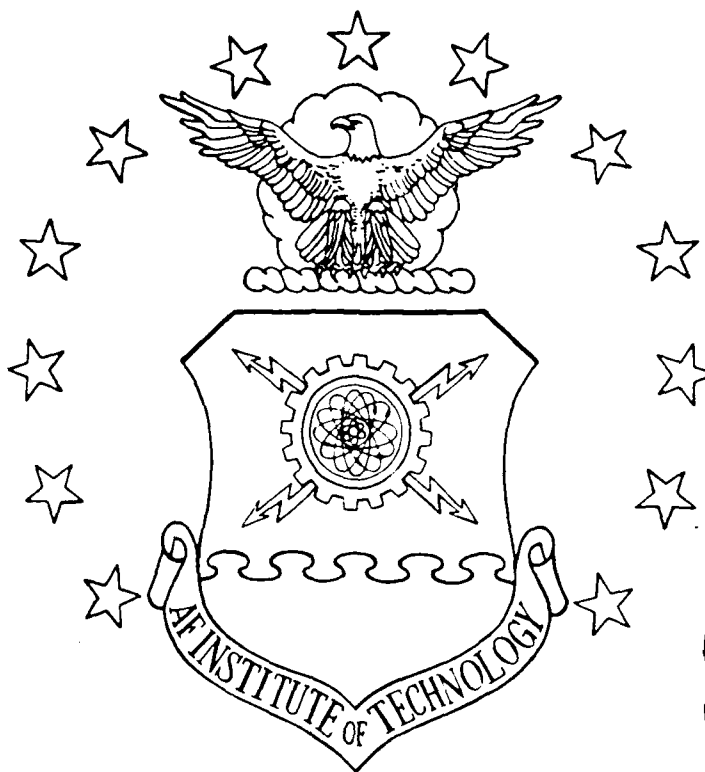


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TOTAL QUALITY MANAGEMENT
IN THE DEPARTMENT OF DEFENSE

THESIS

BRUCE E. SPRINGS, B.S.
CAPTAIN, USAF

AFIT/GLM/LSR/89S-57

DEPARTMENT OF THE AIR FORCE
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Wright-Patterson Air Force Base, Ohio

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AFIT/GLM/LSR/89S-57

TOTAL QUALITY MANAGEMENT
IN THE DEPARTMENT OF DEFENSE

THESIS

Presented to the Faculty of the School of Systems and
Logistics of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Logistics Management

Bruce E. Springs, B.S.

Captain, USAF

September 1989

Approved for Public release; distribution unlimited

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Abstract

Executive Order 12552 challenged all federal agencies to achieve a three percent productivity increase. All agencies have not progressed at the same speed, however. Some agencies may have encountered the same failures and successes without benefit or knowledge that others may have overcame the same stumbling blocks.

If managers had a comprehensive document that they could use to identify where other agencies were with TQM implementation, successes, and who the points-of-contact are for each agency, they could share their experiences and make it possible for the entire DoD community to progress more efficiently with TQM implementation.

This thesis therefore attempts to develop a description and assessment of the TQM initiatives within the DoD community. It will outline what the responsibilities quality offices and the approaches agencies are taking.

The objectives of this research were to identify the early roots of TQM from both public and private sector experiences, to identify DoD agencies and Air Force units and what they are doing to implement TQM and to catalogue what successes these agencies have enjoyed to date, and to provide points-of-contact for each agency mentioned in.

To accomplish the research objectives, a literature review of quality journals, periodicals, and DoD directives was conducted. This was done to trace the principal factors shown to contribute to quality for which TQM has been based. In addition, interviews will be conducted with DoD/Air Force agencies tasked with the responsibility for implementing TQM. These agencies will be asked what they have done to implement it, the problems/successes they have encountered, and how they overcame or attempted to overcome problems.

TOTAL QUALITY MANAGEMENT IN THE DEPARTMENT OF DEFENSE

I. Introduction

General Issue

The United States Government, industries, and service sector are being transformed into an entity deeply concerned with quality. Customers are now demanding quality because they are offered more choices. In fact, a study conducted by Gallup for the American Society for Quality Control found that people will pay a premium to get what they perceive to be higher quality (Hutchens, 1989:34).

The Department of Defense also has recognized that quality plays an important role. In February 1986 a Presidential Executive Order 12552 (revised April 1988, Executive Order 12637) was signed with the aim of making government agencies significantly more productive by 1991 (Burstein and Sedlak, 1988:38). The 1986 Executive Order challenged all federal agencies to achieve a three percent increase in productivity each year (Taft, 1988). Federal agencies are now required to develop and implement an annual productivity plan and to assess their progress on a yearly basis. The 1988 Order supplements the program by asking that federal agencies evaluate the performance of

managers and leaders based on their achievements. The Department of Defense has begun a full scale effort to identify and refine those actions which can be improved to help meet or exceed the President's three percent goal.

The thrust of the Department's leadership in productivity and quality improvement has been: First, to raise awareness to the contributions productivity and quality make to essential defense missions; second, to recognize and reward successes; third, to develop and refine the tools which support these objectives; and finally, to integrate productivity and quality into the management of all resources (Taft, 1988). During the spring of 1988, former Secretary of Defense Carlucci issued the DoD posture statement on quality. It highlighted the fact that higher quality and greater productivity result not from inspecting a product or service but from removing inefficiencies in the process that creates it (1988).

Quality improvement has caught the attention of key personnel within the DoD. With constant pressure to trim the federal budget deficit, defense spending has been declining with not much hope for this trend to change during the next several years. The need for a strong defense, however, remains the same. The challenge is to find innovative approaches to meeting our defense

requirement that will use limited dollars efficiently. Attention to quality is one such approach. The DoD strategy for continuously improving performance at every level is called **Total Quality Management (TQM)**. TQM is defined as:

"A philosophy and a set of guiding principles that represent the foundation of a continuously improving organization. It is the application of quantitative methods and human resources to improve the material and services supplied to an organization, all the processes within an organization, and the degree to which the needs of the customer are met, now, and in the future. It integrates fundamental management techniques, existing improvement efforts, and technical tools under a disciplined approach focused on continuous improvement" (Department of Defense Directive 5000.51, 1989).

Specific Problem

Executive Order 12552 challenged all federal agencies to achieve a three percent productivity increase. All agencies have not progressed at the same speed, however. Some agencies may have encountered the same failures and successes without benefit or knowledge that others may have overcome the same stumbling blocks.

If managers had a comprehensive document that they could use to identify where other agencies were with TQM implementation, successes, and who the points-of-contact are for each agency, they could share their experiences and make it possible for the entire DoD community to progress more efficiently with TQM implementation.

This thesis therefore attempts to develop a description and assessment of the TQM initiatives within the DoD community. It will outline what the responsibilities quality offices and the approaches agencies are taking.

Research Objectives

The objectives of this research were:

1. Identify the early roots of TQM from both public and private sector experiences.
2. Identify DoD agencies and Air Force units and what they are doing to implement TQM and to catalogue what successes these agencies have enjoyed to date.
3. Provide points-of-contact for each agency mentioned in this investigation.

Approach to the Problem

To accomplish the research objectives, a literature review of quality journals, periodicals, and DoD directives was conducted. This was done to trace the principal factors shown to contribute to quality for which TQM has been based. In addition, interviews will be conducted with DoD/Air Force agencies tasked with the responsibility for implementing TQM. These agencies will be asked what they have done to implement it, the problems/successes they have encountered, and how they overcame or attempted to overcome problems.

II. Literature Review

Introduction

This chapter examines pertinent literature concerning total quality management. It begins with an review of the principals of the quality pioneers whose work serves as the building block for which TQM is based. It then looks at costs of having poor quality, examines who should be held accountable for quality in an organization, and finally, how quality can be measured.

What are the Determinants of Quality?

Everyone may think of quality in different ways and several authors offer their own definitions, but before quality can be defined, a common reference must be developed. Garvin states that eight dimensions can be identified as a framework for thinking about the basic elements of product quality. Each is self contained and distinct, for a product can be ranked high on one dimension while being low on another (1984:29). The eight are:

1. Performance: This refers to the primary operating characteristics of a product.

2. Features: This refers to secondary characteristics that supplement the product's basic functioning.

3. Reliability: This reflects the probability of a product's failing within a specified period of time.

4. Conformance: Garvin identifies this as the degree to which a product's design and operating characteristic match preestablished standards.

5. Durability: The amount of use one gets from a product before it fails.

6. Serviceability: The speed, courtesy, and competence of repair.

7. Aesthetics: Garvin admits that this is a subjective dimension, but, how a product looks, feels, sounds, tastes, or smells is important to the customer.

8. Perceived Quality: Also subjective, consumers, not always having perfect information about a product, use their own perceptions about product quality.

Quality continues to be a "buzzword" for the 1980s. The search for quality excellence, quality improvement, and related product/service enhancement philosophies still occupy the limelight in technical/professional journals, government/industry forums, and management symposiums. Quality training programs are increasingly popular in both manufacturing and service industries. The value of quality is again being appreciated as not just an advantage, but as a necessity to ensure a growing profit (Talley, 89:24).

What must management do? It is not enough for management to have their people do their best. Deming

noted, "Everyone is already doing their best. Efforts, to be effective, must move in the right direction. Without guidance, best efforts result in a random walk" (McGovern, 1988).

Deming advocated that quality should be the building block for improvement. Profits have been the measurement tool most often used to determine the success of a company, but Deming stated, "Paper profits do not make bread: improvement of quality and productivity do. They make contribution to better material living for all people, here and everywhere" (McGovern, 1988).

The Department of Defense (DoD) has joined industry in focusing on improving quality of work at every level and activity. The goal of TQM is to instill a "cultural change" within the DoD and all external activities associated with defense acquisition (Rowland, 1988). During the last couple of years, Robert Costello, the former Undersecretary of Defense for Acquisition, has strongly advocated the total quality management concept within the DoD (van Voorst, 1988:44).

The move toward TQM began in earnest after completion of the Packard Commission's study, "A Quest for Excellence." Former Secretary of Defense, the Honorable Frank Carlucci, outlined the DoD's approach during a presentation to the Dayton, Ohio Chapter of Defense Preparedness Association:

Our task will be guided by three underlying principals: first, the essential need for stability in defense funding, planning and acquisition; second, a new approach to quality in acquisition, which will structure, integrate and coordinate acquisition improvement programs into a single sustained drive for excellence; and finally, a realization that success demands true partnership among DoD, industry, and Congress (Carlucci, 1988B)

TQM was introduced to implement these principals in the DoD and in its contractors. "Its goal is to manage the country's defense efforts in a manner consistent with the age of the B-2" (Carlucci, 1988B).

The DoD is growing to realize that quality makes a difference. The future acquisitions of new weapon systems like the Advanced Tactical Fighter will necessitate a quantum leap in readiness and sustainability, continuing a trend of improvement in the Air force over the last 40 years. General Bernard P. Randolph, commander, Air Force Systems Command, noted, "In world War II, fighters averaged one combat mission every three days. By Vietnam, fighters were averaging nearly one mission a day. Current surge tests with F-15 units in Europe have demonstrated rates of better than four a day" (Department of the Air Force, 1989).

TQM will allow the DoD to continue this trend. No one can afford to have poor quality. Here are some statistics that drive the point home: If the U.S. had service suppliers who did their jobs right 99.9% of the time, there would be some 20,000 wrong prescriptions filled each year, unsafe drinking

water almost one hour each month, two long or short airplane landings a day at Los Angeles and New York: 500 incorrect surgical operations per week, and 2,000 lost articles of mail per hour every day. In the defense arena, given 1,000,000 grenades with a 99.9% quality level, there would be 999 duds and one would go off in '0' seconds (Department of the Air Force, 1989).

Early Pioneers in Quality

Much of the basis for TQM comes from such notable scholars as Dr. W. E. Deming and Dr. J. H. Juran. Both of these men "pioneered" in the quality control field (Department of Defense, 1988). Other prominent pioneers in the field include A. V. Feiganbaum and Dr. G. Taguchi. The works of all four individuals were highlighted at the recent Defense Systems Management College (DSMC) presentation on TQM (McGovern, 1988). The work of these pioneers point to a few basic premises.

An organization that gets involved in quality improvement will face two challenges: first, instead of trying to improve product quality, it must concentrate on improving the *quality of the process* that produces the process; finally, the company must assure *ongoing* quality improvement throughout the organization (Lowe and Mazzeo, 1986:22).

Each of these quality giants offer slightly different definitions for quality. To Crosby, quality is conformance

to requirements. Juran defines quality as fitness for use. Deming describes quality as a predictable degree of uniformity and dependability at low cost and suited to the market (Lowe and Mazzeo, 1986:24). An examination of the road maps these three offer for success follows.

Crosby

Crosby states that there are five erroneous assumptions that are held by most managements about quality and that they cause most of the communication problems between those who want quality and those who are supposed to effect it (Crosby, 1979:17).

