QUALITY MANAGEMENT & PRODUCTIVITY

Meryem ŞAHİN TÜTÜNCÜ
Hacettepe University Department of Chemical Engineering
KMÜ 310

Meryem ŞAHİN TÜTÜNCÜ

- ✓ **Chemical Engineer (Hacettepe University Department of Chemical Engineering)**
- ✓ Head of Quality Management System and Productivity Department to **TÜBİTAK**
- ✓ Experiences of Quality Management Systems, service management and information security systems (CMMI, ISO 9001, ISO 27001, ISO 20000, AQAP-150, AQAP-160, AS 9100/9006, IEEE 12207, ITIL) for 21 year’s.
- ✓ Experiences of Perception Survey design, implementation and analysis
- ✓ CMMI L-3 (**TÜBİTAK Space Technologies Research Institute**) and CMMI L-4 (**TÜBİTAK Software and Data Management Institute**) Process Improvement Projects as Project Manager in TÜBİTAK.
- ✓ 10 year’s experience in defense systems domain.
- ✓ 2 year’s experience in space domain.
- ✓ Management of CMMI Level-3 (**Defence Company**) Improvement Projects, experience in CMMI Class A, Class B Appraisals as CMMI Level-3 SCAMPI A Appraisal Team Member, Ownership of CMMI processes - Product and Process Quality Assurance.

meryem.tutuncu@hacettepe.edu.tr

meryem.tutuncu@tubitak.gov.tr

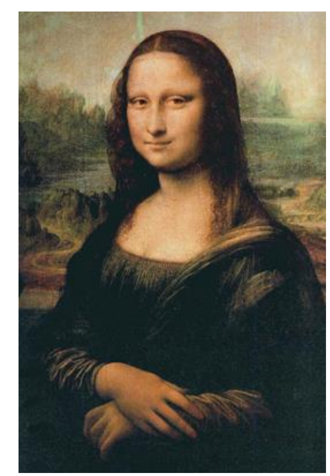
What is Expectation? (Iterative)

Iterating allows you to move from vague idea to realization

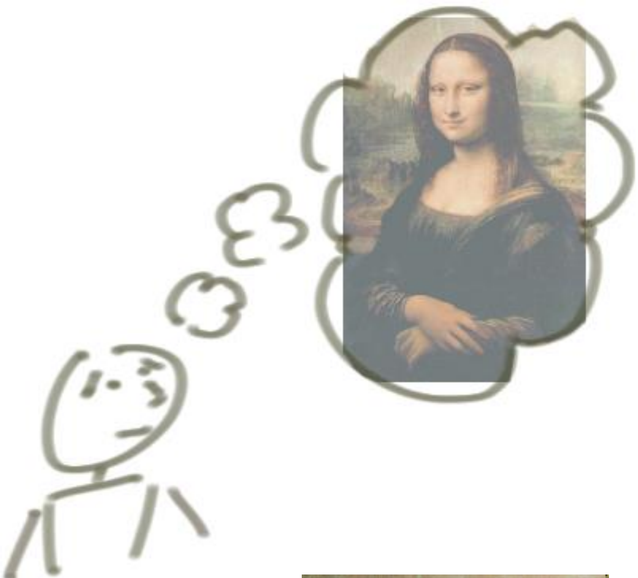
1

2

3

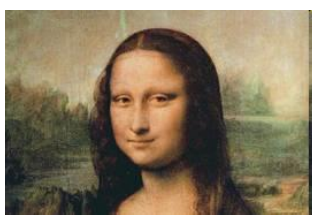


What is Expectation? (Incremental)

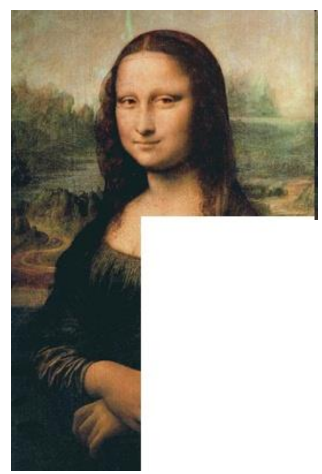


But, incrementing calls for a fully formed idea

1

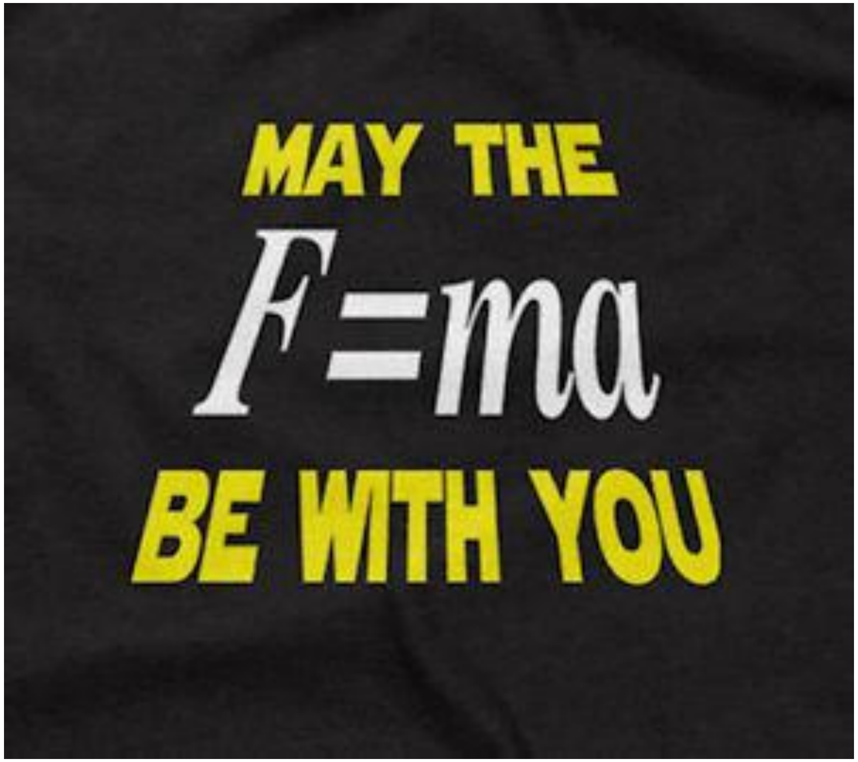


2



3

What is Expectation?



Lecture Outline

Chapter 1

- Quality Concepts
- History of Quality Methodology
- Quality Gurus

Chapter 2

- Evolution of Quality
- Quality Management
- Deming's Principles
- Total Quality Management

Chapter 3

- Process Approach
- Process Improvement
- Tools and Techniques

Chapter 4

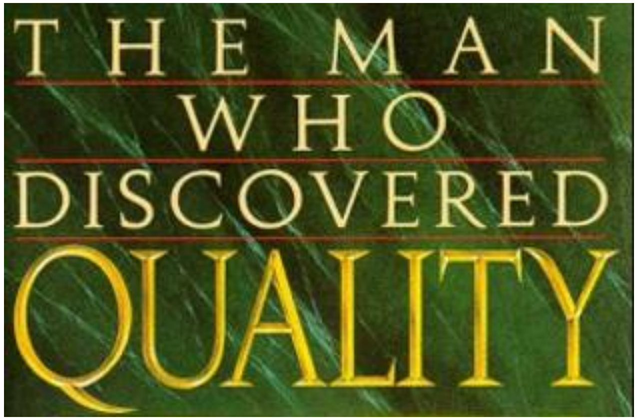
- Quality and Productivity

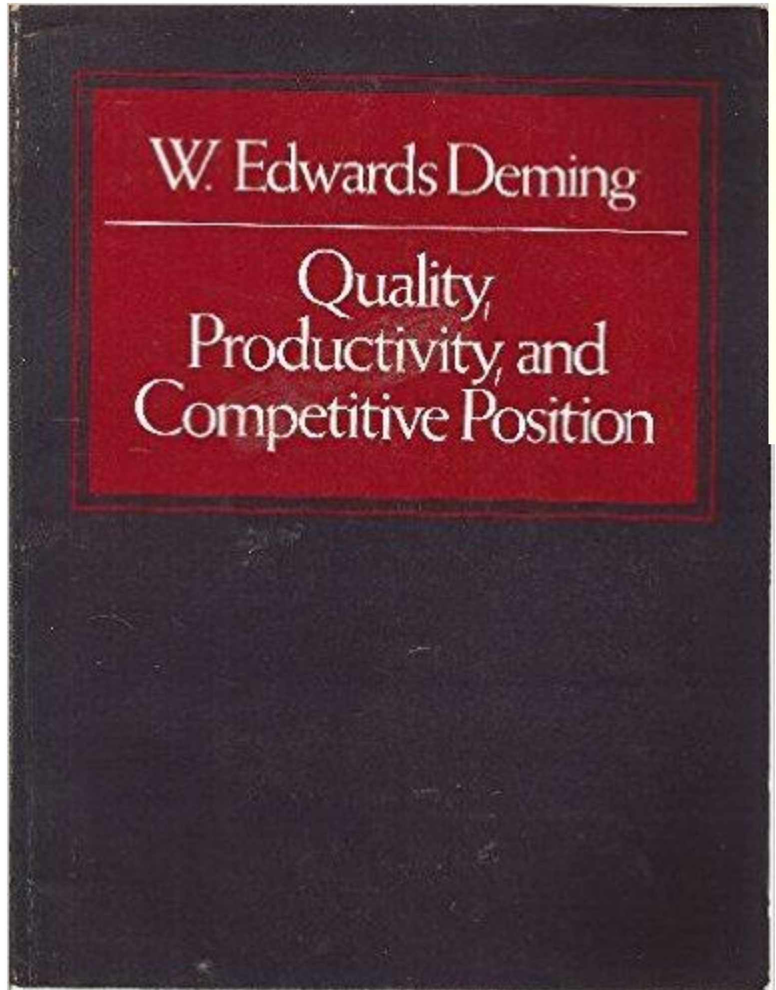
Chapter 5

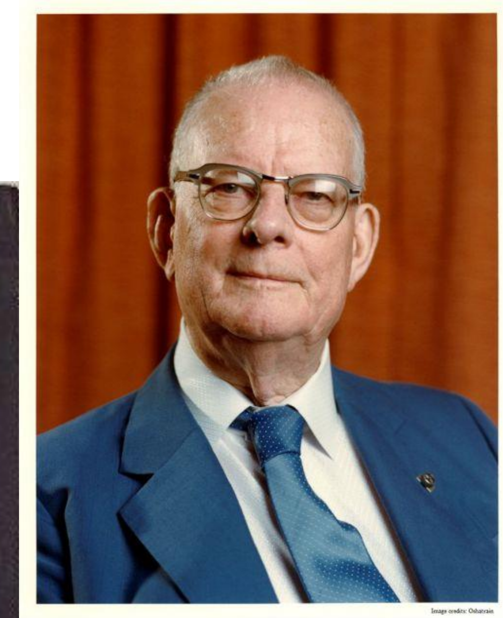
- Cost of Quality

Chapter 6

- Quality Awards and Quality Standards

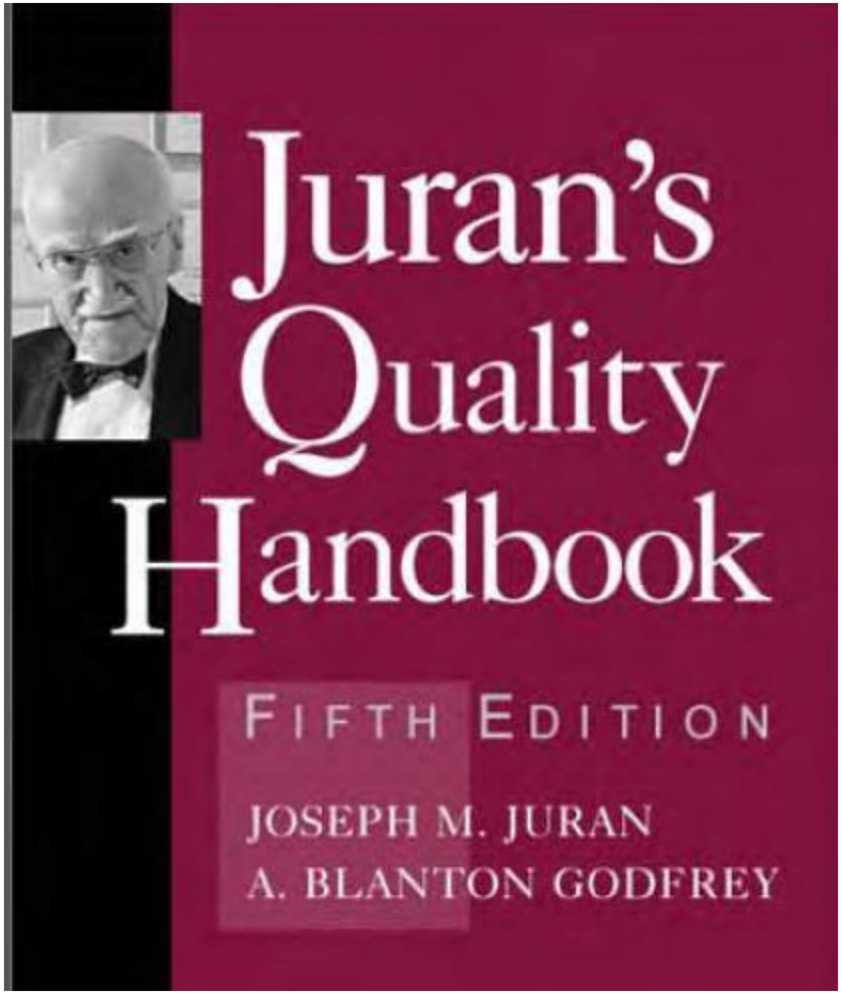






1st Edition, 1982

Others



Nicholas, J., 1998, Competitive Manufacturing Management, Irwin/McGraw Hill, USA

Kalite Yönetimi Kuram, İlkeler, Uygulamalar Prof. Dr. Hasan Şimşek Seçkin Yayıncılık, Mart 2010

Juran's Quality Handbook, Sixth Edition

Quality Management for Organizational Excellence, Goetsch, D. L. ve Davis, S. B., 2014, 7th Edition, Pearson, Great Britain.

Chapter 1

- What is Quality?
- Meaning of Quality
- Dimensions of Quality
- History of Quality Methodology
- Quality Gurus

What is Quality?

What does the word “quality” mean to you?

- Think about your past experiences staying at various hotels. Did you stay at a “quality” hotel? What about the experience made it a “quality” experience for you?

- Think about a product you bought. How can you define its “quality”?

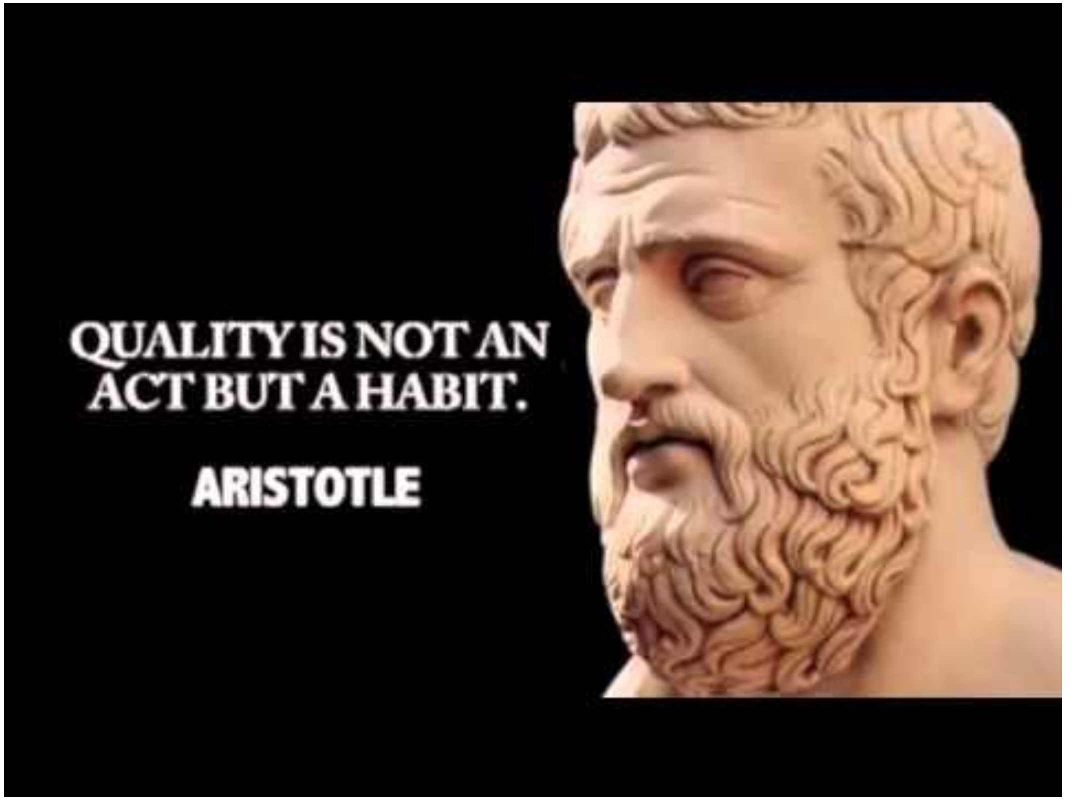
What does the word “quality” mean?

https://www.facebook.com/PorscheCentreWilloughby/videos/1126756607406845/

What does the word “quality” mean?

https://www.youtube.com/watch?v=RxPZh4AnWyk

What is Quality?



Aristoteles (Aristo) (BS 384– BS 322) Ancient Greek philosopher.

What is Quality?

What is Quality?

"Quality is never an accident. It is always the result of intelligent effort."

John Ruskin

"Productivity is never an accident. It is always the result of a commitment to excellence, intelligent planning, and focused effort."

~Paul J. Meyer

Box 1.2 : QUALITY – What it stands for?

Q : Quest for excellence

U : Understanding customer's needs

A : Action to achieve customer's appreciation

L : Leadership – determination to be a leader

I : Involving all people

T : Team spirit to work for a common goal and

Y : Yardstick to measure progress.

What is Quality?

- **Conformance to specifications** (British Defense Industries Quality Assurance Panel)
- **Conformance to requirements** (Philip Crosby)
- **Fitness for purpose or use** (Juran)
- **A predictable degree of uniformity and dependability, at low cost and suited to the market** (Edward Deming)
- **Synonymous with customer needs and expectations** (R J Mortiboys)
- **Meeting the (stated) requirements of the customer- now and in the future** (Mike Robinson)
- **The total composite product and service characteristics of marketing, engineering, manufacturing and maintenance through which the product and service in use will meet the expectations by the customer** (Armand Feigenbaum)

What is Quality?

- “The degree to which a system, component, or process meets

  (1) specified requirements, and

  (2) customer or users needs or expectations” (IEEE)

- The totality of features and characteristics of a product or service that bears on its ability to satisfy stated or implied needs” (ISO 8402)

- Degree to which a set of inherent characteristics fulfils requirements (ISO 9000:2015)

Defining Quality

The totality of features and characteristics of a product or service that bears on its ability to satisfy stated or implied needs

American Society for Quality

Different Views

- User-based: better performance, more features
- Manufacturing-based: conformance to standards, making it right the first time
- Product-based: specific and measurable attributes of the product

Implications of Quality

1. **Company reputation**
   - Perception of new products
   - Employment practices
   - Supplier relations
2. **Product liability**
   - Reduce risk
3. **Global implications**
   - Improved ability to compete

Key Dimensions of Quality

- Performance
- Features
- Reliability
- Conformance
- Durability
- Serviceability
- Aesthetics
- Perceived quality
- Value

Meaning of Quality

Of the many meanings of the word “quality,” two are of critical importance to managing for quality:

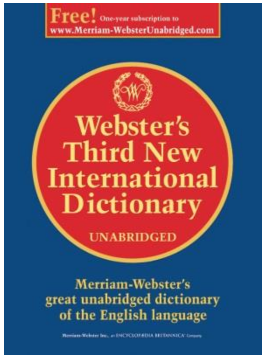
1. “Quality” means those ***features of products*** which meet customer needs and thereby provide customer satisfaction. In this sense, the meaning of quality is oriented to income. The purpose of such higher quality is to provide greater customer satisfaction and, one hopes, to increase income.

However, providing more and/or better quality features usually requires an investment and hence usually involves increases in costs. Higher quality in this sense usually “costs more.”

2. “Quality” means ***freedom from deficiencies***—freedom from errors that require doing work over again (rework) or that result in field failures, customer dissatisfaction, customer claims, and so on. In this sense, the meaning of quality is oriented to costs, and higher quality usually “costs less.”

Meaning of Quality

- Webster's Dictionary
  - degree of excellence of a thing



- American Society for Quality
  - totality of features and characteristics that satisfy needs

- Producer's and Consumer's Perspective

Meaning of Quality: Producer's Perspective

- Quality of Conformance
  - Making sure a product or service is produced according to design
    - ✓ if new tires do not conform to specifications, they wobble (tereddüt etmek/bocalamak)
    - ✓ if a hotel room is not clean when a guest checks in, the hotel is not functioning according to specifications of its design

Meaning of Quality: Consumer's Perspective

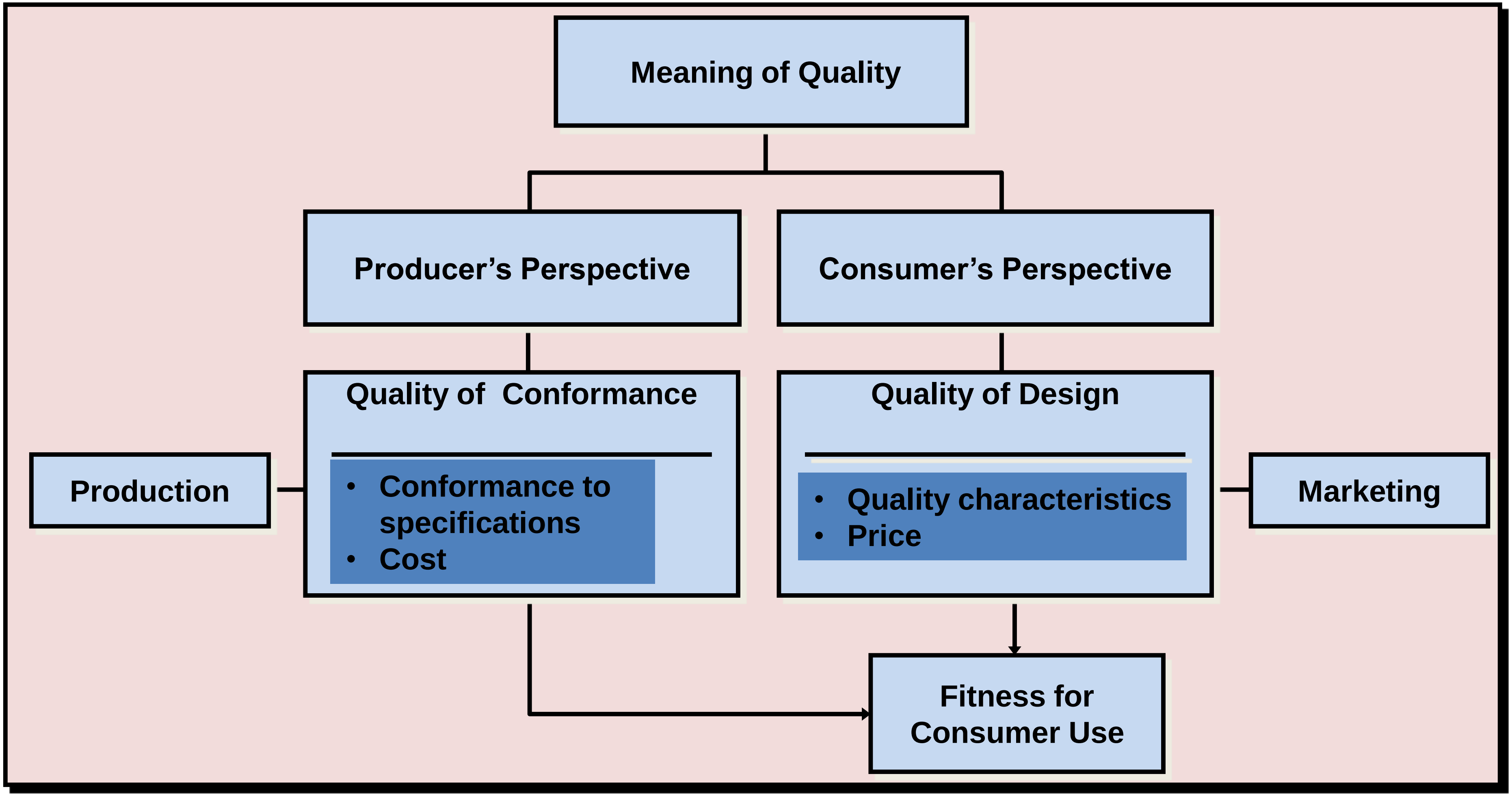
- Fitness for use
  - how well product or service does what it is supposed to
- Quality of design
  - designing quality characteristics into a product or service

A Mercedes and a Ford are equally "fit for use," but with different design dimensions

Meaning of Quality: A Final Perspective

- Consumer's and producer's perspectives depend on each other
- Consumer's perspective: «PRICE»
- Producer's perspective : «COST»
- Consumer's view must dominate

Meaning of Quality



Dimensions of Quality: Manufactured Products

- Performance
  - basic operating characteristics of a product; how well a car is handled or its gas mileage
- Features
  - "extra" items added to basic features, such as a stereo CD or a leather interior in a car
- Reliability
  - probability that a product will operate properly within an expected time frame; that is, a TV will work without repair for about seven years

Dimensions of Quality: Manufactured Products (cont.)

- **Conformance**
  - degree to which a product meets pre–established standards
- **Durability**
  - how long product lasts before replacement
- **Serviceability**
  - ease of getting repairs, speed of repairs, courtesy and competence of repair person

Dimensions of Quality: Manufactured Products (cont.)

- **Aesthetics**
  - how a product looks, feels, sounds, smells, or tastes
- **Safety**
  - assurance that customer will not suffer injury or harm from a product; an especially important consideration for automobiles
- **Perceptions**
  - subjective perceptions based on brand name, advertising, and the like

Dimensions of Quality For Services

Reliability / Consistency

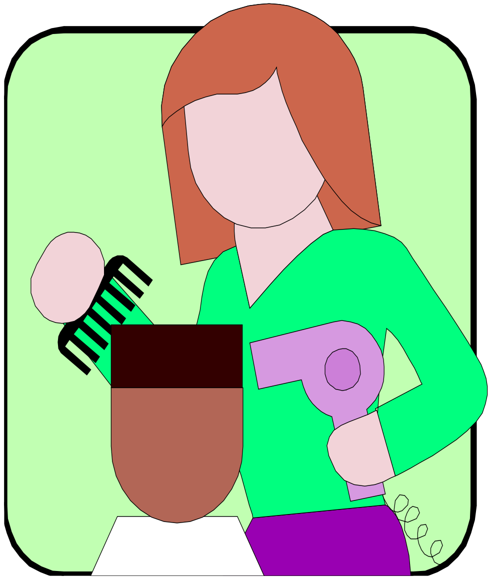
Responsiveness

Completeness

Competence

Understanding

Accessibility



Security

Courtesy

Credibility

Communication

Dimensions of Quality For Services

Dimensions of Quality: Service

- **Time and Timeliness**
  - How long must a customer wait for service, and is it completed on time?
  - Is an overnight package delivered overnight?
- **Completeness**
  - Is everything customer asked for provided?
  - Is a mail order from a catalogue company complete when delivered?

Dimensions of Quality: Service (cont.)

- **Courtesy**
  - How are customers treated by employees?
  - Are catalogue phone operators nice and are their voices pleasant?
- **Consistency**
  - Is the same level of service provided to each customer each time?
  - Is your newspaper delivered on time every morning?

Dimensions of Quality: Service (cont.)

- **Accessibility and convenience**
  - How easy is it to obtain service?
  - Does a service representative answer you calls quickly?
- **Accuracy**
  - Is the service performed right every time?
  - Is your bank or credit card statement correct every month?
- **Responsiveness**
  - How well does the company react to unusual situations?
  - How well is a telephone operator able to respond to a customer's questions?

Dimensions of Quality

1. **Performance**
   - ➢Will the product/service do the intended job?
2. **Reliability**
   - ➢How often does the product/service fail?
3. **Durability**
   - ➢How long does the product/service last?
4. **Serviceability**
   - ➢How easy to repair the product / to solve the problems in service?

Dimensions of Quality

5. **Aesthetics**
   - What does the product/service look / smell / sound/feel like?
6. **Features**
   - What does the product do/ service give?
7. **Perceived Quality**
   - What is the reputation of the company or its products/services?
8. **Conformance to Standards**
   - Is the product/service made exactly as the designer/standard intended?

Quality in different areas of society

Area	**Examples**
Airlines	On-time, comfortable, low-cost service
Health Care	Correct diagnosis, minimum wait time, lower cost, security
Food Services	Good product, fast delivery, good environment
Postal Services	fast delivery, correct delivery, cost containment
Academia	Proper preparation for future, on-time knowledge delivery
Consumer Products	Properly made, defect-free, cost effective
Insurance	Payoff on time, reasonable cost
Military	Rapid deployment, decreased wages, no graft
Automotive	Defect-free
Communications	Clearer, faster, cheaper service

Why Quality is Important?

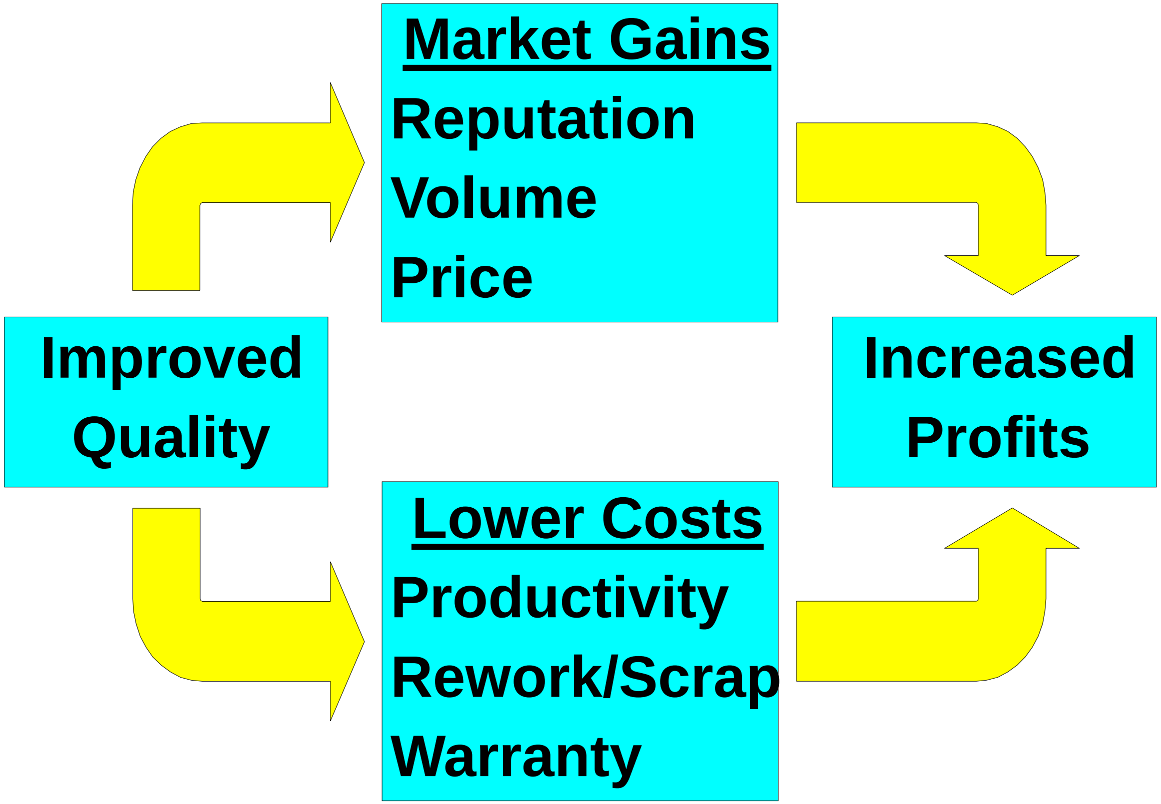
No quality, no sales

No sale, no profit

No profit, no jobs

Importance of Quality

- Costs & market share
- Company's reputation
- Product liability
- International implications



History of Quality Methodology

- Reach back into antiquity, especially into China, India, Greece and the Roman Empire : skilled crafstmanship.

