

Quality Management Systems

Competition and Quality



Japan, In Search of Excellence, Competitive Advantage

Competition for customers, clients, contracts, resources, position, funds, continuity (survival) and growth on the basis of:

the product/service	pre-sales service	prices and value
reputation	customer loyalty	reliability
unique-selling points	delivery	after-sales service

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Common-sense propositions



- No focus on quality - lose market share and reputation.
- Good reputation is easier to lose than regain.
- People trust and become accustomed to favourites
- They remember the bad. "I'll never go there again".
- New loyalties with substitute suppliers.
- Complacency breeds neglect.
- It takes a major operational and psychological effort to
 - maintain quality vigilance (entropy).
 - regain a lost reputation.
- Common-sense either forgotten or only realised post hoc

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What is Quality?



..... a perception of class, excellence, a type of "referential" standard or (in definition) reflecting needs and expectations of customer.

Guru definitions :

- product or service, nature or features reflecting capacity to satisfy express or implied statements of need (Deming)
- conformance to requirements (Crosby)
- fitness for purpose or use (Juran)
- product/service characteristics as offered by design, marketing, manufacture, maintenance and service that meet customer expectations (Feigenbaum)
- Oakland (1995) - perceivable, measurable move from mere satisfaction to "delight and reputation for excellence".
- Reliability. "Next door swears by her 8-year old Zanussi!"

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The Quality Chain, Value Engineering and Analysis



Bargain holiday in Crete

- booking and travel documents
- the outward bound experience
- airport to resort transfers
- arrival - the villa and pool
- the road, the dump, the drag strip
- the food and the waiters
- the impotence of the rep.
- the substitute villa
- the return trip

“I’ll never travel with First Option Holidays again”

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Contributors to the quality chain must be



- **aware ---- willing ---- inclined to action**
- Can we be certain that "quality certified" products & services are reliable & satisfactory in every way. ISO 9000 means the system is certified, nothing more.
- a company that generates a quality product can probably do this without the burden of a rigid quality system
- Customers test the quality - market choice + legal rights

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Elements of a Quality Policy



- organisation structure for quality: roles, responsibilities
- how client/customer needs and perceptions will be identified
- technical/economic resource allocation
- QMS scheme & operation
- how suppliers & supplies will be required to meet standards
- prevention & zero defects/CQI approach vs. "inspect-out"
- communication, knowledge, information & staff development
- audit of QMS in operation
- Partnership with staff, customers and suppliers.
- Physical manifestation not just conceptual

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Quality to meet requirements & delight



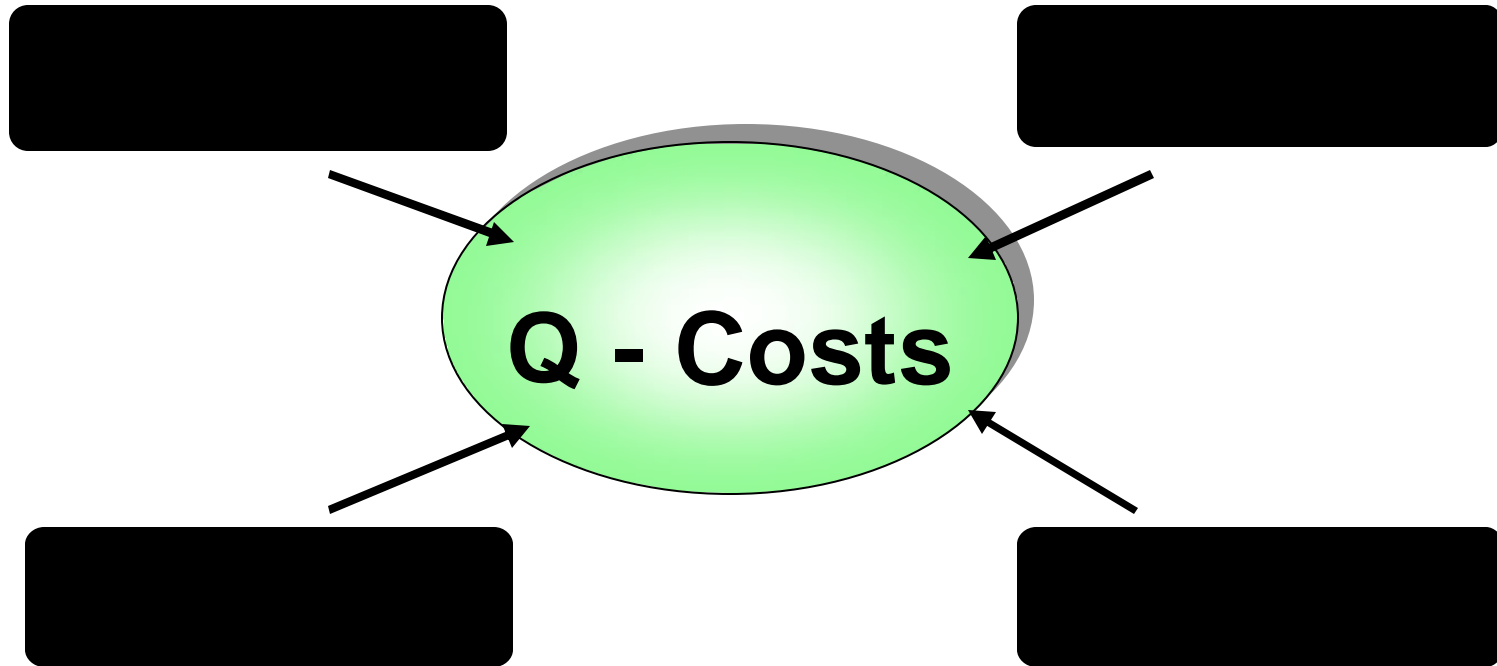
- **marketing orientation and market research**
 - Clear understanding of what customers really want & like.
- **Capacity & ability to deliver.**
 - craft pottery wins a big order - the growth problem
 - Golden Wedding party - the band must learn to play the Anniversary Waltz or turn down the gig!

