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Department of the Navy
Office of the Under Secretary of the Navy
Total Quality Leadership Office

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Three Experts on Quality Management:

Philip B. Crosby
W. Edwards Deming
Joseph M. Juran

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OCT 01 1992 **A** *J. Gerald Suárez*



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ABOUT THE TQL OFFICE

The TQL Office is a part of the Office of the Under Secretary of the Navy. Its mission is to provide technical guidance to the Department of the Navy Executive Steering Group (ESG).

The ESG group was chartered by the Secretary of the Navy in 1989 to lead the transformation to a quality-focused organization. Its members include the Vice Chief of Naval Operations, the Assistant Commandant of the Marine Corps, the assistant secretaries, the systems commanders, and other selected Navy and Marine Corps leaders. Under Secretary of the Navy Dan Howard chairs that group.

One of its first actions was to create the TQL Office to ensure that its plans and actions for TQL training and implementation would be consistent across the organization. Progress has been significant:


—In February 1992, the ESG published a vision statement, guiding principles, and strategic goals for the Department of the Navy. These documents lay the foundation for the Department's strategic plan. They say, in effect, that the entire organization will focus on quality as it plots its course for the future.

—In April 1992, the Department's TQL education and training program was brought "on

line" on both coasts, staffed by a cadre of TQL specialists who are providing education and training to senior leaders and command-level TQL coordinators and quality advisors. It is an ambitious program, essential to reaching the "critical mass," those people within an organization with the requisite knowledge, power, and leadership to sustain a cultural change.

—The TQL Office is publishing a newsletter to communicate the activities of the ESG and to provide a forum for the exchange of information and ideas related to TQL. The newsletter also provides a vehicle to document stories about how TQL principles and tools can be applied to military settings.

The TQL Office publishes other materials such as this report. The intent of the publications series is to clarify what TQL is and how it works within our organization. We hope it serves you well.



LINDA M. DOHERTY

Director

Total Quality Leadership Office
Office of the Under Secretary of the Navy

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**Department of the Navy
Office of the Under Secretary of the Navy
Total Quality Leadership Office**

THREE EXPERTS ON QUALITY MANAGEMENT:

**PHILIP B. CROSBY
W. EDWARDS DEMING
JOSEPH M. JURAN**

by
J. GERALD SUAREZ



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FOREWORD

U.S. leaders are focusing today on quality to restore the country's competitive edge. We know now that an emphasis on quality improves overall productivity and reduces costs.

As a nation, we used to think just the opposite, that quality costs, that you have to create products of high quality. As a result we emphasized productivity at the expense of quality and began to lose many of our customers as competition increased. Our customers wanted quality and the competition was able to offer it at a price that customers were willing to pay.

We're smarter now. *Quality is defined by the customer.* It always has been, but we didn't have to listen after World War II when everything we produced, good or bad, had a market. Now we know that if we understand what quality means to the customer, how the customer defines quality, and we meet those criteria, we are on our way to creating new markets and, perhaps, recapturing others.

One question we frequently ask ourselves goes something like this: "If Japan can, why can't we?" Those words were used in the title of a 1980 NBC documentary that forever changed the way we look at ourselves in the world marketplace. During that broadcast, commentator Lloyd Dobyns told us the chilling tale of a nation rapidly losing its economic might. At the same time he offered us some hope in the person of W. Edwards Deming, American statistician and quality expert. What Deming taught the Japanese back in the 1950s and what he was proposing for American businesses seemed, in 1980, to be revolutionary to viewers, but the bottom line could not be argued. Quality paid, and paid handsomely.

Since then, a number of U.S. businesses and government agencies have heeded the advice of W. Edwards Deming, Philip B. Crosby, Joseph M. Juran, and others. Hewlett-Packard, Xerox, and Motorola, for example, have demonstrated that a focus on quality will reduce production costs because money is no longer spent on waste and rework. The savings can be reinvested in new technology and in reducing the cost to the customer.

A number of Federal agencies have reached the same conclusions. Their leaders know that services, like products, are the result of processes that can also be analyzed and improved. The General Accounting Office recently adopted a Total Quality Management (TQM) approach for its own organization after studying the successes of private industry. The Internal Revenue Service now views the taxpayer as the customer, a change having profound effect on its relationship with the public.

Probably the most dramatic progress within the Federal Government has taken place within the Department of Defense (DOD), and, in particular, the Department of the Navy (DON). This report concludes with a description of the DON's quality initiatives undertaken to meet the challenge of becoming a leaner, but more efficient and effective organization in the face of massive budget cuts. I describe this crisis in Mary Walton's most recent book (*Deming Management at Work*, 1991).

We have a sense of urgency. If any private-sector company was faced with a drop in their bottom line of the sort that we are anticipating over the next five years, they would declare bankruptcy tomorrow and walk away. What we are looking at in the most rosy of scenarios would amount to catastrophic failure in the private sector.

If we're going to maintain a viable maritime force over the next decade, we have to find a way out of the crisis, and one of those ways is through quality-focused management and streamlining every efficiency we can get from everywhere, because we're not going to get any more money. We're going to get a hell of a lot less... Ten years from today there's no way we can predict where our budget's going to be, except we can be absolutely sure we're going to be a smaller organization than we are now, with an undiminished mission, and that is to protect the national interest of this country. (pp. 150-151)

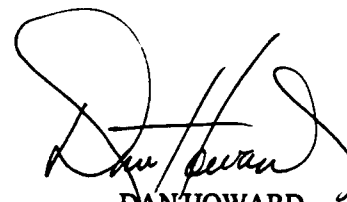
Even when organizations become convinced that they need to do business in a new way, they often don't know where to begin. There are a number of approaches, but what are they really saying and how do they compare? The leaders in the Department of the Navy asked the same questions before adopting the Deming philosophy. Deming emphasizes leadership responsibility and integrates process improvement methods with new methods for leading people, critical components for an organization as large and complex as the DON.

Those who begin to study quality-focused management systems soon run across the names of Crosby, Deming, and Juran. These three have been carrying the message of quality to the world for decades. As much as we know about each man individually, little has been published that compares the three approaches. The author of this report, J. Gerald Suarez—researcher, instructor,

and consultant for the Department of the Navy Total Quality Leadership Office--describes the three approaches and compares one to the other. To write this report, he attended the Crosby Quality College, Juran Institute seminars, and Deming's 2-day and 4-day seminars. He brings to the material a balanced treatment.

A word of advice for readers outside of the Department of the Navy. Each organization has a unique mission and a unique culture. If you are reading this report to help you make a decision about which way to go, remember that what you choose must support your own special requirements. You may find that none of the approaches described here would work for you, but from your reading

you will have a better understanding of what to consider. What is the role of leadership? How is quality defined? How are the roles of suppliers and customers addressed? To what extent are employees involved in quality efforts? We hope this publication will help you in your quest.



DAN HOWARD

Under Secretary of the Navy

THE AUTHOR

J. Gerald Suárez is a Ph.D. candidate in industrial and organizational psychology at the University of Puerto Rico. He has been involved in quality management since 1985, when he conducted research on the implementation of the Deming management approach at Hewlett-Packard.

Gerald started his career as an industrial psychologist for a private consulting firm, focusing on quality management issues. In 1987 he was hired by the Navy Personnel Research and Development Center (NPRDC) in San Diego, California, as a personnel research psychologist. At NPRDC, he was both instructor and consultant within the Department of the Navy and the Department of Defense (DOD). He wrote a number of reports on TQM/TQL education, among them a report that describes a strategy

for educating the DOD acquisition work force in TQL, and another that presents an education and training plan for TQL in the DOD. He also coedited a report of selected readings in TQL implementation.

Gerald received a Fleet Support Service award in 1991 for providing initial training to the TQL Fleet Teams formed by the the Chief of Naval Operations to lead TQL demonstration projects in selected Fleet units. Gerald instructed them in team building and in the use of the seven management and planning tools. He also served as a consultant to the Atlantic Fleet TQL teams as they began to work with their units.

In 1991, he joined the Office of the Under Secretary of the Navy's TQL Office as a technical advisor, researcher, and instructor. He is a member of the faculty responsible for training the Department of the Navy's TQL specialists and Senior Leaders Seminar instructors. He is a frequent guest speaker at TQL conferences.

Gerald is a member of the Deming Study Group in Washington, DC. In 1990 he was nominated and selected to Who's Who in the West.

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INTRODUCTION

More managers than ever before are focusing on quality as a way of increasing productivity, reducing costs, and meeting customer needs. These managers are beginning to understand the importance of continuously improving the quality of their services and products as a way of achieving these goals. Those who begin to learn about quality quickly become familiar with the names of Philip B. Crosby, W. Edwards Deming, and Joseph M. Juran--renowned quality experts--who have been carrying forth the message of quality for more than 30 years.

There has been a consistent demand for information about the unique approach of each of these experts. An early effort conducted at the Navy Personnel Research and Development Center (Houston, Shettel-Neuber, & Sheposh, 1986) addressed the suitability of applying the approaches of Crosby, Deming, and Juran to naval repair and maintenance facilities. The report identified statistical process control (SPC) as the primary focus.

Interest in the approaches of Crosby, Deming, and Juran continues. This report has been written to answer many of the questions that we and others associated with quality initiatives are asked. It addresses the approaches of Crosby, Deming, and Juran as comprehensive management philosophies aimed at long-term improvements and customer satisfaction through leadership.

This report is intended for individuals beginning their education in the field of quality. I provide a biographical sketch of the three experts, describe their definitions of quality and the basic principles underlying their approaches, and discuss similarities and differences between them. Finally, I describe the direction that the Department of the Navy has taken in its pursuit of quality and improved productivity.

THREE EXPERTS ON QUALITY

At an age when most people have retired, Philip B. Crosby, W. Edwards Deming, and Joseph M. Juran continue an untiring pace of work--conducting seminars, consulting with clients, and writing new texts. They have devoted their lives to helping organizations improve the quality of their products and services. Their influence is now worldwide and their accomplishments legendary.

W. Edwards Deming, senior of the three, continues a one-man show with his now-famous 4-day seminar aimed at awakening managers to the need for quality improvement. At 91, he continues to teach and consult both here and abroad. Joseph Juran, 87, has worked devotedly to establish his own institute, which provides education, training, and consulting in how to manage for quality. Philip B. Crosby, 65, has established a Quality College, which has trained more than 100,000 managers. In 1991 Crosby retired from the firm Philip Crosby Associates (PCA) and started a new company, Career IV, Inc., for the purpose of conducting seminars, writing books, and conducting a limited lecture tour.

CROSBY

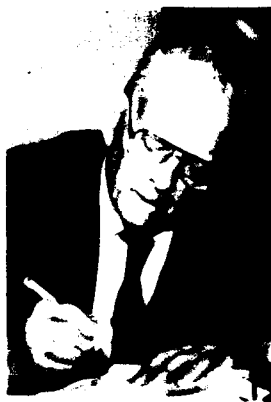


Philip B. Crosby is an internationally known quality expert. He is best known for popularizing the "Zero Defects" concept that originated in the United States at the Martin Marietta Corporation where Crosby worked during the 1960s.

Crosby, an engineer, began his career as a junior technician in a quality department, working his way up through that company and several others until eventually he became Director of Quality and Corporate Vice President of ITT Corporation, where he spent 14 years. In 1979, Crosby's book *Quality is Free* was published and became a best seller in the field of management. That same year, he established the consulting firm PCA and, with it, the Quality College. Crosby is also the author of *Leading* (1990); *Let's Talk Quality* (1989); *The Eternally Successful Organization* (1988); *Running Things: The Art of Making Things Happen* (1986); *Quality Without Tears: The Art of Hassle-free Management* (1984); and *The Art of Getting Your Own Sweet Way* (1972). Crosby's books have been translated into 10 languages.

