Malaysian Technical Cooperation Program-2004

Introduction to Productivity Improvement Program….

by

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NPC, P.Jaya

PERBADANAN PRODUKTIVITI NEGARA

PUSH FOR PRODUCTIVITY
GO FOR QUALITY

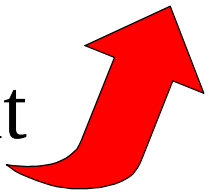
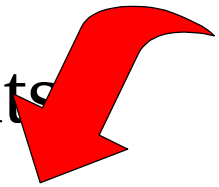
Perspectives of Quality

Transcendental:	**Quality = excellence. Recognized only through experience**
Product-Based:	**Quality is precise and measurable**
User-Based:	**Quality lies in the eyes of the beholder**
Manufacturing-Based:	**Quality is conformance to the firm's developed specifications**
Value-Based:	**Quality is a trade-off between price and value**

Quality Drives the Productivity

- If operations does it right the first time and produces products and services that are defect-free, waste is eliminated and related costs are reduced
- Costs are reduced as product quality improves because there are fewer products lost to scrap, fewer products returned for warranty work, and fewer interruptions

Quality And Productivity

- Productivity = output / input
- Fewer defects increase output 
- Quality improvement reduces inputs 

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Deming Chain Reaction

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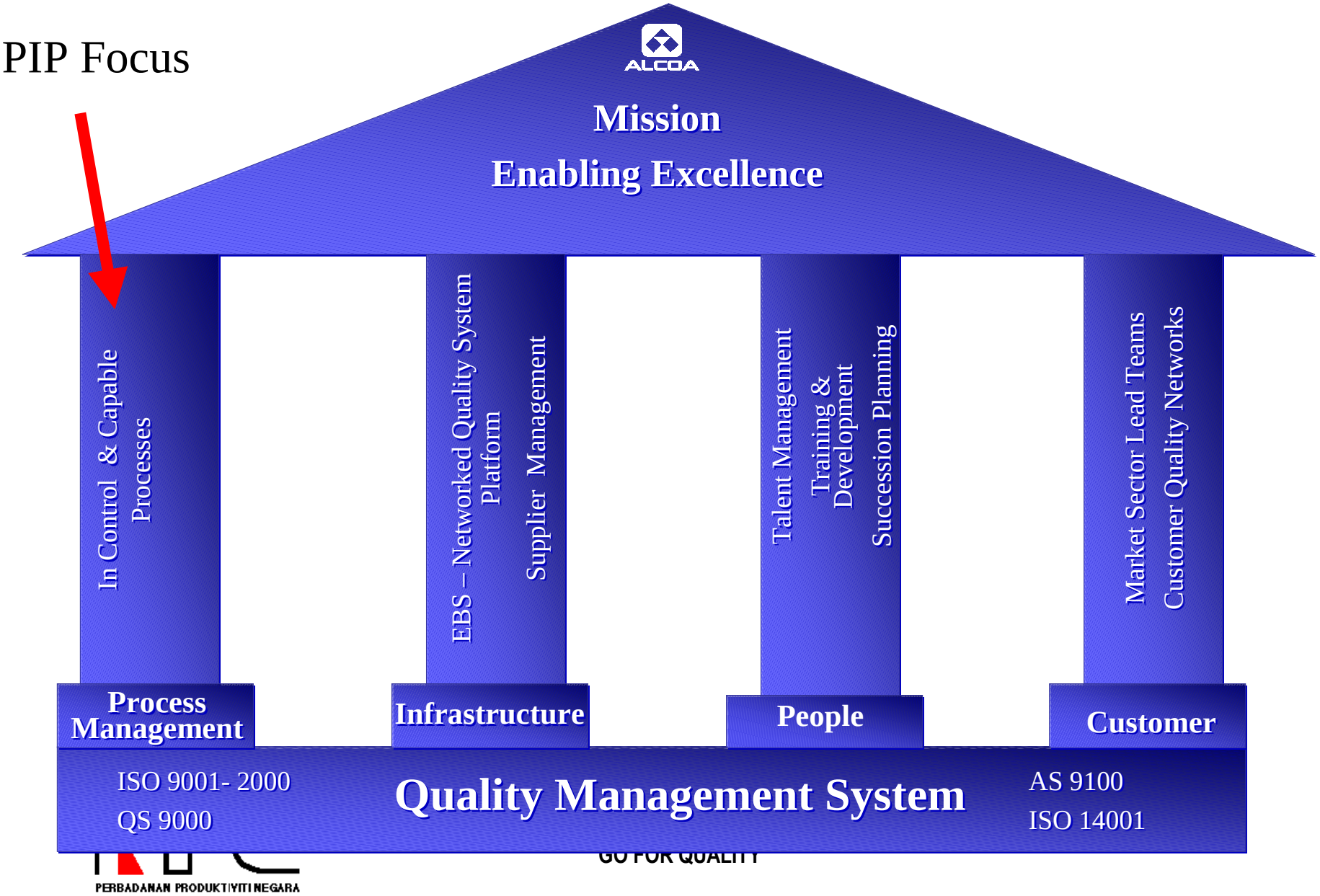
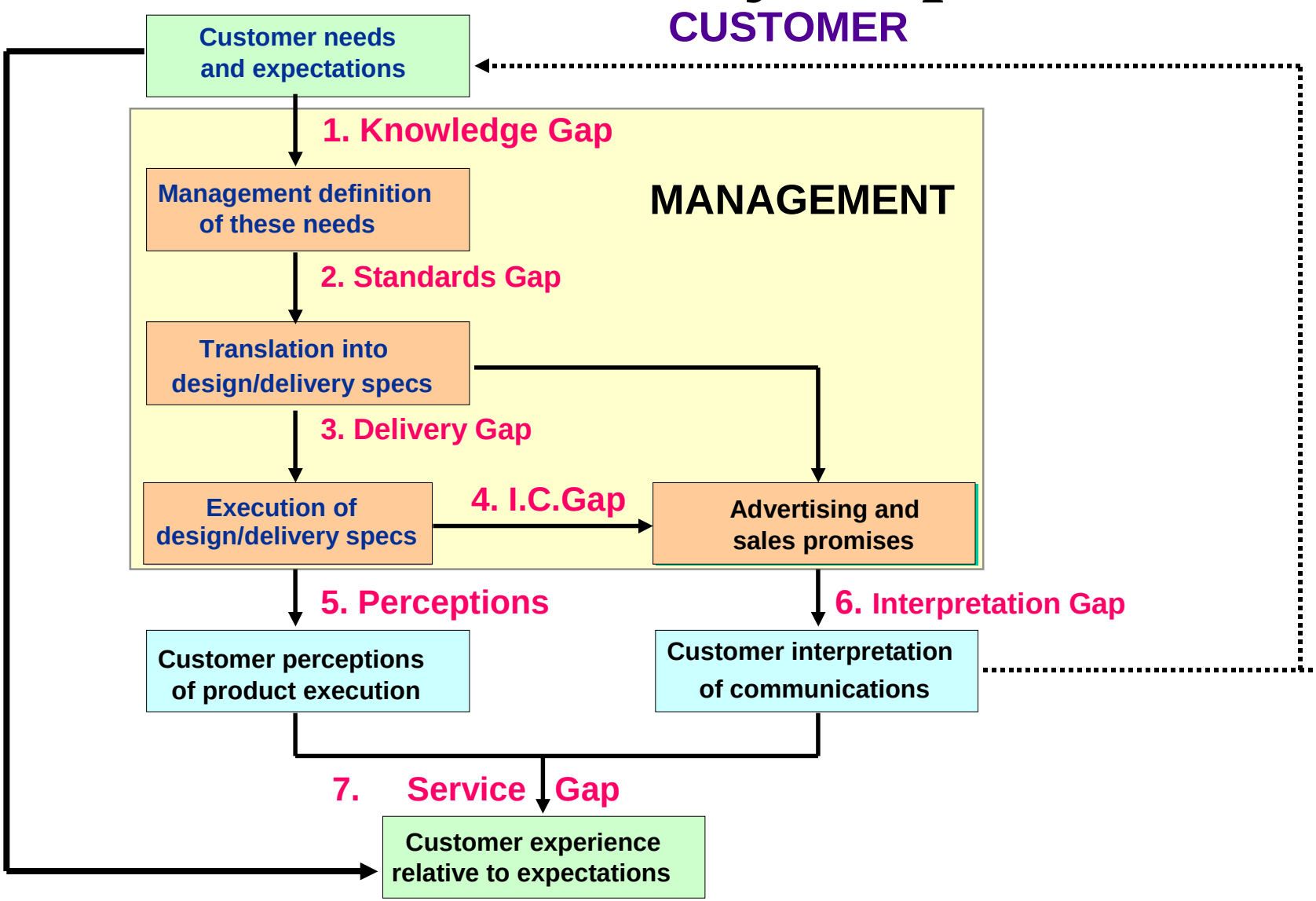
Quality Platform