The first erroneous assumption is that quality means goodness, or luxury, or shininess, or weight (Crosby, 1979:17). Here he points to his definition of quality, conformance to requirements, and the importance of defining the requirements in specific terms and then measuring to detect nonconformance. If a Cadillac conforms to all the requirements of a Cadillac, then it is a quality car. If a pinto conforms to all the requirements of a Pinto, then it is a quality car. Luxury or its absence is spelled out in specific requirements, such as carpeting or rubber mats (Crosby, 1979:17).

The second erroneous assumption is that quality is an intangible and therefore not measurable (Crosby, 1979:18). Crosby asserts that quality is measured by the cost associated with a lack of quality. Measurements should be

established both for measuring the overall cost of quality and for compliance. These measurements should be displayed for all to see, for they provide visible proof of improvement and recognition of achievement (Crosby, 1979:18).

The third erroneous assumption is that there is "economics" of quality (Crosby, 1979:18). Managers, according to Crosby, tend to offer excuses for why they can't afford to have good quality. "This is an indication that they don't understand quality and that they are just wishing you would go away. If they want to make certain that they are using the least expensive process that will still do the job, they should get deep into process certification and product qualification" (Crosby, 1979:19)

The fourth assumption that causes problems is the one that says that all the problems of quality are originated by the workers, particularly those in the manufacturing area (Crosby, 1979:20). Crosby believes this is because it is easier to blame others for our mistakes than to take responsibility ourselves. "People in the manufacturing ghetto can contribute only a little to the prevention of problems because all planning and creation is done elsewhere. And it is the "elsewheres" that need attention when it comes to reducing the cost of quality" (Crosby, 1979:20)

The fifth erroneous assumption is that quality originates in the quality department (Crosby, 1979:20). Quality

department people should measure conformance by the various means at their disposal; they should report results clearly and objectively; they should lead the drive to develop a positive attitude toward quality improvement; they should use whatever educational programs can be helpful. But they should not do the job for others, or the others will not change their evil ways" (Crosby, 1979:20).

It is difficult to reach the mind of someone who is enthusiastically agreeing with you. Crosby points out that in a world where no one is against quality, very few have it. He says that everyone thought they understood it all. To overcome this lack of understanding on the subject, he provides four absolutes which answer the questions--What is quality? What performance standard should be used? Finally, what measurement system is required?

In the first absolute, quality has to be defined as conformance to requirements (Crosby, 1984:64). Crosby states that quality improvements are built on getting everyone to do it right the first time. Management can assist by establishing the requirements that employees are to meet, supply whatever is necessary in order for employees to meet those requirements, and spend all its time encouraging employees to meet those requirements. Requirements, as are measurements, are a form of communications.

The second absolute points out that the system for causing quality is prevention not appraisal (Crosby, 1984:73). He

says that the most visible expense in quality control practice is in the area of appraisal. Checking, testing, and inspecting are always done after the fact and is an expensive and unreliable way of getting quality. Sorting, evaluating and appraisal only sift through what has already been done. Crosby points out that what is needed is prevention and that an error that does not exist cannot be missed.

The third absolute states that the performance standard must be zero defects, not "that's close enough" (Crosby, 1984: 86). While setting requirements is a process that is easily understood, Crosby says that the need to meet requirements each and every time is not so easy to understand. A performance standard is a device for making a company function when individuals recognize the importance of every little or seemingly insignificant action.

The measurement of quality is the price of nonconformance, not indexes, is the fourth absolute (Crosby, 1984:86). The price of nonconformance involves all of the expenses incurred in doing thing wrong. Twenty percent of sales in manufacturing and thirty five percent of operating costs in service companies is the enormous amount of money required to correct purchase orders, correct procedures drawn up to implement orders, correct the product or service, do work over, and pay for warranty and other nonconformance claims.

Crosby outlined a 14 step quality improvement program:

1) Management Commitment. The goal of management commitment is to make it clear where management stands on quality (Crosby, 1979:175). They serve as the role models for the entire quality program and their actions set the state of mind for everyone else. In addition, management must be involved with the program and state the policies that govern how jobs are done.

2) Quality Improvement Teams. The purpose of these teams are to run the quality improvement team by laying out an improvement program and ensuring that it is followed (Crosby, 1979:179). The team is headed by a member of management staff committed to quality and the need for improvement. Other team members should be representatives from each department within the organization. Further, each department should have their own team.

3) Quality Measurement. This is to provide and display current and potential non-conformance problems in a manner that permits objective evaluation and corrective action (Crosby, 1979:199). Measurements should be done on both manufacturing as well as service.

4) Cost of Quality Evaluation. This is done to define the ingredients of the cost of quality, and explain its use as a management tool (Crosby, 1979:209). This cost can be

categorized three ways: failure, prevention, and appraisal. Failure and appraisal should not exceed 2.5 percent of sales dollars.

5) Quality Awareness. This is to provide a method of raising the personal concern felt in the organization toward the conformance of the product or service and the quality reputation of the organization (Crosby, 1979:212). This can be accomplished by regular meetings between management and employees and by using any forum that allows information about the quality program to be communicated to everyone.

6) Corrective Action. The purpose is to provide a systematic method of resolving forever the problems that are identified through previous action steps (Crosby, 1979:224). Task teams are used consisting of responsible members of each affected organization meeting as often as necessary to resolve the problem. Once the problem is eliminated, the team is dissolved. Further, daily meetings are held between the supervisor and quality, weekly meetings between production supervision and quality management, and monthly meetings between by the general manager and staff.

7) Establish an Ad Hoc Committee for the Zero Defects Program. The goal of this step is to examine the various activities that must be conducted in preparation for formally launching the Zero Defects Day (Crosby, 1979:231). It is this committee that spearheads the drive for defect prevention and "Do It Right the First Time" (DRIFT).

8) Supervisor Training. This should be accomplished to define the type of training that supervisors need in order to actively carry out their part to the quality improvement program. (Crosby, 1979:238). Since the supervisor is the front line key to achieving an effective quality program, it is the supervisor who must be able to participate in setting goals for the organization program. In addition, the supervisor must be fully trained to ensure he understands the program.

9) Zero Defects Day. To create an event that will let all employees realize that there has been a change is the purpose of this step (Crosby, 1979:241). Some face to face approach must be used to let all of the employees know that a Zero Defects approach has been initiated and that it has full management support.

10) Goal Setting. This is done to turn pledges and commitment into action by encouraging individuals to establish improvement goals for themselves and their groups (Crosby, 1979:247). Goals should be set with milestones determined by the Team in specific and measurable terms.

11) Error-Cause and Removal. This is done to give the individual employee a method of communicating to management the situations that make it difficult for the employee to meet the pledge to improve (Crosby, 1979:250).

To solicit individual input, employee concerns should be staffed by the functional area with a stated maximum time for acknowledgment back to the employee.

12) Recognition. This step is important to appreciate those who participate (Crosby, 1979:254). Recognition should be given to teams and individuals but it is not necessary to apply a price tag toward the recognition.

13) Quality Councils. This is done to bring together the professional quality people for planned communication on a regular basis (Crosby, 1979:256). This is accomplished by the team chairpersons and the quality professionals who meet on a regular basis to upgrade and improve the program.

14) Do it Over Again. Purpose: to emphasize that the quality improvement never ends (Crosby, 1979:257). On a twelve to eighteen month cycle, the goals set may have been met. This may lead to stagnant behavior calling for a complete turnover of the entire team.

Deming

Deming was an advocate for changing managerial philosophies to achieve higher quality. Tribus pointed out that "Deming had one of those brilliant flashes of insight that few of us are privileged to have. Like Newton with the apple, Einstein with relativity, and Freud with the subconscious, so Deming saw a new way with management" (1988:29). Deming's philosophy was if management is to be

responsible for improving something as complicated as a modern assembly of machines and people, managers must have a way of learning which problems are caused by the workers and which are caused by the system (Tribus, 1988:29). According to Deming, good quality does not mean high quality. It is, rather, "a predictable degree of uniformity and dependability, at low cost, and suited to the market" (CPI Purchasing Magazine, 1986:1).

Deming's basic philosophy on quality is that productivity improves as variability decreases. Since all things vary, he says, that is why the statistical method of quality control is needed. "Statistical control does not imply absence of defective items. It is a state of random variation, in which the limits of variation are predictable" (CPI Purchasing Magazine, 1986:1).

There are two types of variation: chance and assignable, and says Deming, The difference between these is one of the most difficult things to comprehend. It is waste of time and money to look for the cause of chance variation, yet, he say, this is exactly what many companies do when they attempt to solve quality problems without using statistical methods. He advocates the use of statistics to measure performance in all areas, not just conformance to product specifications. Further, he says, it is not enough to meet specifications; one has to keep working to reduce the variation as well.

Inspection, whether of incoming or outgoing goods, is, according to Deming, too late, ineffective, and costly. "Inspection does not improve quality, nor guarantee it" (CPI Purchasing Magazine: 1986:2). Moreover, inspection is usually designed to allow a certain number of defects to enter the system. For example, a company that buys items with an acceptable quality level of three percent is, in effect telling the vendor that it can send three bad items out of every 100.

He says judging quality requires knowledge of the "statistical evidence of quality" and that companies dealing with vendors under statistical control can eliminate inspection." You will note from the control charts that came along with the product, far better than any inspection can tell you, what the distribution of quality is, and what it will be tomorrow." In this way, quality is predictable, and one can also safely predict that the vendor's quality will improve over time. "One of the first steps for manager of purchasing to take is to learn enough about the statistical control of quality to be able to assess the qualifications of a supplier, to be able to talk to him in statistical language," (CPI Purchasing Magazine, 1986:2). Deming identifies 14 points for management to improve quality. They are:

- 1) Create constancy of purpose for improvement of product and service (Deming, 1982:24). The manager must set the

direction in which the organization is to go. In addition, he must be able to verbalize the goals and strategies of the company in a way that the employees and customers know what they are and what can be expected.

2) Adopt the new philosophy (Deming, 1982:26). We are in a new economic age. We can no longer live with commonly accepted levels of delays, mistakes, defective material, and defective workmanship. All people in an organization should embrace the view that the customer (internal and external) is the focus of all action.

3) Cease dependence on mass inspection (Deming, 1982:28). Defect detection is dependent upon mass inspection to sort conforming from defective material. Dependence on mass inspection does nothing to decrease variation. Require, instead, statistical evidence that quality is built in to eliminate the need for inspection on a mass basis.

4) End practice of awarding business on the basis of price tag alone (Deming, 1982:31). Deming feels we should get away from awarding business on the basis of price tag. The vendors who meet requirements should be identified. Equipment and services should be bought on the basis of quality as well as price.

5) Improve constantly and forever the system of production and service (Deming, 1982:49). Never ending

improvement strives to continuously reduce variation within specification limits for operationally defined process and product characteristics.

6) Institute training (Deming, 1982:52). All employees in an organization should be trained in their job skills. Their training should include statistical methods so that they can identify when a process is out of control.

7) Adopt and Institute Leadership (Deming, 1982:54). The aim of supervision should be to help people, equipment and systems do a better job. They do this by demonstrating by their behavior that quality is of utmost importance, creating an environment that is conducive to producing high quality, removing other barriers that deny the workers the right to have pride in their work, by being honest at all times, and by helping the workers to grow and develop in areas that will help improve quality.

8) Drive out Fear (Deming, 1982:59). Fear exists when individuals in an organization feel powerless because something or someone is controlling their lives. When this exists, workers will not be able to concentrate on their jobs as they should.

9) Break down barriers between staff areas (Deming, 1982:62). Barriers between departments result in multiple interpretations of a given message. This increases variability in the actions taken with respect to a given message. Operationally defining the ultimate customer's

needs and expectations so that everyone understand how he contributes to the success of the organization is a solid step to breaking down barriers between departments.

10) Eliminate slogans, exhortations and targets for the work force (Deming, 1982:65). Deming places the responsibility for the system and its variability squarely on the shoulders of the manager. Slogans and posters try to shift that responsibility to the worker by emphasizing what they should be doing.

11) Eliminate numerical quotas for the work force and for people in management (Deming, 1982:70-75). Deming points out that a lot of managers use work standards or quotas to monitor performance improvement. However, these standards are negotiated values and have no bearing on a process or its capability. Rather than focusing on the standard as a means to productivity, management should focus on stabilizing and improving the process to increase productivity.

12) Remove barriers that rob people of pride of workmanship (Deming, 1982:77). Management must work to remove the barriers that deny workers the right to feel good about their work, that limit their contributions to the organization, prevent them from being trained, that blame them for all of the mistakes, and that prevent them from getting feedback.

13) Encourage education and self improvement for everyone (Deming, 1982:86). As new equipment comes on the market,

workers need to be trained in the use, care and maintenance of that equipment.

