UNIT-II
TQM Principles

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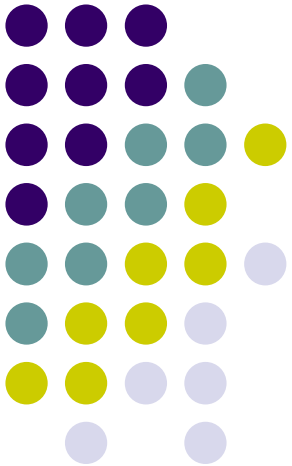
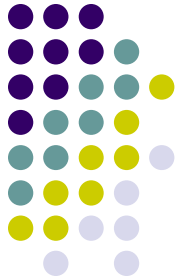
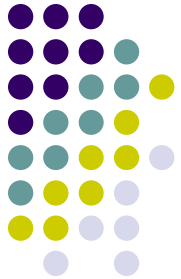


Organization Design and Structure



- Organization design
  - A process in which managers develop or change their organization's structure
- Work specialization
  - A component of organization structure that involves having each discrete step of a job done by a different individual rather than having one individual do the whole job

Organizational Structure: Control

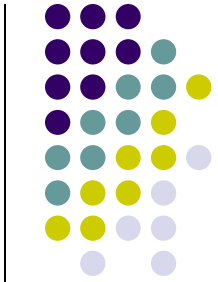


- Chain of command
  - The management principle that no person should report to more than one boss
- Span of control
  - The number of subordinates a manager can direct efficiently and effectively

Organizational Structure: Control (cont'd)

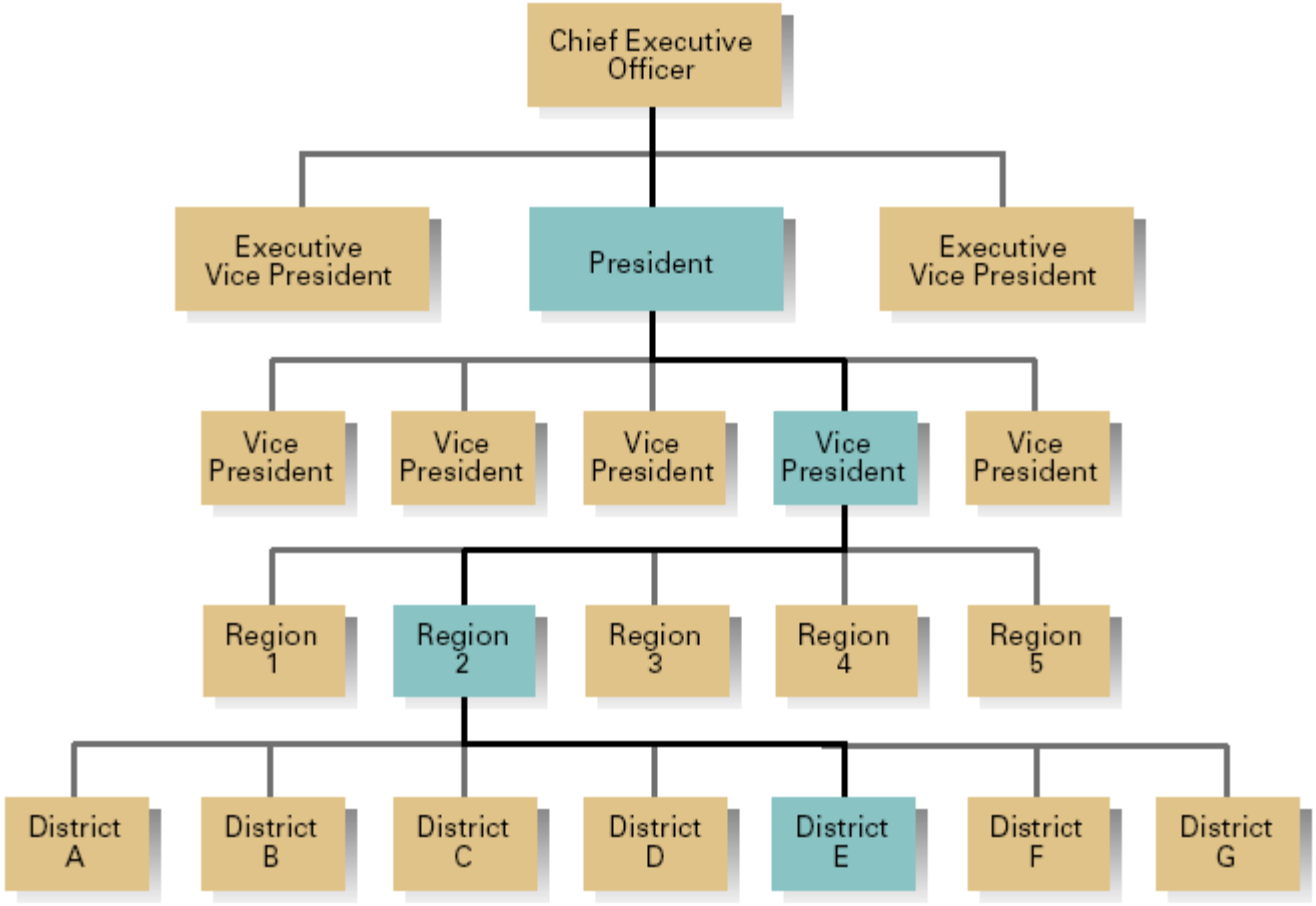
- Authority
  - The rights inherent in a managerial position to give orders and expect them to be obeyed
- Power
  - An individual's capacity to influence decisions
- Responsibility
  - An obligation to perform assigned activities

Types of Organizational Authority

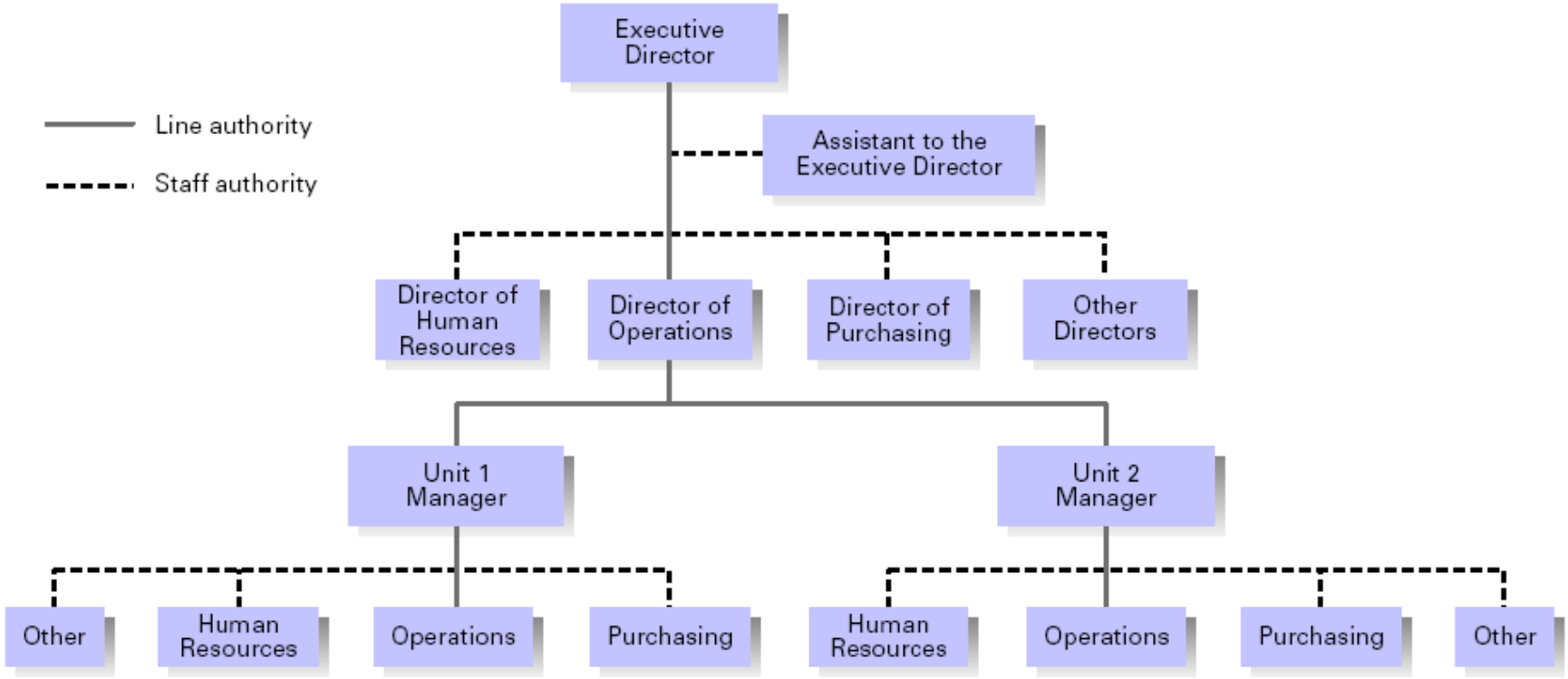


- Line authority
  - The position authority (given and defined by the organization) that entitles a manager to direct the work of operative employees
- Staff authority
  - Positions that have some authority (e.g., organization policy enforcement) but that are created to support, assist, and advise the holders of line authority