- Industrial Revolution (18th century): need for more consistent products that are mass-produced and needed to be interchangeable. Rise of inspection after manufacturing completed and separate quality departments.

History of Quality Methodology

- Science of modern quality methodology started by R. A. Fisher perfected scientific shortcuts for shifting through mountains of data to spot key cause-effect relationships to speed up development of crop growing methods.

- **Statistical methods** at Bell Laboratories: W. A. Shewhart transformed Fisher's methods into quality control discipline for factories (inspired W.E. Deming and J. M. Juran); Control Charts developed by W. A. Shewhart; Acceptance sampling methodology developed by H. F. Dodge and H. G. Romig

History of Quality Methodology

- **World War II:** Acceptance of statistical quality-control concepts in manufacturing industries (more sophisticated weapons demanded more careful production and reliability); The American Society for Quality Control formed (1946).

- **Quality in Japan:** W.E. Deming invited to Japan to give lectures; G. Taguchi developed “Taguchi method” for scientific design of experiments; The Japanese Union of Scientists and Engineers (JUSE) established “Deming Price” (1951); The Quality Control Circle concept is introduced by K. Ishikawa (1960).

History of Quality Methodology

- Quality awareness in U.S. manufacturing industry during 1980s: “Total Quality Management”; Quality control started to be used as a mangement tool.

- Malcolm Baldrige National Quality Award (1987)

- International Standard Organization’s (ISO) 9000 series of standards: in 1980s Western Europe began to use; interest increase in US industry in 1990s; Became widely accepted today: necessary requirement to world-wide distribution of product and a significant competitive advantage.

History of Quality Methodology

- Quality in service industries, government, health care, and education
- Current and future challenge: keep progress in quality management alive
- To sum up: A gradual transition

Quality Gurus

Walter Shewart

- In 1920s, developed control charts
- Introduced the term “quality assurance”

W. Edwards Deming

- Developed courses during World War II to teach statistical quality-control techniques to engineers and executives of companies that were military suppliers
- After the war, began teaching statistical quality control to Japanese companies

Joseph M. Juran

- Followed Deming to Japan in 1954
- Focused on strategic quality planning

Quality Gurus (cont.)

Armand V. Feigenbaum

- In 1951, introduced concepts of total quality control and continuous quality improvement

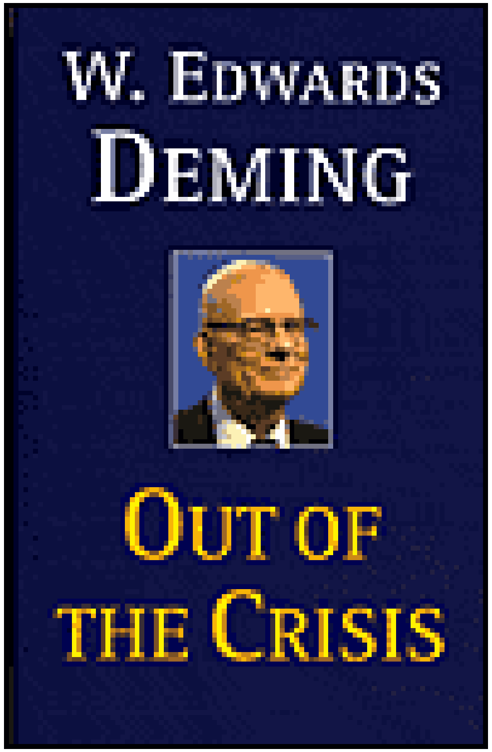
Philip Crosby

- In 1979, emphasized that costs of poor quality far outweigh the cost of preventing poor quality
- In 1984, defined absolutes of quality management—conformance to requirements, prevention, and "zero defects"

Kaoru Ishikawa

- Promoted use of quality circles
- Developed "fishbone" diagram
- Emphasized importance of internal customer

The Quality Gurus Edward Deming

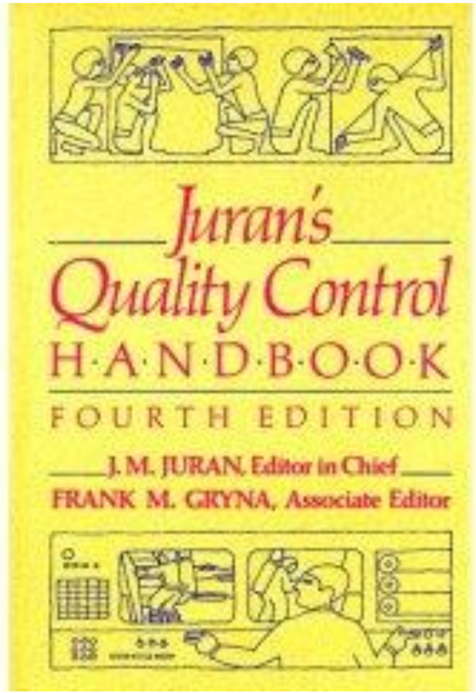


1986

- Quality is "uniformity and dependability"
- Focus on SPC and statistical tools
- "14 Points" for management
- PDCA method

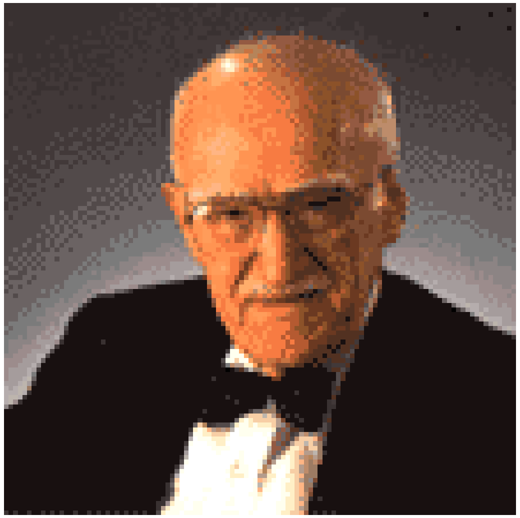
1900-1993

The Quality Gurus Joseph Juran

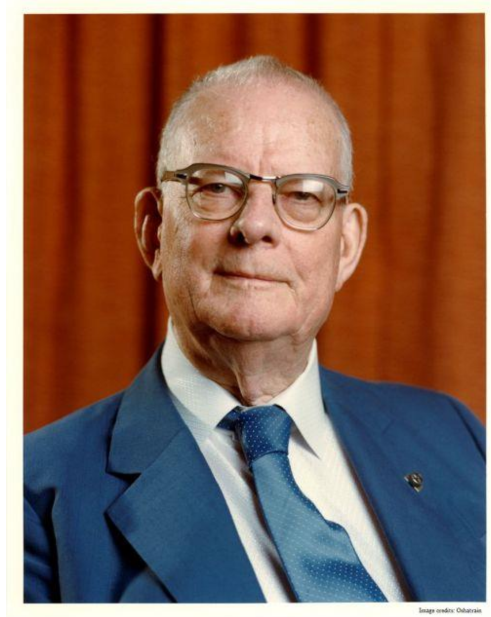


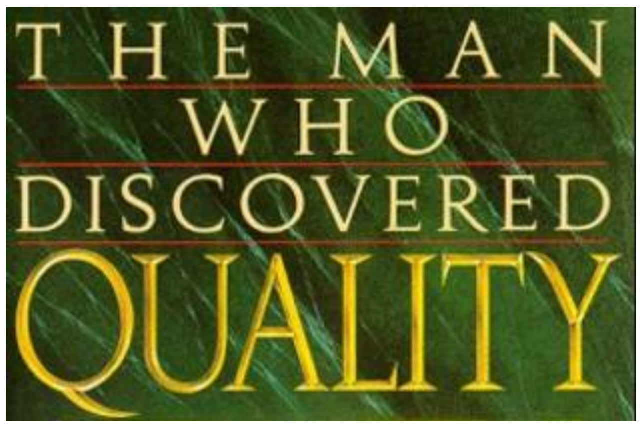
1951

- Quality is "fitness for use"
- Pareto Principle
- Cost of Quality
- General management approach as well as statistics



1904 - 2008





W. Edwards DEMING

The Einstein of Quality

Chapter 2

- Evaluation of Quality
- Deming’s Principles
- Total Quality Management

Evolution of Quality

1. Step

Quality Control

Inspection

Poor quality consciousness

1920s

2. Step

Quality Assurance

Process Improvement

The participation of employees

1960s

3. Step

Quality Management

Process capability and productivity

1980s

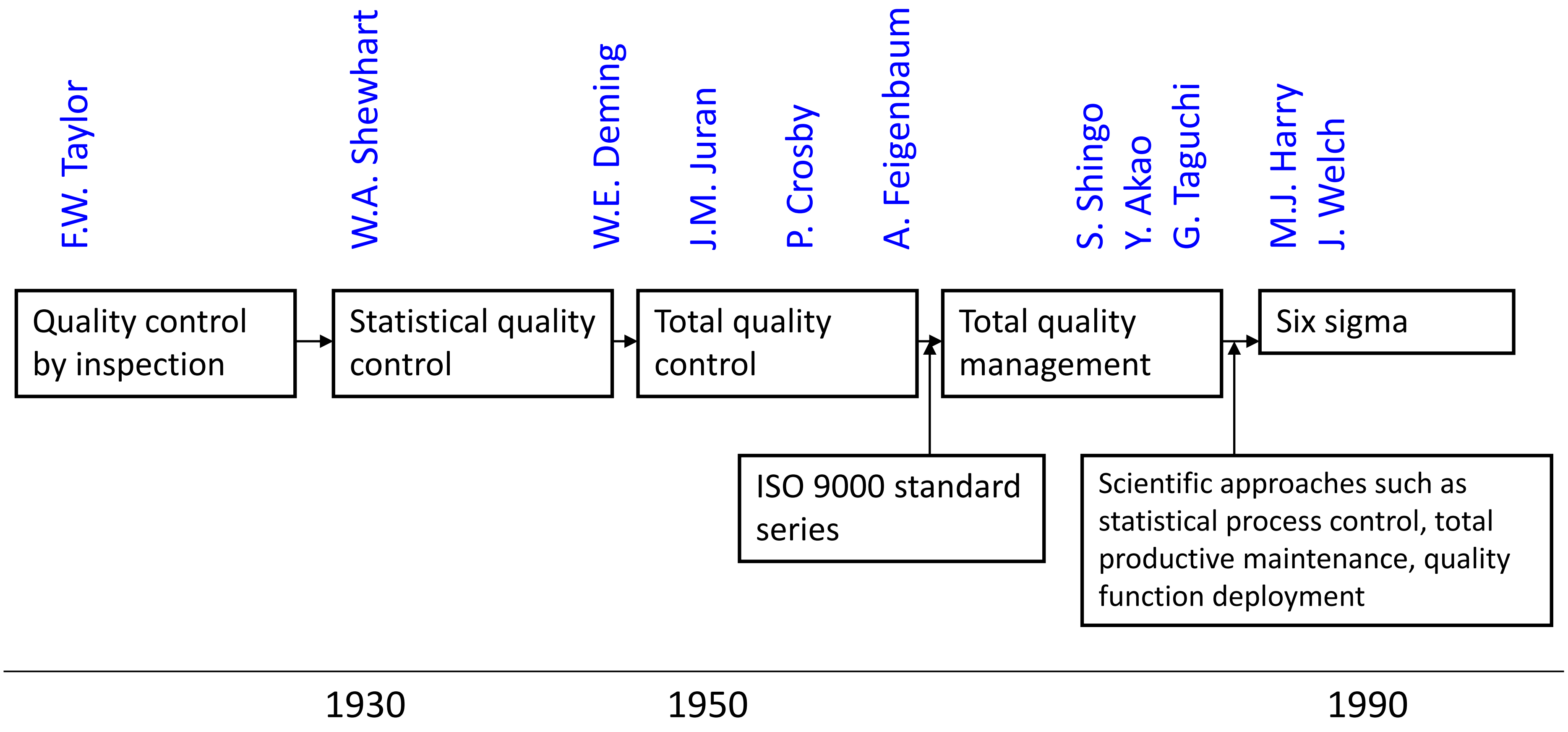
4. Step

Excellence

New cultural direction

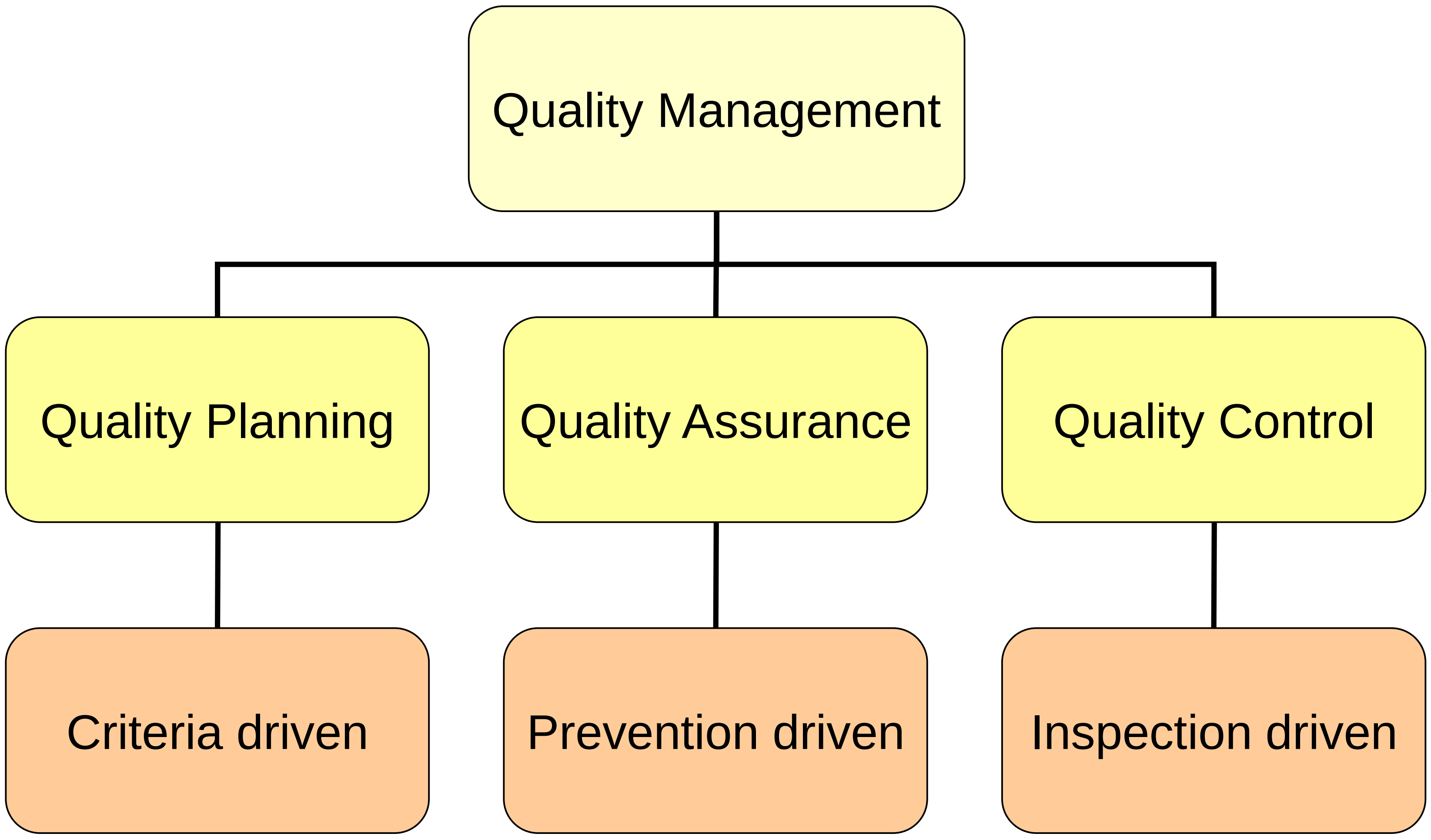
2000s

Evolution of Quality Control and Management



Adapted from: Park (2003)

Quality Management



Quality Management Components

- **Quality Planning**
  - It identifies the standards and determines how to satisfy those standards
  - It lays out the roles and responsibilities, resources, procedures, and processes to be utilized for quality control and quality assurance
- **Quality Assurance**
  - It is the review to ensure aligning with the quality standards. An assessment will be provided here
  - Planned and systematic quality activities
  - Provide the confidence that the standards will be met

Quality Management Components

- **Quality Control**
  - It addresses the assessment conducted during Quality Assurance for corrective actions
  - Measure specific results to determine that they match the standards
  - Use of Statistical Process Control (SPC) : a methodology for monitoring a process to identify special causes of variation and signal the need to take corrective action when appropriate
  - SPC relies on control charts

Quality Planning

Quality planning is a strategic activity, and it is just as vital to an organization's long-term business success as the product development plan, the financial plan, the marketing plan, and plans for the utilization of human resources. Without a strategic quality plan, an enormous amount of time, money, and effort will be wasted by the organization dealing with faulty designs, manufacturing defects, field failures, and customer complaints. Quality planning involves identifying customers, both external and those that operate internal to the business, and identifying their needs (this is sometimes called listening to the **voice of the customer**).

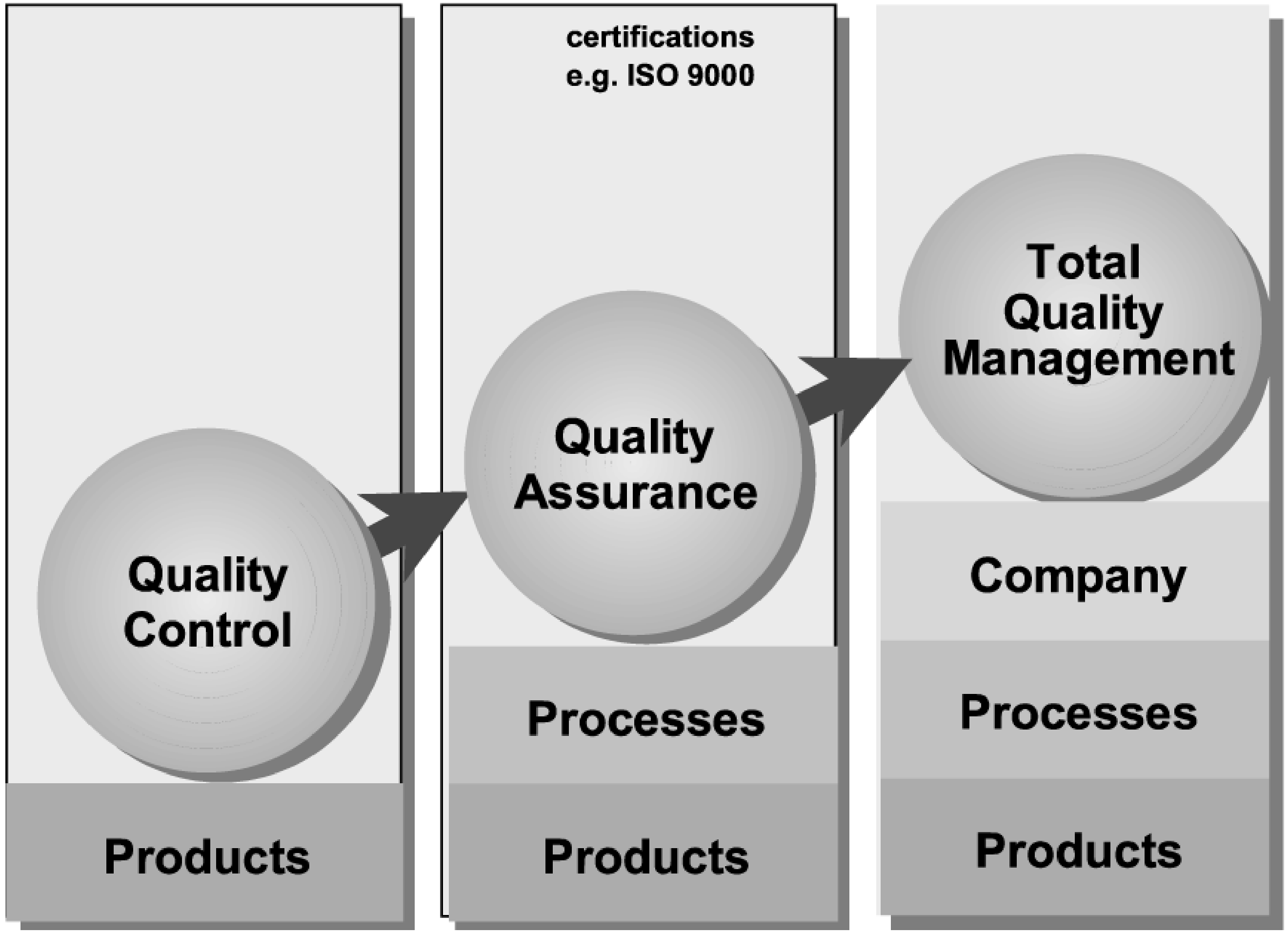
Quality Control

Quality control and improvement involve the set of activities used to ensure that the products and services meet requirements and are improved on a continuous basis. Since variability is often a major source of poor quality, statistical techniques, including SPC and designed experiments, are the major tools of quality control and improvement. Quality improvement is often done on a project-by-project basis and involves teams led by personnel with specialized knowledge of statistical methods and experience in applying them. Projects should be selected so that they have significant business impact and are linked with the overall business goals for quality identified during the planning process. The techniques in this book are integral to successful quality control and improvement.

Quality Assurance

Quality assurance is the set of activities that ensures the quality levels of products and services are properly maintained and that supplier and customer quality issues are properly resolved. Documentation of the quality system is an important component. Quality system documentation involves four components: policy, procedures, work instructions and specifications, and records. Policy generally deals with what is to be done and why, while procedures focus on the methods and personnel that will implement policy. Work instructions and specifications are usually product-, department-, tool-, or machine-oriented. Records are a way of documenting the policies, procedures, and work instructions that have been followed. Records are also used to track specific units or batches of product, so that it can be determined exactly how they were produced. Records are often vital in providing data for dealing with customer complaints, corrective actions, and, if necessary, product recalls. Development, maintenance, and control of documentation are important quality assurance functions. One example of document control is ensuring that specifications and work instructions developed for operating personnel reflect the latest design and engineering changes.

History



certifications
e.g. ISO 9000
Quality
Control
Products
Quality
Assurance
Processes
Products
Total
Quality
Management
Company
Processes
Products

Change of Emphasis in Total Quality

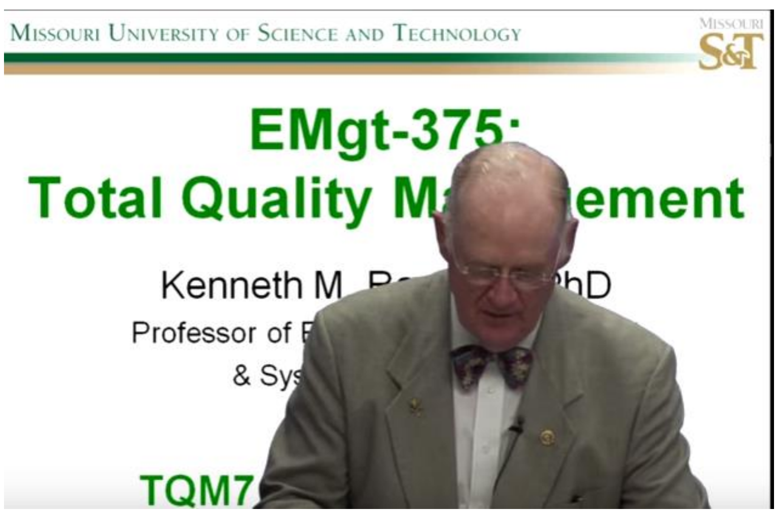
Quality of products	Products
Reduction of cost	Processes
Reduction in time-to-market	Services
Quality of services	Customers/stakeholders
Innovation	Environment
Environmental, social and individual responsibility	Society

The W. EDWARDS Deming Institute

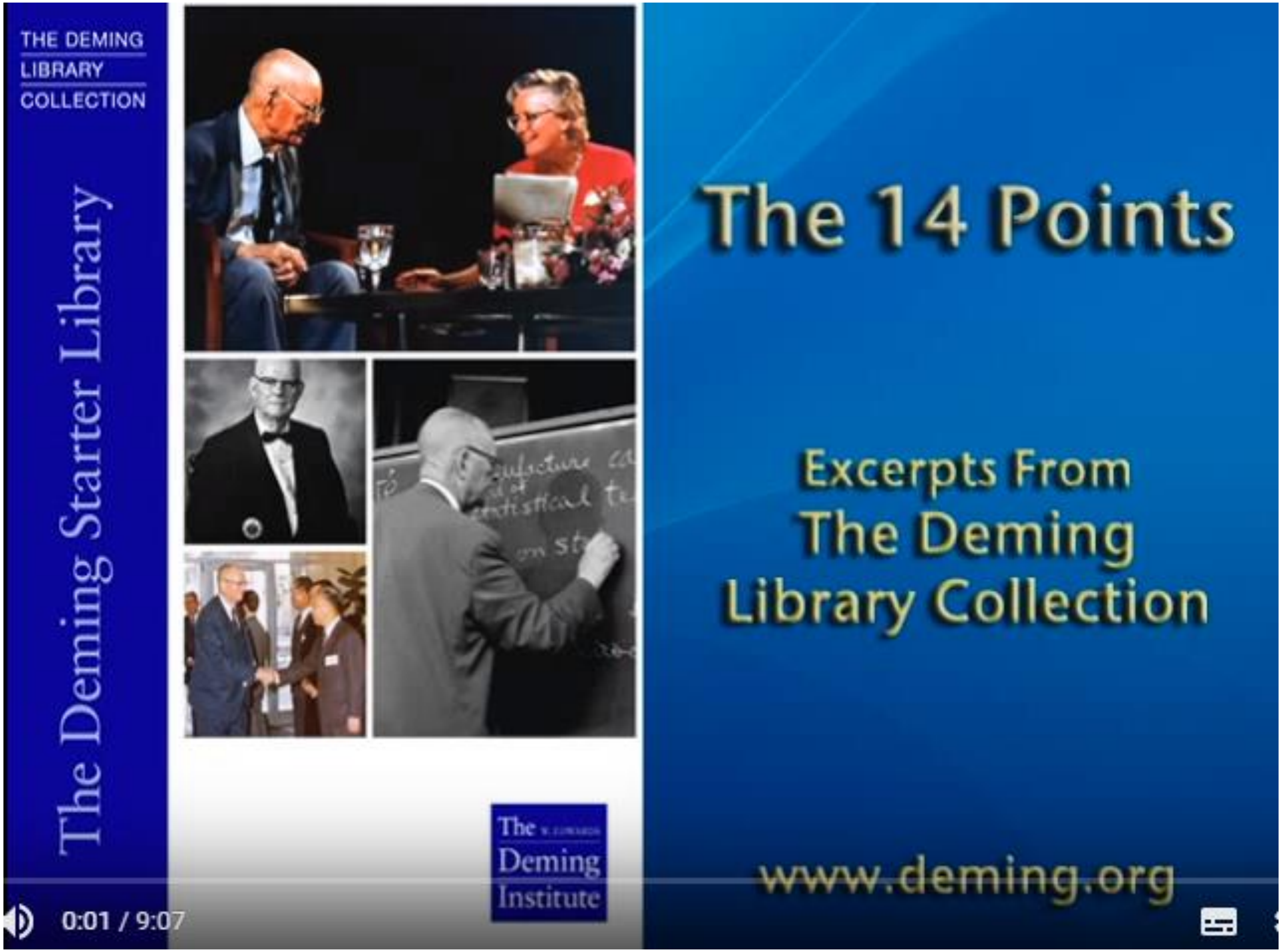
https://www.youtube.com/watch?v=tDu47czfwiI

https://www.youtube.com/watch?v=OXYZENDzvoc

W. Edwards Deming



https://www.youtube.com/watch?v=mLRnqC69c9Q



https://www.youtube.com/watch?v=tsF-8u-V4j4

Continually Improving Processes and Systems

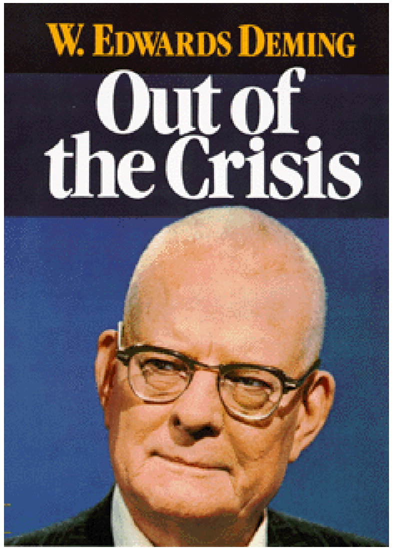
As J.M. Juran and W.E. Deming have maintained since 1950's

"At least 85% of an organization's failures are the fault of management-controlled systems. Workers can control fewer than 15% of the problems. In quality leadership, the focus is on constant and rigorous improvement of every system, not on blaming individuals for problems."

Source: P.R. Scholtes, Total Quality Management, Peter Scholtes, Inc., 1991, 1-12.

