



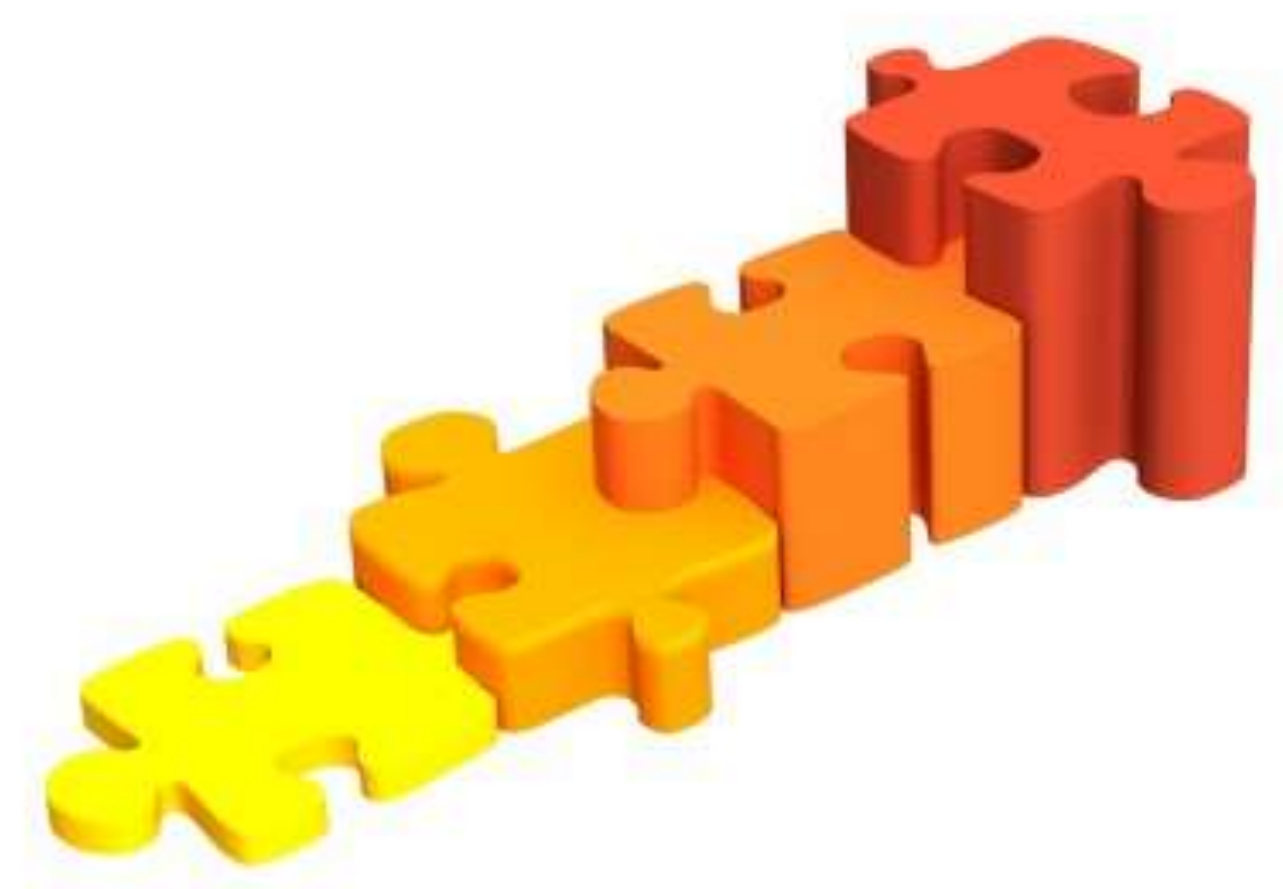
## **Lecture 7: Quality Control in Logistics Management**

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# Learning Objectives

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- To understand what is meant by the term quality
- To examine quality in context & the need to focus on quality
- To understand total quality management



# In-class activity

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**Why is quality so important?**

**What are the implications of poor quality?**

The cost poor quality examples Video:

**[https://youtu.be/jYj\\_R4oCTPI](https://youtu.be/jYj_R4oCTPI)**

# Toyota Recalls

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- Quality (safety) issues with brakes, airbags etc. leading to mass recalls
  - Customer confidence
  - Cost
- Toyota's TPS and TQM



# Dreamliner and A380s Grounded

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- Boeing 787 Dreamliner – batteries
- A380 – cracks in wings; engines
- Disruption to flight services
- Often discovered soon after launch



# Why focus on Quality?

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- !! No focus on quality means lose market share and reputation.
- !! Good reputation is easier to lose than regain.
- !! People trust and become accustomed to favourites.
- !! They remember the bad. "I'll never go there again"!
- !! Threat of substitute suppliers



## In-class activity

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- Think of a product that you think is of high quality.....what is it.....what makes it high quality?
- What about poor quality?

# How could we define Quality?

- Perfection
- Eliminating waste
- Compliance with policies
- Doing it right the first time
- Pleasing customers

