Walter A. Shewhart

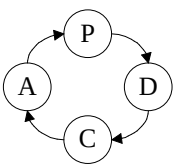
(1891 - 1967)

"Economic control of quality of manufactured product - 1931"

- Western Electric & Bell Telephone Engineer
- Father of Statistical Quality Control
- ASQC's first Honorary Member in 1947

Walter A. Shewhart

- Focused on frequency as a controlling factor
- Developed the control chart
- Distinguished between two sources of variation:
  - Chance cause
  - Assignable cause
- Developed the Shewhart Cycle: (Plan,Do,Check,Act)



W. Edwards Deming

(1900 - 1993)

"Out of the Crisis"
"New Economics"

- Western Electric Statistician
- Advisor, Author, Teacher & Consultant
- ASQC Honorary Member in 1970
- Founder, Third wave of the Industrial Revolution

W. Edwards Deming

- Quality is whatever the customer needs and wants
- Must be redefined continuously since the customers needs changes
- Management is responsible for 94% of all quality problems
- Management must help workers work smarter not harder

W. Edwards Deming

- Productivity improves as variability decreases
- To types of variation:
  - Common causes
  - Special causes
- Management is responsible for all common causes since only management can change them
- Redefined the Shewhart cycle
- Defined a system of Profound Knowledge:
  - Knowledge of: a system, psychology, knowledge and variation
- 14 points for management, 13 obstacles and 7 deadly sins

W. Edwards Deming

- 14 points for management:
  - Create constancy of purpose for product & service improvements
  - Learn & adapt the new philosophy
  - Cease dependence of mass inspection
  - End the practice of awarding business on price tag alone
  - Improve constantly and forever the system of production & service
  - Institute training & retraining
  - Teach & institute leadership
  - Drive out fear
  - Break down barriers between staff areas
  - Eliminate slogans, exhortation, and targets for the workforce
  - Eliminate numerical quotas
  - Give people a chance to take pride in their work
  - Encourage education & self-improvement for everyone
  - Take action to accomplish the transformation

Armand V. Feigenbaum

(1922-)

"Total Quality Control"

- President/CEO, General Systems Company
- Founder, International Academy for Quality
- ASQC President (1961-1963)
- US Army Materiel Command Advisor of Quality Assurance

Armand V. Feigenbaum

- Quality is far more than defect management
- Quality is a strategic business tool just as cost and schedule
- Traditional Quality Control (QC) means rising costs - the way out is Total Quality Control (TQC)
- Total Quality Control (TQC) means being excellence driven rather than defect driven
- TQC is a move from "they shall not pass" to "make them right the first time"

Armand V. Feigenbaum

- With TQC the control starts with the design of a product and ends when the product is delivered in the hands of the customer
- Feigenbaum wants a top management function whose only responsibility is product quality
- The QC function is responsible for Quality Assurance at optimal quality costs.
- Quality costs is divided into (PAF model):
  - Prevention - keeping defects from occurring
  - Appraisal - evaluation of product quality
  - Failure - products that does not meet specifications

Armand V. Feigenbaum

- Quality costs amounts to 7-10% of costs of sales
- Quality costs = 50-75% Failure
  25% Appraisal
  10% Prevention
  (only 1-2% real prevention)
- The work of the TQC function can be classified into four categories:
  - New design control
  - Incoming material control
  - Product control
  - Special process studies

Armand V. Feigenbaum

- Three steps to quality

Organizational commitment	Training, motivation - quality as strategic element
Modern Quality Technology	Error free performance is the goal. Involvement of all employees. New technologies where appropriate.
Quality Leadership	Continuos managerial emphasis and leadership in quality

Armand V. Feigenbaum

- Four deadly sins:
  - Hot house quality (“flavor of the week“ management)
  - Wishful thinking
  - Producing overseas (having someone else fight the quality war)
  - Confining quality to the factory

