



DEPT. OF NUCLEAR TECHNOLOGY
CHULALONGKORN UNIVERSITY

Presentation - 3

“ TOOLS of QUALITY “

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Operations Quality Corp..

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OBJECTIVES of PRESENTATION

This presentation will discuss

the following topics :

- **Foundations of Quality Improvement**
 - **Quality Improvement process**
 - **Statistical thinking**
 - **Variation**

- **Specific tools and their application :**
 - **description**
 - **area of application**
 - **key considerations for use**

QUALITY IMPROVEMENT PROCESS

- What is to be accomplished ?
 - appreciation of a system
 - data collection

- What changes can be made for improvement ?
 - understanding variation
 - what to avoid
 - small scale testing

- How will a change be assessed ?
 - data collection

THE PDSA CYCLE

ACT

- What changes are to be made?
- Next cycle ?

PLAN

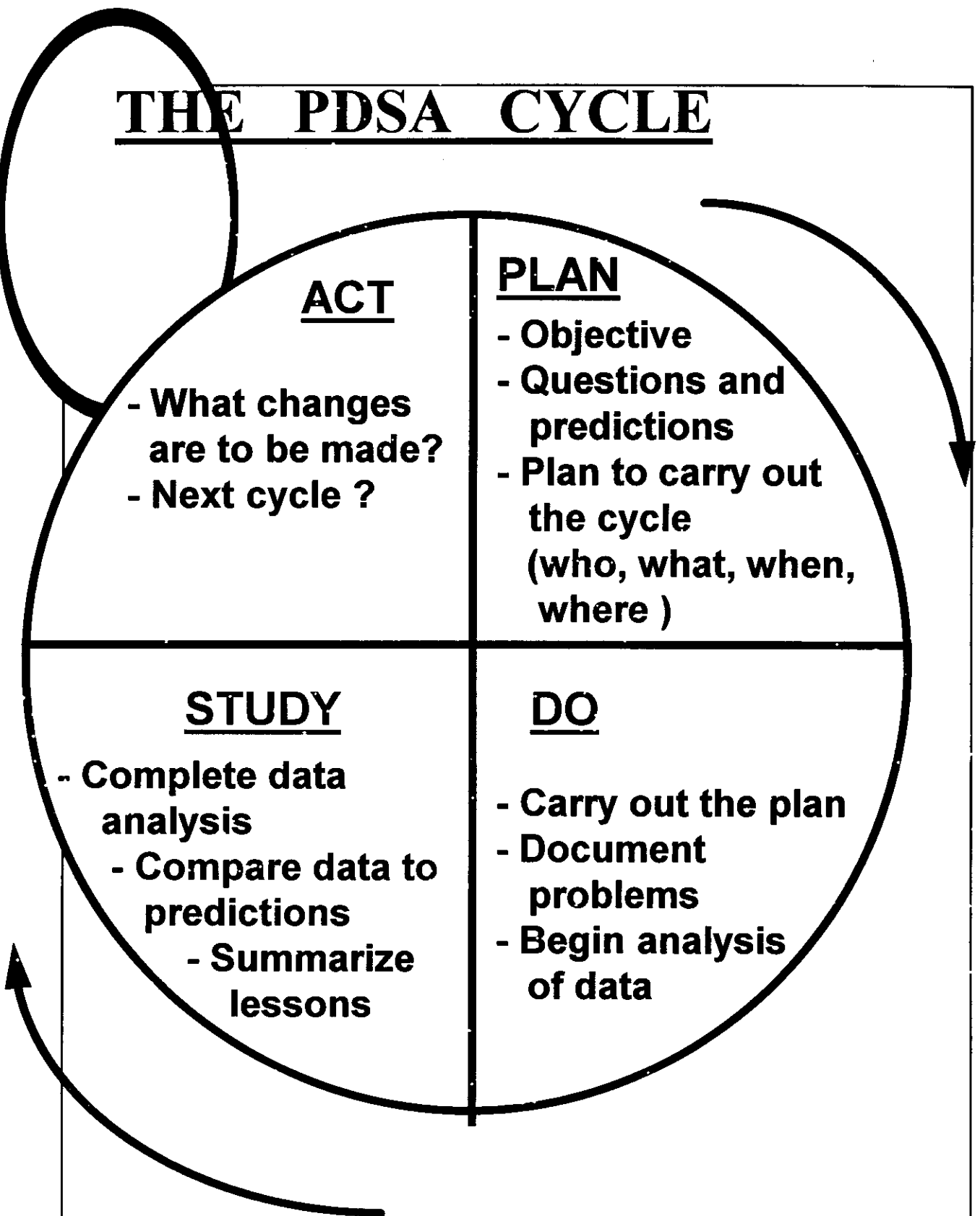
- Objective
- Questions and predictions
- Plan to carry out the cycle (who, what, when, where)

