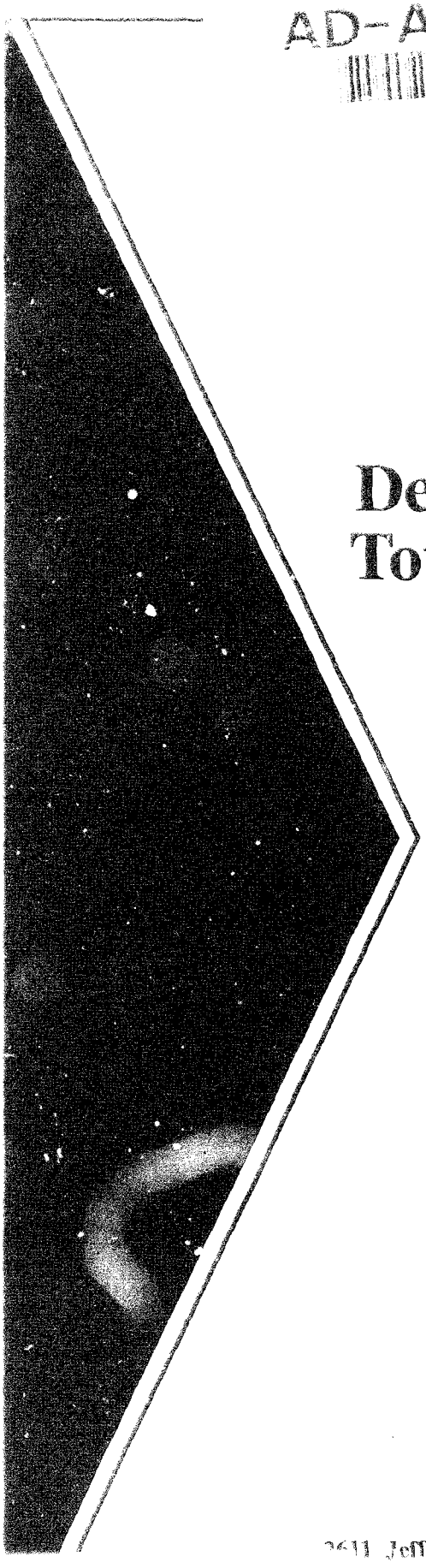
TQLO Publication No. 94-01
March 1994



Department of the Navy Total Quality Leadership Glossary

DEPARTMENT OF THE NAVY
TQL
OFFICE

2611 Jefferson Davis Highway, Suite 2000, Arlington, VA 22202-4016

ABOUT THE TQL OFFICE

The mission of the Total Quality Leadership (TQL) Office, Office of the Under Secretary of the Navy, is to assist the Department of the Navy leaders in their qualify-focused improvement efforts through education, consultation, information sharing, networking, and technical advice. The TQL Office provides technical advice as well to a number of organizations inside and outside of government.

The TQL Office has responsibilities in six key areas: TQL education and training; consultant services; new technologies; assessment; networking and liaison; and information and communication.

Education and Training

The TQL Office is responsible for managing the technical and conceptual content of the Department of the Navy (DON) TQL curriculum. This work involves designing and developing courses as well as training instructors. The staff advises the DON on integration of TQL material into the training pipeline.

Consultant Services

TQL Office members provide technical advice to the Under Secretary of the Navy and other senior Navy and Marine Corps leaders on the application of TQL principles and methods within the DON and on strategic planning. Advice may also take the form of recommendations on policy as well as on Defense Performance Review initiatives.

New Technologies

Technology can provide critical support to DON quality improvement efforts. The job of the TQL Office is to assess new technologies related to organizational change and process improvement and translate them into applications for the DON.

Assessment

Systems are needed to assess the way in which TQL implementation is enhancing mission accomplishment in DON organizations. The TQL Office is designing and developing feedback mechanisms for that purposes as well as developing innovative approaches to improve overall organizational effectiveness.

Networking and Liaison

The TQL Office has much to share with other organizations—both government and private—and much to learn from them. Staff members participate in TQL-related networks and professional organizations. As resources permit, the TQL Office sponsors TQL conferences and seminars.