14) Take action to accomplish the transformation (Deming, 1982:86). Top management must work to at putting the 14 steps into practice which first calls for them to recognize that change is necessary.

Juran

According to Juran, there are two kinds of quality: "fitness for use" and "conformance to specifications." To illustrate the difference, he says a dangerous product could meet all specifications, but not be fit for use. A difference in specification for the same functional use is a difference in quality of design, often called grade. The Cadillac and the Chevrolet automobiles serve the same basic functional use. However, they differ in many features of design. Quality of conformance, on the other hand, relates to the fidelity with which the product conforms to the design. A Chevrolet which can run and a Chevrolet which cannot run have the same quality of design, but they differ in quality of conformance (Juran, 1951:6).

Juran states that there are three main branches of the quality function: acceptance, prevention, and assurance. Acceptance is the traditional "passing or rejecting" job of the inspection department and is the oldest and best developed. Prevention, the job of preventing defects from

happening, has long been recognized as a need and is only now being developed into a working function, he says. Assurance, the job of overseeing the quality function, is only being recognized as a need. It is therefore the least well developed. (Juran, 1951:318).

Assurance, he states, bears the same relation to the quality function that auditing does to the accounting function. Where acceptance and prevention are the action phases of the quality function, assurance is the reporting phase carrying back to management the story of how well the quality function is being performed (Juran, 1951:318). Juran talks about three basic steps to progress: structured annual improvements combined with devotion and a sense of urgency, massive training programs, and upper management leadership. In his view less than 20% of quality problems are due to workers, with the remainder being caused by management. Just as all managers need some training in finance, all should have training in quality in order to oversee and participate in quality improvement projects. And top management should be included because, all major quality problems are interdepartmental. Moreover, pursuing departmental goals can sometimes undermine a company's overall quality mission (CPI Purchasing Magazine, 1986:4).

Companies should avoid "campaigns to motivate the workforce to solve company's quality problems by doing

perfect work," says Juran, because these exhortation only" approaches and slogans "fail to set specific goals, establish specific plans to meet these goals, or provide the needed resources." He notes, however, that upper managers like these programs because they do not detract from their time (CPI Purchasing Magazine, 1986:4). Generating quality-mindedness necessitates first of all a sincere interest on the part of the top management, generously evidenced by those below. This quality-mindedness requires that each intermediate supervisor understand clearly how it is to his interest if a good quality job is done. Further, each operator, inspector, and shopman must understand not merely a set of lifeless specification limits, but their vibrant intent as well (Juran, 1951:150).

He recognizes purchasing's important role in quality improvement. A company cannot produce greater precision in vacuo, he states; it must secure greater precision for its suppliers. Juran also recognizes that purchasing's task can be much more complex than ordinarily assumed (CPI Purchasing Magazine, 1986:4). Juran is not in favor of or single sourcing for important purchases, which he defines as product-related items such as raw materials or components. For important purchases it is well to use multiple sources of supply. A single source can more easily neglect to sharpen its competitive edge in quality, cost and service.

Juran identifies 10 steps to quality improvement. The ten steps are (CPI Purchasing Magazine, 1986:5):

- 1) Build awareness of the need and opportunity for improvement.
- 2) Set goals for improvement.
- 3) Organize to reach the goals (establish a quality council, identify problems, select projects, appoint teams, designate facilitators).
- 4) Provide training.
- 5) Carry out projects to solve problems.
- 6) Report progress.
- 7) Give recognition.
- 8) Communicate results.
- 9) Keep Score.
- 10) Maintain momentum by making annual improvement part of the regular system and processes of the company.

Costs of Quality

A basic activity in a quality improvement program is the collection of quality costs. Quality costs are usually divided into three categories: Appraisal costs, failure costs, and prevention costs (Moore, 1989).

Appraisal cost are the costs incurred to discover the condition of the product (Juran and Gryna, 1980:15). This

could be incoming inspection on purchased materials, in-process inspection on the units being produce, or audits performed on services.

Failure costs are all the costs that result when a defect, error, or failure occurs. Typical failure costs are: unnecessary scrap, rework, downtime, yield losses, retest, and disposition (Juran and Gryna, 1980:14). These are all internal failure costs. There are also external failure costs that occur when a customer returns a product, or when it is necessary to perform a service a second or a third time.

Failure costs are generally the largest category of quality costs. At the same time, failure cost represent the greatest potential for productivity improvements if they can be eliminated or at least substantially reduced.

Prevention costs are the costs incurred to keep failure and appraisal costs to a minimum (Juran and Gryna, 1980:15). For example, the time it takes to analyze why errors are being made so that corrective action can be taken to eliminate those errors, the time spent on that activity would be called a prevention cost. Quality data acquisition and analysis is a prevention cost.

For an organization with a poor quality history, prevention costs are usually the smallest of the quality costs because they do not spend enough time preventing defects and errors. If more time and money were spent

productively on prevention, failure costs would decrease significantly. If more money were spent on prevention, quality costs as a whole would go down. The general relationship between levels of quality and quality costs are decreasing costs for failure and appraisal as the level of quality improves and increasing costs for prevention as the level of quality improves.

Controllability

Who should be held accountable for the errors made by employees in an organization? The reaction most have is that the workers should be held responsible for the errors, or defects, that result from their work. Juran and Gryna state in their research that eighty percent of the problems that exist are controllable by management decisions (or lack thereof), and only twenty percent of the problems are caused by the work force (1980:314).

To help an organization decide if management or the worker is responsible for the defects produced, Juran and Gryna suggested that three questions be asked. If the answer to any of the questions is "no," then the worker should not be held responsible for defects related to his phase of the process. The three questions are:

- 1) Do the operators know what they are supposed to do? This knowledge consists of the product standard, the process standard or a definition of responsibility (1980:315).

2) Do they know what they are actually doing? This means that the workers must have the means of knowing whether the performance conforms to standards (1980:317).

3) Do they have the ability to regulate the process? The worker should be able to regulate or adjust the process whenever the product or process fails to conform to specification (1980:322).

Total Quality Management Master Plan

The DoD has formulated a TQM Master Plan which presents the overall concept and the corresponding actions for meeting the goals. In brief, the TQM Master Plan provides initial answers to the questions "What is TQM?" and "How is TQM to be implemented within the DoD?" (Department of Defense, 1988).

The keys to achieving TQM are establishing, pursuing, and revising a necessary, common, and agreed-upon set of goals and objectives for the effort to provide the basis and direction for implementation (Department of Defense, 1988). The DoD has developed a set of long-range, mid-range, and short-range goals. The specific goals are as follows (Department of Defense, 1989).

Long-Range

1) Establish TQM as a way of life. That it should cease to have its own identity and that the label TQM will

eventually fade away from use as continuous improvement principles and practices become the normal way of doing business.

2) All DoD personnel directly doing continuous process improvement.

3) Widespread industry implementation of continuous process improvement. DoD must encourage the entire defense industry, to include prime contractors, subcontractors, and suppliers, to get involved with TQM efforts to ensure that we are receiving quality products.

4) Congressional understanding of and support for TQM. Through education and liaison, the effort will be to get legislative support for the TQM policies and processes.

Mid-Range

1) Establish and implement policy deployment mechanisms. Functioning policy deployment mechanisms should be in place to provide a means for ensuring all defense elements are working to achieve a common set of goals.

2) Harmonize DoD Directives/Regulations/Instructions and TQM.

3) Eliminate barriers to TQM implementation. TQM barriers, beginning with the top levels, must be eliminated to ensure TQM success. Those barriers include the policies, practices, regulations, laws, and attitudes that contradict the aim of continuous process improvement.

4) Implementation commitment by major defense contractors, with critical mass achieved in at least the top 25 contractors. To influence the top 25 contractors, who receive more than 50 percent contract dollars, to participate in continuous improvement efforts and to insist that their suppliers do as well.

5) DoD Acquisition personnel use TQM principles and practices in dealing with industry. To ensure consistency when dealing with contractors, acquisition personnel must also be trained to fully understand the DoD objectives and policies.

6) Develop, produce, acquire, and promulgate a standard set of TQM training materials.

7) Establish a mature functioning staff of facilitators. To have in place a TQM facilitation staff at all working levels to implement TQM.

8) Understand and coordinate with TQM efforts by other sectors of the Federal Government. To continually interchange with other government agencies who are engaged in improvement efforts themselves.

9) Develop and cultivate key congressional TQM champions. To train and educate key legislative leaders about the importance of TQM to ensure their support during changes in the DoD leadership.

Short-Range

1) Establish executive steering committee and subordinate teams, and begin training and continuous process improvement activities.

2) Identify initial cadre of TQM facilitators, and begin facilitating team activities and training staff facilitators.

3) Implement the TQM training strategy and begin collecting and developing training materials.

4) Establish an R & D program in support of TQM.

5) Develop and implement recognition and reward system based on TQM goals and behavior. DoD will develop a reward and recognition strategy aimed at reinforcing activity and behavior beneficial to TQM.

6) Begin ensuring consistency among TQM and major documentation and guidance. The goal here is to develop a plan for reviewing and ensuring consistency among the documents, regulations and initiatives pertaining to the acquisition community ensuring consistency.

7) Begin enlisting Defense industry commitment. This will be accomplished by taking advantage of existing DoD/industry forums and efforts to increase dialogue about TQM implementation.

III. DoD TQM Implementation

Key Personnel

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Background

The move toward TQM in the DoD began in earnest when the then Secretary of Defense, The Honorable Frank Carlucci, issued the Department of Defense Posture on Quality letter on 30 Mar 1988. The letter recognized that quality is the vehicle upon which higher performance could be achieved.

Secretary Carlucci began the letter by stating that he was giving top priority to the DoD TQM effort for attaining continuous quality improvement in operations, and as a major strategy to meet the President's productivity objectives under Executive Order 12552 (Carlucci, 1988). Several TQM efforts had already been initiated but this was the first DoD wide proclamation. The Secretary articulated the need to expand the TQM

effort throughout DoD and stated "the ultimate goal is the satisfied, quality-equipped, quality-supported soldier, sailor, airman, and Marine" (Carlucci, 1988).

The letter also established functional responsibility, for the first time pointing out the quality in weapons systems is central to the DoD mission. As a result, he appointed the Under Secretary of Defense for Acquisition to lead the TQM Thrust by implementing it as an "integral element of the entire acquisition Process" (Carlucci, 1988). The fundamental principles that underlie this initiative were also outlined. These principles are the DoD Posture Statement on Quality, outlined in Appendix A.

Another major event within the DoD occurred on 18 Aug 88 when forty five of the top leaders from the Office of the Secretary of Defense, the military services, the Joint Chiefs of Staff, and Defense agencies met to discuss the Total Quality Management concept and the Department's implementation plan. They were briefed by William W. Scherkenbach from the General Motors Corporation who studied under Deming (Department of Defense, 1988B). This meeting may have marked the first official TQM effort by the DoD.

Following the meeting, Secretary Carlucci announced that the Department of Defense had launched the implementation of Total Quality Management. The message was directed to all members of the DoD but aimed

particularly to all DoD managers; the ones who can have the most impact on improving all processes and procedures that together make up the system (Carlucci, 1988C).

The message identified five "Salient Features" which serve as the five key features of TQM. They are: 1) To prevent defects rather than detecting them after the fact, 2) focus on the processes which result in products and services, 3) continuous improvement of these processes, 4) innovation of new processes and products, and 5) applies to all types of work.

Functional responsibility was established when Secretary Carlucci stated:

"While TQM is applicable to all of the DoD, my most immediate concern is seeing it used to improve our Acquisition Processes. As such, I gave Dr. Costello, the (former) Under Secretary of Defense for Acquisition, a charter to see to it that TQM becomes the cornerstone of our acquisition improvement efforts and that it enables us to purchase quality goods at reasonable cost" (Carlucci, 1988C).

Dr. Costello issued a message on 19 Aug 88 outlining his agenda for the TQM program stating that he wanted TQM applied to the acquisition of defense systems, equipment, supplies, and services to ensure continuous improvement of products and services being provided to, and by, the DoD (Costello, 1988).

He appointed the Defense Acquisition Board (DAB) to act as the DoD steering group for TQM implementation in

acquisition with the final goal being a link between TQM to the weapon system decision process. This would ensure that TQM is properly considered in acquisition strategy development and effectively implemented during contract execution (Costello, 1988).

The Secretaries of the Military Departments, the Directors of Defense Agencies, and the Assistant Secretary of Defense (Production and Logistics) were asked to develop their own TQM implementation plan and to nominate a focal point for coordination of TQM at the working level.

The third major initiative on TQM within the DoD was the creation of the Total Quality Management Master Plan which was developed in August, 1988. This plan, discussed in Chapter 2, outlines the concepts and methodology of TQM, the long-range, mid-range, and short-range goals of TQM, and the specific actions that were used to initiate TQM.