Deming's 14 Principles

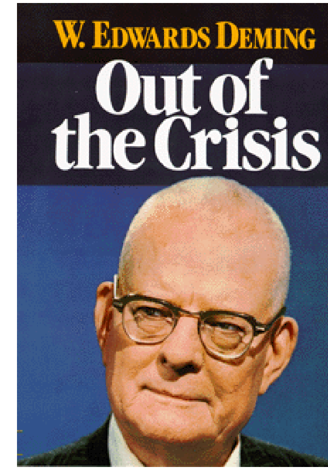
https://www.youtube.com/watch?v=gpBUZZnoZTI



1. **"Create Constancy of Purpose"**
   - Define the problems of today and the future
   - Allocate resources for long-term planning
   - Allocate resources for research and education
   - Constantly improve design of product and service

2. **"Adopt A New Philosophy"**
   - Quality costs less not more
   - Superstitious learning
   - The call for major change
   - Stop looking at your competition and look at your customer instead

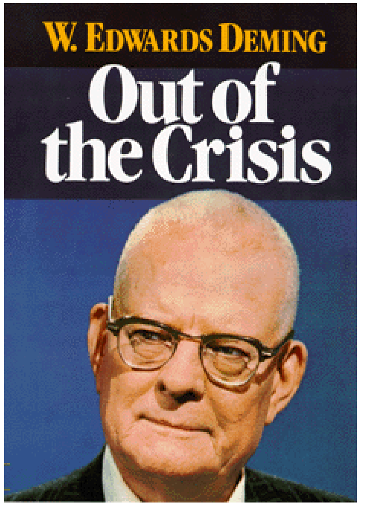
Deming's 14 Principles



3. **"Cease Dependence On Inspection For Quality"**
   - Quality does not come from inspection
   - Mass inspection is unreliable, costly, and ineffective
   - Inspectors fail to agree with each other
   - Inspection should be used to collect data for process control

4. **"End Proactive Awarding Of Business Based On PriceAlone"**
   - Price alone has no meaning
   - Change focus from lowest inital cost to lowest cost
   - Work toward a single source and long term relationship
   - Establish a mutual confidence and aid between purchaser and vendor

Deming's 14 Principles



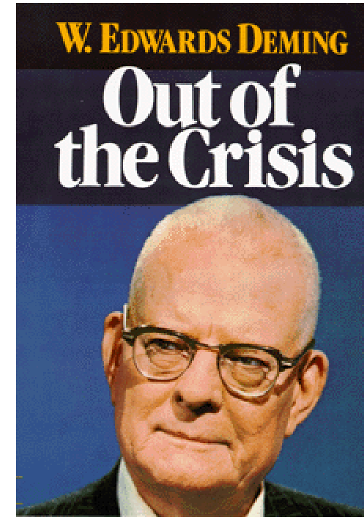
5. "Improve Every Process Constantly / Forever"

- Quality starts qith the intend of management
- Teamwork in design is fundamental
- Forever continue to reduce waste and continue to improve
- Putting out fires is not improvement of the process

6. "Institute Training"

- Management must provide the setting where workers can be succesful
- Management must remove the inhibitors to good work
- Management needs an appreciation of variation
- This is management's new role

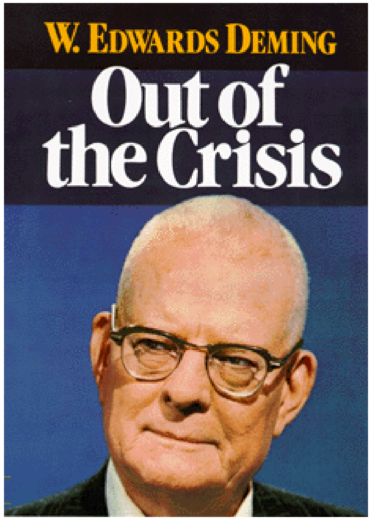
Deming’s 14 Principles



7. **“Adopt And Institute Leadership”**
   - Remove barriers to pride of workmanship
   - Know the work they supervise
   - Know the difference between special and common cause of variation

8. **“Drive Out Fear”**
   - The common denominator of fear
   - Fear of knowledge
   - Performance appraisals
   - Management by fear or numbers

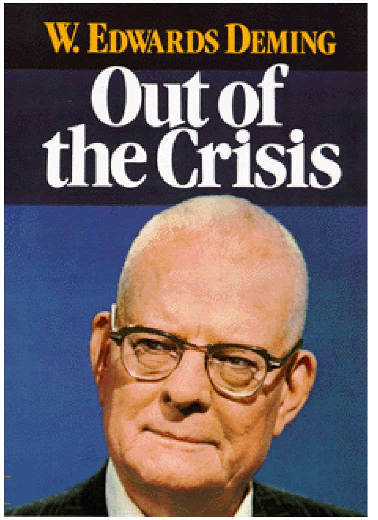
Deming's 14 Principles



9. **"Break Barriers Between Staff Areas"**
   - Know your internal suppliers and customers
   - Promote team work

10. **"Eliminate Slogans, Exhortations And Targets"**
    - They generate frustration and resentment
    - Use posters that explain what management is doing to improve the work environment

Deming's 14 Principles



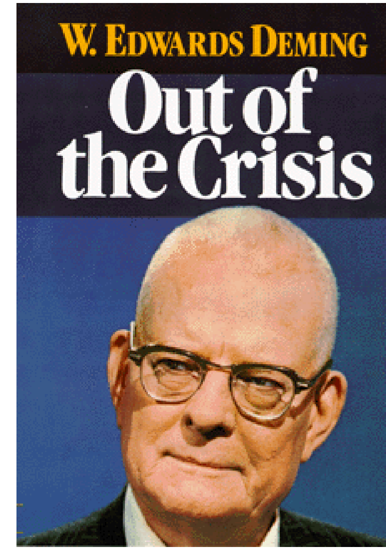
11. "Eliminate Numerical Quotas"

- They impede quality
- They reduce production
- The person's job becomes meeting a quota

12. "Remove Barriers That Rob Pride Of Workmanship"

- Performance appraisal systems
- Production rates
- Financial management systems
- Allow people to take pride in their workmanship

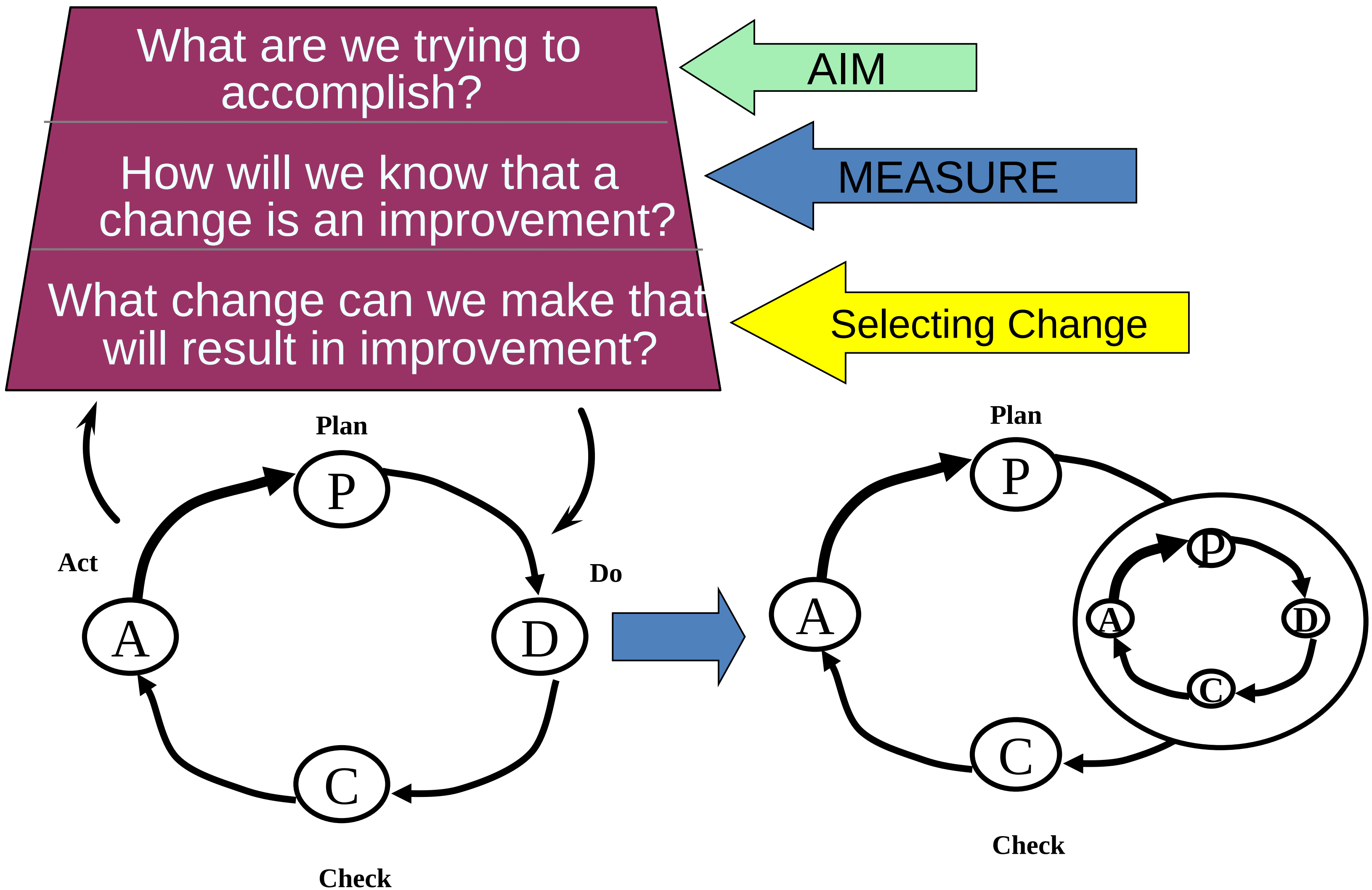
Deming's 14 Principles



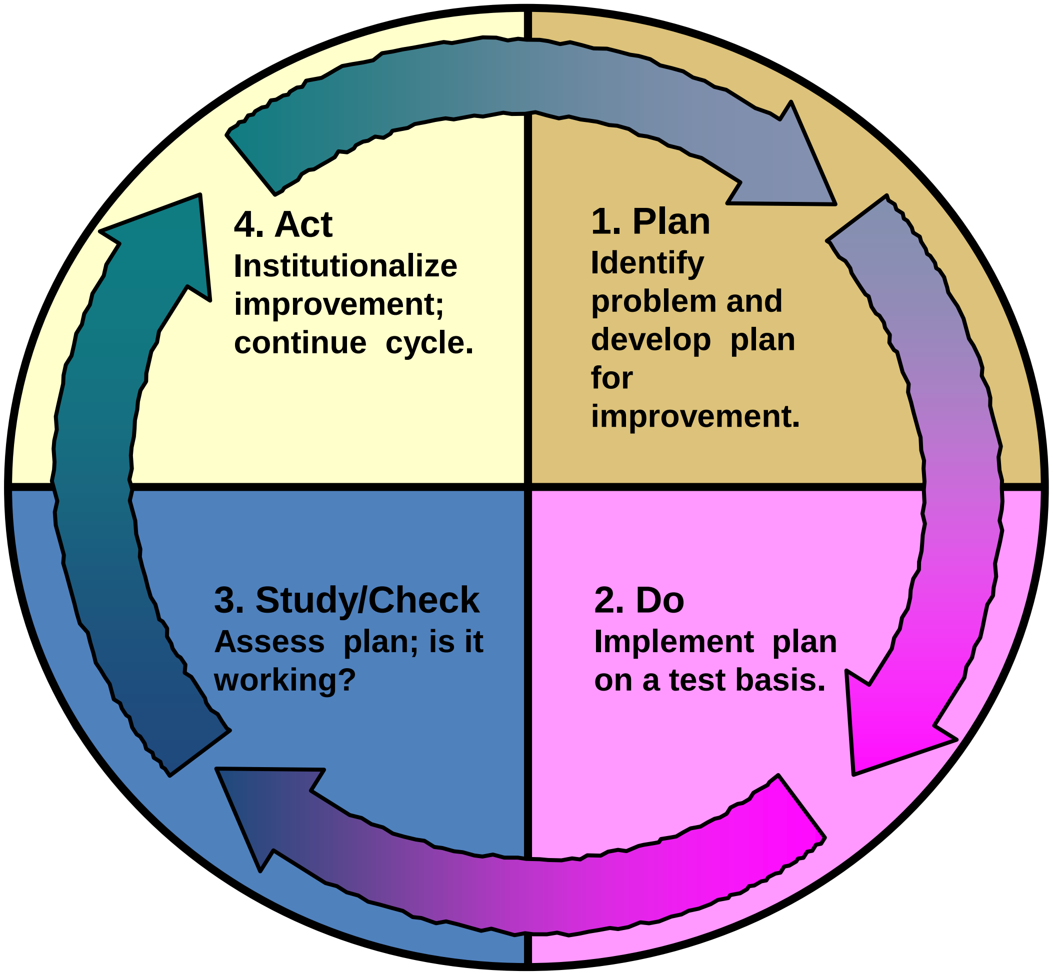
13. **"Institute Programs For Education And Self Improvement"**
    - Commitment to lifelong employment
    - Work with higher education needs
    - Develop team building skills

14. **"Put Everybody In The Company To Work For This Transformation"**
    - Struggle over the 14 points
    - Take pride in new philosophy
    - Include the critical mass of people in the change

Deming's Cycle



Deming Wheel: PDCA Cycle



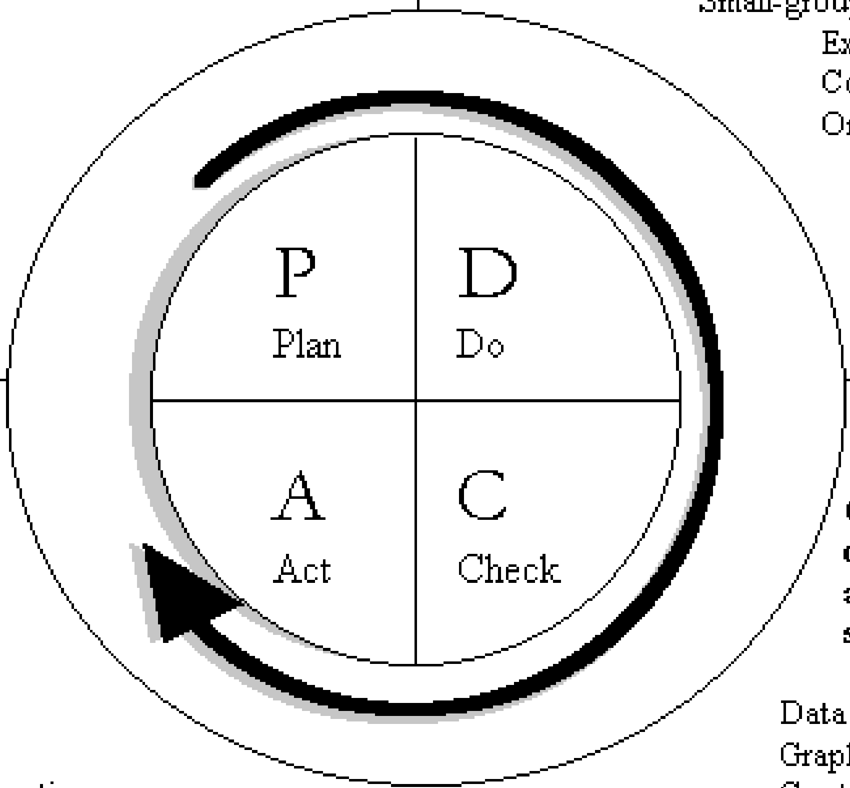
Deming’s Plan-Do-Check-Act

PLAN for changes to bring about improvement

Customer/supplier mapping
Flowcharting
Pareto analysis
Brainstorming
Nominal group technique
Solution/fault tree
Evaluation matrix
Cause & Effect diagrams

DO changes on a small scale first to trial them

Small-group leadership skills
Experiment design
Conflict resolution
On-Job training



ACT to get the greatest benefit from changes

Process mapping
Process standardisation
Controlled reference information
Formal training for standard processes

CHECK to see if changes are working and to investigate selected processes

Data checksheets
Graphical analysis
Control charts
Key performance indicators

"Continuous improvement is better than delayed perfection." - Mark Twain

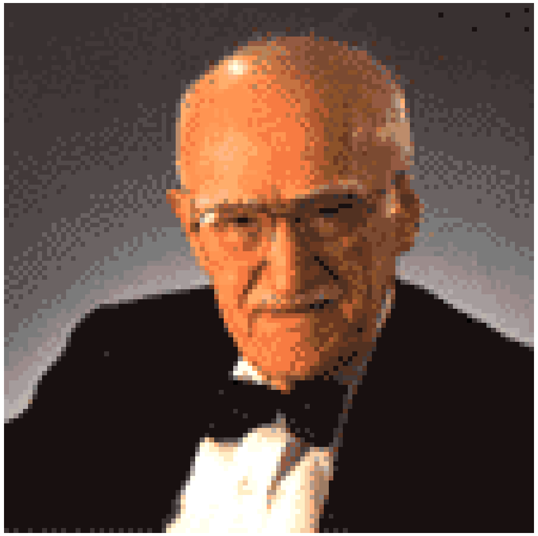
Total Quality Management

(TQM)

Total Quality Management (TQM)

- Started in the early 1980s, Deming/Juran philosophy as the focal point
- Emphasis on widespread training, quality awareness
- Training often turned over to HR function
- Not enough emphasis on quality control and improvement tools, poor follow-through, no project-by-project implementation strategy
- TQM has been unsuccessful in many companies

The Juran Trilogy



1. Planning
2. Control
3. Improvement

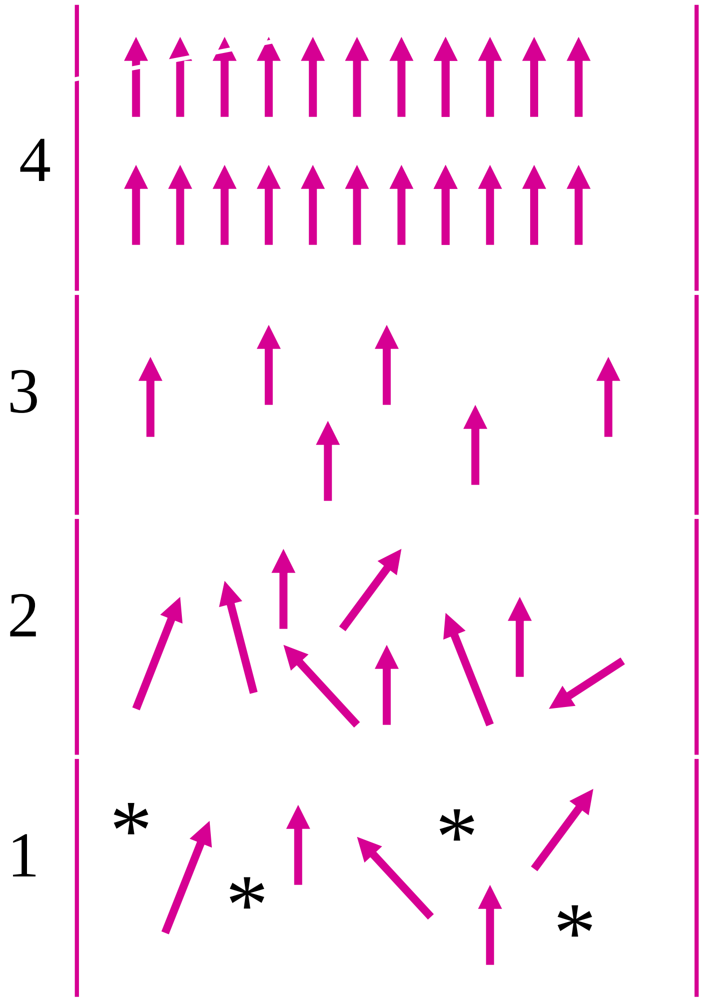
- These three processes are interrelated
- Control versus breakthrough
- Project-by-project improvement

Emphasizes a more strategic and planning oriented approach to quality than does Deming

Total Quality Management

1. The primary focus is on process improvement
2. Most of the variation in a process is due to the system and not the individual
3. Teamwork is an integral part of a quality management organization
4. Customer satisfaction is a primary organizational goal
5. Organizational transformation must occur in order to implement quality management
6. Fear must be removed from organizations
7. Higher quality costs less not more but it requires an investment in training

Total Quality



Planned, aligned, customer focused efforts by all

Many employees work towards company objectives

All employees work towards their own/departmental objectives

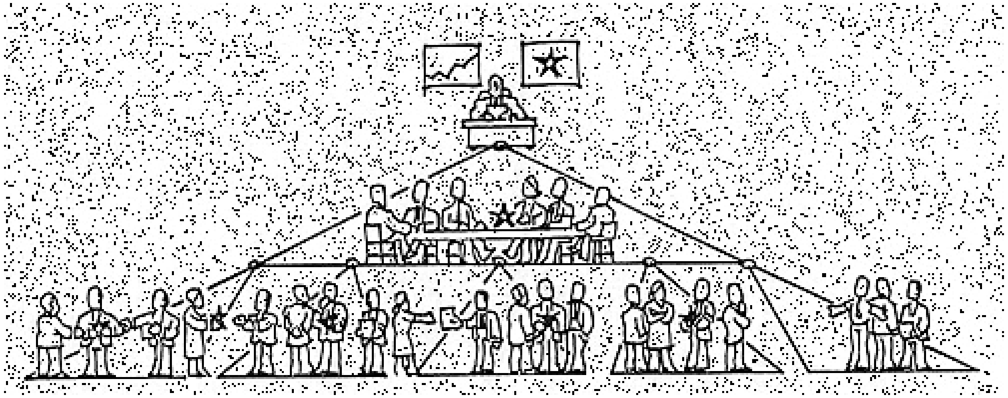
There are a few employees trying to work towards their own/departmental objectives

Source: Ahmet Tunçay, General Secretary of Kalder Ankara Branch, 2007.

Key Principles of TQM

- Devotion to customer satisfaction
- Continuous decrease in undesirable variation
- **KAIZEN:** continuous improvement
- Teamwork
- System and technology development for competition
- Planning for future
- Supplier improvement and participation
- Leadership
- Communication and mutual respect
- Continuous education
- Measurement and statistics
- Employee involvement and empowerment
- Scientific approach to problem solving

TQM Organization



- Lean
- Cross-functional teams
- Leadership
- Facilitation / support
- Employee involvement and empowerment

Total Quality Management

Commitment to quality throughout organization

Principles of TQM

- **Customer-oriented**
- **Leadership**
- **Strategic planning**
- **Employee responsibility**
- **Continuous improvement**
- **Cooperation**
- **Statistical methods**
- **Training and education**

TQM and…

… Partnering

- a relationship between a company and its supplier based on mutual quality standards

… Customers

- system must measure customer satisfaction

… Information Technology

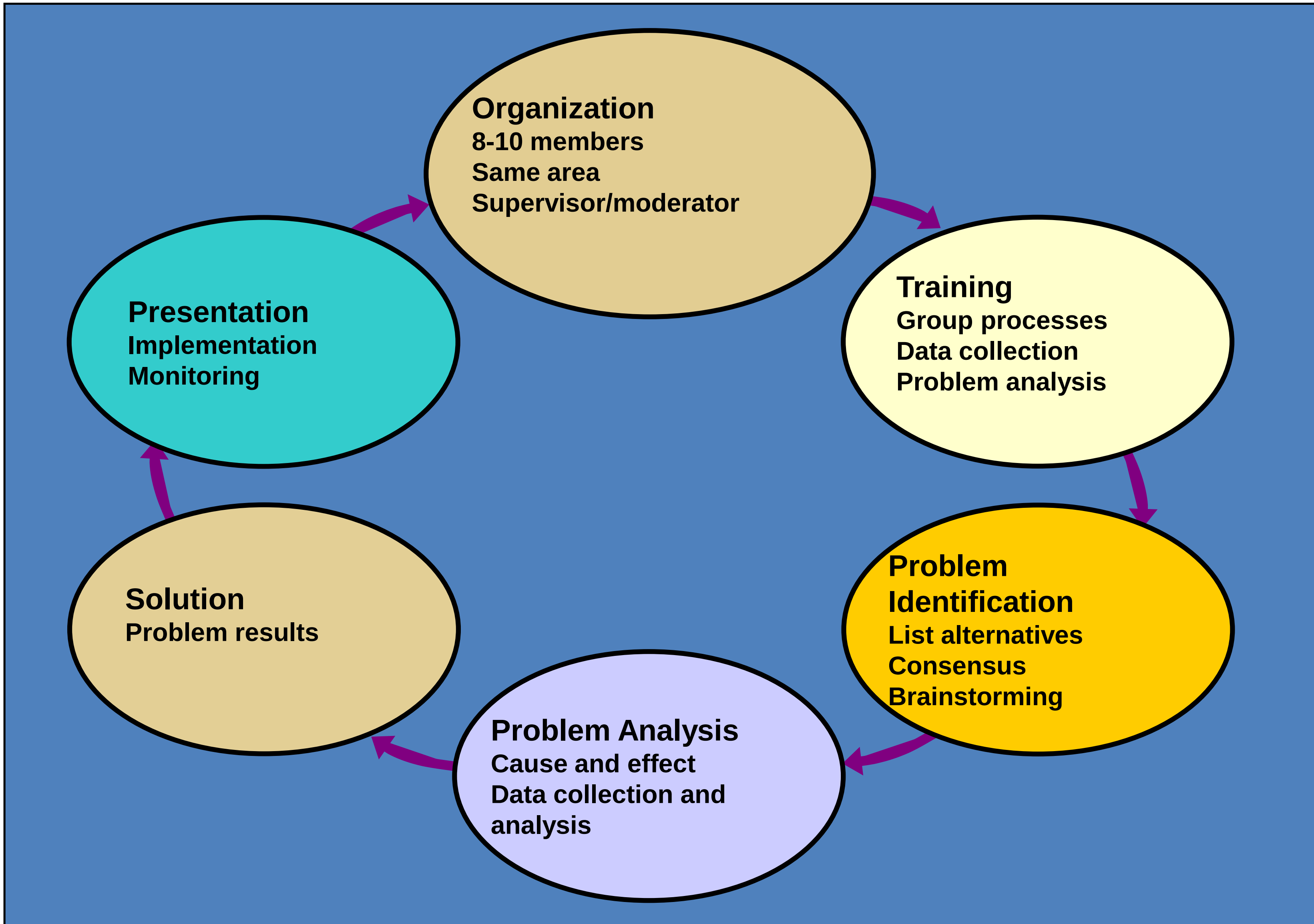
- infrastructure of hardware, networks, and software necessary to support a quality program

Quality Improvement and Role of Employees

Participative problem solving

- employees involved in quality management
- every employee has undergone extensive training to provide quality service to Disney's guests

Quality Circle



Strategic Implications of TQM

- Strong leadership
- Goals, vision, or mission
- Operational plans and policies
- Mechanism for feedback

TQM in Service Companies

- Principles of TQM apply equally well to services and manufacturing
- Services and manufacturing companies have similar inputs but different processes and outputs
- Services tend to be labor intensive
- Service defects are not always easy to measure because service output is not usually a tangible item

Quality Attributes in Service

- Benchmark
  - "best" level of quality achievement one company or companies seek to achieve
- Timeliness
  - how quickly a service is provided

"quickest, friendliest, most accurate service available."

TQM

Encompasses entire organization, from supplier to customer

Stresses a commitment by management to have a continuing, companywide drive toward excellence in all aspects of products and services that are important to the customer

Seven Concepts of TQM

1. Continuous Improvement
2. Six Sigma
3. Employee Empowerment
4. Benchmarking
5. Just-in-time (JIT)
6. Taguchi Concepts
7. Knowledge of TQM Tools

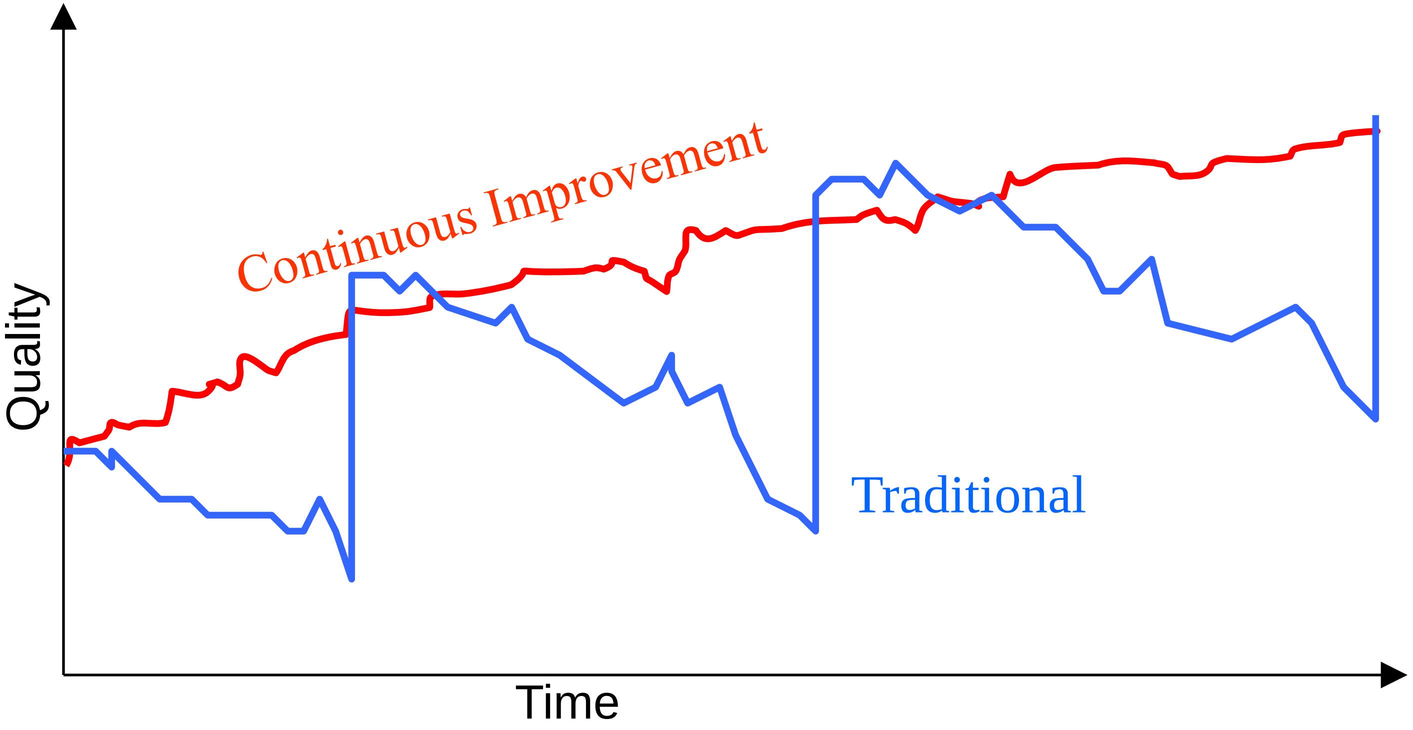
Continuous Improvement

"Continuous improvement is better than delayed perfection." - Mark Twain

Continuous Improvement

- Represents continual improvement of all processes
- Involves all operations and work centers including suppliers and customers
- People, Equipment, Materials, Procedures

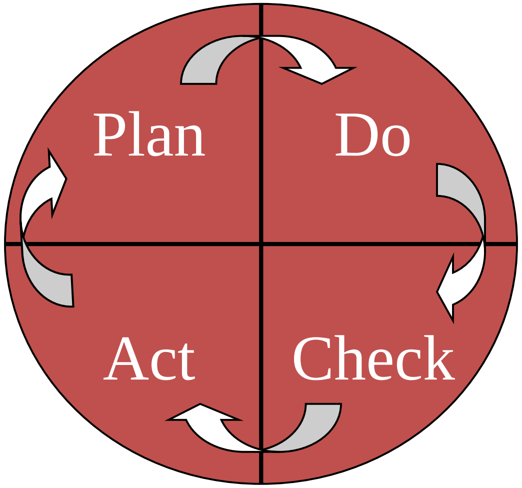
Quality Improvement



Continuous Improvement Philosophy

1. KAIZEN (KAI:Değişim/Gelişim ZEN:Daha İyiye): Japanese term for continuous improvement. step-by-step improvement of business processes.