Armand V. Feigenbaum

- 19 steps to Quality Improvement:
  - Total quality control defined
  - Quality versus quality
  - Control
  - Integration
  - Quality increases profit
  - Quality is expected not desired
  - Humans impact quality
  - TQC applies t all products and services
  - Quality is a total life cycle consideration
  - Controlling the process
  - A total quality system may be defined as
  - Benefits
  - Cost of quality
  - Organize for quality control
  - Quality facilitators, not quality cops
  - Continuos commitment
  - Use statistical tools
  - Automation is not a panacea
  - Control quality at the source

Joseph M. Juran

(1904 -)

"Quality Control Handbook"

- Quality Manager at Western Electric
- Developed the Western Electric Statistical Quality Control Handbook
- Advisor, Author, Teacher & Consultant
- Founder, The Juran Institute in 1979

Joseph M. Juran

- Defines quality as consisting of two different though related concepts:
  - One form is income oriented - higher quality costs more
  - One form is cost oriented - higher quality costs less
- Throughout any organization there are three different languages:
  - Upper management speaks dollars
  - Middle management speaks things and dollars
  - Lower management/workers speaks things

Joseph M. Juran

- Pursues Quality on two levels:
  - Firms must achieve high quality products and,
  - Each individual must achieve individually high quality
- Identified 4 “Fitness of Quality”:
  - Quality of Design: Market Research, Product & Concept
  - Quality of Conformance: Management, Manpower & Technology
  - Availability, Reliability, Maintainability and Logical Support
  - Full Service: Promptness, Competence & Integrity

Joseph M. Juran

- Managing for quality involves:
  - Quality planning
  - Quality control
  - Quality improvement

Joseph M. Juran

- Quality Improvement comes first and involves the following responsibilities for upper management:
  - Create awareness of the need and opportunity for improvement
  - Mandate quality improvement: make it a part of every job description
  - Create the infrastructure: establish a quality council; select projects for improvement; appoint teams; provide facilitators
  - Provide training in how to improve quality
  - Review progress regularly
  - Give recognition to the winning teams
  - Propagandize the results
  - Revise the reward system to enforce the rate of improvement
  - Maintain momentum by enlarging the business plan to include goals for quality improvement

Joseph M. Juran

- Process for Quality Planning (should involve anyone who will be impacted by the plan):
  - Identify the customers. Anyone who will be impacted is a customer, whether internal or external
  - Determine the customers needs
  - Create product features which can meet the customers needs
  - Create processes which are capable of producing the product features under operating conditions
  - Transfer the processes to the operating forces

Joseph M. Juran

- Quality control feedback loop:
  - Evaluate actual performance
  - Compare actual with the goal
  - Take action on the difference
- Juran and TQM:
  - Quality becomes part of each upper management agenda
  - Quality enters the business plan
  - Stretch goals are derived from benchmarking; there are goals for annual quality improvement
  - Goals are deployed to the actions levels
  - Training is done at all levels
  - Measurement is established throughout
  - Upper managers regularly review progress against goals
  - Recognition is given for superior performance
  - The reward system is revised

Genichi Taguchi

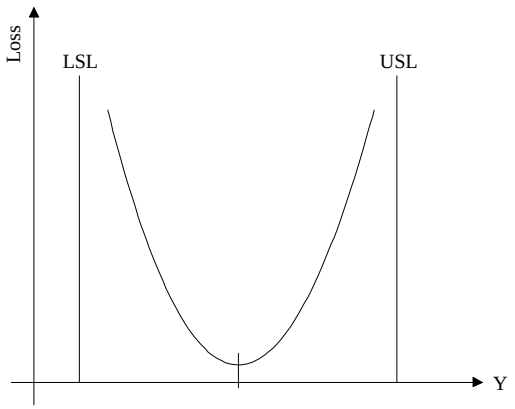
- Nippon Telegraph and Telephone
- First to win the Deming Prize in 1960
- Four time winner of the Deming Prize

"System of experimental design"

Genichi Taguchi

- Quality is defined as the loss generated by that product to society
- The key to loss reduction is not meeting specifications, but reducing variance from the nominal or target value

Genichi Taguchi



- The Taguchi Loss Function
  - One can communicate in the language of things and the language of money