Players in the Quality Chain

- **Cogs in wheel.** Many never see the whole operation or meet the customer n.b. Q-chain for a motor car, '000s of components
- **Japanese doctrine of Kaizen/CQI.** Supply chain attitudes - caring for down-stream & up-stream clients

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Costs of Quality



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TQM - a Strategy and Discourse



- an approach to improving the competitiveness, effectiveness and flexibility of a whole organisation..... a way of planning, organising and understanding each activity and it depends on each individual at each level. TQM is a way of bringing everyone into the processes of improvement
 - **Oakland 1995**
- a TQM programme promotes "quality" as a strategic imperative. Comprehensive TQM programme requires re-evaluation how organisational members address the quality of their work and production /service processes.

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TQM underpinned by policy commitment



- A culture and practice change strategy
- Organisational renewal
- Injection of energy
- Staff encouraged to practice positive, initiative taking behaviours
- Adopt a prevention and CQI ethic
- Quality improvement teams/circles
- Use of methods and techniques (tools)

Headlines! TQM Projects Disappoint!



Why?

- TQM propaganda vs. practical, implementation of QMS
- TQM thinking and language - a "quality doctrine" authorising management to drive the business (competitiveness and customer-orientation).
- Strategy of discourse - vocabulary, values, signs and signifiers
- Compare
 - employee-oriented TQM
 - regulative, systematic, documented QMS (ISO 9000)
 - operational action without the human relations gloss).
- ISO 9000 is criticised for costly documentation and paper chasing. Does accreditation guarantee improved products/services?

Kaizen: Continuous Quality Improvement (CQI)



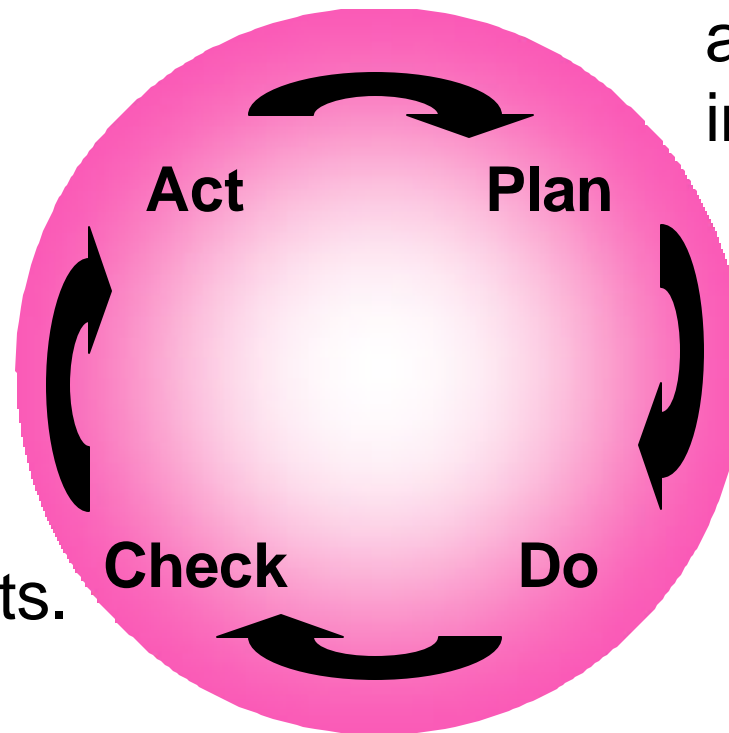
- critical view of organisational performance standards
- continuously challenge and incrementally upgrade performance levels
- contribution and role of workforce
- attitude (ownership), involvement and team effort as the key to improvement

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CQI - the Deming Wheel (PDCA Cycle)

Drop it,
formalise it
or repeat it

Plan for change
aimed at
improvement



Evaluate the results.
Did it work?

Implement the
change

TQM Culture, Programme and Techniques



- **Organisation culture: Theory X vs. Theory Y**
- **Open-mindedness & avoidance of blocking**
- **Experimentation to enable learning**
- **Management belief in & support for quality team process**
- **Team training & support**
- generic problem analysis
- process flow charting
- brainstorming
- cause and effect analysis
- reverse engineering and value analysis
- Pareto analysis
- Statistical process control

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What is a quality circle?



- Origin? Japanese adopted & applied the concept
- Problems? Not a comprehensive technique.
- QCs can help shop-floor CQI

Organisation?

- Regular group (6-9) meeting to examine Q. problems & find solutions
- empowered to act & follow thru.

Requires

- commitment from top mgt & unit mgt, other staff & QC members.
- free participation to challenge assumptions & methods
- examine data & explore possibilities
- call in expertise & ask for training
- budget for tests & pilots.
- skilled team leaders/ facilitators (not dominator).

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Quality Circles - requirements

Method for

- Analysing context, problem, situation and action
- Define the problem and relationship between parts. Verify the causes and knock-on effects.
- soft systems methodology - CATWOE
- plurality of quality objectives
- quantitative measurement & consensus (qualitative judgement.)
- critical evaluation of the problem
- MUSTs and DESIRABLES
- creativity and innovation
- solutions must address the real problem.

Does it work - a sustainable approach? +

Classical functional, problem analysis cycle



- **Situation analysis**
- **Problem definition**
- **Objectives and resourcing**
- **Solution development** - options and best fit from DO NOTHING to DO EVERYTHING. (Min/Max, optimistic/pessimistic, high/low budget etc.). Test models against objectives and constraints
- **Implementation analysis**
 - detailed planning for operational implementation.
 - analysis for potential problems
 - scheduling, work allocation, capacity management, communicating, monitoring systems & overall coordination.