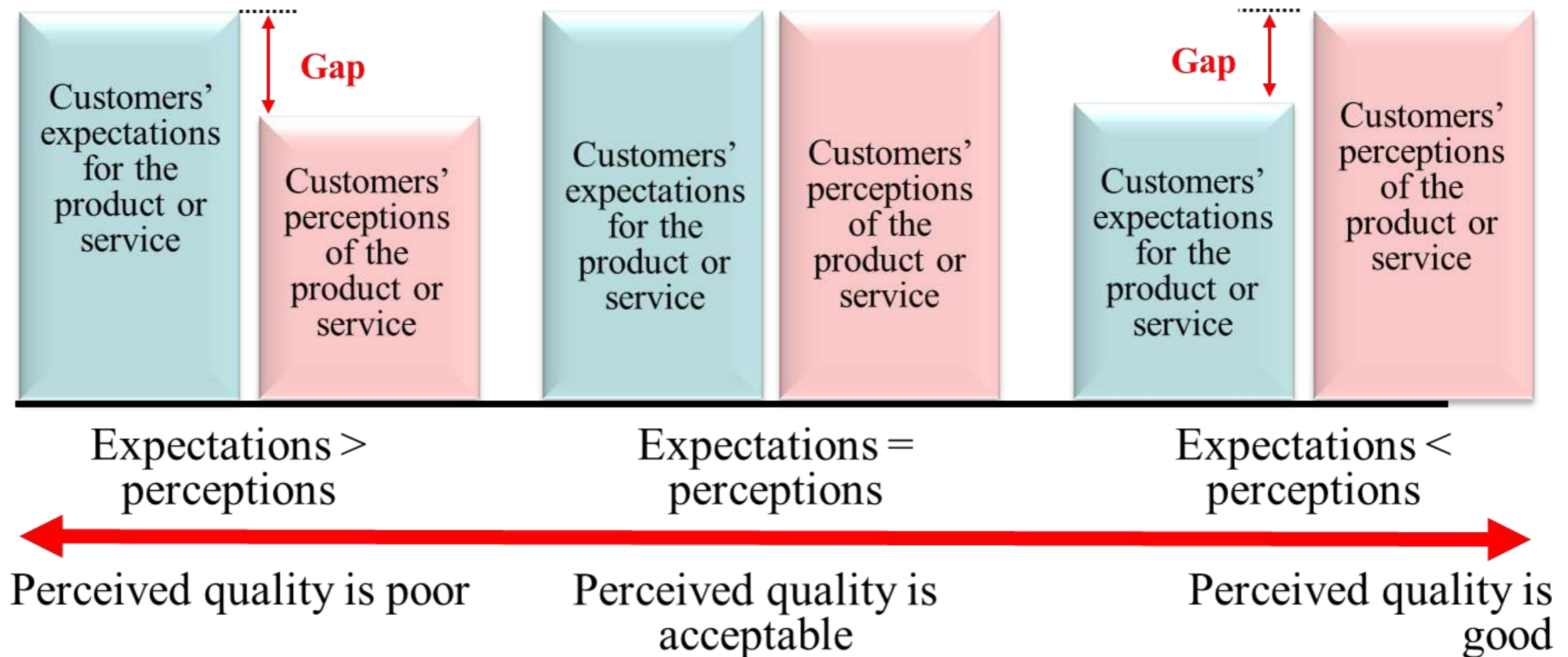
**Any other definitions?**





# Perceived Quality

**Quality** is “consistent conformance to customers’ expectations.”



# Defining Quality

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- Shewhart (1931) defined quality as the “goodness” of a product.
- Legal definitions focus around being “fit for purpose”
- Defining quality around:
  - Product based criteria
  - User based criteria
  - Value based criteria
  - Manufacturing based criteria

# The Eight Dimensions of Product Quality

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David A Garvin, “Competing on the Eight Dimensions of Quality”, *Harvard Business Review*, November-December 1987, pp. 101-109.

- **Performance** – main characteristics of the product/service
- **Special features** – secondary characteristics
- **Aesthetics** – appearance, feel, smell, taste
- **Conformance** – how well the product/service conforms to established standards or customer expectations

# The Eight Dimensions of Product Quality (cont.)

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- **Reliability** – consistency of performance
- **Durability** – useful life of the product or service
- **Perceived quality** – indirect evaluation of quality (e.g. reputation, images, advertising)
- **Serviceability** – speed, courtesy, competence, and ease of repair

# How to Diagnose Quality Problems

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- **Gap 1: the customer's specification – operation's specification** – i.e., service interval of a car
- **Gap 2: the concept – specification** – i.e., climate control system fitted to a car
- **Gap 3: the quality specification – actual quality**
- **Gap 4: the actual quality – communicated image**

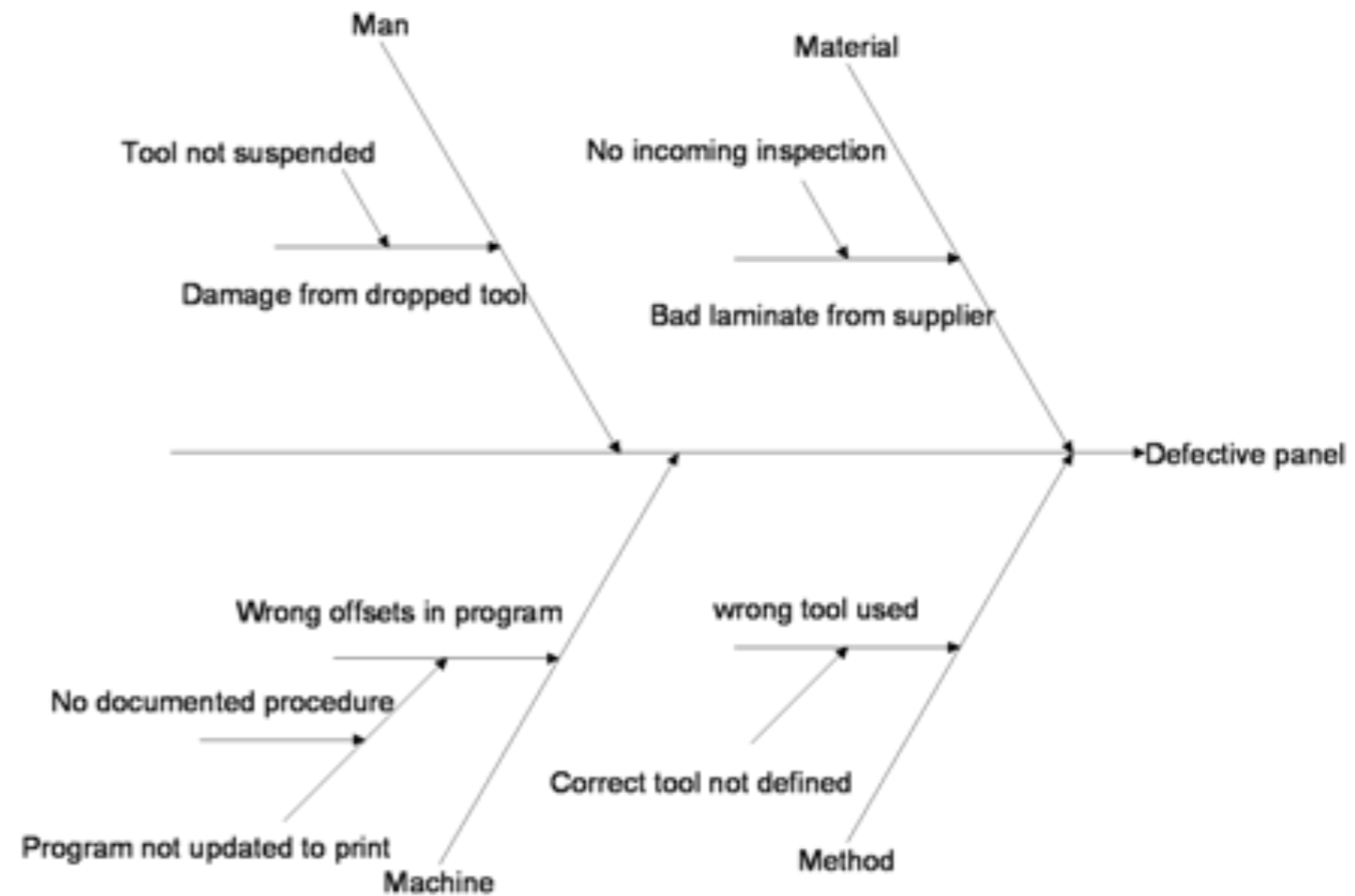
# How to Achieve 'Conformance to Specification'

