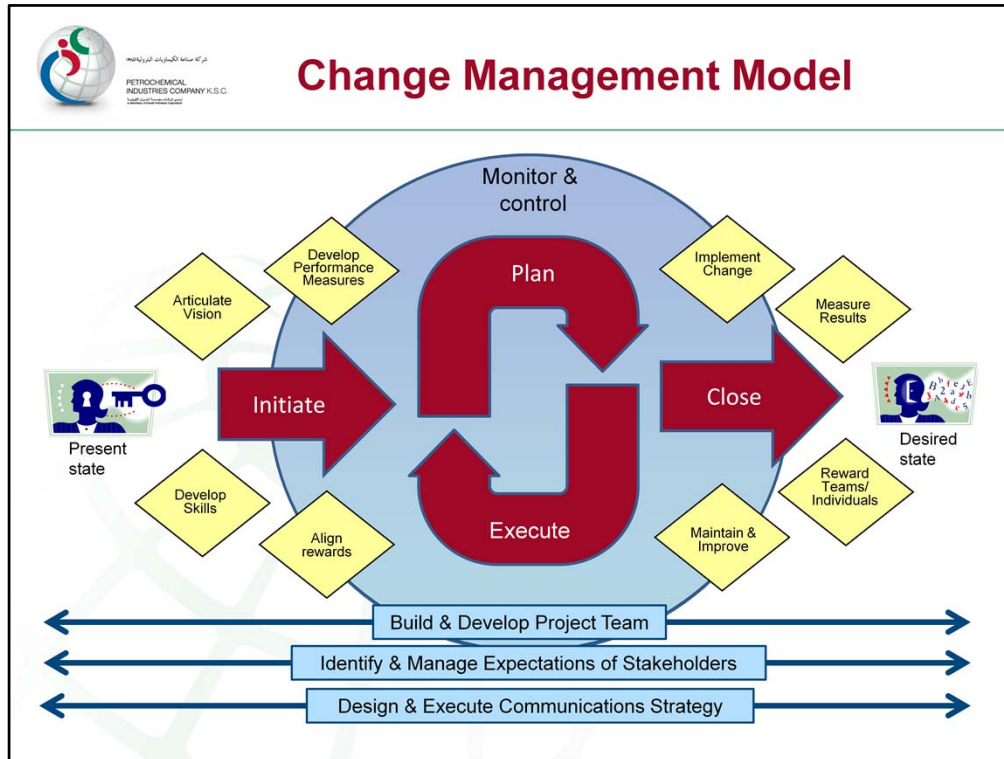
- Project management is the process and activity of planning, organizing, motivating, and controlling resources to achieve specific goals
- A Project is a series of tasks or activities done in a logical order to drive a change in performance.
- A Project is a temporary endeavor designed to produce a unique product, service or result



Executing all major improvements in a project format guarantees the professionalism in which the change is implemented.

It also enhances leadership competencies like planning and communication.

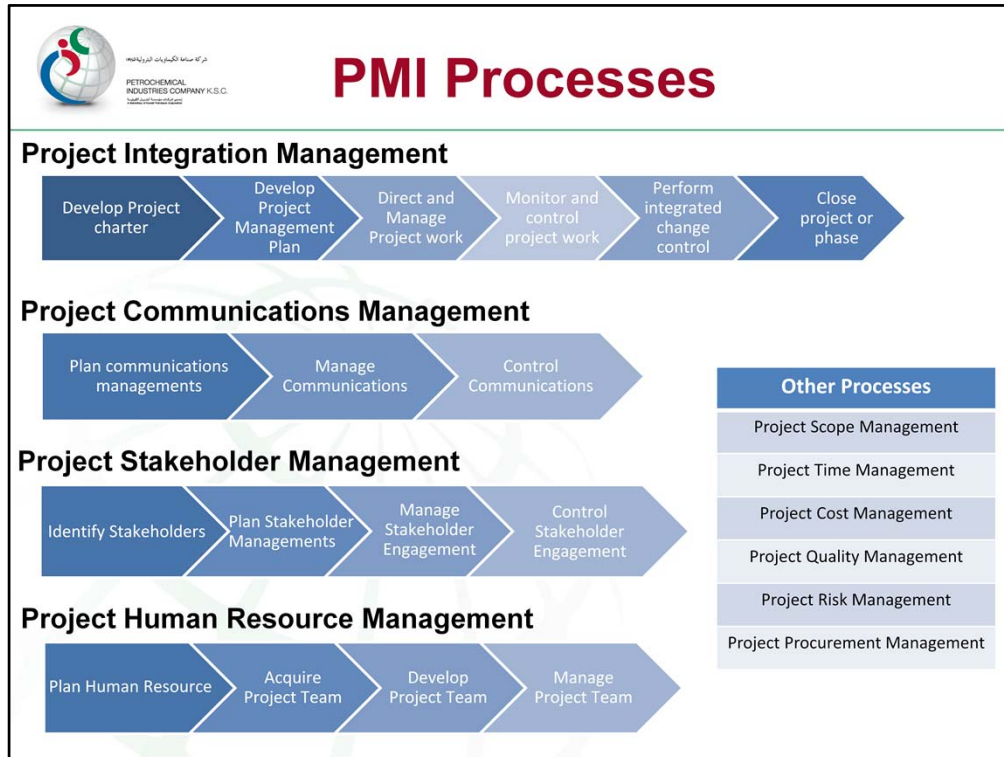
There is no better leadership training than giving an individual a chance to lead a team in achieving certain objectives.



Effective Change Management requires strong leadership and communication skills. It also requires a road map and a checklist of activities.

The model on the slide can be applied to any major change that is targeted by top management.

It can also be applied to any small scale changes like the ones implemented in Lean Six Sigma projects.

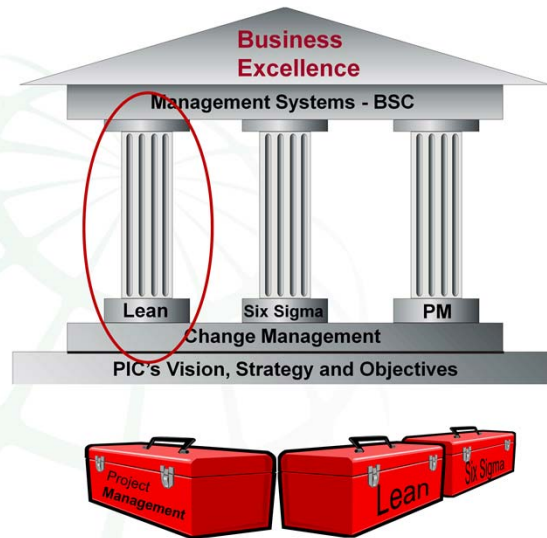


PMI's Project Management Processes provide the needed road map and can equip the project leaders with basic knowledge on :

- Communication
- Stakeholder management
- Team members management
- Risk Assessment
- Documentation and leveraging
- Project deliverables management (Timeline, cost and Quality)



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- **Lean is:** a set of principles, concepts and techniques aimed at continuously eliminating waste in any process.

Henry Ford



"Our production cycle is 33 hours from iron ore to an automobile, compared to 12 days which we thought record breaking."

Taiichi Ohno

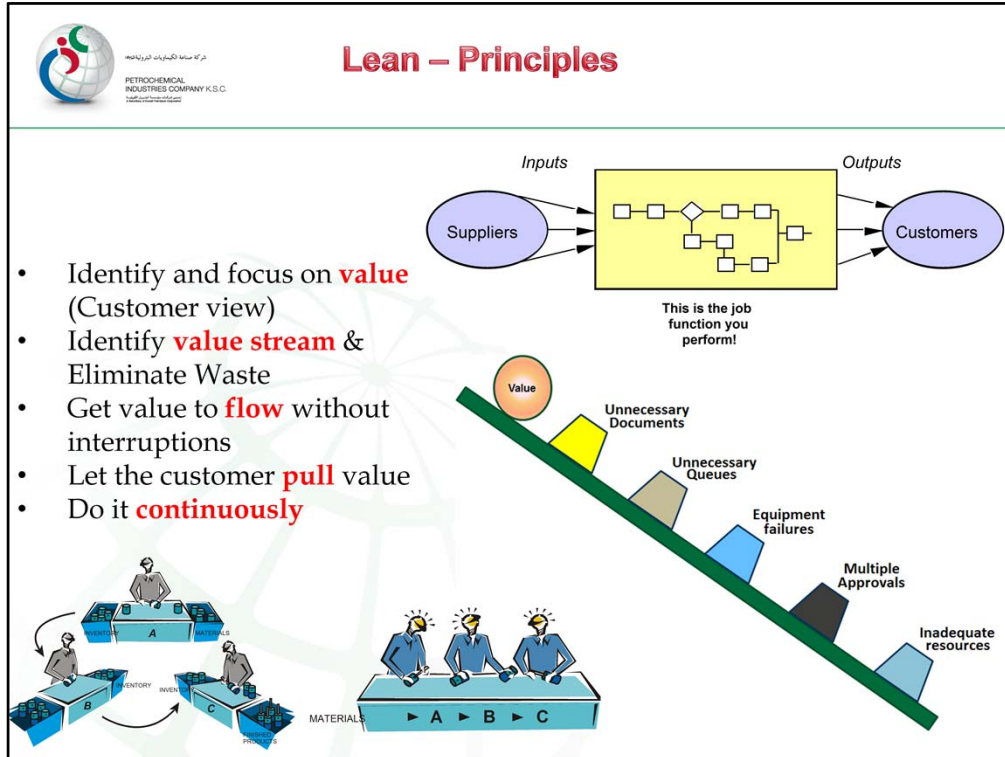


Kiichiro Toyoda



"Unless we establish a method far superior to Ford's, we will never beat Ford."

- Principles were first applied by Henry Ford, who was the first person to integrate an entire mass-production system under what he termed "flow production"
- Following World War II, the Toyota Motor Company adapted Ford's principles as a means of compensating for its challenge of limited human, financial, and material resources.
- The Toyota Production System (or TPS), which evolved from this need, was one of the first managerial systems using Lean principles throughout an entire enterprise.
- Modern day Lean is attributed to Ohno, Shingo, and others at Toyota. Through Toyota's teaching and sharing of knowledge, many other companies have built their own versions of TPS. Examples include the Ford Production System (or FPS) which has been operational for close to 20 years.



Lean is a collection of concepts and techniques aiming to eliminate waste and creating flow in the process using a customer pull system.

This must be done in a continuous fashion focusing on value as perceived by the end user.

There are several concepts to Lean philosophy. In its purest form, Lean empowers all employees to identify and remove or minimize all work that is non value added from the point of view of the customer.

Muda (MOO-dah) means “waste” or more specifically, any human activity which absorbs resources but creates no value

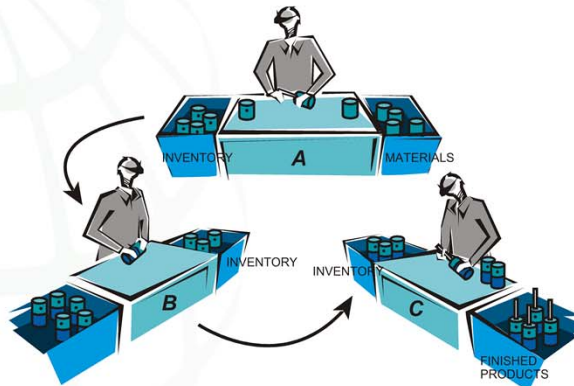

















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Practice Activity

- Six Employees are doing six different task in sequence:
- Each Employee must take as much input as possible from his inbox, perform his task and put it in his outbox.
- Must start and end as directed.

Customer's Requirements: "clean straw man drawings" (not overlapping)
As shown on next slide.



1	
2	
3	 
4	  
5	     
6	 

Where do waste resides?



Tim Wood

1. **Transportation** - Moving material more than necessary
2. **Inventory** – Excess stock in the form of raw materials, Work in Process, and finished goods
3. **Motion** – Any motion that is not necessary to the successful completion of an operation
4. **Waiting** – Idle time between or during operations due to missing material, an unbalanced line, scheduling mistakes, etc
5. **Over Production** – Producing components that are not intended for immediate use or sale
6. **Over Processing** – Doing more to the product than necessary
7. **Defects** – Producing defective goods



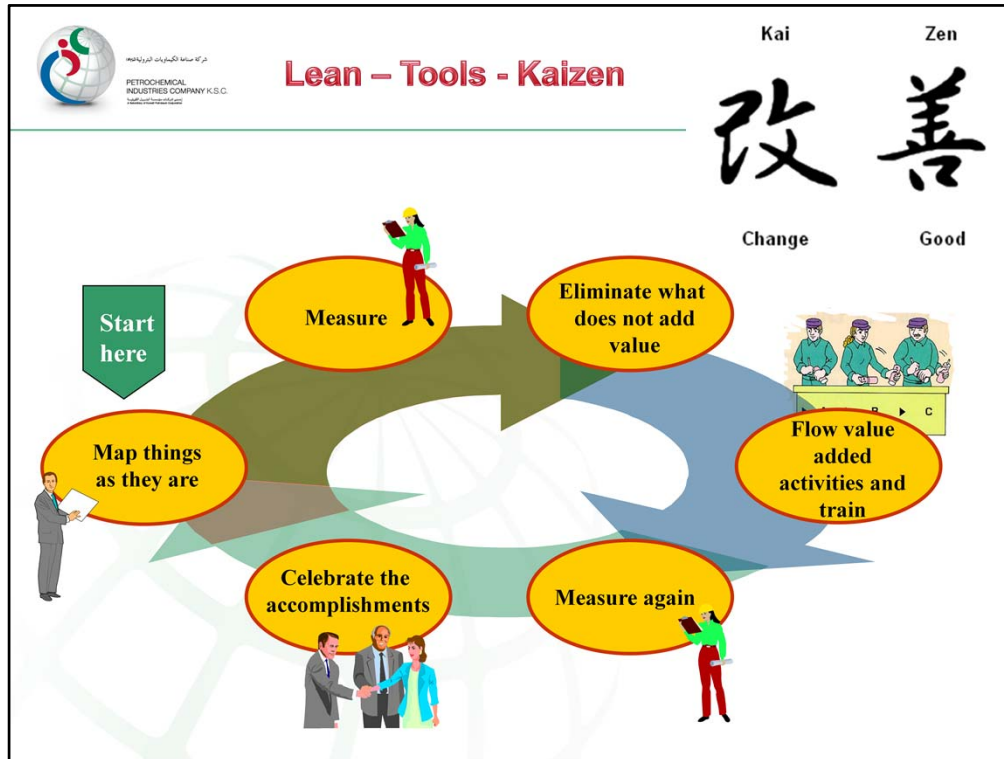
There are many specific types of waste in each of these categories. Sometimes it is helpful to think of three different levels:

Gross Waste or Low-Hanging Fruit - Dealing with these can have a big impact. Specific wastes at this level are relatively easy to spot. Examples include: Plant layout; Rejects; Returns; Rework; Damaged product; Container size; Batch size; Inadequate lighting; Dirty equipment; Material not at Point of Use.

Process and Method Waste – Examples include: Workplace design; Lack of maintenance; Temporary storage; Equipment problems; Unsafe methods.

Micro Waste within Process – Examples include: Double handling; Excess walking; Looking for stock; Paperwork; Speed and feed; No Standard Operating Procedure.

The Toyota Way, Jeffrey K. Liker, McGraw-Hill (2004).

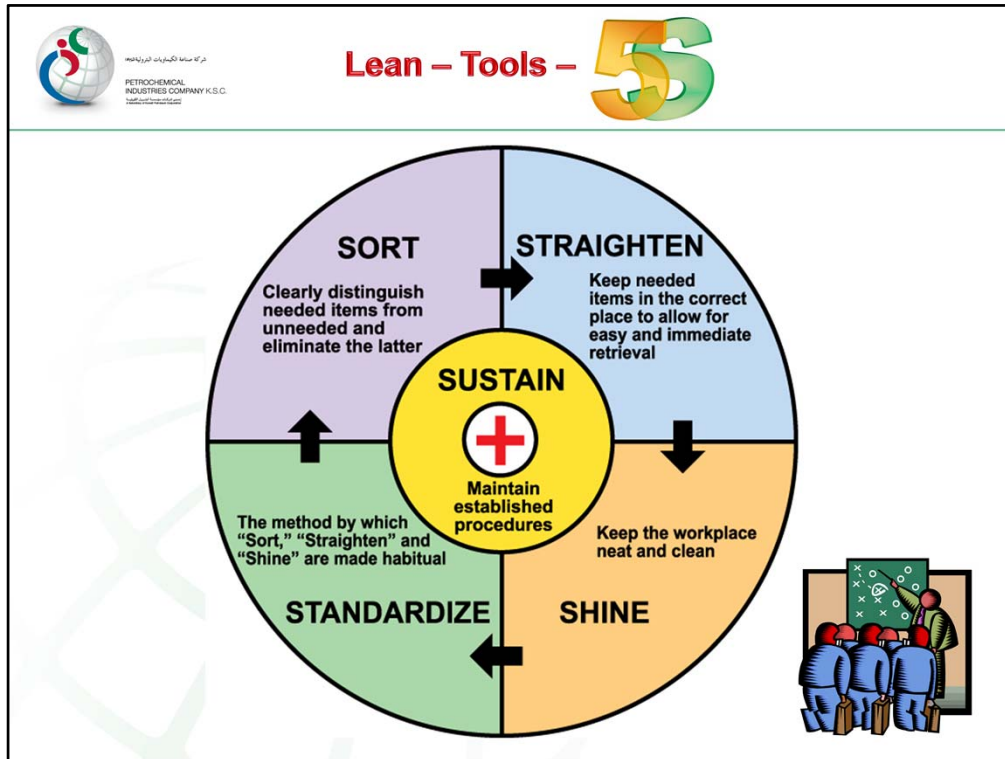


Kaizen (改善^[1], [Japanese](#) for "improvement" or "change for the best", refers to philosophy or practices that focus upon [continuous improvement](#) of processes in manufacturing, engineering, and business management. It has been applied in healthcare,^[1] [psychotherapy](#),^[2] [life-coaching](#), government, banking, and other industries.

In modern usage, it is designed to address a particular issue over the course of a week and is referred to as a "kaizen blitz" or "kaizen event".^[8] These are limited in scope, and issues that arise from them are typically used in later blitzes.

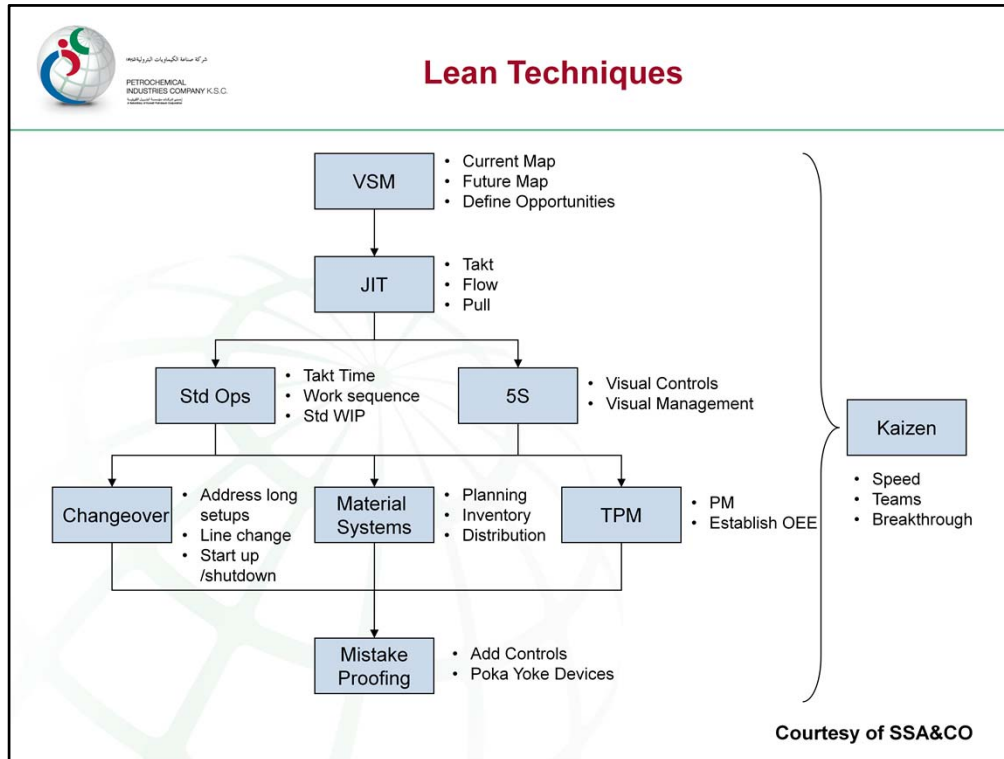
Steps for Kaizen:

- Map things “as they are” using Value Stream Mapping
- Measure current performance
- Eliminate what does not add value
- Flow Value-Added activities
- Brainstorm and implement improvements
- Train employees in new process
- Test changes
- Measure again
- Put in controls to sustain gains
- Present and celebrate the accomplishments!



5S is the name of a workplace organization method that uses a list of five [Japanese](#) words: *seiri*, *seiton*, *seiso*, *seiketsu*, and *shitsuke*. [Transliterated](#) or translated into [English](#), they all start with the letter "S". The list describes how to organize a work space for efficiency and effectiveness by identifying and storing the items used, maintaining the area and items, and sustaining the new order.



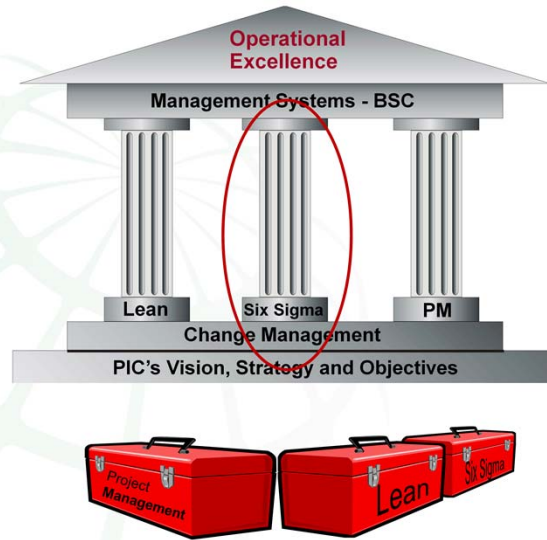


Lean Tools & Terminology:

- 5S: System for workspace organization
- 5-Whys: Technique for root cause investigation
- Cellular work: Teams/Technology linked for maximum customer value
- Heijunka: Leveling Production Flow
- Jidoka: Automation with a human touch
- JIT: Just-in-time.
- Kaizen: A Philosophy for Continuous Improvement
- Kanban: Signaling System alerts the need for an Item
- Poka Yoke: Error (Mistake) Proofing
- Pull Systems: Products 'Made to Order' i.e. at the pull of the customer
- SuperMarkets: Inventory management concept
- Takt Time: Product Pull Rate, as defined by the Customer
- Visual Controls: Simple signals providing immediate understanding
- VSM: Value Stream Mapping



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- **Six Sigma** is a methodology that uses statistical analysis to measure and improve operational performance by identifying and eliminating "**defects**" in any process.

The roots of Six Sigma as a measurement standard can be traced back to Carl Frederick Gauss (1777-1855) who introduced the concept of the normal curve.

Credit for coining the term "Six Sigma" goes to a Motorola engineer named Bill Smith.

Dr. Mikel Harry and Richard Shroeder are the architects of the Six Sigma Methodology.

People like Motorola's Bob Galvin, AlliedSignal's Larry Bossidy, and GE's Jack Welch take the credit for making Six Sigma so popular.



Definitions

Word	Definition
Process	A set of activities performed to deliver a define output
Project	An activity that has start date and end date with a goal, provided with limited resources like money, manpower, time, etc.
Defect	Any condition that does not meet the customer (internal or external) requirement in the product or service offered
Opportunity	A chance for non-conformance, or not meeting the required specifications including the customer requirement
DPMO: Defect Per Million Opportunity	The number of defects in the product or service for 1,000,000 opportunities.



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SixSigma – Methodologies

DMAIC Existing Process



DMAIC

- D:** Define the goals and customer deliverables
- M:** Measure the current performance
- A:** Analyze/determine root cause of defects
- I:** Improve by eliminating defects
- C:** Control future performance

DFSS New Process



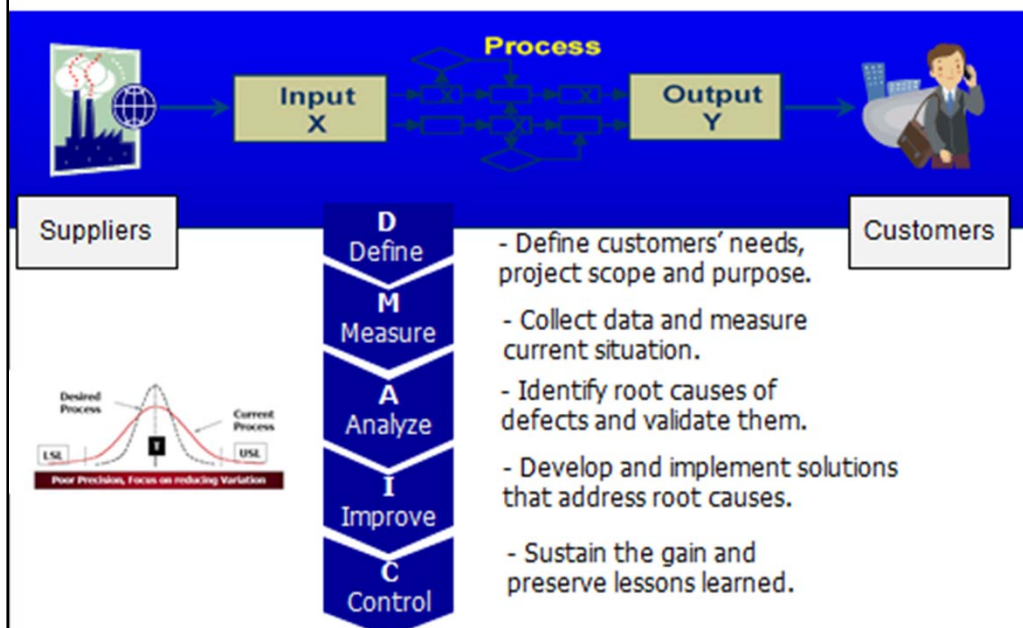
DMADV

- D:** Define the goals and customer deliverables
- M:** Measure/determine customer needs
- A:** Analyze options to meet the customer needs
- D:** Design to meet the customer needs
- V:** Validate the design performance



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Methodology

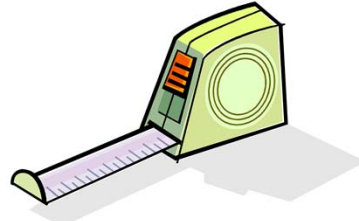




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Measures of Process Quality/Capability

- % Out-of-spec
- DPO/DPMO
- Cp
- Cpk
- **Sigma**



Sigma level	DPMO	Percent defective	Percentage yield
1	691,462	69%	31%
2	308,538	31%	69%
3	66,807	6.7%	93.3%
4	6,210	0.62%	99.38%
5	233	0.023%	99.977%
6	3.4	0.00034%	99.99966%
7	0.019	0.0000019%	99.9999981%

All process capability measures are based on how well the process is delivering against customer requirements.

Therefore they are all related, and if you know one you can mathematically calculate the others.

% out-of-spec is usually the easiest to calculate first.

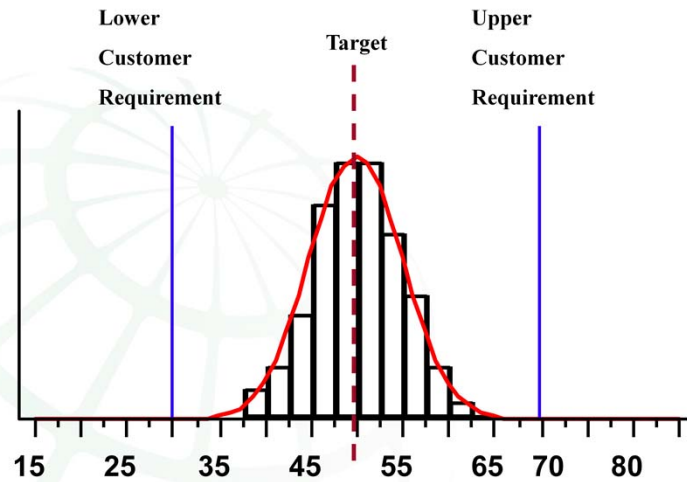
As seen on the slide, Sigma level has a continuous scale that increases as the process efficiency increases.

A process operating at a higher Sigma level produce less defects and more customer satisfaction.



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Example 1

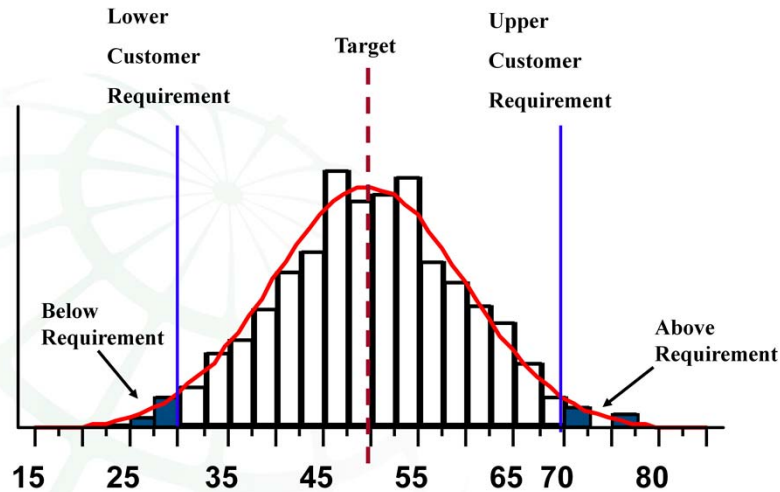


The process in this example has a high probability that it will consistently provide output that meets customer requirements.