Information and Communication

The TQL Office educates the DON about TQL policies and initiatives through a newsletter (*TQLeader*), articles and reports, and presentations at conferences and meetings. It is developing a computer-based quality information network to facilitate communication with DON organizations.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
		Final

4. TITLE AND SUBTITLE

Department of the Navy Total Quality Leadership Glossary

5. FUNDING NUMBERS

6. AUTHOR(S)

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Total Quality Leadership Office
2611 Jefferson Davis Hwy., Suite 2000
Arlington, VA 22202-4016

8. PERFORMING ORGANIZATION REPORT NUMBER

TQLO Pub.
94-01

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

14. SUBJECT TERMS Total Quality Leadership, TQL, Total Quality Management, TQM, TQL Concepts, TQL terminology, TQL glossary, TQM concepts, TQM terminology, TQM glossary

15. NUMBER OF PAGES 22

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UL

TQLO Publication No. 94-01 **March 1994**

Department of the Navy Total Quality Leadership Glossary

DEPARTMENT OF THE NAVY
TQL
OFFICE

2611 Jefferson Davis Highway, Suite 2000, Arlington, VA 22202-4016

FOREWORD

This glossary contains the terms used in the Department of the Navy (DON) Total Quality Leadership (TQL) education and training curriculum. Its purpose is to promote a common understanding of TQL concepts and terminology to aid communication and TQL implementation across the DON. Over time, these words will become a part of the everyday language and thinking of all DON personnel. As we gain further knowledge about how TQL works in our organization, other terms will be added to the lexicon.

Linda M. Doherty

LINDA M. DOHERTY
Director

GLOSSARY

14 Points: Deming's guidance for application of his theory of management for improvement of quality, productivity, and competitive position. [cf. Deming, 1986]

14 "obligations" of management: A different title for the 14 Points that emphasizes management's obligations.

A

Act phase: The fourth phase of the Plan-Do-Check-Act (PDCA) cycle. In this phase, decisions are made regarding adopting changes that were tested, proposing new changes, or continuing through the cycle.

affinity diagram: A planning tool that groups large amounts of language data (e.g., ideas, opinions, issues) according to their natural relationships.

analytic study: A type of study in which actions are taken on the cause system. The primary aim is to improve future performance.

area of opportunity: A sampling assumption used to ensure that the conditions under which data were collected are comparable.

arrow diagram: A tool used to plan the most appropriate path and schedule for the completion of any complex task. Also known as an activity network diagram.

assessment: A systematic method of determining the state or condition of something which involves the collection, analysis, and interpretation of data.

attribute data: Data that result from counting the number of occurrences or items in a single category of similar items or occurrences.

average: A summary indicator of central tendency or location on a measurement scale. Three commonly used indicators are: (1) the arithmetic mean that is obtained by summing the values in a set of data and dividing by the number of values in the set, (2) the median, which is the point on the measurement scale above and below which 50 percent of the measurements fall, (3) the mode, which is the most frequently occurring value in a set of measurements.

B

baseline data: Data from a stable process that are used to determine the effectiveness of process changes.

basic graphic tools: Charting and graphing procedures that are commonly used to depict process performance. These tools assist in describing processes, identifying areas for improvement, and indicating the effects of changes. Among the most commonly used tools are flow charts, check sheets, cause-and-effect diagrams, Pareto charts, control charts, run charts, histograms, and scatter diagrams.

bias: In statistical terms, bias is the degree to which the mean value of a sample statistic approximates the distribution parameter.

boundary: Something that delineates a limit or extent. Boundaries may be spatial, temporal, or organizational. They can be established by agreement or by definition.

brainstorming: An idea-generating technique used by teams to generate many ideas in a short period of time. Ideas are solicited in a nonjudgmental manner from all team members.

bureaucratic hierarchy: A form of organization and management characterized by specialization of functions, adherence to fixed rules, and a hierarchy of authority. [*Webster's New Collegiate Dictionary*]

C

capable process: A process that is stable and meets customer requirements.

causal system: The combination of influences or sources of variation that determine the nature of an output characteristic.

cause-and-effect diagram: A graphic representation that organizes potential causes of process variation into general categories. Typically, these categories include methods, materials, machines, people, and environment. Also called a fishbone diagram, or an Ishikawa diagram (after its developer). Types of cause-and-effect diagrams include the cause enumeration type, the process classification type, and the dispersion analysis type.

chain reaction: A graphic representation of Deming's theory that relates quality to a series of beneficial results. The theory states that as you improve quality, you also improve productivity, capture markets with better quality and lower price, and stay in business and provide jobs.

charter: A written document that describes the boundaries, expected results, and resources to be used by a quality improvement team.