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Questions for Quality Strategy



- Who are our direct and indirect customers
 - Define characteristics, needs, requirements?
- Design features of products or services?
 - How do customers perceive these?
 - Bench-mark comparisons
 - Which features do not compete?
- How can we delight beyond the basic specification?
- Design improvement projects?
 - Who, by when & at what cost?
- Operational ability to bridge the gaps?
- Information & monitoring systems?
- Supply chain analysis - performance & communication?

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Quality Specifications



- Essential contract for supply
 - ensuring merchantable quality in a contract of sale.
 - Failure to draw up a clear specification when contracting is a dangerous & potentially costly strategy.
- **Design quality dimensions include:**
 - Features, performance, delivery, cost, reliability, durability, serviceability, response, aesthetics, reputation.
- **Conformance quality:**
Degree to which product/service design specification is met

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Drawing up the contract/specification



- type of contract - sales, manufacturing, consulting?
 - the parties? National/regional regulations?
- detailed specification
 - contract volume, milestones, stage deliverables?
 - CSFs/CQFs for inputs, processes, outputs ?
 - QA/QC methods? inspection & testing standards
 - staged prices and conditions? variation orders vs. extras

Producer/supplier and client/buyer

- agree every element and interface e.g.
 - can a customer may return goods? How?
 - client inspections. Meetings to discuss & resolve problems

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Process-oriented Quality



Process

- an arrangement of activities involving workers, equipment/facilities, methods and money resources.
- steps in an operation (actions & application of method) that transforms the inputs into outputs which satisfy requirements/expectations.

List the main operational processes in

- A staff selection operation
- Aeroplane turn-round at an airport
- Building a loft extension

Quality indicators?

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Inspect out vs. Zero defects



Inspect out

- QC after a defect or problem involves costly re-working.
- Inspecting out once problems have occurred = out of control!
- Who carries out the performance checks?
- Is a % of faults acceptable? Safety critical?
- Methods? Compare product manufacture with service

Zero-defects Process orientation

- Build in systematic QA, conformance checks
- Focus on prevention at point where work done.
- Information systems to evaluate I-P-O and the QMS itself

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Doing - Things Right First Time
Right Things Wrong
Wrong Things Right



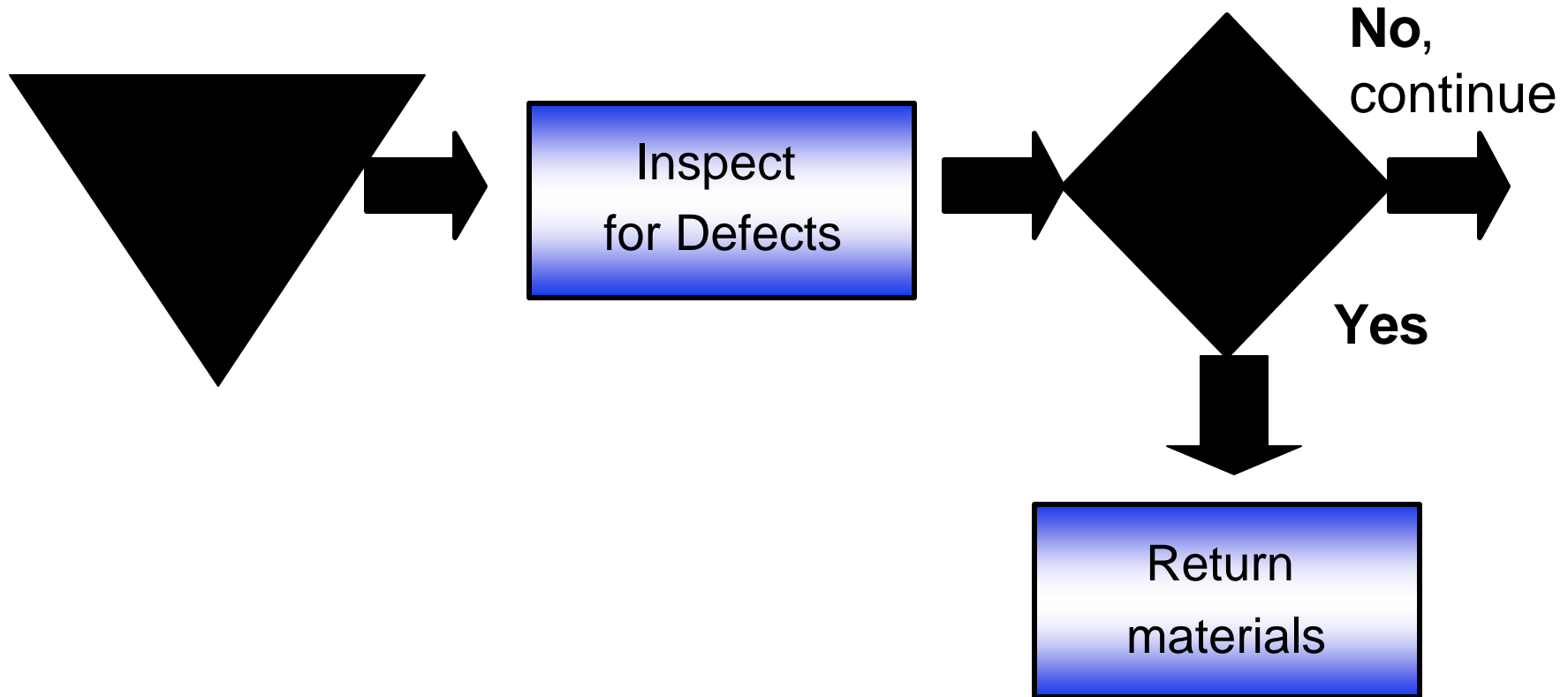
- difficult to ensure clear, shared understanding of function & form of some products/services - e.g. IT system or advertising package.
- knowledge with hindsight - final product is built/tested
- Front-load - good analysis/design. vs. re-work & dissatisfaction.
- Prototyping (mock-ups, story-boards, models)

Full client participation in

- requirements definition
- conceptual understanding
 - constraints, parameters, performance outcomes
- evaluation of models/prototypes
- Does the result meet the spec? Does it delight? If not, why not?