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Example 2



The process in this example has a low probability that it will consistently provide output that meets customer requirements.

Every effort should be made to reduce the variability in this process. If the variability in the process were reduced, the capability would increase with nothing else changing. This is the reason the focus is on reducing variability in the process in order to improve capability.

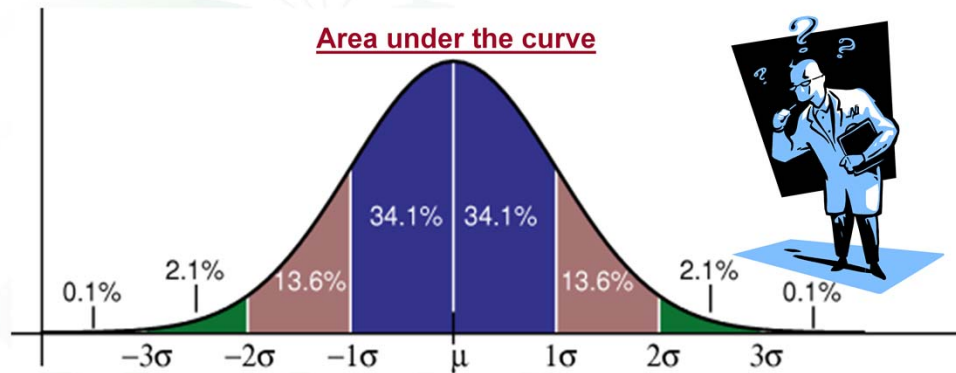


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Statistical Definition

"**Sigma**" (the lower case Greek letter σ) is used to represent standard deviation.

Standard deviation Is a statistic that tells you how tightly the points are clustered around the mean in a set of data. (statistical dispersion)



Probability distribution. It has the following important characteristics: (1) the curve has a single peak; (2) it is bell-shaped; (3) the mean (average) lies at the center of the distribution, and the distribution is symmetrical around the mean; (4) the two tails of the distribution extend indefinitely and never touch the horizontal axis; (5) the shape of the distribution is determined by its Mean (μ) and Standard Deviation (s).

Since the normal distribution is symmetric, it has the nice property that a known percentage of all possible values of X lie within \pm a certain number of standard deviations of the mean, as illustrated above.

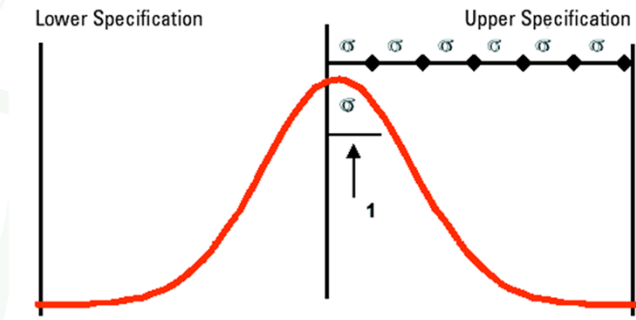


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6 σ

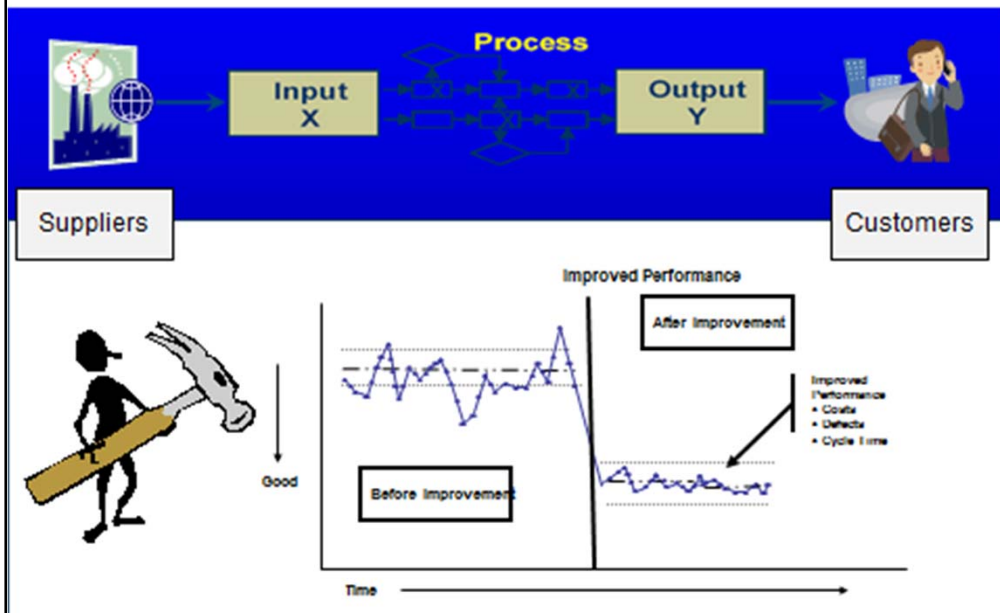
For a process, the sigma capability is a metric that indicates how well that process is performing. The higher the sigma capability, the better.

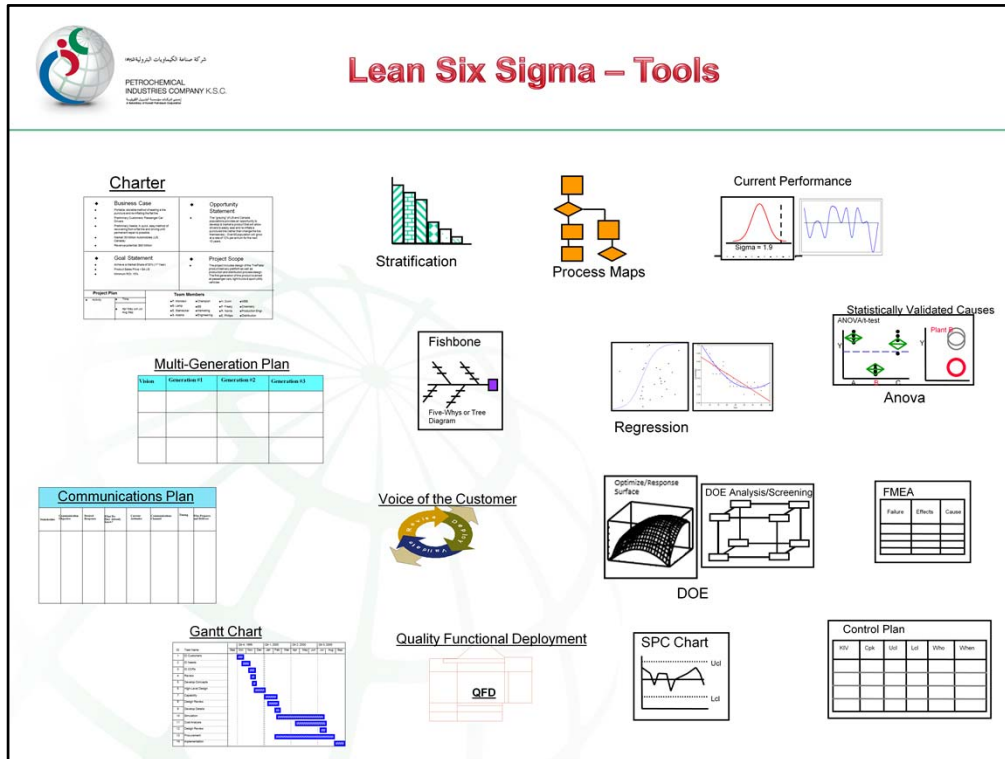
Operating at a "six sigma" level means that you have six standard deviations between the mean of the process and the nearest specification limit



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Why we do this?



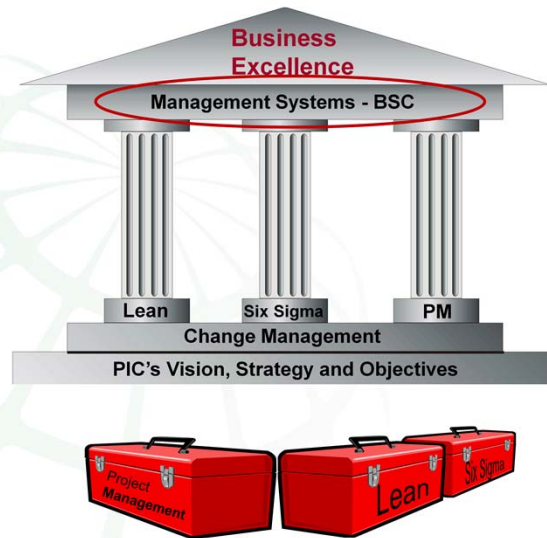


Within the individual phases of a DMAIC or DMADV project, Six Sigma utilizes many established quality-management tools that are also used outside Six Sigma.

The slide shows an overview of the main tools used in PIC



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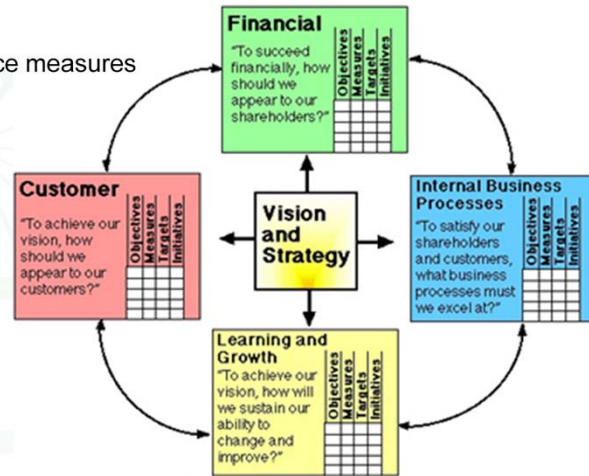
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Balanced Scorecards

BSC is a strategic planning and management system to monitor organization performance against strategic goals

It is a "dashboard" of performance measures

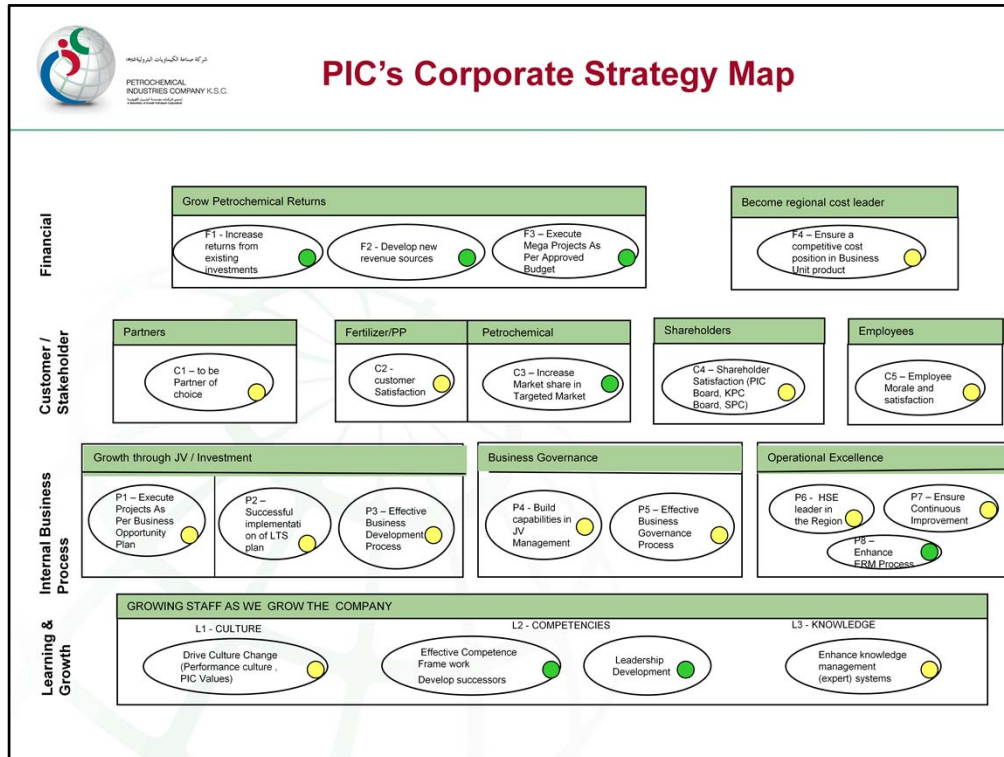
The **BSC** suggests that we view the organization from four perspectives, and to develop metrics, collect data and analyze it relative to each of these perspectives



The characteristic of the balanced scorecard and its derivatives is the presentation of a mixture of financial and non-financial measures each compared to a 'target' value within a single concise report. The report is not meant to be a replacement for traditional financial or operational reports but a succinct summary that captures the information most relevant to those reading it.

It is the method by which this 'most relevant' information is determined (i.e., the design processes used to select the content) that most differentiates the various versions of the tool in circulation.

The balanced scorecard also gives light to the company's vision and mission. These two elements must always be referred when preparing a balance scorecard.

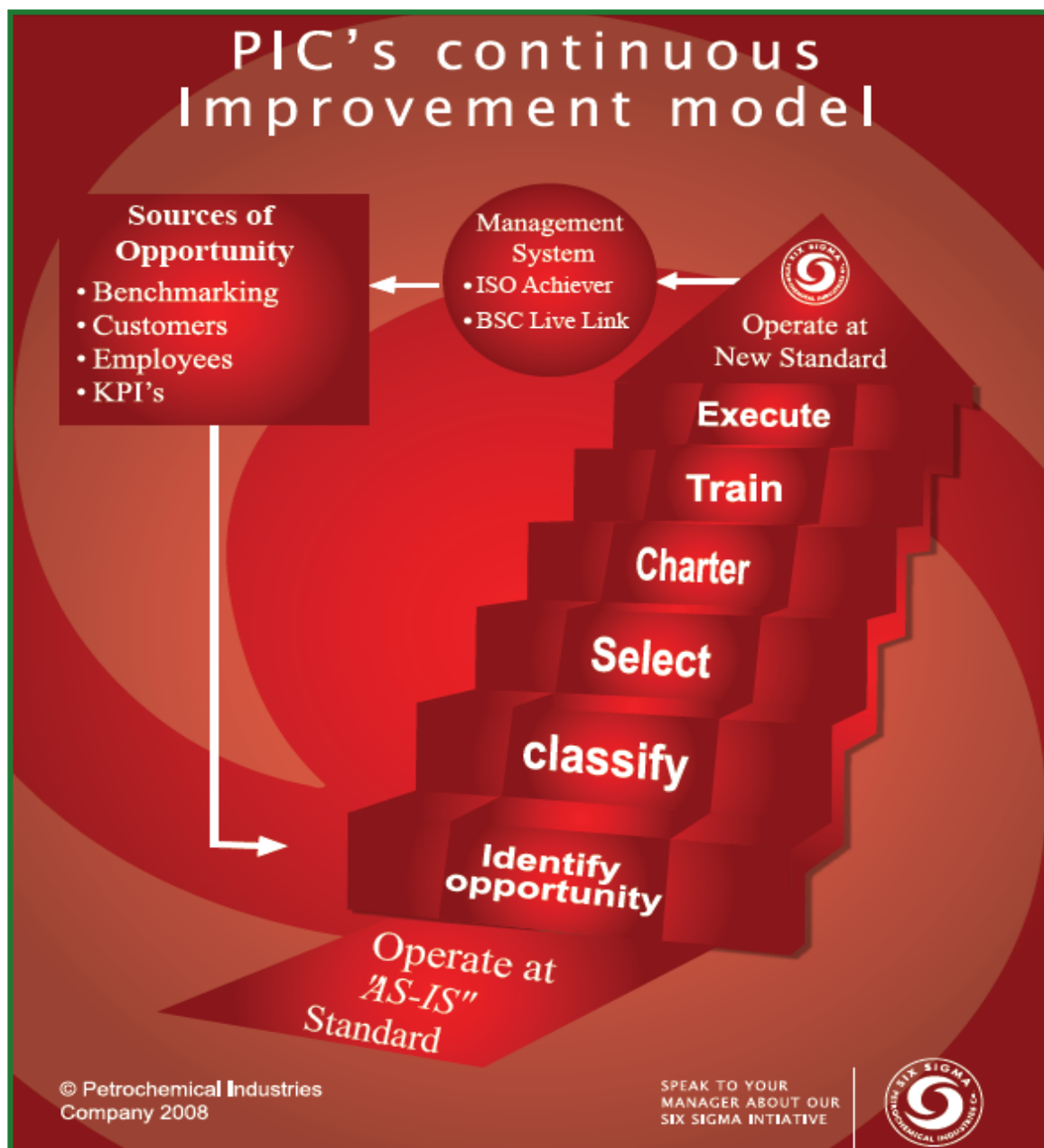


Design of a balanced scorecard ultimately is about the identification of a small number of financial and non-financial measures and attaching targets to them, so that when they are reviewed it is possible to determine whether current performance 'meets expectations'.

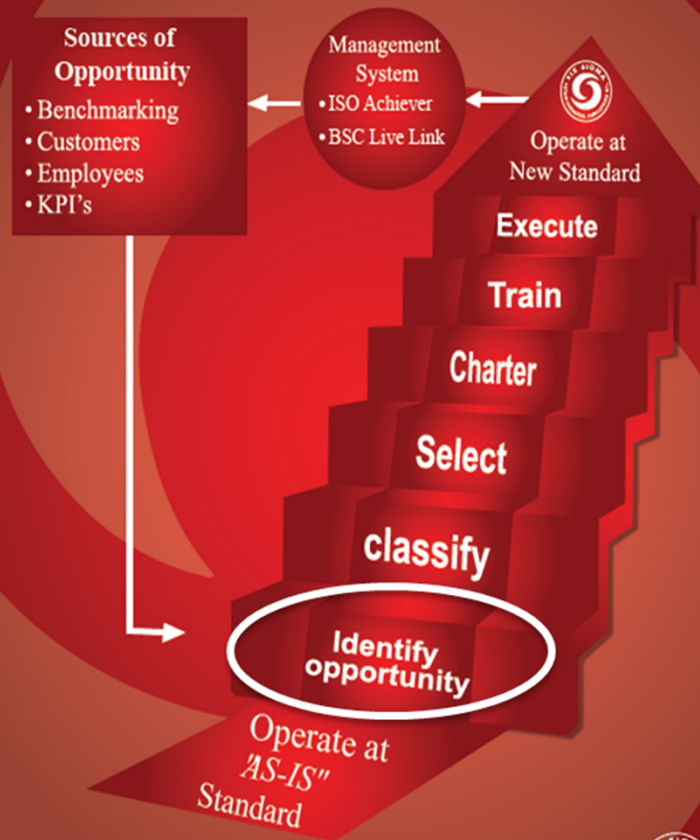
The idea behind this is that by alerting managers to areas where performance deviates from expectations, they can be encouraged to focus their attention on these areas, and hopefully as a result trigger improved performance within the part of the organization they lead



2. PIC's Deployment Model



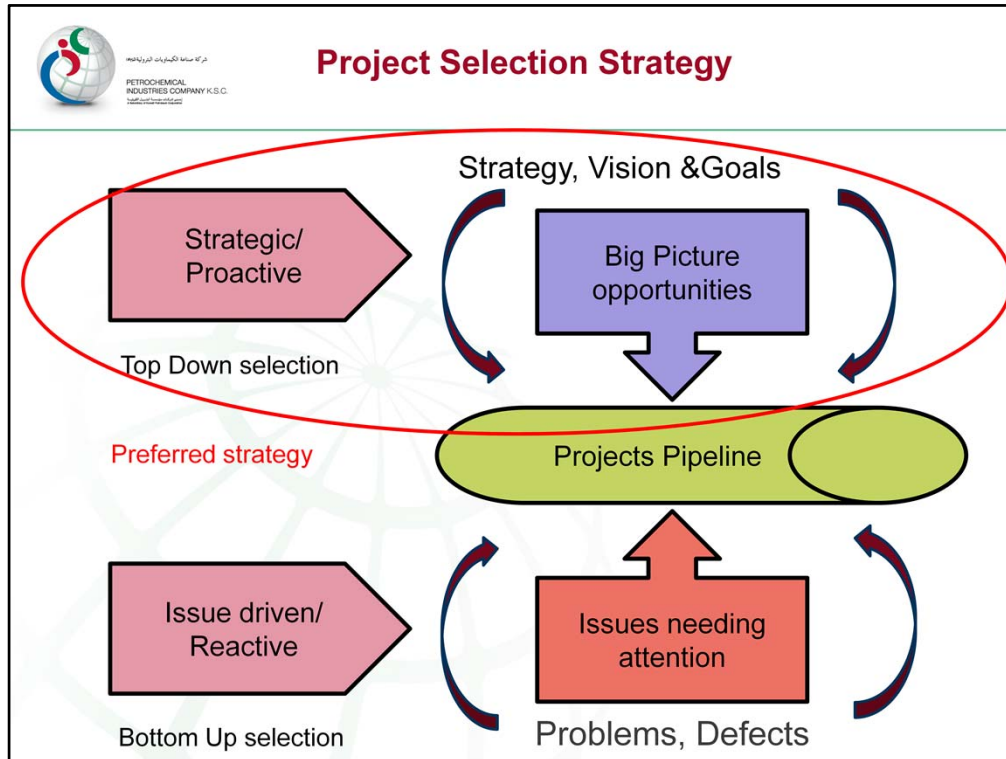
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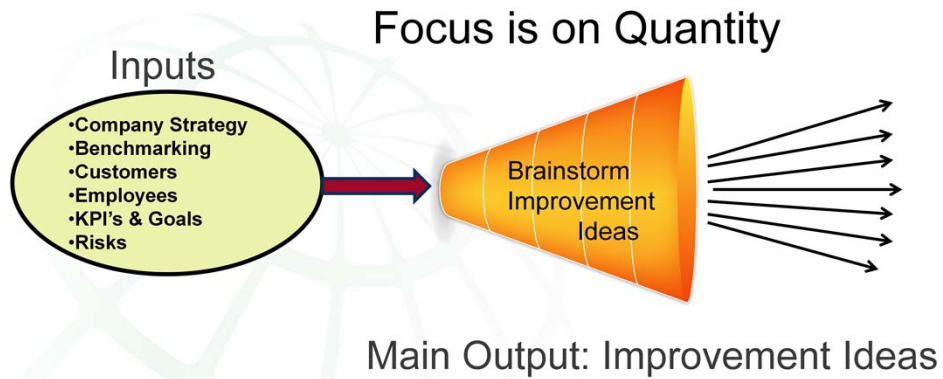
When a reward system is put in place, the project leaders will tend to look for quick improvements and will focus on daily issues and problems for possible six sigma projects.

This is not a healthy practice because the methodology can only achieve strategic objectives when project are selected through a top-down approach.



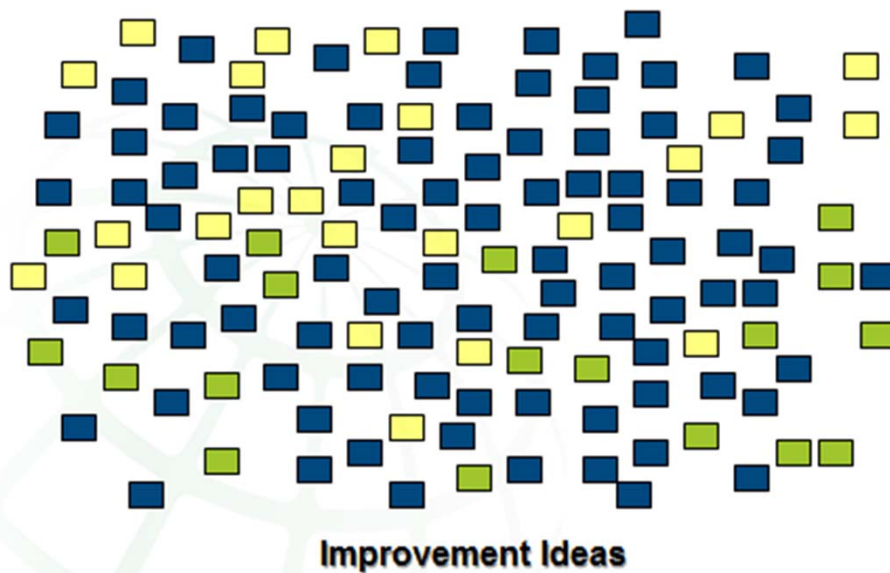
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Opportunity Identification



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Output of OP. ID.





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Practice Activity

- Based on your experience, come up with 2 - 5 improvement opportunities from your work environment



1-

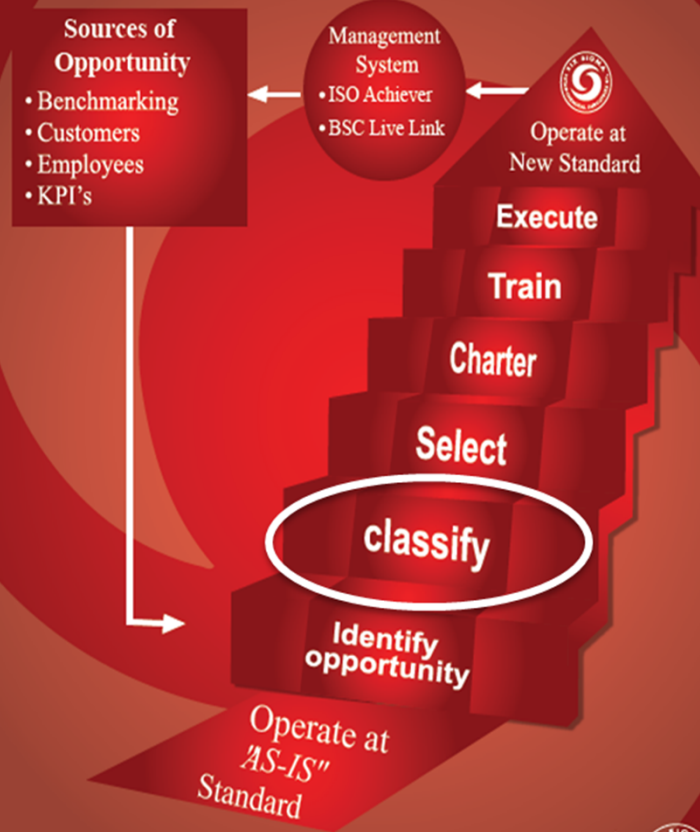
2-

3-

4-

5-

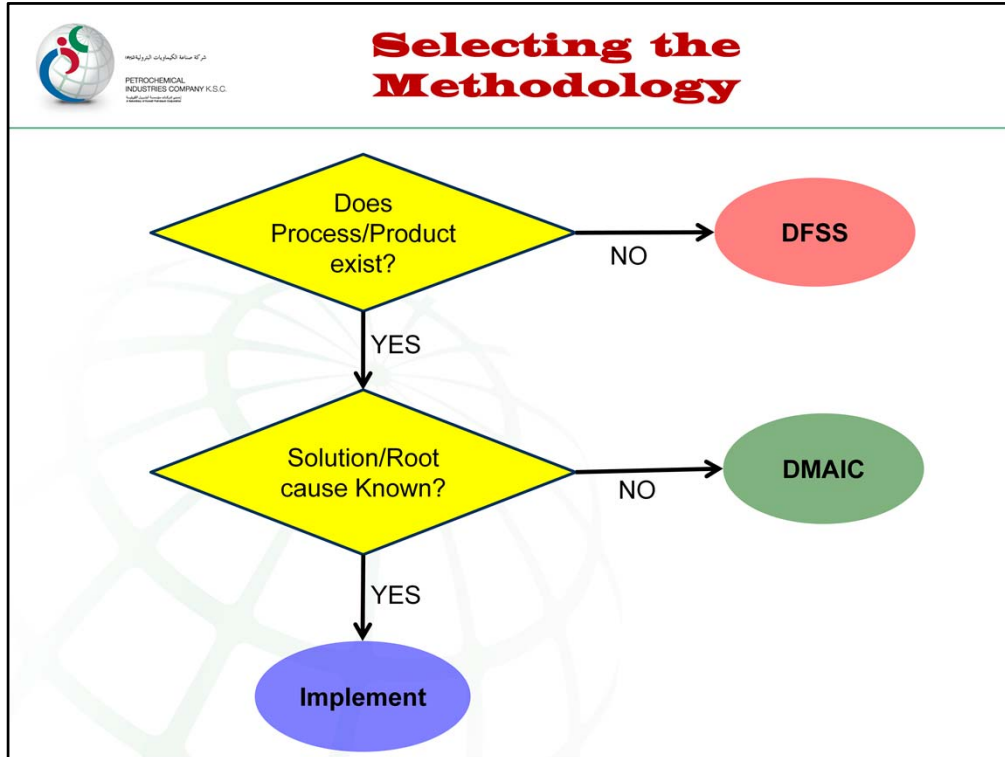
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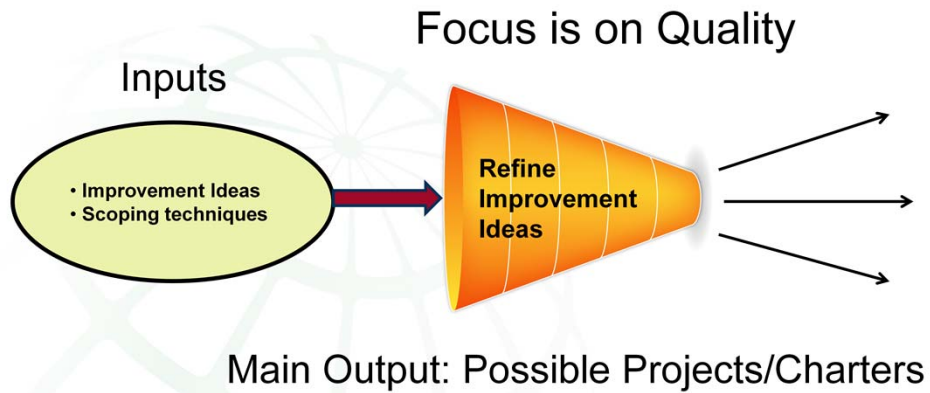
There are several methodologies used by PIC:

- Improve: Measure-Analyze-Improve-Control (MAIC)
- Implement: known proven solution or best practice (Most Effective Technology, MET)
- Innovate: Define-Measure-Explore-Develop-Implement (DMEDI)
- Lean: Eliminate non-value added steps and reduce waste



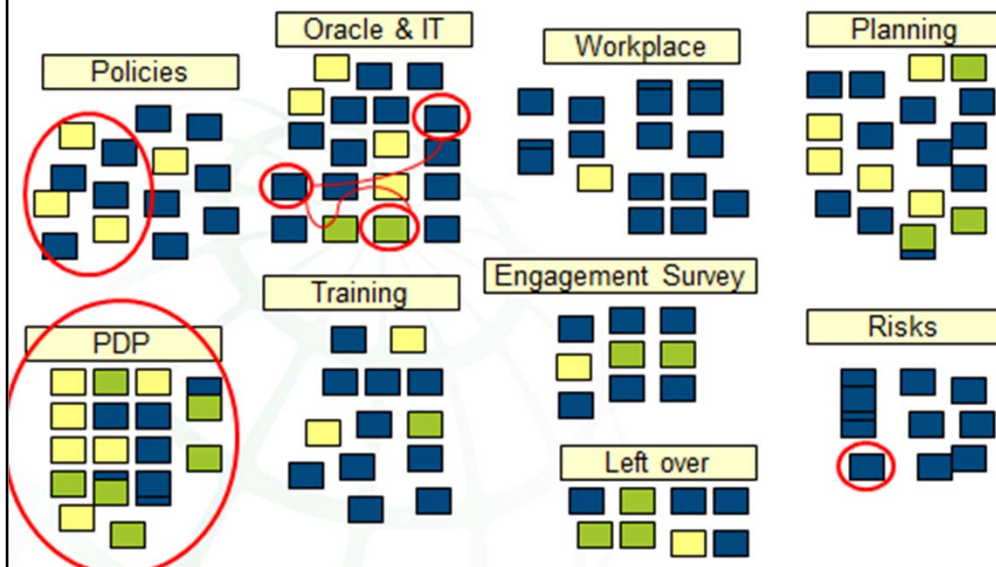
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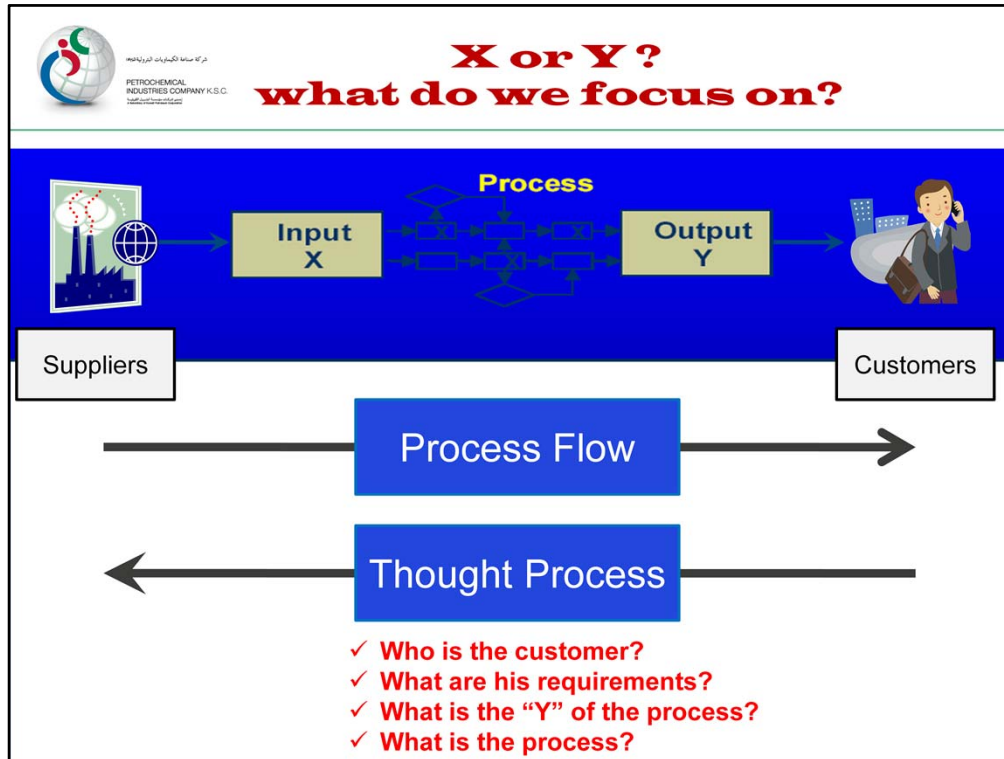
Classifying / Scoping



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Scoping techniques





Scoping skills can be easily developed through practice.

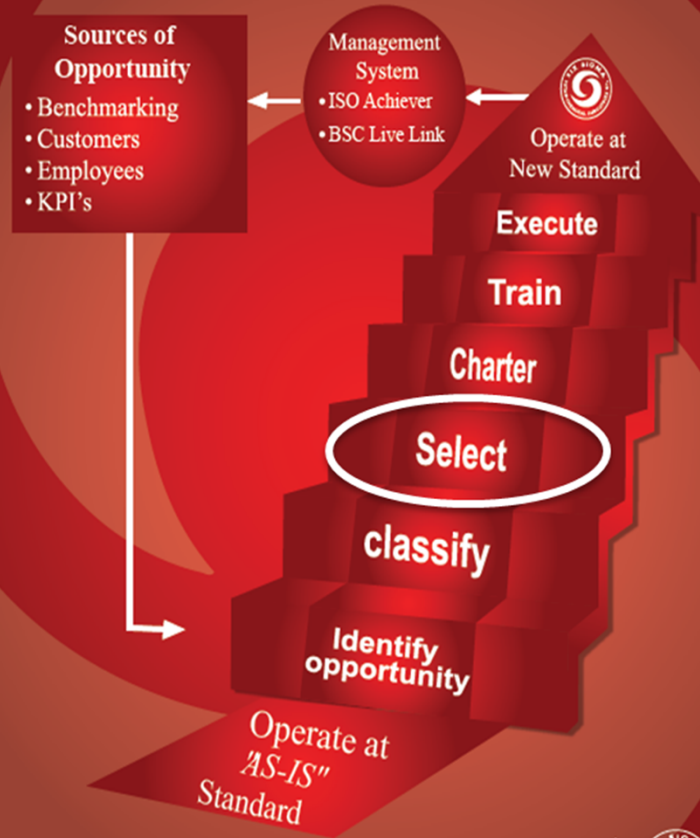
To narrow down the scope, the defect need to be stratified in logical groups or categories.

The scope can then be narrowed to the group or category with the highest impact on process capability.

To widen the scope however is a different story and each opportunity/project can have a different approach to re-scoping.

The questions shown on the slide in red can be a good start.

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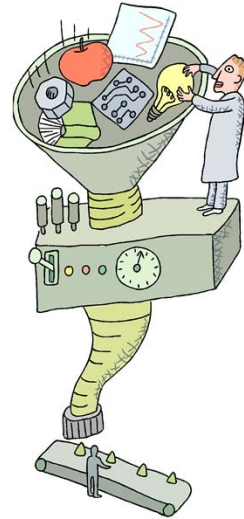




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Projects Selection Criteria

- Project selection is the key driver for initiative success.
- Top Down selection process is the way to go for Lean Six Sigma success.
- We must start with the outputs of main processes.
- **Don't look for problems that fit the DMAIC methodology..... Look For Real Problems**
- Engagement will be much easier to achieve with a well selected project.



At the end of the classify step, you should have a large number of ideas categorized according to the chosen methodology. (DMAIC, DFSS, MET and Lean)
This is the input needed for the selection step.

The output would be a few highly lucrative opportunities that are also highly aligned to the organization strategy.

These opportunities are ready for the Define phase and are the inputs for the next step (Charter).

Responsibility of the select step at PIC resides with business champions.



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Selection Process

Focus is on Alignment to Strategy

Inputs

- Scoped project ideas
- Strategy
- Selection criteria
- Selection tools



Rank &
Select



Main Output: Charters



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Ranking

Opportunities are ranked according to their impact on Strategic drivers



Project Selection Matrix

Rating of Importance to Project Desirability				7	5	4	3	2	1		
				Revenue	Growth	Ease of completion	Customer satisfaction	Savings	Cycle time	Cash flow	Overall Project Value Ratings
	Core Process	Sub Process	Project Title								
1	A	1	Bridgeport Efficiency	3	8	8	3	8	10	2	231
2	A	2	Spur Gear Defects	4	4	4	10	10	2	2	252
3	B	1	Chemical Waste Costs	1	1	1	1	9	1	9	162
4	B	2	Plating Adhesion	2	1	1	8	4	5	2	150
5	C	1	Lost Sales Bids	10	10	2	4	6	1	8	265



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Output of Scoping & Ranking

(Classify / Scope)



(Rank / select)



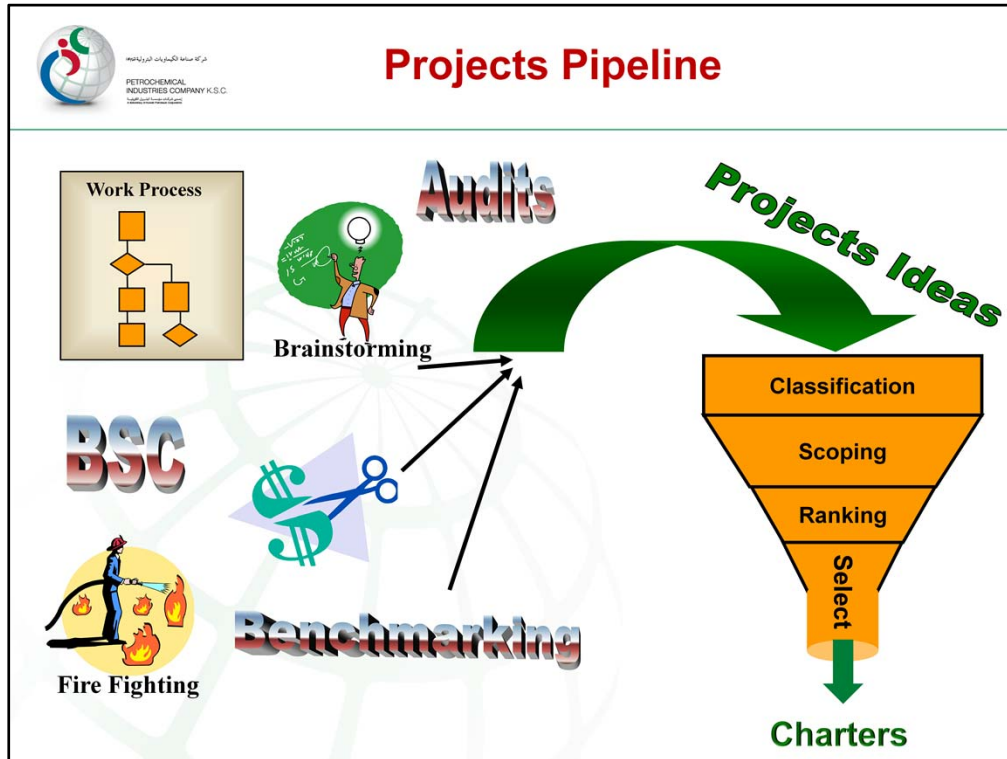
#	Project Title	Project Opportunity	Project Type	Data Available	HR Strategy Alignment	Support Cultural Change	Hard Savings	Score Total
7	Reduce Cycle Time Employee Event Changes	It takes a long time to process event changes (Resignation and Retirement, Social Status), and the method is not aligned with KPC and best practice standards (HR Integration -2030 HR Strategy)	Cycle Time Reduction - Improve	9	9	9	1	28
8	Streamline Nature of Work Allowance Process	The process for assigning the Nature of Work Allowance is not aligned with KPC and Best Practices (HR Integration -2030 HR Strategy)	Defect Reduction - Improve	9	9	9	1	28
9	Enhance Rotation Program	Rotation Program was not fully effective, and key program conditions were not addressed	Defect Reduction - Improve	9	3	9	1	22
10	Improve Job Positions Architecture	Job Positions are not consistent nor aligned within K-Group.	Defect Reduction - Improve	9	9	3	1	22
11	Develop On-the-Job Training	On-the-Job Training today is not formally used as a development tool in PIC	Defect Reduction - Implement	3	9	9	1	22

You must recognize activities that can be projects.

A Project is a series of tasks or activities done in a logical order to drive a change in performance.

It doesn't have to be an "add-on" that someone wouldn't otherwise do.

Projects can be things that you are doing already.

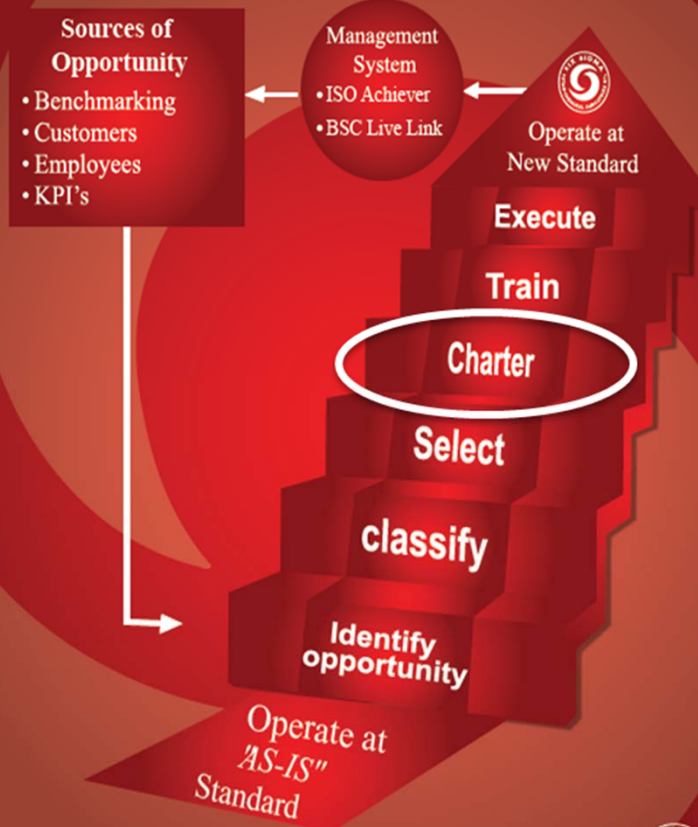


Every one in the organization should contribute to this step of the process, top-management drives process by monitoring and rewarding output
 The out put of the opportunity identification step is a non-stop flow of improvement Ideas to feed the Lean Six Sigma Project Pipeline.
 The Input for the step comes from numerous sources, PIC and other K-companies have multiple sources of data that should be used to identify Six Sigma projects.

Most of our opportunities come from :

- Fire fighting
- Brainstorming
- Work process reviews
- Scorecard gap analysis
- Business Self-Assessment
- Customer Loyalty/satisfaction – through results of study
- Data Mining – through a deep drill of pertinent data sources
- Work Process Reviews

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Why Use a Charter?

- ▶▶ Charters are the link between strategy and action
- ▶▶ Establish clarity for stakeholders
- ▶▶ Provide a roadmap for success
- ▶▶ Contract with the project team



A well written project charter means a well defined project.
Some scholars say that a good definition of a problem is half the solution.



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Elements

- Strategic Alignment
- Problem/Opportunity Statement
- Defect Definition
- Project Scope & Boundaries
- Project Goal/Objectives
- Team Composition
- Timeline



Elements of a charter will vary depending on the type of the project.

In the next few slides, we will go over some of the main elements usually used in improvements projects.



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◆ **Strategic Alignment:**

Specific description of how this project aligns to the Corporate, Business or Functional Strategy. Identify how this project addresses an objective/gap in the business Plan/strategy

- ❑ Which specific strategic goal does the project support?
- ❑ Which aspect of the business/ functional strategy does it support?



How is the Goal of the project aligned with the strategic goals of the company?

To improve the chance of success, you want the commitment and support of top management to your project.

This will only be attained if the project serves the over all strategy,



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- The **Defect Definition** should be
 - Specific to the issues described in the Problem Statement
 - Include a measurement of performance



The defect should be:

- Specific and measurable – When different people look at the process and data, they reach the same conclusion about performance
- Clear and easily understood – It should be an intuitive measure of the process you are improving. If the defect gets better, the performance is getting better
- Easy to measure – This will be tracked for a long period of time; so the easier and cheaper it is to gather the data, the better

In simplest terms, a defect is anything you do not want to have happen in your process. A defect is a nonconformance that can occur at any step of any process and ultimately impact customer satisfaction.

A Defect is any variation of a product, service, or process which adds cost and/or prevents it from meeting customer needs, whether or not it is caught

- Nonconformance to a customer-driven specification
- Nonconformance, interruption of the flow, or intervention in the flow
- Any key customer or process requirement that does not meet standard

The defect should be:

- Specific and measurable – When different people look at the process and data, they reach the same conclusion about performance
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Defect Examples

- On-time Delivery – greater than 15 minutes past committed delivery time
- Asset Utilization – a day that the plant produced less than 312 tons of product
- File Share Reduction – any file share that exceeds 15 GB
- Product Quality – any batch that did not meet the production specification
- Cycle Time – each invoice that took more than 60 days to pay

The best definition for a defect allows you to describe “one defect.” For example, a defect in my project is:

- One shipment that is delivered after the committed delivery date
- A damaged bag
- A pump that fails before 180 days of run time
- An invoice with no price specified

These examples come from real projects.



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• **Scope & Boundaries:**

- What is the focus of the project?
- Where is the project located?
- What is in the scope?
- What is out of the scope?



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• **Project Objective** should be based on **SMART** principles:

- S = Specific
- M = Measurable
- A = Aggressive, Agreed upon
- R = Realistic
- T = Time-based





Team & Timeline

- **Set the team up for success**
 - Set realistic timelines
 - Times set based upon actual “working time”
 - Be upfront if unknowns may push out timelines
 - Focus on issues and deadlines; when does the process owner need the project results?
 - Select team members
 - Select based on skills and ability to commit
 - Make sure the project is reflected in their goals



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A Good Charter

- Clear scope & boundaries
- Clear goals & objectives
- Stated in terms of performance measures
- High priority and aligned to strategy
- Process Owner defined and supportive
- Key Stakeholders supportive



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A Bad Charter



- Scope too broad for amount of time
 - Cannot solve "World Peace" or "World Hunger" in 6 months
- Defect is a list of issues or concerns (not measurable)
- Written based on opinions, not data
- Financials are guessed or very rough estimate
- Timeline is not realistic



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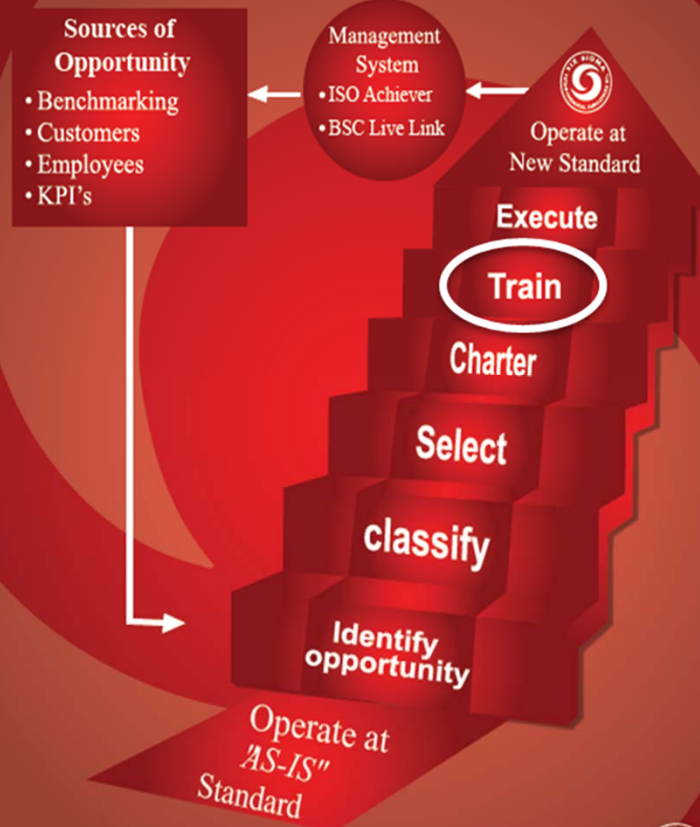
Practice Activity

- Using the opportunities you identified earlier Take 10 minutes to write:
 - Problem/Opportunity Statement
 - Defect Description
 - Project Goal/Objectives
 - Timeline
 - Team Composition



Project Title:		
Opportunity Statement		
Define the Defect		
Goal/Objectives		
Timeline		
Team Characteristics / Composition		
Green Belt Project Leader: Process Owner: Master Black Belt/Coach: Green Belts/Team Members:		Financial Rep: SME's: Resource Leader:
Author:		Revised Date:

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- **Training** (Internal/External) is an important element in Six Sigma deployment
 - Awareness sessions (everyone)
 - Leaders LSS Training (VPs & managers)
 - Green/Black belt Training (project leaders)
 - Master Black belt Training (Coaches)



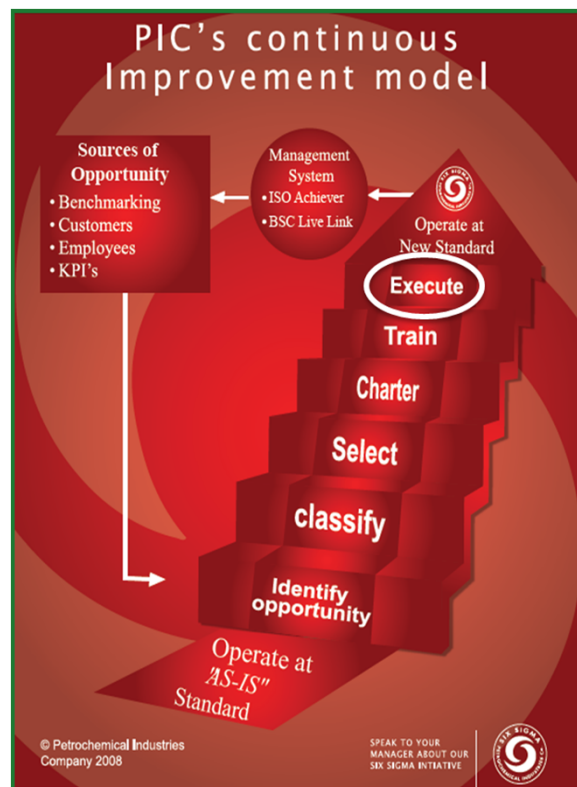
With all the new roles and competencies introduced, an urgent need arises to train all levels in the organization on the new mindset, techniques and tools that they need to perform roles efficiently.



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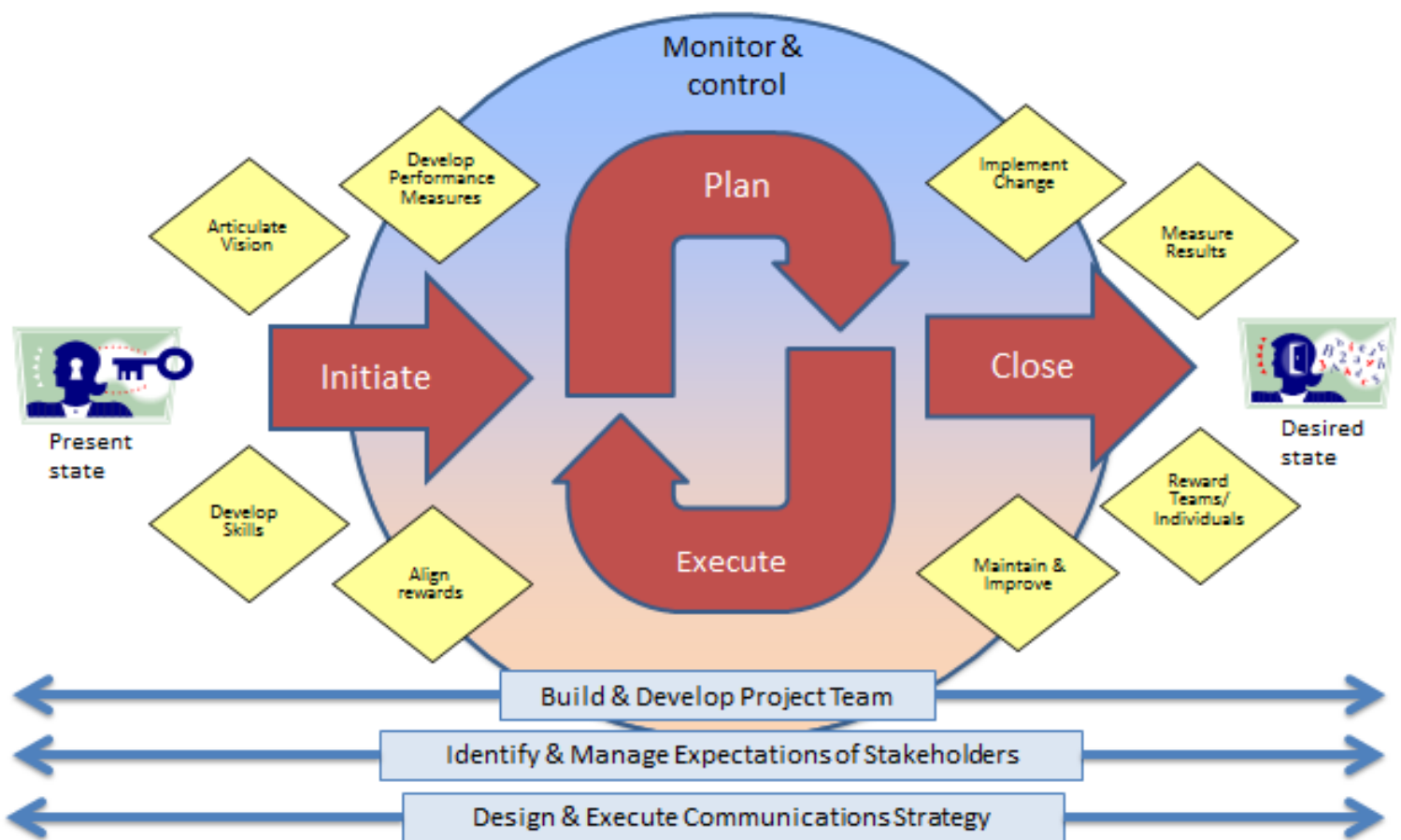


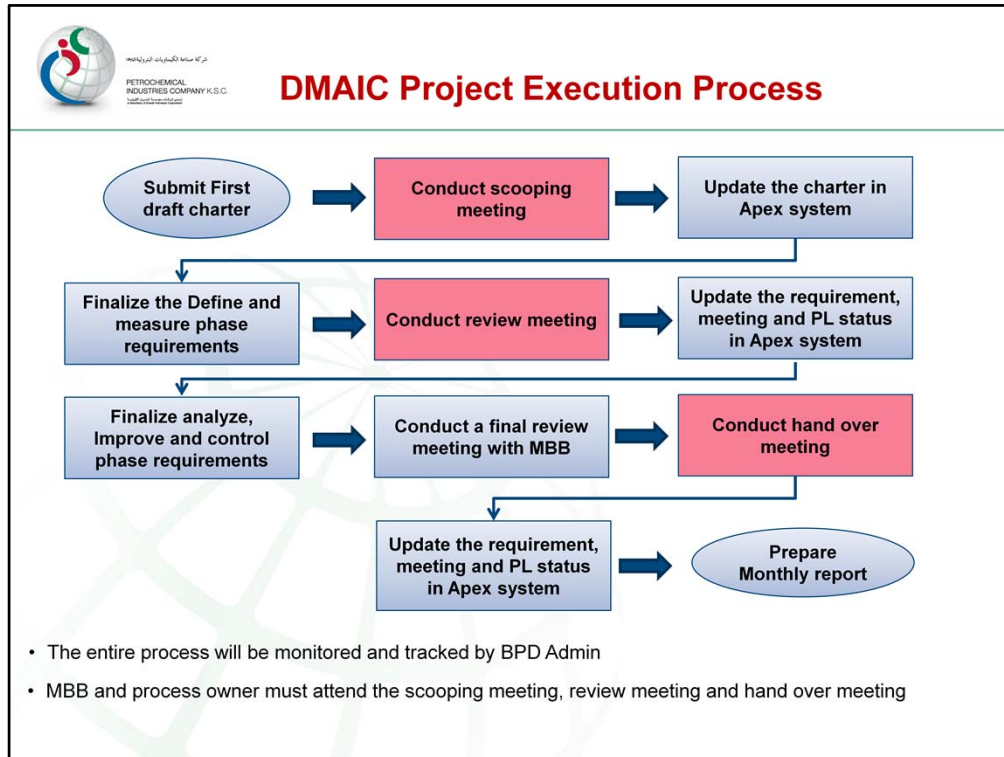
- Curriculum includes:
 - **Lean & Six Sigma**
 - tools,
 - concepts
 - **Project Management**
 - Planning
 - Team Dynamics
 - **Leadership**
 - Communication
 - Change management
 - **Statistics**





3. Executing The Change





A Six Sigma project was chartered by BPDT to improve the tracking and reporting capabilities of Lean Six Sigma Projects.

As a side win, the project leader have developed the process map shown on the slide to describe the execution process of PUC's improvement projects.

The new tracking system guarantees the engagement of process owner in the steps with red background.

These review meetings are now a requirement for moving from one phase to another.



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The Approach

DMAIC

Key Questions



What are we trying to fix?

What are the Y's?

What are the X's?

How do we optimize the X's to get the desired Y?

How do we control the X's to get the desired Y?



By transforming the practical problem to a statistical problem, we are relying on Data to provide statistical solutions, which in turn provide confidence in the solutions



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Movie -- “Measurements”



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Measurement Systems

Facts about Measurement

- ◆ Anything can be measured
- ◆ We need a good measurement system to make correct decisions



Why Measure?