PIP Focus



Seven Quality Gaps



What is Productivity ?

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Efficiency, Effectiveness, and Productivity

- *Efficiency:* comparison to a standard--usually time-based (e.g., how long employee takes to perform specific task)
  - Problem: focus on inputs rather than outcomes
  - May ignore variations in quality or value of service
- *Effectiveness:* degree to which firm is meeting its goals
  - Cannot divorce productivity from quality*Productivity:* financial valuation of outputs to inputs
  - Consistent delivery of outcomes desired by customers should command higher prices

What is productivity ?

- Productivity
  - A measure of the efficiency with which a firm transforms inputs into outputs, calculated as output divided by input.
  - In the broadest sense, productivity is defined as follows:

$$\textbf{Productivity} = \frac{\textbf{system outputs}}{\textbf{system inputs}}$$

Measuring Yield & Productivity

$$Y = (I)(\%G) + (I)(1-\%G)(\%R)$$

where

Y = yield

I = number units started in production

% G = percentage good units

% R = percentage of defective units reworked

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Product Yield Example

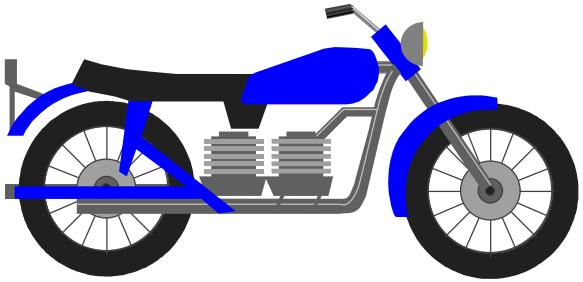
Start 100 motors per day

80% are good

50% of poor quality units can be reworked

$$Y = (I)(\%G) + (I)(1-\%G)(\%R)$$

$$Y = 100\ (0.80) + 100\ (1- 0.80)\ (0.50) = 90 \text{ motors}$$



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Continuous Improvement (CI) ?

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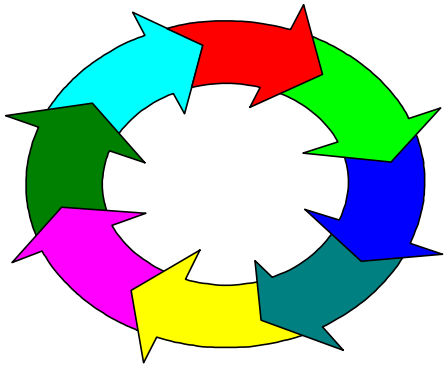
CONTINUOUS IMPROVEMENT



The continuous, ongoing effort an organization makes to *meet and exceed* its customers' changing expectations.

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Continuous Improvement

It also means of continuously improving the way an organization operates. CI seeks to:

- **Raise the standards of performance through improved work processes**
- **Increase the consistency of performance around those set standards**

In Japan, CI is also known as Kaizen

- "Kai"- To change and "Zen" – Make Better
- The Status Quo is Unacceptable
- Improve Constantly..Continuous
- Improvement = Change

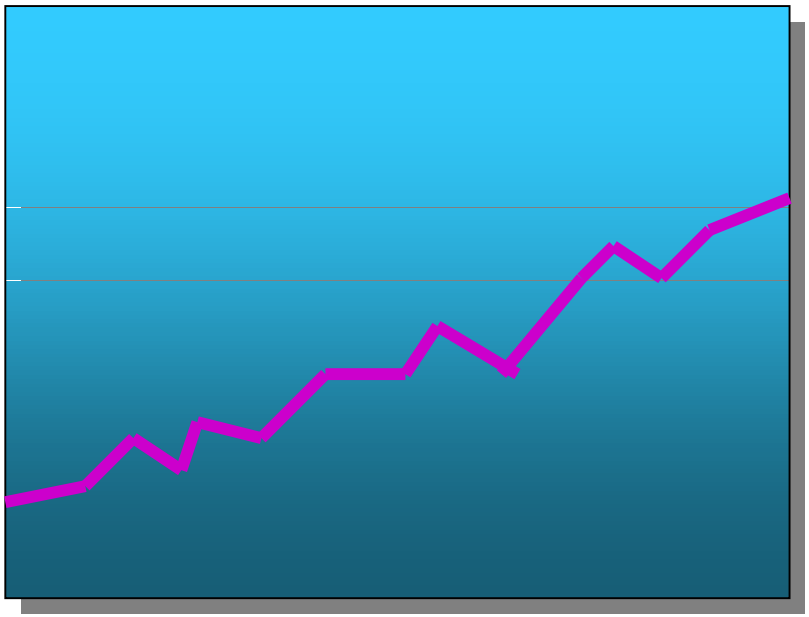
There is nothing wrong with change if it is in the right direction. To improve is to change, so to be perfect is to have change often".

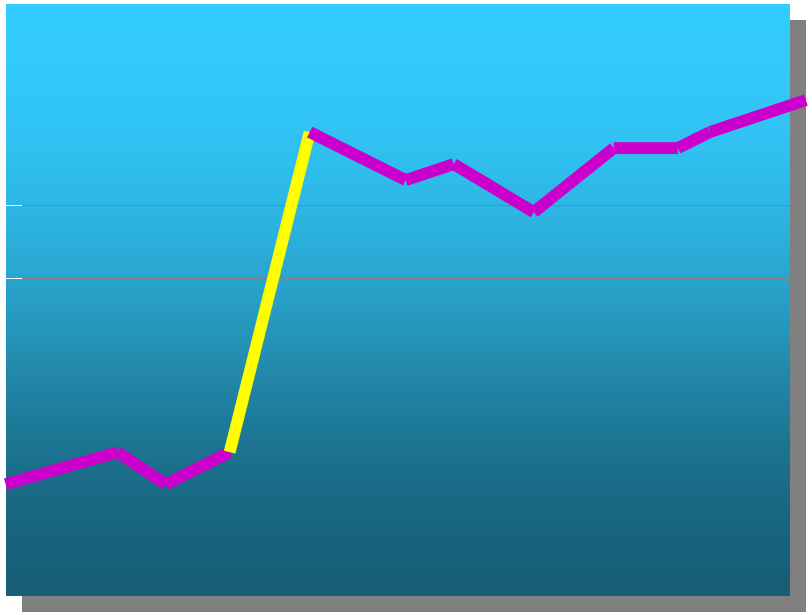
(Winston Churchill)