One of the specific actions was the establishment of a DoD Executive Steering Committee. Secretary Carlucci specifically appointed the members of the DCIMI, Defense Council on Integrity and Management Improvement, as the DoD executive steering committee for TQM. The group was chaired by then Deputy Secretary of Defense, Mr. Taft, and had members from the top levels of the services (Carlucci, 1988C). This committee allowed the DoD to get

off to a good start by involving top leadership and obtaining their commitment and participation from the very beginning. The members of this committee then formed their own second level teams, and the members of those teams will eventually convene third-level teams.

Figure 1 displays this TQM Infrastructure.

The DCIMI, under the leadership of the Secretary of Defense and the Deputy Secretary of Defense shall function as the Executive Steering Committee for TQM (Department of Defense Directive, 5000.51 (draft), 1989).

Another major event within the DoD was the creation of the DoD Directive 5000.51. This directive establishes policy and assigns responsibilities for the implementation of the Total Quality Management concept in the DoD, in support of Executive Order 12837. It also authorizes publication of DoD 5000.51-G, TQM - A Guide for Implementation. This directive applies to the Office of the Secretary of Defense, the Military Departments, the Joint Chiefs of Staff, and the Defense Agencies (also referred to collectively as the DoD Components).

The directive also identifies the DoD policy on TQM and assigns specific responsibilities to the DCIMI, the Under Secretary of Defense (Acquisition) and the DoD components.

DoD 5000.51-G is being developed to support the implementation of DoD 5000.51. It is not the only method

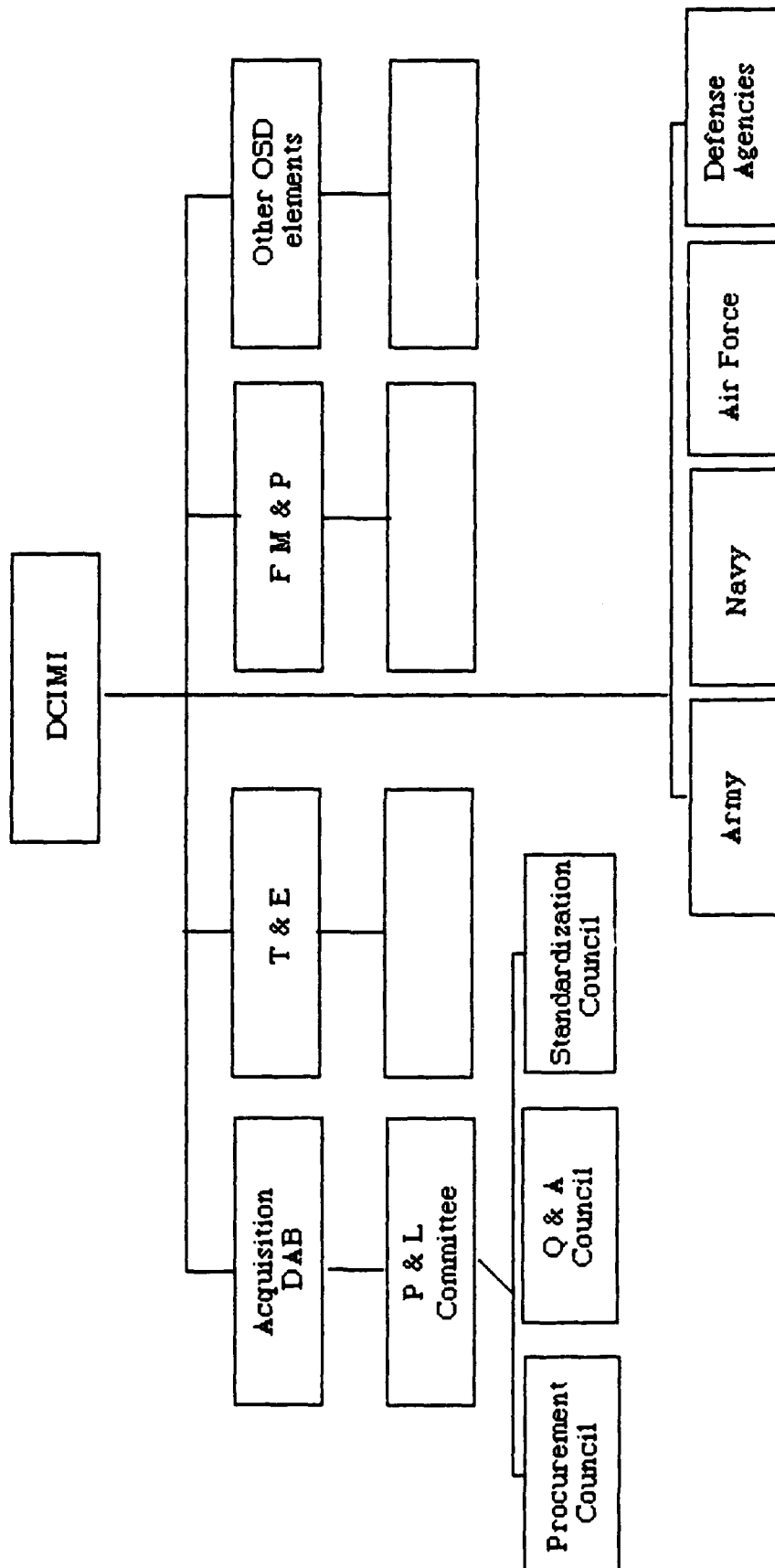


Figure 1. TQM Infrastructure

possible and is not intended to apply exactly to all situations. Rather, it is one approach that can be tailored to meet the needs of the user(s). The guide, though still in draft form, provides a seven step sequential model, which, if followed, will lead to continuous performance improvement (Department of Defense 5000.51-G (draft), 1989).

The seven steps are (Department of Defense 5000.51-G (draft), 1989):

- 1) Establish the management and cultural environment. This can be done by accomplishing the following: providing the vision for what the organization wants to be and where it wants to go; Demonstrating a long term commitment to implement change even when change may be difficult or perceived to have high front-end costs; actively involve all people in the improvement process and encourage and empower people to create the ideas and to make decisions within their area of expertise; use a disciplined approach involving the problem solving tools to overcome problems and achieve progress; ensuring that the proper supporting structure is in place; and by training all employees in the need for the benefits of TQM, and on the tools and techniques that will be used to achieve continuous improvement.

- 2) Define the Mission. The guide provides a seven step procedure for defining the mission: Identify the

customers you serve; identify the requirements of your customers; identify the products or services you provide to meet these requirements; review the previous steps with your customer and adjust as necessary; identify your principal inputs (labor, materials, products, services, etc.); review with suppliers your requirements and their conformance to them (making adjustments as necessary); finally; define your mission with respect to the previous steps.

3) Set performance improvement goals.

4) Establish Improvement projects and action plans.

5) Implement projects with performance tools.

This can be accomplished by first defining the process and identifying the customer and supplier requirements. Next develop and establish measures, assess conformance to requirements followed by identifying improvement opportunities. These improvement opportunities should next be ranked and finally, improve the process quality.

6) Evaluate the improvement efforts and identify areas for future improvement efforts.

7) Review the progress made and then begin the process all over again.

Training

The Policy Guidance Council tentatively designated the Defense Systems Management College (DSMC) as the leader in designing and implementing TQM training. DSMC has developed a training strategy for the DoD entitled, Total Quality Management (TQM) Education and Training Strategy for the DoD Acquisition Work Force. The purpose of the training strategy is to provide broad guidelines for planning and coordinating a TQM education and training program in the DoD acquisition work force (Department of Defense, 1989). The primary emphasis is on acquisition managers, although successful implementation of TQM will ultimately require education and training of the entire work force. Part of the strategies to capitalize on the TQM training resources already in existence within DoD. TQM capabilities which have developed within the DoD logistics system can be transferred to the acquisition system, to be supplemented with resources external to the DoD (Department of Defense, 1989).

This strategy has two objectives (Department of Defense, 1989). The first is to describe the educational requirements for TQM awareness program for managers that provide them with an overview of TQM principles and concepts. The second is to describe program goals, guidelines, and resources available to DoD training developers and managers who will subsequently be

responsible for follow-on education and training of their subordinates.

The training program has developed long-range, mid-range, and short-range goals for the successful institutionalization of TQM within the acquisition community. For the long-range goals, the process of educating DoD acquisition personnel in TQM will be in place, with the majority of the work force trained. Acquisition personnel who deal with the top 20 defense contractors will receive extensive education and training in TQM. TQM will be integrated into ongoing DoD education programs, with training now supplemented by outside public and private educational institutions (Department of Defense, 1989).

A critical mass of acquisition managers will be trained in TQM, for the mid-range goals, with TQM integrated into ongoing acquisition curricula and into existing professional development channels (Department of Defense, 1989). Acquisition managers responsible for specific weapons programs will receive extensive training. The training program for TQM facilitators and statistical experts will be in place. Continuing education packages will be developed and distributed for broad use, with course developers concentrating on programs for specific

applications. Those involved in design, delivery, and evaluation will use TQM methodology to facilitate their work and to ensure quality programs.

Following development of a TQM education and Training strategy, other detailed plans will be developed that addresses training of course developers, facilitators, statistical specialists, and TQM coordinators. This is the objective of the short-range goals.

To date, DSMC has developed two different courses, a one day Senior Management Seminar course and a six day General Management Awareness course. The one day course is broken into two parts. The first part is directed toward defining the key concepts of TQM and their transition into DoD activities such quality, process, variation, and continuous improvement. The second part of the training is designed to enhance team building and related skills (Department of Defense, 1989).

The DoD also has contracts with two consulting organizations to develop a two day awareness training course which will be offered to the people who work at Headquarters DoD (Angiola, 1989). The material, however, will be made available for all services/agencies when it is completed. When the awareness training begins, it is expected to take one year to complete. After that, the plan is to move into more detailed implementation courses. These courses will vary in length but will offer more

specialized training like statistical process control or continuous improvement.

To facilitate the training effort, the DoD has asked the two consulting organizations and DSMC to begin working together to ensure the consistency of the training (Angiola, 1989). This will allow all of the agencies to share their information so that no matter who conducts training, the same message comes across.

Two methods of conducting training has been observed. One method is using outside experts to come into the organization to conduct training. All organizations using this technique have allowed for eventual self training ability. For instance, The Aeronautical Systems Division (ASD) at Wright Patterson AFB has contracted with a consulting organization in Middletown, Ohio to provide training. The contract runs for a period of three years at a cost not to exceed six million dollars. There are options in the contract, though, for the consultants to train a cadre of instructors at ASD to enable self sufficiency after the contract expires.

The other approach has been to use Instructional Systems Development (ISD). ISD is a systematic process for planning, developing and managing training programs (Doherty, 1989:1481). This approach allows organizations to train their own people to be instructors without having them be experts. ISD is described in Air Force

Regulation 50-8, Policy and Guidance for Instructional System Development. The Air Force has adopted a model with five broad steps to describe the ISD process. These Steps are (Doherty, 1989:1481): analyze systems requirement; define education and training requirements; develop objectives and tests; plan, develop, and validate instruction; and conduct and evaluate instruction. The Air Force Logistics Command at Wright Patterson AFB with the help of The Air Force Institute of Technology and Air Training Command, has tailored this approach to meet their needs using only three phases: Planning, development and implementation (Doherty, 1989).

There have been several DoD schools that have been identified as being capable of providing TQM education and training like the Army War College, the Naval Post Graduate School, Air War College, and the Air Force Institute of Technology (AFIT). At the Air Force Institute of Technology, Major Kenneth Jennings and Lt Colonel James Lindsey developed a TQM implementation strategy for DoD managers entitled, "Roadmap to Total Quality Management": A Three Phase Approach. This 'roadmap' identifies three phases and ten milestones. They are (Jennings, 1989):

I. The Assessment and Planning Phase

Milestone 0: Readiness Review

Milestone 1: Executive Education

Milestone 2: Strategic Planning

II. The Process Management and Breakthrough Phase

Milestone 3: Process Ownership and Definition

Milestone 4: Process Simplification, Measurement,
and Control

Milestone 5: Process Improvement

Milestone 6: Breakthrough Projects

III. The Institutionalization Phase

Milestone 7: Information and Measurement Systems
Design

Milestone 8: Job and Task Design

Milestone 9: TQM Evaluation

A complete list and description of all of the phases and milestones can be found in Appendix B to this thesis.

IV. Department of the Air Force TQM Implementation

Introduction

The Chief of Staff of the Air Force, General Larry Welch, and the Secretary of the Air Force, The Honorable E. C. Aldridge sent a joint letter on 26 May 88, throughout the Air Force. In the letter, they stated that they "fully support the Secretary's memorandum and posture statement on quality" (Welch and Aldridge, 1989). They continued by adding that the personal support and involvement of Commanders at all levels throughout the Air Force is essential in achieving quality and in attaining the goals of TQM. "Request you give this endeavor your full support" (Welch and Aldridge, 1989).