- ◆ If we cannot measure it, we cannot manage it or improve it

Definition of Measurement

- ◆ Assigning numbers or values to represent a property or process
- ◆ There are different *types* of measures
 - Quantitative
 - Qualitative
- **Quantitative examples**
 - ✓ 178,999 tons of product sold
 - ✓ 28 goals scored
 - ✓ Economic profit
- **Qualitative examples**
 - ✓ Olympic scoring of diving or figure skating
 - ✓ Consumer reports
 - ✓ Customer satisfaction

Anything can be measured, but you may need to be creative about how it is measured. Engage your team and stakeholders if you have a challenging measurement situation. Ask them “how do we know that performance has gone up or down? What do you look at?”

Measurements are CRITICAL.

In order to survive, people, organizations, and companies must improve.

All work involves a series of steps that make up a process. In order to improve your process, you need to collect information on your process. This information needs to be reliable and accurate; otherwise, poor decisions may be made.



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Scales of Measures

- ◆ Continuous
- ◆ Categorical
 - Ordinal
 - Nominal

The type of analysis that can be done is different for each scale

Continuous Scale

- ◆ A quantitative variable for which all values in a range are possible
 - Example is height
 - It may be measured to nearest millimeter, but that does not mean that values exist only in one millimeter increments. The limitation is the measurement device, however the scale is continuous
- ◆ A continuous scale typically provides more information than an ordinal or nominal scale

Scales of Measures

Continuous: A quantitative variable for which all values in a range are possible.

Ordinal: A value that is not continuous. One value is higher than another and all values can be placed in some kind of order; a discrete variable.

Nominal: A value that is a classification. It may be numeric or a character, attribute data; a discrete variable.

We want to use a continuous scale of measure whenever possible.

Also, note that the measurement scale is DIFFERENT from the data type. It is possible to have numeric values for any measurement scale.



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Ordinal Scale

- ❑ One value is higher than another
- ❑ Can be put in some type of order
- ❑ Example is survey scale where:
 - 1 = strongly disagree
 - 2 = disagree
 - 3 = neutral
 - 4 = agree
 - 5 = strongly agree



Nominal Scale

- ❑ Numeric or character
- ❑ No meaningful order
- ❑ Examples
 - Gender (i.e., male or female)
 - Train 1, Train 2, Train 3 (numbers are assigned arbitrarily, could be interchanged)
 - Method A, Method B, Method C

A variable with an ordinal measure will actually be discrete data. The ordinal measurement scale implies an order, but we are not certain how large the difference may be between two consecutive results. As an example, the finish position of race cars are an ordinal scale. We have no information on how far the second place car was from the first place car.



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A Good Measurement System

- ◆ Is process and result oriented
- ◆ Leads to data-based decision making
- ◆ Focuses on managing improvement
- ◆ Does NOT cause problems for the customer



A Poor Measurement Systems

Garbage in	→	Garbage out
Unplanned measure	→	Poor data
No process	→	Haphazard data collection
Overly complicated	→	Not used and unreliable data

Examples of potentially poor measurement systems are:

Capturing occurrence of an event from logbook entries. Is the event of interest always logged?

Recording the number of defects in painted parts when there appears to be a problem with the painting operation. How many non-defective parts were there, or how many defects are there when operating “normally”?



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Attributes of a Good Measurement System

- ◆ Customer-focused
- ◆ Action-oriented
- ◆ Team-developed and team-owned
- ◆ Reliable
- ◆ Easily understood
- ◆ Timely



Attributes of a Good Measurement System:

- Related to CTx
 - Critical to any dimension
 - Includes: CTS – Critical to Success, CTP – Critical to Process, CTQ – Critical to Quality, CTD – Critical to Delivery
- Customer-focused
 - Measuring what the customer is interested in (e.g., waiting times in a bank line; service level agreement between the customer and a computer service function)
 - To make sure you are working on the right things
- Action-oriented
 - Measures focus on process elements that can be improved (e.g., remove redundant steps from the invoicing process; adjust the flow rate to the reactor)
 - Without action, improvement is not possible
- Team-developed and team-owned
 - Employees are accountable for their performance (e.g., team consensus on audit criteria and process)
 - Team will effect change in the process
- Reliable
 - Measures should be accurate, credible, and trustworthy (e.g., temperature setting on a stove may not accurately reflect the current temperature in the stove)
 - No action will be taken if the measures are not reliable
- Easily understood
 - Data must have a context and mean something
 - Confusion halts progress on improvement



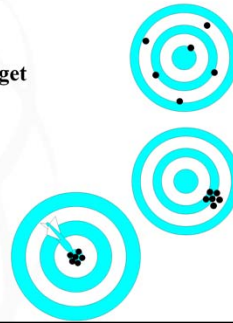
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Measurement Error

- ◆ The total variation in a distribution comes from two different sources:
 - Variation in the process itself
 - Variation in the measurement system
- ◆ Variation in the measurement system can be quantified
- ◆ Additional detail in Evaluating the Measurement Process module

Accuracy and Precision

- ◆ Accuracy
 - Average measurement centered on target
 - May have wide variation
- ◆ Precision
 - Small variation about the average
 - May be off target
- ◆ Both characteristics are needed!



When you measure something (melt index, on time delivery, percent caustic) the numbers you get WILL vary.

This total variation is the sum of the variation in the measurement system added to the variation in the process.

If the measurement system is not good enough, i.e., the variation in the measurement system is too high, then you will never know if you have improved your process.

We will discuss in depth the methods of estimating measurement error in the module “Evaluating the Measurement Process” later this week. For now, we will only present some of the topics to keep in mind.

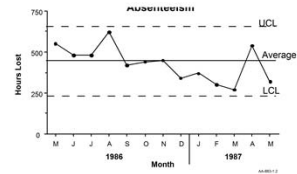


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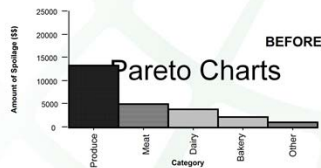
Measurement Capability

Is your measurement capable?

- ◆ Can it detect any improvements/changes in the process?
 - What percent of the total variation is made up of measurement variation?
 - Is the unit of measure adequate?
- ◆ Can it tell if the product is in spec?

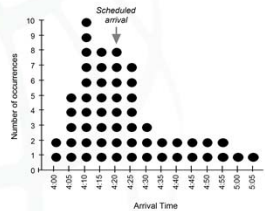


Control Charts



BEFORE

Pareto Charts



Frequency Plots

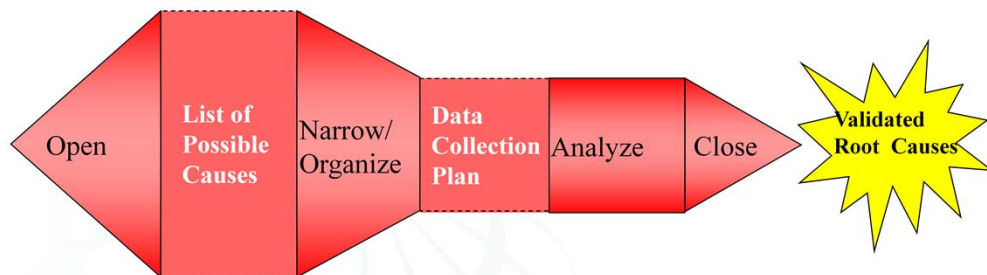
In today's world, BEFORE you commit to something, e.g., tighter specs for customer, you need to know if your measurement is capable.

What if we had to measure all of the fish with only a one-foot measure? There would be only about three sizes found.



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Analyze Phase

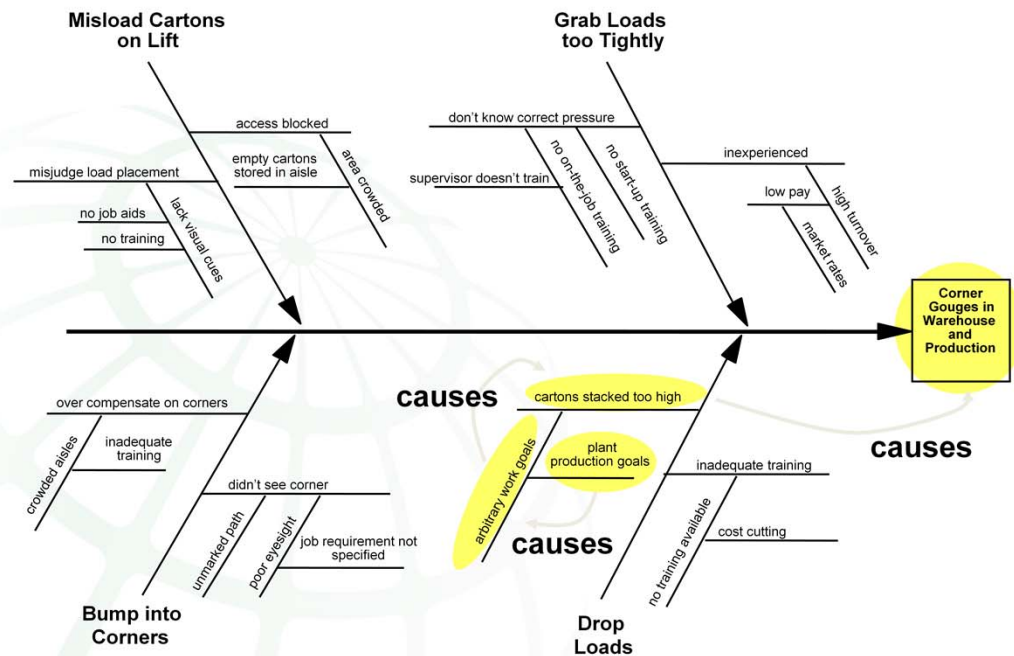


Open-Narrow-Close



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Ishikawa (Fishbone) Diagram



Creating an Ishikawa diagram

1. Brainstorm possible causes
 - Use common sense
 - Limit brainstorm to 2-3 minutes
2. Pick one possible cause
 - Write it on a flipchart or use self-stick notes; place it on a bone
 - Ask why this happens
 - Write that reason on a self-stick note; place it on a bone
 - Ask why that happens...to the natural end of that causal chain
3. Focus again on the first cause
 - Ask if there is another reason why it happens
 - Repeat for this causal chain
4. Pick a different possible cause from your original brainstorm
 - Ask why several times to make causal chains
5. Repeat until you have completed the diagram



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5 Why

1. Why did the machine stop?
Because it was overloaded and blew a fuse
2. Why was the machine overloaded?
The arm was not properly lubricated
3. Why wasn't the arm properly lubricated?
The lubrication pump wasn't working correctly
4. Why wasn't the pump working correctly?
A part on the pump was worn out
5. Why was the pump worn out?
Because the pump had a dirty filter


Creating a 5 Whys Analysis

Ask why as many times as you have to in order to reach the true cause of a problem.


- Although it is called “5 Whys,” you do not always have to go down five levels, nor do you have to stop once you have asked “why” five times.

Many times the root cause of a problem can be found just by asking why until you ultimately get to the root of the problem.

Or simply ask, “Why do we do it this way?”




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Pizza Example

- Consider a pizza delivery shop that guarantees the order delivery within 30 minutes from the time of accepting an order (Or Its Free).
- Shop accountant says the cost of late deliveries for last year was unacceptable. (25% of deliveries are late).



The financial losses from the Pizza shop service policy were obviously impacting the bottom line of the shop.

The Pizza shop needs to keep the current 30 minutes or less policy in order to compete in the market.

The owner/manager must eliminate or lower these losses for next year while keeping same service level.



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$$Y = f(X)$$

1. Come up with as many Possible root causes (X's) for the problem. Individually first, then as a group.
2. As a group, narrow down your selection to a few probable root causes(X's)
3. Provide a description of data needed to validate root causes.



What are the probable root causes for the defect?

What data do you need to measure root causes?



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Root Cause Evaluation Chart

Problem: High pressure utility-meter reading rechecks not complete on time				
Possible Root Cause	Probability	Actionable	Total	Measurable?
Customer file out of date	L/1	M/3	4	Y
Working on billing report too late	M/3	H/9	12	Y
Clerical error on corrected billing	L/1	M/3	4	Y
No scheduled time to meet customer	H/9	M/3	12	Y
Inadequate customer contact procedure	L/1	M/3	4	Y
Too many attempts before contacting customer service	M/3	M/3	6	Y



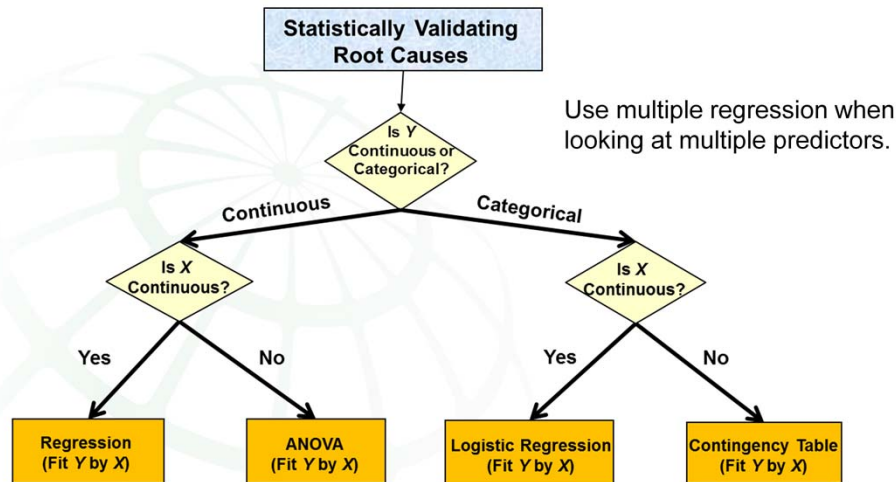
There are many tools that can narrow down your search for the root causes.

The slide shows a simple evaluation chart that can turn possible root causes into probable ones.

Other narrowing down tools are cause & effect matrix and failure modes & effects analysis.

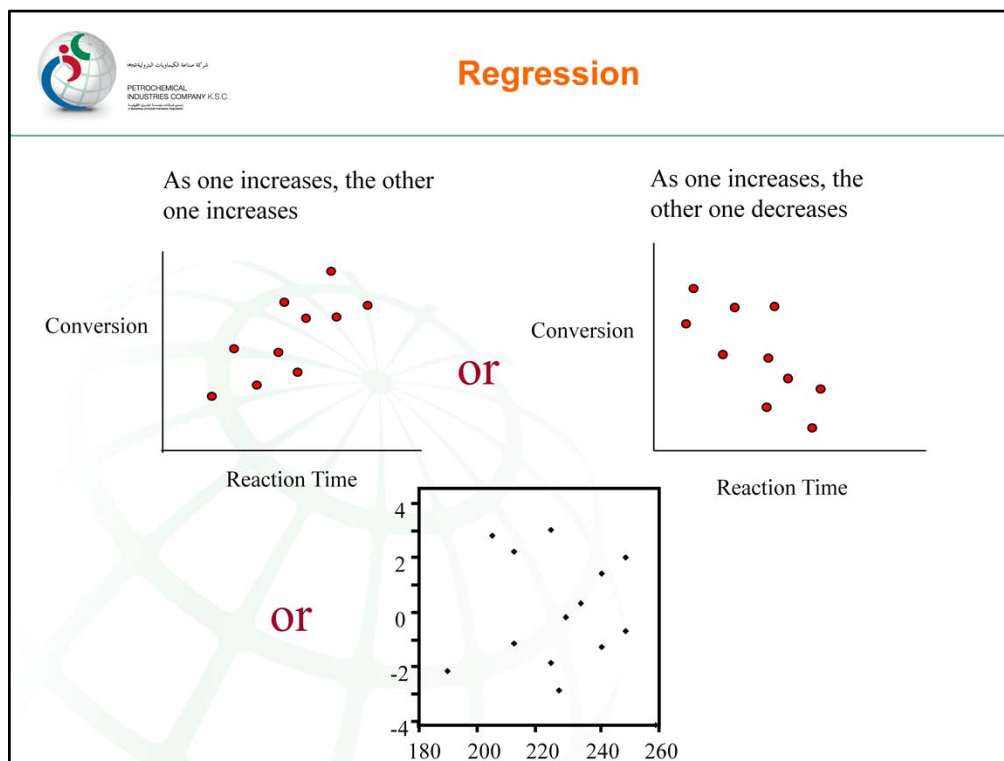


Root Cause Validation



Graphical and statistical validation tools are used based on the type of measurement scale used for the X and the Y.

The next few slides will show each of the four graphical/statistical tools at the bottom of this slide.



In regression, we are looking to utilize the relationships between variables.

Correlation is often a term that is used to refer to the linear relationship between two variables. This can take one of the two forms shown on the slide.

The one on the left is called a direct (or positive) correlation; the one on the right is an inverse (or negative) correlation.

If as the one variable increases, the other one also increases, then the correlation coefficient (r) is equal to one.

If as the one variable increases, the other variable decreases, then the correlation coefficient (r) is equal to minus one.

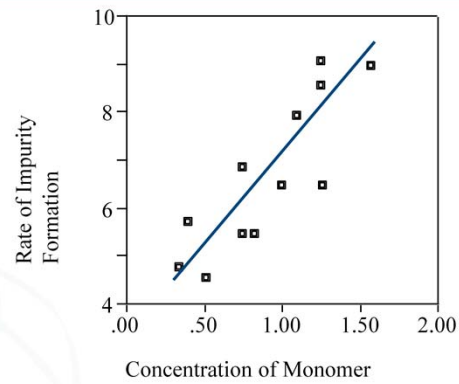
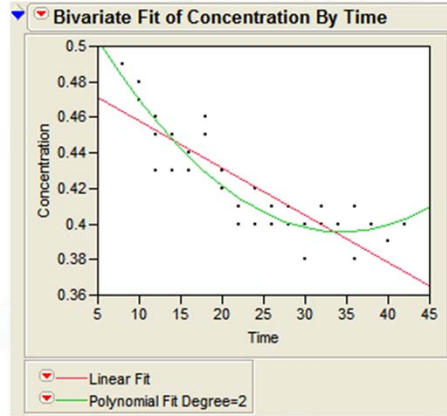
If as the one variable increases, the other variable could increase, decrease, or remain the same, then the correlation coefficient (r) is equal to zero.



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Which Line Is Best?

- ❑ How would we choose the “best” line to draw?



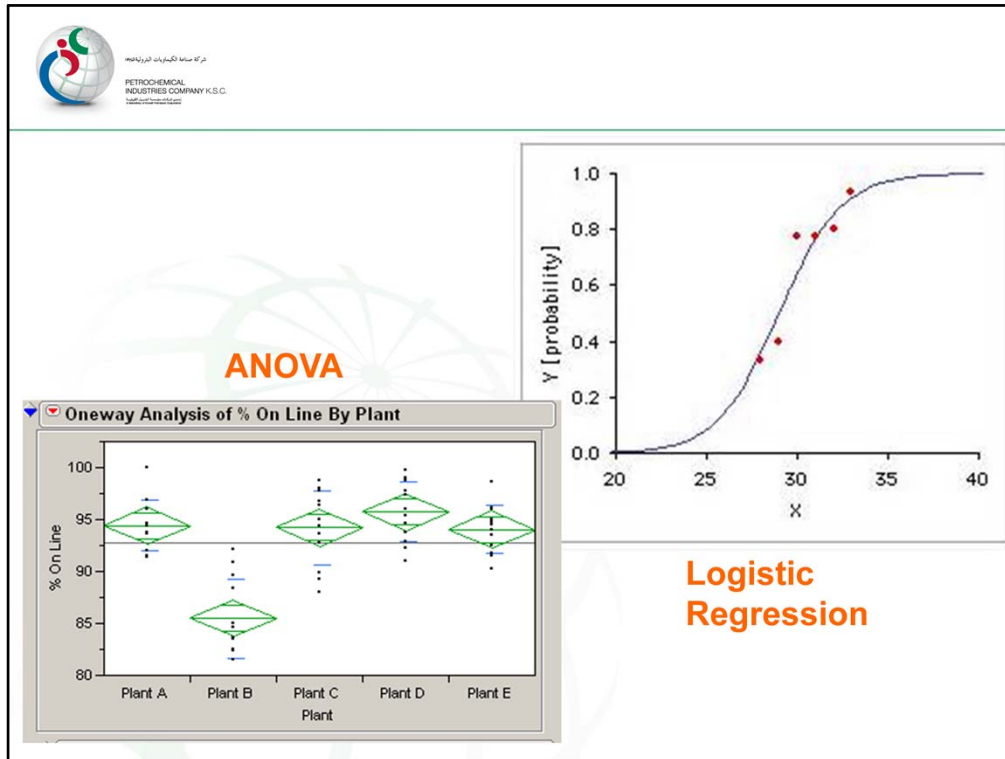
- ◆ The predicted equation for the line:

$$\hat{Y} = \hat{\beta}_0 + \hat{\beta}_1 X$$

- ❑ Where $\hat{\beta}_0$ is intercept, and $\hat{\beta}_1$ is slope of line

One method of drawing a line representing the relationship between the 2 variables is called **The Least Squares** method.

The best line would be the line with the least squared differences between the line and each point on the graph. We will have a better fit if we add more parameters to the model (graph on the left).



The graph on the left is an ANOVA table which is the best format to compare a categorical “X” with a continuous “Y”.

The diamond around each mean is a 95% confidence interval for the mean.

The ANOVA table gives clear indication that plant B is not operating as well as the rest of the plants.

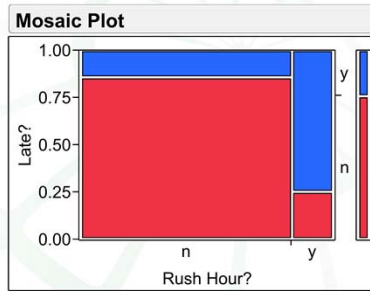
The graph on the right is a logistic regression table which is the best format to compare a continuous “X” with a categorical “Y”.

It shows the probability for one of the “Y” categories against a continuous “X”



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Contingency Table




		Late?		
	Count	n	y	
Rush Hour?	Total %			
	Col %			
	Row %			
n		36	6	42
		72.00	12.00	84.00
		94.74	50.00	
		85.71	14.29	
y		2	6	8
		4.00	12.00	16.00
		5.26	50.00	
		25.00	75.00	
		38	12	50
		76.00	24.00	

The Contingency Table output is provided under the Mosaic plot. It is a simple two-way frequency table where categories of the Y are given as columns and the categories of the X are given as rows.


This can be useful in summarizing the frequencies within each combination of categories for the X and Y variables. Percentages are given to help in summarizing the frequencies in terms of percentages. Additional cell quantities can be added or removed using the options given under the Contingency Table popup menu or right-clicking on the table itself.

The Row % are particularly useful in looking at how the percentages of the Y categories change for the different levels (groups) of X. It appears that the frequency of late deliveries increases significantly At rush hour.



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Data & analysis

No.	Date	Order	Adress	Driver	Order Time	Delivery Time	Total (mints)
<div style="border: 1px solid black; padding: 10px; background-color: #fff9c4; display: inline-block;"> <p>Historic or experimental data will validate which of the brainstormed Possible causes is the true root cause.</p> </div>							
							

This is the best format to use for analysis where all variables are available in one sheet for easy comparison.

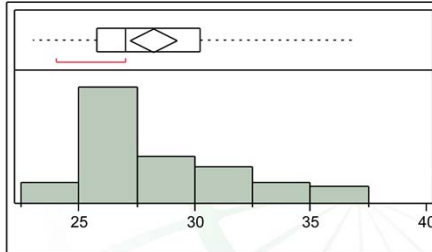
Order number	address	Driver	time of order	time of delivery	Rush Hour?	cycle time	Late?
1	Capital	Hussain	•	•	y	29	n
2	Salmiyah	Sameer	•	•	n	27	n
3	Surra	Hussain	•	•	n	26	n
4	Shwiekh	Hussain	•	•	y	32	y
5	Kaifan	Sameer	•	•	n	27	n
6	Shwiekh	Salim	•	•	n	36	y
7	Hawally	Sameer	•	•	n	28	n
8	Salmiyah	Sameer	•	•	y	34	y
9	Capital	Hussain	•	•	n	26	n
10	Surra	Hussain	•	•	n	24	n
11	Capital	Sameer	•	•	n	27	n
12	Shwiekh	Salim	•	•	n	37	y
13	Salmiyah	Sameer	•	•	n	25	n
14	Hawally	Sameer	•	•	n	26	n
15	Capital	Salim	•	•	n	28	n
16	Kaifan	Hassan	•	•	n	27	n
17	Salmiyah	Hussain	•	•	n	25	n
18	Capital	Hussain	•	•	y	32	y
19	Surra	Salim	•	•	n	24	n
20	Salmiyah	Hussain	•	•	n	28	n
21	Hawally	Sameer	•	•	n	26	n
22	Hawally	Sameer	•	•	n	27	n
23	Capital	Hassan	•	•	n	24	n
24	Shwiekh	Hassan	•	•	n	31	y



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Measuring the “Y”

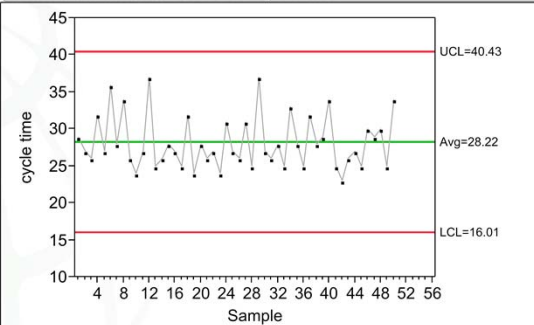
cycle time



Moments

Mean	28.22
Std Dev	3.541532
Std Err Mean	0.5008483
Upper 95% Mean	29.226492
Lower 95% Mean	27.213508
N	50

Individual Measurement of cycle time



The best graphs used to study a continuous variable are “Histogram” of output frequency and a “control chart” displaying the value of each individual point.

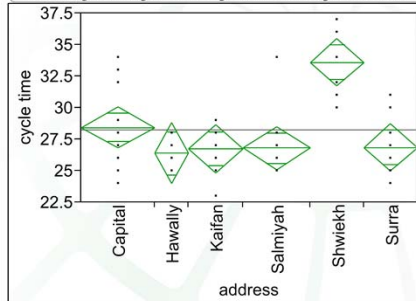


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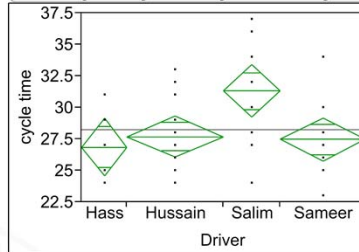
Fit “Y” by “X”



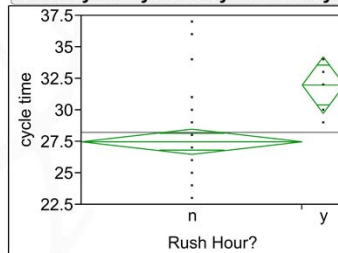
Oneway Analysis of cycle time By address



Oneway Analysis of cycle time By Driver



Oneway Analysis of cycle time By Rush Hour?



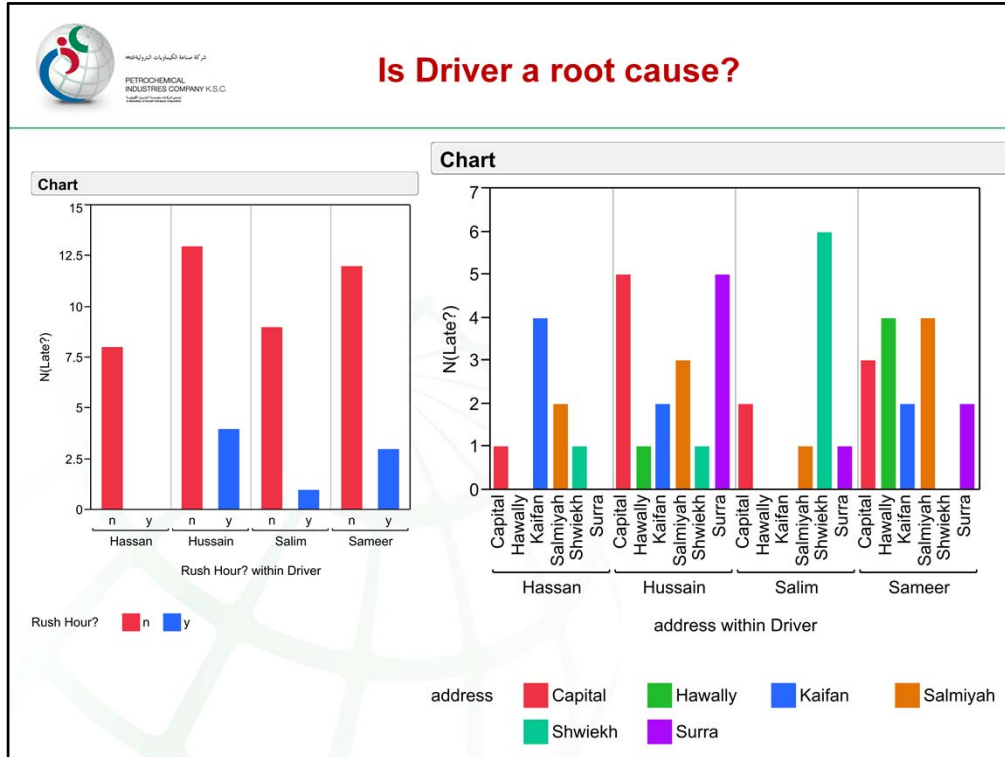
Comparing a categorical “X” with a continuous “Y”, we use an “ANOVA” table.

The graphs show significant contribution to the defect by all 3 categorical factors:

1. Address
2. Driver
3. Rush Hour

What is our conclusion? What will we work on in the improve phase?

Is there a relationship (interaction) between the factors?



Further Analysis shows that most of shwaikh deliveries are made by one driver (Salem).

Which proves that Driver is not a true root cause behind the delay.

Data shows that driver is a root cause only because the address has big influence (interaction).

That is why it is always best to put all X's in one multiple regression model in order for us to see and evaluate the interaction between different factors.