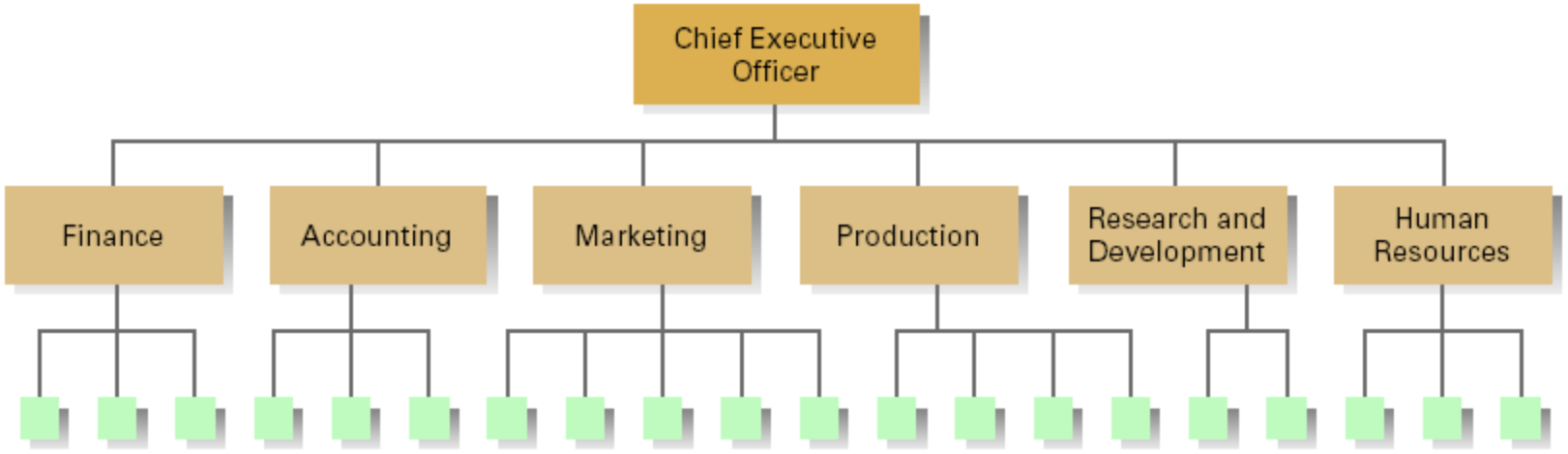
Chain of Command



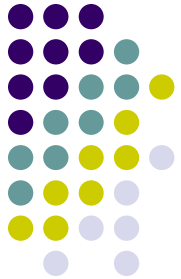
Line Versus Staff Authority



Authority Versus Power



Centralization And Decentralization

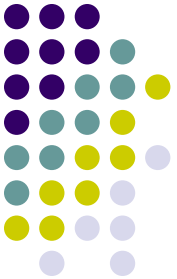


- Centralization
  - A function of how much decision-making authority is pushed down to lower levels in an organization; the more centralized an organization, the higher the level at which decisions are made
- Decentralization
  - The pushing down of decision-making authority to the lowest levels of an organization

Types of Power

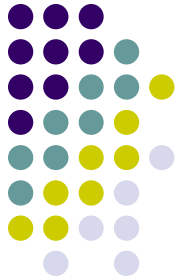
Coercive power	**Power based on fear.**
Reward power	**Power based on the ability to distribute something that others value.**
Legitimate power	**Power based on one's position in the formal hierarchy.**
Expert power	**Power based on one's expertise, special skill, or knowledge.**
Referent power	**Power based on identification with a person who has desirable resources or personal traits.**

Departmentalization



- **Functional departmentalization**
  - **The grouping of activities by functions performed**
- **Product departmentalization**
  - **The grouping of activities by product produced**
- **Customer departmentalization**
  - **The grouping of activities by common customers**
- **Geographic departmentalization**
  - **The grouping of activities by territory**
- **Process departmentalization**
  - **The grouping of activities by work or customer flow**

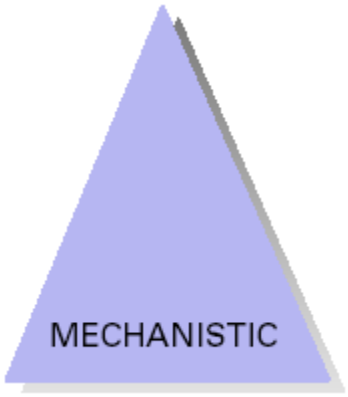
Mechanistic and Organic Organizations



- Mechanistic organization
  - The bureaucracy; a structure that is high in specialization, formalization, and centralization
- Organic organization
  - An adhocracy; a structure that is low in specialization, formalization, and centralization

Structure follows strategy

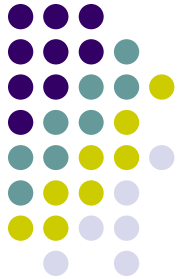
Mechanistic versus Organic Organizations



- Rigid hierarchical relationships
- Fixed duties
- Many rules
- Formalized communication channels
- Centralized decision authority
- Taller structures

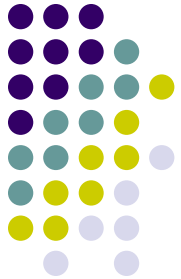
- Collaboration (both vertical and horizontal)
- Adaptable duties
- Few rules
- Informal communication
- Decentralized decision authority
- Flatter structures

Technology and Structure



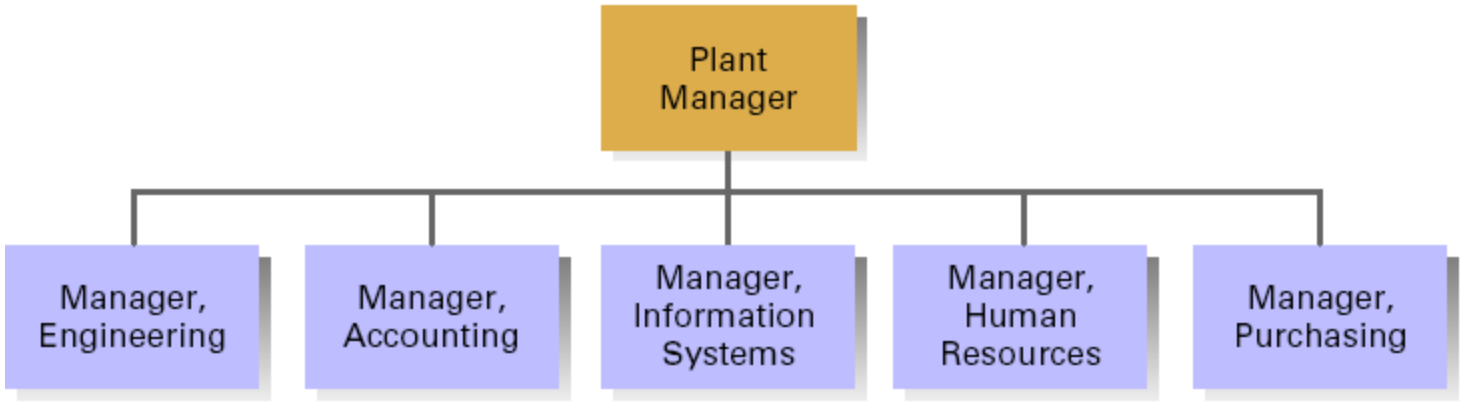
- Unit production
  - Production in terms of units or small batches
- Mass production
  - Production in terms of large batch manufacturing
- Process production
  - Production in terms of continuous processing