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Simple Process Flow Chart

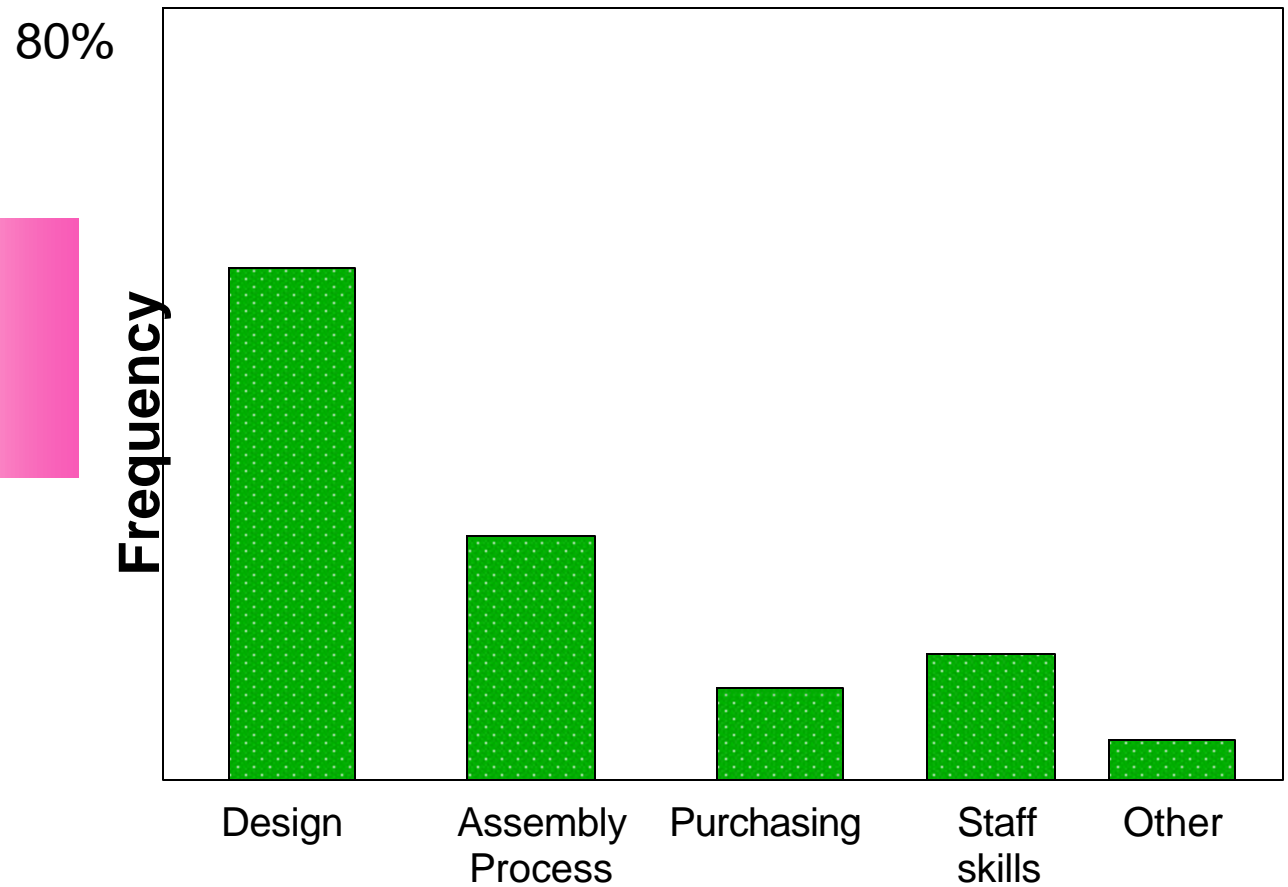


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Pareto Analysis



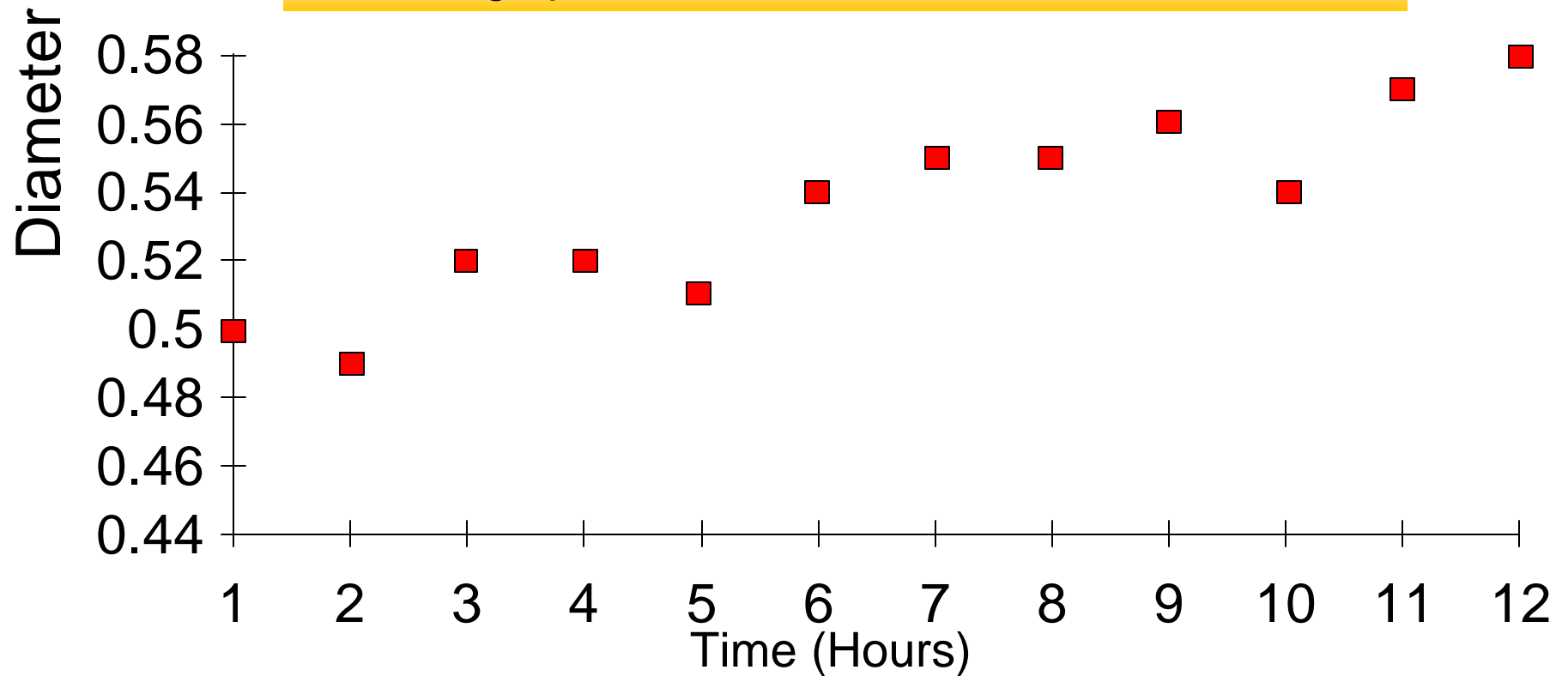