Genichi Taguchi

- Distinguishes between on-line and off-line quality control
  - On-line quality control:
    - Maintaining target values and the variation about the target (The 7 Tools)
  - Off-line quality control:
    - Systems design
      - Selection and design of a robust product with a minimal variation that satisfy the customers (QFD)
    - Parameter design
      - Identify the key process variation that affect product variation
      - Establish parameter levels that impart the least variation into the product (statistical experimental design)
    - Tolerance design
      - Determine which factors contribute to and product variation and establish tolerances that brings the final product into specifications

Kaoru Ishikawa

(1915 - 1989)

"Guide to Quality Control"

- Founder, Union of Japanese Scientists and Engineers (JUSE)
- Leader of the Japanese Quality Movement
- Developed the Japanese Quality Strategy
- President, The Musashi Institute of Technology

Kaoru Ishikawa

- Opposed to Feigenbaums QC specialists. Believes that all employees should be involved in TQC
- 4 Goals of management:
  - People
  - Quality
  - Price, cost and Profit
  - Quantity and Date of Delivery

Kaoru Ishikawa

- The Seven Tools:
  - Pareto chart
  - Cause and effect diagram (Ishikawa)
  - Histograms
  - Check sheets
  - Scatter diagrams
  - Flowcharts
  - Control charts
- 95% of all problems can be solved by these tools and all workers should know how to use them

Kaoru Ishikawa

- Inventor of Quality Control Circles
  - First QC circles initiated at Nippon Telegraph and Cable - 1962
  - There are now 250.000 registered QC circles with Japan's QC Circle Headquarters
  - More than 3.500 case studies filed
  - More important to service industries since they are closer to the customer

Philip B. Crosby

(1926 -)

"Quality is free"

- Vice President, Quality at International Telephone & Telegraph (ITT)
- Founder, Philip Crosby Associates (PCA)

Philip B. Crosby

- Famous for the expression "Quality is Free"
- Poor or high quality does not exist - only conformance or non-conformance
- The goal is Zero Defects
- There is no logical reason for having defects
- Quality improvement is a process not a program
- Quality Management = prevention

Philip B. Crosby

- Quality cost amounts to 15-20% of sales
- Supplier quality audits are nearly useless, unless the vendor is totally incompetent
- The “vaccine” against non-conformance is quality and it consists of:
  - determination
  - education
  - implementation
- Quality Maturity Grid: (Uncertainty Awakening Enlightenment Wisdom Certainty)

Philip B. Crosby

- 5 Absolutes of Quality:
  - Quality means conformance to requirements not elegance
  - There is no such thing as a quality problem
  - There is no such thing as the economics of quality; it is always cheaper to do the job right the first time
  - The only performance measurement is the cost of quality, and
  - The only performance standard is zero defects

Philip B. Crosby

- 14 steps to Quality improvement
  - Make it clear that management is committed to quality
  - Form quality improvement teams with representatives from each department
  - Determine how to measure where current and potential quality problems lie
  - Evaluate the cost of quality and explain its use as a management tool
  - Raise the quality awareness and personal concern of all employees
  - Take formal actions to correct problems identified through previous steps
  - Establish a committee for the zero defects program
  - Train all employees to actively carry out their part of the quality improvement program
  - Hold a “zero defects day” to let all employees realize that there has been a change
  - Encourage individuals to establish improvement goals for themselves and their group
  - Recognize and appreciate those who participate
  - Establish quality councils to communicate on a regular basis
  - Do it all over again to emphasize that the quality improvement program never ends

Tom Peters

- Founder, Palo Alto Consulting Center

“In search of excellence”

Tom Peters

- Empirical focus
  - Aspects of Excellent Companies:
    - Managing ambiguity and paradox
    - A bias for action
    - Close to the customer
    - Autonomy and Entrepreneurship
    - Productivity through people
    - Hands-on, value driven
    - Stick to the knitting
    - Simple form, lean staff
    - Loose-tight properties
  - Prescriptions for management revolution:
    - Create total customer responsiveness
    - Pursue fast-paced innovations
    - Empower people
    - Love change
    - Rebuild systems for a chaotic world

The Gurus of Quality