STUDY

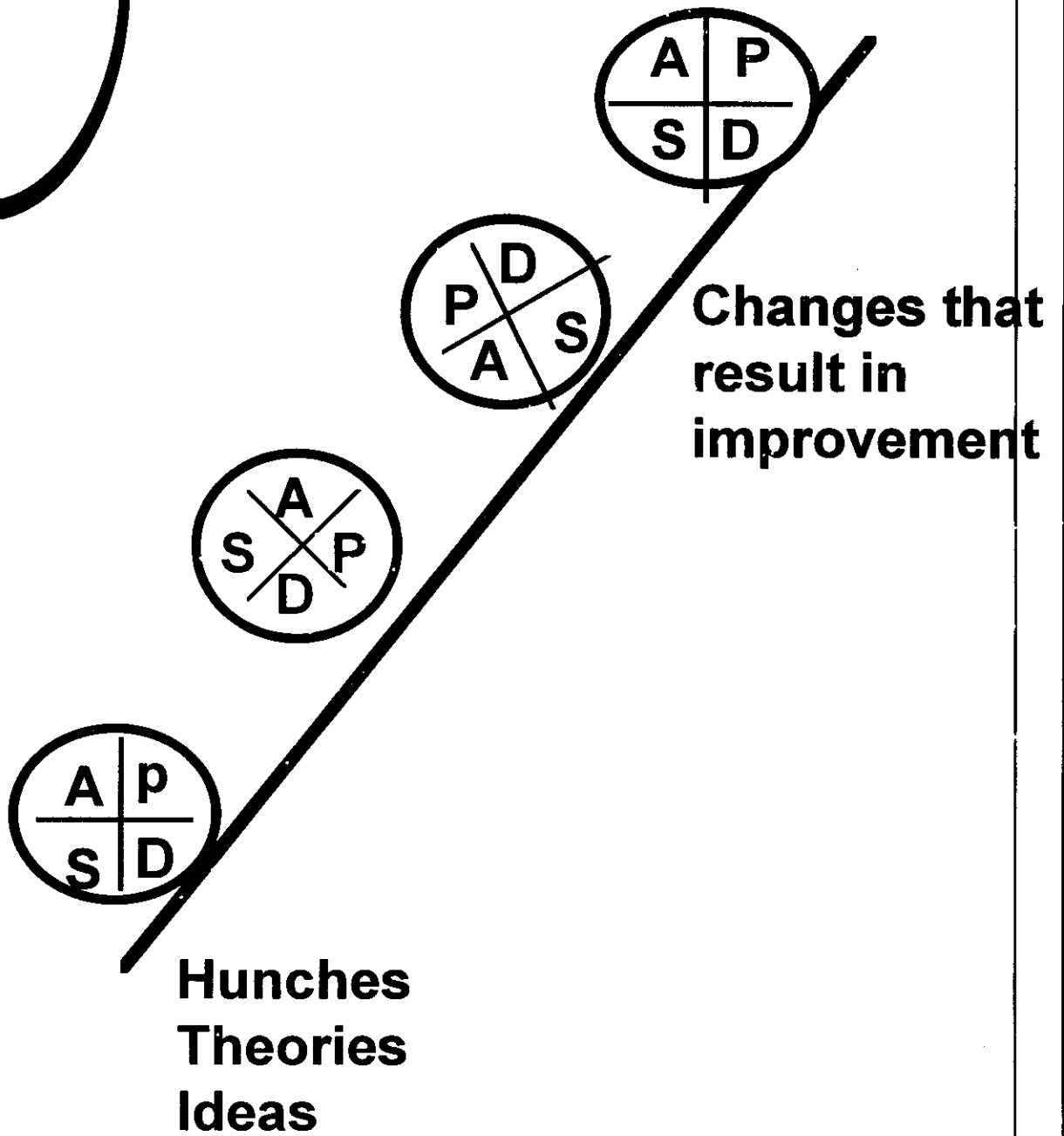
- Complete data analysis
- Compare data to predictions
- Summarize lessons