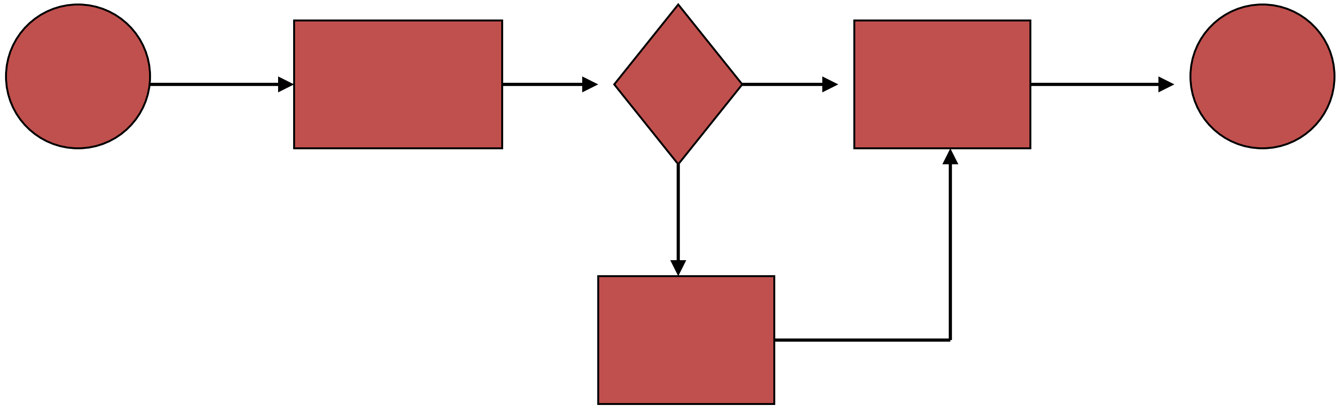
2. PDCA: *Plan-do-check-act* as defined by Deming.



3. Benchmarking : what do top performers do?

Tools used for continuous improvement

1. Process flowchart

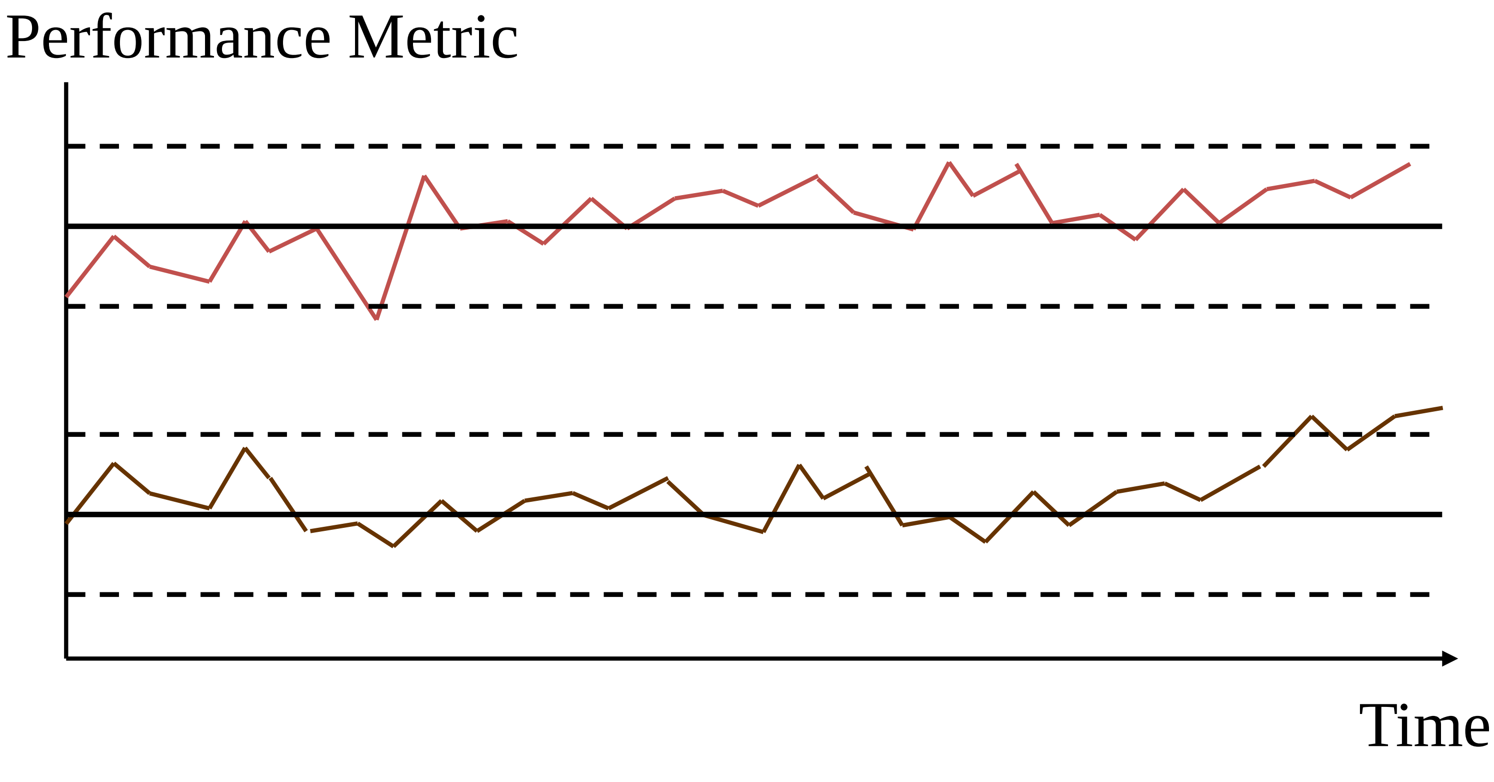


Tools used for continuous improvement

2. Run Chart

Tools used for continuous improvement

3. Control Charts



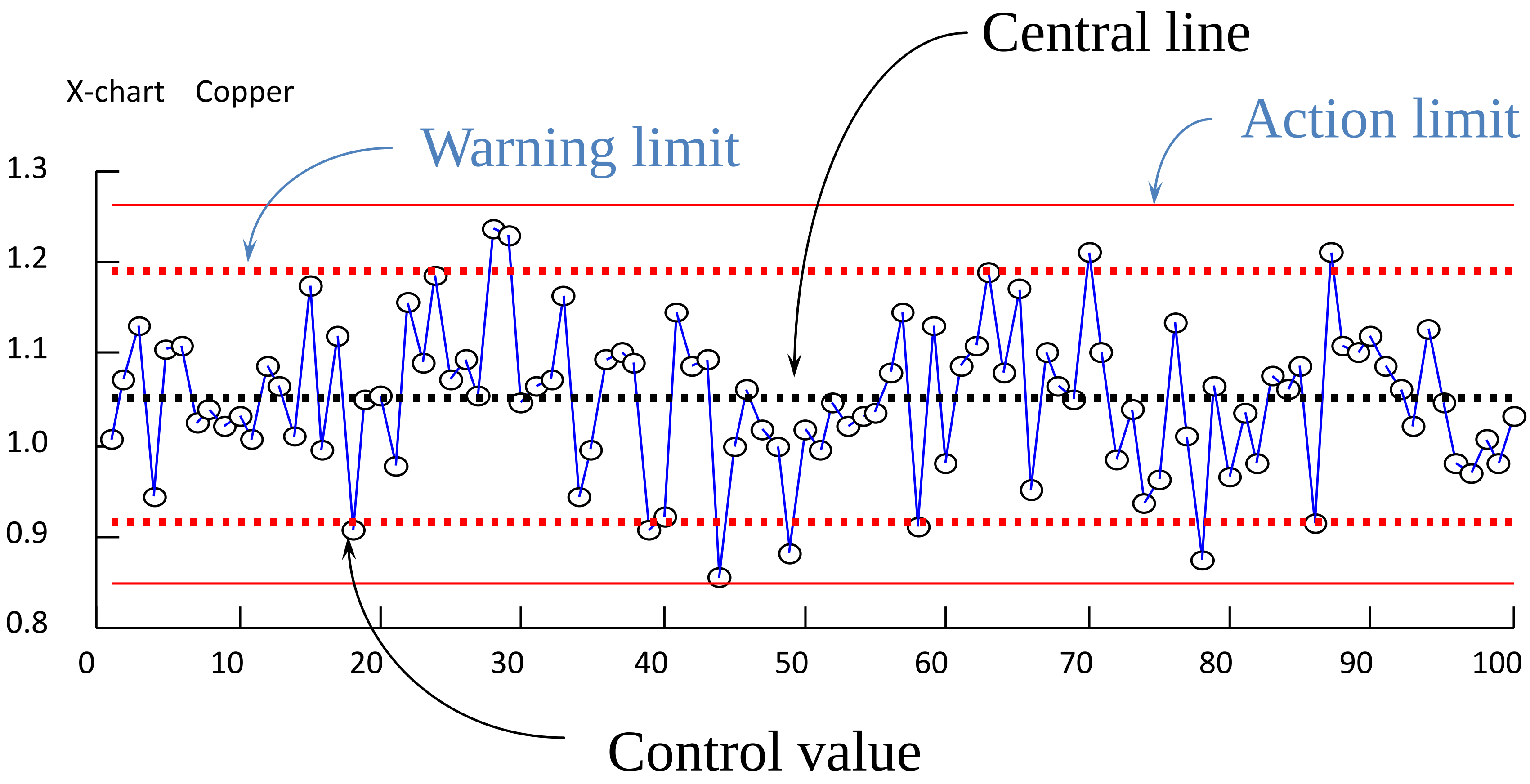
What is a Control Chart?

- A control chart is a presentation of data in which the control values are plotted against time

- Control charts have a central line, upper and lower warning limits, and upper and lower action limits

- Immediate visualisation of problems

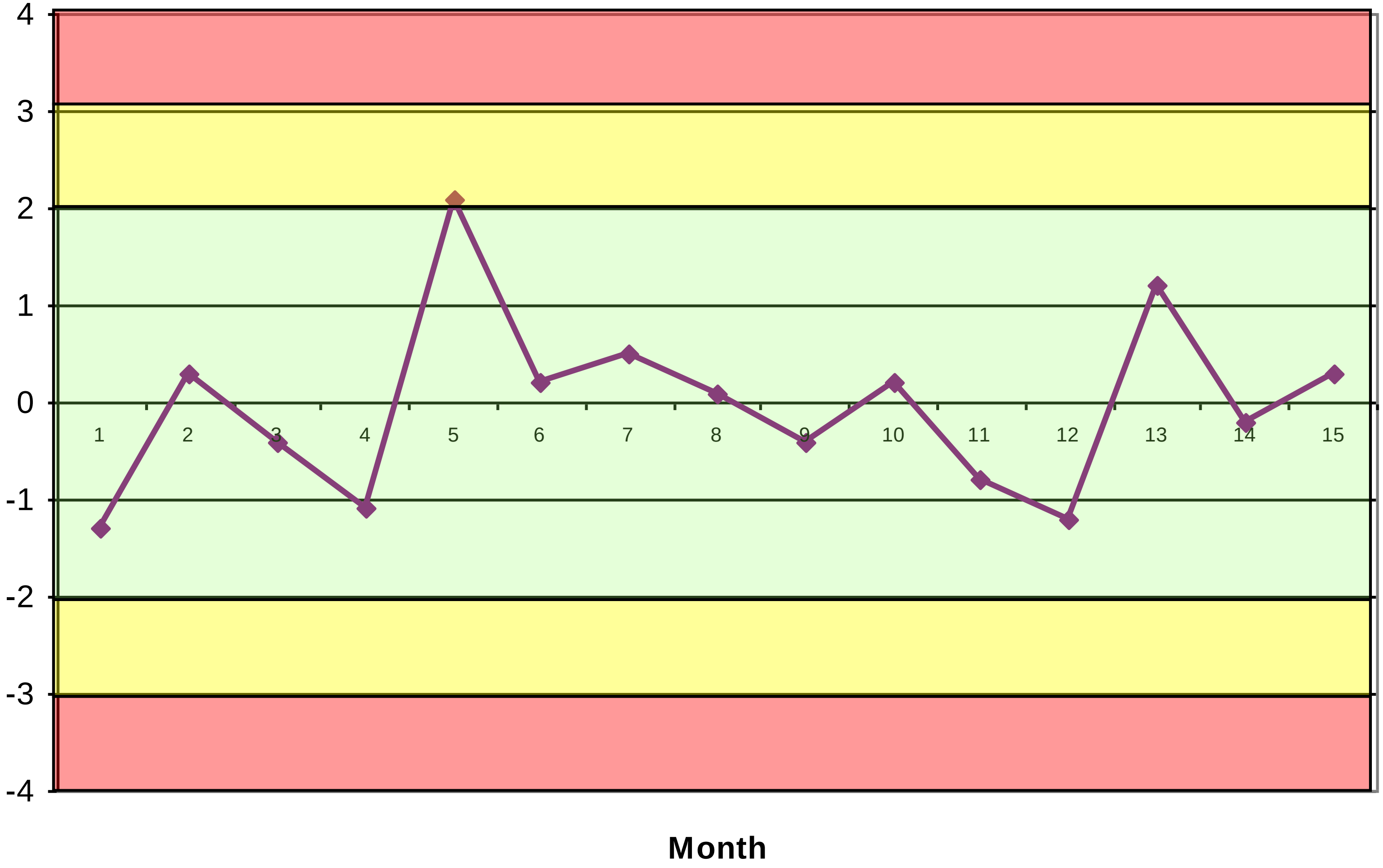
Control chart -illustration of construction



When to Take Action?

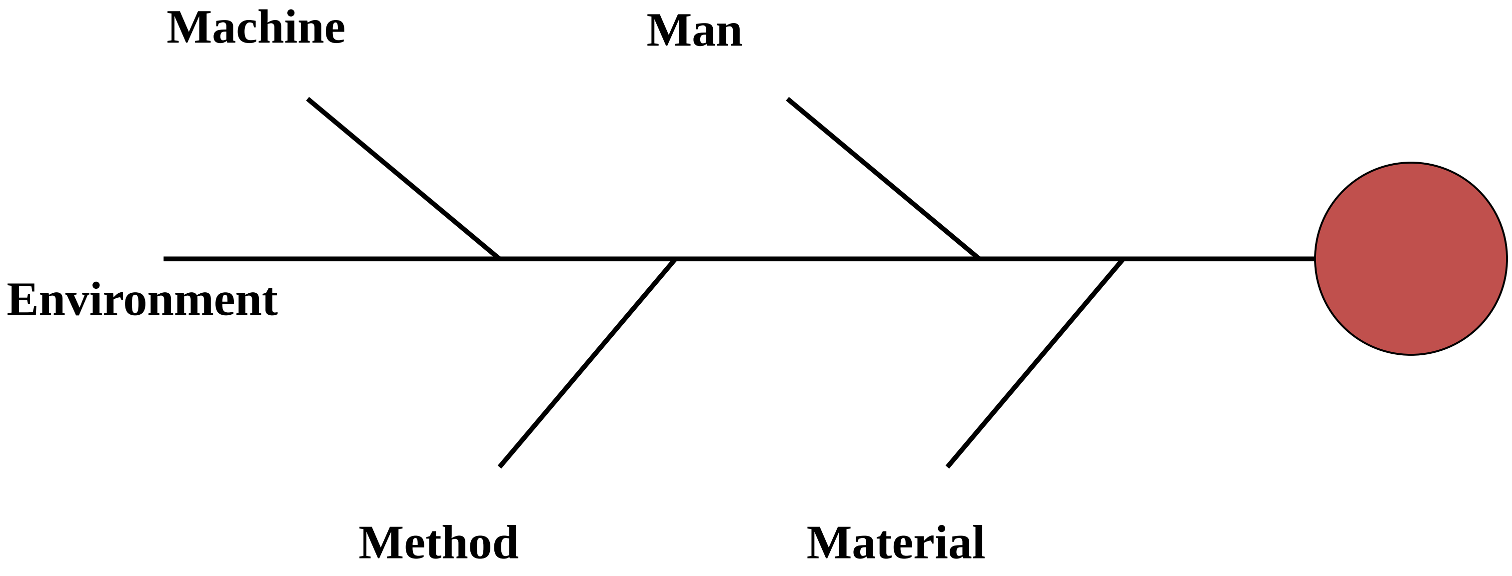
- One point plots outside the Action Limits
- Two consecutive points plots between the Warning and Action Limits
- Eight consecutive points plot on one side of the Center Line
- Six points plots steadily increasing or decreasing
- When an unusual or nonrandom pattern is observed

When to Take Action?



Tools used for continuous improvement

4. Cause and effect diagram (fishbone)



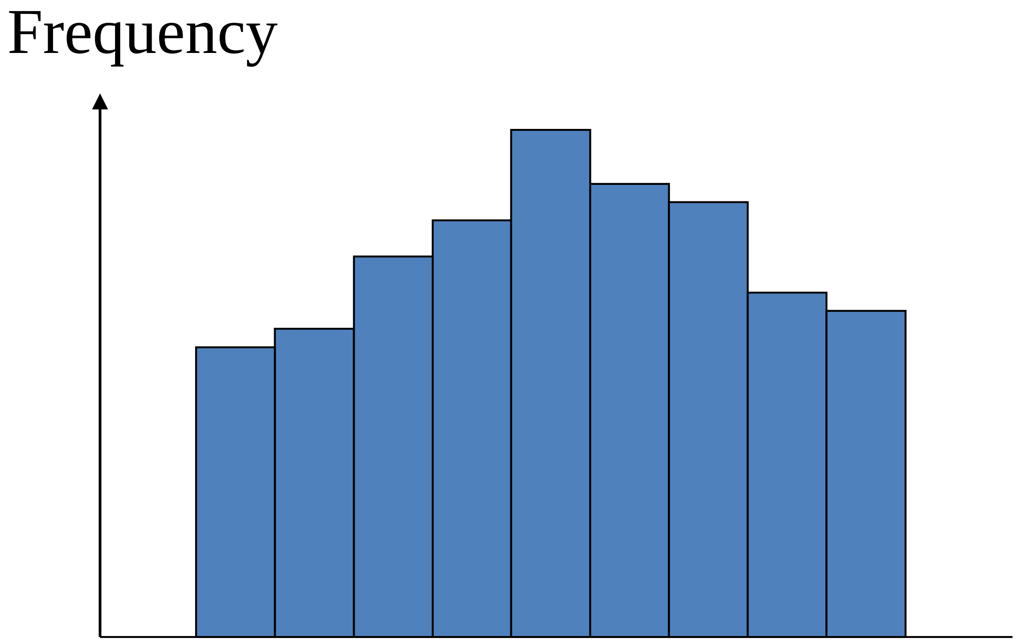
Tools used for continuous improvement

5. Check sheet

Item	A	B	C	D	E	F	G
-------			√ √	√		√	√
-------	√ √ √				√ √ √	√	√ √
-------		√ √	√	√ √		√	

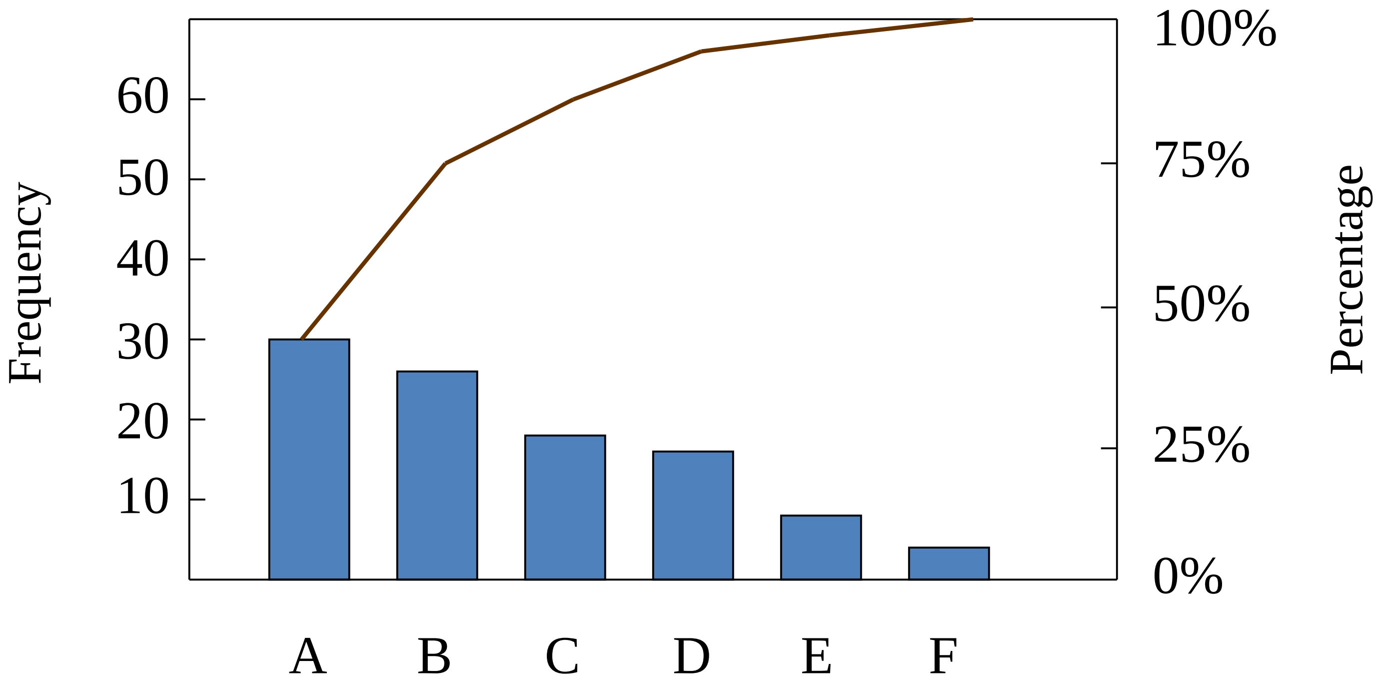
Tools used for continuous improvement

6. Histogram



Tools used for continuous improvement

7. Pareto Analysis



Six Sigma

Six Sigma

- Two meanings
  - Statistical definition of a process that is 99.9997% capable, 3.4 defects per million opportunities (DPMO)
  - A program designed to reduce defects, lower costs, and improve customer satisfaction

Six Sigma

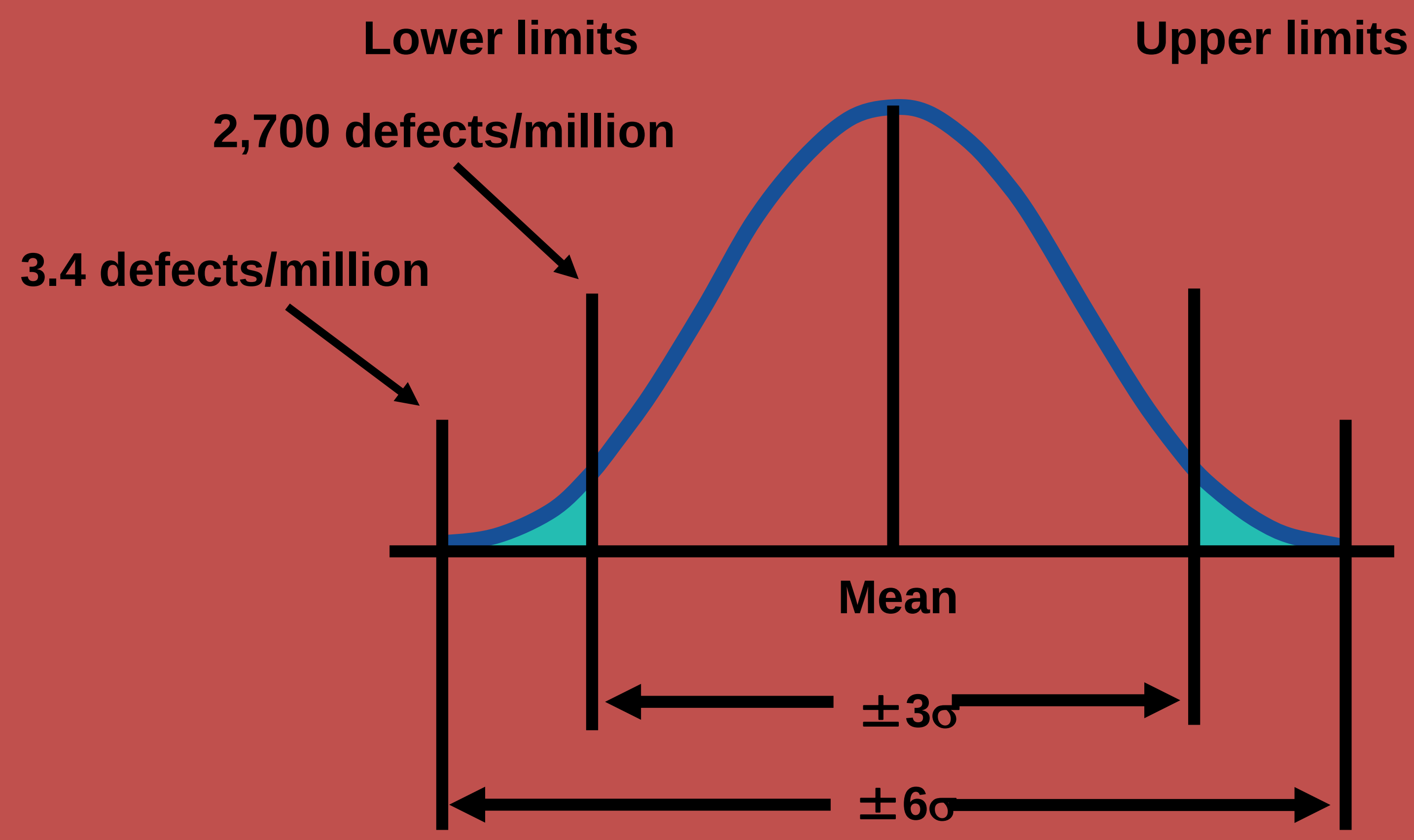


Figure 6.4

Six Sigma Management

1. **Define:** The problem to be solved needs to be defined along with the costs, benefits of the project, and the impact on the customer.
2. **Measure:** Definitions for each Critical-To-Quality (CTQ) characteristic must be developed. In addition, the measurement procedure must be verified so that it is consistent over repeated measurements.
3. **Analyze:** The root causes why defects can occur need to be determined along with the variables in the process that cause the defects to occur. Data are collected to determine the underlying value for each process variable, often using control charts.
4. **Improve:** The importance of each process variable on the CTQ characteristic are studied using designed experiments. The objective is to determine the best level for each variable that can be maintained in the long run.
5. **Control:** The objective is to maintain the gains that have been made with a revised process in the long term by avoiding potential problems that can occur when a process is changed.