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- **Step 1: Defining the quality characteristics**
- **Step 2: Decide how to measure each characteristic**
- **Step 3: Set quality standards**
- **Step 4: Control quality against those standards (where, how and how often)**
- **Step 5: Find and correct causes of poor quality**
- **Step 6: Continue to make improvements**

# Ishikawa Fishbone – Cause and Effect

- Searching for root cause
- What, when, where, how, why?
- Or, Manpower, Machinery, Materials, Method, Money.
- Structure to group discussion and analysis



# Continuous Improvements

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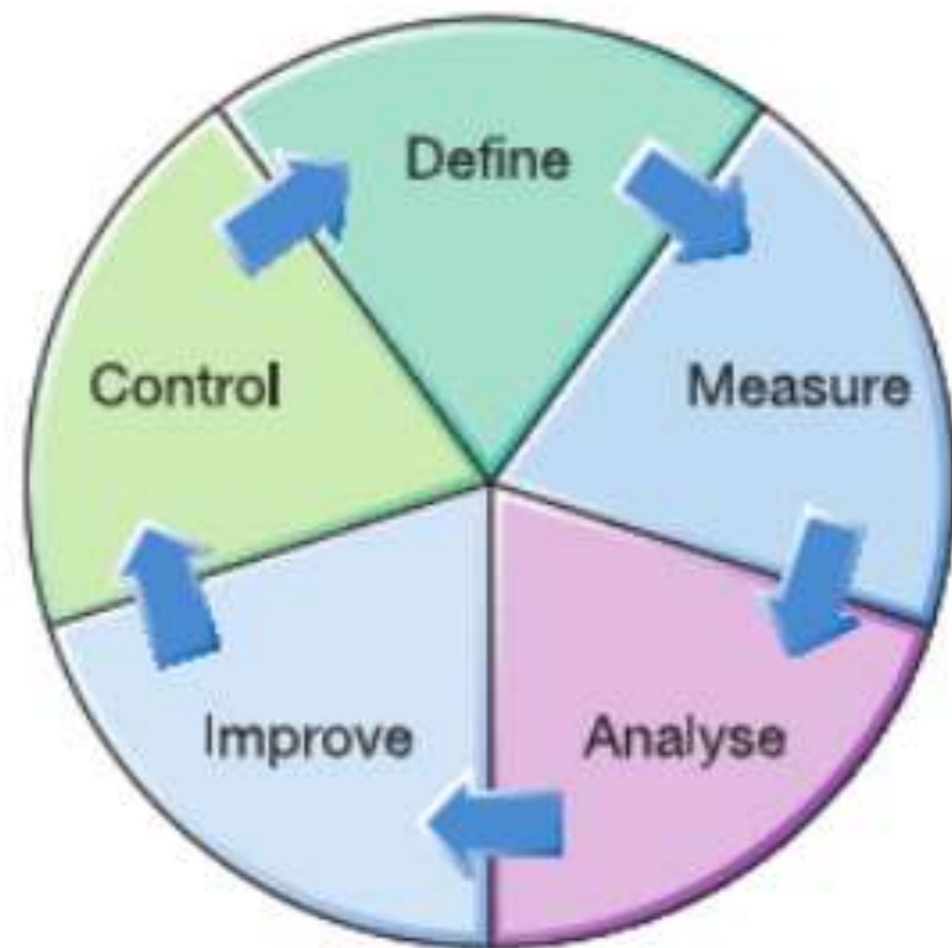
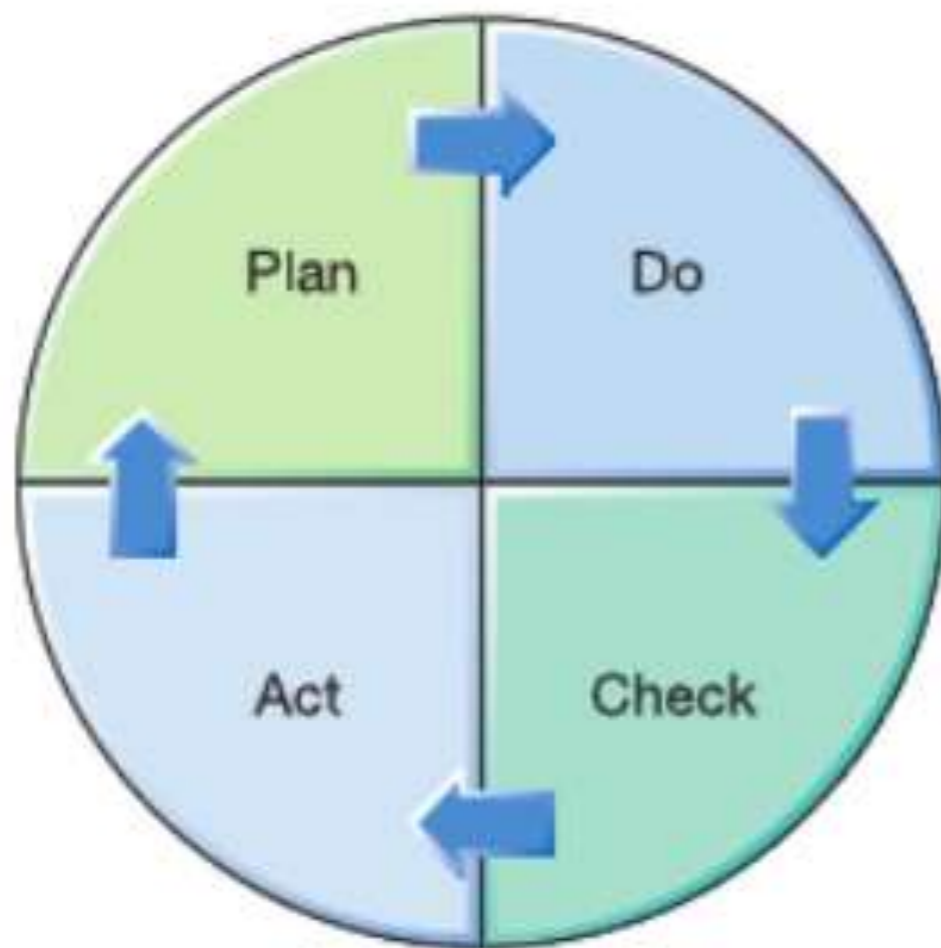
**Audi**