DO

- Carry out the plan
- Document problems
- Begin analysis of data



REPEATED USE of PDSA CYCLE



BARRIERS to QUALITY IMPROVEMENT

- **Bureaucracy**
 - **risk adverse**
 - **inefficient**
 - **inflexible**
 - **rule and analysis oriented**

- **Personnel regulations**
 - **centralized personnel rules**

- **Lack of political support**

- **Management turn-over**

- **Lack of resources**

- **Resistance to change**
 - **fear of losing job**
 - **lack of incentive to improve**

STATISTICAL THINKING

○ Process thinking :

- work is a series of interconnected processes
- problems are usually in the process
- focus on fixing problems, not blaming people

○ Understanding variation :

- variation is present in everything
- variation makes improvement possible
- reduction of variation is improvement

○ Using data to guide actions:

- data should drive actions and behavior
- data must be relevant to measures
- using data is the key

VARIATION

Variation of process output can be due to :

- Common causes - inherent in the process

If only common causes present :

- process stable, “in statistical control”
- variation predictable within statistical limits

- Special causes - outside of the process

If both common and special causes present :

- process unstable
- variation not predictable

- For lasting improvement :

- identify and eliminate special causes
- introduce “fundamental” change in the process to eliminate common causes

TYPICAL PATH of FRUSTRATION

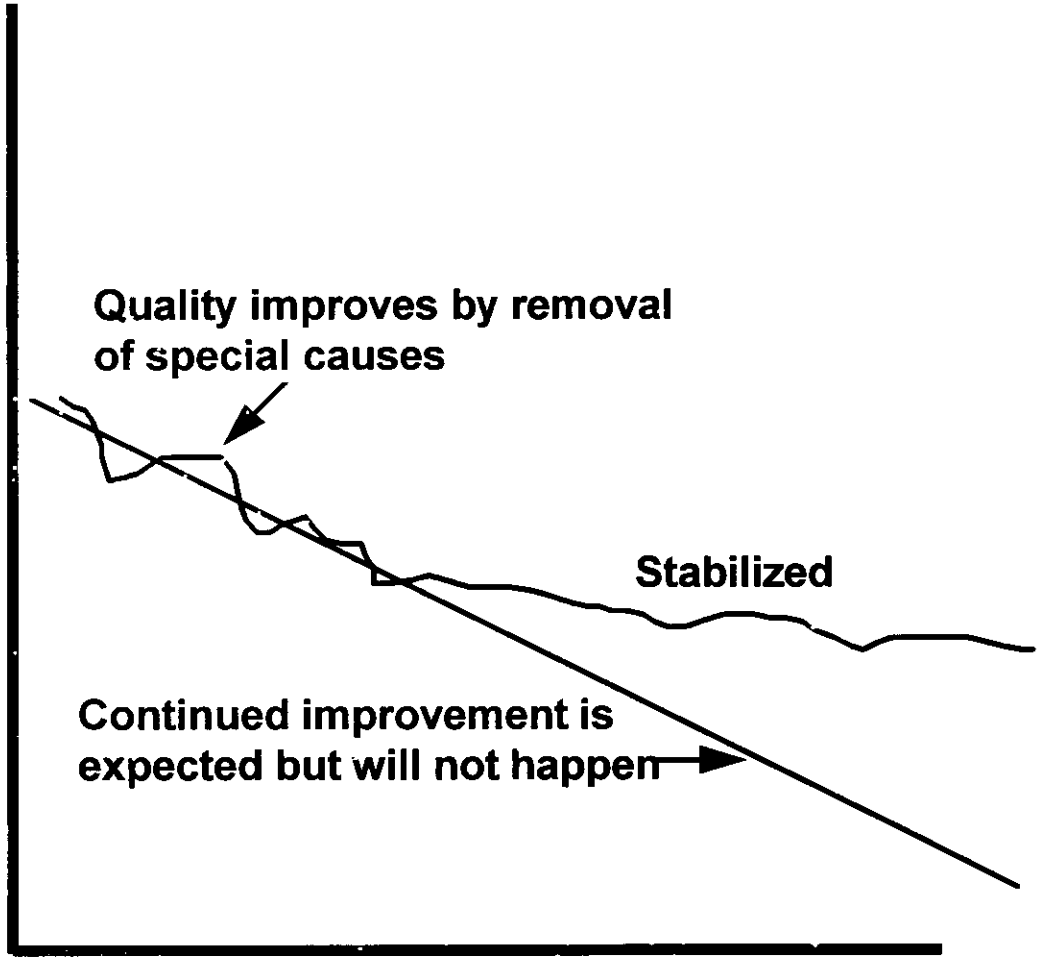
Proportion
of
items
found
faulty

Quality improves by removal
of special causes

Stabilized

Continued improvement is
expected but will not happen

TIME (years)



THE TRADITIONAL SEVEN

TOOLS of QUALITY

- **Flowcharts**
- **Cause and effect diagrams**
- **Check sheets**
- **Scatter diagrams**
- **Histograms**
- **Pareto charts**
- **Control charts**

“ROOT CAUSE ANALYSIS” PROCESS

- Define data requirements
 - collect data
 - review data

- Assessment of event
 - event analysis
 - root cause determination
 - validation of root cause