Some Improvement Initiatives

- Improve Customer Service
- Improve Policy/Procedures
- Improve Work Flow
- Change Work Environment
- Improve Intra-system Communications
- Error Proofing
- Eliminate Waste
- Focus on Variation

TYPES OF CONTINUOUS IMPROVEMENT





Incremental

Transformational

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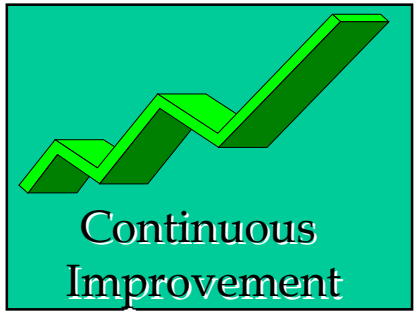
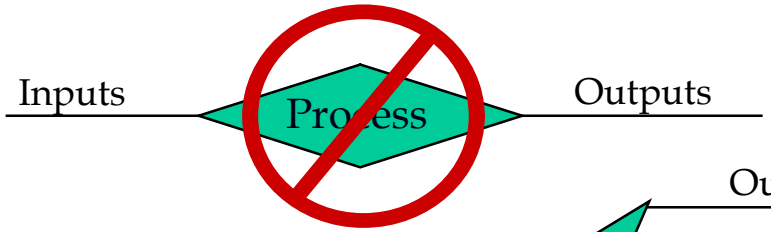
Continuous Improvement



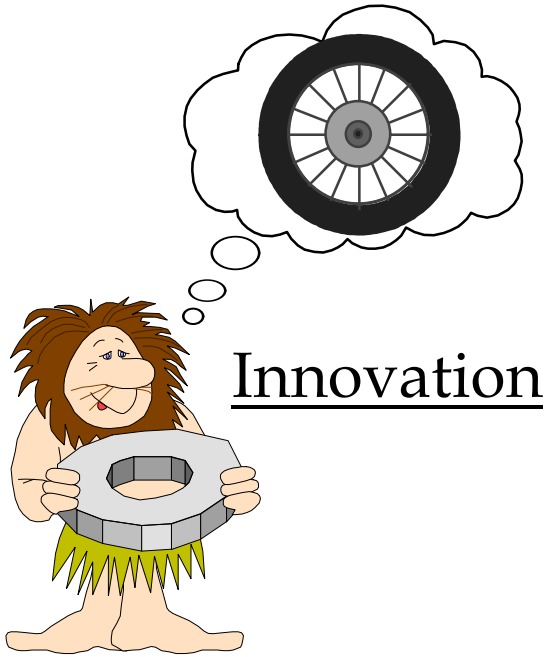
Kaizen

Incremental change over time, averaging 30% per change cycle

Business Process Reengineering



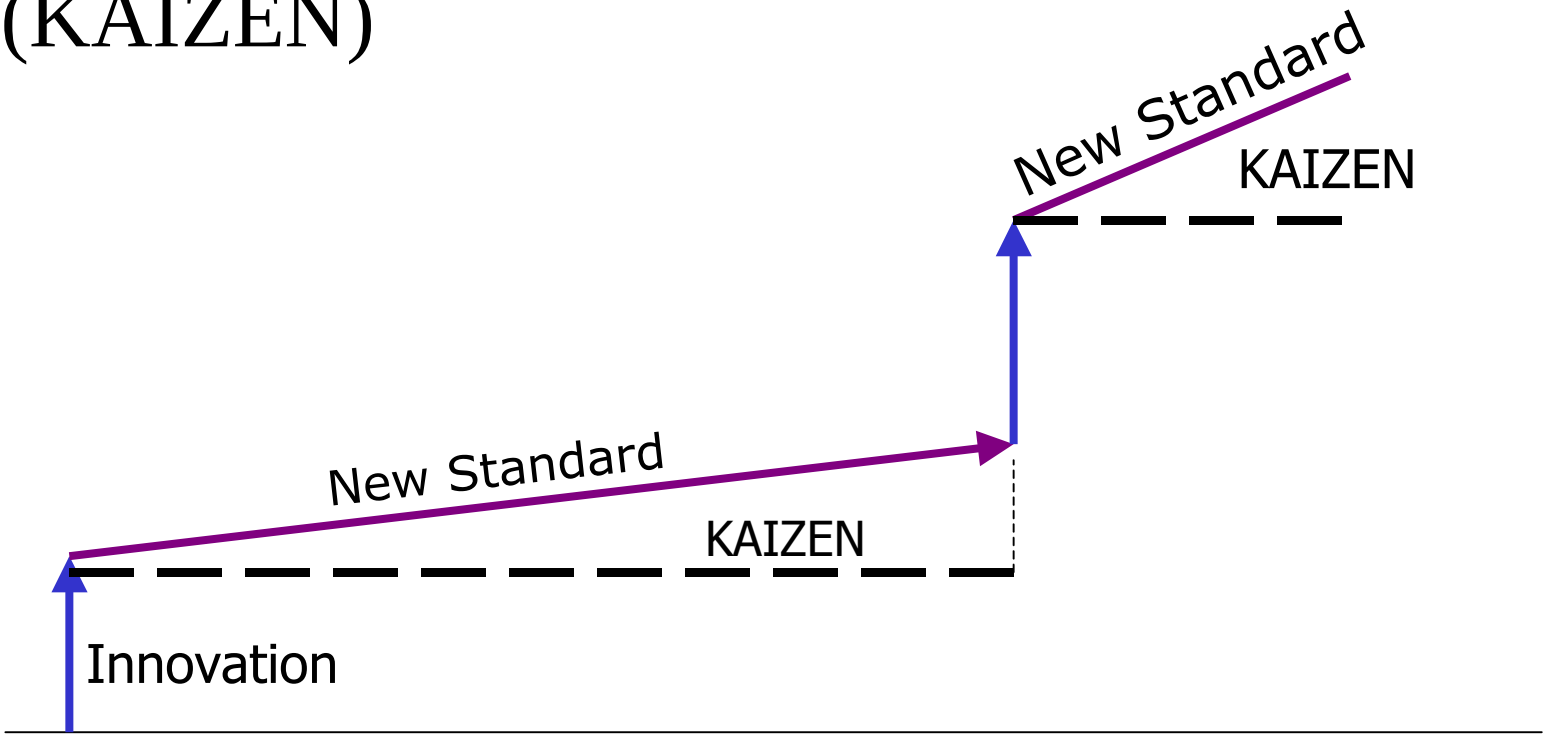
Keep the inputs & required outputs, discard old process & reengineer new



Innovation

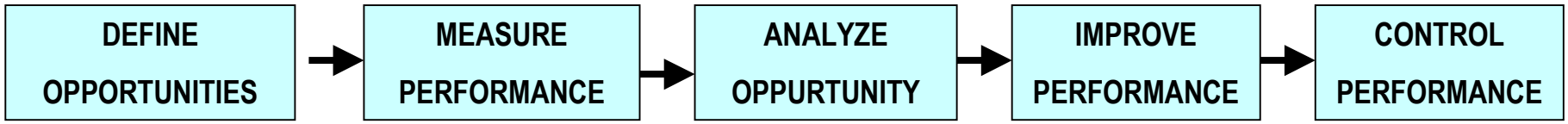
The preferable CI in an Organization

- Innovation (Six Sigma,BPR) plus Incremental (KAIZEN)