80/20 Principle
elicit contribution
and causes.



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Run Chart

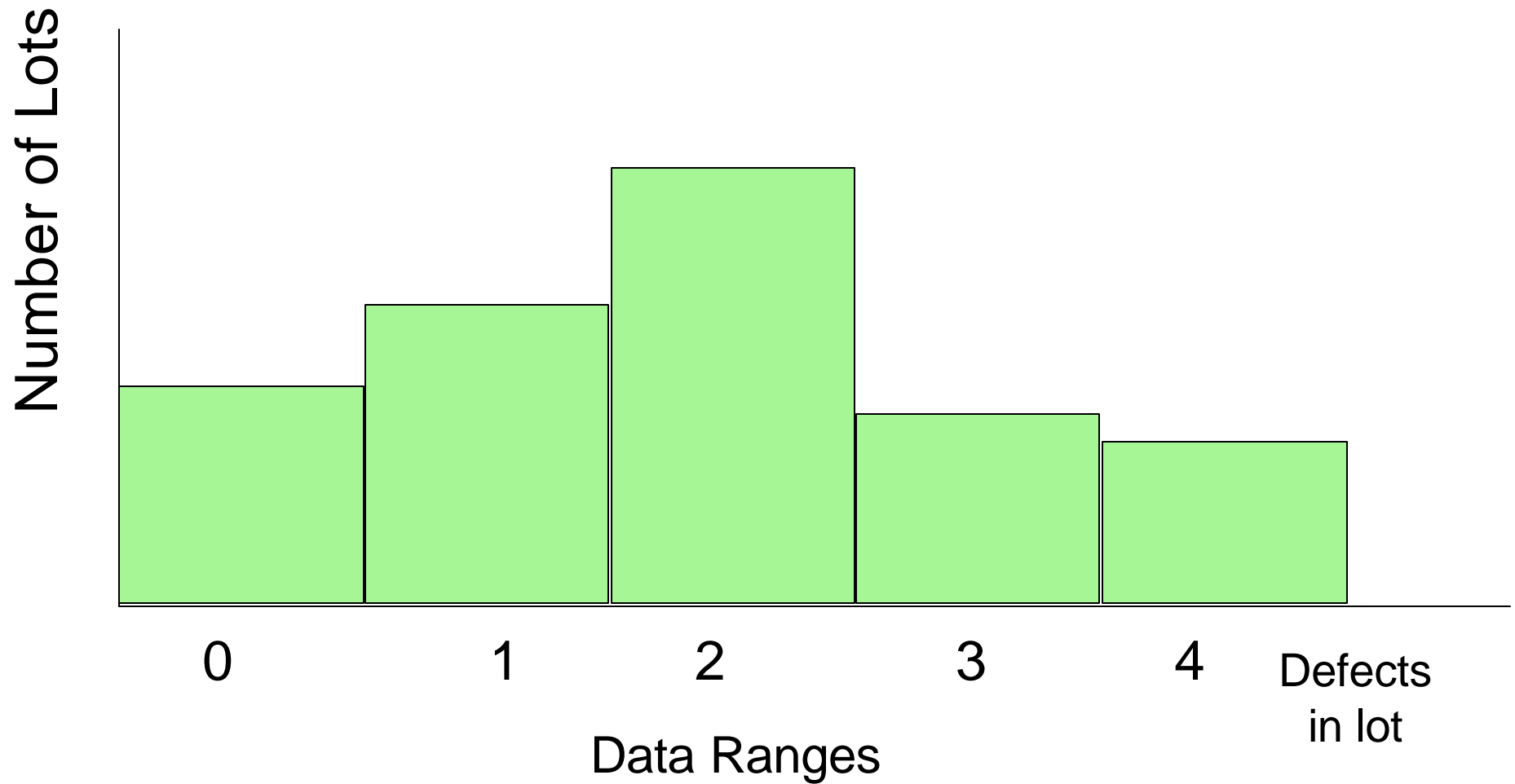
Use to identify when equipment or processes are breaching specifications.