- Problem correction
 - identify and implement corrective action

- Communication
 - internal
 - external - if required

- Follow-up
 - effectiveness review

CRITERIA for
ROOT CAUSE ANALYSIS

- **Serious consequences of event**
- **Sequence of occurrences or multiple failures during the event**
- **Recurring operational or human performance problems or equipment failures**
- **Unexpected conditions encountered during the event**
- **Previous corrective action ineffective**

CHANGE ANALYSIS PROCESS

**Problem
Situation**

**Non-problem
situation**

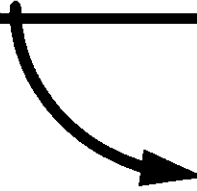
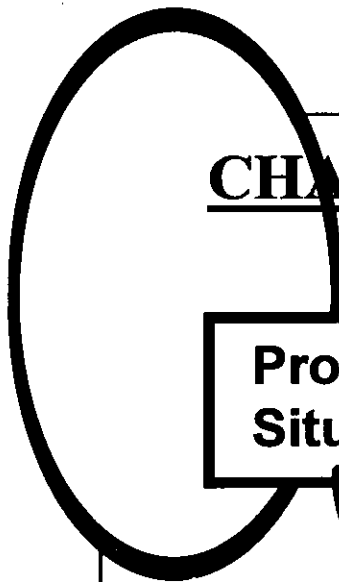
Compare

**Set down ALL
differences**

**Evaluate the
effect of the
differences**

**Determine the
WHY's for changes**

**(Confirm with other
techniques)**



BENCHMARKING

Working definition :

Identification of the best practices in a function or performance area and adapting these practices to improve own performance, so as to eventually challenge the best performer for supremacy

Advantages :

- learn from other companies and plants and avoid their mistakes**
- set attainable goals and focus efforts on these, based on demonstrated success of others**
- build a network of contacts, information exchange and cooperation**

BENCHMARKING PROCESS

- Identify what is to be benchmarked
- Identify the best performers
- Decide what data is to be collected and collect it
- What is the current “performance gap?”
- Set performance objectives
- Communicate findings and gain acceptance
- Set functional goals
- Develop action plans
- Implement specific actions and monitor results
- Benchmark again

HISTOGRAM - ELEMENTARY

DATA ANALYSIS

Basic concepts :

- **Values in a set of data always show variation**

- **Variation displays a pattern**

- **Patterns of variation are difficult to see in a simple table of numbers**

- **Patterns of variation are simpler to see when shown pictorially in a histogram**

PARETO PRINCIPLE

“ 80 % of problems

are caused

by 20% of population ”

therefore :