General Approach

Roadmap to Improvement



WHAT IS IMPORTANT	**HOW ARE WE DOING**	**WHAT IS WRONG**	**WHAT NEED TO BE DONE**	**HOW DO WE GURANTEE PERFORMANCE**

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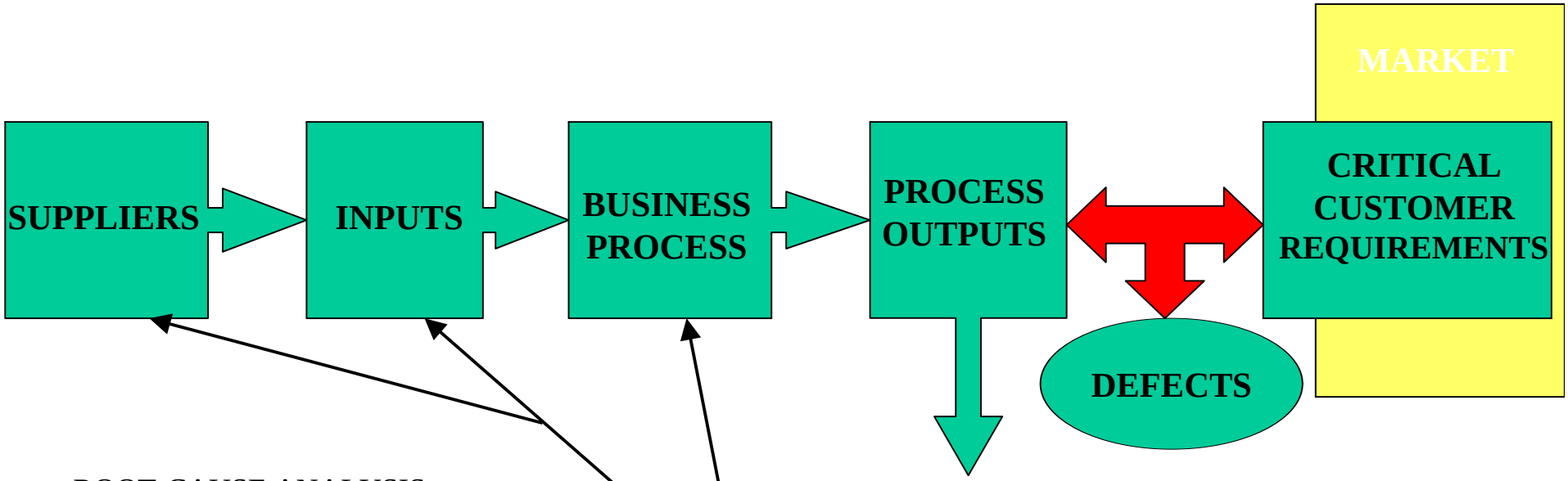
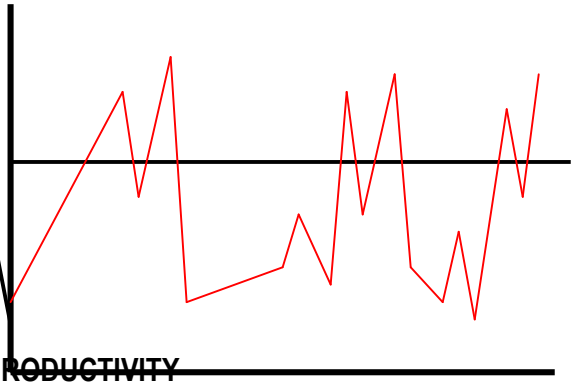
BUSINESS IMPROVEMENT MODEL



ROOT-CAUSE ANALYSIS OF DEFECTS LEADS TO PERMANENT DEFECT REDUCTION



VARIATION IN THE OUTPUT OF PROCESSES CAUSES DEFECTS

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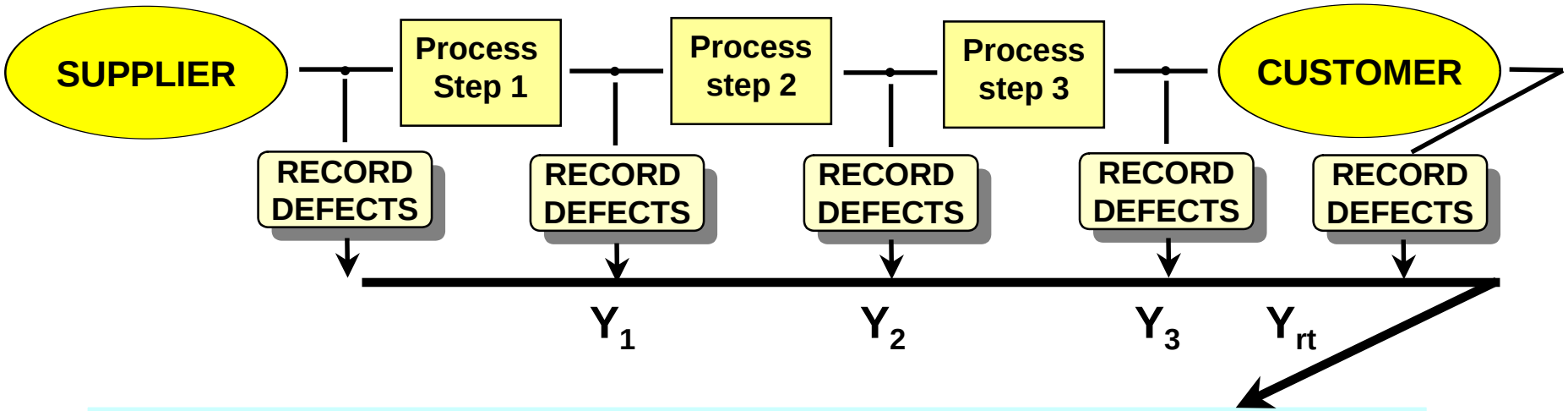
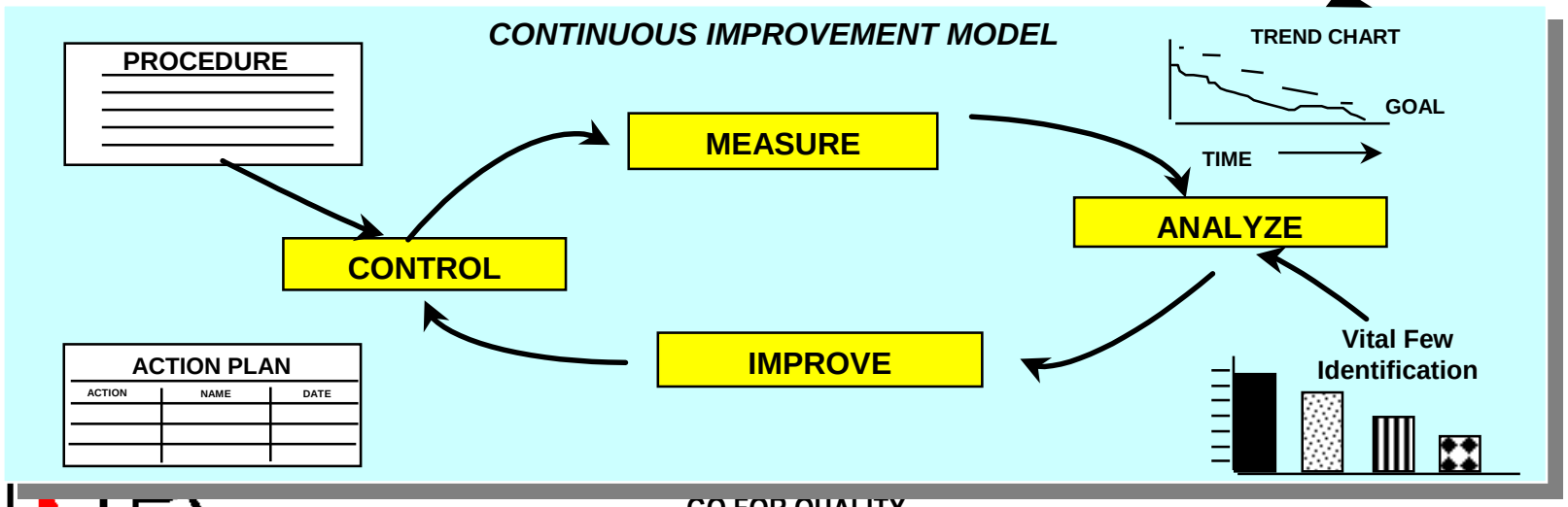
Continuous Improvement