In 1985, PCA went public, and, in 1989, merged with Alexander Proudfoot. The company has 350 employees working in 15 countries. It is now the world's largest management consulting and teaching firm.

DEMING



W. Edwards Deming holds a Ph.D. in physics, but is a statistician by experience. He is an educator, lecturer, author, and an internationally renowned consultant, best known for leading Japanese businesses on the course that has made them leaders in quality and productivity throughout the world. He has been called "The Father of the Third Wave of the Industrial Revolution"

(*If Japan Can . . . Why Can't We?* [NBC White Paper], 1980).

Deming began teaching engineering and physics in the 1920s, at the same time he began studying for his Ph.D. in physics and working summers at the Hawthorne Electric Plant in Chicago. In 1927, he worked for the U.S. Department of Agriculture where he met Walter Shewhart, who was developing techniques to bring industrial processes under statistical control. Deming studied Shewhart's theories, which became the basis of his own work years later.

Deming is author of *Out of the Crisis* (1986); *Quality, Productivity, and Competitive Position* (1982); *Sample Design in Business Research* (1960); *Statistical Adjustment of Data* (1943 & 1964); and *Theory of Sampling* (1950) as well as of numerous papers. As mentioned before, he is credited with having a major influence on Japan's economic recovery after the Second World War. In recognition of Deming, the Japanese Union of Scientists and Engineers established the Deming Prize, given to individuals and organizations who make distinguished contributions to improving the quality of their products or services.

U. S. recognition of Deming's methods of quality improvement came late in 1980, after NBC aired a documentary entitled *If Japan Can . . . Why Can't We?* The program focused national attention on the importance of quality in world competitiveness. This program gave Deming's quality leadership approach a great deal of

exposure, and he began to receive calls from corporations across the U.S. that wanted to hire him as a consultant. Deming continues as a consultant and also conducts seminars on quality leadership and productivity, and continues to travel to New York weekly to teach at Columbia University and New York University.

Deming is the recipient of many awards, including the Order of the Sacred Treasure of Japan and the Shewhart Medal from the American Society of Quality Control. He has been awarded doctorates *honoris causa* by several universities.

JURAN



Joseph M. Juran holds degrees in electrical engineering and law. He has worked as an engineer, industrial executive, government administrator, university professor, labor arbitrator, corporate director, and management consultant. Juran worked at the Hawthorne Electric Plant in Chicago in the 1920s (as did Deming) and also taught at New York University. He is also well known in Japan for

his contributions to the practice of total quality control after the Second World War. Juran's teachings led, in part, to Japan's economic growth and success.

Juran visited Japan in the early 1950s as a lecturer and consultant and taught the Japanese, among other things, about the Pareto principle, which he popularized as the principle of the "vital few and the trivial many." Juran is also known for the "Juran trilogy" and the concept of "managerial breakthrough."

Juran's published works and programs have been translated into 16 languages. He is the chief editor of *The Quality Control Handbook* (1988) and the author of the following books: *Juran on Leadership for Quality* (1989); *Juran on Planning for Quality* (1988); *Managerial Breakthrough* (1964); *Case Studies in Industrial Management* (1955); *Management of Inspection and Quality Control* (1945); and *Bureaucracy: A Challenge to Better Management* (1944). In 1979, Juran established the Juran Institute, Inc., in Wilton, Connecticut, where he conducted seminars and produced educational materials on quality. He is currently the Chairman Emeritus of the Juran Institute, serves on the Institute's Board of Directors, and continues to lecture and consult with organizations around the world.

Juran has received over 30 honorary awards and prizes. Among them is the Order of the Sacred Treasure of Japan. In recognition of his contributions, the Australian Organization for Quality Control established the Juran Medal in 1975.

QUALITY DEFINITIONS

CROSBY

To Crosby, quality means "conformance to requirements" (Crosby, 1979). Quality must be defined in measurable and clearly stated terms to help the organization take action based on tangible targets, rather than on hunch, experience, or opinions.

To Crosby, quality is either present or not present. There is no such thing as differing levels of quality. Management must measure quality by continually tracking the cost of doing things wrong. Crosby refers to this as the "price of nonconformance." To aid managers in tracking the cost of doing things wrong, he developed the following formula: Cost of Quality (COQ) = Price of Conformance (POC) + Price of Nonconformance (PONC). The POC refers to the cost of getting things done right the first time. PONC provides management with information

regarding the wasted cost and a "visible" indication of progress as the organization improves.

DEMING

Deming does not define quality in a single phrase. He asserts that the quality of any product or service can only be defined by the customer. Quality is a relative term that will change in meaning depending on the customer's needs. To meet or exceed the customer's needs, managers must understand the importance of consumer research, statistical theory, statistical thinking, and the application of statistical methods to processes. Definitions extracted from his writings reflect this emphasis on quantitative methods, the application of which results in products having (1) a predictable degree of uniformity resulting from reduced variability, (2) lower cost, and (3) suitability

for the market (Lowe & Mazzeo, 1986). In *Out of the Crisis*, he is cautious in defining quality and characterizes the difficulty of achieving it. "The difficulty in defining quality is to translate future needs of the user into measurable characteristics, so that a product can be designed and turned out to give satisfaction at a price that the user will pay" (Deming, 1986, p. 169).

JURAN

Juran defines quality as "fitness for use." He stresses a balance between product *features* and products *free from deficiencies*. As used by Juran, the word "product" refers to the *output* of any process, and that includes goods as well as services (Juran & Gryna, 1988).

By features, he does not mean luxury items (e.g., power windows) but technological properties of a product (e.g., fuel consumption of a vehicle) designed to meet the customer's needs. Service organizations also possess features, such as promptness of delivery or courtesy extended.

The second element of Juran's definition of quality addresses products free from deficiencies (e.g., errors in invoices, factory scrap, late deliveries). According to Juran, these failures make trouble for the customers and, as a consequence, they become dissatisfied.

Juran's definition of quality reflects his strong orientation to meeting customer's expectations. Anyone affected by the product is considered a customer, according to Juran. This group includes those who deal with the product during its developmental stages, the *internal customers*, and those who deal with the finished product, the *external customers*.

BASIC PRINCIPLES

CROSBY

The foundation of Crosby's approach is prevention. His approach to quality is best described by the following concepts: (1) "Do It Right the First Time"; (2) "Zero Defects" and "Zero Defects Day"; (3) the "Four Absolutes of Quality"; (4) the "Prevention Process"; (5) the "Quality Vaccine"; and (6) the "Six C's."

"Do It Right the First Time"

Crosby's approach focuses on doing things right the first time and every time. There is no place in his philosophy for differing levels of quality or categories of quality (e.g., high/low, good/poor). He believes there should be no reason for planning and investing in strategies that are designed in case something does not conform to requirements and goes wrong. He stresses that the way to manage quality is by prevention, not detection and testing. To Crosby, any product that falls within its design specifications is a quality product (Garvin & March, 1986).

Crosby addresses the need to change management's perception of and attitudes about quality. He has found it

is a common attitude among managers to believe that error is inevitable, it is a normal part of business life, and one needs to cope with it. He believes management creates most of its problems through its attitudes and practices in terms of what is rewarded and supported in an organization. For example, if adherence to schedule is reinforced over quality, then schedule will become the focus of the work.

"Zero Defects" and "Zero Defects Day"

The ultimate goal of his quality improvement process is "Zero Defects" or "defect-free" products and services. Contrary to what is generally believed, "Zero Defects" is not just a motivational slogan, but an attitude and commitment to prevention. "Zero Defects" does not mean that the product has to be perfect. It does mean that every individual in the organization is committed to meet the requirement the first time, every time, and that not meeting the requirement is not acceptable. To get everyone involved in the process of quality improvement, Crosby stresses individual conformance to requirements. To Crosby, when people are asked to "do it right the first time," requirements are the "it" (Crosby, 1987).

His approach provides for the establishment of a "Zero Defects Day," a day that provides a forum for management to reaffirm its commitment to quality and allows employees to make the same commitment.

"Four Absolutes of Quality"

Quality improvement begins with what Crosby calls the four absolutes of quality management, considered by him to be the core concepts of the quality improvement process. The four absolutes are:

1. *Quality is conformance to the requirements:* All the actions necessary to run an organization, produce a product and or service, and deal with customers must be met and agreed. If management wants people to "do it right the first time," they must clearly communicate what "it" is and help them achieve it through leadership, training, and fostering a climate of cooperation.

2. *The system of quality is prevention:* The system that produces quality is prevention (i.e., eliminating errors before they occur). To Crosby, training, discipline, example, and leadership produce prevention. Management must consciously commit themselves to a prevention-oriented work environment.

3. *The performance standard is "Zero Defects" ("Do it right the first time"):* The attitude of "close enough" is not tolerated in Crosby's approach. Errors are too costly to ignore. Leaders must help others in their pursuit of conforming to requirements by allocating resources for training, providing time, tools, etc., to all employees.

4. *The measurement of quality is the price of nonconformance:* Nonconformance is a management tool for diagnosing an organization's effectiveness and efficiency.

These absolutes help management focus on quality improvement and, more importantly, help them make the shift from what Crosby calls conventional wisdom (the idea that if quality goes up, so does the cost) to the idea that quality and costs are not in competition with each other. According to Crosby, as quality increases, cost decreases--thus, quality doesn't cost. This reasoning led to Crosby's famous phrase, "Quality is free, but it is not a gift" (Crosby, 1979).

To implement his quality improvement process, Crosby delineates a 14-step approach consisting of activities that are the responsibility of top management, but also involve workers (Figure 1). The 14 steps represent Crosby's techniques for managing quality improvement and communicating the four absolutes.

Crosby's 14 Steps	
1. Management commitment	8. Quality education
2. The quality improvement team	9. "Zero Defects Day"
3. Quality measurement	10. Goal setting
4. The cost of quality	11. Error-cause removal
5. Quality awareness	12. Recognition
6. Corrective action	13. Quality councils
7. Zero defects planning	14. "Do it over again"

Figure 1. Crosby's 14 steps (Crosby, 1987).

“Prevention Process”

Crosby’s approach addresses prevention rather than inspection and correction of errors (Figure 2). He says that prevention involves thinking, planning, and analyzing processes to anticipate where errors could occur, and then taking action to keep them from occurring. To Crosby, problems usually arise because product or service requirements are either lacking or in error. His prevention process begins by establishing the product or service requirement, developing the product or service, gathering data, comparing the data to the requirement, and taking action on the result. Crosby suggests this is a continuing activity.

“Quality Vaccine”

Crosby sees problems as “bacteria of nonconformance” that must be “vaccinated” with “antibodies” to prevent problems (Crosby, 1984). He has formulated a “quality vaccine” that consists of three distinct management actions—*determination, education, and implementation*. Top management is responsible for continually administering the “vaccine.”

Determination surfaces when management sees the need to change and recognizes that change requires management action. *Education* is the process of providing all employees with the common language of quality, helping them to understand what their role is in the quality im-

provement process, as well as helping them to develop a knowledge base for preventing problems. The third action is *implementation*, which consists of the development of a plan, the assignment of resources, and the support of an environment consistent with a quality improvement philosophy. In this phase, management must lead by example and provide follow-up education.