- ANALYZE using accurate information
- CONCENTRATE on the main problem

GENERATING INFORMATION

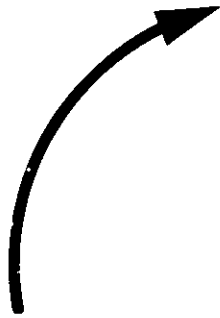
INFORMATION

NEEDS

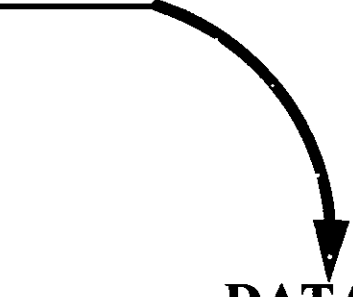


ANSWERS

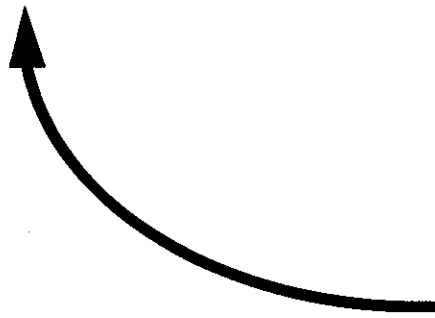
QUESTIONS



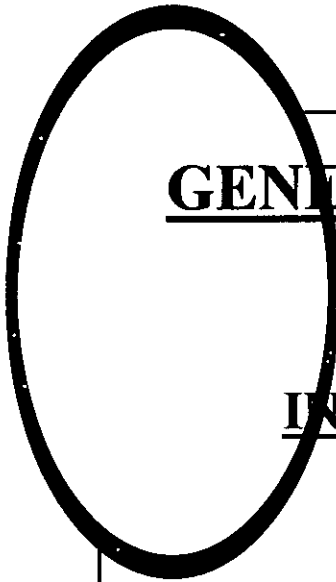
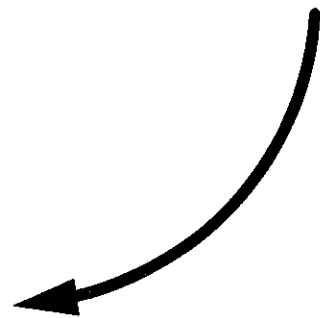
DATA



COMMUNICATION



ANALYSIS



CHECK SHEETS -

COLLECTING DATA

- Layout is important :
 - easy data collection
 - minimizing possibility of errors

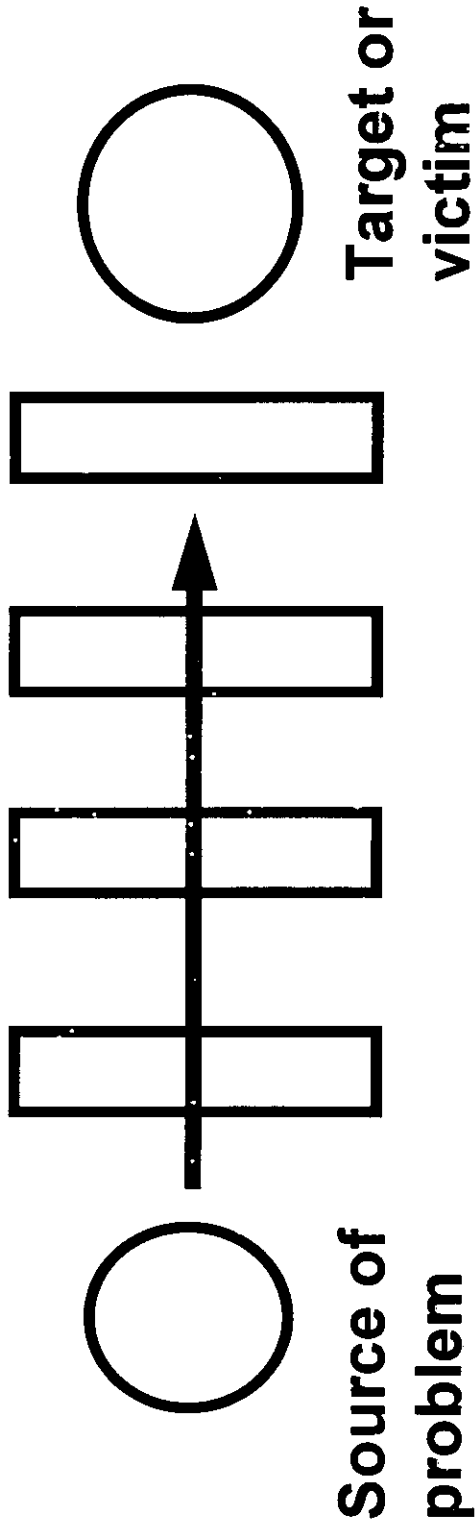
- Illustrations may be used to simplify data collection

