

Introduction to Process Improvement Tools

ISE 608.01
Robert Lundquist

Processes

- What is a process?
- Process vs. project
- What kinds of processes do you deal with every day?
- A series of *value added tasks* that are linked together to turn *input* into a product or service *output*.

Value-added tasks

- A task essential to the ability to produce a process output is called value-added
- Everything else you do is non-value-added
 - not essential
 - may even be a hindrance

Input and Output

- Inputs:
 - Materials
 - Labor
 - **Information**
 - Other resources
- Output
 - end point of a process
 - product, information or service you provide to another individual or group
- Input and output are the process boundaries

What to improve?

- Deming suggested that every process could be improved
 - none are perfect
 - even after process improvement
- Since there is no shortage of targets, where do you start?

Complete this sentence:

- “If it ain’t broke.....”

Why do we do it that way?

- Because we've always done it that way.
- Because *some* years ago *someone* determined that it was the best way.
- Because no one has come up with a better way.
- Because a **process improvement team** has looked at it carefully and determined that this is the right way under present conditions.

A problem

- Something you want that you don't have
- A deviation from expectation

- A problem statement describes the current situation, the expectation, and the *performance measures* to be used.

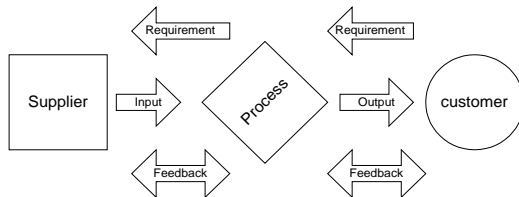
Symptoms

- Worker dissatisfaction or turnover
- Overtime
- WIP queues
- Late or incomplete orders
- Workers compensation costs
- Idle workers (but not idle machines)
- Quality costs

What process should we improve?
In what way does it need improvement?

- Internal dissatisfaction
 - management's view of performance
 - economics
- Customer requirements
 - internal or external
 - quality
 - cost
 - timeliness
 - i.e. everyone wants it good, fast and cheap

Process Chain



Customers

- Internal:
 - same organization
 - might be the next process
- External:
 - another organization
 - usually pays for your output

Customer Requirements

Customer Requirements

=

Needs + Expectations

Performance Measures:

- Productivity
 - throughput
 - completion time
- Quantified Quality
 - defect rate
 - rework
 - customer satisfaction
- Cost
 - inventories

Additional Performance Measures for Process Improvement Projects

- Safety
 - accidents
 - workers compensation costs
- Employee satisfaction
 - morale
 - turnover
- Etc.

Benchmarking

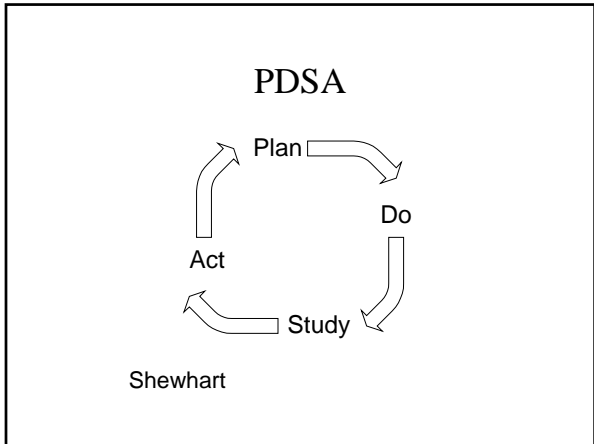
- A continuous, systematic process for evaluating the products, services and work processes of organizations that are recognized as representing best practices for the purpose of organizational comparison and improvement.