“Six C’s”

To Crosby, education is a multi-stage process that every organization must go through, a process he calls the “Six C’s” (Crosby, 1984). The first stage, or “C,” is *comprehension*, which addresses the importance of understanding what is meant by quality. Comprehension must begin at the top and eventually include all employees. Without comprehension, quality improvement will not occur. The second “C” is *commitment*, which also must begin at the top and represents the stage when managers establish a quality policy. The third is *competence*; developing an education and training plan during this stage is critical to implementing the quality improvement process in a methodical way. The fourth “C” is *communication*; all efforts must be documented and success stories published so that complete understanding of quality by all people in the corporate culture is achieved. The fifth is *correction*, which focuses on prevention and performance. Finally, the sixth is *continuance*, which

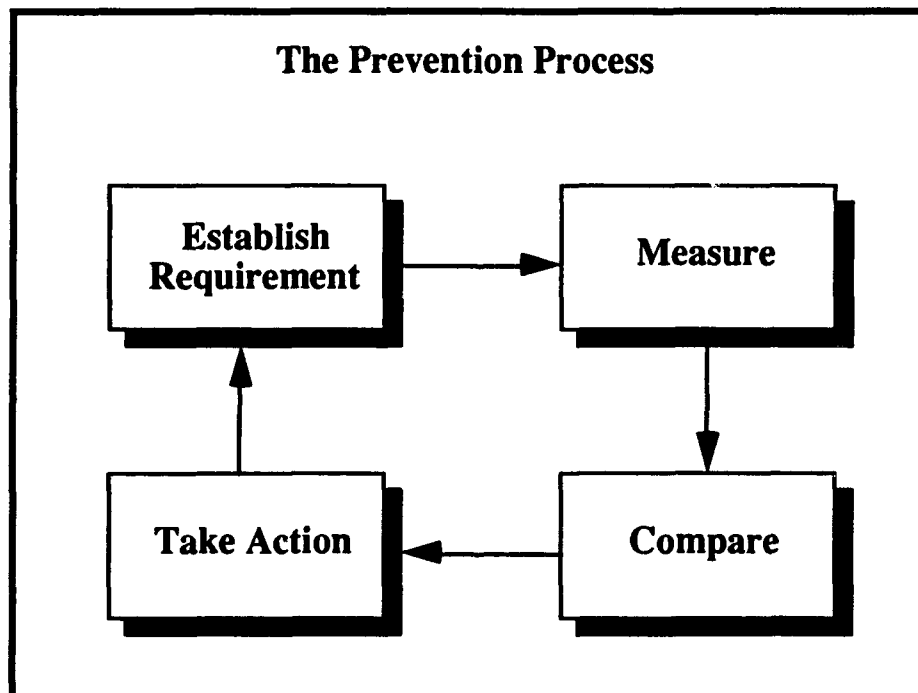


Figure 2. The prevention process (Crosby, 1987).

emphasizes that the process must become a way of life in the organization. Continuance is based on the fact that it is never cheaper or quicker to do anything right the second time, so quality must be integrated into all day-to-day operations (*Quality Process Improvement Management College* [course materials], 1987).

Summary

Crosby's main point is that quality is achieved by preventing defects and conforming to requirements. Requirements must be agreed upon and employees must know how to achieve them. The monetary cost of quality is the focus of measurement, and he developed a formula to help managers track this cost. This formula provides for continuously measuring the cost of waste versus the lower cost of doing things right the first time, which is his performance standard.

He urges activities (e.g., "Zero Defects Day") where management and employees reaffirm their commitment to quality. His training program focuses on helping managers develop an organizational culture that focuses on quality. The ultimate goal of his approach is to provide "defect-free" products and services to the customers.

DEMING

Deming takes a systems and leadership approach to quality. Concepts associated with his approach include (1) the "System of Profound Knowledge," (2) the "Plan-Do-Check-Act Cycle," (3) "Prevention by Process Improvement," (4) the "Chain Reaction for Quality Improvement," (5) "Common Cause and Special Cause Variation," (6) the "14 Points," and (7) the "Deadly" and "Dreadful Diseases."

"System of Profound Knowledge"

Understanding the concepts of profound knowledge is critical to understanding Deming's approach to quality. Deming states in his seminars that there is no substitute for knowledge. Hard work and best efforts are not the answer. Without profound knowledge, management action can cause ruination (Deming, 1989, revised 1991). The system of profound knowledge is made up of four interrelated parts: (1) theory of systems, (2) theory of variation, (3) theory of knowledge, and (4) knowledge of psychology.

Theory of Systems. "A system is a series of functions or activities... within an organization that work together for the aim of the organization" (Deming, 1989, revised 1991). He adds, "Without an aim, there is no system."

The components of a system (e.g., management style, employees, customers, environmental constraints, shareholders, training, recruitment) and its interrelationships to each other must be studied. Lack of appreciation of organizations as systems leads to fragmentation, people going in different directions unaware of the internal and external influences and interactions that affect their work.

Theory of Variation. Knowledge of statistical theory is essential to profound knowledge. Managers must be able to recognize a stable system and understand the concepts of special and common causes of variation. Failure to appreciate the difference will lead to frustration, increased variability, and higher costs (Deming, 1986). These adverse effects result from management taking action and responding to problems without knowing if the cause belongs to the system ("common") or if it is localized ("special"). Measurement of variation provides the means for predicting the behavior of a system.

Theory of Knowledge. The third part of profound knowledge addresses the way in which knowledge is advanced. The process of advancing knowledge can usually be described as a slow, continuous stream of tests and experiments, each designed to advance the state of knowledge in a particular field. Occasionally "break-throughs" occur that produce rapid advances in knowledge, but the general process is that of slow, incremental growth based upon experimentation, guided by theory.

Deming believes that managers should pursue goals similar to those of science (explain, predict, and control) to gain more knowledge about the systems and processes in their organizations. They will need to learn how to increase their knowledge of the processes for which they are responsible by participating in such "scientific" activities as formulating theories, developing hypotheses, designing and conducting experiments. They will need to know how to collect, analyze, interpret, and apply data derived from experimentation. A theory need not be complex, it may be as simple as stating (predicting) that one method of training may be more effective than another for learning certain skills.

Deming is critical of managers who look elsewhere for solutions (e.g., copying a remedy, adopting others' successful ideas). "An example is no help in management unless studied with the aid of theory. To copy an example of success, without understanding it with the aid of theory, may lead to disaster" (Deming, 1989, revised 1991). Theory advances knowledge and knowledge is obtained through use of the scientific method.

"To copy an example of success, without understanding it with the aid of theory, may lead to disaster."

A common "false start" encountered by organizations beginning to focus on quality is their failure to understand the importance of learning the theory of quality management. No two organizations are alike, each has different requirements and may require tailored applications of the theory.

Knowledge of Psychology. The fourth part of profound knowledge involves psychology, in particular the dynamics of people in the workplace, group or team performance, learning styles, and cultural change. Management needs to have knowledge of people and how they interact, of their individual needs, and of their working and learning styles. People are different from one another, and it is management's responsibility to be aware of those differences and use them to optimize performance.

The "Plan-Do-Check-Act Cycle"

Deming emphasizes continuous improvement and believes that it is management's obligation to constantly and forever improve the system of production and service. The concept of ongoing improvement is illustrated by the Shewhart cycle or the Plan-Do-Check-Act (PDCA) cycle (Figure 3).¹

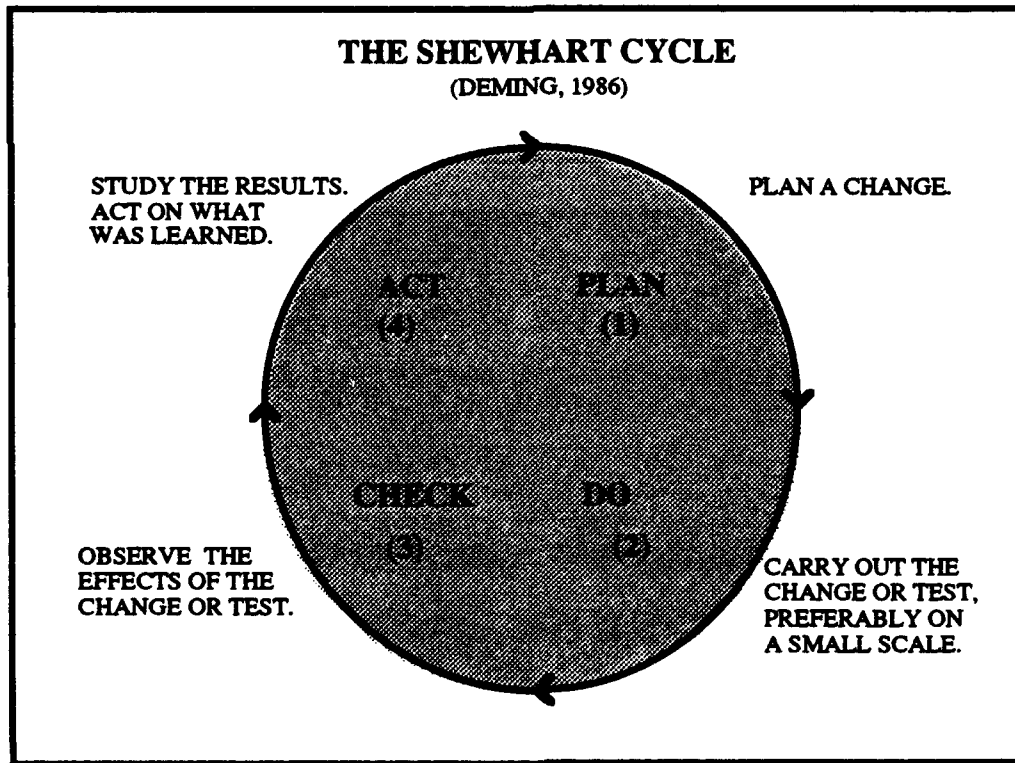


Figure 3. The Shewhart cycle as described by Deming (1986).

¹ Also known by the Japanese as the Deming cycle because it was Deming who first introduced it to the Japanese in the 1950s (Ishikawa & Lu, 1985). For an interpretation of the PDCA cycle, refer to Houston, A., & Dockstader, S. L. (December 1988). *A total quality management process improvement model* (NPRDC Tech. Rep. 89-3). San Diego, CA: Navy Personnel Research and Development Center.

“Prevention by Process Improvement”

Deming stresses that inspection at the end of the process is too late and too costly. His approach is a shift from detection to prevention (Figure 4). To Deming, the prevention approach to quality is achieved by process analysis, control, and improvement. A process is defined as any set of conditions, or set of causes, that work together to produce a given result. It is usually a blending of machines, methods, materials, and people (Figure 4).

Measurement is used to monitor processes and take action to minimize the possibility of producing unacceptable products or services to the customer.

Note that the size of the “process” box has been enlarged in the prevention approach and contains “causes” for a product or service. The diagram is presented this way to emphasize the point that quality results from studying and changing the process, not inspecting the final product.