Despite that early push, the Air Force does not have an official TQM program that includes all of its activities. To date, the Acquisition and Manufacturing community as well as the Logistics and Engineering-Research and Development (R&M 2000) areas have developed focused programs (Walker, 1989). The Air Force is moving toward a Department wide program. Policy letters and an implementation plan have been drafted. Primary direction for TQM will come out of SAF/MR, the office of the Under Secretary of the Air Force. The day to day action items will be handled by AF/PR (headed Major General Landis and Colonel Riggers)(Walker, 1989). When the Air Force

Implementation plan comes out, it will be similar to the DoD plan. Each Major Command (MAJCOM) and agency will be required to appoint a SES or FLAG level TQM focal point (Walker, 1989). In addition, they will be required to develop an appendix to the Air Force Plan.

The remainder of this chapter discusses some of the actions that have taken place to date throughout the Air Force.

LE-RD (R&M 2000)

Key Personnel:

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In response to the TQM effort, the R&M 2000 program, headed by LE-RD, has also begun to evolve. During October, 1988, AF/LE-RD sponsored a joint industry and DoD trip to Japan to gain a better appreciation of the Japanese management approach and their application of the modern engineering and production technologies. This trip revealed several findings (Johnson, 1988): First, they found that variability reduction technologies play an important role in eliminating scrap and rework and are a significant contributor in the F-15J's high reliability. They also found that the Japanese management approach is instrumental in achieving quality for these Japanese companies because they use a process-oriented approach

that nurtures team building and continuous improvement. They discovered that senior management is directly involved. Finally, teamwork, they discovered, and good human relations affect quality.

These same lessons are foundations for the TQM effort. In response, General Monroe Welch, Vice Chief of Staff, issued a policy letter requiring the acquisition commands to drive the maximum benefit from VRP by doing the following (Hatch, 1988):

- a. Ensure validated user requirements are the basis for all actions.
- b. Develop new systems or modifications/upgrades to existing systems simultaneously with their production processes are as fully integrated as possible to meet user requirements at the lowest possible cost. Evaluate progress in this area during each design review.
- c. Reduce performance variations in both the product and the manufacturing process until reaching the most cost-effective level.
- d. Finally, conduct training in variability reduction concepts and techniques for personnel working in acquisition and repair activities.

Directorate of Contracting and Manufacturing

Key Personnel

Mr. Dan Rak

Colonel Charles Williams

Mr. Ryan Bradley

Phone: 202-695-4976

The Acquisition community began officially implementing TQM following a 29 Nov 88 acquisition policy letter by the assistant secretary of the Air Force (Acquisition). The policy was in response to the Under Secretary of Defense letter dated 19 Aug 88. In the letter, Mr. Welch stated noted that the Air Force Executive Council on Acquisition TQM, chartered by the Assistant Secretary of the Air Force for Acquisition, will provide the means for review and approval of TQM policies, standards, and programs throughout the Air Force acquisition community.

Four objectives were cited as being fundamental to ensure that TQM becomes an integral part of the Air Force acquisition process (Welch, 1989):

- 1) Foster awareness and commitment. This can be accomplished by ensuring that all policies, procedures, and examples of successful implementation be incorporated in training courses, workshops, articles, and speeches so that all members of the acquisition workforce understands, accepts, and implements TQM.

2) Incorporate TQM in the Acquisition Process. The commands must identify and implement strategies that deliver robust products, focus on essential requirements, shorten development, build and repair time, increases design and manufacturing productivity, eliminates defects, scrap, and rework, and support continuous improvement.

3) Assess the effectiveness of TQM Implementation. Program executive officers and Program Directors were charged with assessing the effectiveness of TQM implementation and making or suggesting changes in policy and processes to foster continuous improvement.

4) Eliminate barriers to TQM implementation. Barriers to successful implementation of TQM must be identified and successfully eliminated by developing incentives that stimulate performance improvements.

The Acquisition Commands were then directed to use these objective as the initial framework of TQM implementation. The remainder of this chapter looks at how these commands have began implementation.

Air Force Logistics Command

Key Personnel

Colonel Darrel Grapes, AFLC/QP

Major Steve Doherty

Phone: AV 257-5316/6773

The quality program within AFLC began shortly after the arrival of General Alferd G. Hansen in 1987. At a 17 Dec 87 Quality Council meeting, the General stated that "The time has come for us to shift our emphasis away from evaluating the goods and services we provide at the end of the process ... and toward the process itself by which goods and services are actually provided" (Brownlee, 1989). Those philosophies were consistent with the current quality assurance department, but now emphasis would be from the top down to the lowest levels, beginning with his office. He added that the new AFLC quality effort would "represent a cultural change wherein quality becomes everyone's responsibility" (Brownlee, 1989)

General Hansen sent out a letter to all of the ALCs and other centers on 2 Dec 87. This letter identified the quality program office which combined R&M and QA resources. The primary purpose of this office was to set the Commander's quality agenda (Hansen, 1987). Each Command DCS Staff element, the LOC, AFALC, and AFCMC were tasked to identify the key processes that represented

their mission along with the pertinent process control that could be used to alert management when corrective actions were required. Each ALC was then tasked to identify their processes as well (Hansen, 1988).

In another key move that seemed to set a precedent, a new position was created to handle quality matters. Assistant to the Commander for Quality Programs was created in January of 1988 replacing the AFLC Quality Council Executive Office. In February of the same year, QP offices had been established at all of the ALCs mirroring the Headquarters. Noting that attempts to improve quality had become nearly an obsession ... with many U.S. manufacturers," the AFLC Commander explained his vision succinctly: "My intent is to bring AFLC in line with thesis quality revolution. It's time we substitute an 'ounce of prevention' for a 'pound of correction'" (Brownlee, 1989).

General Hansen recognized some key lessons learned that he detailed in a 22 Aug 88 letter. He stated that they had learned first that quality is not easy. Quality would require hard work and it couldn't be accomplished by a contractor. Second, basic logistics process understanding, simplification and continuous improvement are also difficult. Reorganization may be required since basic processes are horizontal while they are vertically organized. The third lesson was that quality cascading

would play an important role in convincing the work force that AFLC was serious about quality. Finally, they learned that consistency through ownership was more effective than standardization by direction from the headquarters (Hansen, 1988B).

QP4

The success of the AFLC program must be measured by the product delivered to their customers, both internal and external. This is the rationale behind the creation of the QP4 program. QP4 stands for Quality equals People + Process + Product + Performance (Hansen, 1988B). In this formula, quality is a condition not an organization.

The term Product includes both products and services customers expect. People refer to a work force totally involved in quality that without, there would be no quality. Process represents "a fundamental shift in the focus from the product or service." This is the key to improvement. "Basic understanding, process understanding, simplification, and continuous improvement is the cornerstone of the command program. Finally, the performance of basic logistics processes and the ability to measure the process performance is crucial to continued quality improvement (Hansen, 1988B).

Strategic Implementation Plan

AFLC has developed a draft Strategic Implementation Plan (SIP) 88-3-1. The SIP defines the corporate issues and challenges associated with AFLC Strategic Objective 88-3 which is to "instill quality in our basic processes and work force to ensure responsive and productive logistics support" (Air Force Logistics Command, 1989). It is in direct response to DoD Directive 5000.51, Total Quality Management (draft). Their strategy will be to establish and institutionalize a Total Quality Management cultural and management environment at every level and in all areas of responsibility (Air Force Logistics Command, 1989).

The SIP identifies responsibility for the success of TQM stating that first, senior management is responsible for creating a positive environment for AFLC people to pursue innovative approaches to institutionalizing TQM across the command. Second, middle management is charged with translating policy and direction into meaningful action by the work force since they stand between senior management and the work force. Therefore, they must be armed with the support and tools to ensure continuous process improvements (Air Force Logistics, 1989).

AFLC has developed a pair of companion strategies to accompany their SIP. Strategy 88-3-2 is designed to

educate and train AFLC's work force to deal with emerging logistics challenges and advancing technologies consistent with functional area management objectives. Strategy 88-3-3 justifies and defends manpower requirements and funding levels.

Quality Bill of Rights

To facilitate the quality movement across the command, a Quality Bill of Rights was developed and distributed command wide. These 'Rights' acknowledged that employees were an essential part of the quality movement and solicited their contributions for improved quality, safety, and productivity. The rights afforded each employee are (Hansen, 1989):

1. The Right to challenge business as usual. Any worker can question the way their operation is managed or operated. Because employees are intimately familiar with their daily work routines managers should encourage them to challenge processes.

2. The Right to be heard. Employees are promised a voice in the operation of their processes and management is obligated to listen. Workers, because of this

protection, can express themselves without fear of reprisal. The right relates to written, oral and other proper means of expression.

3. The Right to expect commitment to quality. All workers have the right to expect their supervisors to set work habits consistent with accountability, dedication, and the desire to "be the best" in their profession.

4. The Right to place quality before production. Product quality will meet or surpass customer expectations. Quality should not be linked to a production quota but instead be indicative of worker commitment to quality. Responsible action should be taken to halt production and remedy defects when processes are substandard. Production quotas will not overshadow quality.

5. The Right to feel genuine pride in AFLC products and services. All employees should know that AFLC processes are being challenged, studied, and enriched daily because of the command commitment to quality.

Process Action Teams

As part of the QP4 initiative, common sense also dictated that workers themselves knew best how to improve

the products and processes they faced everyday. Consequently, AFLC officials asked employees to examine their production methods by using Quality Circles and the fledgling Process Action Teams (PATs), vehicles which both conformed to Dr. Deming's principles that all processes could be enriched (Brownlee, 1989). Basically, workers were in better positions to see problems than those policymakers sitting in distant offices removed from the daily "hands-on" experiences (Air Force Logistics Command News Service, 1988)

This concept applies to all elements of AFLC, although they have been adopted from the maintenance community. A PAT is directed by management and assigned based on key process identification, understanding, prioritization and simplification. They are assigned to specific segments of a process with a clear objective to achieve. A PAT includes all of the functional activities involved in achieving their management assigned objective. This is the fundamental difference between a PAT and a traditional quality circle. Management must understand the scope of the problem and ensure objectives are achievable within a reasonable period of time, usually between four to six months. Once the PAT has achieved its objective and recommendations are in the hands of management, has the obligation to implement the teams recommendations (Hansen, 1988B).

Center Implementation

The AFLC Strategic Implementation Plan will require all Centers to provide a Strategic Implementation Plan Annex as a supplement. The annexes will brief and will reflect critical processes and goals and strategies to improve those procedures (Air Force Logistics Command, 1989). All of the Centers have already established quality centers within their organizations according to Major Steve Doherty of the AFLC/QP office. Further, he added, some of them have already developed and have published their own implementation plan. The goal is to have each of the centers "mirror" the Headquarters program but yet allow the flexibility for each of them to develop strategies to meet their own unique processes (Doherty, 1989B). The following is a list of all of the centers and their primary POCs for Quality implementation.

ORGANIZATION	NAME	AUTOVON
AFALD/QP		
	Mr Tim Sharp	785-8728
AFCMC/QM		
	Capt Kurt Stonerock	785-3044
AGMC/QP		
	Mr Mike Foran	346-7384
AMARC/DP		
	Mr Gary Criss	361-5344
CASC/QP		
	Mr John Zellers	932-5179
ILC/QP		
	Ms Kay Veal	787-8103
AFLC/DSXM		
	Mr Don Loe	787-7519
LOC/PNO		
	Capt Richard Kranesky	787-2966

Medical Center/SGHB	Colonel Gerard Tuttle	787-0168
OC-ALC/QP	Lt Col James Winn	339-5039
OO-ALC/QP	Mr Gin Russel	458-5925
SA-ALC/QP	Mr Rodney House	945-9301
SM-ALC/QP	Colonel Carl Gaymon	633-1164
WR-ALC/QP	Colonel Ron Hoch	466-0719
2750 ABW/XPP	Ms Vanessa English	787-5276

Training

Central to the TQM implementation is an integrated education and training program for the AFLC workforce. Education in this context is that portion of the program concerned with the teaching of TQM principles and concepts and the learning of skills and methodologies related to their application. The intent of the program is to institutionalize TQM within the entire organization (Doherty, 1989). In order for this to happen, the entire AFLC workforce will have to be trained. In addition, continuing education tailored to the specific jobs and organization needs will be required.

AFLC has developed a TQM/QP4 Training Development Plan which contains a model for education and training. The model is tailored from the Instructional Systems Development methodology discussed in chapter 2. The model, co-developed by AFLC, the Air Force Institute of Technology and Air Training Command, is divided in to

three phases: Planning, Development, and Implementation. The planning phase is designed to analyze the TQM requirements by doing front end analysis to determine the training program goals, survey existing training, identify course developers, and identify resource requirements (Doherty, 1989). The Development phase consists of training analysis and course development. The implementation phase which will require training for instructors in their new roles and orientations for supervisors and managers in their supportive actions. This will allow for planning and preparation for maintenance and implementation of the TQM training system (Doherty, 1989).