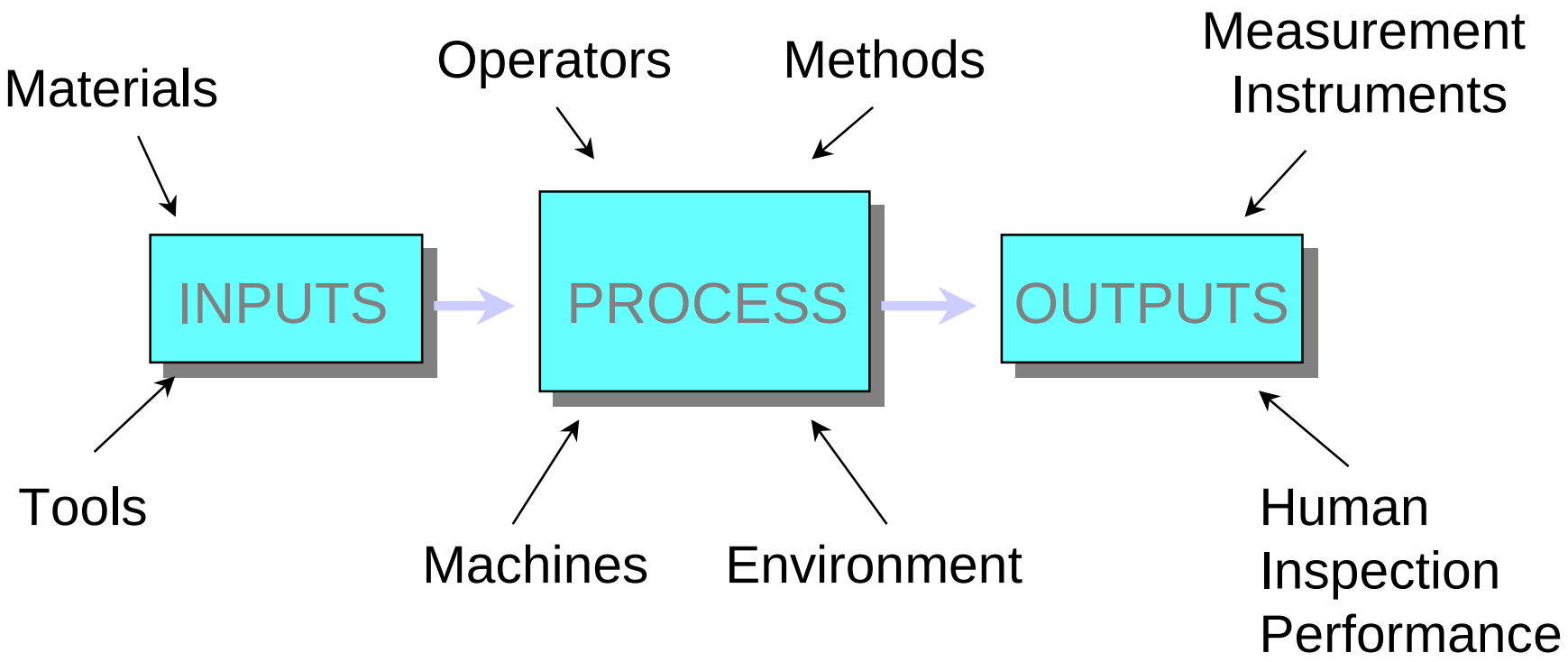
What Causes Defects?

…….Variation

- Possible variability
  - Variability in the machine operation
  - Variability in tool dimensions
  - Variability in the setup
  - Variability in the materials
  - Variability from operator control
  - Variability in the environment
  - Variability of other sources

Quality is inversely proportional to variability

Sources of Variation in Production Processes



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Processes

- **Everything we do can be considered a process or part of a process (input-process-output)**

- **Every process can be characterized by:**
  - Average performance
  - Variation

- **Processes are performing optimally when the result of the process is at the expected value (meaning there is minimal variation)**

Variation

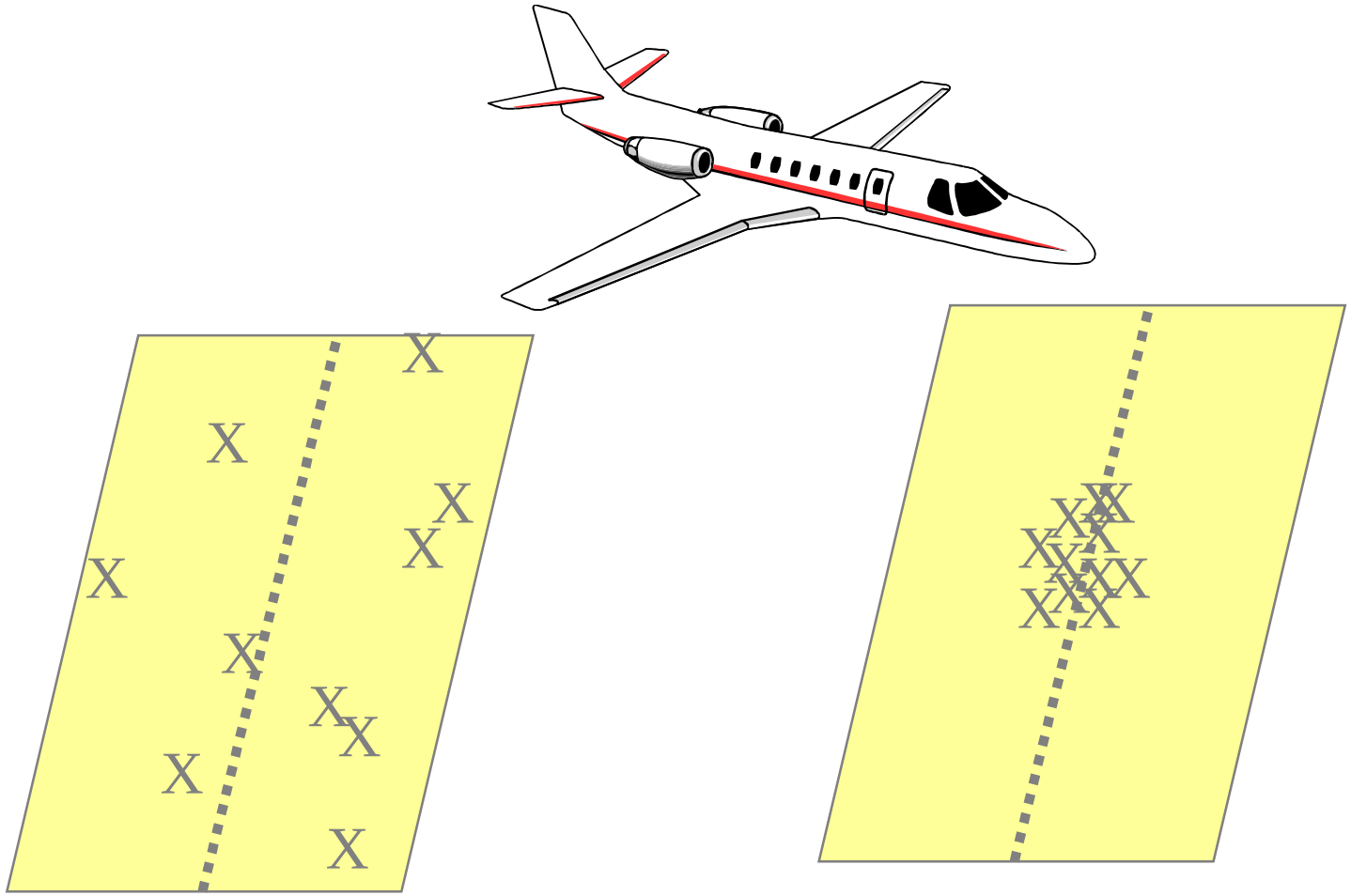
- Variation means that a process does not produce exactly the same result every time the product or service is delivered.