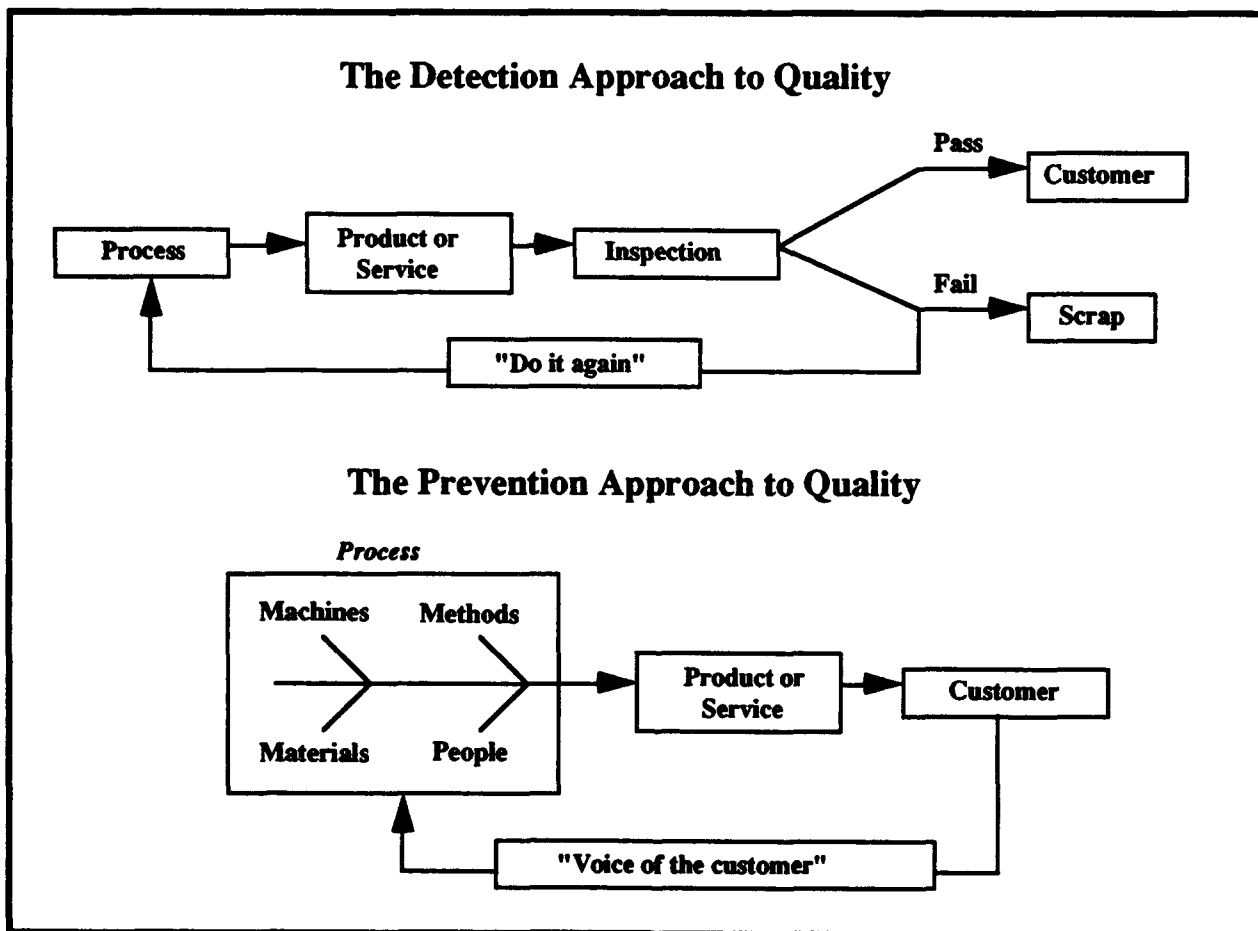


Figure 4. The detection versus the prevention approach to quality (Navy Personnel Research and Development Center, TQL Implementation Seminar [course materials], 1988).

“Chain Reaction for Quality Improvement”

Deming’s philosophy can best be depicted by what he calls the chain reaction for quality improvement (Figure 5) (Deming, 1986, p. 3). By improving quality, costs decrease and productivity improves. As a result, there is a greater potential for an increased market share.

To address the first box in the chain reaction (improve quality), management must adopt the 14 principles of management (Figure 6) and understand the statistical approach to process improvement. To appreciate fully the meaning of improving quality in Deming’s chain reaction, an understanding of the concept of variation is required.

“Common Cause and Special Cause Variation”

When Deming describes quality, he talks about products that possess a predictable degree of “uniformity,” suited to the end-users at a price that they can pay (Deming, 1986, p. 178). McConnell refers to it as “a predictable degree of variation” (McConnell, 1987). Deming says that there’s no such thing as two of a kind, since variation is inherent in everything we do. No two services offered are identical. So, to produce quality, you must produce outcomes that are predictably uniform as well as satisfactory from a customer’s perception.

Deming has labeled sources of variation as *common cause* and *special cause*. He talks about them in terms of *who* is responsible for taking action. Common causes of variation exist because of the system or the way the system is managed. These causes are beyond the reach of the

workers and only those who manage or control the system are responsible for them. Most process problems in an organization, *the common causes of variation*, are correctable only through managerial action. Examples of common cause variation are incoming materials not suited to the requirements, poor instructions, poor supervision, and poor design (Deming, 1986).

There are also *special causes of variation*. Special causes of variation are localized. They are not part of the overall system. They are exceptions or abnormalities. They deserve attention by those who are close to them. Usually the workers or their immediate supervisor can identify and remove special causes.

Tribus says, “It is management’s responsibility to work *on* the system and it is the worker’s responsibility to work *in* the system” (1988). Supervisors and workers must cooperate with each other to remove the special causes so that management can work on the system and begin the transformation (the adoption of the 14 points). This transformation is not easy. As Deming says, “Everyone doing his best is not the answer. It is necessary that people know what to do.” He adds, “The responsibility for change rests on management. The first step is to learn how to change” (Deming, 1982, p. ii).

The best way to identify and monitor special and common causes of variation is by using Walter Shewhart’s control charts (McConnell, 1987). (Shewhart’s discoveries and contributions are far beyond the scope of this report. Suggested readings on control charts appear in the reference list.)

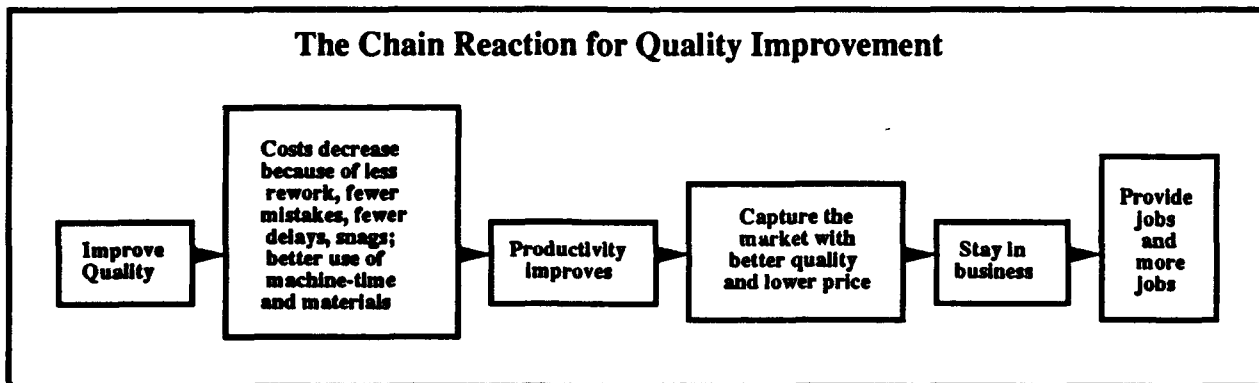


Figure 5. Deming’s chain reaction for quality improvement (Deming, 1986).

“14 Points”

According to Deming, the “14 Points” or “obligations” (Figure 6) apply anywhere, in any organization, regardless of size or type of business. These points provide the basis for initiating and sustaining an organizational transformation that focuses on customer satisfaction through quality. These obligations are management’s responsibility and they cannot be delegated. Deming says, “Adoption and action on the 14 points are a signal that the management intend to stay in business and aim to protect investors and jobs” (Deming, 1986, p. 23). To adopt the 14 points, management needs to put aside short-term thinking for the long-term good of the company so that they can be in business tomorrow.

The 14 points have undergone revision by Deming to help people understand his observations. However, the essence of each point has remained essentially the same from one version to the next.

“Deadly” and “Dreadful Diseases”

There are many roadblocks to institutionalizing the transformation. Deming categorizes them as “deadly diseases” and “dreadful diseases” (Figure 7). “Deadly diseases” afflict most companies in the Western World.

The cure for deadly diseases is not easy. It requires a complete change of management style. The dreadful diseases are management practices that are harmful, but, in Deming’s view, are easier to cure. To remedy the diseases, Deming “prescribes” his 14 points or obligations of top management.

Summary

Deming defines quality in terms of current and future needs of the customer. He places emphasis on statistical thinking and statistical methods. An understanding of profound knowledge (e.g., systems theory) is essential to his approach to quality.

He gives management the responsibility of adopting the 14 points and of leading by example, but does not provide a step-by-step approach on how to implement these roles and responsibilities.

He views the organization as a system and advocates using a scientific method to optimize the system.

Deming's 14 Points

1. Create constancy of purpose toward improvement of product and service.
2. Adopt the new philosophy.
3. Cease dependence on inspection to achieve quality.
4. End the practice of awarding business on the basis of price tag alone.
5. Improve constantly and forever the system of production and service.
6. Institute training on the job.
7. Institute leadership.
8. Drive out fear.
9. Break down barriers between departments.
10. Eliminate slogans, exhortations, and targets for the work force.
11. Eliminate numerical quotas for the work force and numerical goals for management.
12. Remove barriers that rob people of pride of workmanship. Eliminate the annual rating or merit system.
13. Institute a vigorous program of education and self-improvement.
14. Put everybody in the company to work to accomplish the transformation.

Figure 6. Deming’s 14 Points (Deming, 1986).

The Deadly Diseases

1. Lack of constancy of purpose.
2. Emphasis on short-term profits, short-term thinking.
3. Evaluation of performance, merit rating, or annual review.
4. Mobility of management; job hopping.
5. Management by use of visible figures only.
6. Excessive medical costs.
7. Excessive costs of liability.

The Dreadful Diseases or Obstacles

1. Search for examples of how to solve problems of quality.
2. Creative accounting.
3. Purchasing standards that assume a certain percentage of defects.
4. Management's delegation of its responsibilities to others.
5. The supposition that problems are the fault of the work force.
6. The attempt to safeguard quality by inspecting goods already produced.
7. False starts: modest, ad hoc efforts to bring about change.
8. Hope for instant pudding.
9. The supposition that automation will transform industry.
10. The supposition that it is only necessary to meet specifications.

Figure 7. The "deadly" and "dreadful diseases" (Deming, 1986, Chapter 3).

JURAN

Juran proposes a strategic and structured (i.e., project-by-project) approach to achieving quality. Concepts he developed to support his philosophy include (1) the "Spiral of Progress in Quality," (2) the "Breakthrough Sequence," (3) the "Project-by-Project Approach," (4) the "Juran Trilogy," and (5) the principle of the "Vital Few and Trivial Many."

The "Spiral of Progress in Quality"

Juran stresses that "any organization produces and distributes its products through a series of specialized activities carried out by specialized departments." These activities (actions) are depicted by the "spiral of progress in quality" (Juran and Gryna, 1988, p. 2.4). The spiral shows actions necessary before a product or service can be introduced to the market (Figure 8).

"Each specialized department in the spiral [e.g., customer service, marketing, purchasing] is given the responsibility to carry out its assigned special function. In addition, each specialized department is also assigned a share of the responsibility of carrying out certain com-

pany-wide functions such as human relations, finance, and quality" (Juran & Gryna, 1988, p. 2.4). Quality results from the interrelationship of all departments within the spiral. Juran talks about "quality function" to describe activities through which the departments around the spiral can attain quality.

Quality improvement projects are carried out throughout the organization. The approach includes:

1. Identifying the activities that could meet the company's goals of fitness for use.
2. Assigning the activities to the various departments and organizations around the spiral.
3. Providing the facilities and tools needed to conduct these activities.
4. Conducting the assigned activities within the designated departments.
5. Ensuring that these activities are properly carried out.
6. Coordinating the departmental activities.

“Breakthrough Sequence”

Juran’s philosophy addresses improvement and innovation in terms of “breakthrough.” He defines breakthrough as a “dynamic, decisive movement to new, higher levels of performance” (Juran, 1964). His breakthrough sequence involves activities that, if carried out properly, will result in improvements in quality and will eventually result in unprecedented performance that will help the organization launch innovative products. Breakthroughs can lead to: (1) attainment of quality leadership, (2) solution to an excessive number of field problems, and (3) improvement of the organization’s public image.

There are barriers that affect opportunities for breakthrough. As with any other change, breakthrough can be resisted by managers who traditionally concentrate on control. Through control, managers maintain the present levels of performance or prevent adverse change. Control activities, such as problem solving, have a short-term focus; they are necessary to hold on to gains, but will not lead to improvement and innovation. Breakthrough activities are needed to achieve higher levels of performance and innovation and to exceed customer satisfaction.