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Steps of the Improve phase



- Brainstorm possible solutions
- Select solutions
- Implement solutions
- Validate Solutions

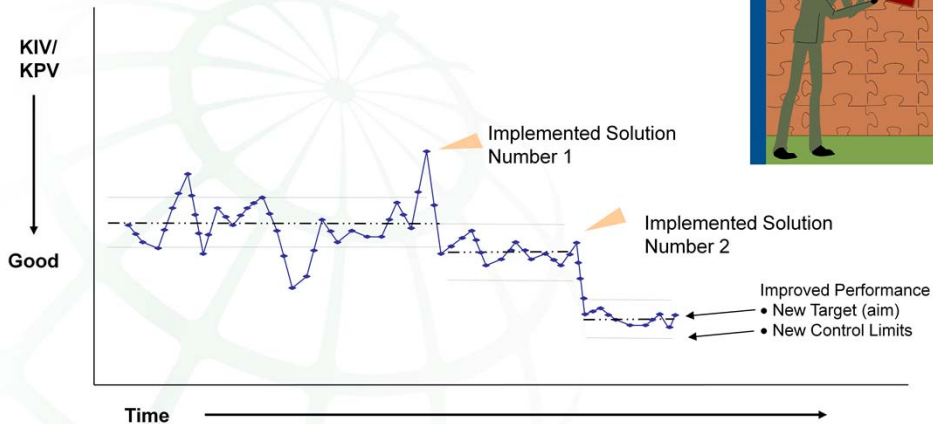




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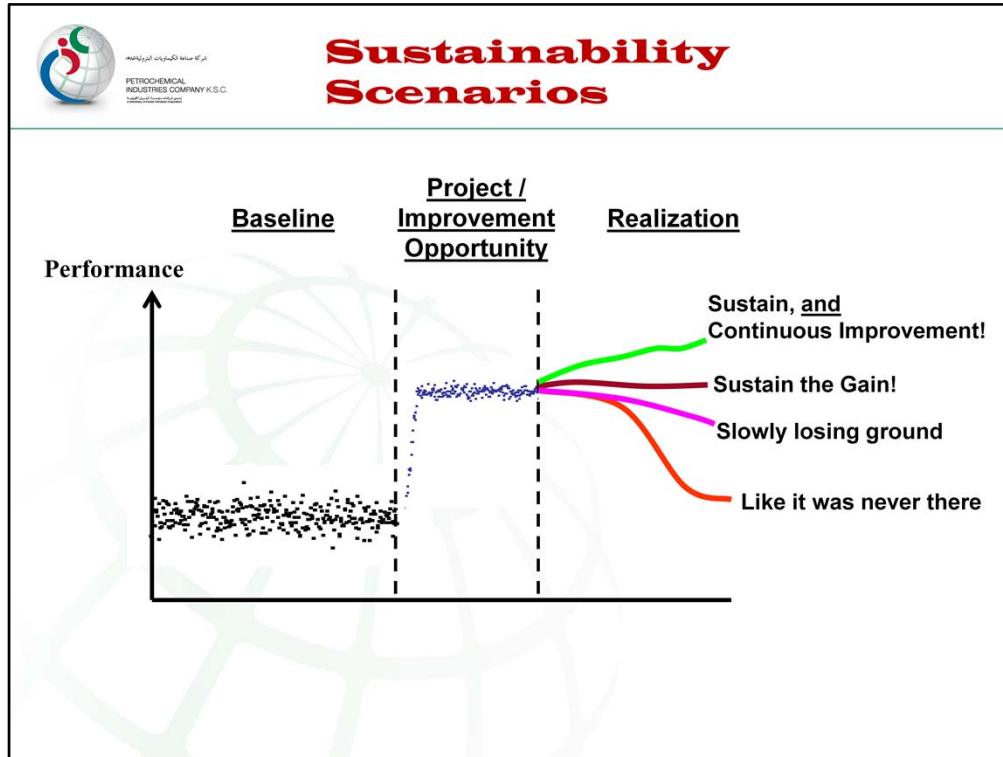
Validating the Solution

- Practical Significance? Compare performance before and after the implementation
- Does the solution meet project goals?



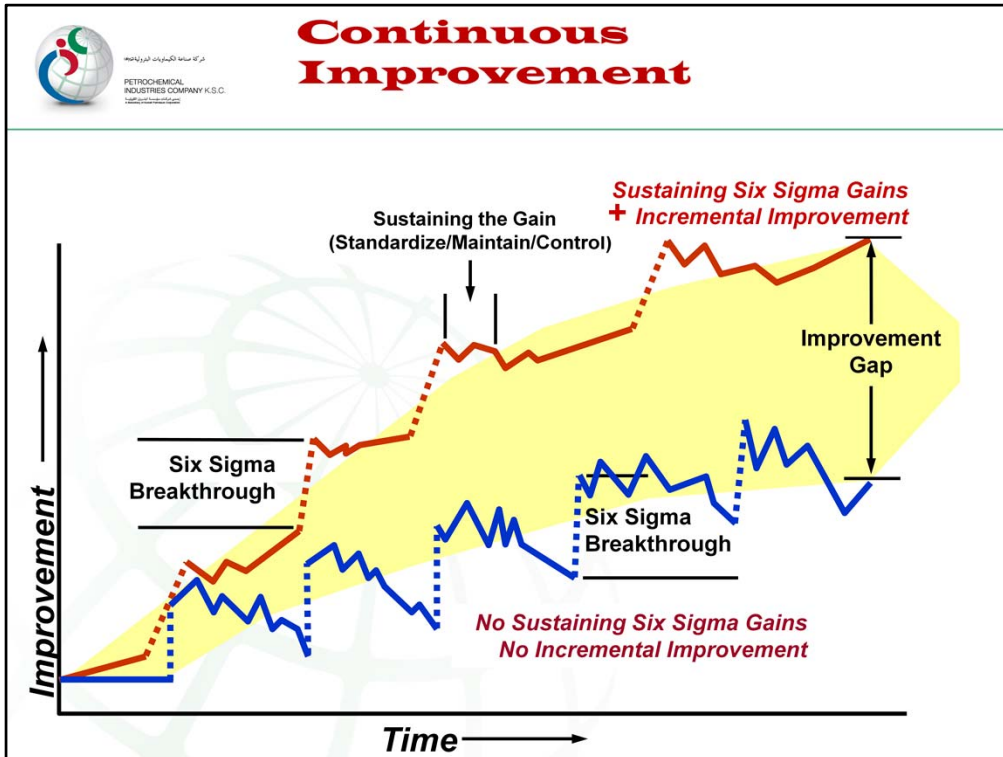
Successful execution of a properly designed and documented Implementation Plan will result in the validation of new KIV/KPV targets and ranges, which are required for sustainable process performance improvement.

At the conclusion of the Improve phase, you must also validate financial impact and a new sigma performance level.



There are many scenarios of what can happen once an improvement is completed. The desired situation is that the improvement is maintained over time — Sustaining the Gains. But sometimes the improvements are lost and the process goes back to the way it was before the work was initiated. This is probably the worst case. Another possibility is that the improved process slowly declines over time. It may or may not get back to the original state, but with every day, value is lost —Sustaining the Gains is certainly the desired result, but there is one scenario which is even better — the process maintains the original gains, and then continues to improve even further. This is a result of the foundation for improvement built by the Green Belt Project Leader and Project Team.

Consider building a discipline of Continuous Improvement into your Control Plan. Integrating an Improvement Cycle (Plan-Do-Check-Act) as part of a Control Plan will enhance the plan's robustness.

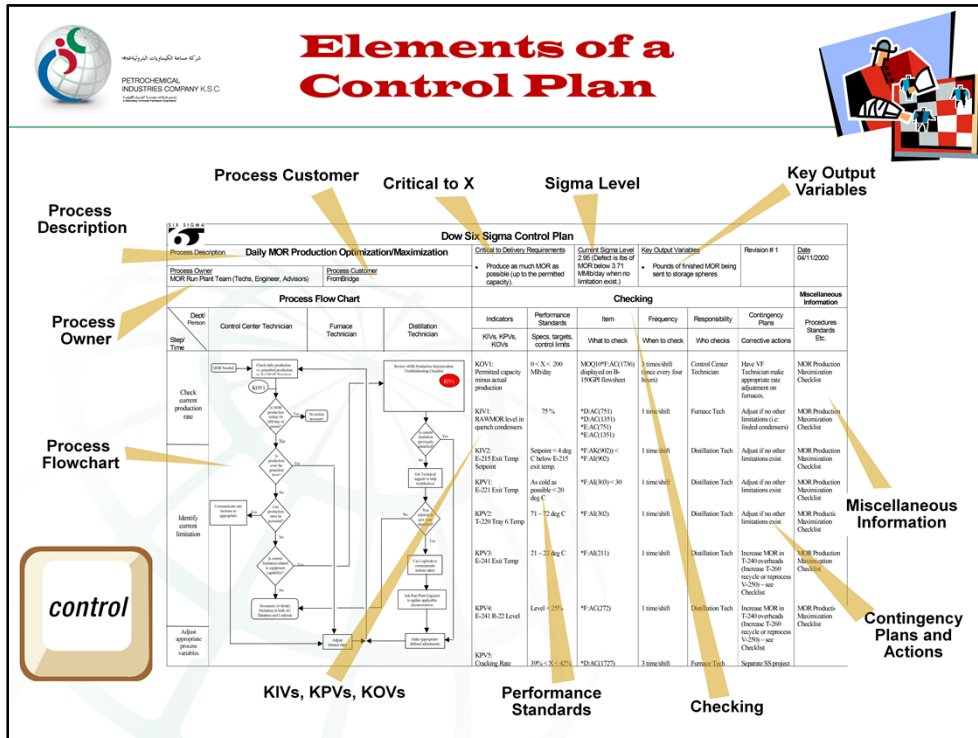


The Six Sigma MAIC Process can be repeated, so that in addition to sustaining the original gains of the initial improvement, additional improvements can continue to be made. Over time, the level of performance is significantly higher when there is Six Sigma breakthrough improvement, sustained gains from the Six Sigma breakthrough improvement, and incremental improvement.

This slide shows what happens over a long period of time when you follow a Six Sigma improvement with sustaining the gains and incremental improvement.

The blue line shows that if you do *not* make efforts to sustain the gains and have incremental improvement, then you will eventually have a decline after each Six Sigma breakthrough.

As time passes, the “improvement gap” between the two approaches keeps getting larger.



You have an example of a Control Plan on one of the following pages. Refer to this example as we walk through each of the Control Plan elements.

Although the Control Plan implementation is a deliverable of the Control phase, a large part of it can already be completed in previous phases, starting as early as Measure phase. "Build as you go," you do not need to wait until you are in the Control phase to start building your Control Plan.

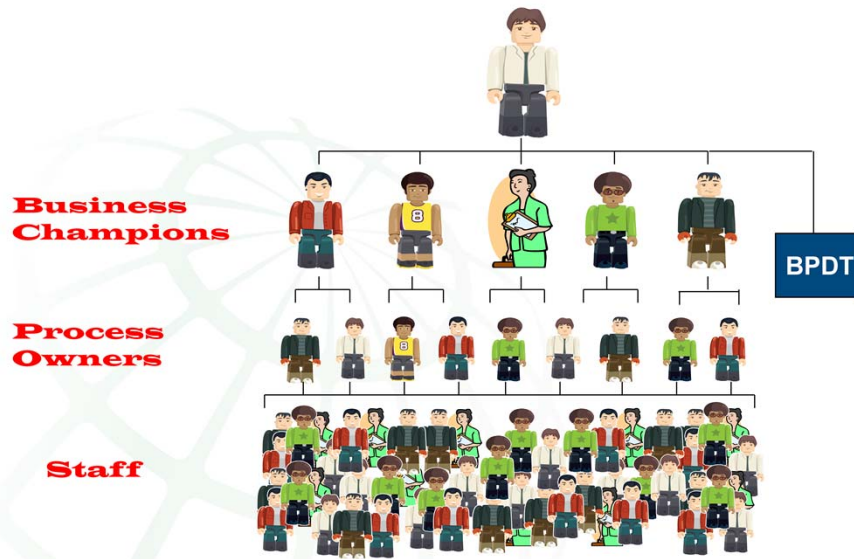
Why Create a Control Plan?

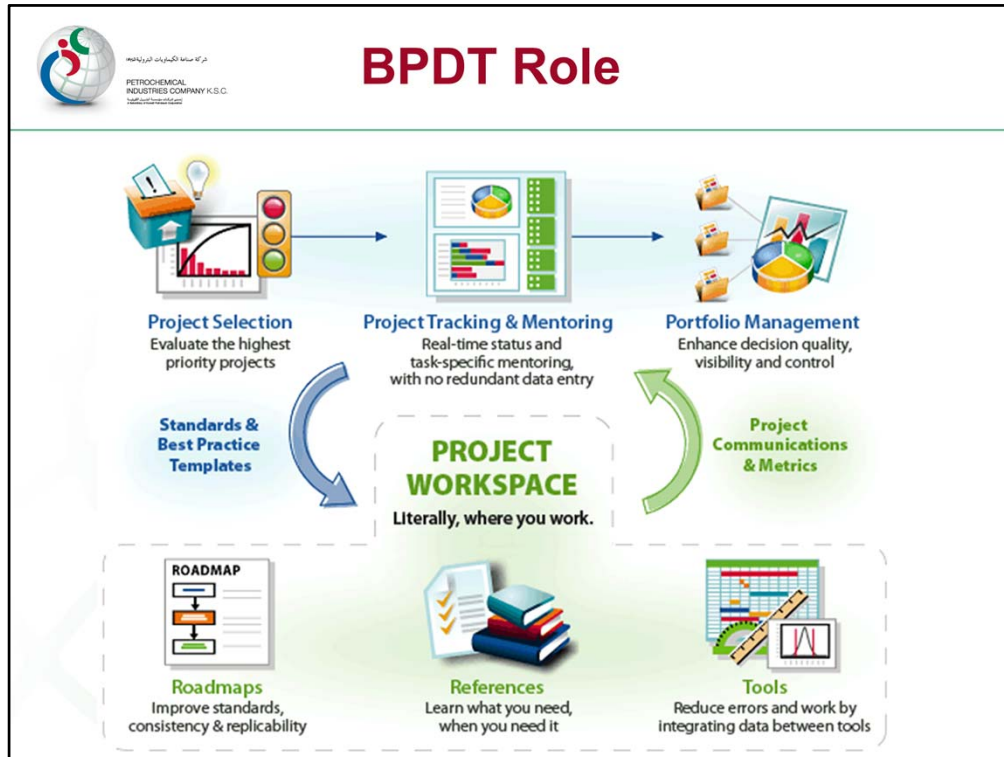
- Manage Key Variables (Input, Process, and Output)
- Provide Process Owner with information to manage the process
- Clarify roles and responsibilities in the new process
- Promote standardization and replication

SPEED LIMIT 10

Traffic Light

Roles & Responsibilities



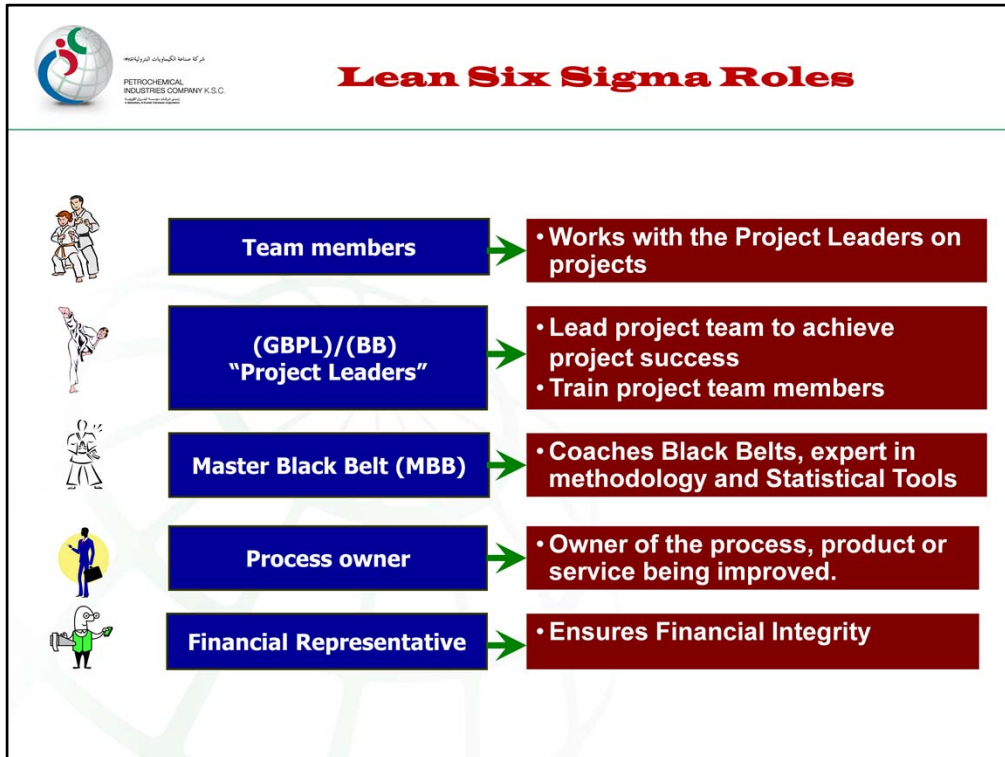


Leaders must realize that BPDT has little to do with the actual selection or execution of company's improvement project.

BPDT must be viewed as the body that sets the standards for the improvement process but they are not the owners.

BPDT owns the technical know how and tools for process excellence and aims to train, coach and mentor PIC professionals in the proper use of these tools and methodologies.

BPDT is also responsible for managing a portfolio of all completed and active improvement projects in PIC



Master Black Belt

- Provide technical leadership for Six Sigma methodology, technology, and tools
- Teach, train, and certify Black Belts (BB) and Green Belt Project Leaders (GBPL)
- Coach BB and GBPL to achieve success in projects and daily work
- Assess skill/knowledge in applying Six Sigma
- Provide input to Business/Functional Champions

Process Owner

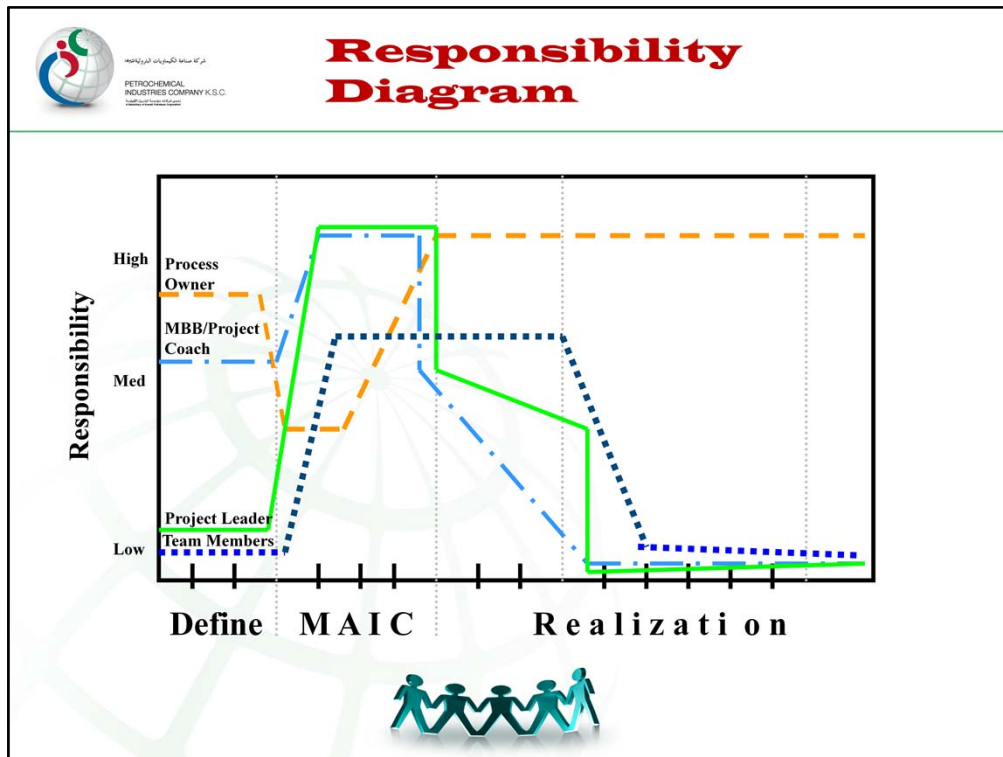
- Identify areas for project focus and work with Local Champion to scope projects
- Resource, staff, and monitor projects
- Create environment for project success
- Continue implementation of process changes and ensure standardization

Black Belt/Green Belt Project Leader

- Scope the project with the Champions to ensure successful project charter
- Lead project or everyday work teams to achieve project success
- Advocate Six Sigma approach, train team members
- Create control system for sustaining gains, transfer successfully to Process Owner
- Use appropriate Six Sigma tools and processes in daily work

Team Member/Green Belt

- Learn Six Sigma methodology and tools
- Provide assistance and expertise to teams
- Support Process Owners in sustaining project gains



The Black Belt or Green Belt Project Leader has high involvement during the Measure through the Control phase. There is a low level of involvement during Realization as ownership and day-to-day operation of the improved process is transitioned to the business or function.

The Process Owner has low to medium involvement at the start of the Measure phase, Involvement rises rapidly through Analyze to Control, leveling off through the Realization phase, since this role is responsible for sustaining the gain.

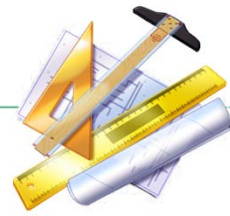
The Master Black Belt (MBB) or Project Coach has a high project involvement during Measure through Control. Involvement decreases rapidly between Control and Realization as ownership and day-to-day operation of the improved process is transitioned to the business or function. at a rate faster than the Project Leader.

The Green Belt Team Member involvement rises up to a moderate level through the four phases MAIC. If the Green Belt Team Member has a role to play in the running of the improved process, expect them to have a medium to high involvement from Realization forward. If the Green Belt Team Member is not involved in running of the improved process then their involvement would go from low to none as the project progressed through the first three months of Realization.



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Metrics



➤ Lean Six Sigma Deployment KPI's:

- ✓ Financial Savings
- ✓ MBBs - quantity, alignment
- ✓ BBs - quantity, alignment
- ✓ GBPLs - quantity, alignment
- ✓ Projects quantity
- ✓ Projects quality
- ✓ **Engagement**



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Engagement



Financial
Savings

Projects
Completion

Quality of
Projects

Key Process outputs

Competencies

☐ *Participate in the identification and deployment of Green Belt Project Leaders, Black Belts and Master Black Belts*

- ✓ Understand skill/competency levels
- ✓ Integrate employee training/certification/promotion requirements with project activities supporting implementation of Business/Function strategy
- ✓ Follow-up on skill/competency application and validation
- ✓ Incorporate into Employee Development Plans



Six Sigma defines a culture, several methodologies and multiple tools that PIC is integrating into the way we do work. With this, we are developing skill sets and competency levels in our people.

You should participate in the identification and deployment of people in the Six Sigma roles. Understand what the skill sets/competency levels are that they are trying to achieve. Integrate any required employee training, certification, promotion requirements with the project activities supporting the implementation of your Business or Function strategy.

You have to think through that planning. Like anything, if someone learns something when they are a newer employee, they are going to apply it throughout their whole career.

As a leader get engaged with your employees in that application and validation of their skill set. Incorporate it into their Employee Development Plan

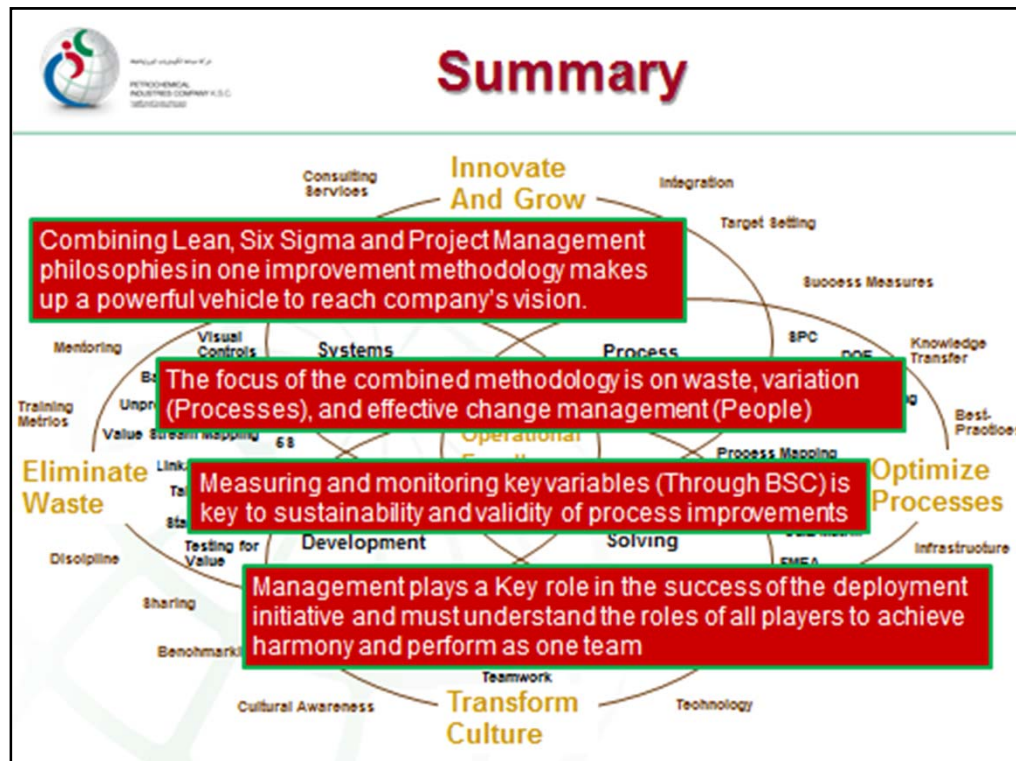
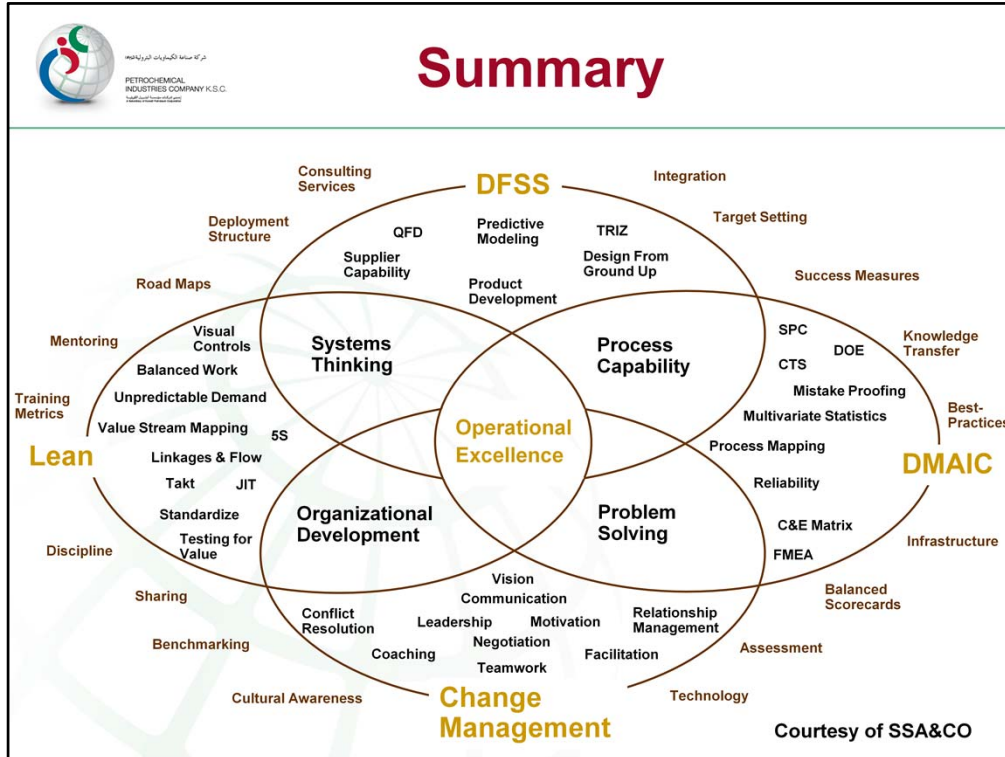


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Leaders Roles

1. Ensure your personal understanding of PIC's Six Sigma Deployment Model, culture, methodologies and tools
2. Ensure the active projects in your Business/Function are strategically aligned, properly chartered and resourced
3. Fill the Business/Function Project Pipeline with value-added projects
4. Charter Projects effectively
5. Get actively engaged in project review meetings
6. Provide project leaders with resources. Especially time...
7. Accelerate project implementation through LEVERAGING
8. Incorporate Six Sigma goals into Performance Management Plans and Employee Development Plans
9. Integrate Six Sigma thinking into your daily work and expect the same of others

Movie -- “Indy 500”





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Petrochemical Industries Company K.S.C.