Check phase: The third phase of the Plan-Do-Check-Act (PDCA) cycle. It is the phase in which the effects of the "Do" phase are assessed. This phase is sometimes referred to as the "Study" phase in the Plan-Do-Study-Act (PDSA) cycle. These cycles are the same except for their titles.

check sheets: Forms that are designed in such a way as to make it easy to collect, organize, and analyze data.

common causes: Those causes of variation that are inherent in the process over time and affect all outputs of the process. [cf. Moen et al., 1991]

consensus: A decision by a group that is acceptable to them, but is not unanimous nor arrived at by a vote. All members support the decision, even without universal agreement.

constancy of purpose: A leadership obligation to establish and demonstrate unwavering commitment to the long-term purpose of the organization.

continual improvement: Regular and frequent improvements. (See **process improvement.**)

control chart: A statistical tool used to distinguish between variation in a process resulting from common causes and variation resulting from special causes. Several types of control charts are used, depending upon the kind of data being used.

control limit: A line on a control chart, calculated from data, that represents the limits of the common cause system and is used as a basis for taking action.

correlation: A statistic which indicates the degree and nature of the relationship between two or more variables.

critical mass: A state in which a sufficient number of people with position power, knowledge, and leadership initiate and sustain a transformation.

critical process: (See **process.**)

cross-functional team: A team whose membership includes those from more than one organizational function and who have responsibility for some portion of an identified process.

customer: The person or group who establishes the requirements of a process and receives or uses the output of that process. **External customer**: An individual or group outside the boundaries of the producing organization who receives or uses the output of a process. **Internal customer**: An individual or group inside the boundaries of the producing organization who receives or uses output from a previous stage of a process to contribute to production of the final product or service. An **end user** is the person who uses the product or service for whom it was intended.

customer feedback system: A system used by producing organizations or groups for obtaining information from customers about relevant quality characteristics of products and services.

D

data collection plan: A plan that provides guidance for gathering information. It establishes the why, who, what, how, where, and when of data collection.

defect: A nonconformity to customer requirements.

defective: An item or service that contains one or more defects.

demographic data: Information on characteristics that can be useful for describing or classifying groups of individuals.

dispersion: (See **variation.**)

distribution: A graphic representation of the dispersion, location, and density of measured values.

Do phase: The second phase of the Plan-Do-Check-Act (PDCA) cycle. The phase in which the plan is executed.

E

effectiveness: The degree to which the right things are done.

efficiency: The ratio of the useful output to the total input in a system.

empowerment: Delegation of authority and provision of the means to improve processes as stated in the team charter.

end-user: (See **customer.**)

enumerative study: A type of study in which actions are taken on the frame at a particular time or location. Valid predictions cannot be made from this type of study.

environment: Circumstances and conditions that interact with and affect an organization. These can include economic, political, cultural, and physical conditions inside or outside the boundaries of the organization.

ESC: (See **Executive Steering Committee**.)

Executive Steering Committee: The team of guiding members of an organization who comprise the highest level quality improvement team in the organization.

extended system: A system that extends beyond the boundaries of the producing organization to include the customers and the suppliers of the organization. Interactions among these components are managed by the producing organization using the principles of system optimization. Processes internal to the producing organization that link the customer and supplier are regarded as significant processes.

F

fishbone diagram: (See **cause-and-effect diagram.**)

flow chart: A schematic diagram that uses various graphic symbols to depict the nature and flow of the steps in a process. Deployment flow charts and opportunity flow charts are two types commonly used. Flow charts can be drawn to represent different levels of analysis, e.g., macro, mini, and micro.

frame: In statistical studies, a frame is a means of access to a universe under investigation or to a sufficient portion thereof. It is usually a list that provides a way of identifying tangible units that belong to the universe.