- Audi accepted and implemented 15,000 suggestions for improvements from employees in 2017.
- This led to savings of 108.6 million Euros in 2017.

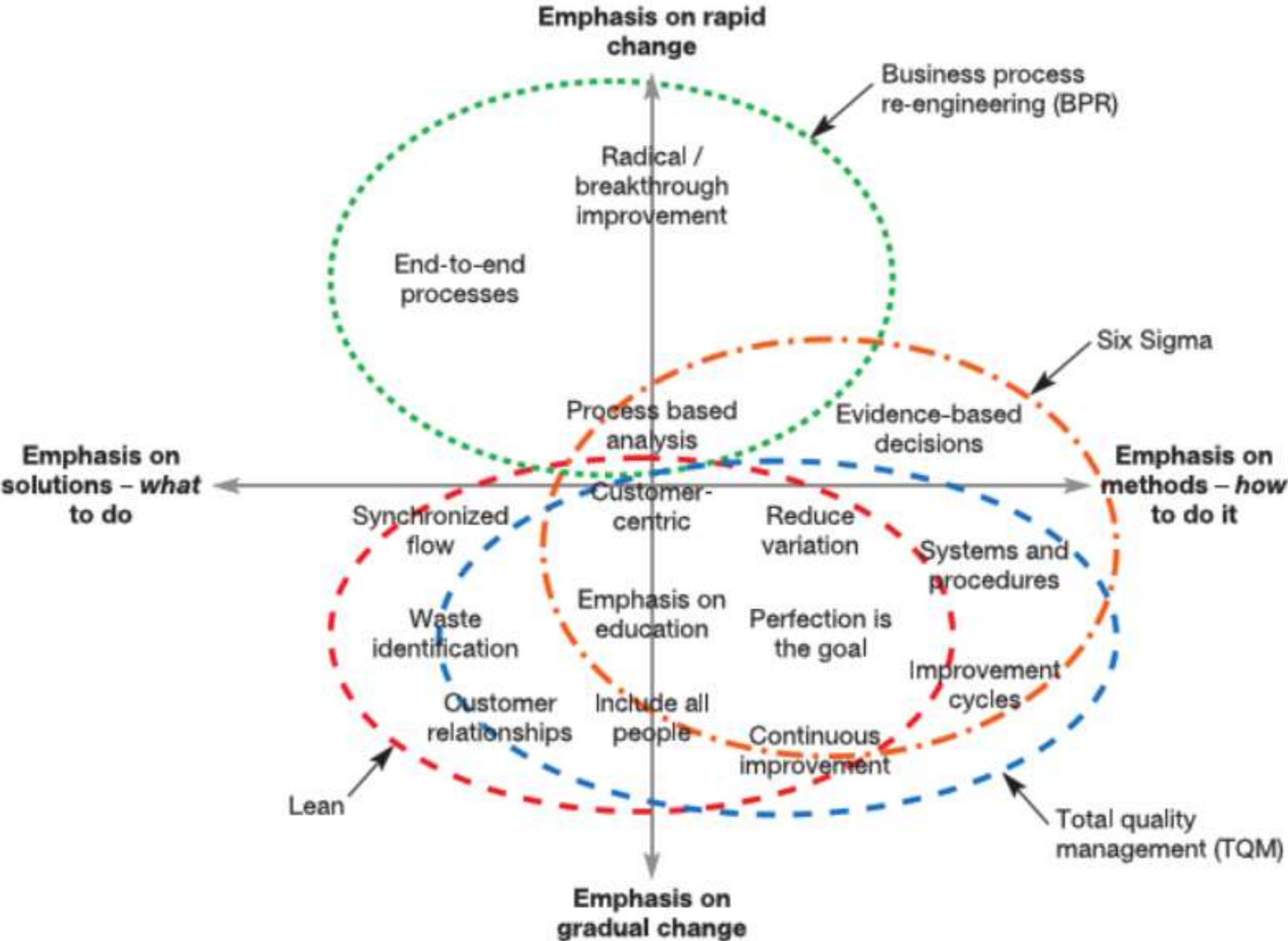


# Improvement Cycles

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# Four Approaches for Improvements



# Six Sigma

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- Six sigma means the specification range of any part of a product or service should be within 6 standard deviation, which is 99.99966%. (3.4 defects per million)
- Motorola's 'Total Customer Satisfaction' in 1980s which focused on removing product defects
- A disciplined methodology of defining, measuring, analysing, improving and controlling the quality in every one of the company's products, processes, and transactions with the ultimate goal of virtually eliminating all defects.