Thanks



Sources & References:

- iSixSigma.com
- Six Sigma Academy
- Motorola University
- GE six sigma
- DOW's Training Material
- PIC's Successful Projects

Appendix 3

Planning Applications

Case Study

By: Shafi Alajmi



Successes in Corporate Planning

The Lean Six Sigma Process

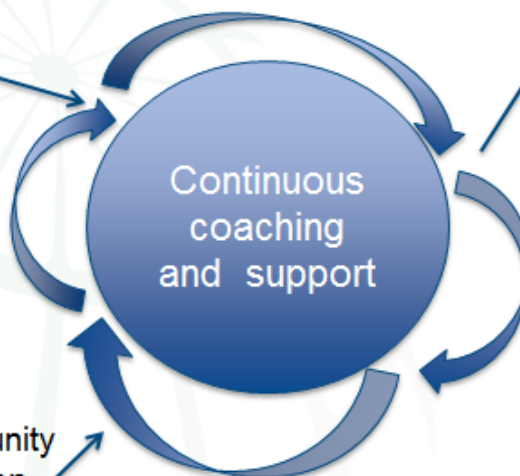
Inputs

GB & BB Training

Annual Leadership Training

Annual Awareness Sessions

Semi Annual Opportunity Identification workshop



Outputs

18 Successfully completed projects

Planning Six Sigma Projects Pipeline

2 Certified Black Belt Projects Leaders

All CP employees participated in six sigma projects as Team Members

Competencies and Culture transformation

Six Sigma Applications in Corporate Planning Department

6th of November 2014



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Agenda



- Main Processes in Corporate Planning Department
- Department Six Sigma Projects Pipeline
- Successes in Corporate Planning Department
- Six Sigma Projects in Corporate Planning Department
- Case Study: Improve Corporate BSC
action items completion time
- Conclusion



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Main Processes in Corporate Planning Department



- **Strategic Planning**
 - Long Term Strategy
 - Five Year Plan
 - Business Portfolio Management System
 - Capital Expenditure Budget
 - Knowledge Management
- **Business Development**
 - Develop new Business Opportunities to PIC
 - Feasibility Studies
 - Business Governance
 - CP Weekly Bulletin
 - Capital Tracking Process
- **Performance Management**
 - PIC Corporate BSC
 - Department local BSC
 - Senior Management Annual Incentive Plan (SMAIP)
 - Statistic reports to stakeholders



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Department Six Sigma projects pipeline



- Conduct brainstorming session for the department with main stakeholder to develop list of potential six sigma projects
- Collect necessary data to identify the defect/opportunity in high level.
- Develop the department six sigma project idea list.
- Conduct meeting with the DCEO and Department Manager to rank the six sigma project ideas
 - Strategic
 - Financial
 - Implementation
- Finalize and approve the annual six sigma projects pipeline for the Department.
- Implement the six sigma project as per the pipeline.
- Review and update the six sigma projects pipeline in semi-annual basis

Brainstorming

Reduce the cycle time of
PIC capital tracking report/
Improve the accuracy of the
data in the report

Reduce the number of
change notices on programs
in annual operational Budget

Improve CP weekly bulletin
report

Improve Annual Plan (Objectives / Targets)
Process
(SMAIP/ target settings)

Improve a process for
Portfolio Management

Improve the process of
Research studies budgeting
(costs & time).

Improve the monthly report
to ministry

Improve KPC PM Reporting
with PIC FA's
(Quality + Cycle time)

Improve the PMO status
report submission process
with SBU's (Aromatics+
Olefins)

Increase the utilization of BI
with regards to Corporate
BSC



Brainstorming

High level scope

Reduce the cycle time of issuing PIC capital tracking report

Opportunities	Scope	How to measure
<ul style="list-style-type: none"> Long Cycle time of developing and issuing PIC capital tracking report to KPC-CP 	<ul style="list-style-type: none"> Capital Tracking report for Strategic projects / Investments Cycle time start from proposing the projects for tracking process from PIC-CP and end with accepting the report from KPC-CP 	<ul style="list-style-type: none"> Create baseline for time required for developing and issuing capital tracking report compared to the target

Six Sigma projects ranking

Idea	Link to strategy	Financial Impact	Actionable	Total
Reduce the cycle time of PIC capital tracking report/ Improve the accuracy of the data in the report	9	1	9	19
Reduce the number of change notices on programs in annual operational Budget	3	3	3	9
Improve CP weekly bulletin report	9	1	9	19
Improve Annual Plan (Objectives / Targets) Process (SMAIP/ target settings)	9	3	3	15
Improve Portfolio Management process	9	3	9	21
Improve the process of Research studies budgeting (costs & time).	3	9	3	15
Improve the PMO status report submission process with SBU's (Aromatics+ Olefins)	9	1	9	19
Improve KPC PM Reporting with PIC FA's (Quality + Cycle time)	9	1	1	11
Increase the utilization of BI with regards to Corporate BSC	9	1	9	19
Improve the monthly report to ministry	3	1	9	13

Scale: 9 = High 3 = Medium 1 = Low

2014/2015 Six Sigma projects pipeline

Six Sigma Project
Improve Portfolio Management process
Reduce the cycle time of PIC capital tracking report/ Improve the accuracy of the data in the report
Improve CP weekly bulletin report
Improve the PMO status report submission process with SBU's (Aromatics+ Olefins)
Increase the utilization of BI with regards to Corporate BSC
Improve Annual Plan (Objectives / Targets) Process (SMAIP/ target settings)
Improve the process of Research studies budgeting (costs & time).
Improve the monthly report to ministry
Improve KPC PM Reporting with PIC FA's (Quality + Cycle time)
Reduce the number of change notices on programs in annual operational Budget

Successes in Corporate Planning The Lean Six Sigma Process

Inputs

GB & BB Training
Annual Leadership Training
Annual Awareness Sessions
Semi Annual Opportunity Identification workshop

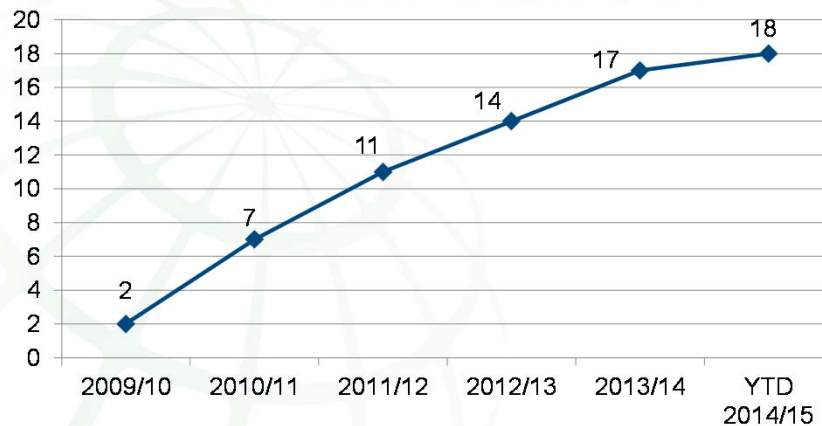
Continuous coaching and support

Outputs

18 Successfully completed projects
Planning Six Sigma Projects Pipeline
2 Certified Black Belt Projects Leaders
All CP employees participated in six sigma projects as Team Members
Competencies and Culture transformation

18 Lean Six Sigma Projects Completed in Planning Department

Cumulative Number of Projects by Year





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Six Sigma Projects in Corporate Planning Department



Sr. no.	Project Title	Type	Objective
1	Improve Business Governance Committee (BGC) action items completion time	Defect Reduction DMAIC	To reduce the BGC Action Items completion delay by 70%.
2	Improve Corporate BSC action items completion time	Cycle Time Reduction DMAIC	Days of delay in Corporate BSC action item completion to be less than 10 days
3	Improve the Capital Approval Process and Tracking	Defect Reduction DMAIC	70% reduction in defect.
4	Improve Capital Projects expenses approval Process	Cycle Time Reduction Implement	Improve the cycle time between approving any capital project and issuing its AFE from 26 days to 5 days and Solve the existing problem of reports inconsistency between CP & Finance
5	Improve the Compliance to the Business Governance Committee Charter	Defect Reduction Implement	The percentage of the set charter roles addressed in the BGC meeting to be 80% quarterly
6	Improve action items completion (%) for Derivatives Strategy Implementation	Defect Reduction Implement	80% of action items for Derivatives Strategy Implementation to be completed on time
7	Reduce Capital Project Closing Time	Cycle Time Reduction DMAIC	Over 40% reduction in closing time of capital projects to an average of 15 working days.
8	Improve 5 Year Plan report accuracy	Defect Reduction DMAIC	To Reduce the # of comments/ clarification by 80 %
9	Reduce PIC Strategic Project IRR Variation during Feasibility study (%)	Defect Reduction Implement	Reduce variation of Project IRR to be below 5%



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Six Sigma Projects in Corporate Planning Department



Sr. no.	Project Title	Type	Objective
10	Increase the utilization of PIC Corporate BSC report in Business Intelligent System	Defect Reduction KAIZEN	% of Utilization of PIC Corporate BSC report in BI to be more than 80%
11	Increase the Acceptance Rate of Captured Learning	Defect Reduction Implement	The Acceptance Rate of Captured Learning to be 70% in 201Q/2011
12	Reduce the Cycle Time of Captured Learning Approval	Cycle Time Reduction Implement	Captured Learning approval Cycle Time To be less than 25 Days
13	Reduce delayed time of reporting Feedstock Midterm plan to KPC	Cycle Time Reduction Implement	To Reduce the defect of delayed submission of report from historical average of 17 days to zero Days
14	Improve the effectiveness of oil relations report	Defect Reduction Implement	To create a data base that consists of all the regions/ countries that PIC is dealing with.
15	Reduce Page Printing in PIC	Defect Reduction DMAIC	Reduce page printing in PIC by 15%.
16	Improve Engagement of six sigma process Owners during project's realization period	Defect Reduction Implement	Ensure sustaining the benefits from completed Six Sigma Projects and No. of completed six sigma projects monitored in BSC after handover to be 90 % and more
17	Increase the number of Best Practices Approved to be implemented in PIC	Defect Reduction Implement	Four Best Practices approved to be implemented in PIC One in each quarter.
18	Reduce Cycle Time of Capital Tracking Report for National and Critical Projects	Cycle Time Reduction DMAIC	Reduce the Cycle time for developing the Capital Tracking Report to be less than 5 Months



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Six Sigma Projects in Corporate Planning Department



Increase the Acceptance Rate of Captured Learning

Opportunity statement

The Acceptance Rate of Captured Learning was 31% in 2009/10

Define the Defect

The Acceptance Rate of Captured Learning less than 70% monthly

Objectives

The Acceptance Rate of Captured Learning to be 70% in 2010/2011

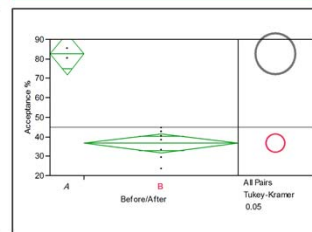
List of solutions

Solution and desired Outcome (Action to be taken)	Responsibility	Completion Dates	
		Plan	Actual
1. Review and update the KLM process	Sahar / Team	16-Dec-10	13-Dec-10
2. A. Review and update the Criteria for Captured Learnings	Hussain Ashtar / Team	16-Dec-10	23-Dec-10
B. Document the Criteria for Captured Learning	Hussain Ashtar / Team	23-Dec-10	10-Jan-2011
3. A. Develop the communication Plan	Shafiq	2-Nov-10	26-Oct-10
B. Implement the communication Plan	Shafiq / Team	10-Jan-11	20-Jan-11
4. Propose encouragement plan for KLM Team	Shafiq	16-Dec-10	23-Dec-10
5. Form Department KLM working team to review and approve the submitted KLM	Abdulrahman / Team	25-Nov-10	24-Nov-10
6. Conduct workshop with Department KLM working team to evaluate Captured Learning submitted	All / Team	13-Dec-10	13-Dec-10
7. Revise and update the KLM team charter	Abdulrahman / Team	25-Nov-10	26-Nov-10

Before and After Picture



Validation of improvement



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Six Sigma Projects in Corporate Planning Department



Improve Capital Projects expenses approval Process

Opportunity statement

It takes 26 days on average for the project owner to issue the AFE after approving the capital project

Define the Defect

Any AFE issued that takes more than 5 working days

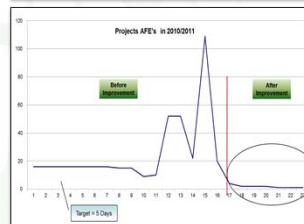
Objectives

Improve the cycle time between approving any capital project and issuing its AFE from 26 days to 5 days and Solve the existing problem of reports inconsistency between CP & Finance

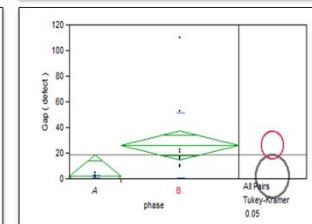
List of solutions

S/C	Solution & Desired Outcome (Actions to be taken)	Responsibility	Completion Dates	
			PLAN	ACTUAL
#1	Solution # 1 : Finalize the procedure of issuing AFE's :	TEAM	26-Oct-10	26-Oct-10
		RDS	10-Nov-10	10-Nov-10
		AM	21-Nov-10	21-Nov-10
	Solution # 2 : Post the live link form :	CM	31-Oct-10	31-Oct-10
		TEAM	2-Nov-10	2-Nov-10
		AM/RDS	10-Nov-10	11-Nov-10

Before and After Picture



Validation of improvement



Six Sigma Projects in Corporate Planning Department

Increase the utilization of PIC Corporate BSC report in Business Intelligent System

Opportunity statement

% of Utilization of PIC Corporate BSC report in BI was 33%

Define the Defect

% of Utilization of PIC Corporate BSC report in BI below 80%

Objectives

% of Utilization of PIC Corporate BSC report in BI to be more than 80%

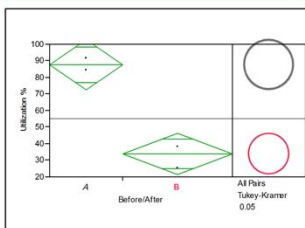
List of solutions

Action	Responsibility
Revise and update the BSC Process	CP
Revise and Update the BSC Guidelines	CP
Conduct BI BSC training Program	IT
Revise and update the BSC coordinator roles and responsibilities	CP
Develop and implement BSC Communication plan (Flyers, screensaver, awareness)	CP/IT
BI system improvement	IT

Before and After Picture



Validation of improvement



Six Sigma Projects in Corporate Planning Department

Improve the Compliance to the Business Governance Committee Charter

Opportunity statement

The average percentage of charter roles addressed in the BGC meeting was 32% for FY 2011/12

Define the Defect

Any BGC meeting does not address 80% of the set charter roles for the quarter.

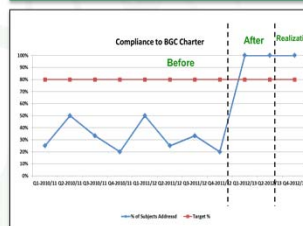
Objectives

The percentage of the set charter roles addressed in the BGC meeting to be 80% quarterly

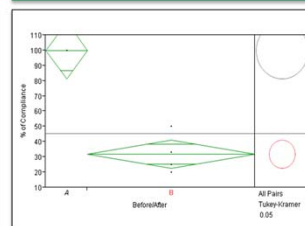
List of solutions

Action to Be taken	Resp.	Completion Date	
		Plan	Actual
1 Update the BGC work Process	Team	15 Apr.12	15 Apr.12
2 Develop Annual BGC Agenda	BGC Coordinator / Team Leader	30 Apr.12	15 Apr.12
3 Develop Gap analysis to activate all agenda items	Team	30 Apr.12	15 Apr.12
4 Incorporate feedback to BGC in Pre-Board procedures	SBU BAAP / Naser / Salman	15 May.12	2 May.12

Before and After Picture



Validation of improvement





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Six Sigma Projects in Corporate Planning Department



Improve 5 Year Plan report accuracy

Opportunity statement

As average of the last four years Corporate Planning department received 42 comments/clarifications request per year on PIC five Years plan document from the following:
Top management Board of directors KPC-CP This huge # of comments measure the accuracy of the 5 years plan document issued by CP department

Define the Defect

Any comment that is received from TM/BOD/KPC-CP after issuing the 5 years plan report

Objectives

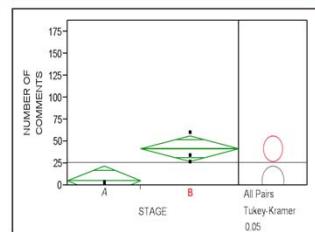
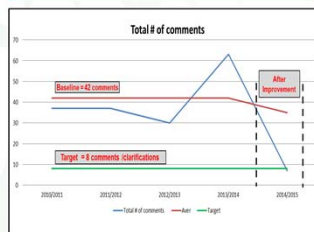
To Reduce the # of comments/clarification by 80 %

List of solutions

Before and After Picture

Validation of improvement

Implementation Plan				
Project title: Improve 5 Year Plan report accuracy				
RC	Solution & Desired Outcome (Actions to be taken)	Responsibility	Completion Dates	
			PLAN	ACTUAL
RC01	Conduct meeting with SBU's (Related to JV'S) :			
	(1) Review against previous year	Sahar	20th June	17th June
	(2) discuss and present the findings	Sahar	20th June	17th June
RC02	Issue an email to SBU's to assign a focal point and a back up	Abeer	10th July	09 July
RC03	Develop a clear work process	TEAM	10th July	10th July
RC04	SBU's to analyze JV's 5 yrs plan before submitting	TEAM	15th June	05 June



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البحر فراتة مؤسسة البترول الكويتية
A Subsidiary of Kuwait Petroleum Corporation

Six Sigma Projects in Corporate Planning Department



Reduce Cycle Time of Capital Tracking Report for National and Critical Projects

Opportunity statement

Average Cycle time for Capital Tracking Reporting from identifying the projects to be tracked to KPC –CPA acceptance was 9.1 months for the last 6 years.

Define the Defect

Cycle time for Capital Tracking Report from identifying the projects to be tracked to KPC –CPA acceptance more than 5 Months

Objectives

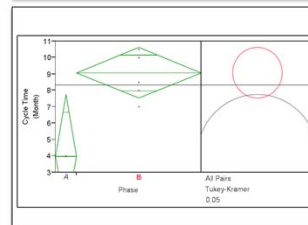
Reduce the Cycle time for developing the Capital Tracking Report to be less than 5 Months

List of solutions

Before and After Picture

Validation of improvement

#	Solution and desired Outcome (Action to be taken)	Responsibility	Completion Dates	
			Plan	Actual
1	Gather data for capital tracking from JV's starting from end of financial year	George/Baha	8 May 14	12 May 14
2	Conduct KPC Capital Tracking Procedure awareness to all concerned departments in KPC	Team	30 June 14	30 June 14
3	Assign responsibility for the Financial Model ownership	Team	7 July 14	7 July 14
4	Update the process with Improvement	Team / Dismoud	10 July 14	2 July 14
5	Conduct capital tracking report presentation before sending the report to KPC	George	15 July 14	10 July 14
6	Issue Capital Tracking report for aromatics and Styrene	Shafi	20 July 14	14 July 14
7	Specify a deadline for KPC to provide their comments if any regarding the report.	Shafi	20 July 14	14 July 14
	Conduct awareness sessions as per communication plan	Team	As per communication plan	On Going



Case Study:

Improve Corporate BSC action items completion

Define

Project Title : 064 - Improve Corporate BSC action items completion time

Business/Function: Corporate Planning / Strategy

GBPL / Black Belt: Shafi AlAjmi

Team Members: Sahar AlAwadi

Mohammed Baha

Abdullah AlAzmi

Process Owner: CP Manager

Local Champion: DCEO Planning

Master Black Belt: Aref AlAwadi

Defect

Days of delay in Corporate BSC action item completion exceeding 10 days

Opportunity

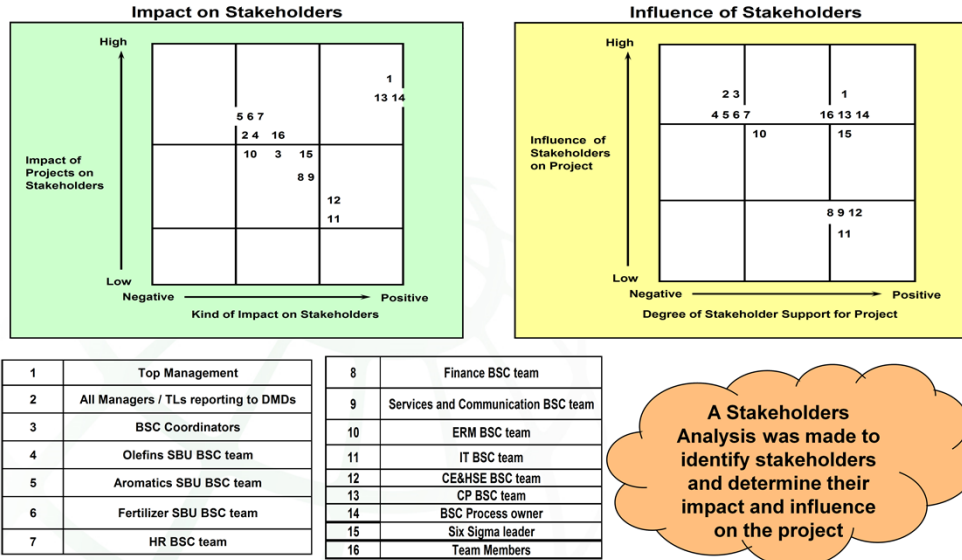
It took 34.7 days of delay on average over the last year to complete the action items from Corporate BSC meeting

Objective

Days of delay in Corporate BSC action item completion to be less than 10 days

Measure

Stakeholders Analysis

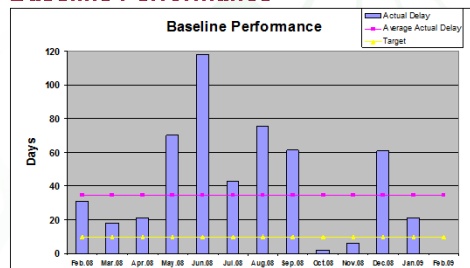


Measure

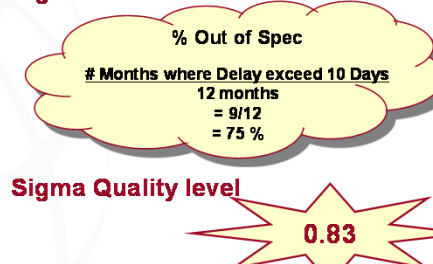
Data Collection

Action #	Action	Sector / Department	Completion Date - Target	Completion Date - Actual	Status	Days of Delay
1	Develop Local HR BSC	HR	31 Dec.07	17 Mar.08	Completed with Delay	78
2	Develop monthly report for departments Expenditures vs Budget based on new Organization - Prepare the Data	Finance	17 Sep.07	16 Nov.07	Completed with Delay	59
3	Improve ERP supply chain measure (To check Expense Practice)	Olefins Marketing	30 Aug.07	30 Sep.07	Completed with Delay	30
4	To check with Exsiste the reason of propylene shortage from KHEC	Olefins Marketing	17 Sep.07	17 Sep.07	Completed on Time	0
5	To check KHEC decision regarding Fert. Chlorination	CP	17 Sep.07	17 Sep.07	Completed on Time	0
6	Investigate the high cost of ammonia and Urea production cost (specially chemicals)	Operation	30 Aug.07	30 Sep.07	Completed with Delay	30
7	Develop monthly report for departments Expenditures vs Budget based on new Organization	Finance	30 Nov.07	12 Jan.08	Completed with Delay	42
8	Conduct Awareness program on Near Miss reporting	HSE	31 Oct.07	28 Oct.08	Completed on Time	0
9	Develop and communicate the KM Criteria	CP	30 Sep.07	30 Sep.07	Completed on Time	0
10	Develop Olefins SBU BSC	Olefins SBU	31 Dec.07	20 Dec.07	Completed on Time	0
11	Develop Aromatics SBU BSC	Aromatics SBU	31 Dec.07	17 Feb.08	Completed with Delay	5
12	Report the POCE as per New SBU's	Finance	10 Jan.08	15 Jan.08	Completed with Delay	5
13	Identify the Partner satisfaction measure and develop the measure details	Olefins SBU	15 Dec.07	17 Feb.08	Completed with Delay	52
14	Report the status of the Fertilizer customer satisfaction survey	Fertilizer Marketing	10 Dec.07	15 Dec.07	Completed with Delay	5

Baseline Performance



Sigma calculations



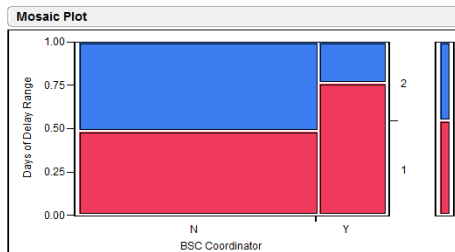
Root Cause Validation Summary

Root Cause Validation Summary were used to validate the 6 Root Causes

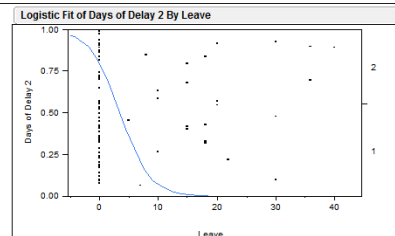
Number	Probable Root Causes	Validation Method	Validated	What we learn from analyzing the data
1	No Defined and well constructed work process	Survey	Yes	There is no written, defined well constructed work process for BSC actions completion
2	No BSC coordinators in some departments	Proportion Test	Yes	Propability for the delay on BSC actions completion is higher in the departments that do not assign BSC coordinator
3	No delegation of responsibilities during leave, travel, course	Contingency	Yes	Propability for the delay on BSC actions completion is higher when department managers take annual leaves, training courses or travel in business trip
4	Actions with multiple responsibilities	Proportion Test	No	There are no relation between the delay of BSC actions completion and actions multiple responsibilities
5	Actions are not understood clearly	Survey	Yes	Actions must be clearly defined and communicated to Managers
6	Action with KPC/Equate involvement	Proportion Test	No	There are no relation between the delay of BSC actions completion and actions with KPC/Equate involvement

Validation of root causes

No BSC coordinators in some departments



No delegation of responsibilities during leave, travel, course



Actions are not understood clearly

40 % of Managers / TLs do not understood the actions clearly

Whole Model Test

Model	-LogLikelihood	DF	ChiSquare	Prob>ChiSq
Difference	23.292493	1	46.58499	<.0001 *
Full	29.552062			
Reduced	52.845155			
RSquare (U)			0.4408	
Observations (or Sum Wgts)			77	
Converged by Gradient				

Parameter Estimates

Term	Estimate	Std Error	ChiSquare	Prob>ChiSq
Intercept	1.34854313	0.3378029	15.94	<.0001 *
Leave	-0.3994616	0.1417473	7.94	0.0048 *

For log odds of 1/2

Analyze

Validated Root Causes

1

No defined and well constructed work process

2

No BSC coordinators in some departments

3

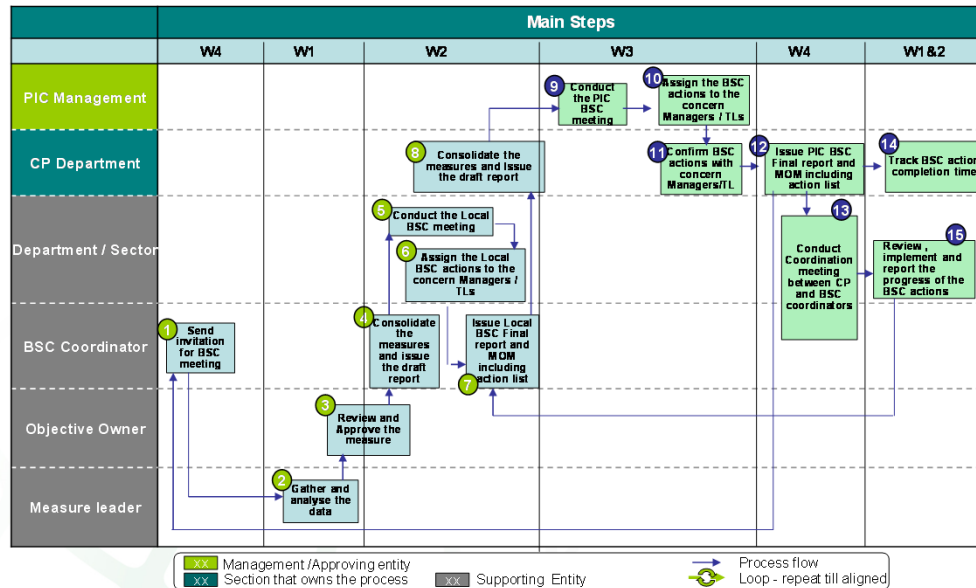
No delegation of responsibilities during leave, travel and training course

4

Actions are not understood clearly

Improve

BSC Report Development Process

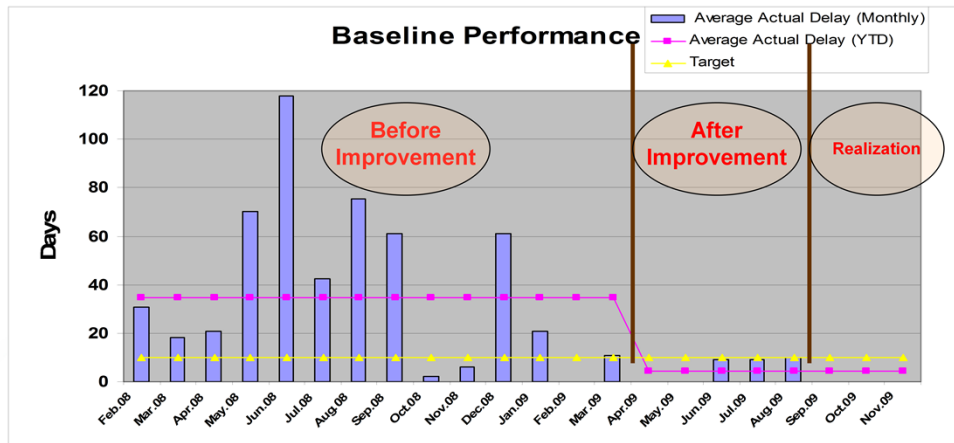


Implementation Plan (1/2)

RC	Solution and desired Outcome (Action to be taken)	Responsibility	Completion Dates		Status
			Plan	Actual	
1	A. Develop Detailed Process for PIC BSC Report Development including BSC Actions Completion	Team	10-Jun-09	3-Jun-09	Completed
	B. Communicate the New Process to All Departments	CP Department	30-Jul-09	30-Jul-09	- Completed. - Awareness session conducted on 28th July09. Email sent to all Managers and BSC coordinators on 30th July 09. Meeting conducted with BD Olefins manager, HR manager, finance manager.
	C. Develop Measure in CP BSC to measure PIC BSC action completion time	Team	14-Jun-09	14-Jun-09	Completed
2	A. Define Roles and Responsibilities for BSC coordinator	CP Department	1-Mar-09	1-Mar-09	Completed
	B. Assign BSC coordinator in each Sector/Department	All DMDs	15-Mar-09	19-Mar-09	Completed
	C. Conduct Awareness session for BSC coordinator	CP Department	15-Apr-09	25-Apr-09	Completed
	D. Conduct training BSC training for BSC coordinator	CP Department in coordination with HR	25-May-09	25-May-09	Completed