G

Gantt chart: A chart used to plan and manage work in relation to time.

gap: In the context of statistical sampling, a gap is the portion of the universe not included in the frame. The larger the gap, the higher the risk of invalid results. In the context of strategic planning, a gap is the difference between what an organization is doing today to accomplish its mission and what it needs to do to achieve its vision of the future organization.

goal: A statement of a result to be achieved in the long term, representing a major accomplishment.

guiding principles: A set of statements generated by the guiding members of an organization intended to guide the behavior of all members of the organization towards each other and their customers and suppliers. These statements are based on an agreed-upon set of organizational values.

H

histogram: A vertical bar graph that depicts the distribution of a set of continuous data.

I

implementation plan: A plan for starting Total Quality Leadership implementation in an organization, with the aim of establishing critical mass and beginning the practice of process management.

innovation: The application of knowledge leading to development of new processes, products, or services in response to anticipated customer requirements.

inputs: Materials or information used to produce a product or service.

internal customer: (See **customer.**)

internal environment: (See **environment.**)

internal supplier: (See **supplier.**)

Ishikawa diagram: (See **cause-and-effect diagram**.)

J

judgment sample: A sample used in analytic studies to determine the conditions to be studied and the measurements to be taken for each set of conditions. The sample is based on knowledge of the process.

just-in-time: The concept of supplying inputs only when they are needed for use.

L

LCL: (See **control limit.**)

leadership: The process of inducing others to take action toward a common goal.

linking pin: A member from an ESC or QMB who is assigned to work with a subordinate QMB or PAT in order to interpret their team charter, and provide guidance and support for the team's activities. The linking pin is a nonvoting member of the subordinate team.

M

management: The exercise of authority, whether formal or informal, in directing and coordinating the work of others. [cf. Shafritz, 1980]

management of participation: The boundaries, limits, or controls placed upon participative management. In TQL, participation on PATs and QMBs is directed by higher authority rather than by voluntary actions of team members.

matrix diagram: A graphic tool that shows the relationships and strength of relationship between two or more qualitative variables.

mean: (See **average.**)

median: (See **average.**)

mission statement: A written document that defines the fundamental and unique purpose that sets one organization apart from others and identifies the scope of operations. It describes what the organization does, who it does it for, and how it does it.

mode: (See **average.**)

multi-voting: A repetitive process used by a team to conduct a straw poll to select the most important or popular items from a large list of items generated by the team. The process is conducted with limited discussion and difficulty.

N

NGT: (See **nominal group technique.**)

nominal group technique: A weighted ranking technique that allows a team to generate and prioritize a large number of issues without creating "winners" and "losers" among the team members.

O

objectives: Specific, measurable, mid-term and short-term performance targets necessary for achieving long-term goals.

objectives matrix: A technique used to combine different measures of performance into a summary index that allows for meaningful comparisons of performance.

operational definition: A definition that gives communicable meaning to a concept by specifying how the concept is measured and applied within a particular set of circumstances. It is composed of three elements: criterion, test, and decision. Operational definitions change according to their applications.

opportunity flow charts: A graphic technique that differentiates process activities that add value from those that add cost only.

optimization: A process of orchestrating the combined efforts of all components of a system toward achievement of the stated aim of the system. [cf. Deming, 1986]

organizational culture: A pattern of basic assumptions, invented, discovered, or developed by a given group, as it learns to cope with its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore is to be taught to new members as the correct way to perceive, think, and feel in relation to those problems. [cf. Schein, 1990]

organizational transformation: The result of making fundamental changes in the strategies, design, management, and leadership of an organization.

organizational values: Enduring beliefs and assumptions about modes of conduct or states of existence that are deemed worthwhile or desirable within the organization.

outcome: The way the customers respond to products or services.

output: The products or services produced by a process.

overadjustment: Inappropriate action taken on a process because variation is mistakenly ascribed to a special cause when, in fact, the cause is part of the common cause system. Commonly known as "tampering."

P

paradigm: A set of rules based on an explicit or implicit set of assumptions that explains how things work or ought to work.

paradigm shift: A change in the way one perceives the way things work or ought to work.

Pareto chart: A vertical bar graph that displays categories of items in decreasing order of frequency or magnitude from left to right. This chart enables the user to prioritize the items.

participative management: A management technique that allows non-management personnel an opportunity to participate in decision-making, provide input to management decisions, and/or execute management actions.