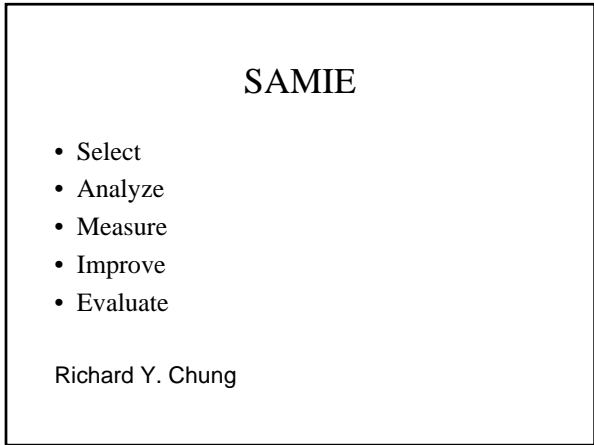
Sources of Benchmarking Data

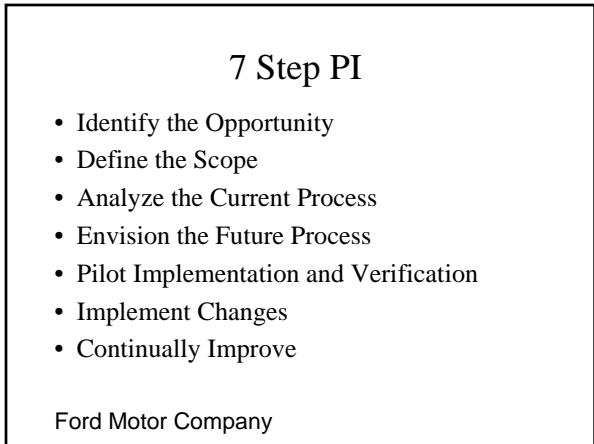
- Internal
- Suppliers
- Customers
- Open literature
- Partners

Models of Process Improvement

- PDSA (PDCA)
- SAMIE
- 7-Step PI
- Process Management







Process Management

- Establish ownership
- Define boundaries and interfaces
- Define the process
- Set control points
- Implement measurements
- Provide feedback for control and continuous improvement

Eugene Melan

Process Improvement Tools

- Brainstorming
- Affinity Diagram
- Criteria Rating
- Force Field Analysis
- Fishbone Diagram
- Process Flow Chart
- Pareto Chart
- Run Chart

Brainstorming

- Freewheel or round-robin
- Time limit
- Recorders
- Ground rules (suggested)
 - Don't edit or criticize
 - Go for quantity
 - Be creative
 - Build on ideas of others

Affinity Diagram

- Used to:
 - add structure to a large or complex issue or..
 - break the issue into easy-to-understand categories
 - gain agreement on direction for the project

Affinity Diagram

- State the issue (goal)
- Generate ideas (brainstorm)
- Put each idea on a card or a sticky note
- Arrange into groups
 - can be done iteratively until the group agrees
- Create a name for each group

Criteria Rating

- Used to:
 - select among several alternatives
 - make a group decision objectively
 - obtain agreement of the group with a decision
- Criteria examples
 - cost
 - impact or urgency
 - safety

Criteria Rating Form

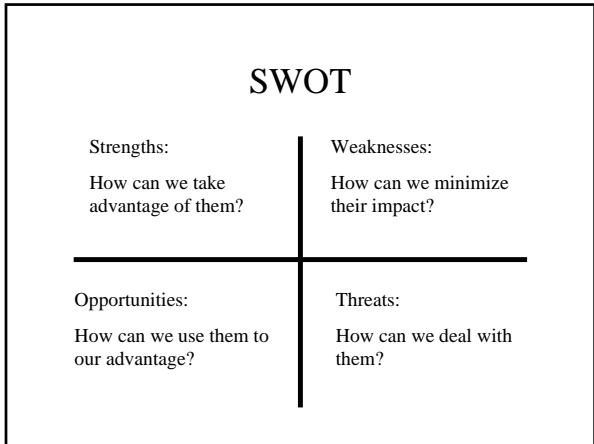
Criteria	Weight	Alternatives		
		A	B	C
1				
2				
3				
4				
Total	100%			
Summary				