Implementation Plan (2/2)

RC	Solution and desired Outcome (Action to be taken)	Responsibility	Completion Dates		Status
			Plan	Actual	
3	A. Conduct meeting with Managers to communicate the results	Team	30-Jul-09	30-Jul-09	- Completed - Awareness session conducted on 28th July09. Meeting conducted with BD Olefins manager, HR manager, finance manager.
	B. Memo to HR Manager to Include BSC actions completion as a fixed item in the Handover template	CP Manager	13-Jun-09	16-Jun-09	Completed
	C. Conduct monthly meetings for BSC coordinator	CP Department	8-Jul-09	16-Jun-09	- Completed. Meeting conducted in monthly basis for Departments with assigned actions
	D. Improve the BSC Minutes of meeting (Implement Management Assurance Tracking System (MATS))	CP Department	15-Jun-09	18-Jun-09	Completed
4	A. Confirm the action understanding and write up with the Concern manger / team leader	CP Department	23-Jun-09	24-Jun-09	Completed
	B. Include step in the process to make sure the understanding of the BSC action	Team	10-Jun-09	3-Jun-09	Completed
	C. Conduct awareness session for Managers regarding the importance of Completing BSC action and its link to Strategy Implementation	CP Team	30-Jul-09	30-Jul-09	Completed
All	Develop BSC Communication Plan	CP Department	14-Jun-09	10-Jun-09	Completed



Old Sigma Quality level

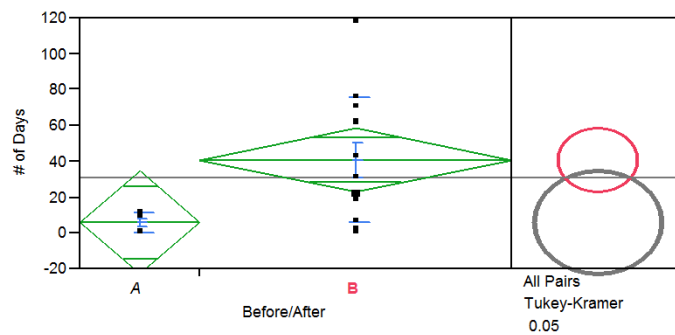
0.83

New Sigma Quality level

2.65



Improvement Validation by ANOVA Analysis



Average Delay of action completion

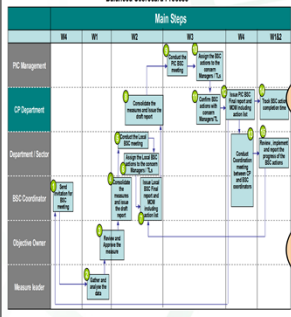
Before Improvement
35 days

After Improvement
5 days

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Control

Six Sigma Control Plan

Process Description		Critical to Quality Requirements	Current Sigma Level	Key Output Variables		Revision #	Date				
Process Owner		Process Customer									
CP Manager		PIC		2.47	Time required to complete PIC BSC action						
Process Flowchart			Checking				Miscellaneous Information				
Dept/ Person			Indicators	Performance Standards	Item	Frequency	Responsibility	Contingency Plans	Procedures Standards Etc		
Step/ Time			KIVs, KPVs, KOVs	Specs, targets, control limits	What to check	When to check	Who checks	Corrective actions			
The process follows 15 main steps			Completion Time of BSC Action items Completed Completed to 100% on time, 10 days delay is accepted		CP BSC measure Monthly		CP BSC Coordinator / PIC BSC Coordinator	- Conduct meeting with BSC Coordinators - Inform Management (PIC BSC Meeting)	Measure is already developed in CP BSC. CLICK HERE TO SEE THE DETAILED MEASURE		
Balanced Scorecard Process 			No Delegation of responsibilities / No BSC coordinator No delegation of responsibilities to other departments		Adherence to BSC Governance Adherence to BSC Governance		PIC BSC Coordinator	- Quarterly evaluation report presented to PIC management - Conduct awareness session	CLICK HERE TO SEE THE EVALUATION TEMPLATE		
			Confirm understanding of Action / Better coordination Confirm understanding of Action / Better coordination		Meeting with Departments have action items Meeting with SBU/D have BSC action items		PIC BSC Coordinator	- Reminder to be sent to concern SBU/department	CLICK HERE TO SEE THE FOLLOW UP TEMPLATE		

Management/Approving entity Section that owns the process Supporting entity Process flow Step - repeat if required

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Conclusion

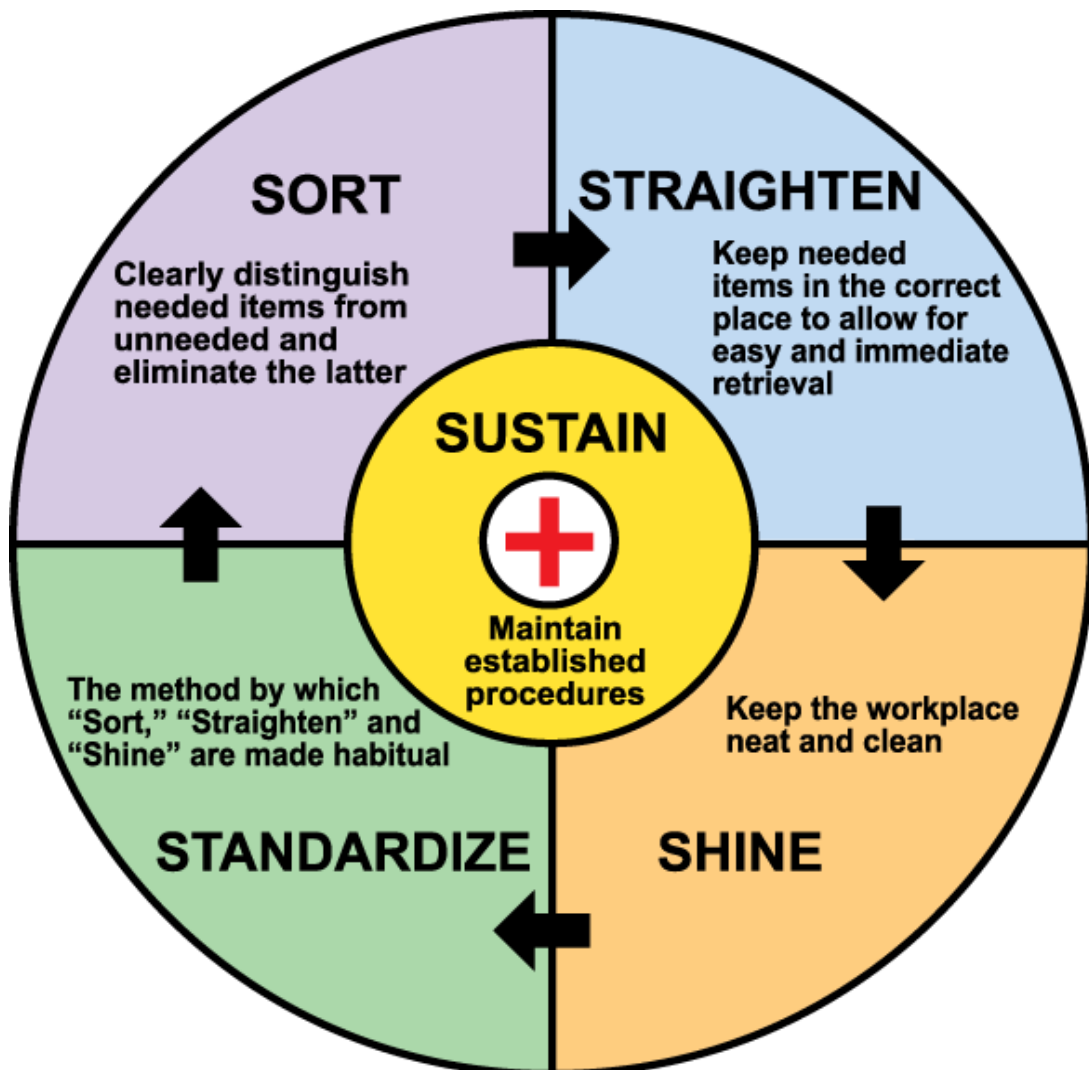
- Competencies development and Culture transformation in the department.
- Improve planning processes from customer/stakeholder perspective.
- Continuous improvement to Planning processes:
 - Reducing Cycle Time
 - Reducing Defect
- Six Sigma Projects pipeline ready for implementation.

Appendix 2

Workplace Optimization

5S - Case Study

By: Saud Almajedi





“Workplace Optimization Concepts”

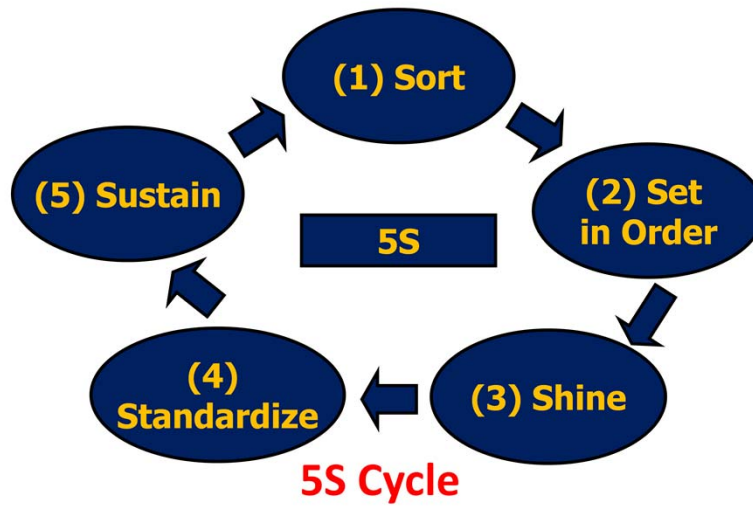


Arab Fertilizer Association
since 1975

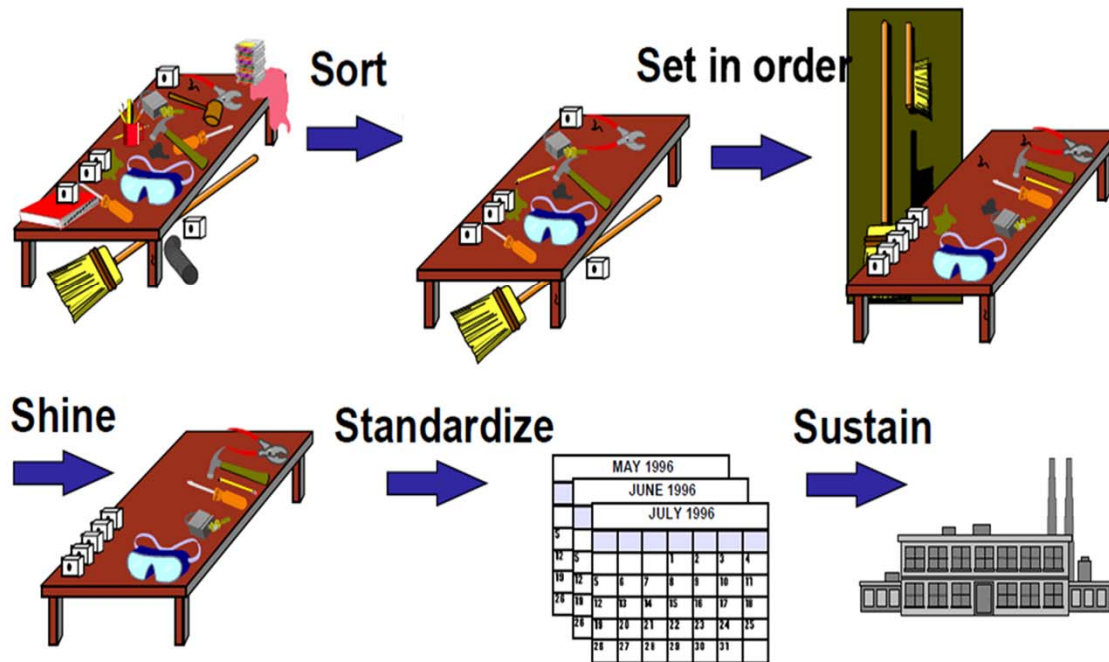
AFA SIX SIGMA WORKSHOP 2014
DEAD SEA, JORDAN
4-6 NOVEMBER, 2014

This Module is developed in an attempt to explain the main concepts and elements of the 5S Lean technique.

5S METHODOLOGY



What Are The “5S”



Step 1: **Separate** (Seiri): Get rid of what is not needed

Step 2: **Sort** (Seiton): Arrange tools, parts and equipment so they can be used without wasting time and motion

Step 3: **Sweep** (Seiso): Clean work site daily to guarantee safety

Step 4: **Standardize** (Seiketsu): Create procedures and assignments to confirm the first three S's

Step 5: **Sustain** (Shitsuke): Maintain a 5-S discipline and seek ways to improve



What is 5S Methodology ?

- Visual Control
- Visual Management

What are 5S ?

1. Sort

- Sorting through the contents of an area and removing unnecessary items
- Results in
 - Less 'clutter'
 - Simplification
 - Shorter time to locate items



2. Set in Order

- Arranging necessary items for easy and efficient access, and keeping them that way
- Results in
 - Efficient storage
 - Effective placement
 - Orderly workplace



3. Shine

- Clean everything & keep it clean
- Use cleaning as a way to ensure that your area and equipment is maintained as it should be
- Results in:
 - Maintain Sort
 - Maintain Set in Order
 - Better Equipment operation
 - Pleasant work environment



4. Standardize

- Create guidelines for keeping the area organized, orderly, and clean. **Make the standards visual and obvious**
 - A result of the first three steps
 - Develop SOPs



5. Sustain

- Educate and communicate to ensure that everyone follows the 5S standards
 - Error Proof your 5S Implementation
 - Continued communication
- Results in
 - Continued improvement
 - Change in culture





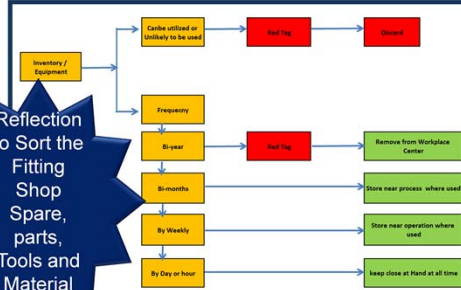
Actions Required for Sorting



Basic Sorting Procedures

- Examine the workplace to identify items that are not needed
- Take "before" pictures
- Tag items
- Take tagged items to the holding area
- If unclear whether an item is needed or not, tag with a different color and segregate
- Classify tagged items by usage
- Keep items in holding area no more than 3-4 weeks
- Move to Company storage area
- Dispose of the item
 - Move to another department
 - Sell outside
 - Discard
- Take "After" photographs

Red Tagging Workflow



Reflection
to Sort the
Fitting
Shop
Spare,
parts,
Tools and
Material



This is the most difficult step. First you must get started and you must decide what is unnecessary. Once you have accomplished the sort step the rest becomes easier.



Actions Required for Setting in order



Basic Setting in Order Procedures

- A. Ensure only necessary items are in the workplace
- B. Decide what items to place where
- C. Use 5-whys; frequency of use
- D. Take 'before' photographs
- E. Place needed items so they can be retrieved quickly and with minimal walking
- F. Tell others about location of items
- G. Outline locations of equipment, supplies, safety zones, etc
- H. Identify all needed items with labels
- I. Take 'after' photographs
- J. Take color coding to identify clearly
- k. Evaluate progress

Reflection of
How Set in
Order
Applied?

Tools and Spare parts



(a) Use the guidelines from Sort:

- Needed hourly or daily – keep within reach of point of use
- Needed weekly or monthly – keep within work area
- Needed occasionally – keep in a more distant location

In addition, answer the following questions:

- What do I need to do my job?
- Where should I locate this item?
- How many of these do I really need?

(e) Label each cabinet, drawer, or locker with a comprehensive list of contents

(g) Create Visual Controls within the workplace:

- Arrows – to show direction
- Divider Lines – to delineate walkways and workstations
- Limit Lines – to identify height limits for stacked items
- Marker Lines – to show position of equipment
- Range Lines – to show range of equipment operation, door openings, etc
- Stripes – to identify potential safety hazards

(i) The evaluation should be conducted by the workplace and 5S leaders



Actions Required for Shining



Basic Shining Procedures

- Take 'before' photographs
- Find ways to prevent dirt, contamination, etc
- Keep checklist of all places which need to be checked or improved – and frequency of check
- Within the checklist, distribute the workload
- Take 'after' photographs
- Evaluate progress

Color Coding




Reflection of How
Shine Order
Applied?




(b) Tag all items that cause contamination. Use 5 whys or cause & effect diagramming to determine the root cause of dirt/contamination. Develop corrective and preventative actions.

(c) & (d) The checklist should include: What checks to conduct, the frequency of checking, who is responsible for checking, and a place to indicate that the check has been completed.

(f) The evaluation should be conducted by the workplace and 5S leaders.




Actions Required for Standardize



Basic Standardize Procedures

Standard Procedures of Fitting & Pump Shop

- a) Check the first 3 S's are implemented; Sort, Set in Order, & Shine.
- b) Establish standards & frequency for repeating the first 3 S's
- c) Create/modify procedures/forms to better fit your workplace needs
- e) Assign individual responsibilities for areas/machines/inspections
- f) Check/Evaluate with senior leadership
- g) Provide positively reinforcing feedback



Reflection of
Standard
Procedures?

(c) Fine-tune the frequency and time of Sort, Set in Place, Shine so that continuous improvement is regularly addressed

(d) Items that should be checked for standardization:

- 5S tag procedures
- Holding area guidelines
- Standardized Visual Controls
- Standardized cleaning/checking schedules
- Create a simple system for cleaning the workplace



Actions Required for Sustaining



Basic Sustaining Procedures

- a) Treat the workplace as though it's your home
- b) Periodic checks that the first 4S's are driven into daily work
- c) Celebrate successful implementation
- d) Prominently display the results of the effort
- e) Develop and post Key Lessons Learned

In-house Training Communicating



Scene of Educating
the Team
Supervisors



The actions conducted through the fifth S, Sustain, will build additional ownership and bring pride into the workplace. Results of the effort that show progress through photographs and measures should be posted in the communications area.



Roadmap steps



First Meeting: Kick off & Sort



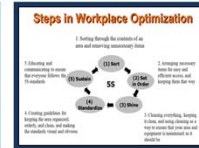
Third Meeting : Shine and Standardize.



Second Meeting : Set in Order



Fourth Meeting: Sustain



Kickoff of a 5S event is normally conducted following a normal workgroup meeting. Typical is a short introduction, a few slides to introduce Sort, and covering the ground rules for 5S tags and the holding area. This is followed with a 2 hour initial sort of the target area.

Between weekly Sort times, the 5S leader following the holding area guidelines, decides on actions to take on items within the store. Where necessary, the person who tagged the item and the workplace leader are consulted before an action is chosen.



Things Must Consider



Leadership Involvement



Holding Area



Tagging Items



Classifying Items



Communicating Results



Tagged items that are moved to the holding area should be logged in. The trigger to begin the second phase of 5S “Set in Order” is when there is a drop off in the number (or frequency) of items being logged into the holding area.

Holding area Location choice for the holding area is of critical importance. This should be located in a visible, high-traffic area so that it does not become the ‘forgotten dump’. By the reception area to the building, or in close proximity to the workplace leader’s office are both good choices. It should be in an open area, rather than behind closed doors in a room.



[5S Video Case Study:](#)



5S in Industrial Fabrication Workshop KOC: Before



5S in Industrial Fabrication Workshop KOC: After



5S in Industrial Fabrication Workshop KOC: Before



5S in Industrial Fabrication Workshop KOC: After





5S in Industrial Carpentry Shop KNPC: Before



5S in Industrial Carpentry Shop KNPC: After



5S in Industrial Carpentry Shop KNPC: Before



5S in Industrial Carpentry Shop KNPC: After





5S in Industrial Carpentry Shop KNPC: Before



5S in Industrial Carpentry Shop KNPC: After



5S in Industrial Carpentry Shop KNPC: Before



5S in Industrial Carpentry Shop KNPC: After





5S in Industrial Carpentry Shop KNPC: Before



5S in Industrial Carpentry Shop KNPC: After



5S in Industrial Fitting Shop , KOC: Before



5S in Industrial Fitting Shop , KOC: After





Live Example



Improve the workplace of Fitting and Pump Shop
Industrial Services Group, KOC in Ahmadi



The Internal Area of
Fitting & Pump Shop



This Project is a Best Sharing Practice
Between PIC and KOC

Project Leader: NBS Saud Khalifa AlMajedi
(Senior Maintenance Engineer)

Team Members:

Recipient Working Team Members From KOC

1. Khalid AlFozan – Manager Industrial Services
2. Khaled Al-Ajmi – Ag. Team Leader Central Workshop
3. Adnan AlQattan – Senior Foreman, Fitting Shop
4. Aulio Dias – Senior Foreman, Fitting Shop
5. Dioudado Bembe Jr. – Foreman, Fitting and Pump Shop

Donor Working Team Members From PIC

1. Ahmad Al Mulla – Manager Technical Service
2. Dr. Saud Kh. AlMajedi – Master Black Belt
3. Yussoph M. Capal – Maintenance Engineer

Process owner: Technical Service Manager KOC

Local Champion Recipient: Basam Al Houti

DOO (Major Projects & Tech Services) KOC

Local Champion Donor Leader: Abdullah Swailem

DOO (PIC, Fertilizer)

Master Black Belt: Anel Alawadi



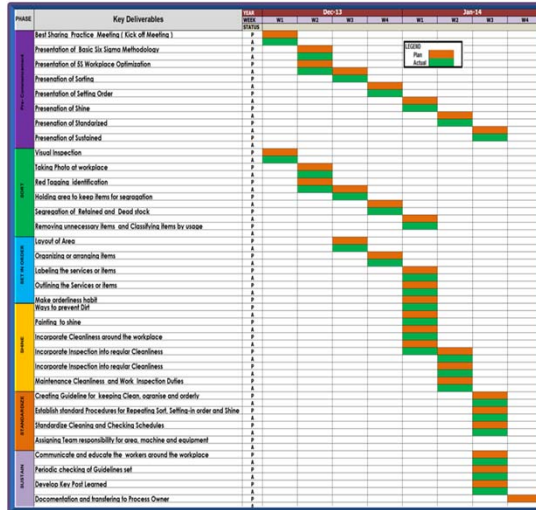
5S Project Requirement



Defect : Any area in workplace of Workshop- Fitting and Pump Shop, Industrial Services Group, KOC in Ahmadi not applied of 5S' Methodology.

Opportunity: Several years the workplace of Workshop- Fitting and Pump Shop, Industrial Services Group, KOC in Ahmadi is experiencing of lacking in workplace Environment performance ; and based on the Current Survey Percentage, 45 % is the standing rating status of said Workplace.

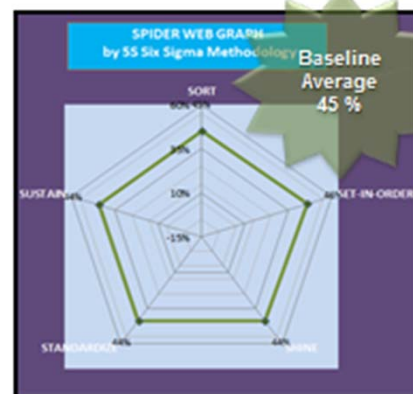
Objectives : Implement 5S methodology in the of workplace of Fitting and Pump Shop, Industrial Services Group, KOC in Ahmadi at best level performance operation with the desire to reach by 80 % rating.



Communication Plan

SR	Stakeholder	Communication Objective	Desired Stakeholder Response	What Does the Stakeholder Currently Know?	Current Stakeholder Attitude	Communication Channel/ Method	Frequency of Communication	Who Prepares and Delivers the Communication
1	Team Supervisors	To improve the Team Workplace and Maintaining as per 5S Methodology	Acceptance	To provide timely and good quality output as per their Service Order	Negative	Meeting	Weekly	Team Members
2	Workshop Foreman	To improve the Team Workplace and Maintaining as per 5S Methodology	Acceptance	To ensure the best in the world not in Fitting Shop - Central Workshop is as per Target	Negative	Meeting	Weekly	Team Members
3	Senior Engineer	To ensure the Best in the world not in Fitting Shop - Central Workshop is as per Target	Acceptance	To provide precise quality of work by scheduling accordingly with technical advice for production	Negative	Meeting	Weekly	Team Members
4	Original Inspection Engineer	To provide Technical inspection report in request of Service Order	Acceptance	To carry out inspection per regular requirement	Medium	Email	Weekly	IS-IBB
5	Six Sigma team members	To monitor and track the project outputs	To maintain collaboration for project	To keep active, monitor and feedback to project's task	positive	Meeting	Weekly	IS-IBB
6	Process owner	To support the project and ensuring to provide the project requirements	Need to improve	Need to improve	Positive	Email	As per request	IS-IBB
7	Local Champion Owner	To support the project and providing services need to stakeholder	Support project	To guide new project leaders	Positive	Email	As per request	IS-IBB
8	Maintenance Team leader	To provide support and ensuring all stakeholder complying as project requirements task	Support project	Current process	Positive	Meeting	As per request	IS-IBB
9	Master Black Belt	To provide more concept for effectiveness	Coaching and guidance	Current process	Positive	Meeting	As per request	IS-IBB

Baseline 5S percentage





5 Why Diagram

Root Causes Evaluation Summary

NO	Gap Description	Why	Why	Why
1	No labeling to Workshop Services	Only selected services have indication signs	No procedures to keep an indication	No procedure to keep an indication
2	Cleanliness not maintained in general area	Workshop Worker is not properly performing cleanliness	There is no standard policy procedure for cleaning	No procedure to keep an indication
3	Signboard not sufficient an emergency	Only no signboard in the area	Need to signboard in the area	No procedure to keep an indication
4	Equipment Stagnant in position	Fitting equipment is messy	Equipment not fixed as per ergonomics	No procedure to keep an indication
5	Steel Workshop not clean	No periodic cleaning	No ergonomics implemented	No procedure to keep an indication
6	Corrosion occurring at Workplace	Heavy corrosion and concrete structure coming damaged	No PM work order issued in this Workshop	No procedure to keep an indication
7	Useless of equipment	Some equipment is used at monthly basis	Some equipment is fixed permanently	No procedure to keep an indication
8	Cracking and Steel cleaning is making for the workshop	Cracking of Table is making the area bad	No area for sufficient cleaning	No procedure to keep an indication
9	Over production	Quantification for ordering is not clearly define	Produce evaluation is not obtained	No procedure to keep an indication
10	Concrete Floor damaged and no proper floor	Heavy steel structure is directly loaded to concrete surface	Without proper way for handling the material is damaged to concrete	No procedure to keep an indication
11	Equipment Stagnant in position	Workshop equipment is messy	Equipment not fixed as per ergonomics	No procedure to keep an indication
12	Unsafe structure in emergency	No proper location	No arrangement	No procedure to keep an indication
13	No workflow method practice	Lack of internal Workflow diagram	No develop Instruction procedures	No procedure to keep an indication
14	No weekly inspection for Accessibility	Operator claimed the area required	Duration of work not matching	Delay of work order record
15	No Weekly Safety Indication at some Workshop Services	No one possible suggestion	Team Supervision not performing well to this area	Area making mess and miserable
16	No proper Tagging Indication	Actual work is not match as per traditional standard procedure	The work requires of long duration	Quality work would be affected
17	Useless Tables	Useless Tables	Some Table make the area non ergonomic	Some Table do not contribute to spare frequency of work
18	Corrosion occurring at Workplace	corrosion and concrete structure coming damaged	No PM work order issued in this Workshop	No procedure to keep an indication
19	No New letter, slogan, board, poster banners, badge and indication	No internal procedure for information requirements	Negligence of improving	Work order requires of clearing to organizer
20	Statistical Services is not supported	Panel board, switch, outlet cable trap Regularly in position	Electric wire is everywhere, neither fixed at correct area, and etc.	No safety Check List
21	Contractor has no identified plan for contract scope	No one allocate a contractor area	Due to Short duration to every task that contractor is possible carry out the task temporarily	Engineer focuses the allocation through coordination of the Owner

S/N	Probable Root Cause	Verification Method	Validated?	What We Learned from Analyzing the Data	Contribution to Opportunity	What Action Will We Take?
1	Workplace Environment is not performed proper Cleanliness	Weekly Inspection	Yes	Cleanliness affecting the planning surroundings of workplace that make degrading the system operation of KOC-Fitting Shop	High	One Cleaner must be assigned and all area must provide a routine cleaning schedule of its area
2	Job Plan for Standby equipment for repair is not available. Ergonomics must standardly identified for Job Risk Assessment	Weekly Inspection	Yes	Some equipment is kept in the KOC-Fitting Shop, during duration due to the late delivery of spare parts and some produce (4m ² x 1m x 1m) is a big waste due to incorrect placement of Spare parts and material	High	Standby equipment must be assessed if all functional otherwise to be subject of scrap requirements
3	No New letter, slogan, board, poster banners, badge, border lining, shadowing and etc.	Weekly Inspection	Yes	Workplace like Fitting Shop, requires of sufficient m ² of m ² x m ² x m ² (m ² allocation message and segregation of properties identification	High	Reorganize the entire slogan, efficient signboards for a well guidelines and provide identification of property
4	Late Delivery of spare parts upon maintenance repair is required. And Duration of spare parts, Material etc. are not organized	Weekly Inspection	Yes	Any delay of spare parts increase maintenance cost and produce production	High	Monitoring schedule and coordinate required
5	Internal procedure of Fitting Shop, to its operation is not acceptable since last two years when PM not issued for allowing the Fitting Shop	Weekly Inspection	Yes	Workplace without proper management had failure to comply of work target and under danger to workers	High	Need to improve all the possible angles in order to ensure the its application is conforming to its working area operation through 5S application
6	Racks, modular structures, new structure, still press, equipment and etc. are improperly arrange and disorganized	Weekly Inspection	Yes	Mass workplace did not guarantee of clear vision in working cycle operation	High	preventive maintenance of structure as well as application of 5S methodology to spare parts showing non-compliance in
7	Internal procedure as per Ergonomics procedures for the Work flow of work is not available	Weekly Inspection	Yes	Work without procedure in working procedures made the workplace non conformant at its purpose	High	Training by Team experience to workers by ergonomics to sustain the operation to its improvement
8	Scheduling for Work Order relating for Fitting Shop participation is not contributing to its operation	Weekly Inspection	Yes	Scheduling by its duration without proper assessing the resources requirements make the plan fail	High	Clear scheduling to workplace activities are essential to make productive and acceptable quality operation



5S Six Sigma Methodology And Application

Implementation Plan



STEP #	SOLUTION AND DESIRED OUTCOME	WHO	PLAN	ACTUAL	TIME	COMMENTS
1	Meeting with the External Customer team	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
2	Assessment of Internal Customer Region	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
3	Data preparation	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
4	Photo to KOC-Fitting Shop	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
5	Campaign to inventory	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
6	In-house Education	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
7	Red Tagging implementation	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
8	Services Arrangement	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
9	Space reduction, reorganizing Workflow Detailed	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
10	Aesthetics Appearance	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
11	Drawing Preparation	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
12	Work order Creation	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
13	Planting the wall Floor	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
14	Crane Floor Cleaning	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
15	Removal of Empty point at steel structure	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
16	Rebuilding of roller ceiling	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
17	Construction of entrance cabinet	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
18	Renovation of Stream Cleaning area	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
19	Workshop Procedure Development	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
20	Electrical Services Arrangement	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
21	Tagging, Labeling, Checklist	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
22	Verification, Reorganization (KOC)	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
23	Handling procedures by Team	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
24	Store procedures	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
25	Sorter procedures	KOC	17-Dec-12	20-Dec-12	2	COMPLETED
26	Project Transfer to Owner	KOC	17-Dec-12	20-Dec-12	2	COMPLETED

Sort

Basic Sorting Procedures

- Sort through the contents of an area and removing unnecessary items
- Results in
 - * Less 'clutter'
 - * Simplification
 - * Shorter time to locate items

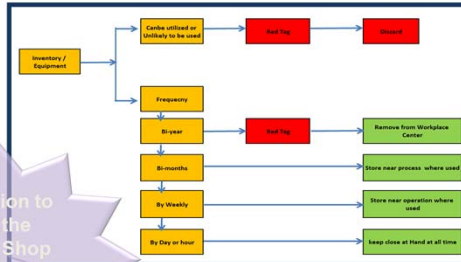
First Action

- Examine the workplace to identify items that are not needed
- Take "before" pictures
- 5S tag items
- Take items to the holding area
- If unclear whether an item is needed or not, tag with a different color and segregate
- Classify tagged items by usage (Tagging Strategy)

While tagging items, ask the following questions:

- Is it needed?
- Is it needed in this quantity?
- How frequently is it used?
- Should it be located here?
- Who is ultimately responsible for the item? (verify with them)
- Are there any other non-necessary items cluttering the workplace?
- Are there tools, materials, other items on the floor?