# Six Sigma – Performance Measurement 1

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- **A defect** – failure to meet customer-required performance
- **A defect unit or item** – any unit of output that contains a defect
- **A defect opportunity** – a number of different ways a unit of output can fail to meet customer requirements
- **Proportion defective** – the percentage of fraction of units that have one or more defect
- **Process yield** – the percentage of total units produced by a process that are defect free

# Six Sigma – Performance Measurement 2

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- **Defect per unit (DPU)** – the average number of defects on a unit of output
- **Defects per opportunity (DPO)** – the percentage of defects divided by the total number of defect opportunities
- **Defects per million opportunities (DPMO)** – the number of defects per 1 million opportunities
- **The Sigma measurement** – the number of standard deviation derived from DPMO

# Six Sigma – Example

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- Insurance claims – a random sample of 300 claims
- 51 claims had one or more defects. (74 defects in total)
- 4 types of errors (coding, policy conditions, liability and notification)
- Proportion defective: 17% ( $= 51/300$ )
- Yield: 83% ( $= 1-0.17$ )
- DPU: 24.7% ( $= 74/300$ )
- DPO: 6.2% ( $= 74 / (300 * 4)$ )
- DPMO: 62,000 ( $= 0.0062 * 1,000,000$ )

# What is TQM?

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- a holistic approach to the management of quality
- emphasizes the role of all parts of an organization and all people within an organization to influence and improve quality
- a philosophy of how to approach the organization of quality improvement



# Definition of TQM

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An effective system for integrating the quality development, quality maintenance, and quality improvement efforts of the various groups in an organisation to enable production and service at the most economical levels which allow for full customer satisfaction

(Slack et al., 2016)