- Variation exists in all processes

- Measuring and understanding variation in our business processes helps identify specifically what the current level of performance is and what needs to change in order to reduce the variability and reduce the defects delivered to customers.

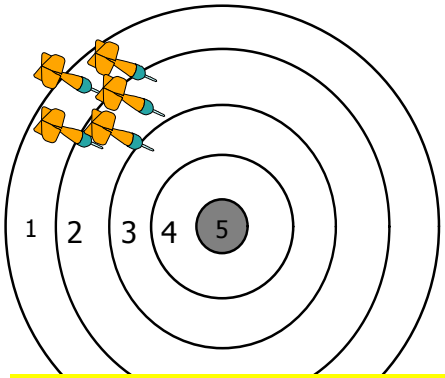
Too much variation in any process resulted in poor customer satisfaction and ineffectiveness process.

Variation-
Which Pilot Would You Choose?

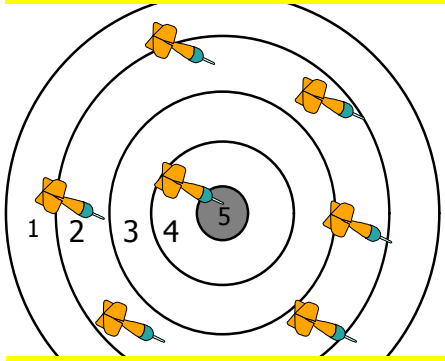


Airplane landing's example

What is Really Happening?

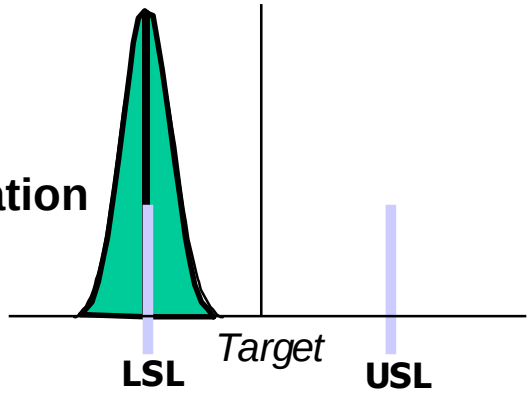


Precise, but not Accurate

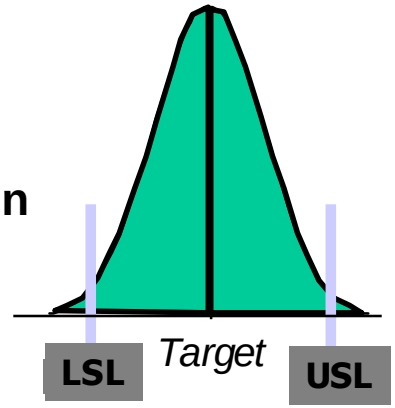


Accurate, but not Precise

Off target, Small Deviation



On target, Large Deviation



Process Analysis

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Key Attitudes of Process Improvement:

1. Most problems are in the process, not the person!
2. Don't blame the person - fix the process.
3. Every process can be improved – forever!
4. Problems are normal – each an opportunity to learn.
5. Measurement of processes leads to improvement.
6. Every process must have a "process owner" or team responsible for its execution and improvement.
7. We "know what we are doing" by knowing the process.

Process and product quality

- Process quality and product quality are closely related
- A good process is usually required to produce a good product
- For manufactured goods, process is the principal quality determinant
- For design-based activity, other factors are also involved especially the capabilities of the designers

Principal product quality factors

Development technology

Process quality

People quality

Cost, time and schedule

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Process analysis

- Study an existing process to understand its activities
- Produce an abstract model of the process. You should normally represent this graphically. Several different views (e.g. activities, deliverables, etc.) may be required
- Analyse the model to discover process problems.

The Seven Wastes

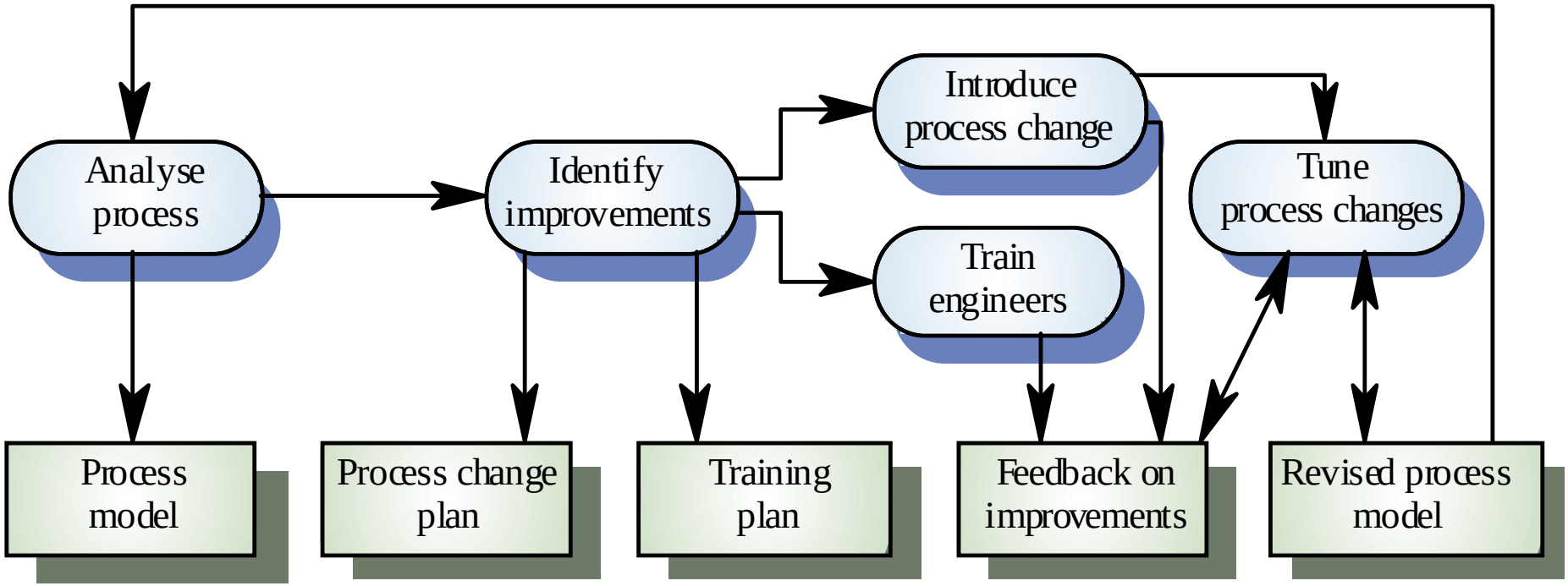
Manufacturing	Service
• Defects	• Errors in Documents
• Transportation	• Transport of Documents
• Overproduction	• Doing Work Not Requested
• Waiting	• Waiting for the Next Step
• Processing	• Process Steps & Approvals
• Movement	• Unnecessary Motion
• Inventory	• Backlog of Work