The Training Development Plan has also established a Training Planning Team (TPT). The TPT is the vehicle through which the AFLC organizations provide the Quality Office HQ AFLC/QP with assistance essential for the successful management of the training function (Air Force Logistics Command, 1989B). The TPT is chaired by HQ AFLC/QP, the TQM Program Office; co-chaired by HQ AFLC/QP, the Directorate of Civilian Personnel; with co-chair assistance from Air Training Command through HQ AFLC/TTGT, the ATC Training Advisor to AFLC (Air Force Logistics Command, 1989B).

Success Story

A white collar process that was addressed under QP4 involved the stock control and distribution system (ADP Modernization Project) at OC-ALC. There was a perception that the system was not working as designed. A team of experts from the Headquarters went to OC-ALC to solve the problems and found the system performing to specifications. However, there was an excessive backlog of transactions, significant data base spills, late reports, and unacceptable user functions of the SC&D process. The team analyzed interfaces. "Interfaces" refers to how the system is fed, by whom, etc. Their recommended changes to the process were adopted, and by October, significant improvement was noted.

Another successful effort has been the work that the AFIT/LS Quality Working Group has done for The Air Force Acquisition Logistics Division (AFALD). The consultations have covered Strategic Planning and Training using the "Roadmap To Total Quality Management" approach discussed in Chapter III. The first step was a two day Strategic Planning meeting with the senior managers followed by training of several Process Action Teams (PATs) within AFALD to include each directorate and division. The projects so far have been to streamline the logistics process in the acquisition of new weapon

systems. This has led to the streamlining of several policies and procedures.

Air Force Systems Command

Key Personnel

Brigadier General Doneen, Special Assistant For TQM, Mr
Charles Hooper, Major Margaret Charles
Captain Glen Drives
Mr Scott McClinden

Phone: 878-6869/7838/6613

Background

The Commander of Air Force Systems Command, General Bernard Randolph, began to advocate quality within AFSC on 12 May 88. That is when he sent out a letter outlining TQM in AFSC. In the letter General Randolph stated that he makes "no distinction between TQM and the mission of Air Force Systems Command (Randolph, 88). He identified four essential factors that are key to TQM success: management commitment, people development, quality excellence, and user satisfaction. Further he stated, "I am committed to make TQM 'A way of life' in AFSC" (Randolph, 1988).

To facilitate the implementation of TQM throughout AFSC, a Corporate Board of Directors has been established.

This Board consists of General Randolph, The Product Division Commanders, The General officer DCSs at HQ AFSC, and the Commanders at FTD, AEDC, and The Flight Test Center (McClinden, 1989). They have met once, in January. A future meeting is planned that will be facilitator training to help them develop a corporate vision and a set of corporate goals for the divisions to use for planning purposes and to try to structure the effort of the entire command (McClinden, 1989). This meeting is pending planning efforts of the Defense Management Review issues dealing with Acquisition Reorganization that have arisen.

It was recognized in the January meeting that each of the product Divisions were proceeding along with their own programs tailored to meet their own process needs. The problem, however, was the confusion that it was causing Government Contractors. Request for Proposals contained different requirements, not only from each of the product divisions, but also from each of the Services. Recognizing the problems that this was causing, a consensus was made that top level planning is required to spell out where AFSC will be going with the TQM effort over the next several years (McClinden, 1989).

The TQM effort in AFSC has began initiating efforts to expose everyone within the command to TQM. In addition, they have also encouraged Contractors to join in on Quality Improvement efforts as well. Contractors will

not be told what specifically they want them to do. In fact, there is an agreement within the command that they do not want to develop any contract language. "But there are things that they need to do and they are going to have to make informed judgements" as to which one of the quality philosophies best work for them. "What we want are results" (McClinden, 1989). The forthcoming planning session will have on the agenda which results does the command want. Some possible results could be cost reduction, in field failures, and/or reduction in the time it takes to design a test and produce a systems. This will allow the System Program Offices to approach contractors in one accord.

To date, AFSC does not have an implementation plan. The planning meeting with the Corporate Board of Directors will be laying the ground work that will allow better for a plan to be developed. Training is another issue to be worked. The ultimate goal is to develop a standardized training program (McClinden, 1989). To date, several organizations are using different training sources so they can determine which ones are good, which ones are bad, and which ones apply. From that they will attempt to identify the best training and put together a listing of the courses for the various classes of people at various levels need.

Aeronautical Systems Division

Key Personnel

Colonel Ronald Fullerton, (ASD/CCT)

Major Frank Roth (External) (ASD/CCT)

Ms Eve Vaught (Internal) (ASD/CCT)

Mr Dale Weisman (Training) (ASD/CCT)

Phone: AV 785-1775/9984

Background

ASD's initial contact with TQM was in the Propulsion Systems Program Office (SPO). Early in 1987, Colonel Howard Bethel, the SPO Director, became aware that an engine manufacturer was engaged in an organizational transformation process called "Q+." The management of that company recognized change was required in the way they operated their organization. To help them, they obtained the professional services of a consulting group who developed techniques for instilling a TQM culture (Alexander, 1989). These techniques proved successful for them and the engine manufacturer, so Colonel Bethel followed suit.

A couple months after the Propulsion SPO began using the "Q+" process, the Training Systems SPO, which was

headed by Colonel Wayne Lobbestael, also began using the assistance of the consultants. Both SPO directors saw big differences in their organizations and recommended to the then Commander of ASD, Lt General Bill Thurman, that these techniques be made available to the rest of the organizations at ASD (Alexander, 1989B). Their recommendation was approved.

The ASD has contracted with that consulting company to provide training and to facilitate the introduction and operation of the TQ structure. The contract was awarded on 15 July 88 and extends for a period of three years. A six million dollar cap has been placed on the contract. There are options in the contract for training their own instructor cadre that will enable self sufficiency after the initial training has been conducted and the TQ system is initially operational (Aeronautical Systems Division, 1988).

Implementation Plan

ASD has developed a TQM Implementation Plan which outlines the approach they will take to implement TQM. "Implementation involves adopting a Total Quality (TQ) approach in conducting our internal operations as well as incentivizing our suppliers, the Aerospace Defense

Contractor Community, to produce a quality product and motivating them to adopt a TQ approach in their operations (Aeronautical Systems Division, 1988).

Their objective is to deliver products and services to the user that consistently conform to requirements that satisfy his needs and expectations. In addition, the plan identifies three goals: meet user's needs; maintain acquisition excellence; and enhancing technological superiority (Aeronautical Systems Division, 1988)

The ASD approach to TQM is guided by a vision of the organization. The vision is a statement of what the organization is, what it is trying to achieve, and how it is to conduct itself. The ASD Vision is: "We are the Aeronautical Systems Division, the center of excellence for research, development and acquisition of aerospace systems. We work together to create quality systems for combat capability to ensure we remain the best Air Force in the World and preserve the American way of life forever" (Alexander, 1989B). ASD believes this vision can only be realized through the practice of TQM. To guide the organization, the ASD Commander, Gen Mike Loh, established a set of principles which describe how ASD should be operating in a TQM environment. The principles serve as benchmarks. They are as follows (Alexander, 1989B):

1. Change the culture - make the Total Quality approach A Way of Life.
2. Commit fully to the Command's policies and goals.
3. Know and satisfy our customers needs.
4. Delegate responsibility and authority - accept accountability.
5. Give everyone a stake in the outcome.
6. Set goals, compete, measure progress, and reward.
7. Strive for continuous improvement - make it better.

V. Department of the Navy TQM Implementation

Key Personnel

Mr. Gerard Hoffman, Director, ASN (S&L)

Mr. Patrick Malone, ASN, (S&L) SPCAG

Background

The Official TQM program within the DON began after the signing of Executive Order 12552 on 25 February 86 and the subsequent release of Executive Order 12637 on 27 April 87. In June 1987, the Secretary of the Navy, Chief of Naval Operations, and Commandant of the Marine Corps signed the DON Productivity Improvement Guiding Principles (Department of the Navy, 1988). This was not the first attempt at productivity improvement, however. From 1984 to 1986, the Secretary of the Navy Conducted a top-down review of industrially funded activities to identify improvements and make recommendations based on the application of private sector industrial management and control techniques.

In September and October 1986 and February and March of 1988, the DON conducted productivity workshops to develop the basis for the DON Total Improvement Action Plan (Department of the Navy, 1988). The workshops focused on performance improvement perspectives of senior level field activity commanders with subsequent Flag-Level

Steering Group deliberation of similar performance improvement issues. The workshops developed a series of roadblocks to improvement. They included: system and tradition encourages status quo; bureaucratic barriers to effective management; need for top level "champions"; no clear, cohesive, compelling long range vision and plan; diffused focus on what's important and how to measure success; and finally, lack of incentives to improve productivity.

As a result of the improvement need identified by the workshops, it became clear that those improvements sought by the DON relate to Total Performance Improvement of which quality improvement is a significant part. Other factors included are productivity, timeliness, effectiveness, quality of work life, innovation and budgetability. A subsequent planning meeting between the Flag Level steering group and the Undersecretary of the Navy in September 1988 concluded that TQM is congruent with most of the Total Performance Improvement objectives and that Total Quality Management would be viewed as the primary driver to long range overall total performance improvement (Department of the Navy, 1988).

On 4 November, 1988, the Undersecretary of the Navy, H. Lawrence Garrett, III, forwarded the DON TQM Implementation Plan in response to the 19 August 88 tasking by the Undersecretary of Defense (Acquisition)

(Department of the Navy, 1988b). The plan specified that TQM will be implemented at all levels within the Navy and Marine Corps. The fundamentals of TQM will be applied to all processes associated with supporting naval and marine forces including the acquisition of systems, equipment, supplies, facilities, and services to assure continuous improvement of products and services being provided to, and by, the DON. The purposes of the plan was to provide guidance for implementation to TQM throughout the DON as the primary means of achieving continuous performance improvement, establishing goals for TQM implementation and for continuation of Total Performance Improvement efforts responsive to Executive Order 12637 and implementing directives, to subject existing value added strategies, such as acquisition streamlining, to TQM philosophy to achieve continuous improvement in the DON acquisition process, and to establish responsibility and publish the strategies for meeting the goals outlined in the implementation plan (Department of the Navy, 1988)

The DON TQM Implementation Plan identified seven fundamentals:

- 1) Adopt Principles of the DoD Posture on Quality Support with a unified top level commitment. TQM demands leadership and involvement in continuous improvement

efforts. It provides a vehicle for achieving high levels of overall performance compatible with the DON Productivity Improvement Principles.

2) Recognize decentralized management giving subordinate commands within the DON the autonomy to prescribe their own procedures for implementation of TQM.

3) Establish a steering Group to implement TQM and demonstrate leadership in a continuous improvement process.

4) Emphasize teaming and interlocking network of Quality Management Boards (QMBs) and Process Action Teams (PATs).

5) Train DON managers and personnel, beginning with top management.

6) Stimulate industry through encouragement and positive contractual arrangements.

7) Provide room to succeed (resources and encouragement) and reward success: recognize consistent quality achieved through teamwork and leadership.

Goals

The goals of the DON TQM program represent a combination of TQM goals and other performance improvement goals outlined in previous Total Performance Improvement Action Plan. All were developed through a consensus building process which included Executive Level

Steering Group and senior field level manager deliberation. The OMBs and PATs are responsible for using these goals to make the transition to TQM. The goals are (Department of the Navy, 1988):

- 1) Demonstrate top management support and involvement in TQM.
- 2) Stimulate and maintain active participation in TQM implementation from key organizational components and their managers, supervisors, and employees.
- 3) Educate all DON personnel in TQM perspectives and train appropriate personnel in concepts and techniques for TQM implementation starting with top management.
- 4) Improve the DON acquisition process through TQM while stimulating and maintaining industry interest through publicity and conspicuous support for TQM concepts.
- 5) Identify and remove roadblocks to improvement by eliminating or modifying inhibiting regulations and reducing processing time for Model Installation Program (MIP/MIEP) waivers.
- 6) Integrate TQM planning into the DON planning, programming, and budgeting process to support TQM implementation.

7) Develop and implement a master plan for aggressive use of productivity enhancing capital investment programs.

8) Establish at all commands and activities indicators of progress to be used as tools for improvement of internal processes as well as the basis for reporting organizational progress toward the Presidents goals.

Strategies

Specific functions have been identified as priority improvement targets. These functions constitute the bulk of the in house industrial shore establishment that provide support to the fleet and have high potential for significant near term improvements. The objective is to achieve the Presidents goal of three percent annual productivity improvement in designated functions. Specific improvement targets and basic action areas are as follows (Department of the Navy).