PAT: (See **Process Action Team.**)

PDCA cycle: (See **Plan-Do-Check-Act cycle.**)

PDPC: (See **process decision program chart.**)

Plan-Do-Check-Act (PDCA) cycle: Also known as the Shewhart or Deming cycle, it is an application of the scientific method useful for gaining knowledge about and improving processes.

Plan phase: The first phase of the Plan-Do-Check-Act (PDCA) cycle. A plan based upon a prediction is developed in this phase. The plan identifies what needs to be improved, how it is to be implemented, and how the results are to be evaluated.

planning assumption: A belief, based upon past knowledge and experiences, about how current and future events, both internal and external to the organization, are likely to affect the achievement of desired results.

prioritization matrix: A graphic tool used to prioritize tasks, issues, or possible options based on known, weighted criteria.

problem solving: Treating a problem by dealing with the symptom rather than the cause.

process: A set of causes and conditions that repeatedly come together to transform inputs into output. A **significant process** is one that begins with an external customer requirement that can be traced back through the process of the producing organization and to the inputs of the organization. This process, if improved, will affect customer outcomes. (See **extended system.**) A **critical process** is a stage within a significant process that is deemed most important for improvement.

Process Action Team: A team chartered by the ESC or a QMB composed of individuals from within a single command function who work together on a stage of a process.

process capability: The predictable distribution of performance of a stable process.

process decision program chart: A graphic tool that maps out conceivable negative events and contingencies that can occur in the execution of a plan along with appropriate countermeasures.

process improvement: The continuous endeavor to learn about the cause system in a process and to use this knowledge to change the process to reduce variation and complexity and to improve customer satisfaction. [cf. Moen et al., 1991]

process management: Actions taken by a chartered team to identify critical processes within a significant process, stabilize them, and continually improve them.

producible quality characteristic: Those quality characteristics identified by a stakeholder that a providing organization can produce.

profound knowledge: Deming's term to describe the system of knowledge required to achieve organizational transformation and system optimization. It consists of four interdependent parts (disciplines): appreciation for a system, knowledge about variation, psychology, and the theory of knowledge. It is deemed to be more important to have a broad understanding of how the components interact than to have in-depth knowledge of any individual part of the system.

Q

QFD: (See **quality function deployment.**)

QMB: (See **Quality Management Board.**)

quality: The extent to which a product or service meets or exceeds customer requirements and expectations.

quality advisor: A TQL support position within a DON organization. This person assists QMBs and PATs in data collection, analysis, and interpretation. The advisor also trains these teams in the use of methods and tools for process improvement.

quality characteristic: A property or attribute of a product or service that is considered important to a stakeholder.

quality circle: A small group that voluntarily performs quality improvement activities within the workplace, carrying out its work continuously as part of a company-wide program of quality control, self-development, mutual education, flow control, and improvement within the workplace. [cf. Imai, 1986]

quality function deployment: A system for designing products or services based on customer requirements and involving all necessary functions of the producing organization.

quality improvement teams: Any team that has been established to improve quality, usually through the improvement of an organization's processes. In the DON, the Executive Steering Committees, Quality Management Boards, and Process Action Teams are the teams linked by charters to make process improvements.

quality leadership: The practice of the 14 Points by any person having formal authority within an organization.

quality loss function: (See **Taguchi loss function.**)

Quality Management Board: A cross-functional team composed of managers, usually of the same organization level, who are jointly responsible for a process, system, product, or service.

quality philosophy: An enduring, value-based set of interrelated statements created by an organization's guiding members that reflect the quality principles, concepts, and methods that address what the organization stands for and how it conducts its business.

R

random: In the context of process performance, random means having no specific pattern.

random sample: A sample selected in such a way that every member of a frame has an equal and independent chance of being selected.

range: A statistic that depicts the extent of dispersion in a set of data. It is determined by calculating the difference between the largest and smallest values in the data set.

rational sample: (See **judgment sample.**)

rational subgrouping: A method for dividing data into subgroups based upon some rational hypothesis in order to answer specific questions.

representative sample: A sample created with the intention of minimizing bias and increasing the validity of the results of a study. (See **bias.**)

run chart: A line graph that depicts data plotted over time. Run charts are used to assess and achieve process stability.