Organization Design Applications

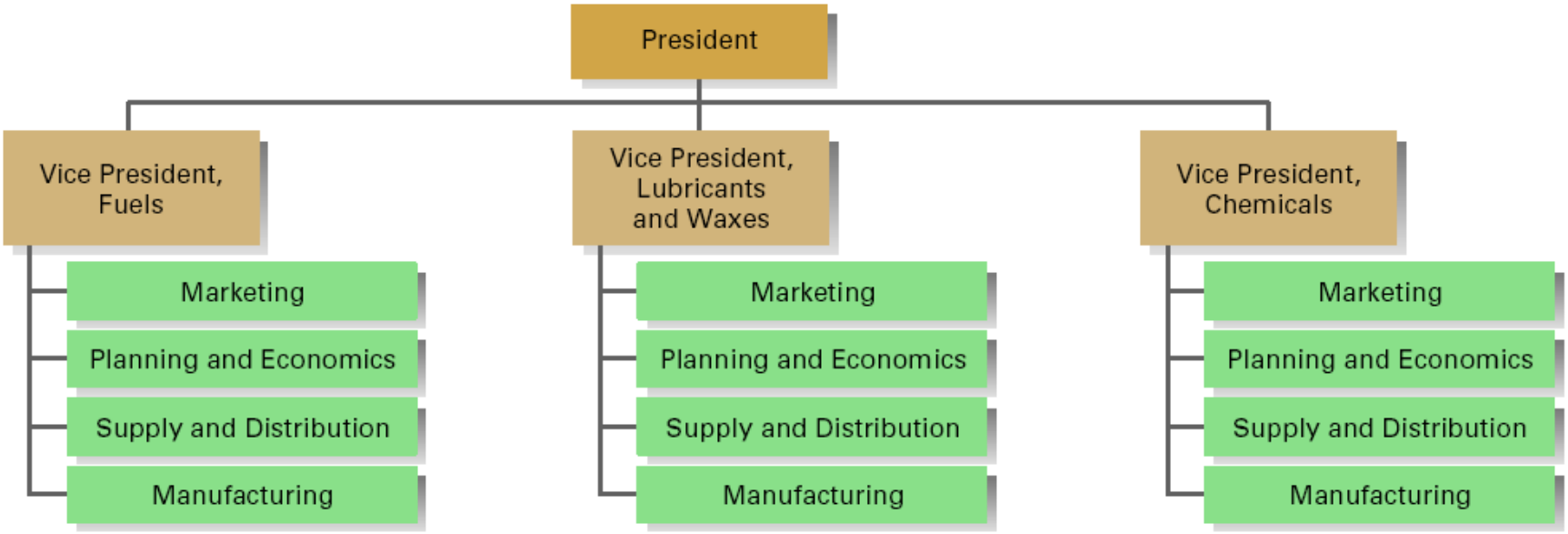


- Simple structure
  - An organization that is low in specialization and formalization but high in centralization
- Functional structure
  - An organization in which similar and related occupational specialties are grouped together
- Divisional structure
  - An organization made up of self-contained units

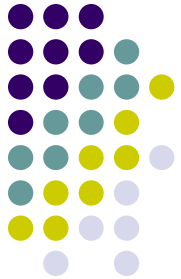
Functional Structure



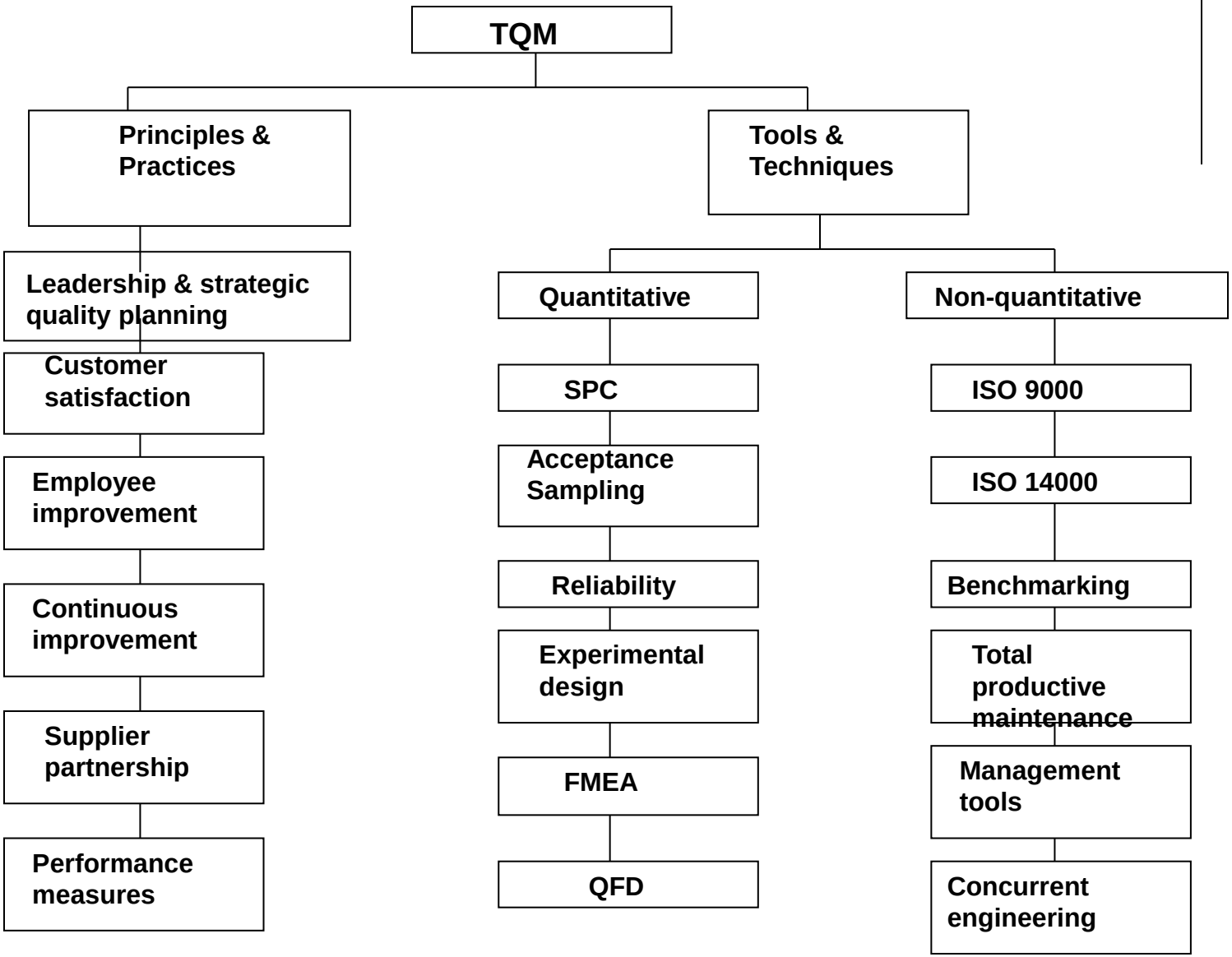
Divisional Structure



Other Organizational Structures

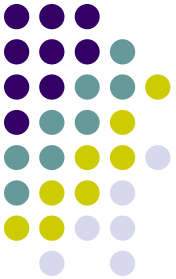


- Matrix structure
  - An organization in which specialists from functional departments are assigned to work on one or more projects led by a project manager
- Team-based structure
  - An organization that consists entirely of work groups or teams
- Boundaryless organization
  - An organization that is not defined or limited by boundaries or categories imposed by traditional structures



Scope of the TQM activity

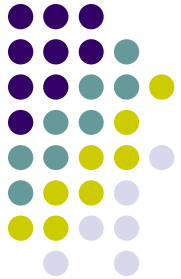
TQM Six Basic Concepts



1. Leadership
2. Customer Satisfaction
3. Employee Involvement
4. Continuous Process Improvement
5. Supplier Partnership
6. Performance Measures

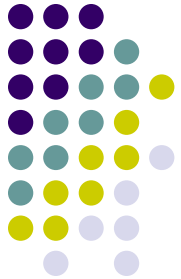
(All these present an excellent way to run a business)

1. Leadership



- Top management must realize importance of quality
- Quality is responsibility of everybody, but ultimate responsibility is CEO
- Involvement and commitment to CQI
- Quality excellence becomes part of business strategy
- Lead in the implementation process

Characteristics of Successful Leaders

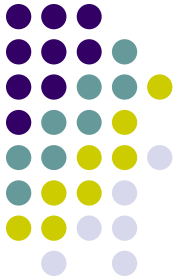


1. Give attention to external and internal customers
2. Empower, not control subordinates. Provide resources, training, and work environment to help them do their jobs
3. Emphasize improvement rather than maintenance
4. Emphasize prevention
5. Encourage collaboration rather than competition
6. Train and coach, not direct and supervise
7. Learn from problems – opportunity for improvement
8. Continually try to improve communications
9. Continually demonstrate commitment to quality
10. Choose suppliers on the basis of quality, not price
11. Establish organisational systems that supports quality efforts