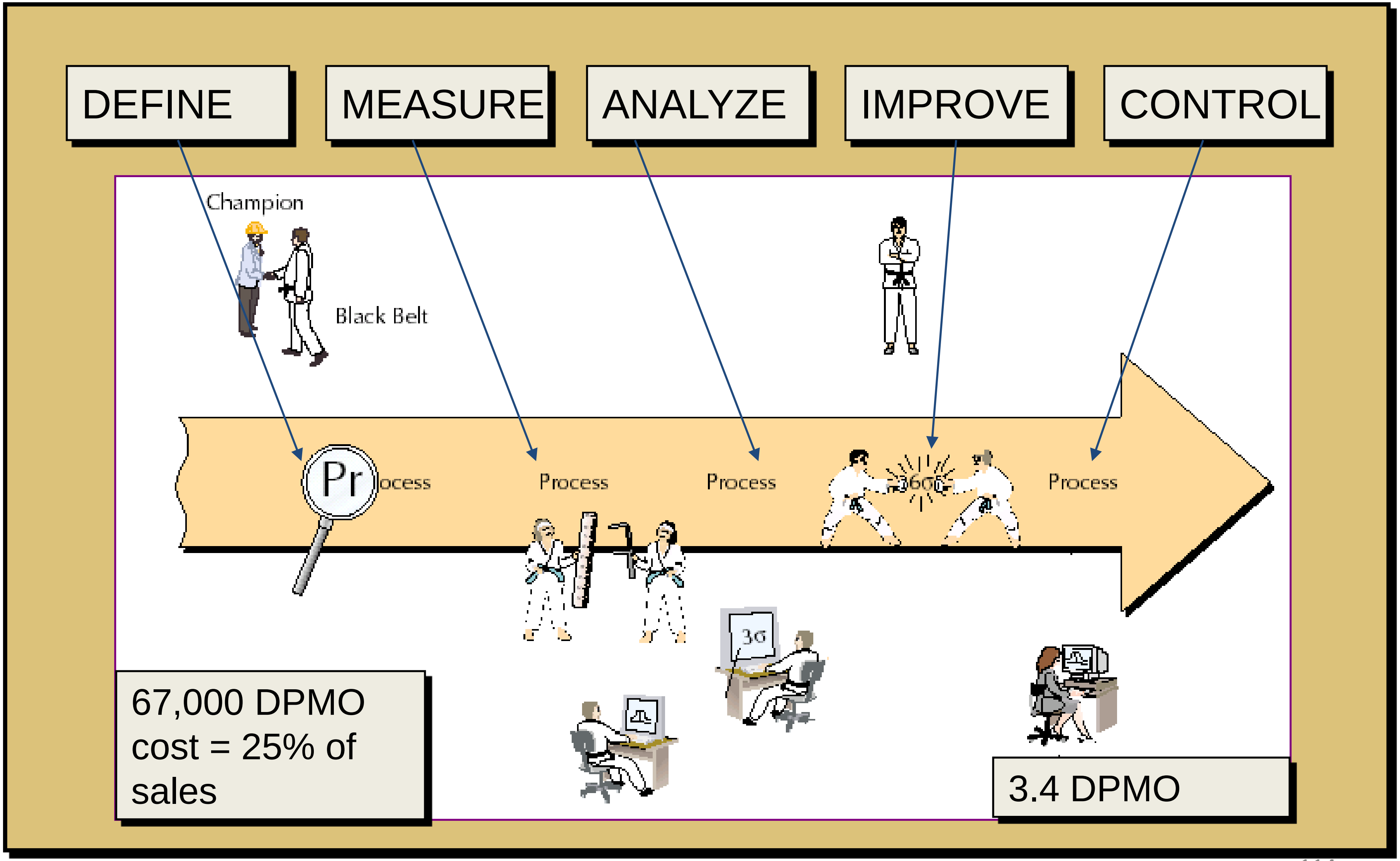
Six Sigma

- A process for developing and delivering near perfect products and services
- Measure of how much a process deviates from perfection
- 3.4 defects per million opportunities
- Champion
  - an executive responsible for project success

Black Belts and Green Belts

- Black Belt
  - project leader
- Master Black Belt
  - a teacher and mentor for Black Belts
- Green Belts
  - project team members

Six Sigma: DMAIC



Employee Empowerment

- Getting employees involved in product and process improvements
  - 85% of quality problems are due to process and material

- Techniques
  - Build communication networks that include employees
  - Develop open, supportive supervisors
  - Move responsibility to employees
  - Build a high-morale organization
  - Create formal team structures

Benchmarking

Selecting best practices to use as a standard for performance

1. Determine what to benchmark
2. Form a benchmark team
3. Identify benchmarking partners
4. Collect and analyze benchmarking information
5. Take action to match or exceed the benchmark

Just-in-Time (JIT)

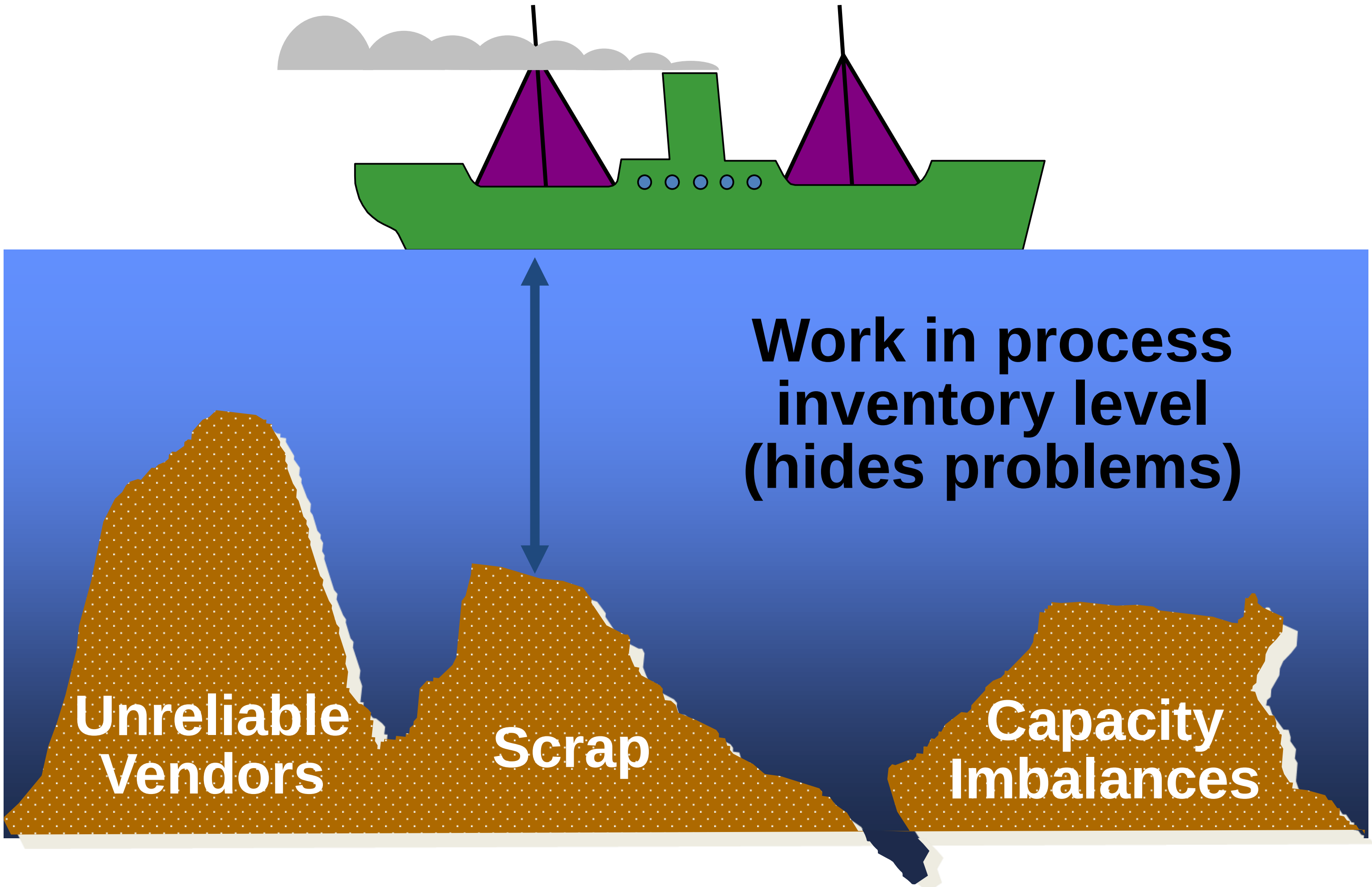
Relationship to quality:

- JIT cuts the cost of quality
- JIT improves quality
- Better quality means less inventory and better, easier-to-employ JIT system

Just-in-Time (JIT)

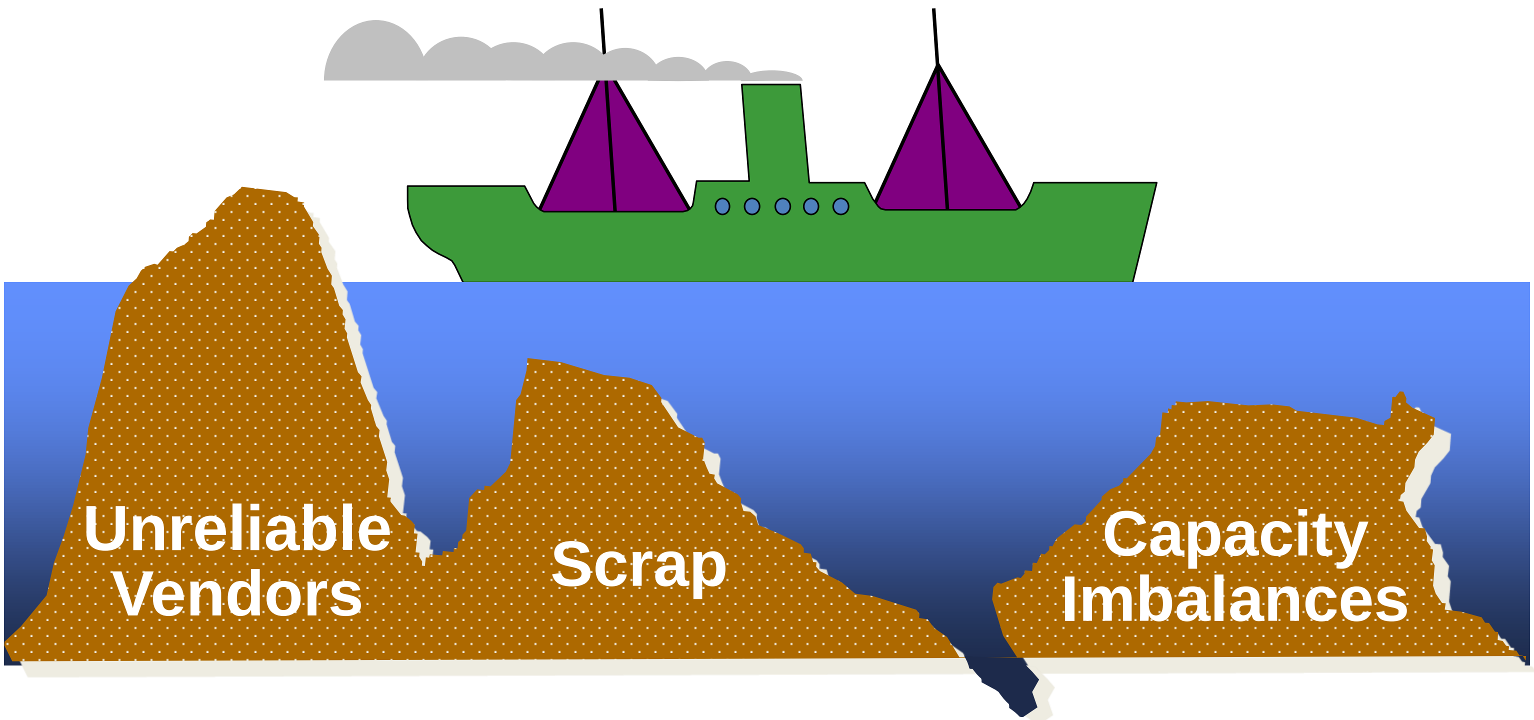
- ‘Pull’ system of production scheduling including supply management
  - Production only when signaled
- Allows reduced inventory levels
  - Inventory costs money and hides process and material problems
- Encourages improved process and product quality

Just-In-Time (JIT) Example



Just-In-Time (JIT) Example

Reducing inventory reveals problems so they can be solved



Taguchi's Contribution

In the early 1980s, Prof. Genechi Taguchi introduced his approach to using experimental design for;

1) Designing products or processes so that they are robust to environmental conditions.
2) Designing/developing products so that they are robust to component variation.
3) Minimizing variation around a target value.

By robust, we mean that the product or process performs consistently on target and is relatively insensitive to factors that are difficult to control.

Taguchi Philosophy

3 stages in a product's (or process's) development:

1) System design: uses scientific and engineering principles to determine the basic configuration.
2) Parameter design: specific values for the system parameters are determined.
3) Tolerance design: determine the best tolerances for the parameters.

Taguchi Philosophy

- **Recommends:** statistical experimental design methods have to be used for quality improvement, particularly during parameter and tolerance design phases.

- **Key component:** reduce the variability around the target (nominal) value.

Taguchi Concepts

- Engineering and experimental design methods to improve product and process design
  - Identify key component and process variables affecting product variation
- Taguchi Concepts
  - Quality robustness
  - Quality loss function
  - Target-oriented quality

Quality Robustness

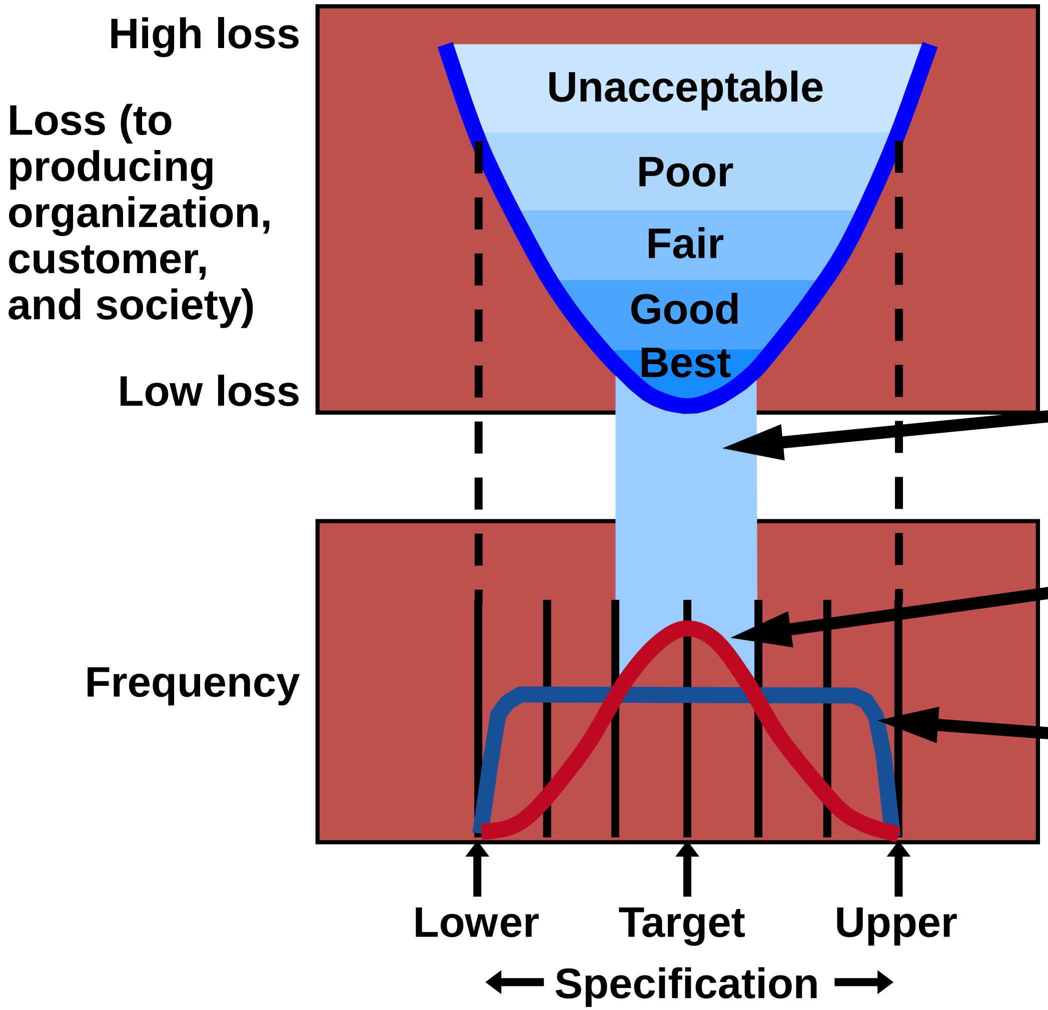
- Ability to produce products uniformly in adverse manufacturing and environmental conditions
  - Remove the effects of adverse conditions
  - Small variations in materials and process do not destroy product quality

Quality Loss Function

- Shows that costs increase as the product moves away from what the customer wants
- Costs include customer dissatisfaction, warranty
  and service, internal
  scrap and repair, and costs to society
- Traditional conformance specifications are too simplistic

Target-oriented quality

Quality Loss Function



$$L = D^2C$$

where

L = loss to society

D = distance from target value

C = cost of deviation

Target-oriented quality yields more product in the "best" category

Target-oriented quality brings product toward the target value

Conformance-oriented quality keeps products within 3 standard deviations

Figure 6.5

Use of Simple Scientific Tools for TQM

1. Pareto analysis
2. Flowcharts
3. Check sheets
4. Histograms
5. Scatter diagrams
6. Control charts
7. Fishbone diagram

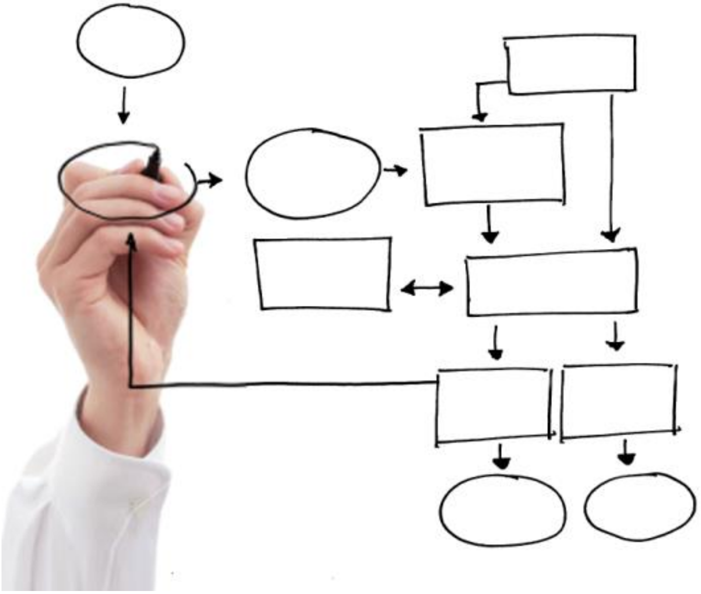
Chapter 3

- Process Approach
- Process Improvement
- Tools and Techniques

Process Approach

What is the meaning of Process?

A process is a set of activities that interact to achieve a result.



Statistical Methods for Quality

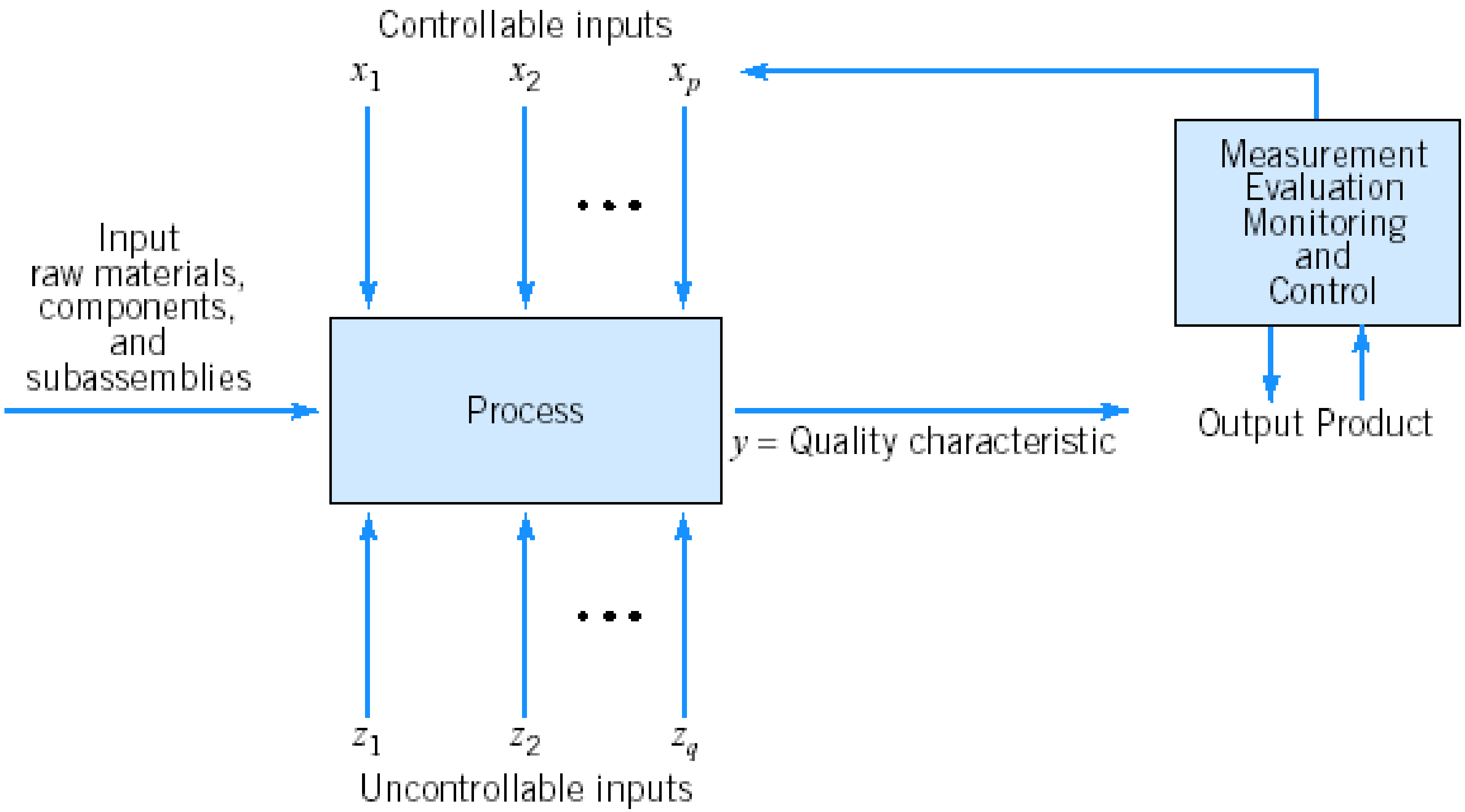


Figure 1-3 Production process inputs and outputs.

What is the process approach?

The systematic management of processes and their interactions to achieve intended results

ISO/TC 176 SC 2/N1273

What is the process approach?

All organizations use processes to:

- set interrelated or interacting activities
- transform inputs into outputs
- build in checks to meet objectives and promote continuous improvement

The process approach integrates processes into a complete system to achieve strategic and operational objectives

ISO/TC 176 SC 2/N1273

What is the Process Approach?

What is the process approach?

All organizations use processes to achieve their objectives.

A process:

- set of interrelated or interacting activities that use inputs to deliver an intended result

NOTE: Inputs and outputs may be tangible (e.g. materials, components or equipment) or intangible (e.g. data, information or knowledge).

The process approach includes establishing the organization's processes to operate as an integrated and complete system.

- The management system integrates processes and measures to meet objectives
- Processes define interrelated activities and checks, to deliver intended outputs
- Detailed planning and controls can be defined and documented as needed, depending on the organization's context.

How do I do it?

To use the process approach an organization should:

- understand and define the processes needed to meet its objectives
- recognize that the processes are unique to its own context
- integrate all of the processes and their interactions into a system that utilizes risk-based thinking

Process approach and risk-based thinking

- The process approach incorporates risk-based thinking
- Risk-based thinking ensures risk is considered when establishing, implementing and maintaining a management system, each process and each activity

The process approach and PDCA

Processes can be managed using the PDCA cycle

Plan	**set objectives and build processes necessary to deliver results**
Do	implement what was planned
Check	monitor and measure processes and results against the objectives
Act	take actions to improve results

Risk-based thinking...

Risk-based thinking, PDCA and the process approach

These three concepts together form an integral part of the ISO 9001:2015 standard. Risks that may impact on objectives and results must be addressed by the management system. **Risk-based thinking is used throughout the process approach to:**

- Decide how risk (positive or negative) is addressed in establishing the processes to improve process outputs and prevent undesirable results
- Define the extent of process planning and controls needed (based on risk)
- improve the effectiveness of the quality management system
- maintain and manage a system that inherently addresses risk and meets objectives

PDCA...

PDCA is a tool that can be used to manage processes and systems. PDCA stands for:

P Plan: set the objectives of the system and processes to deliver results ("What to do" and "how to do it")

D Do: implement and control what was planned

C Check: monitor and measure processes and results against policies, objectives and requirements and report results

A Act: take actions to improve the performance of processes

PDCA operates as a cycle of continual improvement, with risk-based thinking at each stage.

What are the possible benefits?

- Increases accountability
- Increases ability to focus and link key processes
- Improves internal integration of processes
- Increases awareness of process performance for more consistent results
- Better use of resources
- Improves customer confidence in the organization

All of these add value for the organization

The Process Approach in ISO 9001:2015

Steps in the process approach	What to do?	Guidance
	PLAN	
Define the context of the organization	The organization should identify its responsibilities, the relevant interested parties and their relevant requirements, needs and expectations to define the organization's intended purpose.	Gather, analyze and determine external and internal responsibilities of the organization to satisfy the relevant requirements, needs and expectations of the relevant interested parties. Monitor or communicate frequently with these interested parties to ensure continual understanding of their requirements, needs and expectations.

The Process Approach in ISO 9001:2015

Steps in the process approach	What to do?	Guidance
Define the scope, objectives and policies of the organization	Based on the analysis of the requirements, needs and expectations establish the scope, objectives and policies that are relevant for the organization's quality management system.	The organization shall determine the scope, boundaries and applicability of its management system taking into consideration the internal and external context and interested party requirements. Decide which markets the organization should address. Top management should then establish objectives and policies for the desired outcomes.

The Process Approach in ISO 9001:2015

Steps in the process approach	What to do?	Guidance
Determine the processes in the organization	Determine the processes needed to meet the objectives and policies and to produce the intended outputs.	Management shall determine the processes needed for achieving the intended outputs. These processes include management, resources, operations, measurement, analysis and improvement.

The Process Approach in ISO 9001:2015

Steps in the process approach	What to do?	Guidance
Determine the sequence of the processes	Determine how the processes flow in sequence and interaction.	Define and describe the network of processes and their interaction. Consider the following: • The inputs and outputs of each process (which may be internal or external). • Process interaction and interfaces on which processes depend or enable. • Optimum effectiveness and efficiency of the sequence. • Risks to the effectiveness of process interaction. Note: As an example, realization processes (such as those needed to provide the products or services delivered to a customer) will interact with other processes (such as the management, measurement, procurement in the provision of resources). Process sequences and their interactions may be developed using tools such as modeling, diagrams, matrices and flowcharts.

The Process Approach in ISO 9001:2015

Steps in the process approach	What to do?	Guidance
Define people or remits who take process ownership and accountability	Assign responsibility and authority for each process.	Top Management should organize and define ownership, accountability, individual roles, responsibilities, working groups, remits, authority and ensure the competence needed for the effective definition, implementation, maintenance and improvement of each process and its interactions. Such individuals or remits are usually referred to as the Process Owners. To manage process interactions it may be useful to also establish a management system team that has a system overview across all the processes and may include representatives from the interacting processes and functions.

The Process Approach in ISO 9001:2015

Steps in the process approach	What to do?	Guidance
Define the need for documented information	Determine those processes that need to be formally defined and how they are to be documented.	Processes exist within the organization. They may be formal or informal. There is no catalogue or list of processes that have to be formally defined. The organization should determine which processes need to be documented on the basis of risk-based thinking, including, for example: • The size of the organization and its type of activities. • The complexity of its processes and their interactions. • The criticality of the processes. • The need for formally accountability of performance. Processes can be formally documented using a number of methods such as graphical representations, user stories, written instructions, checklists, flow charts, visual media or electronic methods including graphics and systemization. However, the method or the technology chosen are not the goals. They can be used to describe processes, which are the means to achieve the goals. Effective and organized processes can then deliver consistent and accountable operations and the desired objectives and results which can then be improved.

The Process Approach in ISO 9001:2015

Steps in the process approach	What to do?	Guidance
Define the interfaces, risks and activities within the process	Determine the activities needed to achieve the intended outputs of the process and risks of unintended outputs.	Define the required outputs and inputs of the process. Determine the risks to conformity of products, services and customer satisfaction if unintended outputs are delivered. Determine the activities, measures and inherent controls required to transform the inputs into the desired ouputs. Determine and define the sequence and interaction of the activities within the process. Determine how each activity will be performed. Ensure that the management system as a whole takes account of all material risks to the organization and users. Note: In some cases the customer may specify requirements not only for the outputs but also for the realization of a process.

The Process Approach in ISO 9001:2015

Steps in the process approach	What to do?	Guidance
Define the monitoring and measurement requirements	Determine where and how monitoring and measuring should be applied. This should be both for control and improvement of the processes and the intended process outputs. Determine the need for recording results.	Identify the validation necessary to assure effectiveness and efficiency of the processes and system. Take into account such factors as: • Monitoring and measuring criteria. • Reviews of performance • Interested parties' satisfaction. • Supplier performance. • On time delivery and lead times. • Failure rates and waste. • Process costs. • Incident frequency. • Other measures of conformity with requirements.

The Process Approach in ISO 9001:2015

Steps in the process approach	What to do?	Guidance
	DO	
Implement	Implement actions necessary to achieve planned activities and results.	The organization should perform activities, monitoring, measures and controls of defined processes and procedures (which may be automated), outsourcing and other methods necessary to achieve planned results.
Define the resources needed	Determine the resources needed for the effective operation of each process.	Examples of resources include: • Human resources. • Infrastructure. • Environment. • Information. • Natural resources (including knowledge). • Materials. • Financial resources.

The Process Approach in ISO 9001:2015

Steps in the process approach	What to do?	Guidance
	CHECK	
Verify the process against its planned objectives	Confirm that the process is effective and that the characteristics of the processes are consistent with the purpose of the organization.	The organization should compare outputs against objectives to verify that all the requirements are satisfied. Processes are needed to gather data. Examples include measurement, monitoring, reviews, audits and performance analysis.

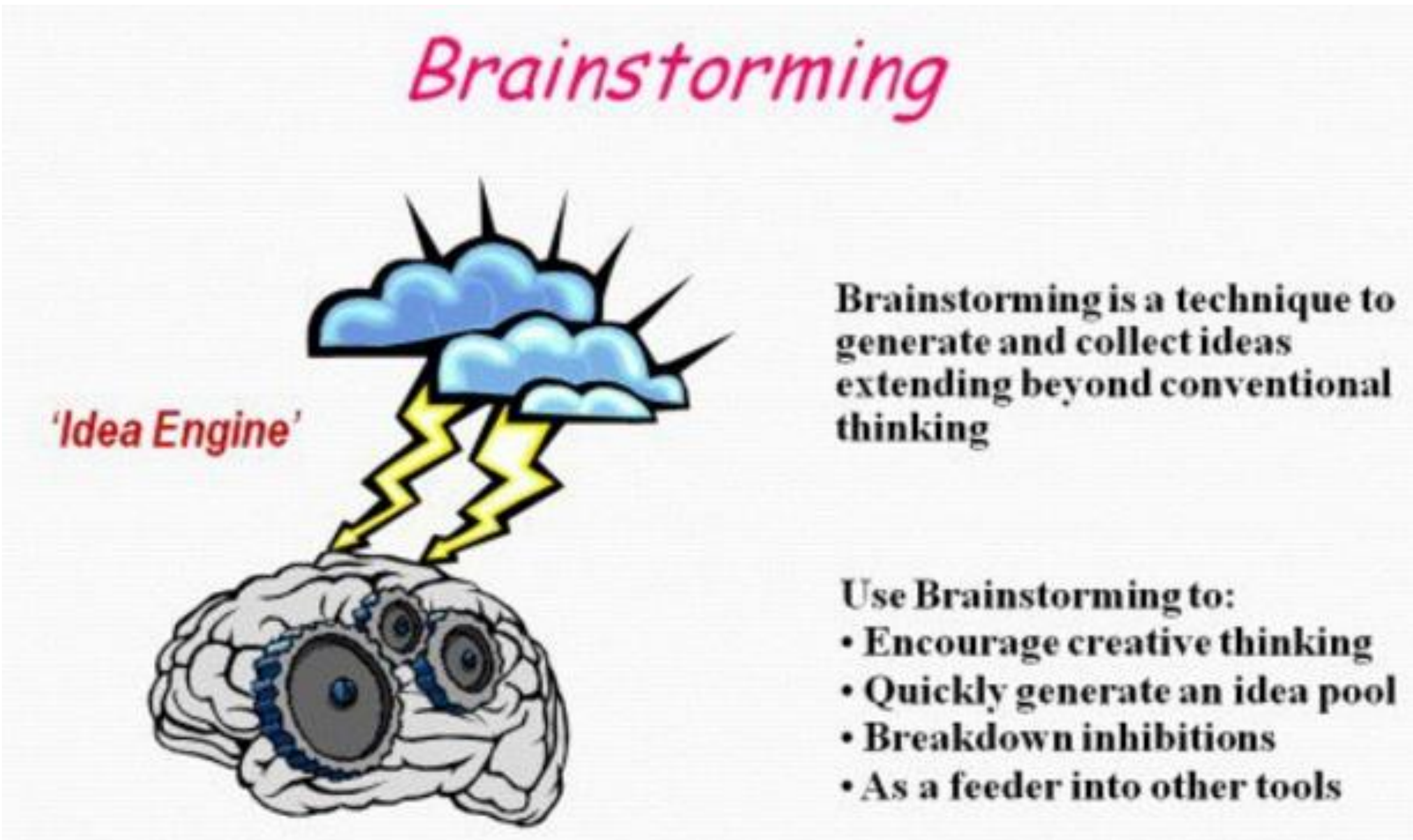
The Process Approach in ISO 9001:2015

Steps in the process approach	What to do?	Guidance
	ACT	
Improvement	Change the processes to ensure that they continue to deliver the intended outputs	Act on the findings to ensure improvement of process effectiveness. (NOTE: Organizations may also wish to improve process efficiency, though it is not a requirement of ISO 9001 to do so). Corrective action as a result of process failure should include the identification and elimination of the root causes of the problems. 'System Thinking' recognizes that an event in one process may have a cause or effect in a dependent process. Causes and the effects may not be within the same process. Problem solving and improvement typically follows the • define the problems or objectives • collect and analyze the data on the problem and relevant processes • select and implement the preferred solutions • evaluate the effectiveness of the solutions. • incorporate the solutions into the routine

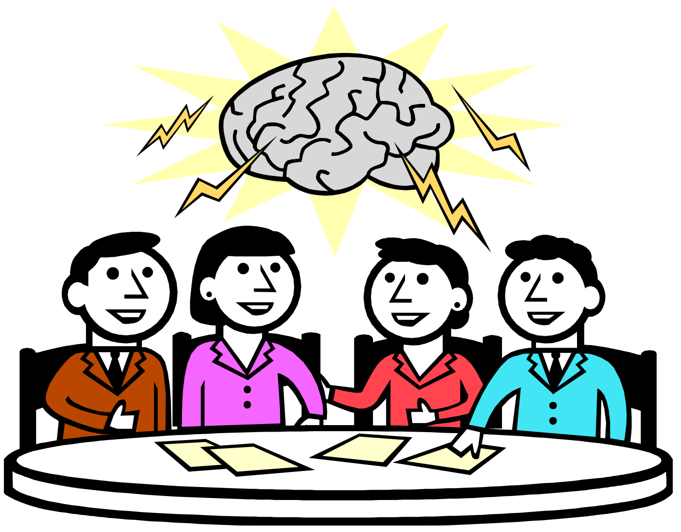
Tools & Techniques

Quality Improvement Tools

Quality Improvement Tools



Brainstorming



- ✓ Everyone participates
- ✓ Go round robin and only one person speaks at a time
- ✓ No discussion of ideas
- ✓ There is no such thing as a dumb idea
- ✓ Pass when necessary
- ✓ Use "BIG" yellow sticky notes and write only 1 idea per sticky note
- ✓ One person assigned as scribe
- ✓ For a complicated issue, the session could last 30-45 minutes…or longer!