1. Naval Shipyards: The initial improvement target for naval shipyards was a \$500 million reduction to the POM-87 baseline with the same workload to be accomplished. This baseline has been reduced to \$469.7 million to compensate for availability deferrals and program changes. The Naval shipyard Corporate Business Strategy and Plan, 1 May 1987, established ten goals with

multiple objectives which are being implemented to improve shipyard operations. The ten goals are: retain technical excellence and improve quality; increase productivity of direct labor work force; improve financial management; reduce cost of material and material support; maintain capital plant; reduce overhead costs; improve organization and customer relations; improve our management of human resources; emphasize environmental protection and hazardous waste management; and install modern management information systems.

2. Naval Aviation Depots: The target initial improvement for NADEPs was \$136 million in cost avoidance during FY-87 based on FY-85 actual expenditures. A savings of \$172 million was realized. Target reductions for FY-88 and FY-89 are an additional \$200 million and \$210 million respectively.

3. Weapons Systems Maintenance Activities: The target improvement for weapon systems maintenance activities was \$60 million for FY-86, \$90 million for FY-87, \$60 million each for FY-88 and FY-89, and \$30 million for FY-90. The baseline is FY-85 actual expenditures. Savings for the first two years were \$187.4 million against the target of \$150 million. Additional goals to be accomplished by FY-90 are ahead of schedule.

4. Public Works Centers: The target improvement for PWCs is a 25 percent reduction in costs by January 1990 using FY85 as the baseline. PWC commanding officers will distribute the savings goal between their direct labor, material, and overhead expenses.

5. Marine Corps: The improvement target is to eliminate anything that works against the Marine Corps' ability to win in combat when called upon.

Reorganization and streamlining efforts have been initiated in the supporting establishment to shift scarce resources into combat units and readiness initiatives. Headquarters elements are being reduced, reporting and paperwork requirements reduced or eliminated where possible, and unnecessary levels of bureaucracy eliminated. Acquisition functions have been consolidated under the Marine Corps Research, Development and Acquisition Command. This reorganization is intended to reduce the time and cost of fielding combat equipment.

6. Supply Functions: Initial improvement targets are in physical distribution functions at the Naval Supply Centers. Specific improvement targets for FY-92 are reductions in unit cost and achieving established goals in receipt time, and record accuracy rate, the rate at which supply centers are able to initially fill valid requirements.

Structure

The DON has not created a special organization for implementation of TQM. A structure was created, however, for managers and workers to take the actions required for continuous improvement of DON processes. Subordinate commands are given the authority to establish a structure which meets their needs.

The DON Executive Level Steering Group is the top of the structure for TQM implementation. Chaired by the Under Secretary of the Navy, membership includes: all Assistant Secretaries of the Navy; the Vice Chief of Naval Operations; the Assistant Commandant of the Marine Corps; the Deputy Chief of Naval Operations (Logistics); and selected second echelon commanders. A trained facilitator will be assigned to assist the Steering Group in defining processes and reaching consensus on issues and actions.

Successful Prototype

Over the past several years, many DON field activities have implemented TQM. One of the most successful implementations has been at the Naval Air Systems command and its six depot maintenance facilities, exemplified by the Cherry Point Depot which was selected by the Office of Management and Budget as a Quality Improvement Prototype in the President's Productivity Improvement

Program. Cherry Point was recognized as a leader in implementation of the priorities cited in the continuous improvement thrusts that was developed by each of the Depot commanders because they were faced with the pressures of continued competition, reduced operating budgets and demands for more sophisticated technical and factory support (Office of Management and Budget, 1988).

Faced with the private sector and other depots, Cherry Point's principal areas targeted for improvement are: timely and quality service for its customers, lower composite labor rates, enhanced business systems, and technology advancement.

Number one among depots in overall performance indicators, Cherry Point has taken a lead role, not only in advanced technology applications, but also in reinforcing employee involvement through its gainsharing program. In February of 1988, Cherry Point employees received their first share of savings achieved by the depot (Office of Management and Budget, 1988).

While the Cherry Point program is long term in scope and effect, significant improvement in the "bottom line" has already been seen. With revenues approaching \$300 million in Fiscal Year 1987, customers are getting more for their dollars. Systems and processes are being

improved dramatically. Factory operations have been improved and error rates have been reduced in many manufacturing and business functions.

VI. Department of the Army TQM Implementation

Key Personnel

Mr. Steve Burdt, Director, SARD-ZE

Mr. Steve French, SARD-ER

Phone: (202) 695-3515

Background

The Army began using some of quality management tools as early as 1985 when they were using the techniques of Statistical Process Control to monitor contracts (French, 1989). Other process improvement efforts were introduced in 1986 and 1987 but the major push came in 1988. That is when the organizational Senior level committee began meeting. The committee was made up of the Secretary and Under Secretary of the Army as well as several General officers. This committee has met three times. In addition, each member of the committee heads their own committee with further committees stemming from those. Then in November of 1988, the Army Implementation Plan for Total Quality Management was published.

The Army Total Quality Management Implementation Plan for Acquisition responds to the Under Secretary of Defense for Acquisition requirement of 19 August 88 that Services develop a plan for TQM implementation. The Secretary of the Army and the Chief of Staff, Army, are

firmly committed to TQM implementation and issued a joint message on the Department of the Army Posture on TQM. The message stated that TQM is a tool which must become an integral part of every functional activity in the Army to include every level, organization, government as well as industry (Vuono and Marsh, 1988). They went on to say that "the role of our suppliers cannot be ignored. They are an integral part which must be totally involved in the process improvement efforts" (Vuono and Marsh, 1988).

To date, the Army plan applies to the "Total Army Acquisition Community" which includes the DA Staff, MACOMs, subordinate commands, organic depots, plants, arsenals, laboratories, and all other organizations involved in the development and acquisition of Army material, goods, services, and facilities (Department of the Army, 1988).

Strategy

The Army TQM long strategy calls for the acquisition community to change its way of doing business to achieve continuous process improvement on a wide scale. To achieve Short and Mid Term goals calls for a vigorous and disciplined efforts to be taken to achieve a lasting cultural change in the acquisition workforce (Department of the Army, 1988). Through top management commitment and leadership and intensive training of all

levels of the work force, the goal is to change the business of acquisition to focus on the following (Department of the Army, 1988):

- a. process, vice product, orientation.
- b. Structured and integrated organizational infrastructure for policy deployment and progress review.
- c. Comprehensive, integrated teaming structures linked from the top the bottom of the acquisition work force.
- d. Customer/ User acceptance of product and services.
- e. Utilization of systematic, disciplined process improvement methodologies.
- f. Acceptance of process ownership and accountability for process effectiveness by the work force.

The Army Plans to involve industry with their TQM efforts also by influencing those who contract for ARMY acquisition business. The push will be to get them to adopt TQM philosophy in their operations and to insure it is adopted in those of their subcontractors and suppliers. Those efforts include:

- a. The development of procedures and practices which measure and reward successful implementation of TQM in the contract award process.
- b. The development of incentive methods to motivate early implementation and celebrate successful implementation.

c. Priority commitment of those resources necessary to ensure timely, adequate and thorough training.

d. Close association with DoD, sister services and industry TQM efforts to insure efficiency in TQM implementation.

Implementation Tasks

Infrastructure. The overall ARMY TQM effort is the responsibility of the Army Total Quality Management Committee (ATQMC), which reports directly to the Defense Council on Integrity and Management Improvement. The ATMC serves as the management oversight arm of the Under Secretary of the Army for TQM. Initially, their main role will be to oversee the implementation of TQM in the acquisition process but will expand its oversight to non acquisition elements. It will be supported by functional work groups which will be created and abolished as needed to address specific issues, products or processes. Executive Steering Committees (ESCs) will be established at the Major Command (MACOM) and the Major Subordinate Command (MSC) levels and will be chaired by the commander. Figure 2 depicts this organizational structure.

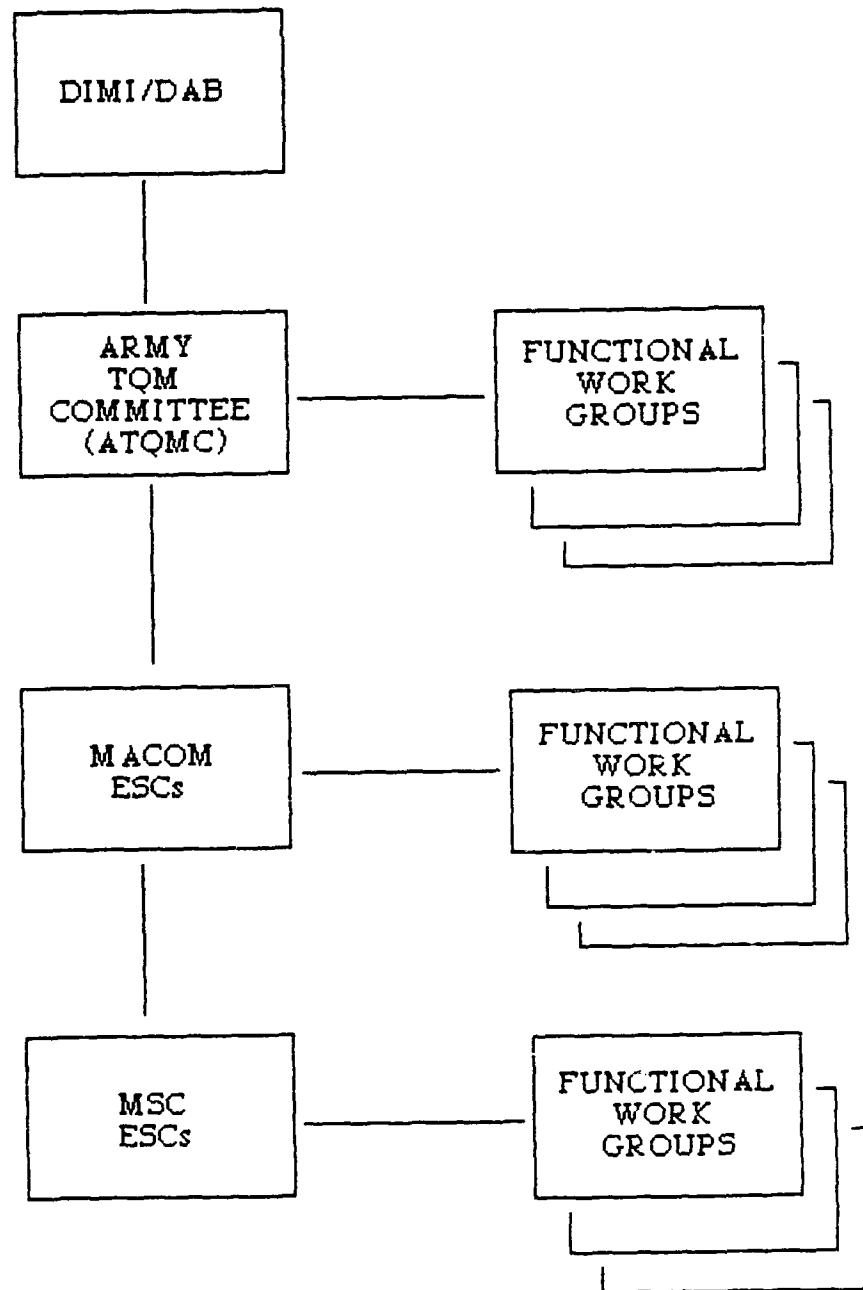


Figure 2. Department of the Army TQM Infrastructure

Milestones

Eight implementation tasks have been developed each with its own set of individual task elements. In addition, milestones for each task have been set. These milestones represent a continuing series of events for each event and will be updated on a yearly basis, in December. The task elements and milestones are as follows (Department of the Army, 1988 and French, 1989):

<u>TASK</u>	<u>MILESTONE</u>
1. Infrastructure	
a. Identify Army Focal Point for TQM.	Complete
b. Establish working group to support Army Total Quality Management	Complete
c. First meeting of ATQMC for TQM	Complete
d. Establish Major Command Executive Steering Groups (ESC)	Complete
e. Establish functional work groups to support Major Command ESCs	Complete
f. Establish MSC Executive Steering Groups	Complete
g. Establish Functional Work groups to support major subordinate command ESCs	Incomplete (Feb 89)

- | | | |
|-----------------|--|------------------------|
| h. | Develop Major Command TQM
Implementation Plans. | Incomplete
(Mar 89) |
| i. | Develop Major Subordinate Command
TQM Implementation Plans | Incomplete
(Apr 89) |
|
2. Training | | |
| a. | Host first executive one day
TQM session. | Complete |
| b. | Conduct ATQMC/MACOM CDR/ARSTAF
principal TQM training. | Complete |
| c. | Identify and retain consultant(s)
for TQM training. | Incomplete
(Feb 89) |
| d. | Identify four day TQM session
for ATQMC functional work group
members. | Incomplete
(Mar 89) |
| e. | Publish Army training plan. | Incomplete
(Apr 89) |
| f. | 100% ESC members receive one day
executive training. | Dec 89 |
| g. | 100% working group members receive
four day management training. | Dec 89 |
| h. | Establish in house training programs
at appropriate institutions. | Dec 89 |