Red Tagging Workflow



Reflection to Sort the Fitting Shop Spare, parts, tools and Material



Set in Order

Basic Setting in Order Procedures

- Ensure only necessary items are in the workplace
- Decide what items to place where
- Use 5-whys; frequency of use
- Take 'before' photographs
- Place needed items so they can be retrieved quickly and with minimal walking
- Tell others about location of items
- Outline locations of equipment, supplies, safety zones, etc
- Identify all needed items with labels
- Take 'after' photographs
- Take color coding to identify clearly
- Evaluate progress

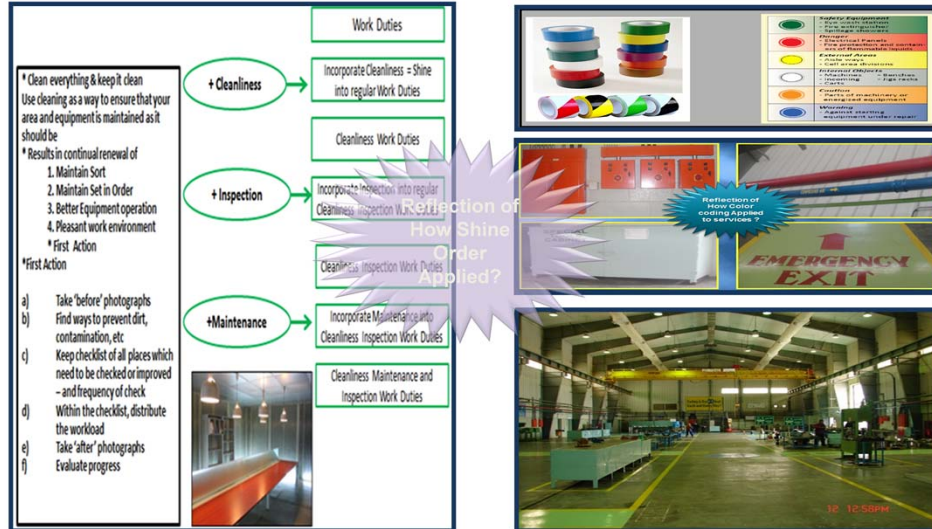
Reflection of How Set in Order Applied?

Tools and Spare parts





Color Coding



Standard Procedures of Fitting & Pump Shop

- a) Take 'before' photographs
- b) Check the first 3 S's are implemented
 - 1. Sort
 - 2. Set in Order
 - 3. Shine
- c) Establish standards & frequency for repeating the first 3 S's
- d) Create/modify procedures/forms to better fit your workplace needs
- e) Assign individual responsibilities for areas/machines/inspections
- f) Check/Evaluate with senior leadership
- g) Provide positively reinforcing feedback
- h) Take 'after' photographs





In-house Training Communicating

- ## Scene of Educating the Team Supervisors



Control Plan

23

Appendix 1

Kaizen Event – Case Study

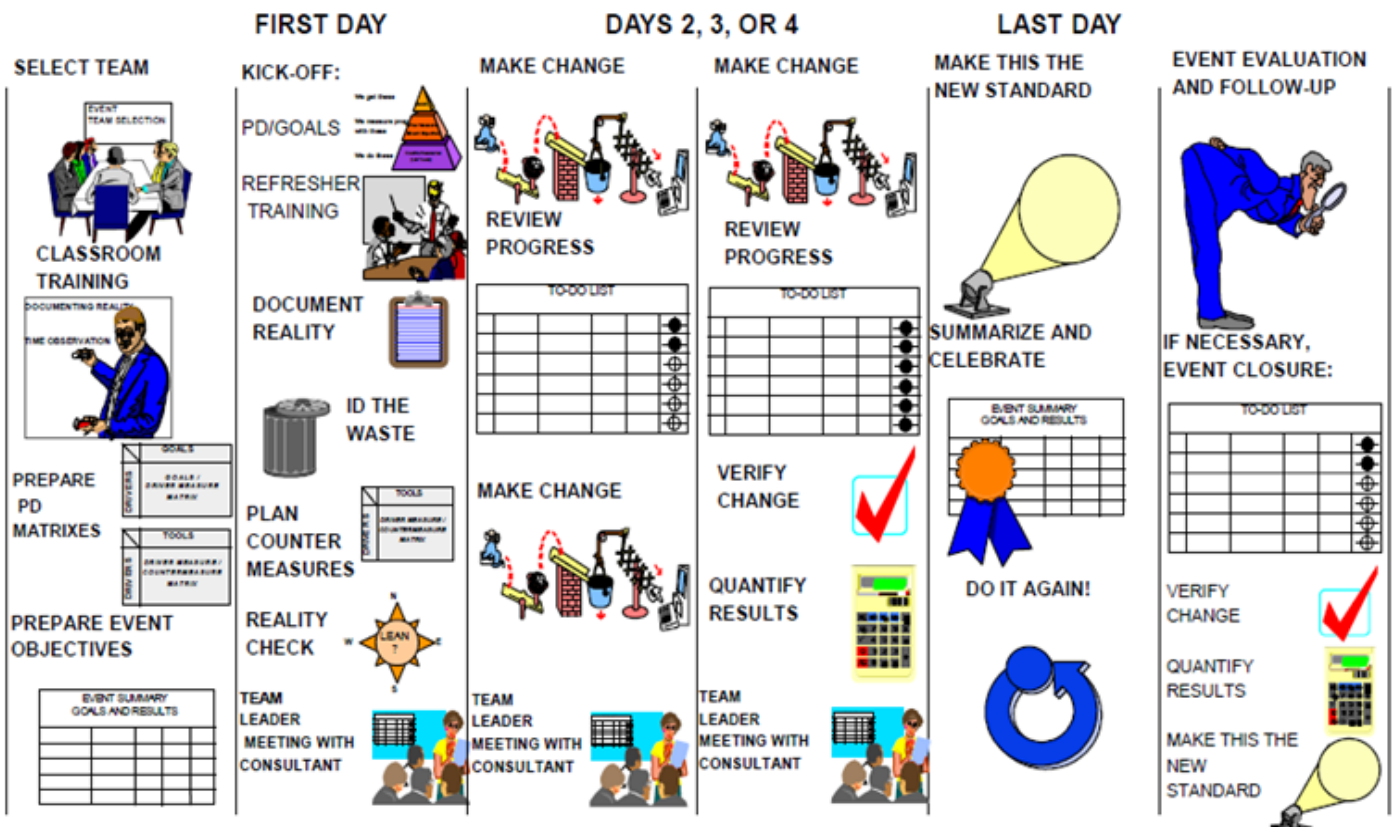
By: Mahdi Alajmi



PREWORK

EVENT WEEK

POST EVENT



Kaizen Concept

Lean Six Sigma

PIC

Nov, 2014



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PETROCHEMICAL
INDUSTRIES COMPANY K.S.C.
إحدى شركات مؤسسة البترول الكويتية
A Subsidiary of Kuwait Petroleum Corporation

By: BB Mahdi Alajmi



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Agenda



- What is Kaizen ?
- How does Kaizen work ?
- Benefits of Kaizen
- 1st PIC Kaizen Event
- Workshop Results
- Achievements
- Way Forward

改善
Kaizen



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What is Kaizen ?



Kaizen is a Japanese term meaning "change for the better".

改

Kanji character for "Kai"/ "Gai"
CHANGE

善

Kanji character for "Zen"/ "Shan"
GOOD / BETTER



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Definition of 'Kaizen'



Kaizen is a Japanese concept of continuous improvement designed for enhancing processes , reducing waste and eliminate the non – adding value steps.

The concept of Kaizen encompasses a wide range of ideas: it involves making the work environment more efficient and effective by creating a team atmosphere, improving everyday procedures, ensuring employee satisfaction and making a job more fulfilling, less tiring and safer.





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Ministry of Health - Saudi Arabia

Kaizen Principles



- ✓ Get rid of old assumptions
- ✓ Look for ways to make things happen
- ✓ It does not cost money to do Kaizen
- ✓ If something is wrong, fix it on the spot
- ✓ Look for wisdom from ten people rather than one
- ✓ Never stop doing Kaizen

A Kaizen event is a great opportunity to test some of those ideas you've been too busy to try



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Keys to Success



- How to Guarantee Success at Your Kaizen Event:
 - ✓ Create a Cross-Functional Team and Involve Employees
 - ✓ Plan Your Event in Advance
 - ✓ Spend More Time on the Floor than in the Classroom
 - ✓ Implement the Plan, Do, Check, Act/Adjust (PDCA)
 - ✓ Stay Focused on the Event





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Benefits of Kaizen Philosophy



- Continual small improvements add up to major benefits:

- ✓ Improved productivity
- ✓ Improved quality
- ✓ Better safety
- ✓ Faster delivery
- ✓ Lower cost
- ✓ Greater customer satisfaction



Kaizen events help organizations think long-term rather than short term



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5 Things to Avoid



During a Kaizen Activities 5 things to avoid:

1. Failing to Define Critical Success Factors

2. Striving for Perfection

- ✓ Accept the fact that the event won't go perfect, and simply try to make it as good as possible.

3. Lack of Follow Through

- ✓ Regular follow ups with both the management team and the front line employees to ensure everything which was learned, was used on a regular basis.

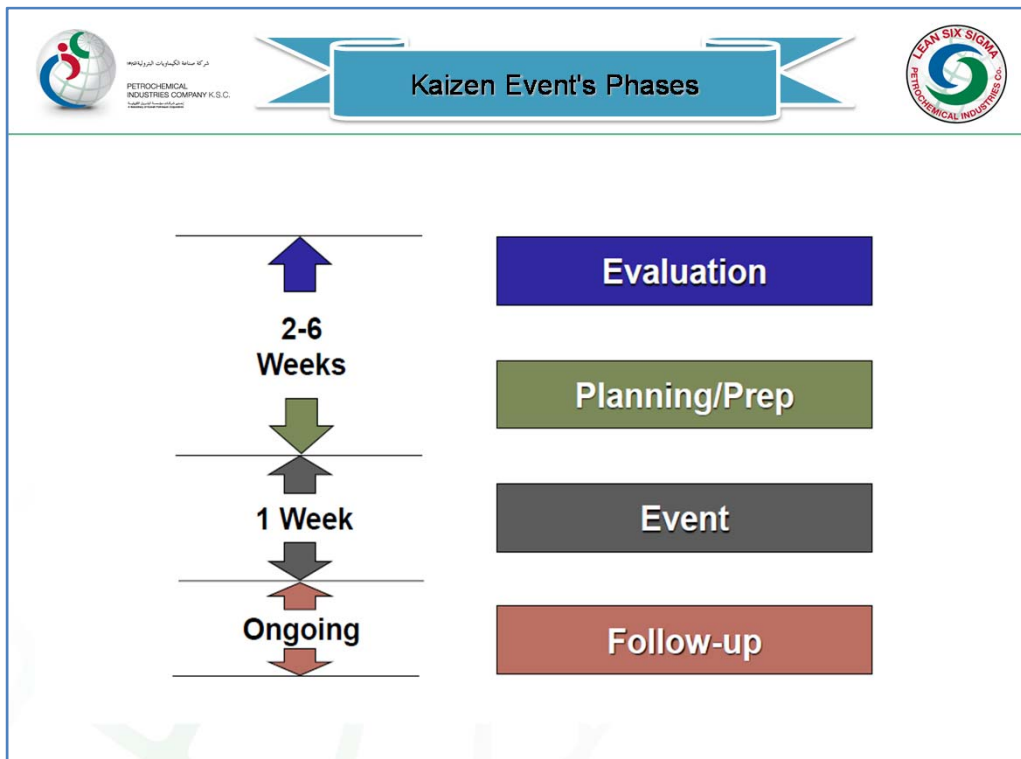
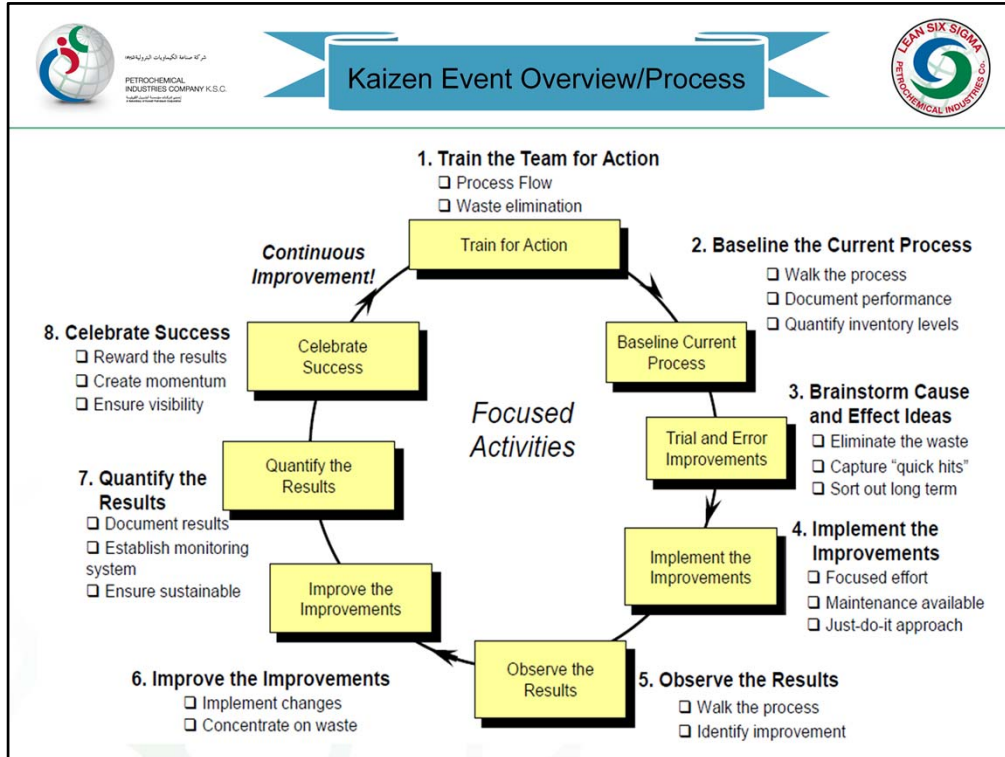
4. Lack of Management Commitment

- ✓ Make sure the management team is fully buy-in.

5. Celebrate Success

- ✓ Otherwise they will fall back into old ways of doing things.







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Ministry of Health

Kaizen Event Activities



PREWORK

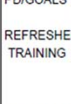
SELECT TEAM



FIRST DAY

KICK-OFF:

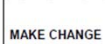
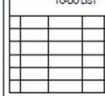
PD/GOALS



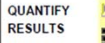
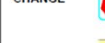
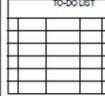
EVENT WEEK

DAYS 2, 3, OR 4

MAKE CHANGE

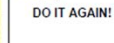
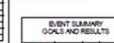
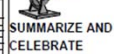
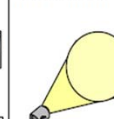


MAKE CHANGE



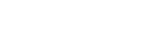
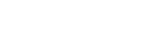
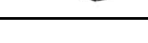
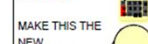
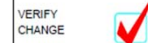
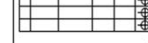
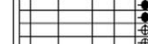
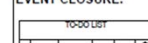
LAST DAY

MAKE THIS THE NEW STANDARD



POST EVENT

EVENT EVALUATION AND FOLLOW-UP









Kaizen Event Team



- **Kaizen Event: Streamline Purchasing Process (PR – GRN)**
- **Sponsor : DMD Fertilizer**
- **Process owners: Sami Hamadah (Commercial Manager)**
- **Coordinator: Mahdi Alajmi**
- **Team members:**
 1. Nasser Almutairi
 2. Salim Alghadban
 3. Nader Alotaibi
 4. Homoud Alenazi
 5. Mahmoud Abdulrahim
 6. Yousef Alsasal
 7. Faiq Alomair
 8. Yousef Alomani





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Kaizen Event Charter



➤ Opportunity

a six sigma project targeting purchasing process from PR to PO was successfully completed last year, reducing cycle-time from 60 to 30 days. The entire purchasing cycle (PR to GRN) takes an average of **112 days**.



➤ Goals

- Reduce non-added value steps in process.
- Reduce waiting Time throughout process.
- Reduce cycle time to **45 days**.



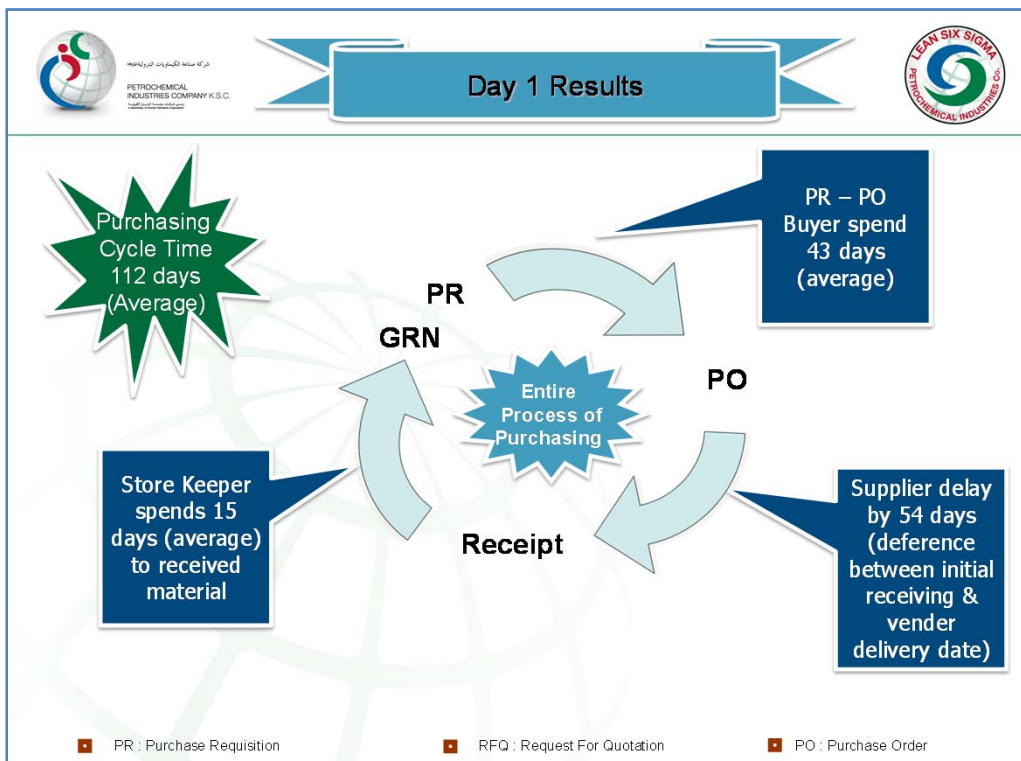
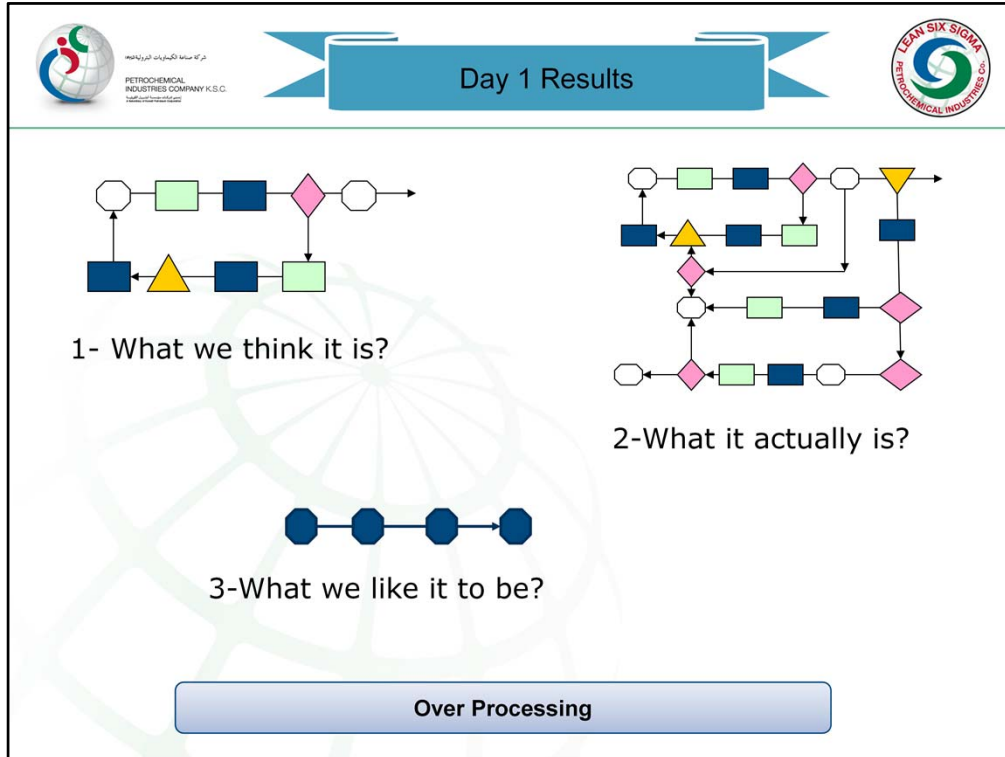
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Day 1 Results



- Kaizen Training
- Flowcharting techniques Training
- Developed existing Process Map “ Map things as they are”
- Measure current performance







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Day 1 Results



➤ Current issues:

1. Over processing (Many stages)
2. Delay in approvals
3. Duplicate approvals
4. Lack of follow – up
5. Lack of communication
6. Delay in material clearance
7. Delay in delivery time



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Day 2 Results



- Identified Value Added
- Developed Ideal Future Process Map
- Brainstorming for Issues
- Developed Solution List



- Developed Targets & Goals (Cycle Times)
- Established Owners of Sub-Processes
- Evaluated & Prioritized Solutions
- Developed Implementation Action Plan
- Prepared & Presented Final Report



PIC's Kaizen Achievements





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Achievements



- Deeper knowledge and understanding of the process
- Increased ownership and accountability of Procurement process
- Expectations and Goals clearly
- Developed Implementation Action Plan
- Prepared & Presented Final Report

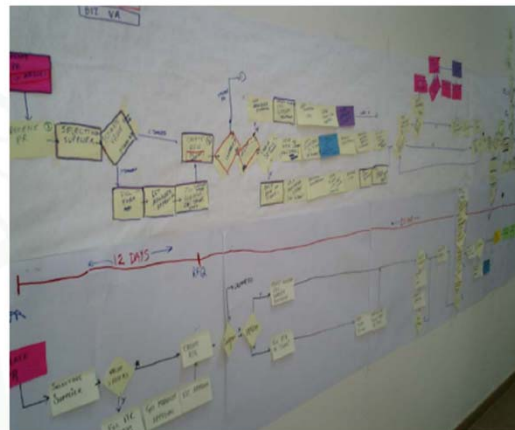
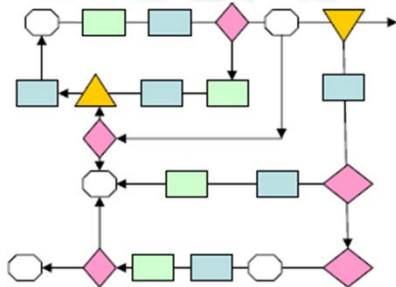


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Achievements



- Current and Future Process maps Identified.



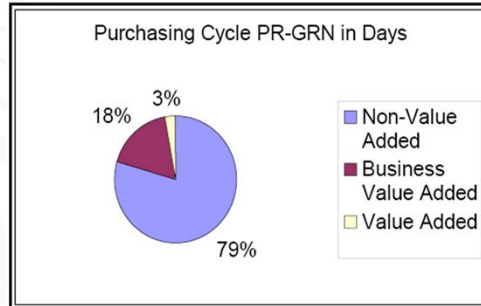


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Achievements



- Current Value Added & Non-value added steps Identified
- Process Reduced from **117** to **36** steps



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Achievements



- **49** solutions were agreed upon by Team
- Impact/Effect Matrix was used to prioritize Improvements/solutions





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Achievements



➤ Action plan created for list of solutions

- Action, Owners, and completion dates agreed upon
- 40 Solutions to be completed by 31-Jul (60 day Plan)
- 9 Solutions to be completed by 30-Sep (90 day Plan)



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Achievements



- **Procurement Cycle Time reduced from 112 to 55 days**
(50 % Cycle Time Reduction)
- **Sub-Process Owners identified**





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Achievements



- Put in controls to sustain gains

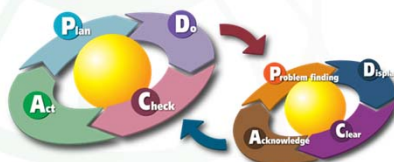


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Sample from Action Plan



Process	Issue/opportunity	Solution	Action	Impact	Efforts	Owner	Completion Date
PO-GRN	Delivery of material is done in Oracle (not maximo)	Technical solution required to link maximo GRN & Oracle. (BI7P)	IT system enhancement	Medium	Medium	Manager	30-Sep-09
	Supplier delays compared to promised date	Include penalties for orders that are later than promised delivery date.	Charter	High	Low	Manager	31-Jul-09
	suppliers changes in invoice create problems (Invoice value not matching with PO value)	Do not accept any extra charges. Communicate expectation to supplier when issuing PO	Change Policy / communicate	High	Low	Manager	31-Jul-09
	Gate pass process is contributing to delays	Have one transport company make deliveries shualba, thereby have yearly gate pass.	Charter	High	Low	Team Leader	30-Sep-09
	Supplier some times sends the wrong material	Penalize suppliers for not sending correct items (or Broken items)	Change Policy / charter	High	Low	Team Leader	31-Jul-09
	Adds to delivery times	Add shipment time for Ex-works orders 2 week Air Freight 45 Days sea freight 5 Days DHL Establish LC & advance payments in advance to issuing PO.	Change Policy / communicate	Medium	Medium	Team Leader	31-Jul-09
	Long approval times	Hardcopies of POs must be signed same day	Change Policy / communicate	High	Low	Manager	31-Jul-09





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شركة صناعة الكيماويات البترولية

Six Sigma Projects Opportunity



- Reduce cycle time from RFQ to quotation receipt from suppliers.
- Minimize dealings with distributors (Agents add extra layer and more time for quotation)
- Improve existing tracking system to track order deliveries.
- Improve quarterly supplier evaluation.
- Improve the annual communication plan with suppliers (Need to develop relationships)
- Reduce variation between vendor promise dates and actual delivery date.
- Reduce Demurrages & clearance time for imports to Kuwait.
- Improve payment Cycle time to our vendors.

And 10 more Implement (just Do it)



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Way Forward



- Follow-up Sessions:
 - Early August
 - Early October
- Review progress and follow up on Implementation Plan
- Review procurement cycle time improvements





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Questions...



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Thank you