Nominal Group Technique

Use a
Nominal Group Technique
To focus brainstorming results

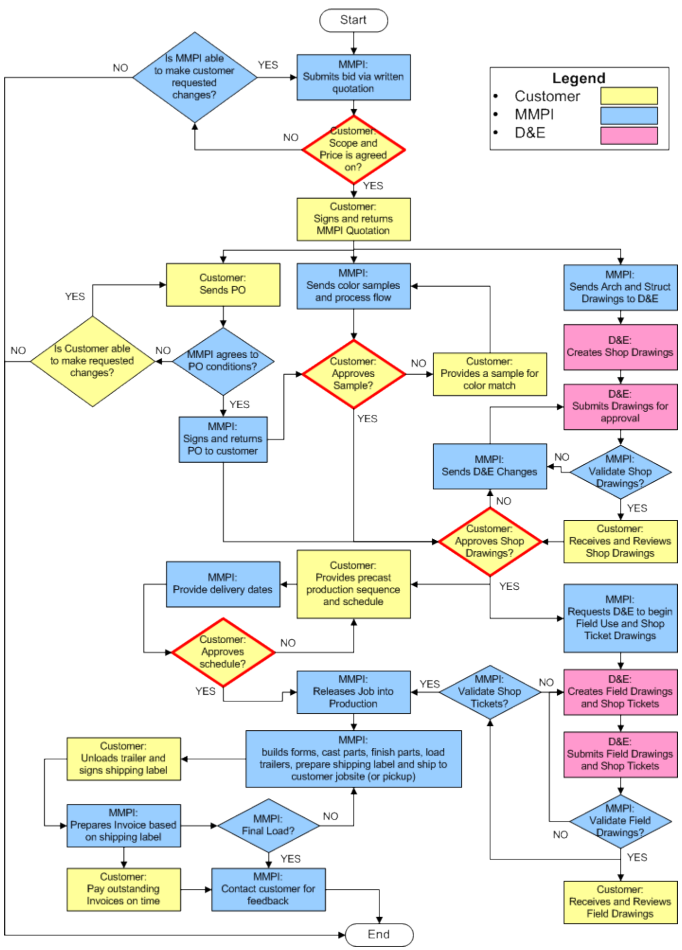
An internet search on

"Nominal Group Technique"

Will yield many examples and methods to apply this technique

Flow Diagrams

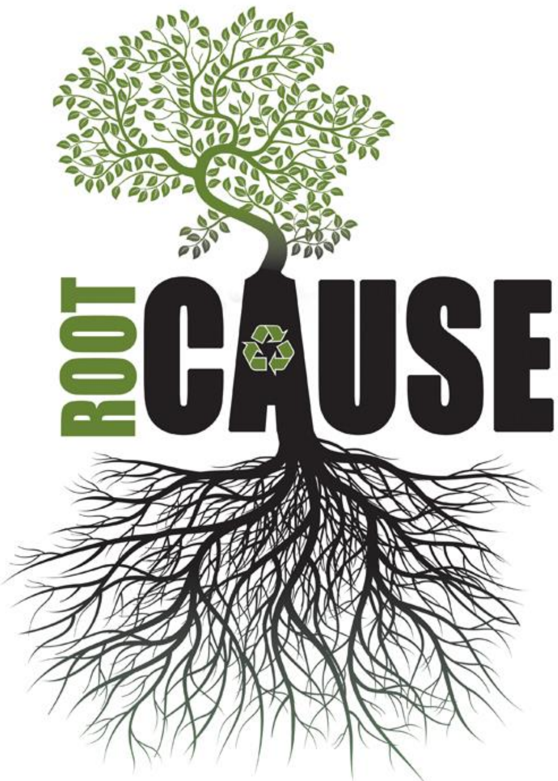
Why is flow diagramming helpful?



- ✓ Build a common understanding of a whole process
- ✓ Develop process thinking
- ✓ Improve a process
- ✓ Standardize a process

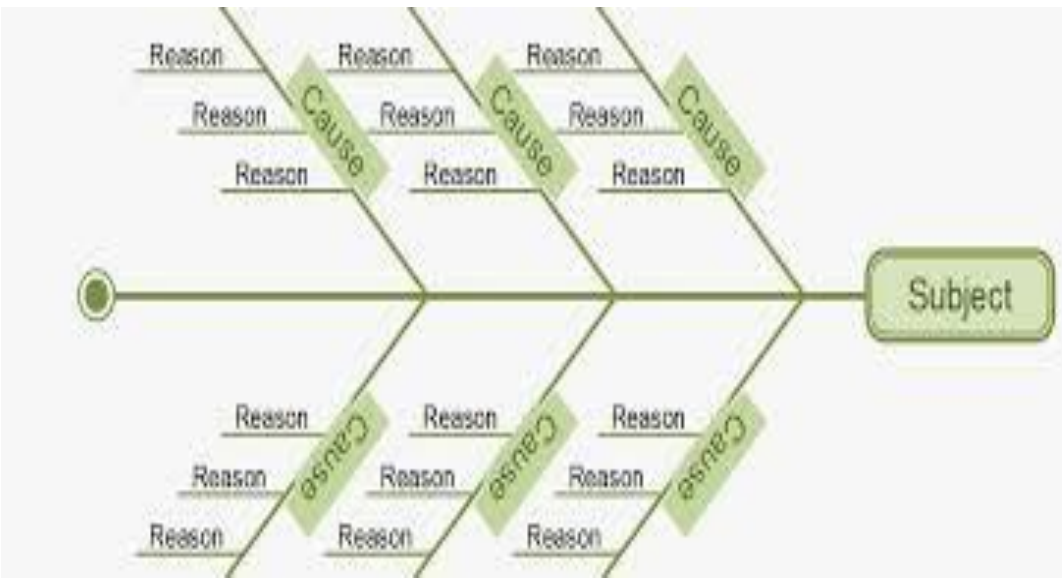
Investigate the Root Causes

Understand the root causes of a problem BEFORE you put a “solution” into place



Cause & Effect Diagrams

Why are cause and effect diagrams helpful?



- ✓ Identify and display many different possible causes for a problem
- ✓ See the relationships between the many causes
- ✓ Helps determine which data to collect

Cause & Effect Diagrams

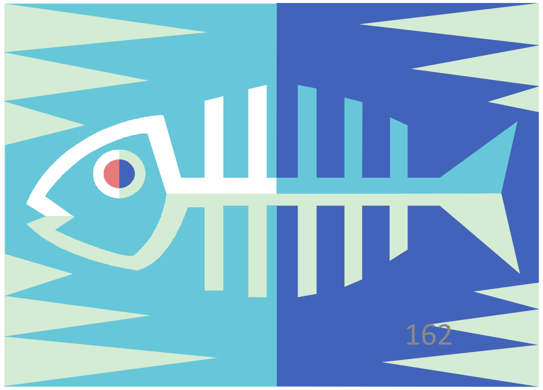
- Bones should not include solutions
- Bones should not include lists of process steps
- Bones include the possible causes

Better understand the current situation…..

Now begin to develop a change.

How To Construct Cause & Effect Diagrams

- Clearly define the focused problem
- Use brainstorming to identify possible causes
- Sort causes into reasonable clusters
  (no less than 3, not more than 6)
- Label the clusters (consider people, policies, procedures, materials if you have not already identified labels)
- Develop and arrange bones in each cluster
- Check the logical validity of each causal chain



The 7 Basic Quality Tools for Process Improvement

http://asq.org/learn-about-quality/seven-basic-quality-tools/overview/overview.html

Seven Quality Control Tools

- Pareto Analysis
- Flow Chart
- Check Sheet
- Histogram
- Scatter Diagram
- SPC Chart
- Cause-and-Effect Diagram

Quality pros have many names for these seven basic tools of quality, first emphasized by Kaoru Ishikawa, a professor of engineering at Tokyo University and the father of "quality circles."

Seven Quality Control Tools

Cause-and-effect diagram (also called Ishikawa or fishbone chart): Identifies many possible causes for an effect or problem and sorts ideas into useful categories.

Check sheet: A structured, prepared form for collecting and analyzing data; a generic tool that can be adapted for a wide variety of purposes.

Control charts: Graphs used to study how a process changes over time.

Histogram: The most commonly used graph for showing frequency distributions, or how often each different value in a set of data occurs.

Pareto chart: Shows on a bar graph which factors are more significant.

Scatter diagram: Graphs pairs of numerical data, one variable on each axis, to look for a relationship.

Stratification: A technique that separates data gathered from a variety of sources so that patterns can be seen (some lists replace “stratification” with “flowchart” or “run chart”).

- Excerpted from Nancy R. Tague’s The Quality Toolbox, Second Edition, ASQ Quality Press, 2005, page 15.

Tools of TQM

- Tools for Generating Ideas
  - Check sheets
  - Scatter diagrams
  - Cause-and-effect diagrams
- Tools to Organize the Data
  - Pareto charts
  - Flowcharts

Tools of TQM

- Tools for Identifying Problems
  - Histogram
  - Statistical process control chart

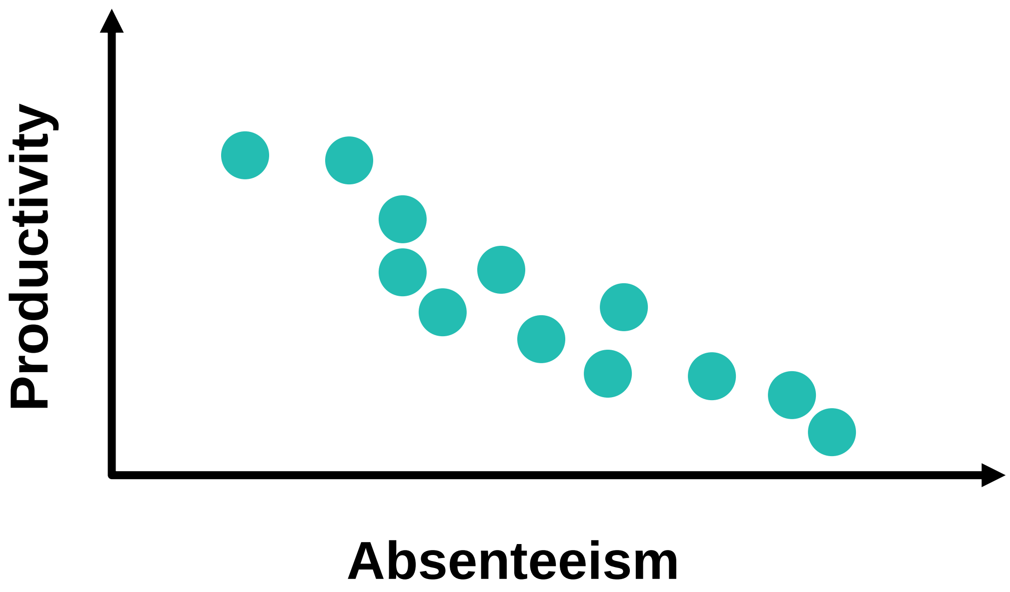
Seven Tools of TQM

Check Sheet: An organized method of recording data

	Hour							
Defect	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
A	*///*	*/*		*/*	*/*	*/*	*///*	*/*
B	*//*	*/*	*/*	*/*			*//*	*///*
C	*/*	*//*					*//*	*////*

Seven Tools of TQM

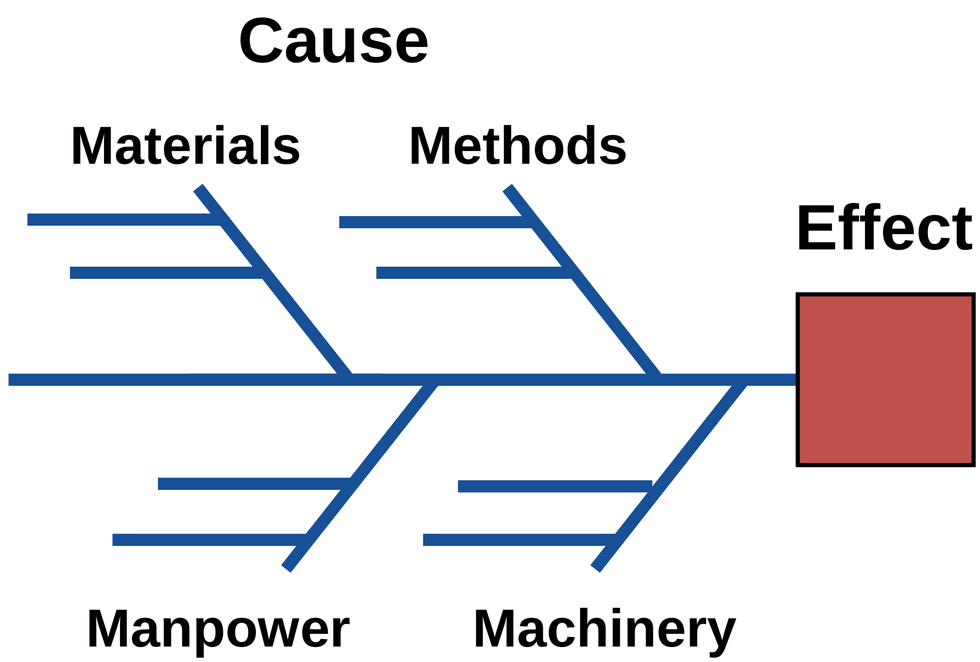
Scatter Diagram:
A graph of the value of one variable vs. another variable



Seven Tools of TQM

Cause-and-Effect Diagram:

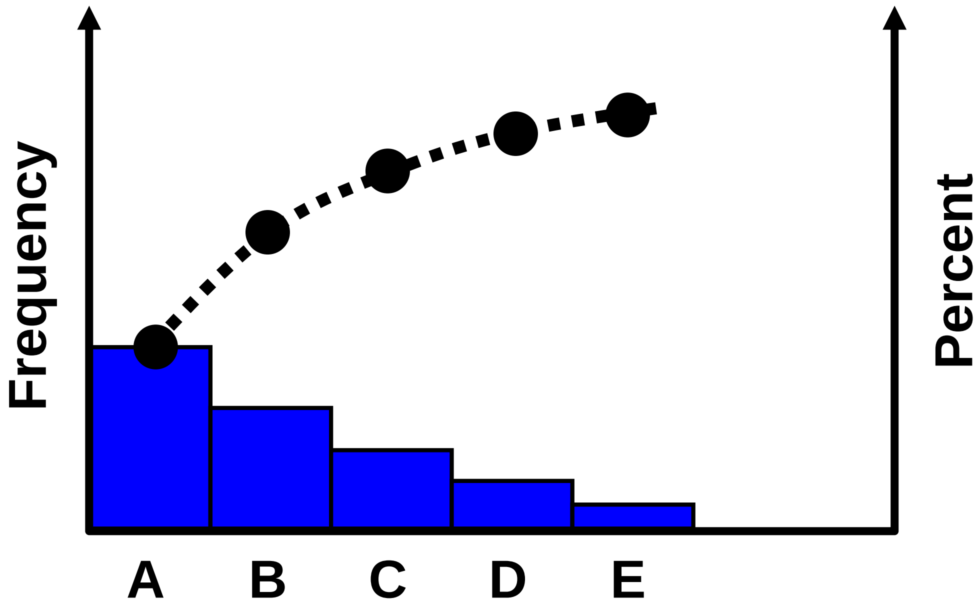
A tool that identifies process elements (causes) that might effect an outcome



Seven Tools of TQM

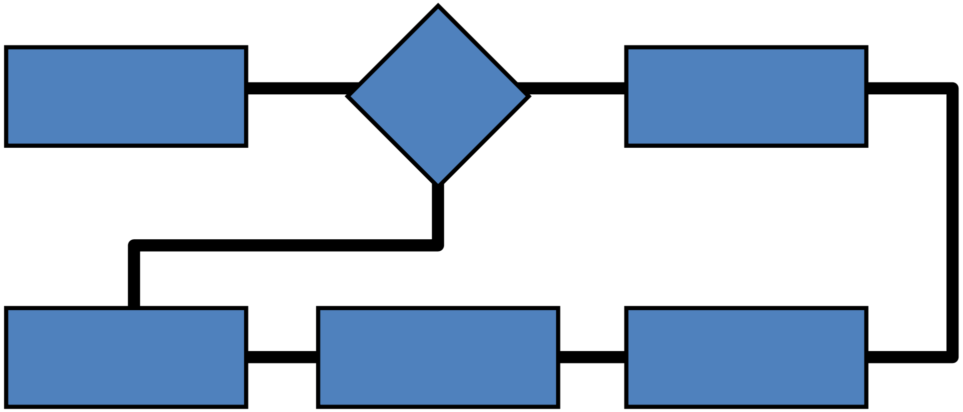
Pareto Chart:

A graph to identify and plot problems or defects in descending order of frequency



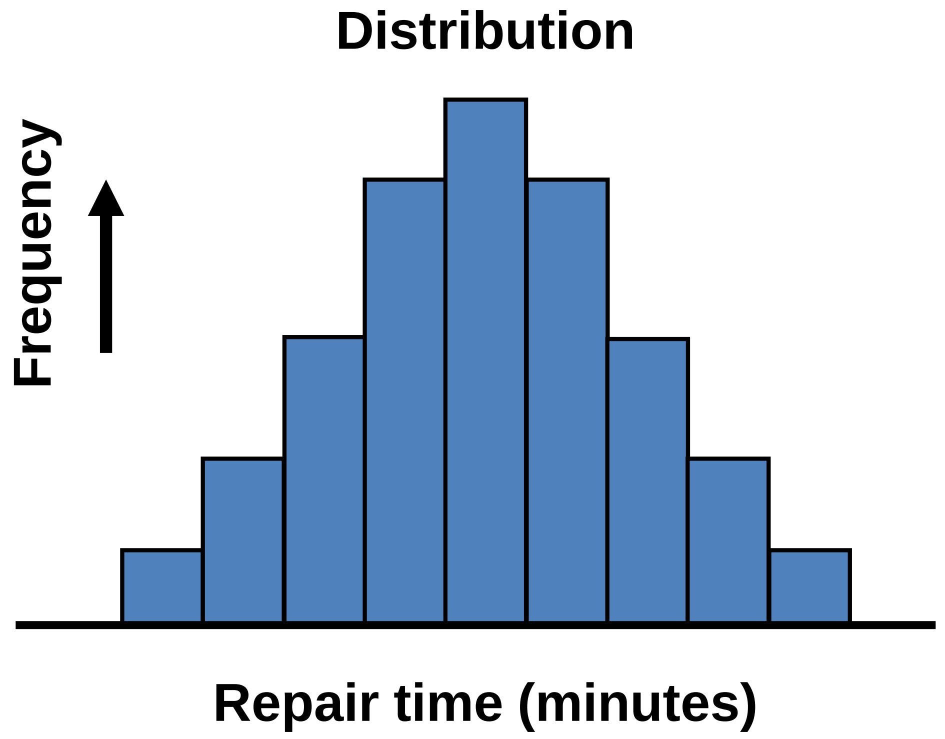
Seven Tools of TQM

Flowchart (Process Diagram): A chart that describes the steps in a process



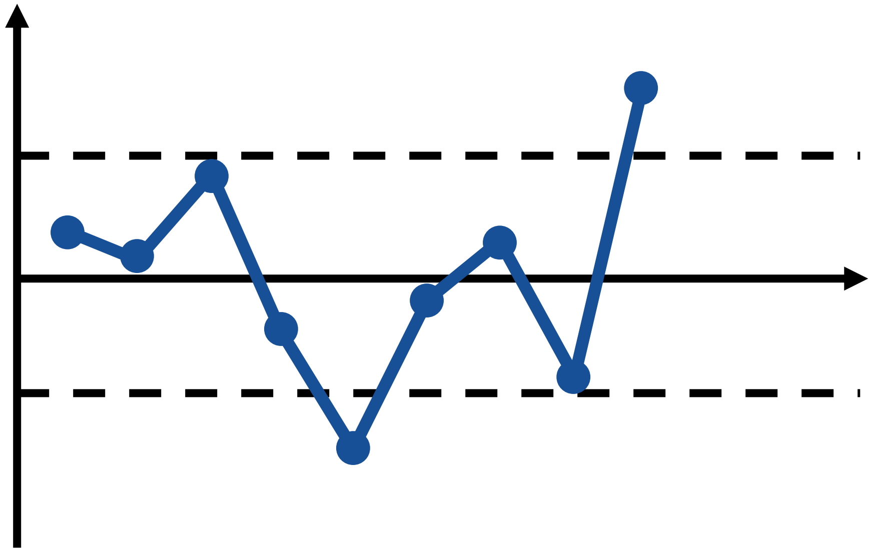
Seven Tools of TQM

Histogram: A distribution showing the frequency of occurrences of a variable

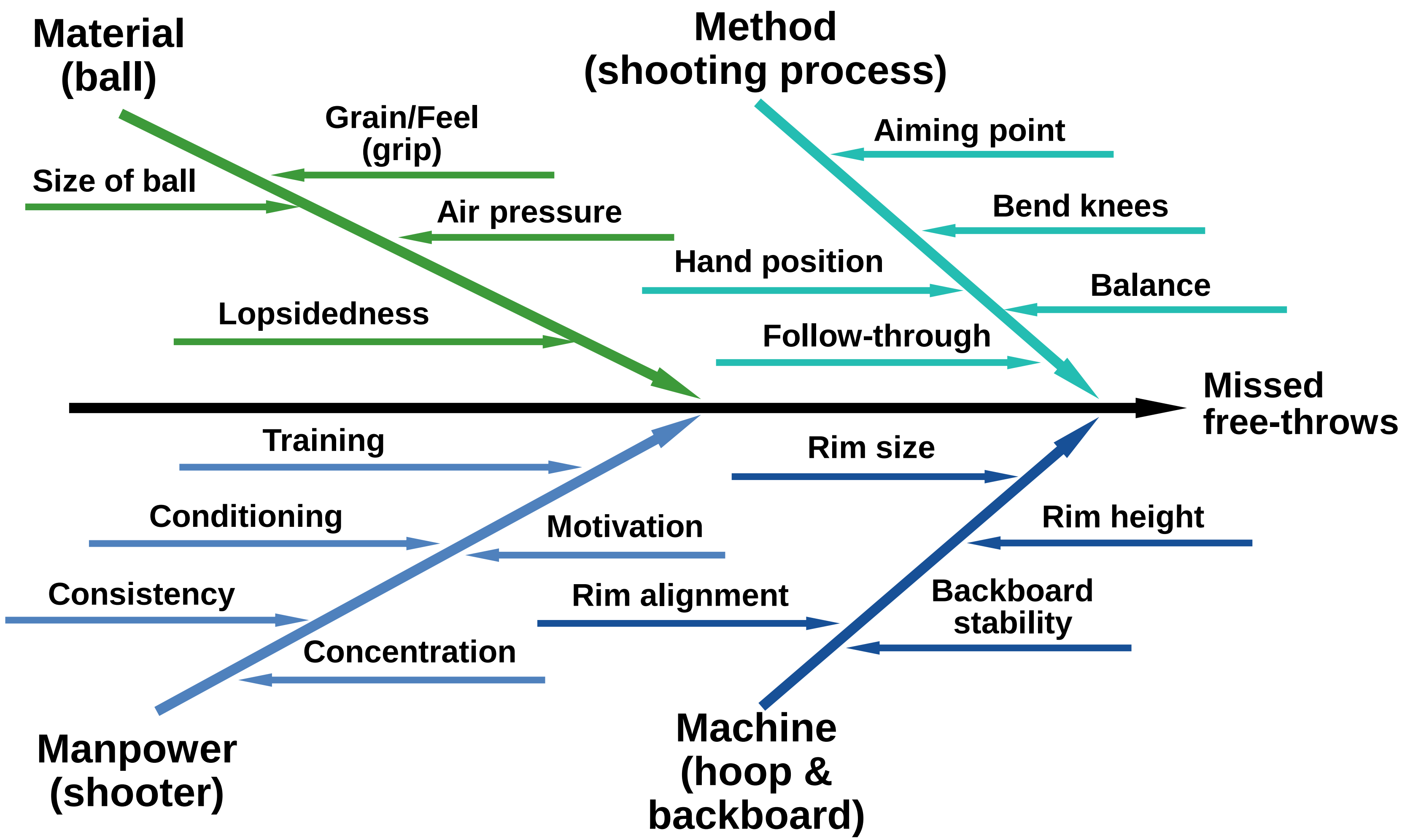


Seven Tools of TQM

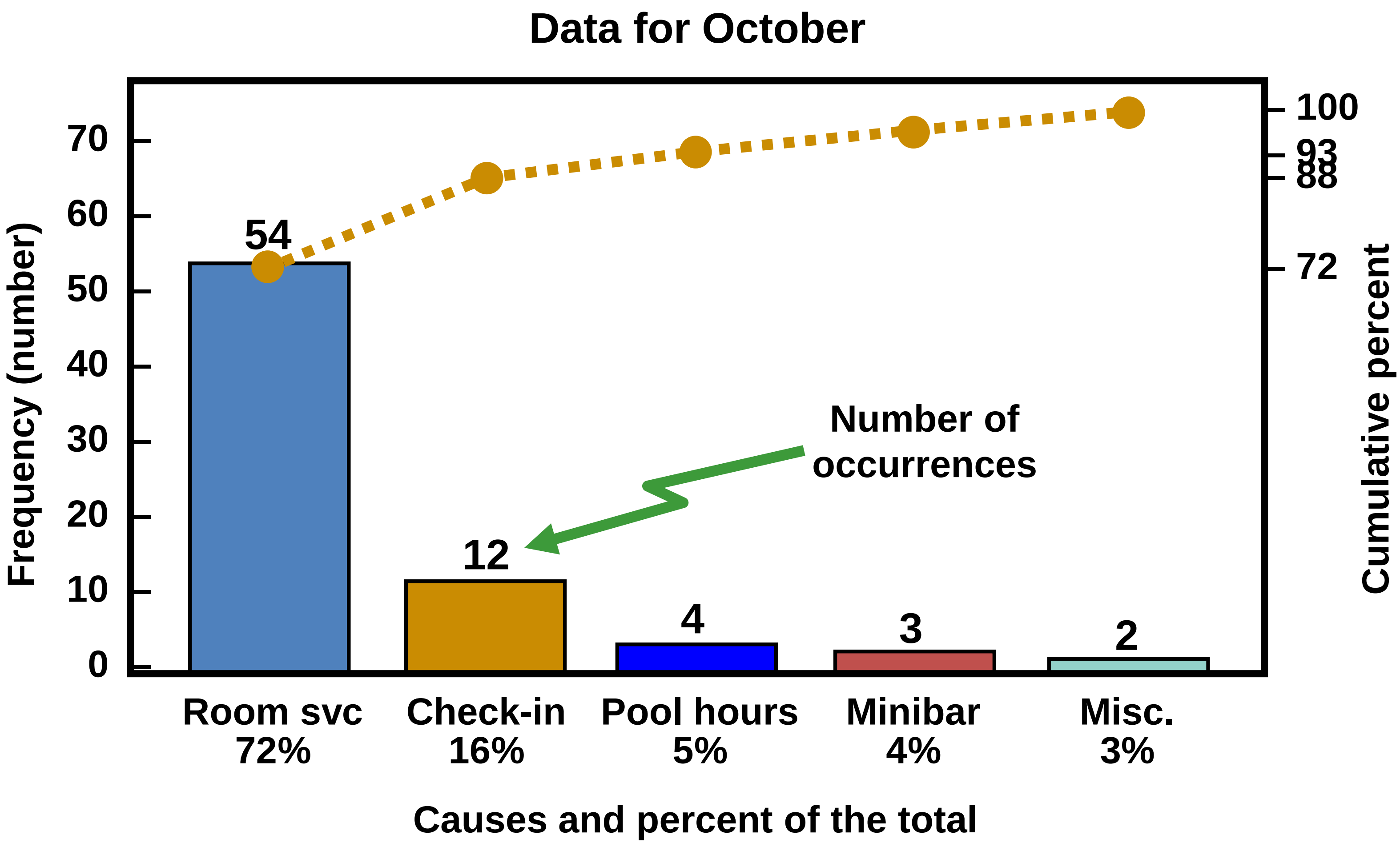
Statistical Process Control Chart: A chart with time on the horizontal axis to plot values of a statistic