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Histogram

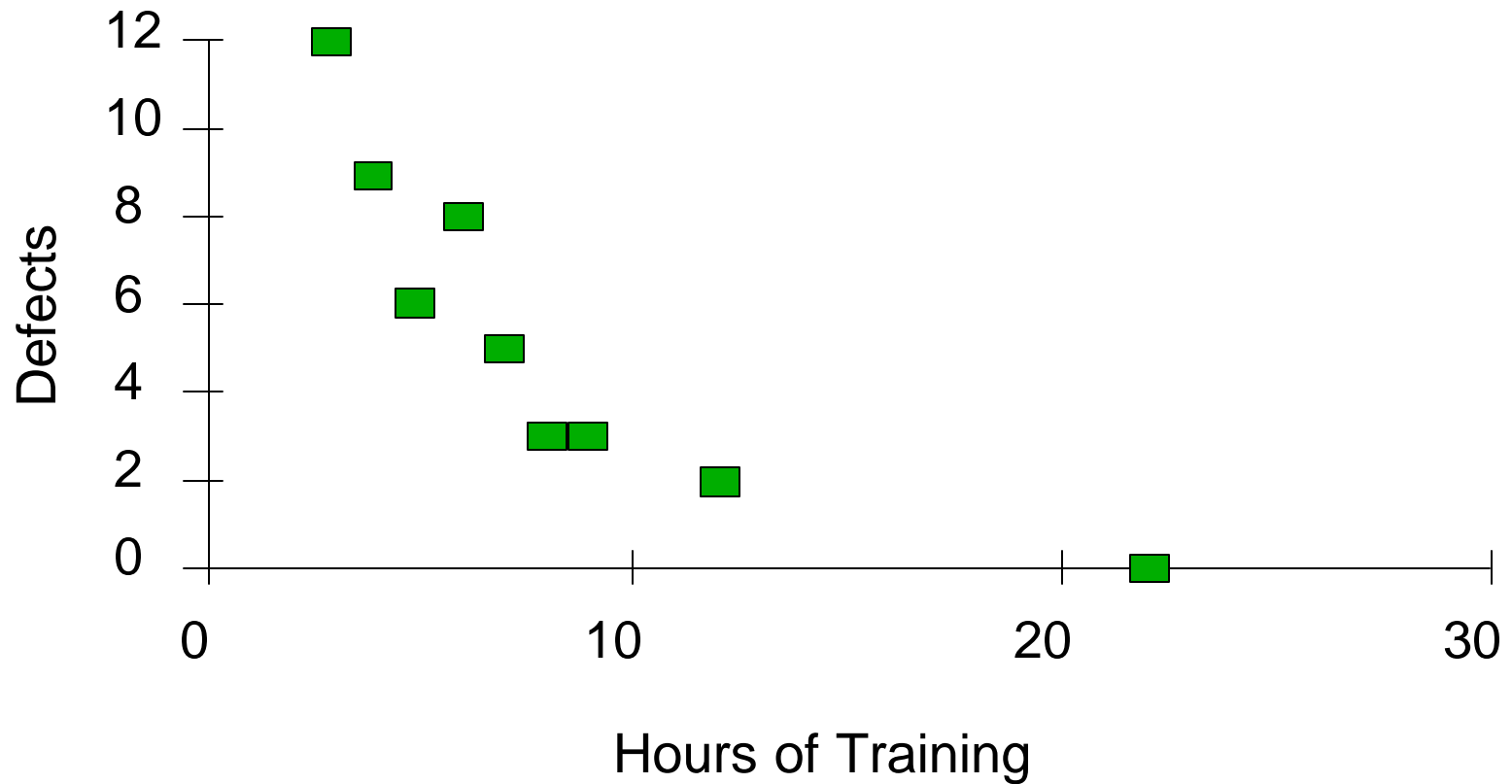
Identify frequency of defect occurrence and monitor Q-performance.



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Scatter Diagram

relationships between quality results and training?