- Data should be :
 - simple
 - meaningful, especially to customer

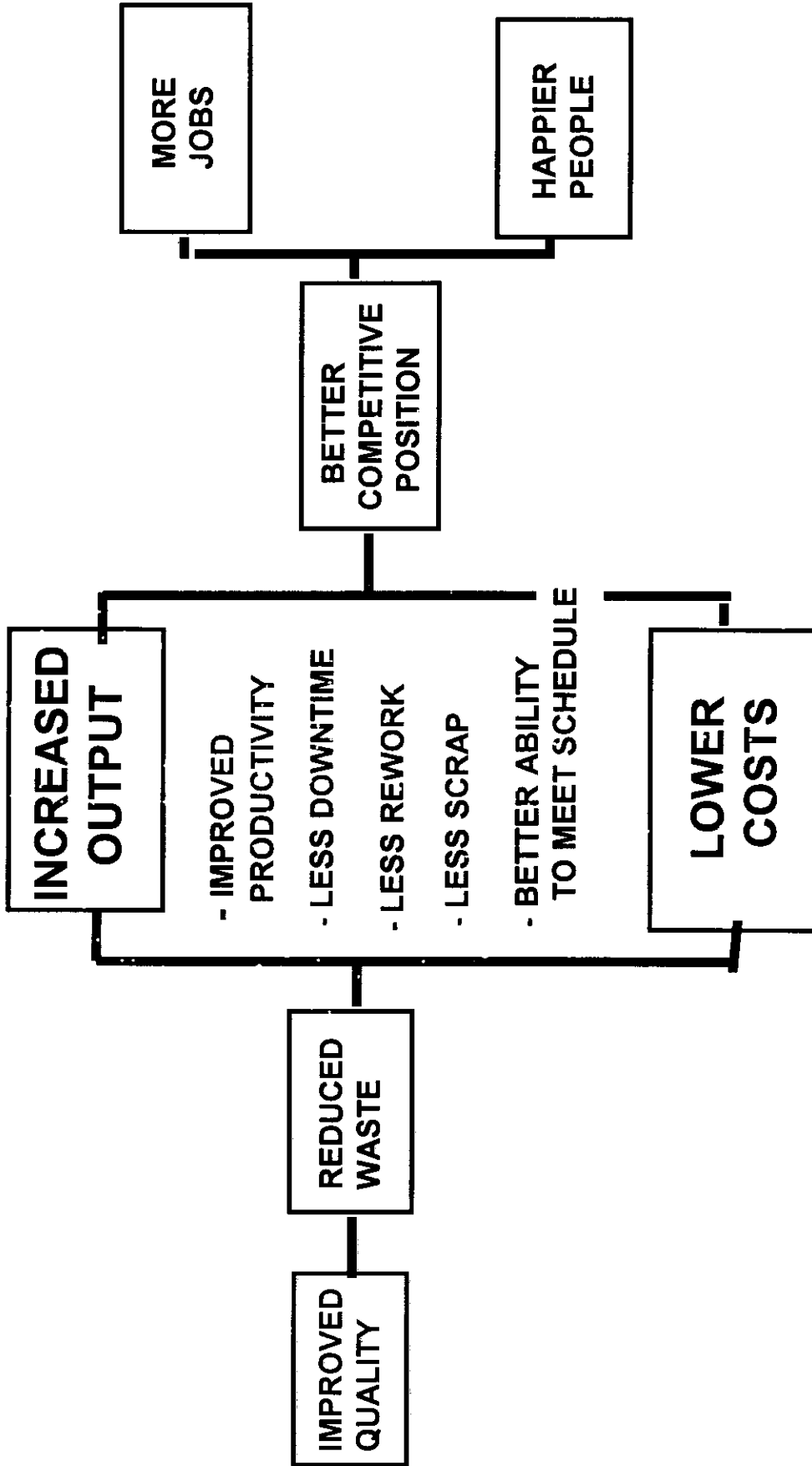
- Check sheets should be kept near to where data is recorded