Cause-and-Effect Diagrams



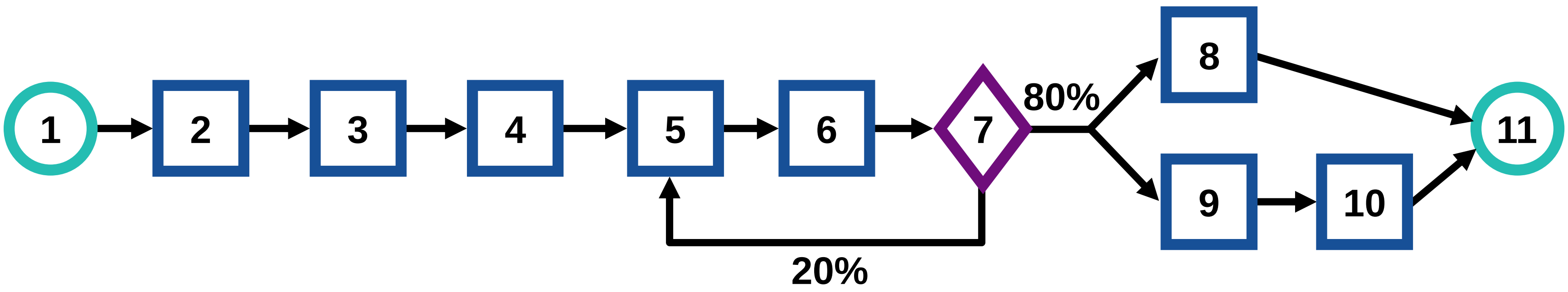
Pareto Charts



Flow Charts

MRI Flowchart

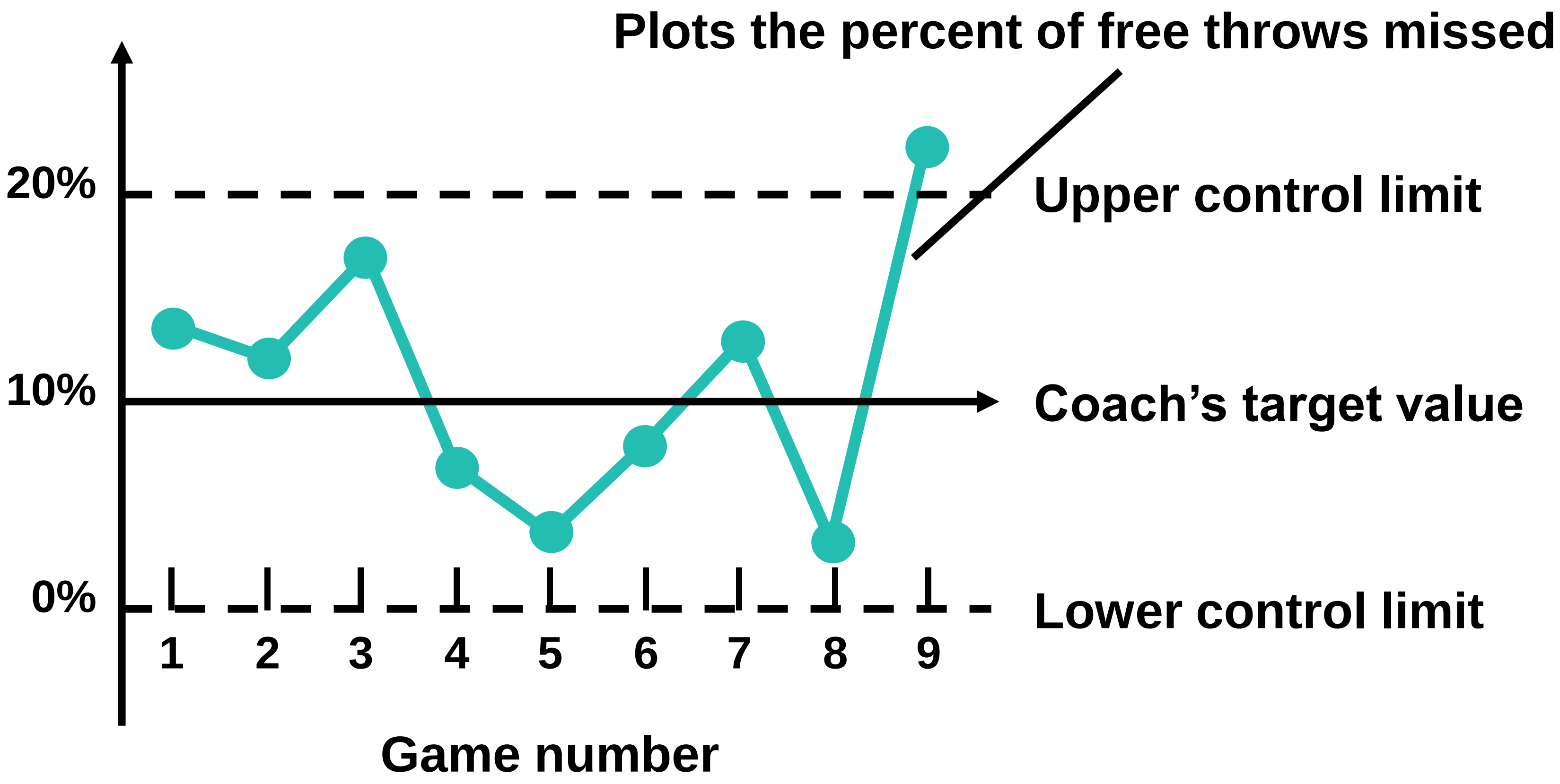
1. Physician schedules MRI
2. Patient taken to MRI
3. Patient signs in
4. Patient is prepped
5. Technician carries out MRI
6. Technician inspects film
7. If unsatisfactory, repeat
8. Patient taken back to room
9. MRI read by radiologist
10. MRI report transferred to physician
11. Patient and physician discuss



Statistical Process Control (SPC)

- Uses statistics and control charts to tell when to take corrective action
- Drives process improvement
- Four key steps
  - Measure the process
  - When a change is indicated, find the assignable cause
  - Eliminate or incorporate the cause
  - Restart the revised process

An SPC Chart



Plots the percent of free throws missed
20%
10%
0%
Upper control limit
Coach's target value
Lower control limit
1
2
3
4
5
6
7
8
9
Game number

Chapter 4

- Quality and Productivity

Quality & Productivity

Quality Control

Quality has different connotations- in health and hospitality it may mean 'hygiene'; in electricals and electronics, it may mean, 'safety;' in services it may mean 'speed' and 'reliability' and so on. In the present context even price is a quality measure! Operationally, however, quality refers to conformance to established standards. Quality control consists of all those activities, which are designed to define, maintain and control specific quality of products within reasonable limits. It is the systematic regulation of all variables affecting the goodness of the end product. In other words, quality control involves determination of quality standards and measurement and control necessary to ensure that the established standards are practiced and maintained. It does not attempt to achieve the perfect quality but to secure satisfactory or reasonable quality at a reasonable and competitive level of cost through a systematic control over the variables in the manufacturing process, variations in the quality of the product can be kept reasonably stable.

Significance Quality Control

In today's competitive environment the mere success and survival of any enterprise whether it is a small scale unit or large scale enterprise depends upon the achievement and maintenance of a satisfactory level of quality. Quality control offers several advantages.

(a) It helps to improve the brand image of the enterprise.

(b) It facilitates standardization.

(c) It helps to reduce costs by cutting down wastes caused by the production of defective products.

(d) It helps to increase sales turnover.

(e) It enables the entrepreneur to face competition more effectively in domestic as well as international markets.

(f) It helps the entrepreneur to determine costs and prices at competition levels in advance of production.

(g) It enables the manufacturer to comply with quality standards prescribed by the government.

Quality standards are set only after considering consumer's demands and cost of the product. The variation in quality are caused by variations in the materials used, in men, machines, tools, and equipment and in methods and procedures of production and inspection these variables need to be controlled if quality products are to be produced.

Methods of Quality Control

Traditionally, there are two methods of quality control:-

1. Inspection
2. Statistical quality control

1. **Inspection:** - There are three important aspects of inspection.

(a) *Process inspection*: - It is designed to check raw material, machines etc. It saves time and wastage of material and prevents process bottlenecks.

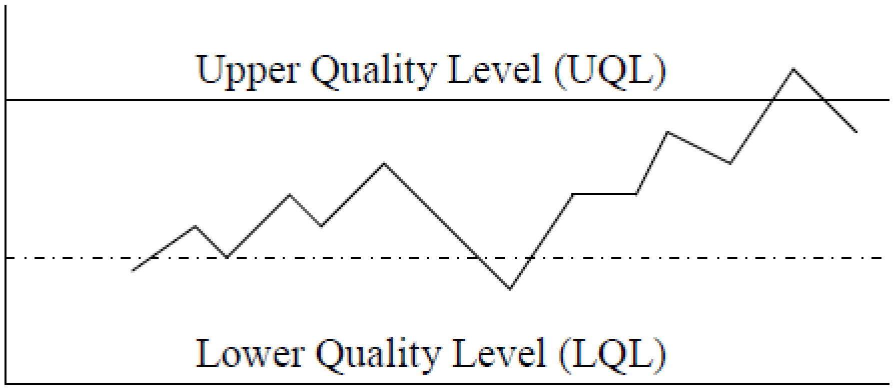
(b) *Product Inspection*: - It is to ensure that goods sent into the market for sale are free from defects and conform to the set standards of quality.

(c) *Inspection Analysis*: - A thoughtful and careful analysis of inspection results would help the entrepreneur in locating the critical points in the manufacturing process at which control is breaking down.

Methods of Quality Control

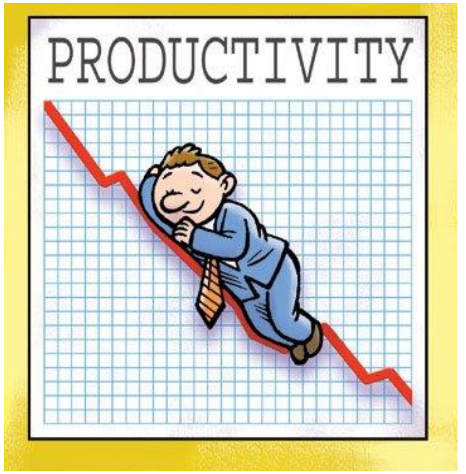
2. **Statistical Quality control (S.Q.C.):-** Under this method a sample of items to be controlled is selected and statistically checked to ensure that the established standards of quality are maintained. It involves making things right rather than discovering and rejecting those made wrong. Control charts and acceptance sampling are used for this purpose.

(i) Quality Control Charts: A quality control chart is a graph on which the characteristics of samples are plotted. The chart given in Fig. below is an example.



(ii) Acceptance Sampling: In this method a sample of products is checked. Full lot is rejected if the percentage of defective items is more than the predetermined limit otherwise the whole lot is accepted. The percentage of defective items that is acceptable is called Acceptable Quality Level (AQL). This level involves a risk (called producer's risk) that an unsatisfactory lot might be accepted. To minimize these risks, lot tolerance percentage defective (LTPD) is determined. This is the highest level of defects beyond which a lot will not be accepted for sale.

Productivity



Productivity refers to the physical relation between the quality produced (output) and the quantity of resource used in the course of production (input)

$$\text{Productivity (P)} = \frac{output}{input}\frac{(O)}{I}$$

Output implies production while input means land, labour, capital, management etc. Productivity measures the efficiency of the production system. Higher productivity means producing more from a given amount of input or producing a given amount with minimum level of inputs.

In other words the more the output from one worker or one machine (or a piece of equipment) per day per shift, the higher is the productivity. Higher productivity is not to be taken in sense of higher workloads or faster machines alone but it is always elimination of waste of all type of labour (time and skill) machine time, capital, and material management etc.

Productivity = Output per unit of input

Productivity and production are two different terms. Productivity is a relative term indicating the ratio between total output and the total inputs used therein on the other hand production is an absolute concept, which refers to the volume of output. The volume of production may increase but productivity may decline due to inefficient use of resource. Efficient use of input may increase productivity but the volume of production may not increase. Production refers to the end result of production system whereas productivity reflects its efficiency.

Dikkat

- ***Etkinlik:*** Bir sistemde kaynakların nasıl kullanıldığını ölçen bir kavramdır. Belli bir amaca ulaşmak için yapılması gereken faaliyetlerin en az kaynakla yapılıp yapılmadığının bir göstergesidir.

$$\text{Etkinlik} = \frac{\text{Standard girdi kullanımı}}{\text{Fiili girdi kullanımı}}$$

Örneğin bir raporun değerlendirmesi için gereken süre 48 saatse ve değerlendirme 60 saatte yapılıyorsa rapor değerlendirme için etkinlik 48/60=%80'dir bu %25 fazla iş gücü zamanı kullanımı demektir

- ***Etkililik:*** Bir işletmenin daha önceden belirlenmiş olan amaçlarına ne düzeyde ulaştığını gösteren orandır.

$$\text{Etkililik} = \frac{\text{Gerçekleşen sonuç}}{\text{Planlanan sonuç}}$$

Örneğin bir kurumdaki benzer iş süreçlerini tamamlama sürelerinin aylık ortalama hedefi 20 dakika olarak planlanmışsa ve gerçekte bu süre 25 dakika olarak tespit edilmiş ise süreç tamamlama için etkililik 25/20=%125'dir bu planlanandan %25 daha az etkili bir sonuç demektir

- ***Verimlilik:*** Bir üretim ya da hizmet sisteminin ürettiği çıktı ile bu çıktıyı elde etmek için kullanılan girdi arasındaki ilişkidir.

$$\text{Verimlilik} = \frac{\text{Çıktı}}{\text{Girdi}}$$

Örneğin bir çalışanın standartlar dahilinde bir ayda doküman yazma kapasitesi 50 sayfa ise ve o çalışanın günlük doküman yazma ortalaması 40 olarak tespit edilmişse çalışanın verimliliği 40/50=%80'dir.

Significance

Benefits derived from higher productivity are as follows:

1. It helps to cut down cost per unit and thereby improve the profits.
2. Gains from productivity can be transferred to the consumers in from of lower priced products or better quality products.
3. These gains can also be shared with workers or employees by paying them at higher rate.
4. A more productive entrepreneur can have better chances to exploit export opportunities.
5. It would generate more employment opportunities.

Measurement of Productivity

Productivity may be measured either on aggregate bases or on individual basis, which are called total and partial productivity respectively.

Total Productivity Index= $\dfrac{total\ outputs}{total\ inputs}$

$$\frac{total\ production\ of\ goods\ and\ services}{labour + material + capital + Energy + Managed}$$

This index measures the efficiency in the use of all the resources.

Partial productivity Indices, depending upon factors used, it measures the efficacy of individual factor of production. Following are productivity indices for individual inputs.

Management Productivity Index = $\dfrac{output\ unit}{total\ \cos t\ of\ management}$

Machine Productivity Index = $\dfrac{total\ output}{machine\ hours\ worked}$

Land Productivity Index = $\dfrac{total\ output}{area\ of\ land\ used}$

Örnek

- Tüm girdiler için verimliliği hesaplarsak, **Toplam Verimliliği** ölçeriz. Toplam verimlilik tüm örgütün verimliliğini tanımlar. Örneğin bir firmanın haftalık ürettiklerinin değeri 8600 $; işgücü, malzeme ve sermaye gibi girdilerinin değeri 10.200 $ olsun. Firmanın toplam verimliliği,

$$\text{T.V.} = \frac{\text{Çıktı}}{\text{Girdi}} = \frac{8600\ \$}{10200\ \$} = 0{,}84$$

Örnek

- Çoğunlukla, bir defada bir girdinin verimliliğini ölçmek daha yararlı olur. Çünkü onun ne derece etkin kullanıldığını belirleyebiliriz. Verimliliği, çıktının tek bir girdiye oranı olarak hesaplarsak, **kısmi verimlilik** ölçüsünü elde ederiz. Aşağıda kısmi verimlilik ölçümüne iki örnek verilmiştir.
- Yeni fırınımız 4 saatte 346 kurabiye üretmiştir. Verimliliği nedir?

V= 346/4=86,5 kurabiye/saat

- Mobilya dükkanımızda masaları boyamak için 2 yeni işçi işe aldık. Eğer işçiler 8 saatte 22 masa boyarlarsa verimlilikleri nedir?

$$\text{İşgücü Verimliliği} = \frac{22 \ \text{masa}}{2 \ \text{işçi} \times 8 \ \text{saat}} = 1{,}375 \quad \text{masa}/\text{saat}$$

Örnek

- Boya verimliliğini çıktının bir grup girdiye oranı olarak ölçeriz. Bu **kısmi faktör** (çoklu faktör) verimliliğidir. Örneğin çıktımızın değeri 382 $, işgücü ve malzeme maliyeti 168 $ ve 98$ olsun. Çoklu faktör verimliliği:

$$\text{MFP (KFV)} = \frac{\text{Çıktı}}{\text{İşgücü} + \text{Malzeme}} = \frac{382\$}{(168+98)\$} = 1,43$$

Factors Influencing Productivity

Productivity is outcome of several interrelated factors, which may broadly be divided into two categories- human factors and technological factors.

1. **Human Factors**: Human nature and human behaviour are the most significant determinants of productivity. Human factors include both their ability as well as their willingness:

(a) *Ability to work:* Productivity of an organization depends upon the competence and caliber of its people-both workers and managers Ability to work is governed by education, training, experience, aptitude, etc. of the employees.

(b) *Willingness to work:* Motivation and morale of people are very important factors that determine productivity. These are affected by wage incentive schemes, labour participation in management, communication systems, informal group relations, promotion policy, union management relations, quality of leadership, working hours, sanitation, ventilation, subsidized canteen, company transport, etc.

Factors Influencing Productivity

2. Technological Factors: Technological factors exert significant influence on the level of productivity. These include the following:

(a) Size and capacity of plant
(b) Product design and standardization
(c) Timely supply of materials and fuel
(d) Rationalization and automation measures
(e) Repairs and maintenance
(f) Production planning and control
(g) Plant layout and location
(h) Materials handling system
(i) Inspection and quality control
(j) Machinery and equipment used
(k) Research and development
(l) Inventory control

Factors Influencing Productivity

3. Managerial factors: The competence and attitudes of managers have an important bearing on productivity. In many organizations, productivity is low despite latest technology and trained manpower. This is due to inefficient and indifferent management. Competent and dedicated managers can obtain extraordinary results from ordinary people. Job performance of employees

depends on their ability and willingness to work. Management is the catalyst to create both. Advanced technology requires knowledgeable workers who in turn work productively under professionally qualified managers. No ideology can win a greater output with less effort. It is only through sound management that optimum utilization of human and technical resources can be secured.

Factors Influencing Productivity

4. **Natural Factors:** natural factors such as physical, geographical and climate conditions exert considerable influence on productivity, particularly in extreme climates (too cold or too hot) tends to be comparatively low. Natural resources like water, fuel and minerals influence productivity.

5. **Sociological Factors:** Social customs, traditions and institutions influence attitudes towards work and job. For instance, bias on the basis of caste, religion, etc., inhibited the growth of modern industry in some countries. The joint family system affected incentive to work hard in India. Close ties with land and native place hampered stability and discipline among industrial labour.

6. **Political Factors:** Law and order, stability of Government, harmony between States, etc. are essential for high productivity in industries Taxation policies of the Government influence willingness to work, capital formation, modernization and expansion of plants etc. Industrial policy affects the size, and capacity of plants. Tariff policies influence competition. Elimination of sick and inefficient units also helps to improve productivity.

7. **Economic Factors:** Size of the market, banking and credit facilities, transport and communication systems, etc. is important factors influencing productivity.

Quality Management and Productivity

- Productivity
  - ratio of output to input
- Yield: a measure of productivity

Yield=(total input)(% good units) + (total input)(1-%good units)(% reworked)

or

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

Yield=(total input)(% good units) + (total input)(1-%good units)(% reworked)

or

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

EXAMPLE 3.2	Computing Product Yield

The H&S Motor Company starts production for a particular type of motor with a steel motor housing. The production process begins with 100 motors each day. The percentage of good motors produced each day averages 80 percent and the percentage of poor-quality motors that can be reworked is 50 percent. The company wants to know the daily product yield and the effect on productivity if the daily percentage of good-quality motors is increased to 90 percent.

EXAMPLE 3.2	Computing Product Yield

The H&S Motor Company starts production for a particular type of motor with a steel motor housing. The production process begins with 100 motors each day. The percentage of good motors produced each day averages 80 percent and the percentage of poor-quality motors that can be reworked is 50 percent. The company wants to know the daily product yield and the effect on productivity if the daily percentage of good-quality motors is increased to 90 percent.

SOLUTION:

$$\text{Yield} = (I)(\%G) + (I)(1 - \%G)(\%R)$$
$$Y = 100(0.80) + 100(1 - 0.80)(0.50)$$
$$= 90 \text{ motors}$$

If product quality is increased to 90 percent good motors, the yield will be

$$Y = 100(0.90) + 100(1 - 0.90)(0.50)$$
$$= 95 \text{ motors}$$

A 10 percentage-point increase in quality products results in a 5.5 percent increase in productivity output.

Product Cost

$$\text{Product Cost} = \frac{(K_d)(I) + (K_r)(R)}{Y}$$

where:

K_d = direct manufacturing cost per unit

I = input

K_r = rework cost per unit

R = reworked units

Y = yield

$$\text{Product Cost} = \frac{(K_d)(I) + (K_r)(R)}{Y}$$

where:
K_d = direct manufacturing cost per unit
I = input
K_r = rework cost per unit
R = reworked units
Y = yield

EXAMPLE 3.3	Computing Product Cost Per Unit

The H&S Motor Company has a direct manufacturing cost per unit of $30, and motors that are of inferior quality can be reworked for $12 per unit. From Example 3.2, 100 motors are produced daily, 80 percent (on average) are of good quality and 20 percent are defective. Of the defective motors, half can be reworked to yield good-quality products. Through its quality management program, the company has discovered a problem in its production process that, when corrected (at a minimum cost), will increase the good-quality products to 90 percent. The company wants to assess the impact on the direct cost per unit of improvement in product quality.

SOLUTION:

The original manufacturing cost per motor is

$$\text{Product cost} = \frac{(K_d)(I) + (K_r)(R)}{Y}$$

$$\text{Product cost} = \frac{(\$30)(100) + (\$12)(10}{90 \text{ motors}}$$

$$= \$34.67 \text{ per motor}$$

The manufacturing cost per motor with the quality improvement is

$$\text{Product cost} = \frac{(\$30)(100) + (\$12)(5)}{95 \text{ motors}}$$

$$\text{Product cost} = \$32.21 \text{ per motor}$$

The improvement in the production process as a result of the quality management program will result in a decrease of $2.46 per unit, or 7.1 percent, in direct manufacturing cost per unit as well as a 5.5 percent increase in product yield (computed in Example 3.2) with a minimal investment in labor, plant, or equipment.

Computing Product Yield for Multistage Processes

$$Y = (I)(\%g_1)(\%g_2) \ldots (\%g_n)$$

where:
I = input of items to the production process that will result in finished products
g_i = good-quality, work-in-process products at stage i

$$Y = (I)(\%g_1)(\%g_2) \dots (\%g_n)$$

where:
I = input of items to the production process that will result in finished products
g_i = good-quality, work-in-process products at stage i

EXAMPLE 3.4 Computing Product Yield for a Multistage Process

At the H&S Motor Company, motors are produced in a four-stage process. Motors are inspected following each stage with percentage yields (on average) of good quality in-process units as follows.

Stage	Average Percentage Good Quality
1	0.93
2	0.95
3	0.97
4	0.92

The company wants to know the daily product yield for product input of 100 units per day. Further, it would like to know how many input units it would have to start with each day to result in a final daily yield of 100 good quality units.

EXAMPLE 3.4 Computing Product Yield for a Multistage Process

At the H&S Motor Company, motors are produced in a four-stage process. Motors are inspected following each stage with percentage yields (on average) of good quality in-process units as follows.

Stage	Average Percentage Good Quality
1	0.93
2	0.95
3	0.97
4	0.92

The company wants to know the daily product yield for product input of 100 units per day. Further, it would like to know how many input units it would have to start with each day to result in a final daily yield of 100 good quality units.

SOLUTION:

$$Y = (I)(\%g_1)(\%g_2)(\%g_3)(\%g_4)$$
$$= (100)(0.93)(0.95)(0.97)(0.92)$$
$$Y = 78.8 \text{ motors}$$

Thus, the production process has a daily good-quality product yield of 78.8 motors.

To determine the product input that would be required to achieve a product yield of 100 motors, I is treated as a decision variable when Y equals 100:

$$I = \frac{Y}{(\%g_1)(\%g_2)(\%g_3)(\%g_4)}$$
$$I = \frac{100}{(0.93)(0.95)(0.97)(0.92)}$$
$$= 126.8 \text{ motors}$$

Quality–Productivity Ratio

QPR

– productivity index that includes productivity and quality costs

$$\text{QPR} = \frac{\text{(non-defective units)}}{\text{(input) (processing cost) + (defective units) (reworked cost)}}$$

The Quality-Productivity Ratio

Another measure of the effect of quality on productivity combines the concepts of **quality index** numbers and product yield. Called the **quality-productivity ratio** (QPR),[8] it is computed as follows:

$$QPR = \frac{\text{good - quality units}}{(\text{input})(\text{processing cost}) + (\text{defective units})(\text{rework cost})}(100)$$

This is actually a quality index number that includes productivity and quality costs. The QPR increases if either processing cost or rework costs or both decrease. It increases if more good-quality units are produced relative to total product input (i.e., the number of units that begin the production process).

Örnek

$$\text{verimlilik endeksi} = \frac{\text{cari dönem verimliliği}}{\text{baz dönem verimliliği}}$$

2007 yılında verimlilik oranı 1,25 ve

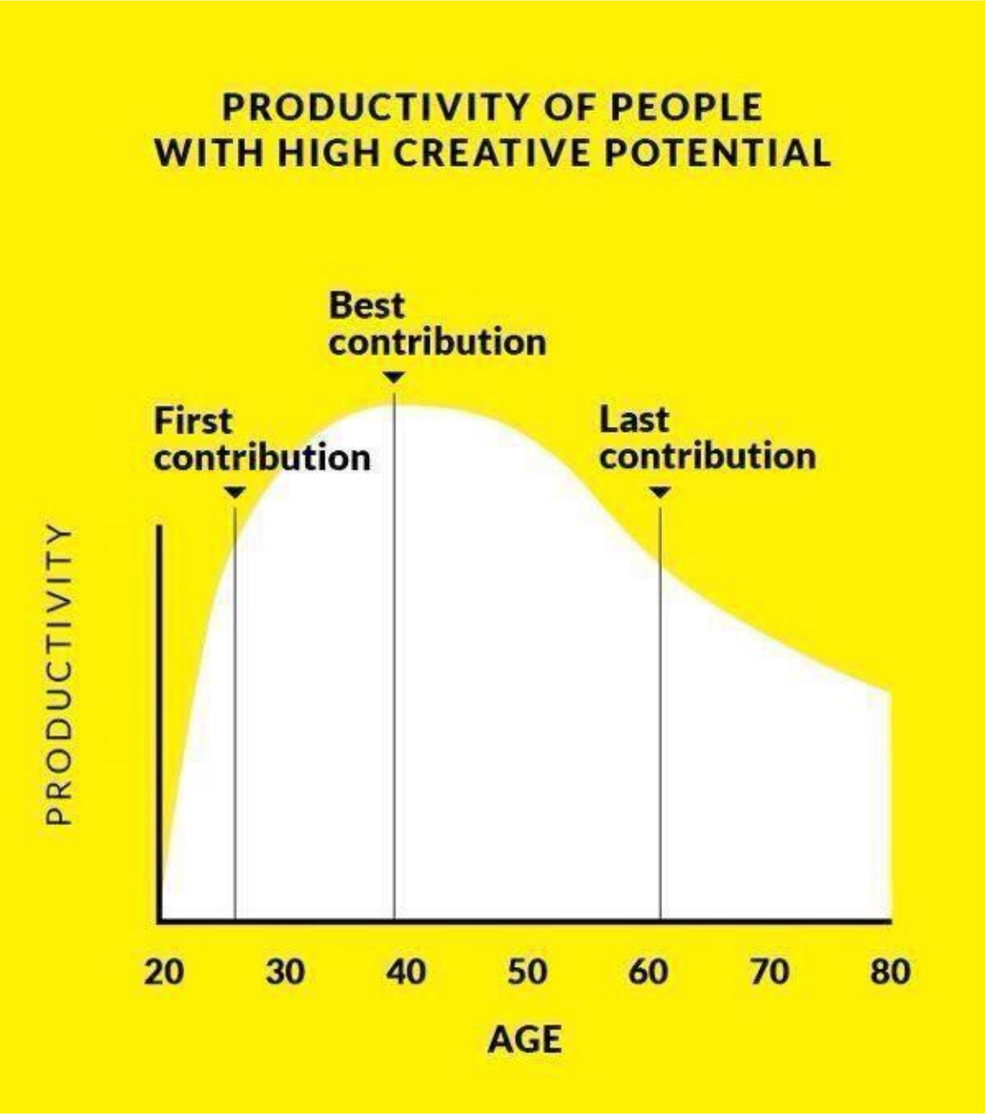
2008 yılında verimlilik oranı 1,18 ise 2007 yılı baz alındığında 2008 yılındaki verimlilik değişimi endeks olarak:

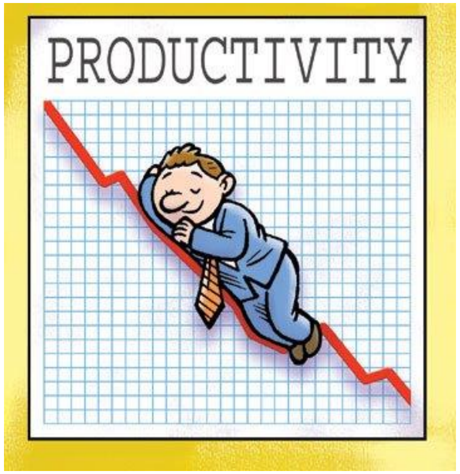
$$V_i = \frac{1,18}{1,25} = 0,944$$ olarak hesaplanır.

Yani, 2007 yılında verimlilik "1" ise

2008 yılında verimlilik "0,944" dür.

Direk olarak azalma miktarı %5,6 (1-0,944) bulunur.