According to Juran, breakthrough and control are part of a continuing cycle of gains and plateaus in performance, and he considers that all managerial activity is directed at either breakthrough or control (Juran, 1964). According to Juran, all breakthroughs follow the same sequence:

1. Policy making.
2. Setting objectives for breakthrough.
3. Breakthrough in attitudes.
4. Use of Pareto principle.
5. Organizing for breakthrough in knowledge.
6. Creation of steering arm.
7. Creation of diagnostic arm.
8. Diagnosis.
9. Breakthrough in cultural pattern.
10. Transition to the new level.

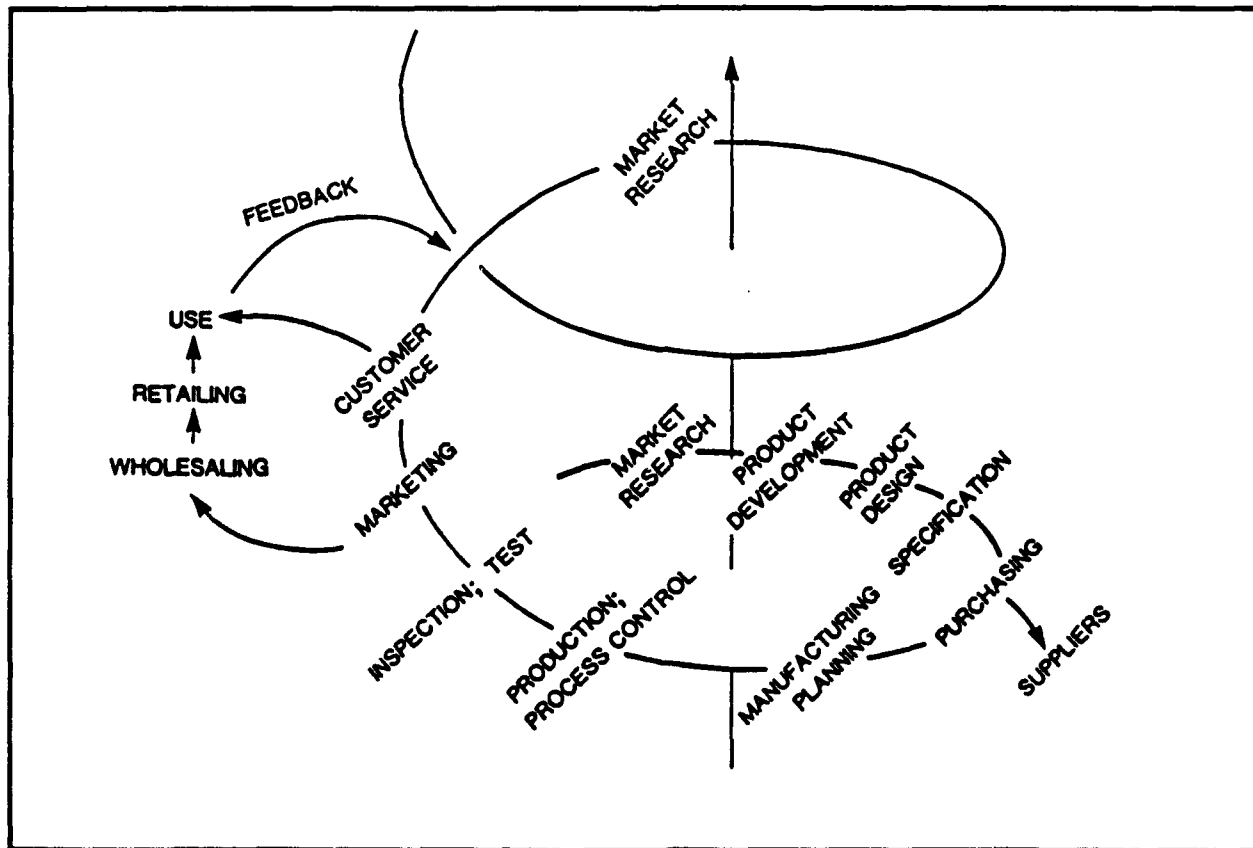


Figure 8. The “spiral of progress in quality” (Juran & Gryna, 1988).

“Project-by-Project Approach”

The quality improvement methodology, as depicted by Juran, requires project-by-project implementation. Two kinds of teams are formed, the *steering arm* and the *diagnostic arm*, to work on analyzing problems (Figure 9). A committee of managers is formed to solicit project nominations from all employees, to select that year’s projects, and to appoint teams to address each one. Typically, large numbers of project teams must be formed, depending on how many projects have been selected. His approach requires that members of the team develop skills in team leadership and team participation and acquire knowledge of problem-solving tools. Also, all employees need to participate in the improvement process and have the skills needed to make improvements.

The main thrust of these teams is to solve problems, but Juran distinguishes between “putting patches” on problems and finding and removing the causes of problems. He calls the process of analyzing problems the

“journey from symptom to cause.” Examination of the symptom must be the starting point of the action team. The symptom is the evidence that something is wrong. Once the symptom has been identified, the objective of the team is to come up with a solution. However, the members will first need to discover the cause.

Juran developed two “journeys” to describe how the teams interact with each other in this process--the journey from symptom to cause, which he named the *diagnostic journey*, and the journey from cause to remedy, called the *remedial journey* (Juran & Gryna, 1988). Both journeys are different in purpose and require teams of people from different levels and departments (e.g., first-line supervisors, customer service) within the organization with different skills.

The teams’ outcomes are documented and presented to the rest of the organization in an annual audit. The process of soliciting nominations for next year’s projects is then repeated.

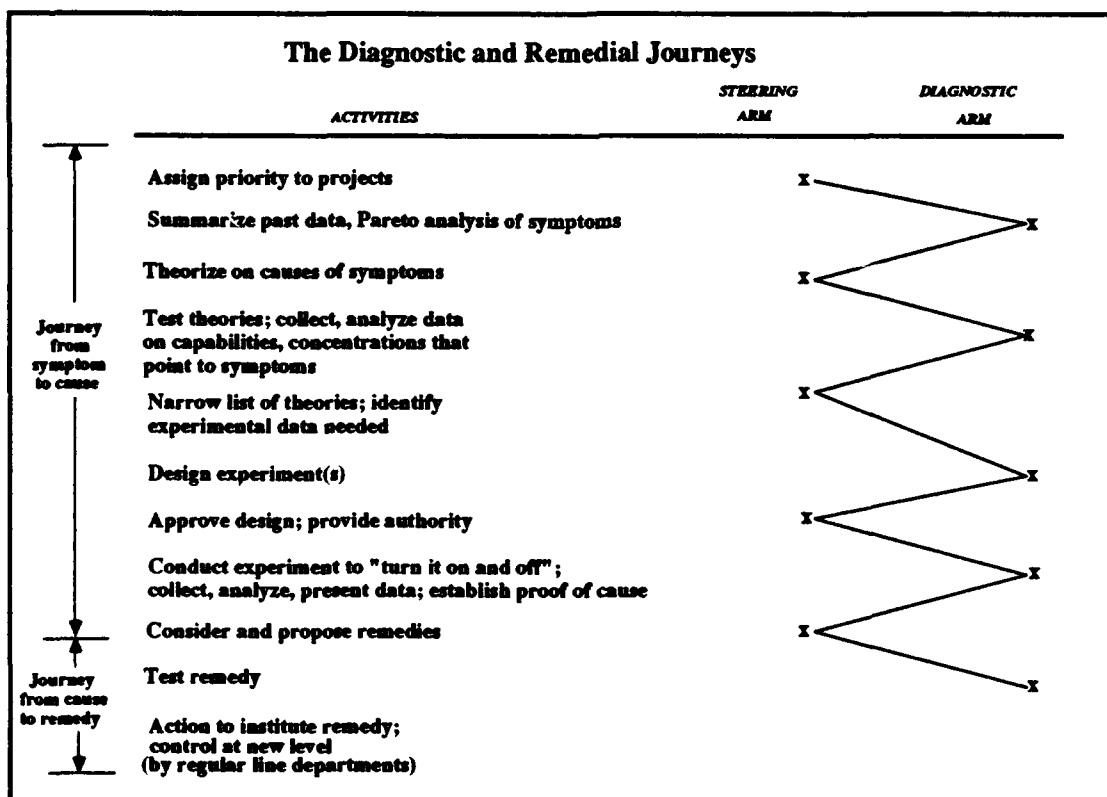


Figure 9. The diagnostic and remedial journeys (Juran, 1988).

The "Juran Trilogy"

The "Juran trilogy" provides a systematic approach to carrying out Juran's methodology for managing for quality. Essential to implementation, however, is active leadership, starting at the top.

This trilogy (Figure 10) states that management for quality consists of three interrelated quality-oriented processes -- quality planning, quality control, and quality improvement (Juran, 1986). *Quality planning* involves developing a process that will achieve the established goals. People working in the planning phase are responsible for determining who their customers are and identifying customer needs and expectations. *Quality control* is concerned with holding onto gains and not letting waste increase. The control process addresses the sporadic spikes in variation; if necessary, the people working in this process create teams to determine the causes of any abnormal variation in the process. Those involved in the *quality improvement* process are concerned with lowering

the cost of poor quality in existing processes, but, more importantly, are responsible for using the lessons learned for seeking innovative ways to achieve better levels of performance. In this respect, Juran's approach addresses continuous improvement.

Each process in the trilogy (planning, control, and improvement) is "universal" (inherent in organizations focusing on quality). Relevant activities include identifying customers, establishing measurements, and diagnosing causes. Juran compares the activities of the trilogy with those of financial operations. Money is the language of management and, in his terms, quality planning is analogous to budgeting, quality control to cost control, and quality improvement to cost reduction.

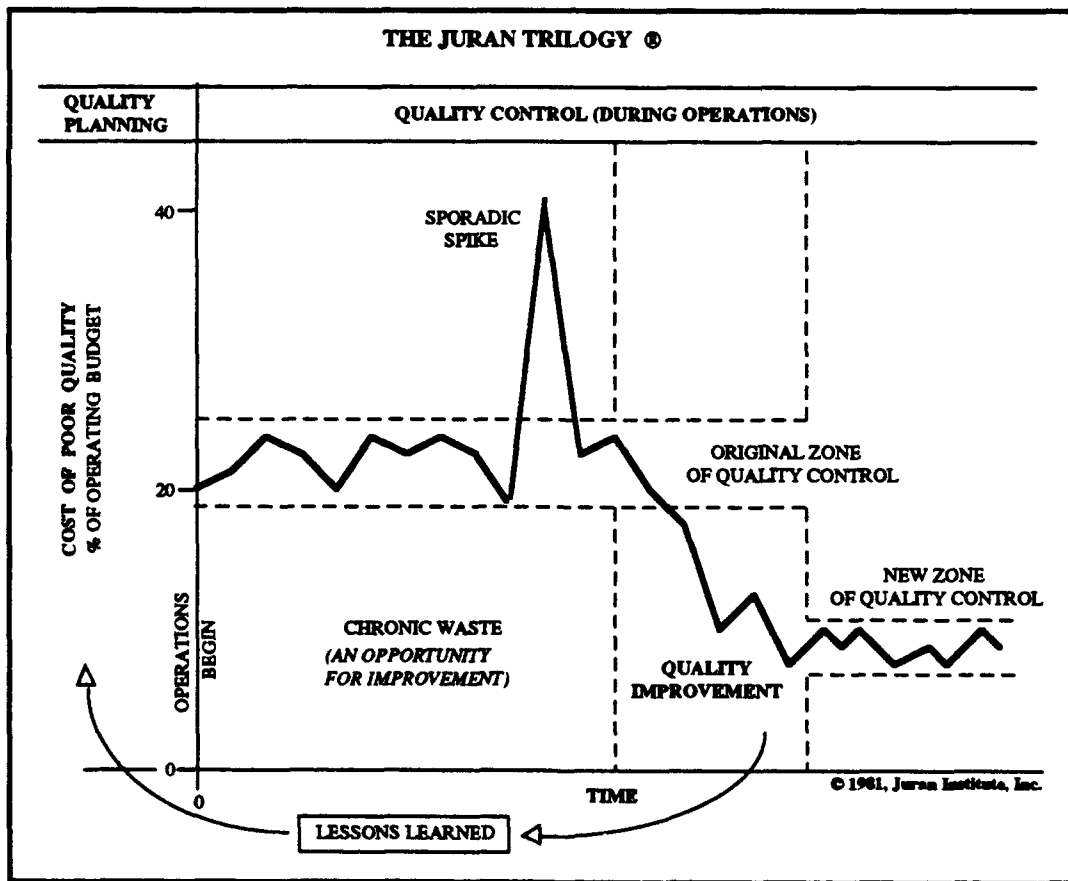


Figure 10. The "Juran trilogy" (Juran, 1981).