S

sample: A subset of units from a frame or a cause system.

sampling plan: (See **data collection plan.**)

scatter diagram: A graph depicting the strength and shape of the relationship between two variables.

scientific method: A systematic and consistent set of procedures designed to understand and predict behavior.

significant process: (See **process.**)

SPC: (See **statistical process control.**)

special causes (of variation): Causes that are not in the process all the time or do not affect every product or service, but arise because of specific circumstances. Sources of variation that are unpredictable or unstable. [cf. Moen et al., 1991]

specification limits: A range of values, based on customer requirements, used to judge the acceptability of a product or service.

stability: A state in which a process has displayed a certain degree of consistency in the past and is expected to continue to do so in the near future.

stable process: A process in which variation in outputs arises only from common causes. A process that is stable is predictable. [cf. Moen et al., 1991]

stakeholders: The groups and individuals inside or outside the organization who affect and are affected by the achievement of the organization's mission, goals, and strategies.

standardization: A method used to achieve uniform practice within a process, i.e., that all workers are following a standard operating procedure.

statistical control: The condition describing a process from which all special causes have been eliminated and only common causes remain; evidenced on a control chart by the absence of points beyond the control limits and by the absence of nonrandom patterns or trends within the control limits. (See **stable process**.)

statistical process control: The application of statistical methods for the purpose of reducing process variation.

statistical quality control: The application of statistical methods to improve the quality of products. The emphasis is on acceptance sampling of the product rather than the process that produced the product.

strategic framework: The combination of an organization's mission, vision, and guiding principles which serves as a context for practicing strategic management.

strategic goal: A long-range change target that guides an organization's efforts in moving toward a desired future state.

strategic intent: A driving force compelling leadership toward its vision.

strategic management: A process that links strategic planning and strategic intent with day-to-day operational management into a single management process. It is used to describe Phase Two of TQL implementation.

strategic plan: A document that describes an organization's mission, vision, guiding principles, strategic goals, strategies, and objectives.

strategic planning: The process by which the guiding members of an organization develop a strategic plan.

strategy: A means for achieving a long-range strategic goal.

suboptimization: A condition that occurs when the performance of a system component has a net negative effect on the aim of the total system. Performance of the component is improved at the expense of the system.

supplier: The person or group who provides an input to a process [cf. Moen et al., 1991]. **External supplier**: An individual or group outside the boundaries of the receiving organization who provides input to the receiving organization. **Internal supplier**: An individual or group within the boundaries of an organization (department/division/office) who provides input to another individual or group within the organization.

supporting plans: Operating plans developed at lower levels of the organization that support the organization's strategic plan.

system: A network of interdependent components that work together to try to accomplish the aim of the system. [Deming, 1993]

system optimization: (See **optimization.**)

T

Taguchi loss function: The concept that there is an increasing economic loss as product quality characteristics deviate from their target value.

tampering: (See **overadjustment.**)

team: A group of individuals organized to work together to accomplish an aim.

team leader: A member of a team responsible for leading the team in the accomplishment of the aim.

total quality: An extension of the quality concept to include improvement of all of the quality characteristics that influence customer-perceived quality. This includes sources of variation from incoming supplies, all of the significant processes within an organization, and all those that can influence customer satisfaction, needs, or expectations when the product or service has left the organization.

Total Quality Leadership: The application of quantitative methods and the knowledge of people to assess and improve: materials and services supplied to the organization; all significant processes within the organization; and meeting the needs of the end-user, now and in the future. [Department of the Navy, 1991]

TQL: (See **Total Quality Leadership**.)

TQL coordinator: A person selected by the commanding officer to assist in the implementation of process management.

tree diagram: A graphic tool for mapping the full range of tasks needed to achieve the end goal, purpose, or objective.

U

underadjustment: Not taking action on a process when action is needed.

universe: In a statistical study, universe represents the entire set of values possessing the property under investigation.