  
T total  
Q uality  
M anagement



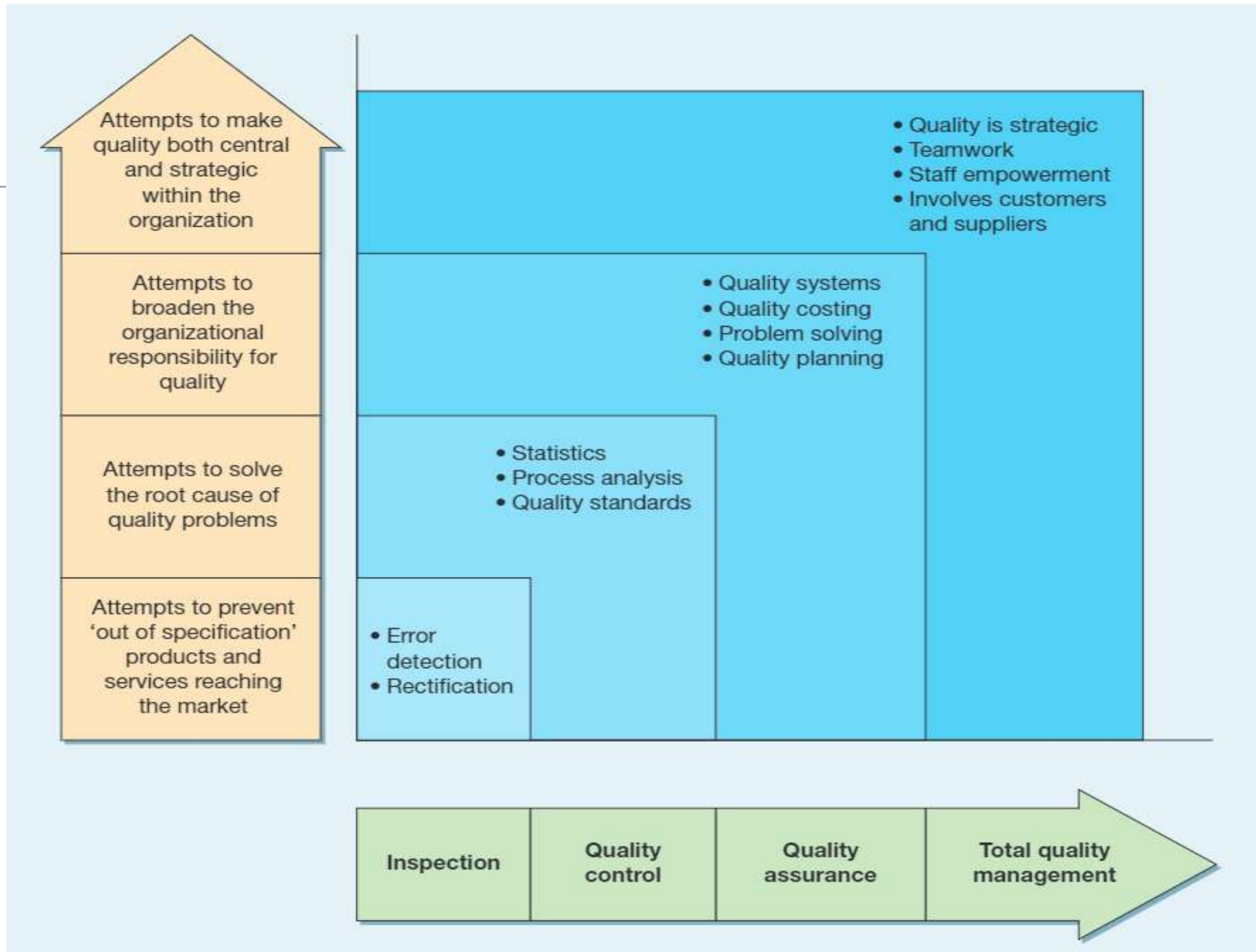


Figure 1. Total Quality Management

# Key Aspects of TQM

## 1. Meeting the needs and expectations of customers

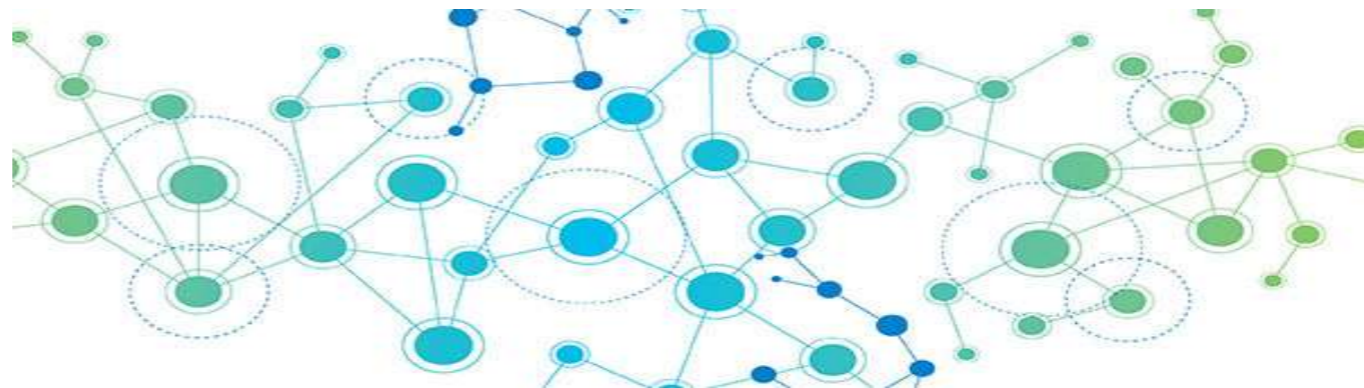
- Customer centricity or voice of the customer
- Start with an insight into customer needs, wants, perceptions, and preferences
- Translate them into quality objectives and drive customer improvement



# Key Aspects of TQM (cont.)

## 2. Covering all parts of the organization

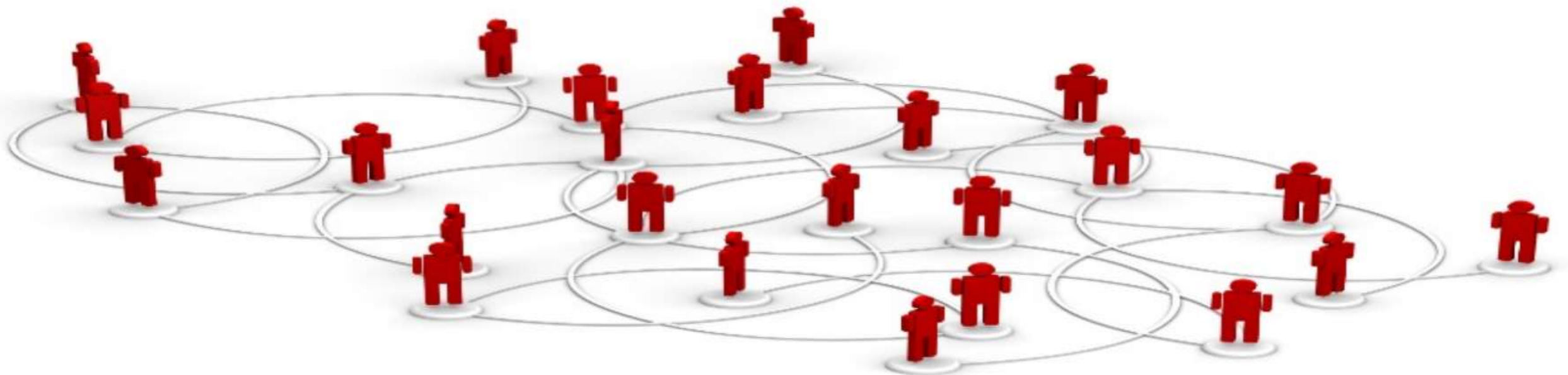
- Each department, each activity, each person, and each level need to work together
- **Internal customer/supplier concept:** everyone is a customer and supplier within an organization
- Use of **Service level agreements (SLAs)** within an organization e.g. for response times and range of services