Waste adds costs but does not add value as defined by customer

Process improvement

- Understanding existing processes
- Introducing process changes to achieve organisational objectives which are usually focused on quality improvement, cost reduction and schedule acceleration
- Most process improvement work so far has focused on defect reduction. This reflects the increasing attention paid by industry to quality

The process improvement process



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Process improvement stages

- Process analysis
  - Model and analyse (quantitatively if possible) existing processes
- Improvement identification
  - Identify quality, cost or schedule bottlenecks
- Process change introduction
  - Modify the process to remove identified bottlenecks
- Process change training
  - Train staff involved in new process proposals
- Change tuning
  - Evolve and improve process improvements

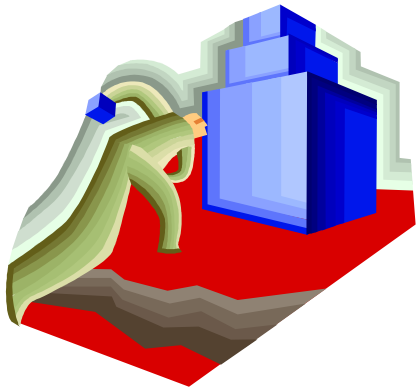
Process measurement

- Wherever possible, quantitative process data should be collected
  - However, where organisations do not have clearly defined process standards this is very difficult as you don't know what to measure. A process may have to be defined before any measurement is possible

- Process measurements should be used to assess process improvements
  - But this does not mean that measurements should drive the improvements. The improvement driver should be the organizational objectives

Classes of process measurement

- Time taken for process activities to be completed
  - E.g. Calendar time or effort to complete an activity or process
- Resources required for processes or activities
  - E.g. Total effort in person-days
- Number of occurrences of a particular event
  - E.g. Number of defects discovered



Map the Process

A process is a set of related activities that together achieve a defined purpose. A process is comprised of specific steps or tasks, which can be measured, and continuously improved.

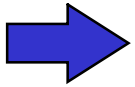
Process Mapping

- Visualizing the process helps create understanding and consensus.
- The map represents the actual flow of events.
- Helps create orderly thinking and analysis.
- Becomes a focus for continuous improvement.

Process Flowchart Symbols

Operations

Inspection



Transportation

D

Delay

Storage

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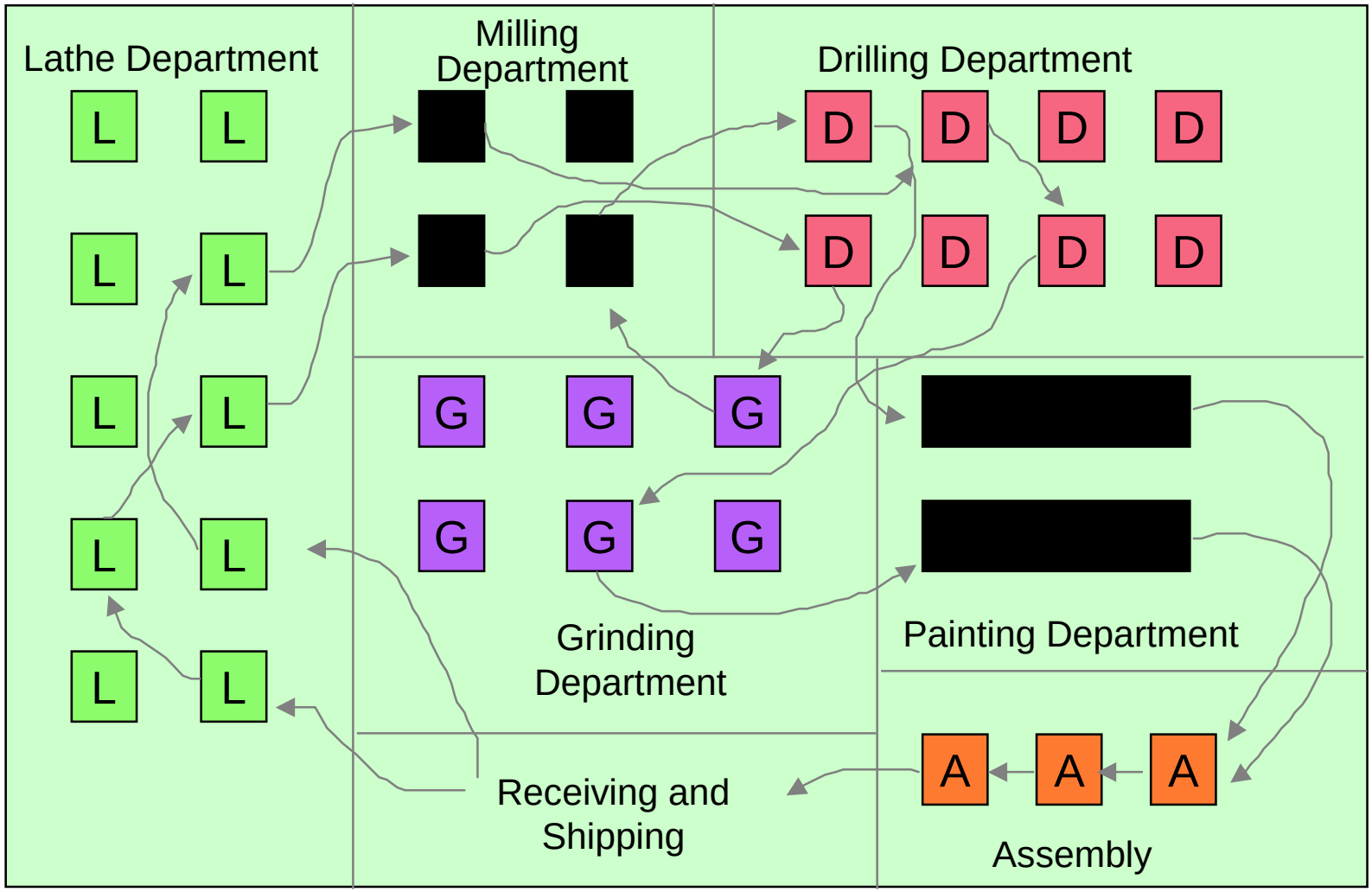
Process Flowchart