Implementation Process

- Must begin from top management, most important CEO commitment
- Cannot be delegated (indifference, lack of involvement cited as principle reason for failure)
- Top/senior management must be educated on TQM philosophy and concepts, also visit successful companies, read books, articles, attend seminars
- Timing of implementation – is the org ready, re-organization, change in senior personnel, current crisis – then need to postpone to favourable time
- Need a roadmap/framework for implementation
- Formation of Quality Council – policies, strategies, programmes

Implementation Process



Quality council job–

1. Develop core values, vision statement, mission statement, and quality policy statement
2. Develop strategic long-term plan with goals and annual quality improvement program with objectives
3. Create total education and training plan
4. Determine and continually monitor cost of poor quality
5. Determine performance measures for the organization, approve them for functional areas, and monitor them.
6. Continually determine projects that improve processes, particularly those affect external and internal customer satisfaction
7. Establish multifunctional project and departmental or work group teams and monitor progress
8. Establish or revise the recognition and reward system to account new way of doing business. Must begin from top management, most important CEO commitment

Implementation Process

Core values

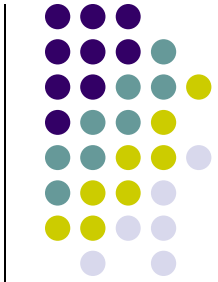
- foster TQM behaviour and define the culture

- need to develop own values

Examples from Malcolm Baldrige National Quality Award

1. Customer-driven excellence
2. Visionary leadership
3. Organizational and personal learning
4. Valuing employees and partners
5. Agility
6. Management for innovation
7. Management by fact
8. Systems perspective
9. Social responsibility
10. Focus results and creating value

Strategic Planning



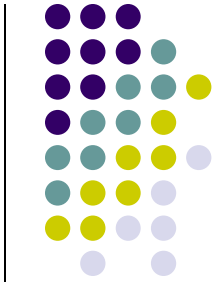
- ***Strategic Planning*** is a deliberate process used by organizations to develop a mission, vision, guiding values, strategic objectives, and specific strategies for achieving the objectives.

- Strategic business planning is similar to strategic quality planning.

7 steps to strategic planning

1. Customer needs
2. Customer positioning
3. Predict the future
4. Gap analysis
5. Closing the gap
6. Alignment
7. Implementation

TQM - Strategy Approach



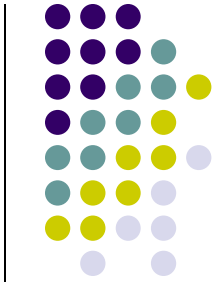
- an approach to improving the competitiveness, effectiveness and flexibility of a whole organisation..... a way of planning, organising and understanding each activity and it depends on each individual at each level. TQM is a way of ..... bringing everyone into the processes of improvement (**Oakland 1995)**

- a TQM programme promotes "quality" as a strategic imperative. Comprehensive TQM programme requires re-evaluation how organisational members address the quality of their work and production /service processes.

Strategic Quality Goals and Objectives

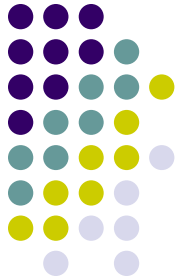
- Goals must be focused
- Goals must be concrete
- Goals must be based on statistical evidence
- Goals must have a plan or method with resources
- Goals must have a time-frame
- Goals must be challenging yet achievable

2.Customer Satisfaction



- Customer is always right – in Japan customer is “King”
- Customer expectations constantly changing – 10 years ago acceptable, now not any more!
- Delighting customers (Kano Model)
- Satisfaction is a function of total experience with organization
- Must give customers a quality product or service, reasonable price, on-time delivery, and outstanding service
- Need to continually examine the quality systems and practices to be responsive to ever – changing needs, requirements and expectations – Retain and Win new customers

Issues for customer satisfaction



Checklist for both internal and external customers

1. Who are my customers?
2. What do they need?
3. What are their measures and expectations?
4. Does my product/service exceed their expectations?
5. How do I satisfy their needs?
6. What corrective action is necessary?

Customer Feedback

To focus on customer, an effective feedback program is necessary, objectives of program are to:

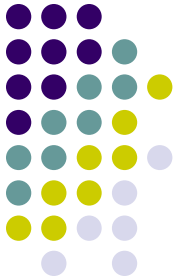
1. Discover customer dissatisfaction
2. Discover priorities of quality, price, delivery
3. Compare performance with competitors
4. Identify customer’s needs
5. Determine opportunities for improvement

Customer Feedback Tools/Method

- Warranty cards/Questionnaire
- Telephone/Mail Surveys
- Focus Groups
- Customer Complaints
- Customer Satisfaction Index

Good experience are told to 6 people while bad experience are repeated to 15 people

3. Employee Involvement



- People – most important resource/asset
- Quality comes from people
- Deming – 15% operator errors, 85% management system
- Project teams – Quality Control Circles (QCC), QIT
- Education and training – life long, continuous both knowledge and skills
- Suggestion schemes; Kaizen, 5S teams
- Motivational programmes, incentive schemes
- Conducive work culture, right attitude, commitment

Quality circles

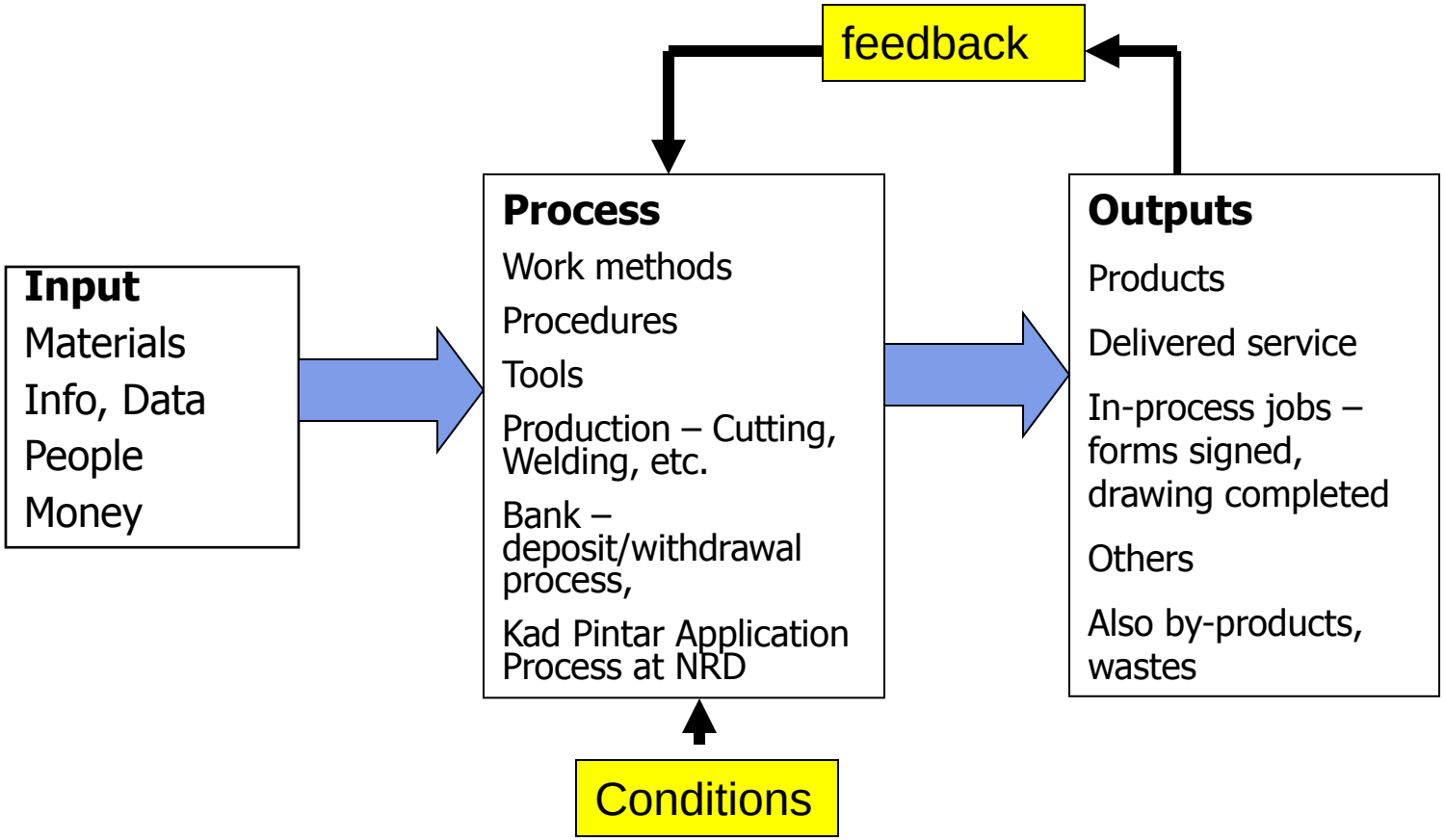
- *Teams of workers and supervisors* that meet regularly to address work-related problems involving quality and productivity.
- Developed by *Kaoru Ishikawa* at University of Tokyo.
- Became immediately popular in Japan as well as USA.
- *Lockheed Missiles and Space Division* was the leader in implementing Quality circles in USA in 1973 (after their visit to Japan to study the same).
- Typically *small day-to-day problems* are given to quality circles. Since workers are most familiar with the routine tasks, they are asked to identify, analyze and solve quality problems in the routine processes.