## Key Aspects of TQM (cont.)

### **3. Including every person in the organization**

- Everyone should contribute.
- Scope for creativity and innovation



## Key Aspects of TQM (cont.)

### **4. All costs of quality are considered**

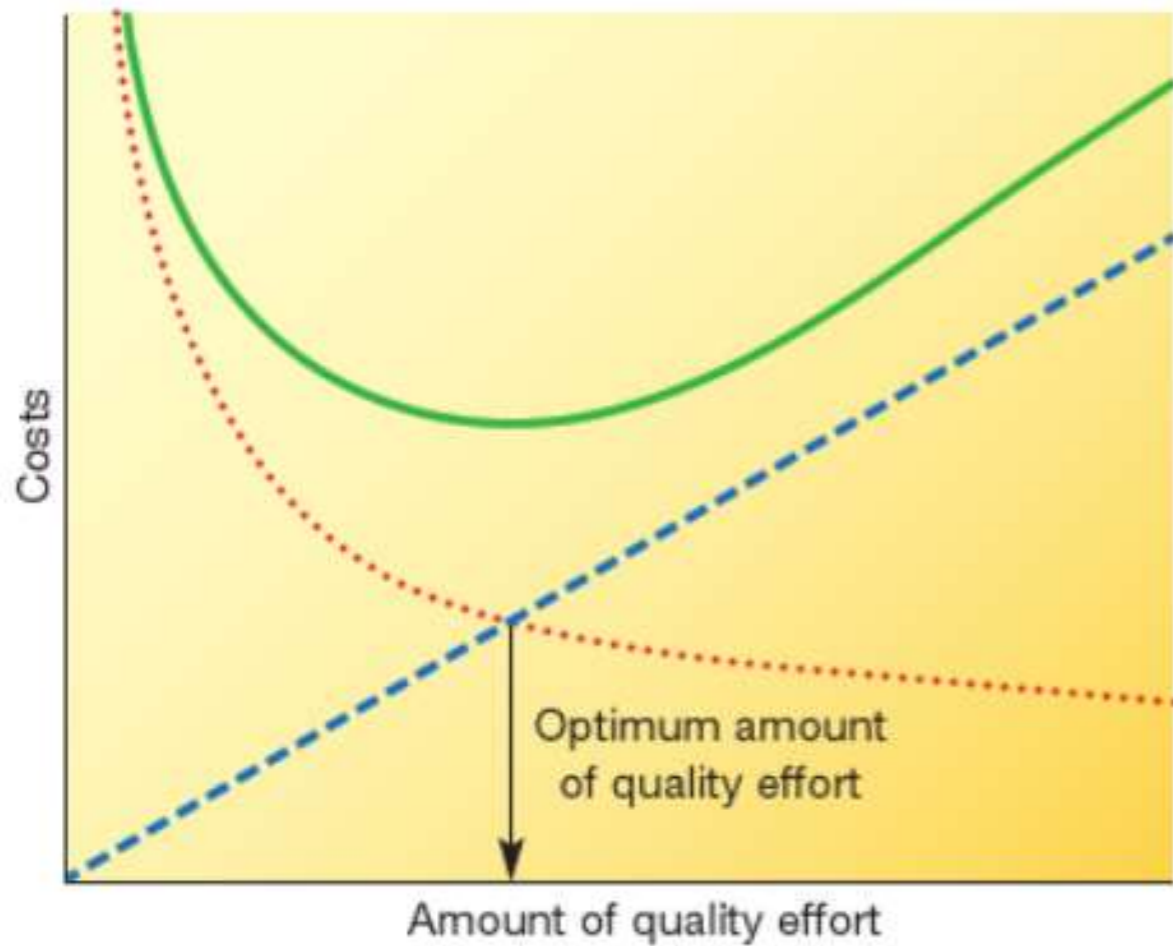
- Prevention costs
- Appraisal costs
- Internal failure costs
- External failure costs

Can you think of any examples for each cost category?

# Key Aspects of TQM (cont.)

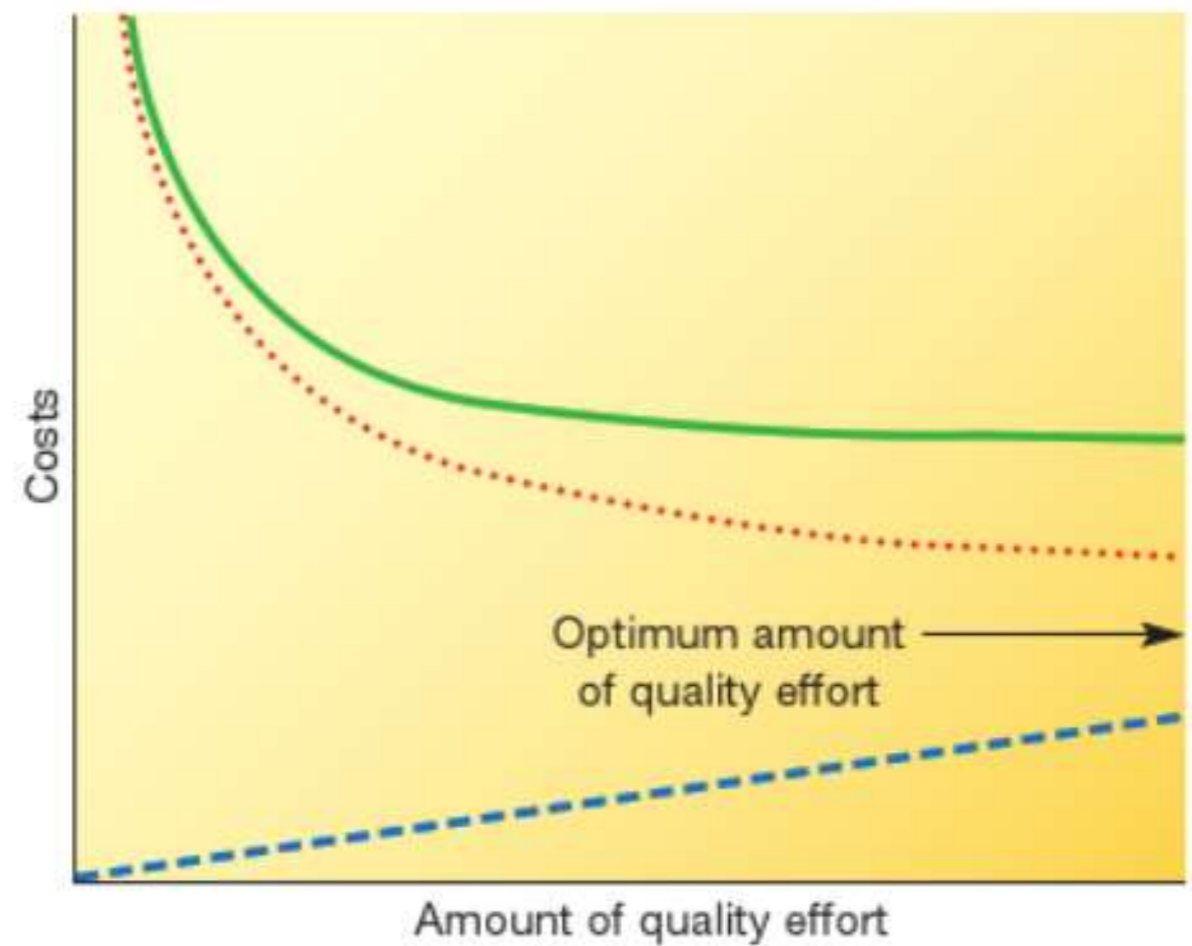
## 4. All costs of quality are considered (cont.)