The "Vital Few and the Trivial Many"

Because Juran emphasizes prioritization of problems to be solved, the Pareto diagram is an especially useful tool to him. The diagram is based upon the principle developed in 1897 by the Italian economist Vilfredo Pareto. Pareto conducted studies of wealth distribution. He found that the vast majority of wealth in his society was held by a remarkably small percentage of the population. In general, the Pareto principle states that a few factors account for the largest percentage of a total.

Juran applied this concept to the industrial world to classify problems of quality (Figure 11). According to Juran, most of the cost of poor quality can be attributed to a very small number of causes called "the vital few." The other defects, called the "trivial many" and, lately, the "useful many," can be ignored for a time.

The Pareto diagram depicts columns arranged in descending order. The diagram in Figure 11 illustrates causes from many sources of variation. According to this graph, one should concentrate on cause "A" first because it is responsible for most of the defects and will result in the biggest payoff (Ishikawa, 1982). It should be noted, however, that frequency should not be the only characteristic to consider when beginning a Pareto analysis. Sometimes frequently occurring defects are not the most serious, and common sense needs to prevail in those situations when selecting initial causes for improvement.

Summary

The "project-by-project" approach is at the heart of Juran's philosophy. Using the concepts of the "spiral of progress" and the "breakthrough sequence," managers are able to target and improve specific areas.

Quality is defined by fitness for use and customer requirements. As with Crosby, the monetary cost of quality is the focus of measurement. He puts emphasis on company-wide goals and the deployment of specific goals. Juran targets training toward quality management practices and problem-solving techniques. His approach focuses on quality planning, quality control, and quality improvement processes as a way to manage for quality.

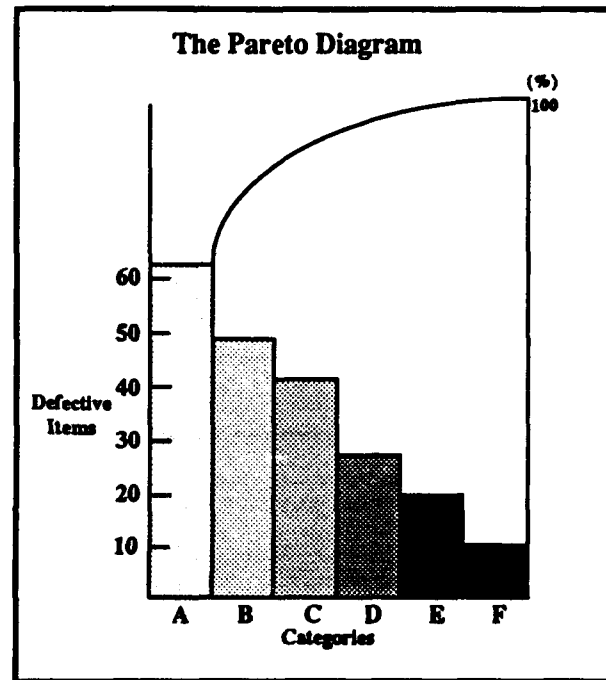


Figure 11. The Pareto diagram.

THE THREE APPROACHES: SIMILARITIES

Crosby, Deming, and Juran agree that it is management's responsibility to establish an organizational culture in which commitment to quality is the main focus. The mission of the organization must be clear to everyone, and every management action must lead to fulfillment of that mission. This culture should be characterized by commitment from the top of the organization. They agree that continuous education and training at all levels is necessary to foster a common language of quality and to develop employee skills and knowledge. Effective communication, cooperation, and teamwork throughout the organization are essential.

These experts agree that more than 85 percent of all problems associated with quality can be attributed to management policy or action. This means that management action is required to achieve improvements.

They also agree that the pursuit of customer-focused quality is a long-term process that will not produce results overnight. The improvements will be evident over time in terms of reduced costs, but, more importantly, organizations will eventually be able to anticipate and prevent problems.

They do not view improvements in terms of final products and agree that current inspection methods to achieve quality are not effective in producing a quality product at an affordable price. They say that there are some processes where inspection will always be required (e.g., for reasons of safety such as flying an airplane after conducting an overhaul), but that it is important to eliminate inspection as a means to achieving quality. They agree that cost and quality are not in competition with one another.

The three experts distinguish clearly between internal and external customers, and all support the practice of involving the suppliers in the quality effort. It is impossible to achieve quality when products or services provided by suppliers are inferior. These approaches also require the use of measurement and problem-solving techniques, but the emphasis on their use varies.

The approaches of Crosby, Deming, and Juran do not represent "programs" in the usual sense of the word; they

The approaches of Crosby, Deming, and Juran do not represent "programs" in the usual sense of the word; they do not have starting and ending dates.

do not have starting and ending dates. These are management philosophies aimed at long-term improvements through adoption of strategic planning for quality.

These three philosophies have been implemented over the years in various organizations in different countries. As philosophies they go beyond the economic concerns of an organization and address an organization's employees as well. They give high priority to pride in workmanship, education, and the work environment as well as to team building, teamwork, cooperation, and participation, all essential to cultural change. Figure 12 summarizes these similarities in list form.

Similarities

- Top management support and commitment are essential.
- Education and training must be continuous.
- Measurement is critical.
- Improvements are not viewed in terms of final products.
- Most problems associated with quality can be attributed to management policy or action.
- Implementation is applicable to any organization.
- Post-production inspection needs to be minimized.
- Effective communication and teamwork at all levels are essential.
- Managers need to provide workers with the means to do a good job.
- There are no shortcuts to quality.
- Suppliers must be involved in the quality effort.
- The pursuit of quality must be a continuous effort.

Figure 12. Similarities between the approaches of Crosby, Deming, and Juran.

THE THREE APPROACHES: DIFFERENCES

There are a number of differences between the three approaches. Differences affecting use of measurement, goal setting, supplier relationships, and leadership activities are discussed here.

USE OF MEASUREMENT

Crosby, Deming, and Juran recognize measurement as important to quality improvement efforts, but they use it in different ways. Both Crosby and Juran view the cost of quality as the focus of measurement. Cost is measurable in terms of dollars, and, for them, money is the language of management. Success of quality efforts is ultimately measured by meeting customer requirements, but Crosby and Juran use the reduction in cost as an indicator of the effectiveness and efficiency of the process used to meet customer requirements. Juran considers that the cost of poor quality is a key factor because it represents how much the organization is losing and how much it is spending on scrap and rework. Nevertheless, he acknowledges the fact that there are other equally important factors to measure, such as how the organization compares with the competition and how customers perceive quality. Deming does not use the cost of quality as a focus of measurement. He considers that the "unknown" costs, such as the impact of the loss of a customer, are far more important than "visible" ones. To Deming, measuring and

meeting customer needs and "expectations" about a product or service are paramount to implementing quality improvements.

Deming gives greater emphasis than do his counterparts to quantitative methods and statistical methods as a means of analyzing and improving the production process. He uses measurements of process variation to determine whether processes are stable and capable.

GOAL SETTING

To Crosby, the ultimate goal should be "defect-free" products and services, but he stresses that intermediate goals should be set as well to help organizations focus their efforts on becoming "defect-free." To him, a quality product or service results when the process has consistently produced something that falls within specification limits. Deming, on the other hand, considers that being within specifications is just the first step to continuous process improvement (Figure 13). He advocates reducing process variation on a continuing basis to improve quality. Conforming to specifications is not enough, he says; worse, yet, it ensures the status quo.

Figure 14 summarizes all of the important differences between the approaches of Crosby, Deming, and Juran.

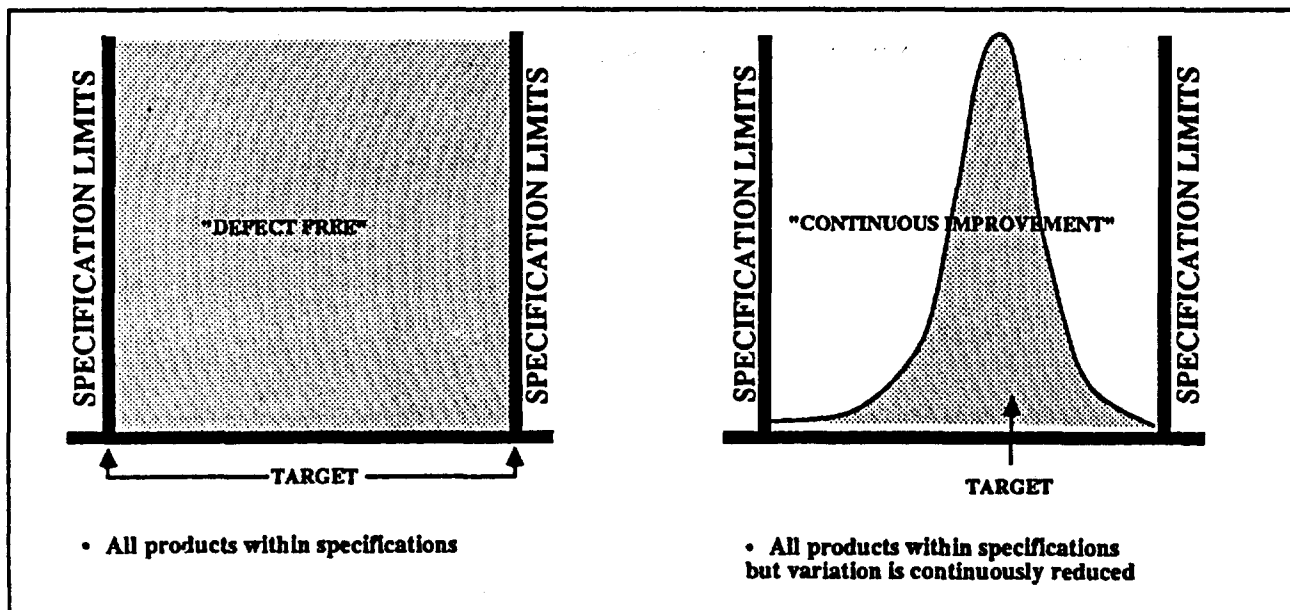


Figure 13. Differences between the "defect-free" and continuous improvement approaches to quality.