3. Evaluation

- | | |
|--|---------------------------------|
| a. Develop measures to relate progress of TQM implementation and success. | Incomplete
(Jun 89) |
| b. Develop guidelines for annual command report which reflects TQM measures. | Incomplete
(Sep 89) |
| c. Conduct first year end review of TQM implementation progress. | Dec 89 |
| d. Update TQM Implementation Plan. | Dec 89
and yearly thereafter |

4. Involve and Influence Industry

- | | |
|---|------------------------|
| a. SARDA, MACOM and MSC ESCs provide briefings to contractor executives and industrial associations on TQM plans. | Ongoing |
| b. Establish Joint Army-Industry teams to identify and eliminate roadblocks to successful TQM implementation. | Incomplete
(May 89) |
| c. Expand the Contractor Performance Certification Program adoption of TQM. | Complete |

d. Develop and implement the Army Exemplary Contractor Program to provide publicity and recognition to contractors who achieve High TQM payoff on Army Contracts. Complete (Jun 89)

e. Conduct Joint Government/Industry Seminars for exchange and feedback on TQM practices, tools, and techniques that are providing substantial payoffs. Complete

5. Government Support to Industry

a. Publish procedures and practices which measure and reward successful implementation of TQM in the contract award process. Ongoing with DoD (Jun 89)

b. Develop incentive techniques for inclusion in contracts to reward cost reductions achieved through TQM application. Oct 89

c. Develop and fund manufacturing technology thrusts for application of advanced technologies to processes which have inherently been inefficient. Nov 89

d. Develop and implement program for sharing contractor investments for Dec 89

productivity improvement as a
financial motivation for near term
application of state-of-the-art
technology for process improvement.

6. Policy

- | | |
|--|----------|
| a. Publish an Army Posture Statement on
Total Quality Management. | Complete |
| b. Develop action plan for elimination
of roadblocks to TQM. | Oct 89 |
| c. Identify the Army Regulations and
Pamphlet which require modification
due to TQM and schedule their revision. | Nov 89 |
| d. Update Templates (Transition from
Development to Production,
4245.7-M) to include TQM. | Complete |

7. Awareness and Motivation

- | | |
|--|---------|
| a. Brief industrial associations. | Ongoing |
| b. Visit contractor organizations to
publicize Army TQM interest and
keep up to date on contractor
implementation progress. | Ongoing |
| c. Develop and implement a program
for group sharing and for command | Sep 89 |

reporting of savings resulting from
TQM implementation.

- d. Develop and implement a recognition Oct 89
system to honor team achievement
at each command.

8. Initiatives

- a. Define the objectives, common and Ongoing
unique components, divergent or
conflicting elements.
- b. Synchronize and eliminate conflicting Ongoing
elements of initiatives.

Current Initiatives

Several programs currently underway within the
Department of the Army are directly related to TQM.
Coordination of these efforts are hoped to ensure
uniformity of purpose, resource efficiency and more
effective and timely institutionalization of the Army
TQM program. Those programs are (Department of the Army,
1988C):

- 1) Army Quality Program (AR 702-11).
- 2) Could Cost.
- 3) Reliability, Availability, and Maintainability
(RAM) (AR 702-3).

4) Computer-aided Acquisition and Logistics Support
(CALS).

5) Value Engineering (AMCR 70-8).

6) Contractor Performance Certification Program.

7) Acquisition Streamlining.

8) Manufacturing Technology (MANTECH)

9) Concurrent/Producibility Engineering.

10) MANPRINT Program (AR 602-2).

11) Integrated Logistics Support (ILS) (AR 700-127).

VII. Discussion

The Total Quality Management program within the Department of Defense is attempting to achieve continuous improvement by focusing on the processes that create products and services at every level in every organization. Through training and education, there appears to be a growing culture committed to continuous improvement. Several organizations have begun to focus on what their processes are and how they are using them to meet their needs.

Every successful organization is characterized by dedicated, committed, and participative top leadership. This leadership, in turn, recognizes that everyone must be involved with the improvement of his/her process and that these individuals are the most important resource. Training and educational programs are teaching the philosophies behind process improvement as well as the skills necessary to identify a process out of control.

Much remains to be done with TQM implementation. Even the most successful program are quick to point out that their programs are far from being where they want them. Regulations and guidance is being prepared at all levels that will help facilitate the spread of TQM throughout DoD.

The paths that organizations are taking are different, but the direction appears to be the same. The Air Force Logistics Command (AFLC), who along with the Department of the Navy Aviation Depot have the most successful programs within the DoD, for instance, looked at the philosophies of Deming, Crosby, Juran, and others, as well as the programs that were underway within the Department of the Navy and civilian industry, and decided that no one program met their specific needs. They borrowed something from each of them and added some of their own techniques to come up with a program that best satisfies their process goals.

Despite the widespread successes and accomplishments that several DoD organizations have enjoyed. Much remains to be done. I conclude that two areas need immediate attention, training and implementation strategies.

Independent training strategies lack continuity throughout the DoD prompting the following report which appeared in the Federal Contracts Report (1989).

"The Department appears to be rushing into TQM, especially as it pertains to training its workforce, without having well defined training and implementation plans. Additionally, the committee questions the rationale to train every member of the Department on TQM. The Department cannot afford to spend millions of dollars on training of a "philosophy" while readiness training is either shortened or eliminated, backlogs for Depot maintenance and repair and maintenance of facilities continue to grow, and other high priority requirements remain

unfinanced. Therefore the committee directs the Department to cease all TQM training until the Department formalizes a more cost-effective training strategy and comprehensive implementation plans are developed in each of the Services. Moreover, the committee notes that there are two separate offices within the Office of the Secretary of Defense administering TQM. This seems to be a duplication of effort and inefficient management of TQM.

The Committee has reduced the funding for part of the cost of TQM training in fiscal year 1990. The reductions are as follows:

Army	-\$35 000,000
Navy	-35,000,000
Air Force	-27,000,000
Defense Agencies	-3,000,000

A more structured implementation strategy is also needed. Whether one studies the work of Crosby, Deming, Juran, or any other noted scholar in quality management, one would recognize that they all advocate using a structured approach toward implementing a quality program. One approach that is being met with success in various Air Force organizations is the Roadmap to Total Quality Management currently being used by the Quality Working Group at the Air Force Institute of Technology School of Systems and Logistics. This approach uses three phases and ten milestones. Appendix B has a complete list and description of all of the phases and milestones. This is the approach which has worked for several Air Force Organizations. This approach or something similar should be adopted by the Department of Defense.

APPENDIX A: DoD Posture on Quality

- Quality is absolutely vital to our defense, and requires a commitment to continuous improvement by all DoD personnel.

- A quality and productivity oriented Defense industry with its underlying industrial base is the key to our ability to maintain superior level of readiness.

- Sustained DoD wide emphasis and concern with respect to high quality and productivity must be and integral part of our daily activities.

- Quality improvement is a key to productivity improvement and must be pursued with the necessary resources to produce tangible benefits.

- Technology, being one of our greatest assets, must be widely used to improve continuously the quality of Defense systems, equipments and services.

- Emphasis must change from relying on inspection, to designing and building quality into the process and product.

- Quality must be a key element of competition.

- Acquisition strategies must include requirements for continuous improvement of quality and reduced ownership costs.

- Managers and personnel at all levels must take responsibility for the quality of their efforts.

- Competent, dedicated employees make the greatest contributions to quality and productivity. They must be recognized and rewarded accordingly.

- Quality concepts must be ingrained throughout every organization with the proper training at each level, starting with top management.

- Principles of quality improvement must involve all personnel and products, including the generation of products in paper and data forms.

APPENDIX B: Roadmap to Total Quality Management

A Three Phase Approach
Developed by Major Kenneth R. Jennings,
Air Force Institute of Technology
Wright Patterson AFB OH

I. The Assessment and Planning Phase

Milestone 0--Readiness Review

Purpose: Initial assessment of the readiness of the client organization to undertake a comprehensive Total Quality Management process.

Outcome: Clarification of the scope of the TQM process in client organization. Identification of key areas for change. Negotiation of AFIT-client responsibilities and expectations.

Delivery Mode: AFIT team on-site with diagnostic instruments and checklists. Debriefing and planning with senior management.

Milestone 1--Executive Education

Purpose: Introduction of the philosophy and tools of the TQM process to the senior management group.

Outcome: Comprehensive understanding of the role of senior management and directing a TQM effort. Initiation of improvement efforts selected senior management processes.

Delivery Mode: AFIT on site assistance, and either QMT 082 or Executive overview presentation by AFIT Team.

Milestone 2--Strategic Planning

Purpose: Development of comprehensive plan to integrate TQM into every aspect of the client organization.

Outcome: Interlocking strategic and sub-unit operational plans to implement and promote TQM. Formation of TQM steering committees, process action teams (PATs), and corrective action teams (CATs).

Delivery Mode: Consulting Module--AFIT team, Senior management, and selected support personnel at a suitable meeting location.

II. The Process Management and Breakthrough Phase

Milestone 3--Process Ownership and Definition

Purpose and Outcome: Selection and training of individual "owners" for critical organizational processes, along with the associated process action teams. These owners, in concert with process action teams, have the responsibility and authority to improve cross-functional processes. In defining processes, the process owner and the PAT identify the following: internal suppliers and customers, measurable indicators of quality and service to internal customers, and critical process variance points. This definition forms the framework for the further phases of process management.

Delivery Mode: AFIT Process Management Training

Milestone 4--Process Simplification, Measurement, and Control

Purpose and Outcomes: Training of the PATs in techniques to simplify, measure and control their respective process in an ongoing manner. Outcomes include process streamlining, measurement systems development, and formal control procedures.

Delivery Mode: AFIT Process Management Training and completion of QMT 084.

Milestone 5--Process Improvement

Purpose and Outcome: Training of the PATs and relevant support groups in techniques to improve the processes in an ongoing manner.

Delivery Mode: AFIT Process Management Training and completion of QMT 084.

Milestone 6--Breakthrough Projects

Purpose and Outcomes: Corrective Action Teams (CATs) trained in advanced and specialized problem solving techniques. The CATs are directed by the steering committee toward solving selected high payoff quality, service and performance problems.

Delivery Mode: Under development at this time.

III. The Institutionalization Phase

Milestone 7--Information and Measurement System Design

Purpose and Outcomes: Development or modification of information and measurement systems to reinforce and support ongoing TQM. Systems are designed to deliver needed information directly to those closest to the points of process control. Systems are relatively complete cross-functional processes. Target systems include: Management Information Systems, Decision Support Systems, Inventory Control Systems, Expert Management Systems, and Variance Measurement and Reporting Systems.

Delivery Mode: To be developed.

Milestone 8--Job and Task Design

Purpose and Outcome: Realignment and restructuring of the organization's basic job and task design to form relatively permanent teams to manage complete processes. This will require a graduated change from strictly functional organizational structures to process related structures. The result will be reduced barriers to management and increased work process capability.

Delivery Mode: AFIT Consulting Team on-site.

Milestone 9--TQM Evaluation

Purpose and Outcome: Comprehensive evaluation of the attitudes, actions, systems and supports critical to the ongoing success of Total Quality Management. Results of

the evaluation are fed back to the client organization for action planning.

Delivery Mode: AFIT consulting team using various organizational evaluation techniques.

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Executive Order 12552 challenged all federal agencies to achieve a three percent productivity increase. All agencies have not progressed at the same speed, however. Some agencies may have encountered the same failures and successes without benefit or knowledge that others may have overcome the same stumbling blocks.

If managers had a comprehensive document that they could use to identify where other agencies were with TQM implementation, successes, and who the points-of-contact are for each agency, they could share their experiences and make it possible for the entire DoD community to progress more efficiently with TQM implementation.

This thesis therefore attempts to develop a description and assessment of the TQM initiatives within the DoD community. It will outline what the responsibilities quality offices and the approaches agencies are taking.

The objectives of this research were to identify the early roots of TQM from both public and private sector experiences, to identify DoD agencies and Air Force units and what they are doing to implement TQM and to catalogue what successes these agencies have enjoyed to date, and to provide points-of-contact for each agency mentioned in.

To accomplish the research objectives, a literature review of quality journals, periodicals, and DoD directives was conducted. This was done to trace the principal factors shown to contribute to quality for which TQM has been based. In addition, interviews will be conducted with DoD/Air Force agencies tasked with the responsibility for implementing TQM. These agencies will be asked what they have done to implement it, the problems/successes they have encountered, and how they overcame or attempted to overcome problems.

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