4.Continuous Process Improvement

- View all work as process – production and business
- Process – purchasing, design, invoicing, etc.
- Inputs – PROCESS – outputs
- Process improvement – increased customer satisfaction
- Improvement – 5 ways; Reduce resources, Reduce errors, Meet expectations of downstream customers, Make process safer, make process more satisfying to the person doing

Continuous Improvement

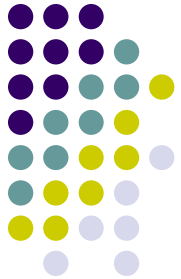
Inputs – processing – outputs



Problem – Solving Method

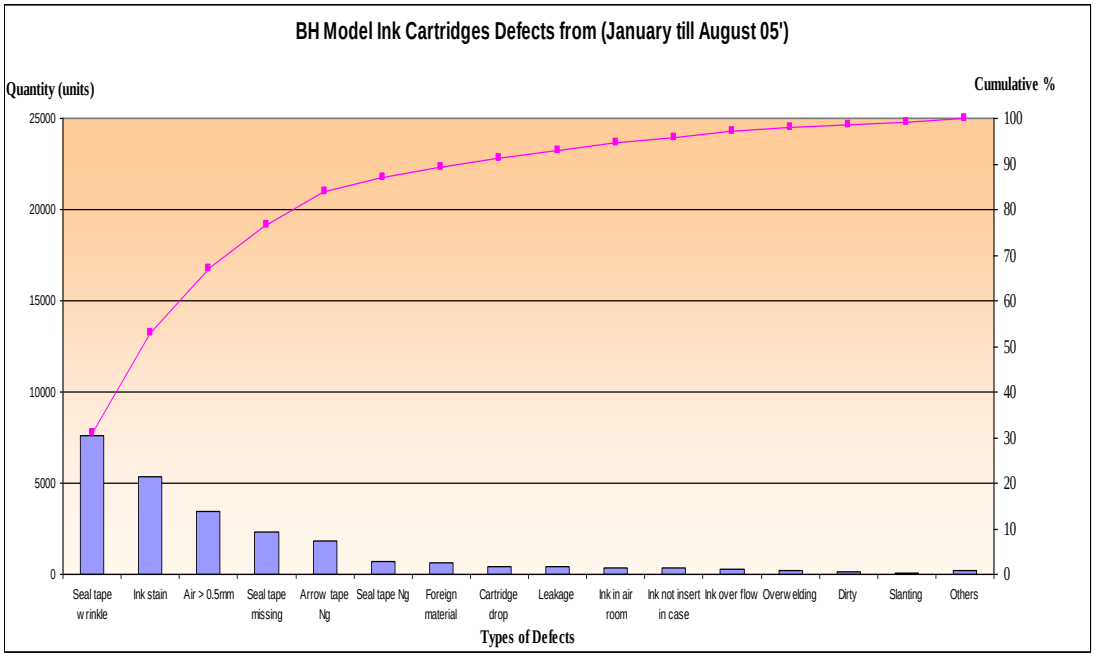
- Identify the opportunity (for improvement)
- Analyze the current process
- Develop the optimal solution(s)
- Implement changes
- Study the results
- Standardize the solution
- Plan for the future

Identify the opportunity (for improvement)

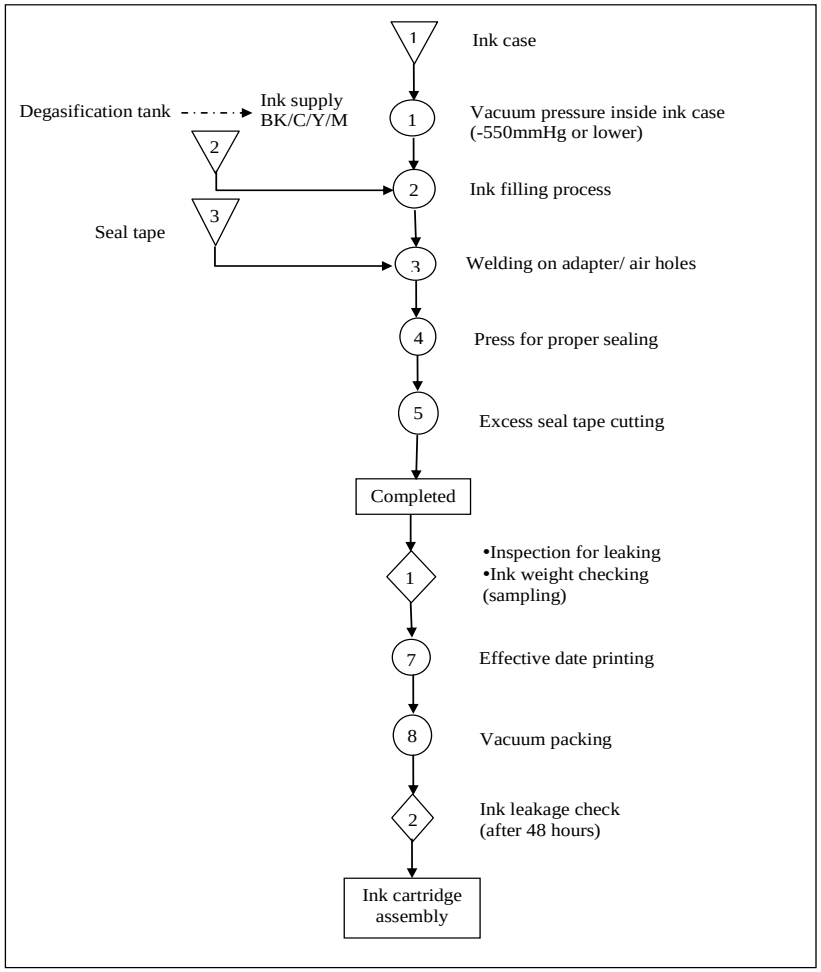


- Phase 1 – Identify problems
- Use Pareto Analysis – external & internal failures, returns
- Phase 2 – Form a team (same function of multifunctional)
- Phase 3 – Define scope of problem (Paint process – data collected for a week showed high 30% ‘runs’ defect)