Date: 9-30-95 Location: Graves Mountain

Analyst: TLR Process: Apple Sauce

Step	Operation	Transport	Inspect	Delay	Storage	Description of process	Time (min)	Distance (feet)
1	●	⇨	□	D	▽	Unload apples from truck	20	
2	○	⇨	□	D	▽	Move to inspection station		100 ft
3	○	⇨	■	D	▽	Weigh, inspect, sort	30	
4	○	⇨	□	D	▽	Move to storage		50 ft
5	○	⇨	□	D	▼	Wait until needed	360	
6	○	⇨	□	D	▽	Move to peeler		20 ft
7	●	⇨	□	D	▽	Apples peeled and cored	15	
8	○	⇨	□	D	▼	Soak in water until needed	20	
9	●	⇨	□	D	▽	Place in conveyor	5	
10	○	⇨	□	D	▽	Move to mixing area		20 ft
11	○	⇨	■	D	▽	Weigh, inspect, sort	30	
	Page 1 0f 3					Total	480	190 ft

Manufacturing Process Layout



How? ...

Various Kaizen Programs Integrated into the Workplace

5 S	Seiri, Seiton, Seiso, Seiketsu, Shitsuke
KSS	Kaizen Suggestion System
QCC	QC Circle/QIT
6 Sigma	Six Sigma
TPM	Total Productive Maintenance
JIT	Just-In-Time Production

A Suggested Sequence of Implementing Kaizen Programs

TPM

6 Sigma

JIT

QCC

KSS

Start Here

5S

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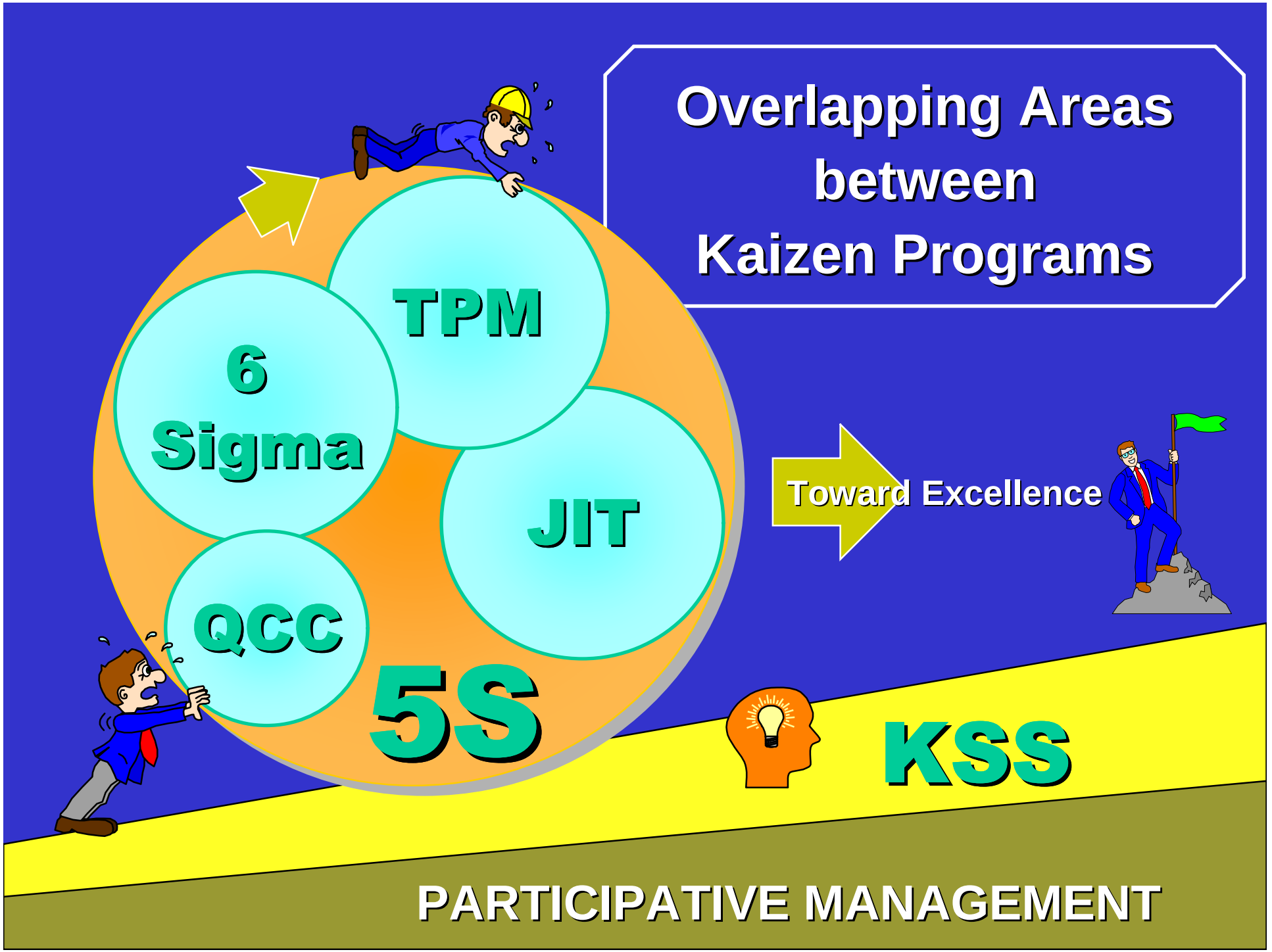
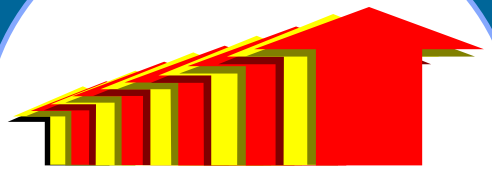
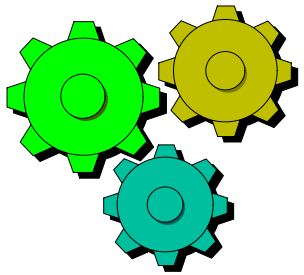

Overlapping Areas between Kaizen Programs
TPM
6 Sigma
JIT
QCC
5S
Toward Excellence
KSS
PARTICIPATIVE MANAGEMENT

COMMON ASPECTS OF KAIZEN PROGRAMS



Incremental but continuous progress

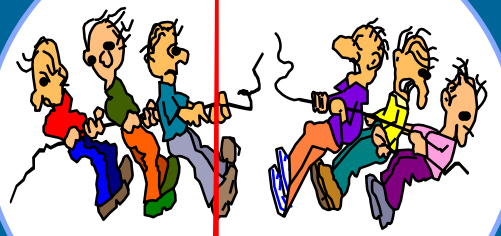
People-oriented



Process-oriented

Little investment but

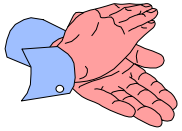
Great efforts

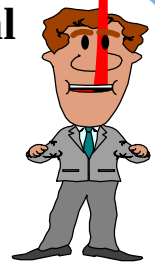


Group efforts

Conventional know-how

Educational and





Morale boosting

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Another Look--Fitting It All Together

- **ISO 9000 Focuses on Basics**
- **Baldrige/PM Provides Integration**
- **Balanced Scorecard Gauges Progress**
- **6 Sigma Drives Improvement**

Questions?

Thank you for your time. If you have any other questions, please feel free to contact me through my website at:

kabir@npc.org.my

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