BARRIER ANALYSIS

Barriers

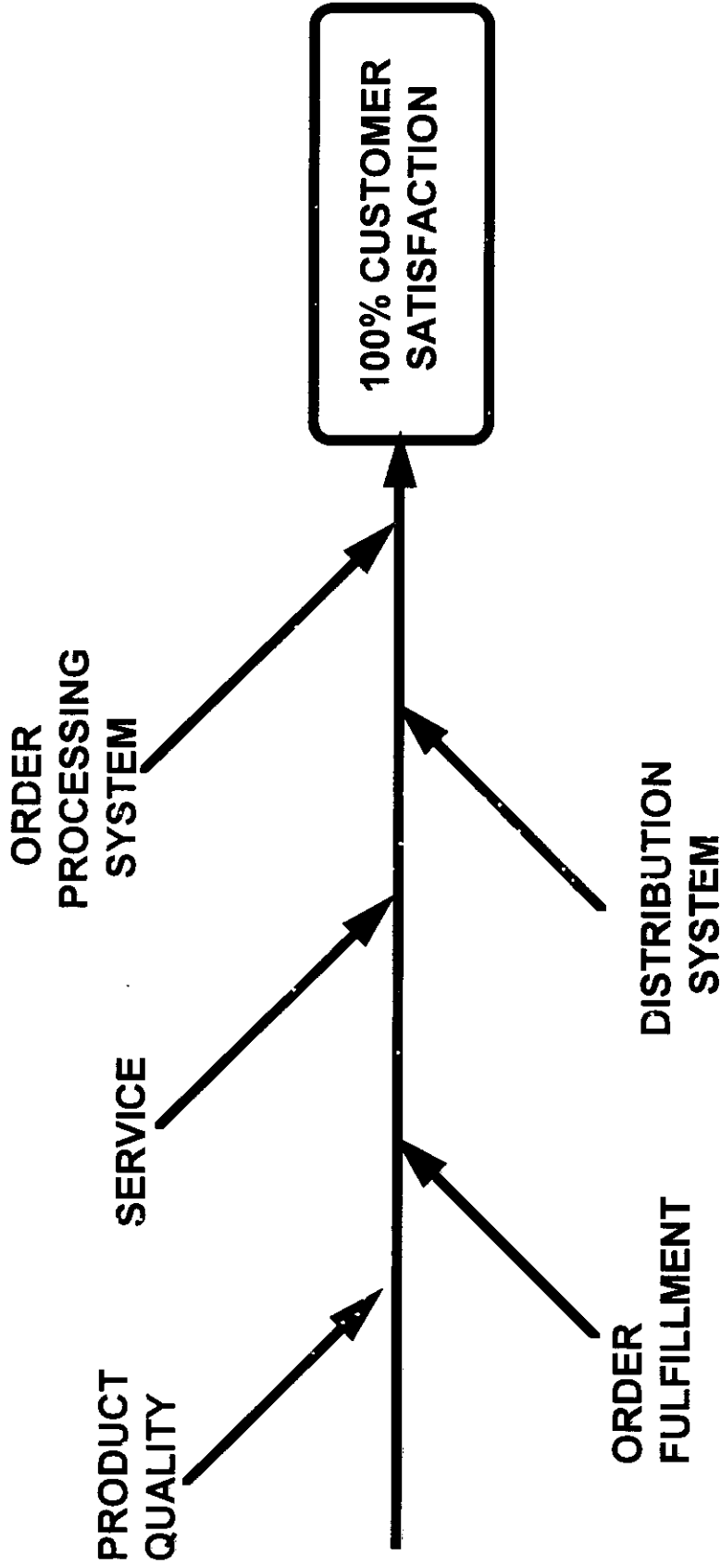


COST vs QUALITY



CAUSE and EFFECT DIAGRAMS

MAIN CAUSE HEADINGS



PROCEDURAL PROBLEMS