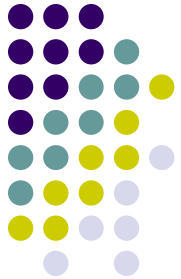
Pareto Diagram Example



Process Flow Chart – Ink filling process



Analyze the current process



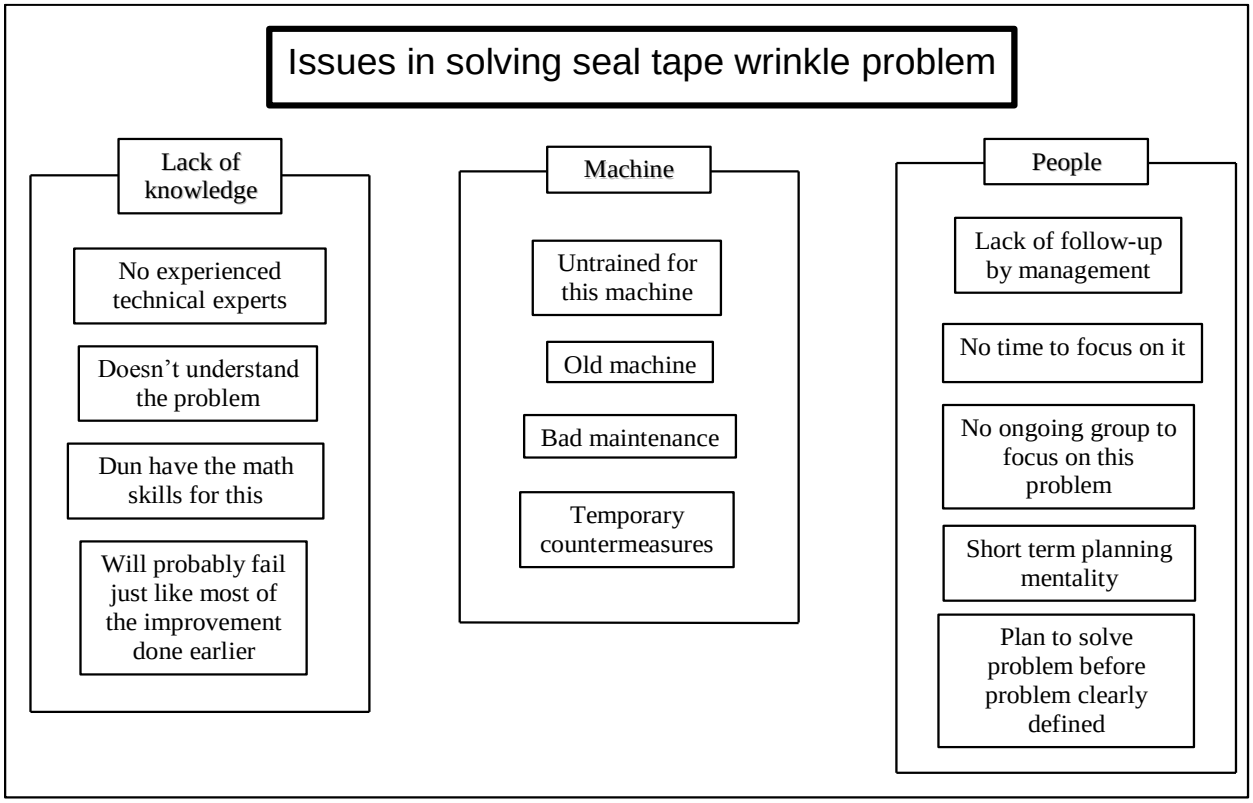
- Understand the current process, how it is performed
- Develop process flow diagram
- Define target performance
- Collect data, information
- Determine causes not solution (use cause and effect diagram)
- Root cause if possible

PROCESS MAPPING

Project Title: Reduce Seal Tape Wrinkle Defect To Increase Sigma
Model: BH Model Ink Cartridges
Process: Ink Filling

No	Input	Processes	Output
1	Ink case (INCOMING)	PROCESS #1	
	~ Pressure inside ink case ~ Jig & clamping conditions ~ Loading & handling method ~ Machine condition ~ Pallet accuracy	Vacuum pressure inside ink case to (-550mmHg or lower)	~ Vacuum pressure under control (Pressure gauge) ~ No misallignment
2	Ink case (AFTER #1)	PROCESS #2	
	~ Parts after #1 process ~ Jig & clamping condition ~ Machine condition (Selfeeder) ~ Ink filling head condition ~ Ink filling volume	Ink filling process	~ No overflow of ink ~ Adequate volume of ink ~ Electronic Scale (M3-31-010) ok
3	Ink case (AFTER #2)	PROCESS #3	
	~ Part after #2 process ~ Jig & clamping conditions ~ Loading & handling method ~ Machine condition (Selfeeder) ~ Temperatue of seal tape heater	Seal tape welding on adapter/ air holes	~ Every line: 215±10°C ~ No misallignment
4	Ink case (AFTER #3)	PROCESS #4	
	~ Part after #2 process ~ Jig & clamping conditions ~ Spring counterbalance ~ Machine condition ~ Seal plate allignment	Press for proper sealing	~ Proper sealing ~ No misallignment
5	Ink case (AFTER #4)	PROCESS #5	
	~ Parts after #3 process ~ Jig & clamping condition ~ Loading & handling method ~ Machine condition (Selfeeder) ~ Cutter condition	Excess seal tape cutting	~ No dented / scratches/ overcut ~ No left over burr

Affinity diagram Example

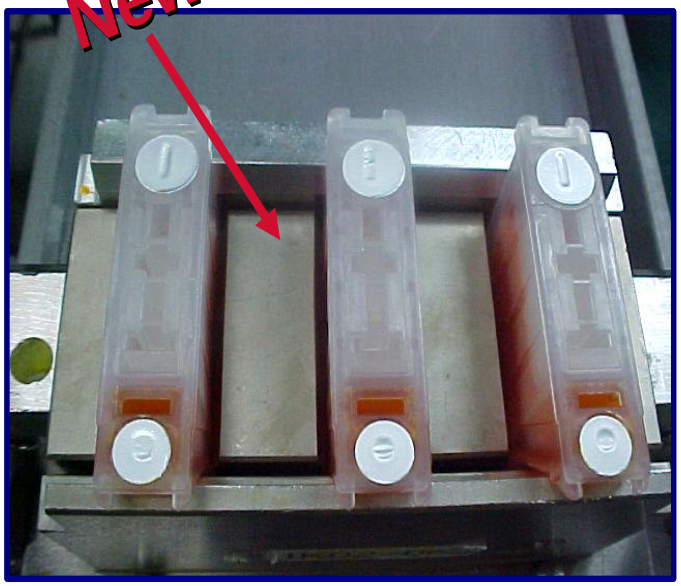


Develop the optimal solution(s)

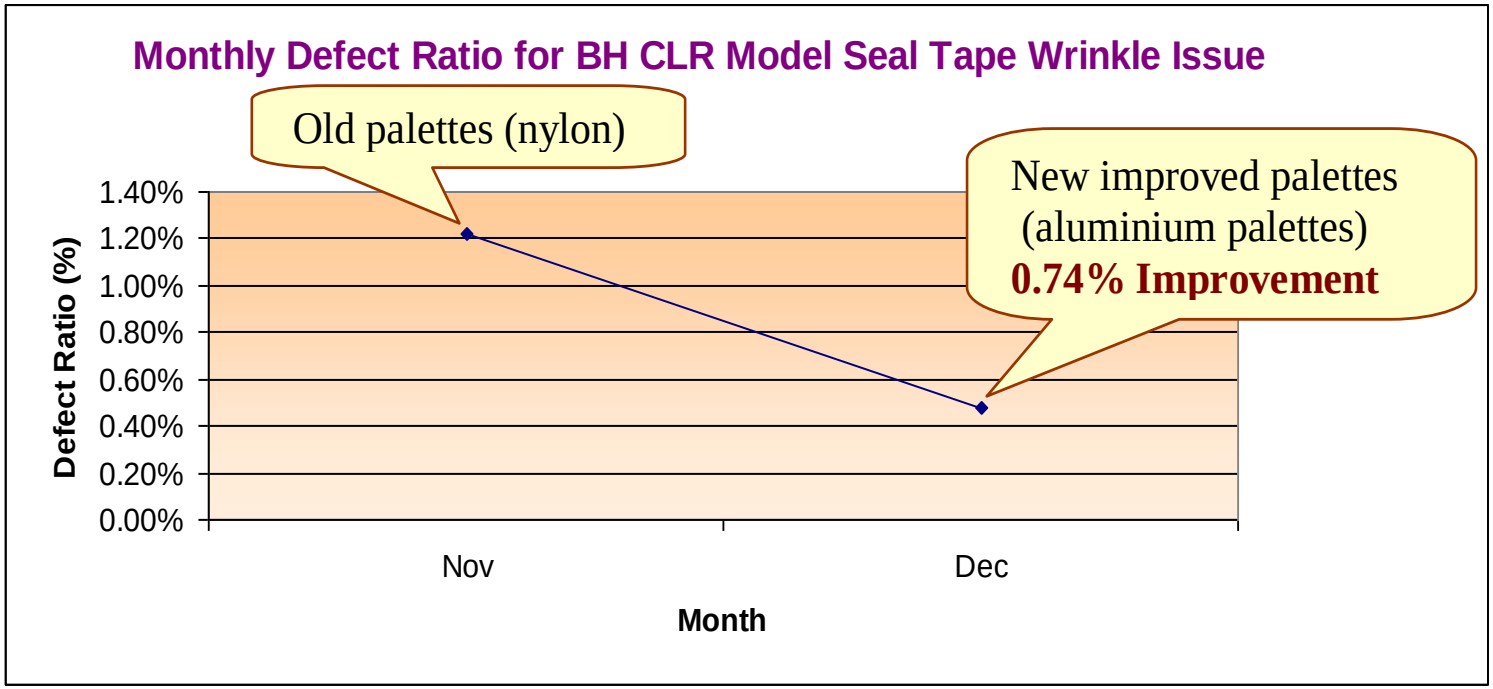
- To establish solutions
- Recommended optimal solution to improve process
- Create new process, combine different process, modify existing process
- Creativity (rubber pad adhesive, door trim)
- Brainstorming, Delphi, Nominal Group Technique
- Evaluate and testing of ideas/possible solutions

Implement changes

- To prepare implementation plan, obtain approval, conduct process improvements, study results
- Why is it done? How, When, Who, When it will be done?