PRODUCTIVITY OF PEOPLE
WITH HIGH CREATIVE POTENTIAL
Best
contribution
First
contribution
Last
contribution
PRODUCTIVITY
20
30
40
50
60
70
80
AGE


PRODUCTIVITY

Chapter 5

- Cost of Quality

Cost of Quality

Product Cost

$$\text{Product Cost} = \frac{(K_d)(I) + (K_r)(R)}{Y}$$

where:

K_d = direct manufacturing cost per unit

I = input

K_r = rework cost per unit

R = reworked units

Y = yield

The Quality-Productivity Ratio

Another measure of the effect of quality on productivity combines the concepts of **quality index** numbers and product yield. Called the **quality-productivity ratio** (QPR),[8] it is computed as follows:

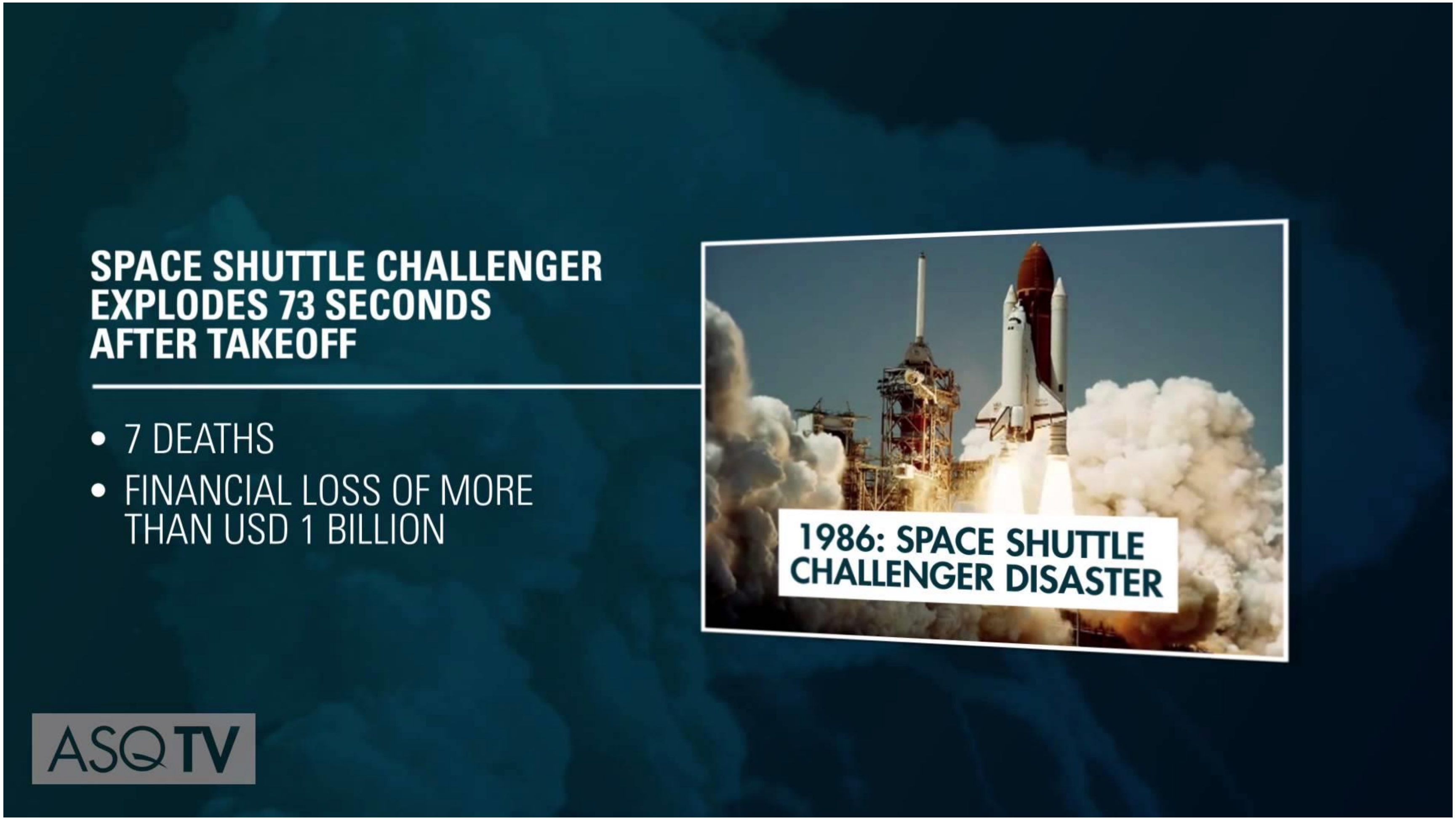
$$QPR = \frac{\text{good - quality units}}{(\text{input})(\text{processing cost}) + (\text{defective units})(\text{rework cost})}(100)$$

This is actually a quality index number that includes productivity and quality costs. The QPR increases if either processing cost or rework costs or both decrease. It increases if more good-quality units are produced relative to total product input (i.e., the number of units that begin the production process).

The Challenger Disaster

What Really Happened!

The Cost of poor Quality !



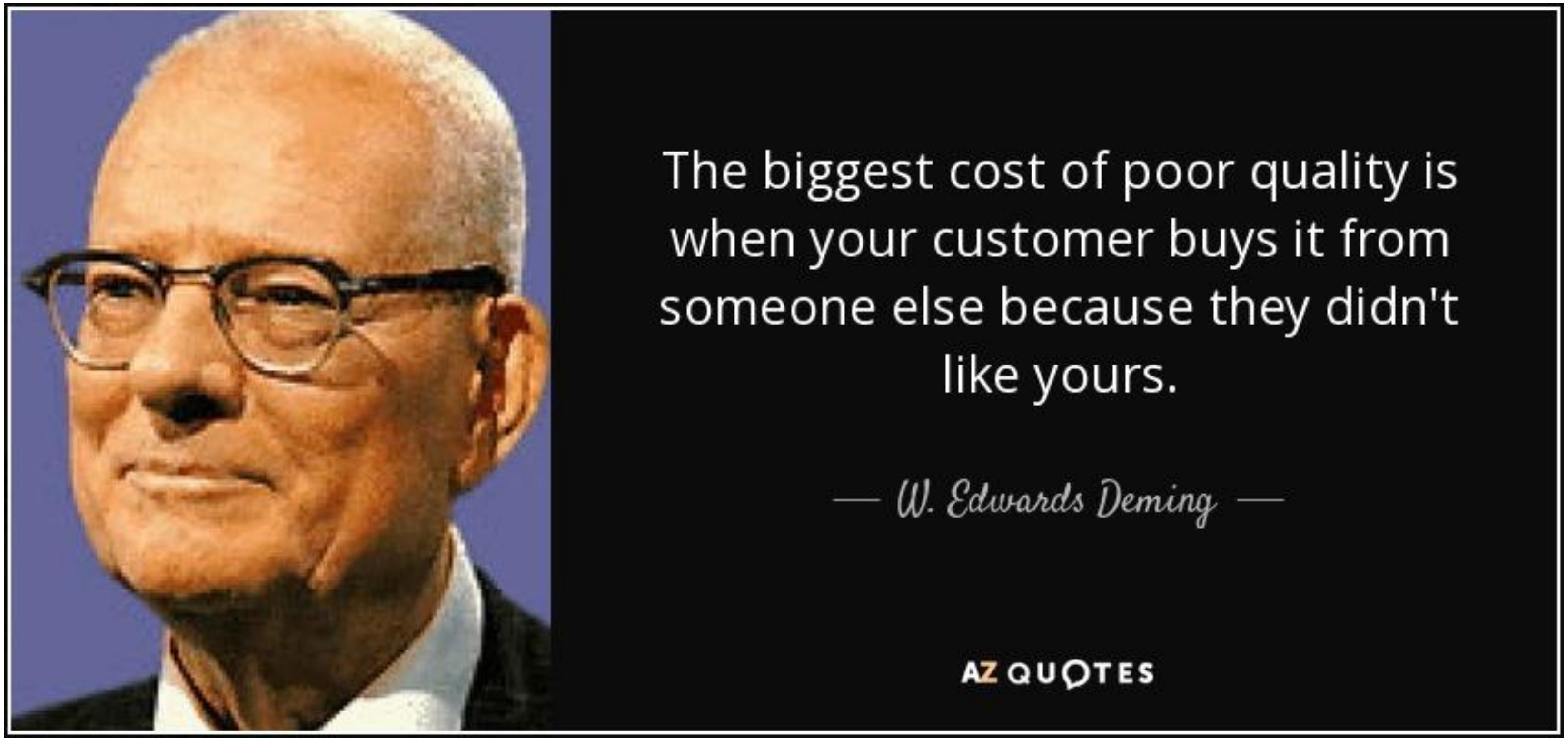
Chernobyl Disaster
What Really Happened

https://www.youtube.com/watch?v=BfKm0XXfiis

https://www.youtube.com/watch?v=DOWD0CBxE7w

The Cost of poor Quality !

The Cost of poor Quality !



Cost of Quality

- Cost of Achieving Good Quality
  - Prevention costs
    - ✓ costs incurred during product design
  - Appraisal costs
    - ✓ costs of measuring, testing, and analyzing

- Cost of Poor Quality
  - Internal failure costs
    - ✓ include scrap, rework, process failure, downtime, and price reductions
  - External failure costs
    - ✓ include complaints, returns, warranty claims, liability, and lost sales

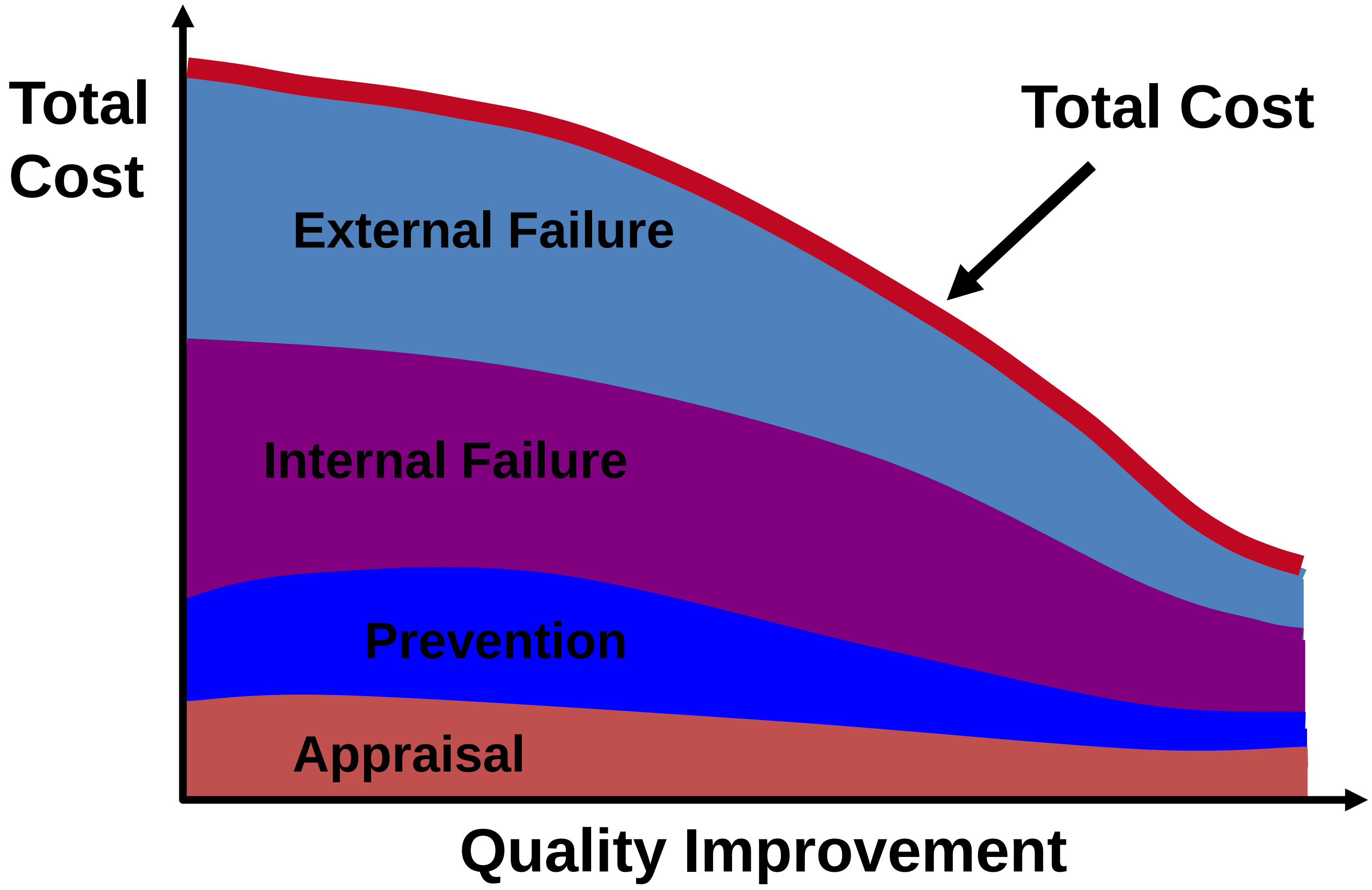
Cost of Quality

1. Prevention costs
2. Appraisal costs
3. Internal failure costs
4. External failure costs
5. Opportunity costs

Costs of Quality

- **Prevention costs** - reducing the potential for defects
- **Appraisal costs** - evaluating products, parts, and services
- **Internal failure** - producing defective parts or service before delivery
- **External costs** - defects discovered after delivery

Costs of Quality



Prevention Costs

- Quality planning costs
  - costs of developing and implementing quality management program
- Product-design costs
  - costs of designing products with quality characteristics
- Process costs
  - costs expended to make sure productive process conforms to quality specifications
- Training costs
  - costs of developing and putting on quality training programs for employees and management
- Information costs
  - costs of acquiring and maintaining data related to quality, and development of reports on quality performance

Appraisal Costs

- Inspection and testing
  - costs of testing and inspecting materials, parts, and product at various stages and at the end of a process
- Test equipment costs
  - costs of maintaining equipment used in testing quality characteristics of products
- Operator costs
  - costs of time spent by operators to gar data for testing product quality, to make equipment adjustments to maintain quality, and to stop work to assess quality

Internal Failure Costs

- Scrap costs
  - costs of poor-quality products that must be discarded, including labor, material, and indirect costs
- Rework costs
  - costs of fixing defective products to conform to quality specifications
- Process failure costs
  - costs of determining why production process is producing poor-quality products
- Process downtime costs
  - costs of shutting down productive process to fix problem
- Price-downgrading costs
  - costs of discounting poor-quality products—that is, selling products as “seconds”

External Failure Costs

- Customer complaint costs
  - costs of investigating and satisfactorily responding to a customer complaint resulting from a poor-quality product
- Product return costs
  - costs of handling and replacing poor-quality products returned by customer
- Warranty claims costs
  - costs of complying with product warranties
- Product liability costs
  - litigation costs resulting from product liability and customer injury
- Lost sales costs
  - costs incurred because customers are dissatisfied with poor quality products and do not make additional purchases

Measuring and Reporting Quality Costs

- Index numbers
  - ratios that measure quality costs against a base value
    - ✓ **labor index**
      - ratio of quality cost to labor hours
    - ✓ **cost index**
      - ratio of quality cost to manufacturing cost
    - ✓ **sales index**
      - ratio of quality cost to sales
    - ✓ **production index**
      - ratio of quality cost to units of final product

Quality–Cost Relationship

- Cost of quality
  - Difference between price of nonconformance and conformance
  - Cost of doing things wrong
    - ✓ 20 to 35% of revenues
  - Cost of doing things right
    - ✓ 3 to 4% of revenues
  - Profitability
    - ✓ In the long run, quality is free

Quality-Related Costs

- Prevention costs
  - activities to keep unacceptable products from being generated and to keep track of the process
- Appraisal costs
  - activities to maintain control of the system
- Correction costs
  - activities to correct conditions out of control, including errors

Prevention Costs

- Quality planning and engineering
- New products review
- Product/process design
- Process control
- Burn-in
- Training
- Quality data acquisition and analysis

Appraisal Costs

- Inspection and test of incoming material
- Product inspection and test
- Materials and services consumed
- Maintaining accuracy of test equipment

Correction Costs

1. Internal Failure Costs
   - Scrap
   - Rework
   - Retest
   - Failure analysis
   - Downtime
   - Yield losses
   - Downgrading (off-specing)

Correction Costs

2. External Failure Costs
   - Complaint adjustment
   - Returned product/material
   - Warranty charges
   - Liability costs
   - Indirect costs

Chapter 6

- Quality Awards and Setting Quality Standards

Quality Awards

- Deming Prize

  1951
- Malcolm Baldrige Quality Award

  1988
- EFQM Quality Awards

  1992
- National Quality Award (based on EFQM model)

  1993

Baldrige Award

- Created in 1987 to stimulate growth of quality management in the United States

- Categories
  - Leadership
  - Information and analysis
  - Strategic planning
  - Human resource
  - Focus
  - Process management
  - Business results
  - Customer and market focus

Other Awards for Quality

- National individual awards
  - Armand V. Feigenbaum Medal
  - Deming Medal
  - E. Jack Lancaster Medal
  - Edwards Medal
  - Shewart Medal
  - Ishikawa Medal
- International awards
  - European Quality Award
  - Canadian Quality Award
  - Australian Business Excellence Award
  - Deming Prize from Japan

International Organization for Standardization

www.iso.org

Overview of ISO 9001 and ISO 14001

by Roger Frost

e-mail frost@iso.org

Manager, Communication Services

2009-01-08

ISO 9001 and ISO 14001 in brief

- ISO 9001 and ISO 14001 are among **ISO's most well known standards** ever.
- They are implemented by more than a million **organizations** in some **175 countries**.
- **ISO 9001** helps organizations to implement **quality management.**
- **ISO 14001** helps organizations to implement **environmental management**.

Quality Management

- ISO 9001 is for **quality management**.
- **Quality** refers to all those features of a product (or service) which are required by the customer.
- **Quality management** means what the organization does to
- ensure that its products or services satisfy the customer's **quality requirements** and
- comply with any **regulations** applicable to those products or services.

Quality management (cont.)

- Quality management also means what the organization does to
- enhance **customer satisfaction**, and
- achieve **continual improvement** of its performance.

Environmental management

- ISO 14001 is for **environmental management**. This means what the organization does to:
- **minimize harmful effects** on the environment caused by its activities,
- to conform to applicable **regulatory requirements**, and to
- achieve continual improvement of its **environmental performance**.

Generic standards

ISO 9001 and ISO 14001 are **generic** standards.
Generic means that the same standards can be applied:

- to **any organization**, large or small, whatever its product or service,
- in **any sector** of activity, and
- whether it is a business enterprise, a public administration, or a government department.

Generic standards (cont.)

Generic also signifies that

- no matter what the organization's scope of activity
- if it wants to establish a **quality management system**, ISO 9001 gives the essential features
- or if it wants to establish an **environmental management system**, ISO 14001 gives the essential features.

Management systems

- **Management system** means what the organization does to manage its processes, or activities in order that
- its products or services meet **the organization's objectives**, such as
- satisfying the **customer's quality requirements**,
- complying to **regulations**, or
- meeting **environmental objectives**

Management systems

- To be really efficient and effective, the organization can manage its way of doing things by **systemizing** it.
- Nothing important is left out.
- **Everyone is clear about who is responsible** for doing what, when, how, why and where.
- Management system standards provide the organization with an international, state-of-the-art **model** to follow.

Management systems (cont.)

- Large organizations, or ones with complicated processes, could not function well without management systems.
- Companies in such fields as aerospace, automobiles, defence, or health care devices have been operating management systems for years.
- The **ISO 9001** and **ISO 14001** management system standards now make these successful practices available **for all organizations**.

Processes, not products

- Both ISO 9001 and ISO 14001 concern **the way an organization goes about its work**.
- They are not product standards.
- They are not service standards.
- They are **process** standards.
- They can be used by **product manufacturers and service providers**.

Processes, not products (cont.)

- Processes affect final products or services.
- **ISO 9001** gives the requirements for what the organization must do to manage **processes affecting quality** of its products and services.
- **ISO 14001** gives the requirements for what the organization must do to manage **processes affecting the impact of its activities on the environment**.

Certification and registration

- **Certification** is known in some countries as **registration**.
- It means that an **independent, external body** has audited an organization's management system and verified that it conforms to the requirements specified in the standard (ISO 9001 or ISO 14001).
- **ISO does not carry out certification** and does not issue or approve certificates

Accreditation

- **Accreditation** is like certification of the certification body.
- It means the formal approval by a specialized body - an accreditation body - that a certification body is competent to carry out ISO 9001 or ISO 14001 certification in specified business sectors.
- Certificates issued by accredited certification bodies - and known as **accredited certificates** - may be perceived on the market as having increased credibility.
- **ISO does not carry out or approve accreditations.**

Certification not a requirement

- **Certification is not a requirement of ISO 9001 or ISO 14001.**
- The organization can implement and benefit from an ISO 9001 or ISO 14001 system without having it certified.
- The organization can implement them for the **internal benefits** without spending money on a certification programme.

Certification is a business decision

- Certification is **a decision to be taken for business reasons**:
- if it is a contractual, regulatory, or market requirement,
- If it meets customer preferences
- it is part of a risk management programme, or
- if it will motivate staff by setting a clear goal.

ISO does not certify

- **ISO does not carry out ISO 9001 or ISO 14001 certification**.
- ISO does not issue certificates.
- ISO does not accredit, approve or control the certification bodies.
- ISO develops **standards and guides to encourage good practice** in accreditation and certification.

The ISO 9000 family

- **ISO 9001** is the standard that gives the requirements for a **quality management system**.
- **ISO 9001:2008** is the latest, improved version.
- It is the **only standard** in the ISO 9000 family that can be used for **certification**.
- There are **16 other standards** in the family that can help an organization on specific aspects such as performance improvement, auditing, training…

The ISO 14000 family

- **ISO 14001** is the standard that gives the requirements for an **environmental management system.**
- **ISO 14001:2004** is the latest, improved version.
- It is the **only standard** in the ISO 14000 family that can be used for **certification**.
- The ISO 14000 family includes **21 other standards** that can help an organization specific aspects such as auditing, environmental labelling, life cycle analysis…

Benefits of ISO 9001 and ISO 14001

- International, expert consensus on state-of-the-art practices for quality and environmental management
- Common language for dealing with customers and suppliers worldwide
- Increase efficiency and effectiveness
- Model for continual improvement

Benefits of ISO 9001 and ISO 14001 (cont.)

- Model for satisfying customers and other stakeholders
- Build quality into products and services from design onwards
- Address environmental concerns of customers and public, and comply with government regulations
- Integrate with global economy

Benefits of ISO 9001 and ISO 14001 (cont.)

- Sustainable business
- Unifying base for industry sectors
- Qualify suppliers for global supply chains
- Technical support for regulations

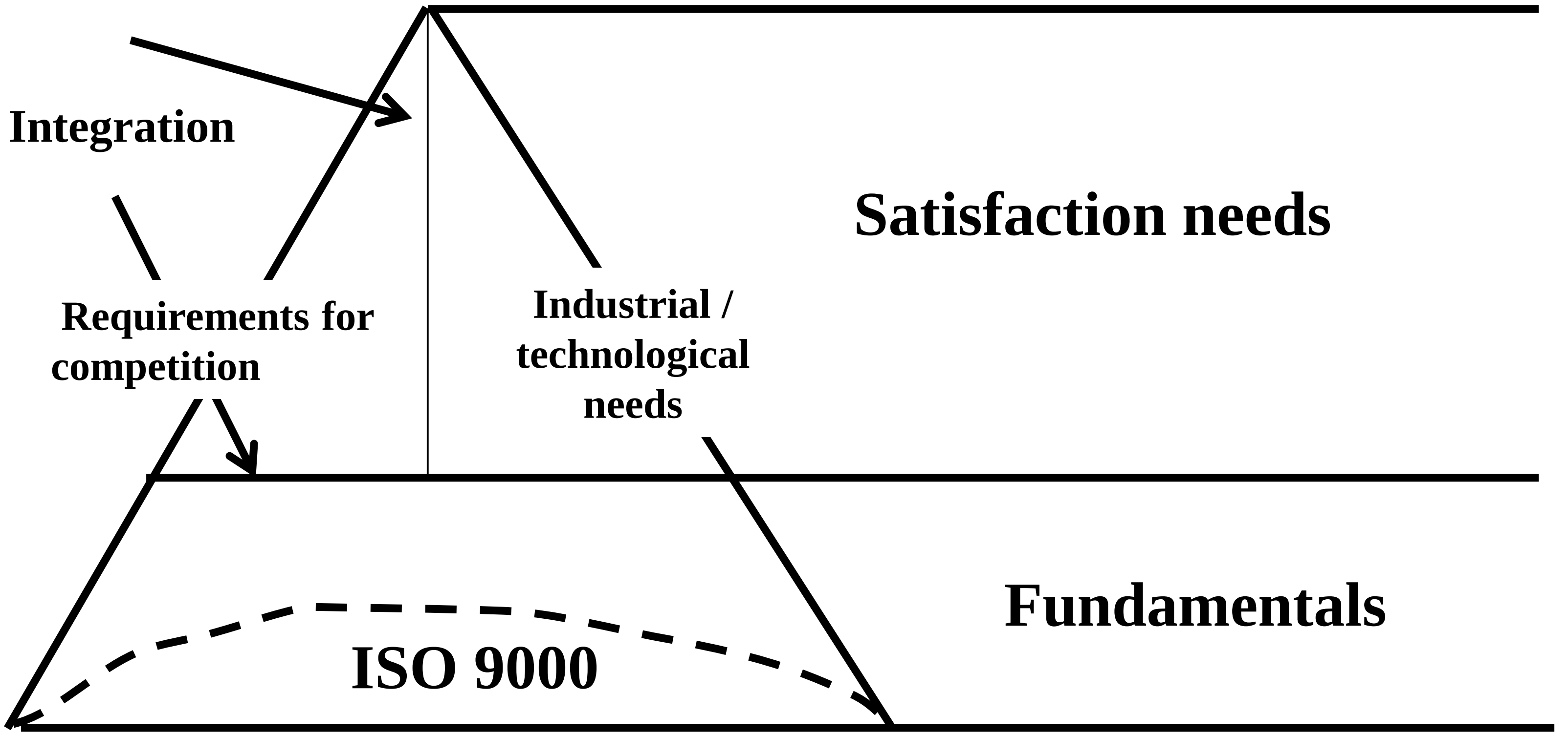
Benefits of ISO 9001 and ISO 14001 (cont.)

- Transfer of good practice to developing countries
- Tools for new economic players
- Regional integration
- Facilitate rise of services

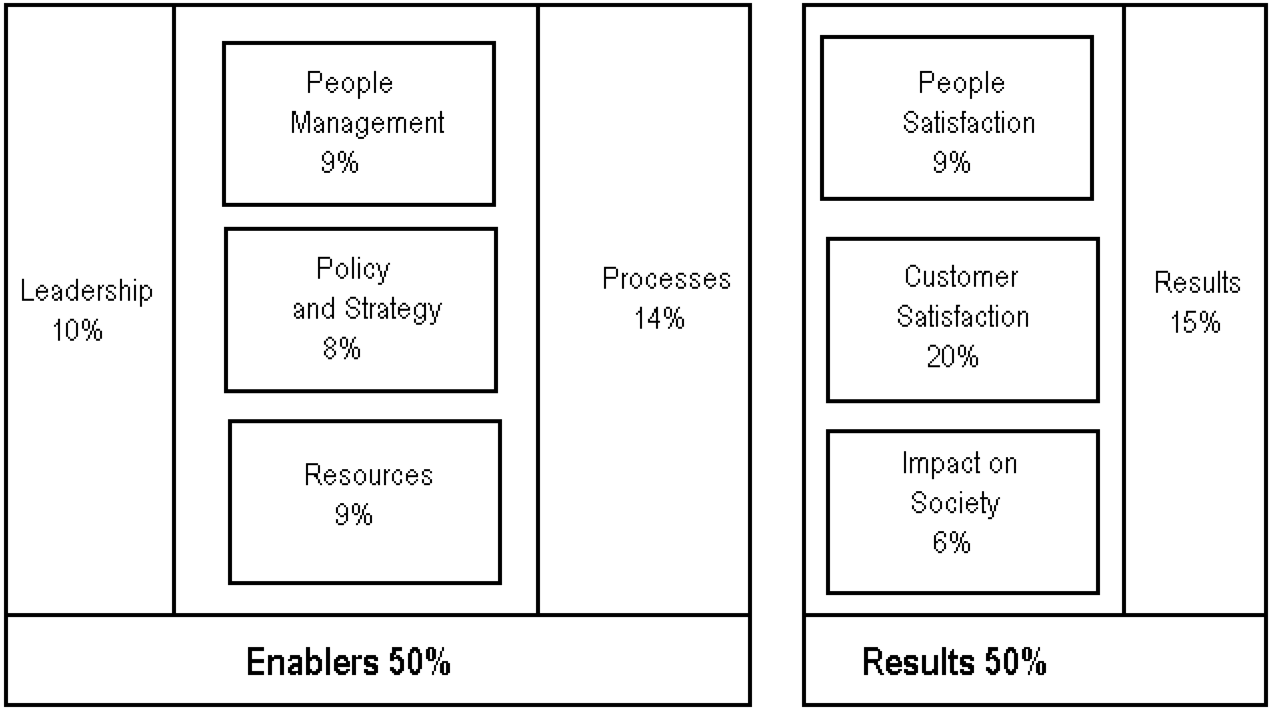
More information

- ISO 9000/ISO 14000 section on **ISO Web site**:
  www.iso.org
- **ISO Management Systems** magazine
  www.iso.org/ims
- **IMS Alerts** free electronic newsletter
  www.iso.org/imsalerts

ISO 9000 and TQM



EFQM Excellence Model



EFQM Award Winners From Turkey

1996 Brisa

Netaş

1997 Beksa

1998 BEKO

2000 Arçelik

Vitra

LASSA LASTİKLERİ 30 ÜLKEDE

Uluslararası marka haline gelen Lassa'nın lastikleri 30'u aşkın ülkede pazarlanıyor. Türkiye dışında,

LASSA

yısı 8 milyonu aştı. Las-
ı, İngiltere, İtalya, Fran-
lararası markaların ana-
ülkelerde anlamlı bir pa-
andı.

VİTRA'NIN ALMANYA BAŞARISI

Türkiye'de pazar lideri olan Vitra, ağırlık Avrupa'da olmak üzere, yaklaşık 50 ülkeye ihracat gerçekleştiriyor. Vitra, seramik sağlık gereçleri pazarında Almanya'da yüzde 12, İngiltere'de yüzde 6, Avusturya'da yüzde 10, Fran-
sa'da yüzde 3, İtal
panya'da yüzde 8
yüzde 10 ve ABD
sahip bulunuyor.

VitrA

ARÇELİK'TEN 7 MARKA

eğişimi logosuna da yansıtan
ik'in yurt dışındaki marka sa-
se Beko'yla birlikte 7'ye çıktı.
2002'de Almanya'daki Blom-
fabrikasını ve markasını satın
Arçelik, Mayısta da Avustur-
ki Elektra Bregenz şirketiyle
ra ve Tirolia markalarının sahi-

arçelik

Daha sonra Leisure ve Flevel markalarını alan Arçelik, İngiltere'de orta-üst gelir grubunda yeni bir pazar segmentine ulaştı. Arçelik Romanya'nın en büyük buzdolabı fabrikası Arctic'i Eylül ayında bünyesine kattı. 70'i aşkın ülkeye ihracat yapan Arçelik, İngiltere'nin dondurucu hariç toplam buzdolabı pazarında Ağustos ayında yüzde 14 pazar payı ile Avrupalı rakiplerini geride bırakarak liderliği ele geçirdi.

AVRUPA'DAN AFRİKA'YA BEKO

Beko Elektronik de, Batı ülkeleri ağırlıklı televizyon ihracatında yıl sonunda 3 milyon 700 bin adete ulaşmayı ve 2003 yılında da 57 ülkeye 5 milyon 250 bin adetlik ihracatı hedefliyor. Beko markalı televizyonlara olan talep Avrupa'da yükselirken, Beko Elektronik'in 2001'de Avrupa'daki pazar payı yüzde 7'ye yükseldi.

BEKO

Common Characteristics of EFQM Award Winners

- The way they look at reasons of doing business radically
- Different approach to business performance measurement
- Advanced use of quality tools
- Breakthrough techniques
- Superior leadership and policy deployment
- Understanding how these produce superior business results
- Continuous self-assessment / improvement
- Fact based management on a defined set of performance indicators

Source: John Kelly, Manager, European Quality Journal, 1999