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Check sheet

track defects or collect data

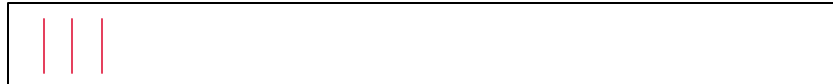
Wednesday

Invoicing errors

Wrong Account

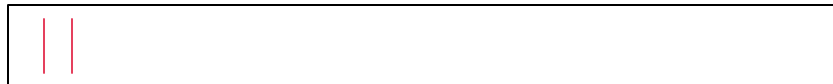

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Wrong Amount


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Accounts payable errors

Wrong Account


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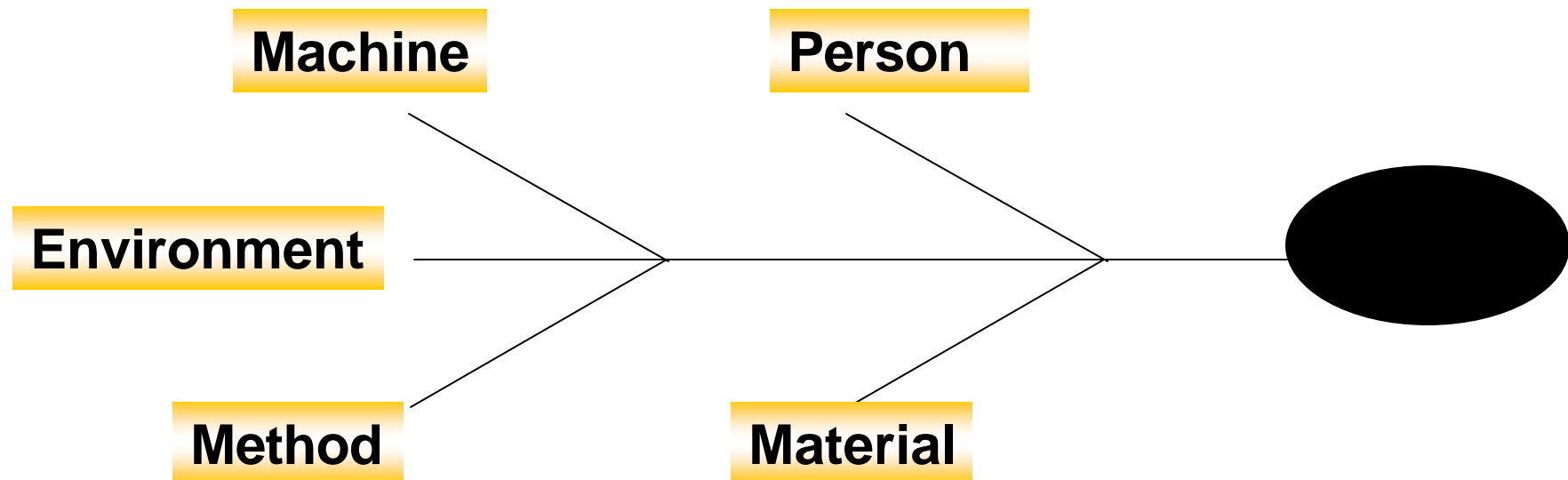
Wrong Amount


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Fish-bone or Cause & Effect Diagram

Possible causes

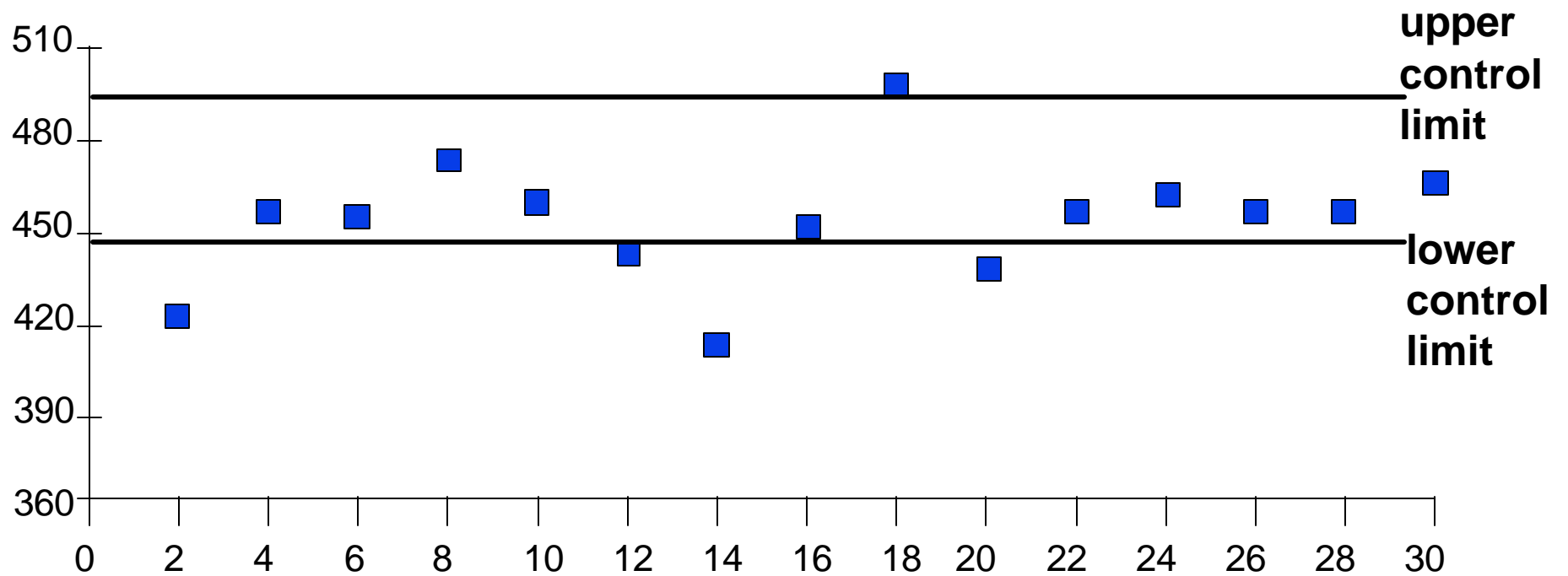


track backwards to find possible cause of Q problem (or effect).

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Control Chart

monitor production process quality & conformance to standards



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Supply chain:

Down-stream Ownership of Up-stream Problems

- server output = input for client station.
- **The interface** - purpose + quality of transformation evident.
- Problems with server product, delivery, reliability, quantity
then
 - evaluate contributory processes and requirement spec.
 - up-stream station must own & resolve the problem
 - Empower staff on the spot (physically & mentally)

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Trouble-shooting?



- machines are not working properly?
- maintenance ineffective?
- machines cannot work to tolerances demanded by the specification?

- problem is not with operations staff but management (not sorting out problems elsewhere).
- Problems in systems feeding into the process are the source
- Matrix organisation?