BEFORE	AFTER
	
1) Old pallette made of nylon material 2) Part slot gap is 13mm 3) Misalignment of ink cartridge during ink filling process 4) Cost of palette: RM 200/palette	1) Aluminium material pallette 2) Part slot gap is 12.5mm 3) Reduce movement of ink cartridge during ink filling process. 4) Cost of palette: RM 200/palette

Effects of Improvement

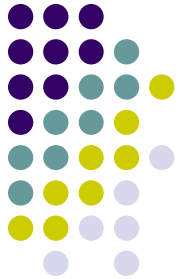


Study the results/Standardize the solution/Plan for the future

Measure and evaluate results of changes
Standardize solution – certify process, operator, done?
Next project/problem areas

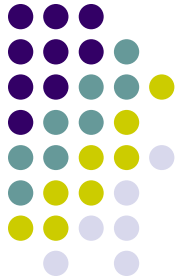
Positron Control Wave Soldering Process					
What	Specs	Who	How	Where	When
A 880 Flux	0.864 g 0.008	Lab technician	Specific gravity	Lab	Daily

5.Supplier Partnership



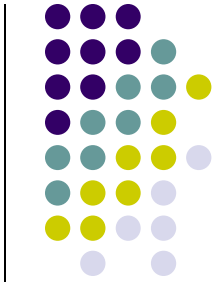
- 40% product cost comes from purchased materials, therefore Supplier Quality Management important
- Substantial portion quality problems from suppliers
- Need partnership to achieve quality improvement – long-term purchase contract
- Supplier Management activities

5.Supplier Partnership



- Define product/program requirements;
  1. Evaluate potential and select the best suppliers
  2. Conduct joint quality planning and execution
  3. Require statistical evidence of quality
  4. Certify suppliers, e.g. ISO 900, Ford Q1
  5. Develop and apply Supplier Quality Ratings
     - Defects/Percent non-conforming
     - Price and Quality costs
     - Delivery and Service

6.Performance Measures



- Managing by fact rather than gut feelings
- Effective management requires measuring
- Use a baseline, to identify potential projects, to asses results from improvement
- E.g. Production measures – defects per million, inventory turns, on-time delivery
- Service – billing errors, sales, activity times
- Customer Satisfaction
- Methods for measuring
- Cost of poor quality
  - Internal failure
  - External failure
  - Prevention costs
  - Appraisal costs

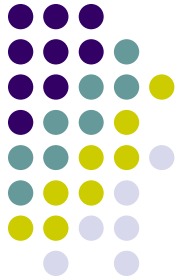
Performance Measures

- Award Models (MBNQA, EFQM, PMQA)
- Benchmarking – grade to competitors, or best practice
- Statistical measures – control charts, Cpk
- Certifications
  - ISO 9000:2000 Quality Mgt System
  - ISO 14000 Environmental Mgt System,
  - Underwriters Lab (UL), GMP
  - QS 9000, ISO/TS 16949

Deming's 14 Points for Management

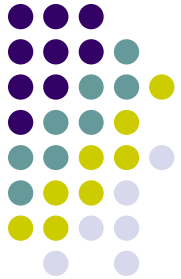
1. Create constancy of purpose towards improvement of product and service with aim to be competitive, stay in business and provide jobs.
2. Adopt a new philosophy – new economic age, learn responsibilities and take on leadership for future change.
3. Cease dependence on inspection to achieve quality. Eliminate the need for inspection on a mass basis by building quality into product in the first palace.

Deming's 14 Points for Management



4. End the practice of awarding business on the basis of price, instead, minimize total costs.
5. Improve constantly and forever the system of production and service, to improve quality and productivity, thus decreasing costs.
6. Institute training on the job
7. Institute leadership, supervision to help do a better job.
8. Drive out fear, everyone can work effectively for company.

Deming's 14 Points for Management



9. Breakdown barriers between departments. Work as teams to foresee production problems.
10. Eliminate slogans, exhortations, and targets for workforce.
11. Eliminate numerical quotas on the workforce.
12. Remove barriers that rob people pride of workmanship.
13. Institute a vigorous program of education and self-improvement.
14. Put everybody to work to accomplish the transformation.

Process improvement

- Customer loyalty is driven by delivered value.
- Delivered value is created by business processes.
- Sustained success in competitive markets require a business to continuously improve delivered value.
- To continuously improve value creation ability, a business must continuously improve its value creation processes.

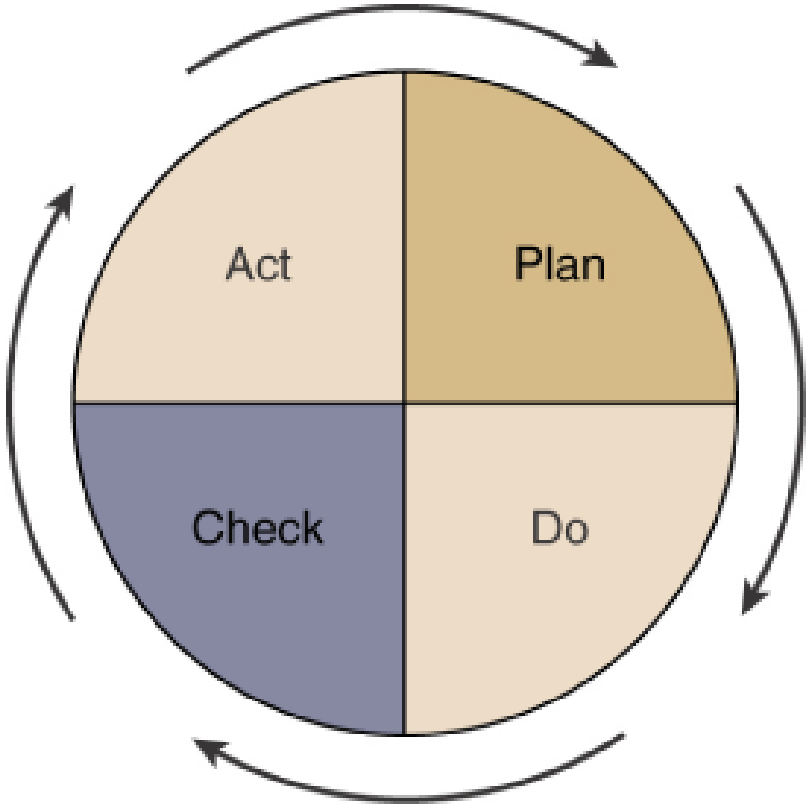
- Continuous process improvement is an old management concept dating back to 1895. However, those approaches were mainly *productivity related*.
- More recently (1951) Toyota implemented *Just-In-Time* which relies on *zero defects* and hence continuous improvement!

PDCA cycle

- Developed by ***Walter A. Shewhart***

- He was a *Statistician at Bell Laboratories*
- Developed statistical control process methods to distinguish between random and nonrandom variation in industrial processes to keep processes under control.
- Developed the “plan-do-check-act” (PDCA) cycle that emphasizes the need for continuous improvement.
- Strongly influenced Deming and Juran.

Shewhart's Plan-Do-Check-Act (PDCA) Cycle



Source: "The PDCA Cycle" from *Deming Management at Work* by Mary Walton, copyright © 1990 by Mary Walton. Used by permission of G. P. Putnam's Sons, a division of Penguin Putnam, Inc.

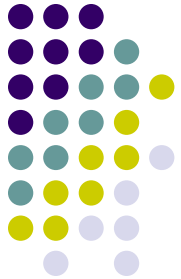
The 5S

- Seiri – sort (housekeeping)
- Seiton – set in order (workplace organization)
- Seiso – shine (Cleanup)
- Seiketsu – standardize (Cleanliness)
- Shitsuke – sustain (Discipline)

Benefits of 5S

- Reduce waste hidden in the plant
- Improve quality and safety
- Reduce lead time and cost
- Increase profit

Seiri – sort

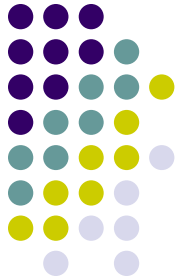


- Ensuring each item in a workplace is in its proper place or identified as unnecessary and removed.
- Sort items by frequency of use
- Get rid of unnecessary stuff
  - Bare essentials for the job
  - Red Tag system
  - Can tasks be simplified?
  - Do we label items, and dispose of waste frequently?