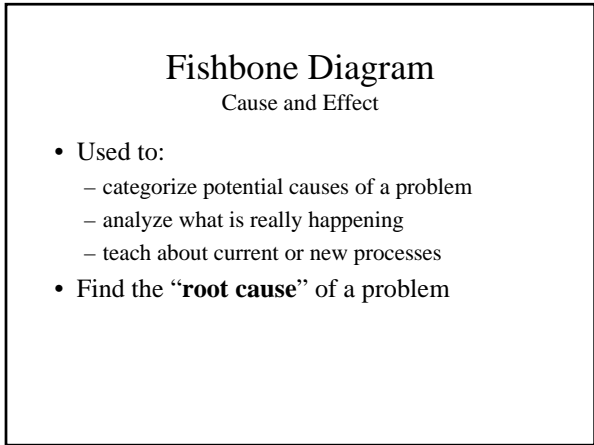
Force Field Analysis

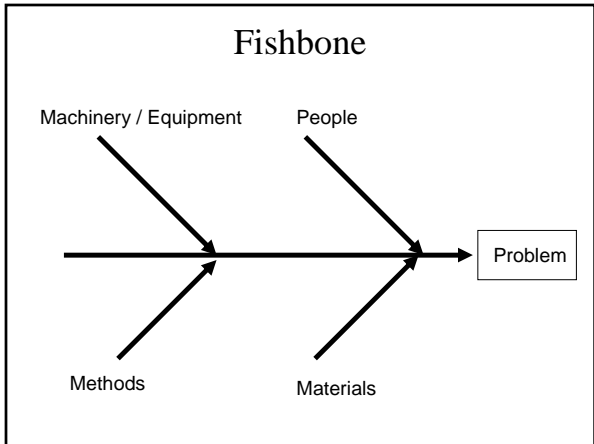
- Used to:
 - identify obstacles to reaching a goal
 - Identify possible causes and solutions to a problem
- Similar to SWOT analysis
 - strengths
 - weaknesses
 - opportunities
 - threats

Force Field Diagram

+	-
Driving Forces	Restraining Forces







Fishbone Categories

- For Manufacturing the usual categories are:
 - Machines
 - Methods
 - Materials
 - People
- But others may be appropriate for a given problem:
 - Policies
 - Procedures
 - Plant
 - Environment
 - Measurement
- You should make up your own set for the situation

Process Flow Diagram

- Used to:
 - define and analyze any process
 - build a step-by-step picture of the process for analysis, discussion, communication, training
- The most important tool:
 - if you can't draw a process flow chart you don't know the process well enough to improve it

Process Flow Chart Steps

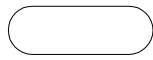
- Identify major process tasks
 - What really happens in the process?
 - What are the steps? (*What happens next?*)
 - Does a decision need to be made before deciding the next step?
 - What approvals are needed?
- Locate the boundaries of the process
 - What are the inputs and outputs? (*Customer?*)
 - Where (*in the process*) do we think the problem is?

Systems Thinking

- “If you take a system and take it apart to identify its components, and then operate those components in such a way that every component behaves as well as it possibly can, there is one thing of which you can be sure. **The system as a whole will not behave as well as it can.**”
- Conversely, “If you have a system that is behaving as well as it can, none of its parts will be.”

Russell Ackoff

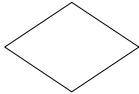
Symbols



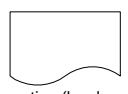
Begin or End



Process step



Decision (yes-no)



Information (hardcopy)



Connector



Direction of Flow

Pareto

- Use a Pareto chart to:
 - determine the relative frequency or importance of problems or causes
 - focus on vital issues by ranking in terms of significance
- Often focuses on Pareto’s 80-20 rule:
 - 80% of the problems are caused by 20% of the _____ (parts, customers, workers, machines, etc.)

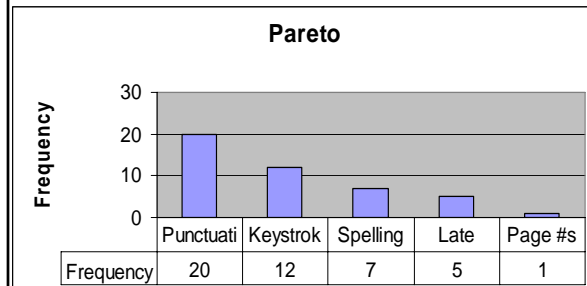
Steps in Constructing a Pareto Chart

- Determine categories
- Select a common unit of measure
- Select a period for data collection
- Collect and summarize the data
- Draw a histogram of the data

Pareto Example Data Table

Error	Frequency	% of Total
Punctuation	20	44.4%
Keystroke	12	26.7%
Spelling	7	15.6%
Late	5	11.1%
Page #s	1	2.2%
	45	100.0%

Pareto Example



Run Charts

- Use run charts to:
 - look at the relationship of a variable with time
 - attempt to find trends
 - compare one time period to another

Run Chart Example

