

CHAPTER 1

WHAT IS TOTAL QUALITY MANAGEMENT?

An organization planning the implementation of Total Quality Management (TQM) is about to embark on the challenge and opportunity of a lifetime. This adventure must surely change the organization. Total Quality Management can be the answer to both the customer's plea for improved products and services and the organization's quality and productivity problems. This chapter sets the stage for the conceptual understanding that is required before starting on the long journey toward TQM implementation. The organization will need time and patience to complete its journey. Planning is essential; TQM implementation must not be left to chance.

1.1 WHAT IS QUALITY?

The concept of quality establishes a foundation for an understanding of TQM. Five perspectives of quality are outlined in Appendix A: Transcendent (I know it when I see it), Product-based (possesses desired features), User-based (fitness for use), Manufacturing-based (conforms to requirements), and Value-based (at an acceptable cost). All must be considered as important to the customer.

Peter R. Scholtes¹ introduces the contrast between effectiveness (doing the right things) and efficiency (doing things right). Quality organizations must be both effective and efficient. Patrick L. Townsend² examines Quality in Fact and Quality in Perception (see Table 1-1). Quality in Fact is usually the supplier's point of view, while Quality in Perception is the customer's. Any difference between the former and the latter can cause problems between the two.

An organization considering TQM must make an effort to define and view quality from their customers' perspectives. If there are conflicts, TQM is a method for resolving these differences.

1.1.1 Definitions of Quality

The Federal Quality Institute³ (FQI) defines⁴ quality as meeting the customers requirements the first time and every time. The Department of Defense (DoD) defines⁵ quality as conformance to a set of customer requirements that, if met, result in a product that is fit for its intended use.

¹ Scholtes, Peter R., The Team Handbook, Madison, WI, Joiner Associates, Inc., 1988, p. 2-6.

² Townsend, Patrick L., Commit to Quality, New York, John Wiley & Sons, 1986, p.167.

³ FQI was formed by executive order in June 1988 to oversee the implementation of TQM in Federal Agencies and their suppliers. Its primary missions are to instill awareness of quality principles and practices in senior management teams, to build a quality alliance and share management strategy, to advance a quality culture in government, and to service as a catalyst for change. FQI's three fold responsibilities include providing a one-day TQM Awareness Seminar to introduce management teams to TQM, establishing a list of certified vendors and consultants on a federal supply schedule for TQM, and providing a resource center for TQM.

⁴ Federal Quality Institute, "Total Quality Management: An Executive Overview," 1989.

⁵ DoD 5000.51G, "Total Quality Management: A Guide for Implementation," 23 March 1989.

Table 1-1: Townsend's Quality View

<p>QUALITY IN FACT</p> <p>Doing the right thing Doing it the right way Doing it right the first time Doing it on time</p> <p>QUALITY IN PERCEPTION</p> <p>Delivering the right product Satisfying our customer's needs Meeting the customer's expectations Treating every customer with integrity, courtesy, and respect</p>
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1.1.2 The Reliability Analysis Center's (RAC) Definition of Quality

Quality is much more than the absence of defects which allows us to meet customer expectations. Quality requires controlled process improvement, allowing us to exceed our customers' expectations. Quality will allow us to recreate pride and loyalty in our organizations. Quality can only be achieved by the continuous improvement of all systems and processes in the organization, not only the production of products and services but also the design, development, service, purchasing, administration, and indeed, all aspects of the transaction with the customer; all must work together toward the same end.

Quality can only be seen through the eyes of the customers. An understanding of the customer's expectations (effectiveness) is the first step; then exceeding those expectations (efficiency) is required. Communications will be the key. Exceeding customer expectations assures meeting all the definitions of quality.

1.1.3 What is Excellence?

The dictionary⁶ defines excellence as "superiority; eminence." Interestingly enough, the Aerospace Guidance and Metrology Center (AGMC), our TQM Case Study, considers itself "A Center of Excellence." AGMC proclaims this in large, bold letters for all to see on the main entrance to the facility. Excellence, then, is a measure or degree of quality.

⁶ Random House College Dictionary, Revised Edition, 1987.

This issue is important because it is a starting point for any management team contemplating the implementation of Total Quality Management. They must agree on a definition of quality and the degree of excellence they want to achieve.

1.1.4 The Customer is King!

The common thread that runs through today's quality improvement efforts is the focus on the customer and, more importantly, customer satisfaction. From the TQM Case Study,

The Customer is the most important person in any process. Customers may be either internal or external. The question of customer satisfaction (whether that customer is located at the next station, or work center or base) is the essence of a quality product. Identifying customers' needs in the areas of what, when, why, and how is an essential part of process evaluation and may only be accomplished through communication.⁷

Thus, the first cultural change that is required in implementing TQM is the acceptance of the customer as the driving source of quality information. The customer must become king!

1.1.4.1 The External Customer

External customers are those using the products or services provided by the organization. For example, the most important customer of any U.S. federal government agency is the U.S. citizen, either as an individual or in groups. Its other external customers include state, county and local governments, business and industry, foreign governments, and other agencies or branches of the federal government. The challenge becomes understanding and exceeding their expectations.