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QMS evaluation questions



- Process performed correctly?
 - How do we know? Who or what says so?
- Are outcomes to specification?
 - What are the tolerances? Room for discretion?
- How do we inspect & test at each process stage?
 - Are defects visible (in machine or code) ?
 - Can operators or supervisors turn a blind eye?
- Are we using the right methods & process technology?
- What mechanisms will ensure client feedback to server & viz

Answers may show

- inputs below standard or in error.
- methods contributing to variability & lack of control.

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Content, scope and focus of a QMS



- design + conformance to design
- processes + transformations
- availability + reliability
- response, delivery + logistics
- accuracy, completeness + maintainability
- cost effectiveness
- consumption feelings, after-glow + after care
- quality control inspections + testing
- the quality manual + control documents
- audit + certification expectations

Quality Manuals and Documents



- **These define the QMS**
 - beliefs and values
 - personnel
 - standards, processes, checks
 - documentation and control elements
 - inspection, testing - rules + preventative/corrective actions
 - audit, certification and review mechanisms.
- specifications - confidential + trade secrets
- Authoring - who writes, authorises and controls?
- Database and re-useable code
 - good word processing with forms - minimum requirement.
 - tender documents, contracts, supplier and operating instructions for teams anywhere in the world.
 - Specifications + everyday occurrences and actions

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Design for a QMS



- Analyse QMS functions , sequences & task relationships
- Identify the data items and data structures
- Form, record, report and chart
- The communication of the quality data

Up-dating and Security

- When process or practice changes - up-date the manual
 - anomalies and redundancy.
 - A database approach from single (PC) user to multi-user (local and wide area network).
- Data capture & access at each processing station.
- Management reports & dissemination
- Ownership and follow-up

Information overload?

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QC vs Quality Assurance



- Inspection is a QC process involving sensors and inspectors checking for defects. Who are the inspectors?
 - Inspection doesn't stop poor products being made.
 - Quality cannot be inspected in, it must be planned, designed and manufactured that way.
 - Sampling e.g. inspect/test some chocolates from a batch.
 - Inspection may be at the end of an assembly line
 - In a bank an inspector may infiltrate as a customer to vet how staff are handling clients.
- Quality ownership - all operators are inspectors of own quality.

Quality Assurance & ISO 9000



- QA requires a structured approach to prevention through planned and systematic activities i.e. a quality management system.
- **ISO 9000** = international standard for design, installation and operation of a QMS - conformance, specification and consistency in quality monitoring and action.

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Obtaining ISO 9000 accreditation involves.



- defining what best practice in production or service delivery will be (product & process definition)
- carrying out best practice - work done to plan, in the defined ways
- audit trail that it is done - records prove attention to quality

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ISO 9000



- International Organization for Standardization (ISO)
- Standards for quality management system
- More than 100 countries
- A prerequisite for global competition?
- ISO 9000 directs you to "document what you do and then do as you documented."

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ISO 9000 series



- flexible - hospitals, colleges, bakers, architects, courier services and manufacturers
- once QMS installed/working, hire certification body to audit
- Certification demonstrates commitment. Some will only contract with ISO 9000 firms
- **ISO 9002 (no design)**
 - basic standard for businesses handling standardised/repeat goods or services e.g. bedroom fitting using bought-in, ready built components
- **ISO 9001 (includes design)**
 - Food manufacturer designing ready-meals for Tesco
 - a software house offering a design for new software
- **ISO 9003** - 9001 / 9002 application for software industry

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Clauses of ISO 9000



- 4.1 Management
- 4.2 Quality Plans
- 4.3 Contracts
- 4.4 Controlling design - not ISO 9002
- 4.5 Controls using documents and data
- 4.6 Purchasing and supply
- 4.7 Customer-supplied equipment
- 4.8 Product identification and tracing
- 4.9 Process controls
- 4.10 Inspection/testing
- 4.11 Measuring and test equipment
- 4.12 Identify status of inspected goods
- 4.13 Control over non-conforming products
- 4.14 Corrective and preventative action
- 4.15 Handling, storage, packaging, preserving and
- 4.16 delivery
- 4.17 Records for quality
- 4.18 Internal audits
- 4.19 Training
- 4.20 Servicing
- Using Statistics

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Forms of ISO Certification



First party:

A firm audits itself against ISO 9000 standards.

Second party:

A customer audits its supplier.

Third party:

A "qualified" national or international standards or certifying agency serves as auditor.

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Benchmarking



- Identify processes needing improvement.
- Identify firms that are leaders in performing the process.
- Develop links with the companies and visit to research their approach, processes and achievements
- Analyse and exchange data. Mutual reciprocity.

Shingo System: Fail-Safe Design



- **Shingo's argument:**
 - SQC methods do not prevent defects
 - Defects arise when people make errors
 - Defects can be prevented by providing workers with feedback on errors
- **Poka-Yoke includes:**
 - Check lists
 - Special tooling that prevents workers from making errors

USA Baldrige National Quality Award (1999)



Criteria for Performance Excellence

- Leadership (weighting 125 points)
- Strategic Planning (85)
- Customer & Market Focus (85)
- Information and Analysis (85)
- Human Resource Focus (85)
- Process Management (85)
- Business Results (450)

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Baldrige Award Groups and Winners



- Manufacturing (produce and sell)
 - manufactured products or processes
 - agricultural, mining, construction
- Service companies
- Small businesses
- Health care
- Educational institutions

Winners

- Declared vision of what they think quality is and how they will achieve it.
- Senior management actively involved.
- Planned, organised programme and effective implementation
- Systematic control.

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ISO 9000 versus TQM or Baldrige-type Awards



- Which should we pursue first?
- What are the differences between the approaches?
- Do you have to be ISO 9000 certified before going for the Baldrige-type Award?