DEFINITION OF QUALITY	CROSBY	DEMING	JURAN
Defined by conformance to requirements.	X		
Defined by fitness for use and customer requirements.			X
Defined by the current and future needs of the customer.		X	

USE OF MEASUREMENT	CROSBY	DEMING	JURAN
Views the monetary cost of quality as the focus of measurement.	X		X
Places emphasis on statistical thinking and statistical methods.		X	X

GOAL SETTING	CROSBY	DEMING	JURAN
"Defect-free" products and services are the ultimate goal. Stresses individual conformance to requirements.	X		
Puts emphasis on company-wide goals and the deployment of goals.			X
Opposes the use of goals and quotas to manage work.		X	

SUPPLIER RELATIONSHIPS	CROSBY	DEMING	JURAN
Favors the practice of reducing the number of suppliers.	X		X
Favors the practice of using a single supplier when possible.		X	

LEADERSHIP ACTIVITIES	CROSBY	DEMING	JURAN
Urges the creation of an activity where management and employees reaffirm their commitment to quality.	X		X
Defines leadership roles and responsibilities but does not provide a "cookbook" approach to implementation.		X	

TRAINING	CROSBY	DEMING	JURAN
Targets training to help managers develop a new organizational culture.	X		
Targets training toward quality management practices and problem-solving techniques.			X
Targets training towards leadership practices. Addresses the need for education and training for enhancing knowledge and developing skills.		X	

QUALITY IMPROVEMENT	CROSBY	DEMING	JURAN
Emphasizes prevention to meet specifications.	X		
Uses three quality-oriented processes (planning, control, and improvement) to achieve improvements.			X
Views the organization as a system and applies the scientific method to optimize the system. Uses statistical methods to monitor variation.		X	

Figure 14. Differences between the approaches of Crosby, Deming, and Juran.

Deming also opposes the use of numerical goals and quotas to manage work. He thinks that individual goals are necessary to help people in their personal and professional lives, but numerical goals imposed from top management can have negative effects on both quality of products and individual and team morale--a certainty if there is no plan to achieve the goals or tools by which to reach them.

Juran sees a need for written objectives for employees, with a plan for reaching them. He addresses quality-related goals and company-wide objectives, but more important to him is the deployment of goals throughout the organization. Strategic goals need to be deployed to all divisions and sections of the organization, and more specific goals need to be deployed to people so that they know what to do.

SUPPLIER RELATIONSHIPS

The three advocates view the role of suppliers differently. Deming favors the practice of working with a single supplier, where feasible, to reduce variability of incoming materials, and states that this practice should be built on a long-term relationship of trust and understanding between supplier and purchaser. In this way, suppliers can produce materials that do a better job of fulfilling the needs of the organization. To maintain long-term contracts, suppliers will be more likely to improve their own processes to provide better products or services.

Crosby and Juran recognize some of the advantages of single suppliers, but they take a more conservative view and simply advocate reducing the number of suppliers. Crosby and Juran consider it important to have different suppliers for the same product when the product is a critical one. That way, the organization will not suffer because of strikes, accidents, or other problems beset by suppliers. Deming recognizes the possibilities of strikes, but admits that customers can receive products and services from alternative suppliers in such cases (Walton, 1986).

LEADERSHIP COMMITMENT

Although Crosby, Deming, and Juran acknowledge and agree that top management support, involvement, and commitment are essential for carrying out any quality-focused efforts, each emphasizes leader participation differently.

Crosby describes the "Zero Defects Day" as the time when management reaffirms its commitment to quality and communicates it to all employees. Similarly, Juran has a vehicle for involving top management. Juran's annual quality program is used by managers to communicate to all employees management's commitment to quality improvement. Managers' decisions and actions must be oriented to establishing a quality council, deploying goals, providing resources, and serving on quality councils and quality improvement teams.

Crosby describes the "Zero Defects Day" as the time when management reaffirms its commitment to quality and communicates it to all employees.

Although Deming acknowledges that top management commitment is imperative, he does not describe a program for accomplishing it. What works in one organization might not work in another. He affirms the need for management's commitment, but it is the responsibility of top management to show its commitment through leadership. Deming is specific, however, about the leaders' roles and responsibilities. As described by Deming, the aim of leadership is not to point fingers at individuals or to keep records of failures. To him, the leader's new job is to remove barriers and create a culture that values helping others to do a better job and to feel pride in workmanship (Deming, 1986). Leaders must lead by example, not by cheerleading. They must be coaches who help to improve the system of which they and their employees are a part.

SUMMARY

CROSBY

One of Crosby's strengths is his emphasis on transforming the culture of the organization. He provides a structured roadmap for attaining management commitment. He advocates individual commitment to quality at each level of the organization. Crosby provides education on the concepts of quality management, but realizes that

each organization must create its own quality improvement process plan. His approach is effective in transmitting the need to change attitudes and behaviors and has been successful in getting organizations started--one reason why Crosby appeals to many managers. Second, Crosby has a structured training program for managers that is taught at the Quality College. Many managers

generally find this approach easy to subscribe to and therefore choose to begin quality improvement using Crosby's approach. His approach emphasizes measuring the cost of doing things wrong versus the cost of doing things right the first time and does not emphasize a statistical basis for reduction of variation. As a result, organizations that do not focus on statistical methods may not be able to achieve improvements beyond initial cost reductions.

According to Andrea Gabor, author of *The Man Who Discovered Quality*, "Until recently (1990), Crosby downplayed the role of statistics. After Deming's popularity gave new credence to the importance of variation control in the late 1980s, Crosby is said to have begun teaching more of the subject at his seminars (Gabor, 1990, pp. 196-197)." In fact, Crosby founded Integrity Systems, Inc., a subsidiary of PCA, to provide clients with training packages in statistical process control.

Crosby advocates programs such as "Zero Defects Day," which has been widely misunderstood and viewed by some critics as merely a motivational program with only short-term benefits. Again, "Zero Defects Day" is intended to be a time when management reaffirms its commitment to quality.

DEMING

One of the main strengths of the Deming's philosophy is his view of organizations as systems and the use of statistical thinking to understand how systems function. The application of the PDCA cycle and quantitative methods to analysis and reduction of variation in all work processes is another important contribution, as is the distinction he makes between special and common causes of variation.

Most importantly, however, Deming stresses that management and leadership issues need to be addressed to create quality in products and services. The history of quality efforts in this country has taught us that to effect major changes in business, it is imperative to create an organizational culture dedicated to quality. This can only be achieved through changing the attitudes of top leadership. Deming's approach emphasizes leadership responsibilities, and he provides leaders with the 14 Points.

Although Deming stresses the adoption of his 14 management principles as the roadmap for change, he does not provide a sequenced implementation plan. Such a plan makes little sense in terms of his theory, but most managers are not taught to use theory. Consequently, they

are frustrated when they do not find a prescribed "linear sequence" of activities that can serve as a "cookbook" to success.

Deming's approach is associated with the application of SPC. He says that a knowledge of statistics is necessary, but not sufficient. The use of statistics is just one aspect of his broad management philosophy. Nevertheless, there are some who believe that by applying SPC they are implementing the Deming philosophy.

Finally, the application of the PDCA cycle is seen by many as a problem-solving tool instead of a means to *continuous* process improvement. Typically, any problem in understanding the power of the PDCA cycle can be tracked back to a lack of understanding about this essential difference. As described by Deming, problem solving is similar to "putting out a fire," that is, removing problems to put the process right back where it was, but that such action does not make the process better (an insight of Juran years ago; see Deming, 1986, p. 51).

JURAN

Juran has developed an approach in which problems are thought of as projects, and all improvements can be made project by project. Juran advocates the annual formation of teams to analyze problems and find solutions to them. His approach has been successful in organizations in which upper management has been heavily involved and has led the effort. Like Deming, he also emphasizes the use of graphics and statistical methods. Juran has devoted more than 300 pages in his *Quality Control Handbook* (1988) to statistical methods, and he views them as essential tools.

Juran's project-by-project approach is effective since it helps to focus improvement on specific areas. This approach can provide short-term results within the framework of a long-term strategy. This approach also builds teamwork and communication in the organization. Although emphasis is on projects, Juran ultimately provides a systems approach to quality through the spiral of progress, which links all of the functions necessary to launch a product or service.

One of the processes addressed by the "Juran trilogy" concerns problem solving and removal of problem causes. If managers give emphasis to this aspect of the trilogy, project teams then become firefighters instead of teams working toward prevention and process improvement. When upper management doesn't focus on the planning process of the trilogy, they are not able to prevent new

problems from occurring and are not able to initiate continuous improvement and strategically direct the course of the organization.

The setting of broad improvement goals by management could lead the organization to fall back into the

practice of managing by objectives. The "trilogy" approach is only as good as the managers who are trying to optimize the system (e.g., selecting the projects, priorities, and goals).

CONCLUSIONS

Managers involved in helping their organizations improve quality are frequently puzzled over which approach to use. Some organizations adopt an eclectic approach using components of the three philosophies and combining what they consider to be the best from the best. Other organizations select either the Crosby, Deming, or Juran approach and remain loyal to it; all their education, training, and implementation efforts reflect support for that one approach. There are organizations that switch in midstream (e.g., begin with Crosby, move to Juran, and then move to Deming). These organizations expect dramatic improvements in a short period of time and their obsession with immediate results forces them to try different approaches on a trial-and-error basis, without thought to a long-term strategy.

The key to successful implementation of quality principles and methods is tied to leadership. In fact, lack of management and leadership commitment is considered by Crosby to be the number one cause of quality improvement failure. According to Juran, every successful quality revolution has included the active participation of upper management. There are no exceptions. Deming agrees.

He says the transformation is top management's job and it cannot be delegated.

The key to successful implementation of quality principles and methods is tied to leadership.

Quality is not a quick fix to address management problems. It is not a program, but a transformation. As part of this effort, top managers must recognize the need for assessment, strategic planning, and the development of a long-term, integrated organization-wide approach. Leadership is needed to establish policies defining the positions the organization will take in regard to quality. Leadership is also needed to cultivate a customer orientation and provide all employees with ongoing education and training. These arguments notwithstanding, success or failure will rest upon the correct assessment of how to achieve customer-defined quality criteria and the kind of leadership required to get the organization mobilized in the most cost-acceptable way.

QUALITY IN THE DEPARTMENT OF THE NAVY

The Department of the Navy (DON) approach to quality improvement is called Total Quality Leadership, or TQL. TQL has been defined as the application of quantitative methods and people to assess and improve:

- materials and services supplied to the organization,
- all significant processes within the organization,
- meeting the needs of the end user, now and in the future.

TQL was developed by the Department of the Navy for the Department of the Navy. DON leaders examined various approaches and concluded from their studies that Deming's philosophy and methods best suited the unique requirements of the organization. Deming emphasizes leadership responsibility and offers a systems approach to managing work and leading people. In the view of the Department, his approach is the most comprehensive--driven from the top, focused on the user, with decisions based on hard data.

The Deming approach makes clear the relationship between quality and productivity. His emphasis on process improvement--on improving the quality of the product or service--is one that ultimately leads to reduced costs and higher productivity. Deming also provides a clear way to pursue continuous quality improvement, based on the user's definition of quality and the use of statistical theory.

The Deming philosophy emphasizes teamwork and cooperation, important to the Department's Sailors and Marines and to those who support them in their mission. Deming also places great value on people and the knowledge they possess. Finally, Deming stresses that leaders have the prime responsibility for making system changes, an essential component of military operational commands.

The Department of the Navy's approach to total quality evolved over a decade. Aviation depots and naval shipyards in the Department of the Navy have been

involved in quality initiatives since the early 1980s. In 1989, the Naval Air Systems Command was the first recipient of the President's Award for Quality, testimony to its long-term efforts to improve organizational performance.

In the past 3 years, tremendous strides have been made at the highest levels within the Department, largely through the initiatives of the Secretary of the Navy who then recognized that the Department of the Navy faced a crisis. It would have to meet mission requirements in the future with drastically reduced funding. To remain operationally ready, the organization would have to go through a fundamental change, a "transformation."

In response to this challenge, he chartered an Executive Steering Group (ESG) in 1989 that was made up of the Department's top civilian and military leaders "to lead and guide the TQL transformation" (Garrett, 1991). Members include the Vice Chief of Naval Operations, the Assistant Commandant of the Marine Corps, the assistant secretaries, the systems commanders, and leaders from other selected Navy and Marine Corps commands. The ESG is chaired by Under Secretary of the Navy Dan Howard.