"unknowable" costs: Costs that result from poor quality but cannot be readily quantified in financial terms. For example, the cost to an organization of a dissatisfied customer, or of employees who are afraid to make suggestions or take risks that might lead to better quality.

unstable process: A process in which variation is a result of both common and special causes. [cf. Moen et al., 1991]

V

variables data: Values resulting from measurement of a continuous variable.

variation: The observed differences in output characteristics produced by a process.

vision: An idealized view of a desirable and potentially achievable future state.

voice of the customer: The quality characteristics of a product or service that customers define as important to meet their needs.

voice of the process: The actual performance of the process.

W

white space: The space represented on an organization chart between adjacent functions that must be managed and improved by owners of those functions to achieve system optimization. [cf. Rummler & Brache, 1991]

Z

zero defects: A situation that exists when all quality characteristics are produced within design specifications. This concept is reflected in the attitude that defects can be prevented, especially if more attention is given to the task at hand. The theme that most embodies this concept is "do it right the first time."

REFERENCE SOURCES FOR GLOSSARY TERMS

Ackoff, R. (1981). *Creating the corporate future: Plan or be planned for.* New York: Wiley.

Brassard, M. (1989). *The memory jogger plus +.* Methuen MA: GOAL/QPC.

Deming, W.E. (1961). *Sample design in business research.* New York: John Wiley.

Deming, W.E. (1986). *Out of the crisis.* Cambridge, MA: Massachusetts Institute of Technology, Center for Advanced Engineering Studies.

Deming, W.E. (1993). *The new economics.* Cambridge, MA: CAES Press.

Department of the Navy. (1991). *DON Executive Steering Group guidance on Total Quality Leadership (TQL)* (White Paper). Washington, DC: Author.

Gibson, J.L., Ivancevich, J.M., & Donnelly, J.H., Jr. (1976). *Organizations: Behavior, structure, processes.* Dallas, TX: Business Publications.

Glass, G.V., & Stanley, J.C. (1970). *Statistical methods in education and psychology.* Englewood Cliffs, NJ: Prentice-Hall.

Houston, A., Hulton, V., Landau, S. B., Monda, M., & Shettel-Neuber, J. (1987). *Measurement of work processes using statistical process control: Instructor's manual* (Technical Note 87-17). San Diego, CA: Navy Personnel Research and Development Center.

Imai, M. (1986). *Kaizen: The key to Japan's competitive success.* New York: Random House.

Juran, J. M. (Ed). (1974). *Quality control handbook* (3rd ed.). New York: McGraw-Hill.

Juran, J. M. (1989). *Juran on leadership for quality: An executive handbook.* New York: The Free Press.

Likert, R. (1961). *New patterns of management.* New York: McGraw-Hill.

McConnell, J. (1988). *Safer than a known way.* Dee Why, Australia: Delaware Books.

Moen, R. D., & Nolan T. W. (1987). Process improvement: A step-by-step approach to analyzing and improving a process. *Quality Progress, 20*(9), 62-68.

Moen, R. D., Nolan, T. W., & Provost, L. P. (1991). *Improving quality through planned experimentation.* New York: McGraw-Hill.

Pearce, J. A., II. (1987). Corporate mission statements: The bottom line. *Executive, 1*, 109-116.

Rummler, G.A., & Brache, A.P. (1991, January). Managing the white space. *Training, 28*(1), 55-70.

Schein, E.H. (1990). Organizational culture. *American Psychologist, 45*(2), 109-119.

Scholtes, P. R., & Hacquebord, H. (1988). Beginning the quality transformation, Part I. *Quality Progress, 21*(7), 28-33.

Scholtes, P. R. et al. (1988). *The team handbook.* Madison, WI: Joiner and associates.

Shafritz, J. M. (1980). *Dictionary of personnel management and labor relations.* Oak Park, IL: Moore.

Shewhart, W. A. (1932). *Economic control of quality of manufactured product.* New York: D. van Nostrand.

Sullivan, L. P. (1986, May). The seven stages in company-wide quality control. *Quality Progress, 19*(5), 77-83.

Ward, J., & Hulton, V. (Compilers). (1990, May). *Total quality management case studies: 1988 recipients of the Malcolm Baldrige National Quality Award* (Quality Support Center Document). San Diego, CA: Navy Personnel Research and Development Center.

Wheeler, D. J., & Chambers, D. S. (1992). *Understanding statistical process control.* Knoxville, TN: SPC Press.