Seiton – set in order

- Time spent looking for things, putting away
- Arrange materials and equipment so that they are easy to find and use
  - Prepare and label storage areas
  - Use paint, outlines, color-coded
  - Consider ergonomics of reaching items
  - Frequent, infrequent users
  - “a place for everything and everything in its place”

Seiso – shine



- Repair, clean & shine work area (“Everyone is a janitor”)
- Important for safety
- Maintenance problems such as oil leaks can identified before they cause problems.
- Schedule for cleaning, sweeping, wiping off
- Cleaning inspection checklists
- Workspace always ready to work
- See workspace through customers’ eyes

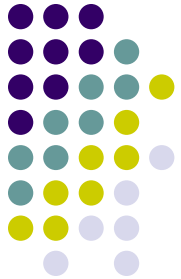
Seiketsu – standardize

- Formalize procedures and practices to create consistency and ensure all steps are performed correctly.
- Prevention steps for clutter
- Otherwise improvements from first 3 lost
- Everyone knows what they are responsible for doing, when and how
- Visual 5S – see status at a glance
- Safe apparel, no wasted resources

Shitsuke – sustain

- Keep the processes going through training, communication, and organization structures
- Allocate time for maintaining
- Create awareness of improvements
- Management support for maintaining
- Training, rewards

Visual Controls - Andon



- Inidcators for tools, parts, and production activities
- Placed in plain sight of all workers so everyone can understand status of system at a glance
- If a machine goes down, or a part is defective or delayed, immediate action can be taken

Implementation

- Gradually – too fast unsustainable
- During slow time
- Importance of training, Management commitment
- Before & After photos
- Change of mentality, not campaigns and slogans. Old way no longer OK
- MBWA, Patrols

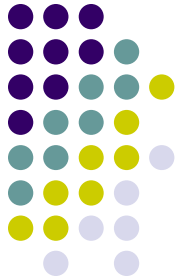
What is Kaizen?

- Kaizen (Ky'zen)
- "Kai" means "change"
- "zen" means "good (for the better)"
- Gradual, orderly, and continuous improvement
- Ongoing improvement involving everyone

History

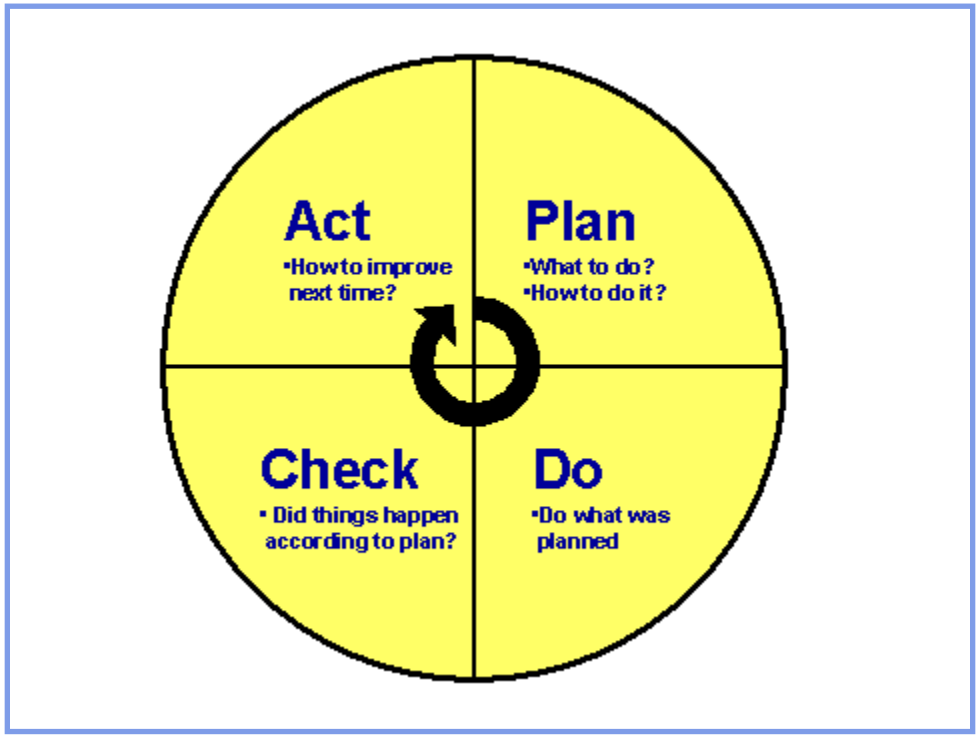
- Modern Kaizen is based on the principles of the Toyota Production System (TPS).
- TPS is a system used in repetitive manufacturing, but the philosophy can be applied to all operations.

How to Kaizen



- Identify the customer
- Deming Cycle
  - Plan – identify what to change and how to do it
    - Current state
    - Future state
    - Implementation plan
  - Do – execute the improvement
  - Check – ensure the improvement works
  - Act – future and ongoing improvements
  - Repeat

Deming Cycle



Identify the Customer

- Value added is always determined from the customer's perspective.
- Who is the customer?
- Every process should be focused on adding value to the customer.
- Anything that does not add value is waste.
- Some non-valued added activity is necessary waste ("NVA-R")
  - Regulatory
  - Legal

Types of Waste

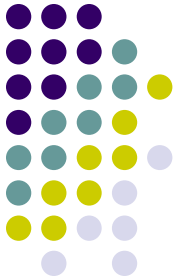
- Overproduction
- Excess inventory
- Defects
- Non-value-added processing
- Waiting
- Underutilized people
- Excess motion
- Transportation

Identify the Current State

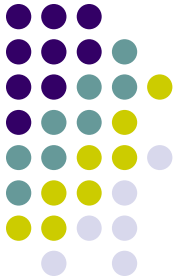
- Crucial first step in process improvement
- Deep understanding of the existing processes and dependencies
- Identify all the activities currently involved in developing a new product
- Observe the process first hand
- Identify Value Added (VA), Non-Value Added Required (NVA-R), and Non-Value Added (NVA)
- Generally creates more questions than answers

Tools

- Flow Charts
- Cause and Effect Diagrams
- Check Sheets
- Histograms
- Pareto Charts
- Scatter Diagram
- Control Charts



Cause and Effect Diagram (CED)

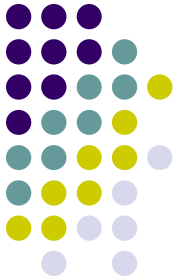


- Ishikawa or Fishbone diagram
- Relates causes to effects
- Benefits?
- Disadvantages?
- How?
  - Start with effect and work back to possible causes

Brainstorm and Analyze

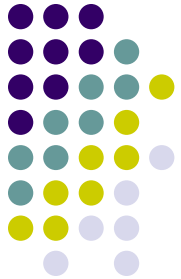
- Kaizen team brainstorming to develop new process
- Post improvement ideas on map or by category
  - Workflow
  - Technology
  - People / Organization
  - Procedures
- Develop detailed future state map
  - New workflow
  - Value Add and Non-Value Add
  - Cycle times
  - Identify Kaizen “bursts” (immediate radical change)

Implementation Plan



- Think global / systems optimization
- Maximum impact to process
- Speed of implementation – create small victories
- Cost-benefit analysis

Implementation Plan

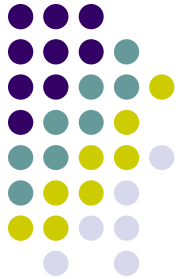


- Will new skill sets be required, and how to achieve them?
- Is the current organization structure sufficient?
- Are there cultural issues?
- Is there potential for “push back”?
- Any implications for suppliers?
- Implications for customers?
- Implications for team members?
- Do current technologies support the new process? Are they available and cost justifiable?
- Technology is an enabler, not a solution.
- Does the reward system support the new process?

Execute

- Develop a concise, achievable milestone plan
- Communicate the plan to everyone
  - Suppliers
  - Team members
  - Customers
- Track activities in public
- Celebrate small victories and publicly analyze failures

Check and Sustain



- Meet regularly (weekly?) to review status of open implementation items
- Re-evaluate Future State regularly (quarterly?) for additional improvement
- Track results on a public Kaizen Board

Typical Results of Kaizen

- 40 – 60% reduction of lean time
- 10 – 15% productivity improvement
- 10 – 20% reduction in rework
- Improved communication between functions and departments
- Clearly defined customer needs throughout the value stream
- Improved customer satisfaction