In September 1990, the ESG members traveled to Naval Air Station Pensacola for a 4-day off-site to develop the Department's vision statement, guiding principles, and strategic goals. On 10 February 1992, the Secretary of the Navy, the Chief of Naval Operations, and the Commandant of the Marine Corps signed a strategic goals document that represents the culmination of work that began 22 months ago in Pensacola.

The goals represent one of three documents prepared by the ESG. The first, a vision statement, states that the support establishment of the DON exists to sustain the Navy-Marine Corps team in its mission. It goes on to say that all services to the force will be of a uniform high quality. Processes and systems affecting those services will be continuously improved.

The second document lists the guiding principles developed to achieve that vision. It begins: "The purpose of the DON support establishment is to provide our Sailors and Marines with the ability to go anywhere, anytime, to defend the nation's interests successfully and survive." It makes reference to "Total Quality Leadership" (TQL) as the approach to be used to describe total quality efforts within the Department.



Commandant of the Marine Corps Gen Carl E. Mundy Jr., Under Secretary of the Navy Dan Howard, Secretary of the Navy H. Lawrence Garrett III, and Chief of Naval Operations ADM Frank B. Kelso II, at the signing of the DON strategic goals, 10 February 1992.

The strategic goals themselves address five areas:

- (1) **Integration**, which refers to the fully integrated Navy-Marine Corps team and the development of strategies and tactical doctrines that will maximize its combat effectiveness;
- (2) **Human Resources, Education, and Training**, which addresses improving the quality of the work force through innovative changes affecting recruitment, training, and quality of life;
- (3) **Acquisition**, which is concerned with improving the process by which maritime weapon systems are designed, developed, tested, and manufactured;

- (4) **Innovation and Technology**, which looks at ways to improve the identification and introduction of new technologies and to create a climate that fosters innovation and invention; and
- (5) **Facilities**, which calls for operating shore facilities that are properly sized and maintained and that result in improved living and working conditions.

These goals say, in effect, that the entire Department will focus on quality as it plots its course for the future. It also means that the leadership accepts responsibility and accountability for changing the things that are not working well and for finding more efficient ways to do business. To quote Deming, "The best way to predict the future is to make it yourself" (Reilly, 1991).

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APPENDIX

**Department of the Navy
Strategic Plan for
Total Quality Leadership:
Vision
Guiding Principles
Strategic Goals**



DEPARTMENT OF THE NAVY STRATEGIC PLAN FOR TOTAL QUALITY LEADERSHIP



On February 10, 1992, strategic goals for the Department of the Navy (DON) were signed out by the Secretary of the Navy, the Chief of Naval Operations, and the Commandant of the Marine Corps.

This document is the first of its kind in the history of the Department. It says, in effect, that the entire organization will focus on quality as it plots its course for the future. It also means that the leadership accepts responsibility and accountability for changing the things that need changing and for finding more efficient ways to do business. Emphasis is on a fully integrated Navy-Marine Corps team.

The strategic goals represent one of three documents that are the foundation for the DON strategic plan. The other two documents, a vision statement and a set of guiding principles, are reprinted here as well. Strategic goals essentially describe the results to be realized in working toward the vision of the organization.

The vision statement, guiding principles, and strategic goals were drafted by the DON Executive Steering Group, formed by Secretary Garrett in 1989 to lead and guide the transformation to Total Quality Leadership (TQL), the approach to be used to implement total quality efforts within the Department. The group is made of 28 top leaders within the Department, including the Vice Chief of Naval Operations and the Assistant Commandant of the Marine Corps. Under Secretary of the Navy Dan Howard chairs that group.

All three documents make reference to the support establishment. Mr. Howard explains what is meant today by that term. "Our concept of the support establishment has changed. The Department of the Navy does not fight wars, the Commanders in Chief fight wars, so in that sense the entire Department is a support establishment. That means that our customer ultimately is the individual Sailor and Marine. The guiding principles document begins with the statement that 'the purpose of the DON support establishment is to provide our Sailors and Marines with the ability to go anywhere, anytime, to defend the nation's interest successfully and survive.'"

To reach the strategic goals, "strategies" and "actions" need to be determined. Toward that end, the ESG is forming working groups made up of senior military and civilian leaders who will define them. As their work progresses, more guidance will be provided to the Department at large.



DEPARTMENT OF THE NAVY VISION, GUIDING PRINCIPLES, AND STRATEGIC GOALS



VISION

The fully integrated Navy-Marine Corps team remains the world's premier force to carry out the national will in an increasingly hostile global maritime environment. It deploys a high quality, multi-purpose, flexible force designed to meet a variety of the most likely contingencies.

In order to respond to the volatile and unpredictable nature of the world-wide threat, our forces must provide deterrence through presence and an ability to project power quickly.

The combined force is sustained in this mission by a support establishment which has dramatically decreased the time necessary to field new weapons systems, alter training cycles, accomplish overhauls, etc.

These and other supporting services, including medical care, are of a uniformly high quality because our leadership accepts responsibility for continuously improving all the systems and processes which govern our support establishment.

The support establishment consists of:

Leaders prepared to exercise their responsibilities with quality as the principal focus.

Properly maintained necessary shore and support facilities.

Acknowledged experts in the technologies key to maritime operations.

Acquisition and maintenance strategies which will strengthen the public/private relationships to produce quality products and services faster and at competitive prices.

Well-trained professionals dedicated to excellence with confidence and pride in their Navy and Marine Corps.

GUIDING PRINCIPLES

The purpose of the DON support establishment is to provide our Sailors and Marines with the ability to go anywhere, anytime, to defend the nation's interests successfully and survive.

In achieving this purpose, the following principles will guide our decisions and actions:

We will accomplish the mission.

We recognize the central fact that our Sailors and Marines are the best prepared and that our units have the highest rates of operational readiness in our history. They are at the heart of our ability to perform the mission. We must maintain that quality.

We are all responsible for accomplishing the mission. That is our first loyalty. We must strive to find new ways to cooperate within the DON which look beyond a single service warfare community or traditional role and responsibility. Pride, professionalism and a sense of community are extremely important but we must ensure that they are not rigid barriers to our interoperability. The valuable process of competing for resources and roles must not be carried to divisive and destructive extremes.

We accept responsibility for taking control of and improving all the systems and processes through which we support Sailors and Marines. We can ensure that the weapons, ammunition, training, transport, health care, housing and all other goods and services which constitute that support are of predictable high quality and available on time and in sufficient quantity for any task they may be called upon to perform.

We must use innovation to meet current and future requirements and challenge ourselves to develop creative methods, including new technologies, to enhance our support to our operating forces.

We are committed to honesty and integrity, recognizing that the public trust and defense of the nation requires the highest standards of moral conduct. By integrity we mean that we will make decisions which are in the best interests of the Navy, the Marine Corps and the nation without regard to personal consequences.

We have adopted the term "Total Quality Leadership (TQL)" as the general term under which we will pursue total quality efforts. However, we understand that it is the concepts and content of those efforts that is important--not what they are called.

STRATEGIC GOALS

We, the leaders in the Department of the Navy, will optimize the effectiveness of the Navy-Marine Corps team by leading our people and managing our systems as an integrated force within a quality-focused organization. We will work to influence our future by translating our vision, mission, and guiding principles into goals, strategies, and actions so that resources and improvements are aligned with the same intent.

We believe that everyone has a legitimate contribution to make in accomplishing these goals; Navy and Marine Corps; military and civilian; operational and support. In starting this translation, we have developed a vision and identified five major strategic goals for the Department of the Navy. These strategic goals are: Integration; Human Resources, Education, and Training; Acquisition; Innovation and Technology; and Facilities. We believe that continuous improvements in these areas are mandatory if the Department of the Navy is to meet the challenges that confront us.

The Department of the Navy will:

Integration

--operate a fully integrated Navy-Marine Corps team that will provide maximum operational capability, capitalizing on the synergism of our operating forces and our support establishment.

Specifically, the DON will:

- develop broad strategies and tactical doctrines that maximize naval service combat effectiveness within the framework of joint and combined operations of the National Military Strategy.
- create and maintain a consolidated naval acquisition, maintenance, and logistics infrastructure that is efficient and responsive to the building, support, and sustainability needs of our naval service forces.
- integrate the focus and efforts of staffs and management organizations to facilitate interaction; and educate our personnel, both military and civilian, in multiple disciplines that affect naval service capabilities and applications.

Human Resources, Education, and Training

--continuously improve the quality of our military and civilian work force through fact-based, innovative systemic changes affecting recruitment, training, and quality of life.

Specifically, the DON will:

- identify and remove the barriers to equal opportunity for all our people.
- improve the military recruiting system through better requirements determination, resource allocation, and day-to-day operations.

Human Resources, Education, And Training (Cont'd)

- improve determination of military training requirements, feedback systems, delivery of training to meet fleet requirements and foster student success; properly fund training and eliminate redundancies in the system.
- improve the civilian recruiting and hiring system through better requirements determination and resource allocation and by assessing national versus local recruiting responsibilities and needs.
- improve civilian training by improving requirements determination, training delivery, and by adjusting resources to match requirements.
- enhance the working environment to improve the performance of quality military and civilian personnel.

Acquisition

- continuously improve the acquisition process to achieve timely design, development, test, manufacture, and support of maritime weapon systems for our Navy-Marine Corps team.

Specifically, the DON will:

- reduce the time from concept definition to fleet introduction.
- stress reduced operating and support costs in all aspects of system design; field fully supported systems with emphasis on interoperability and operational availability.
- foster contractor/government working relationships, emphasizing teamwork built on trust, sound business practices, and the highest standards of ethical behavior. Ensure that an industrial capability for unique naval requirements is maintained.

Innovation and Technology

- continuously improve the process of identifying and introducing new technologies. Ensure our recognition as a world leader in key maritime technologies. Create a climate that fosters innovation and invention.

Specifically, the DON will:

- improve the process of selecting and evaluating technology opportunities; focus DON investment on those technologies that form the foundation of future Navy-Marine Corps system developments; introduce cost-effective technologies into our system as they become available.
- improve the interaction with our sister services, academia, industry and our allies to support the DON technology investment.

Facilities

--operate an adaptable and responsive shore facilities establishment that is properly sized and properly supported to allow continuous improvement in the quality of service to the operating forces; that consists of well-maintained and attractive facilities, resulting in improved living and working conditions and increased productivity at all its installations; and that consistently performs in an environmentally responsible manner and contributes to the quality of life in the communities of which it is a part.


Specifically, the DON will:

- define and implement "quality standards" for facilities that support mission requirements, family and bachelor housing, family support functions, and morale, welfare and recreational activities.
- provide the resources to achieve the defined quality standards over time and maintain the support establishment at these levels; in addition to traditional military construction, consider innovative financing and management arrangements (e.g., cost-sharing, public-private venture, leasing).
- integrate environmental awareness into all DON planning, management, and operations to comply with all applicable environmental laws and to protect the natural resources found on Navy and Marine Corps installations. Minimize waste, conserve energy, and adopt pollution prevention measures to avoid adverse impacts on the environment.


Our vision and associated strategic goals require a significant transformation throughout the naval services. By pursuing our vision, we believe we will enhance our ability to determine our future. Achieving these strategic goals will be neither quick nor easy; however, we believe that our people are capable of meeting the challenges confronting the Navy-Marine Corps team. We recognize that all members of the team have valuable contributions to make to our strategic efforts. As leaders, we will strive to provide the direction and support required for this transformation.



H. Lawrence Garrett III
Secretary of the Navy



Gen Carl E. Mundy Jr.
Commandant of the Marine Corps



ADM Frank B. Kelso II
Chief of Naval Operations

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