Traditional quality model



(a)

TQM-adjusted quality model

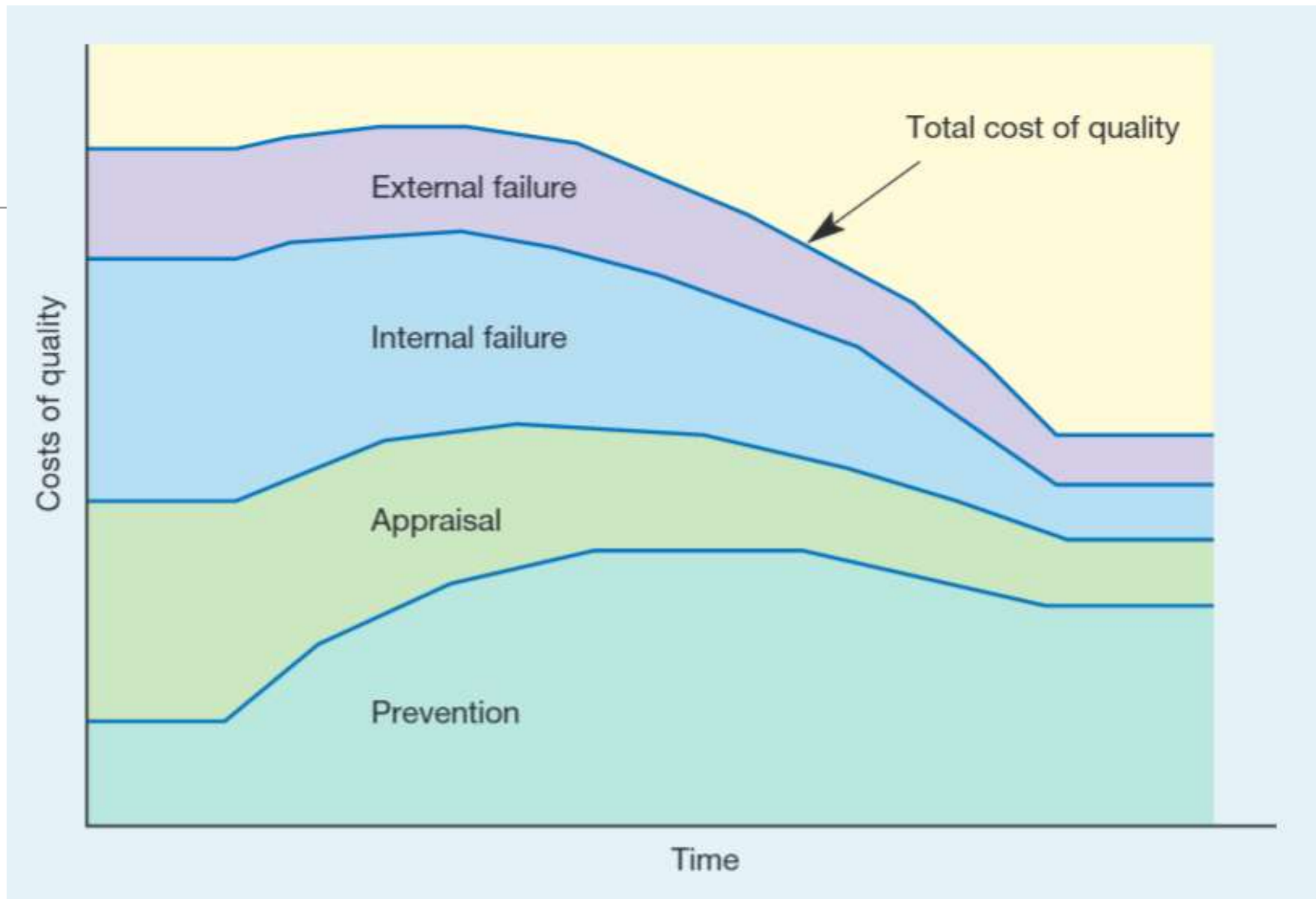


(b)

..... Cost of errors = costs of internal and external failure

---- Cost of quality provision = costs of prevention and appraisal

— Total cost of quality



Increasing the effort spent on preventing errors occurring in the first place brings a more than equivalent reduction in other cost categories

## Key Aspects of TQM (cont.)

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### 5. Developing the systems and procedures which support quality improvement



#### ISO 9001

The standards provide **guidance** and **tools** for companies and organizations who want to ensure that their products and services **consistently meet customer's requirements**, and that **quality is consistently improved**



# Key Aspects of TQM (cont.)

## 6. Development a continuous process of improvement

➤ Lean approach

Aims to meet demand with perfect quality and no waste



## In-class activity

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**What TQM activities is Toyota using and what each activity involves?**

[https://www.youtube.com/watch?v=pdaWR\\_EoI1k](https://www.youtube.com/watch?v=pdaWR_EoI1k)



# Summary

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- Quality is not just about the finished product it encompasses all areas of the business.
- Poor quality can and will result in poor performance.
- Total quality management is the most comprehensive method for shaping and improving quality.



# Further - Advanced Reading

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- Weissman, R (2017) Kobe Steel's quality scandal is an age-old supply chain tale (online) available from <http://www.supplychaindive.com/news/Kobe-Steel-scandal-data-supplier-fraud/507729/>
- Danigelis, A. (2017) *Right on Time: Why Businesses Need Quality Management System Software* (online) available from <https://www.environmentalleader.com/2017/10/right-time-businesses-need-quality-management-system-software/>

# Thank you!

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