1.1.4.2 The Internal Customer

The internal customer is the person or group that receives the results (outputs) resulting from any individual's work. The outputs may include a product, a report, a directive, a communication, a service, . . ., in fact, anything that is passed between people or groups. Customers include peers, subordinates, supervisors and other units within the organization. Their expectations must also be known and exceeded to achieve quality.

An organization must focus on both the internal and external customer and be dedicated to exceeding customer expectations.

⁷ Thomas Guwca, USAF PRAM Final Report, Aerospace Guidance and Metrology Center, Directorate of Maintenance Quality-Productivity Improvement Pilot, April, 1988, p. 40.

1.2 WHY QUALITY?

According to the Strategic Planning Institute, quality is the single most important factor affecting an organization's long-term performance.⁸ Dr. W. Edwards Deming has stated repeatedly that quality improves productivity which leads to improved competitive position and insures that the organization will stay in business.⁹ In essence, improved quality means more jobs and job security. Our experience with government agencies indicates that they are also in competition with other organizations and with private industry for workload. There has also been pressure on government organizations to do more with less; this pressure is expected to increase in the future. Quality, then, is the way to achieve improved productivity and competitiveness in any organization.

1.2.1 Cost of Poor Quality

The cost of poor quality has been quoted by various sources as being between 15% and 50% of the cost of doing business. The June 6, 1988 issue of "USA Today" listed the cost of poor quality as 20% of gross sales for manufacturing and 30% of gross sales for the service sector. Poor quality costs any organization many of its scarce dollars. One of the most effective actions management can take to improve productivity in any organization is to improve the quality of its processes. Quality saves, it does not cost. Quality is the solution to a problem, not the problem. Reducing the cost of poor quality directly affects the bottom line. Improving quality is the most direct way for an organization to increase profit.

1.2.2 The Quality-Productivity Connection

Townsend states that "increases in Quality in Fact can lead directly to increases in productivity. Emphasis on Quality in Fact in manufacturing operations, through the use of statistical quality control, can lead to the conversion of the "hidden factory" that produces scrap, rework, repair, sorting and customer complaints."¹⁰ Any employee, if asked, will tell you that the way to improve productivity is to reduce rework and scrap, i.e., improve the quality of processes. Expense reduction is another by-product of quality improvement. This connection, reducing rework to lower cost, also applies to white collar processes.

It has often been argued (incorrectly) that continuous process improvement must meet a point of diminishing returns. In fact, since reduction in rework reduces cost and pays for more productive output, the argument is largely specious. Certainly, the organization must manage to prioritize for highest return, but there is rarely good economic reason to continue to produce defects and cause rework or to give poor service at any cost.

⁸ Peters, Tom and Nancy Austin, A Passion for Excellence, New York, Random House, 1985, p. 53.

⁹ Deming, W. Edwards, Quality, Productivity and Competitive Position, Cambridge, MA, MIT Center for Advanced Engineering Study, 1982, p. 1.

¹⁰ Townsend, *op. cit.*, p. 6.

1.3 WHAT IS TOTAL QUALITY MANAGEMENT?

Total Quality Management (TQM) is the term given to the Federal Government's organization-wide effort of continuous process improvement. The Federal Quality Institute defines¹¹ TQM as a strategic, integrated management system for achieving customer satisfaction which involves all managers and employees and uses quantitative methods to continuously improve an organization's processes. The Department of Defense describes¹² TQM in the following manner:

Total Quality Management (TQM) consists of continuous process improvement activities involving everyone in an organization - - managers and workers - - in a totally integrated effort toward improving performance at every level. This improved performance is directed toward satisfying such cross-functional goals as quality, cost, schedule, mission, need, and suitability. TQM integrates fundamental management techniques, existing improvement efforts, and technical tools under a disciplined approach focused on continuous process improvement. The activities are ultimately focused on increased customer/user satisfaction.

Jack Strickland, Director of Industrial Productivity and Quality, Office of the Assistant Secretary of Defense for Production and Logistics, has defined TQM as

Both a philosophy and a set of guiding principles that represent the foundations of a continuously improving organization. TQM 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.¹³

TQM starts with a focus on the customer and is never-ending, with a life-time commitment to continuous improvement. TQM combines a participative philosophy of management often attributed to Dr. W. Edwards Deming with emphasis on quantitative techniques and employee involvement (with an emphasis on communication) to improve the quality of goods and services. TQM is a process of controlled change that includes all employees in the improvement of the quality of products and services to increase the productivity of the organization. TQM optimizes creative approaches to problem solving and moves the organization from defect detection to defect prevention. With TQM, all of the organization's resources are used effectively to improve all of its processes. TQM involves everyone in the organization from top management (providing leadership and support) to the lowest position. The timing, sequence,

¹¹ The Federal Quality Institute, *op. cit.*

¹² DoD 5000.51G, *op. cit.*, p. 6.

¹³ Strickland, Jack, "Total Quality Management," Army Research Development and Acquisition Bulletin, May-June, 1989, p. 9.

method of implementation, and integration of these elements will vary from one organization to another.

Central to the TQM approach is the change in management philosophy regarding the "responsibility for quality." Formerly it rested with a separate group of individuals in a department/directorate/division often designated Quality Assurance. Under TQM, the responsibility for quality rests with everyone, each and every employee, from top management to the lowest position in the organization.

TQM is accomplished using a team organization; both management and the employees are members of "Quality Teams" (called Process Action Teams in this guidebook) which focus on continuous process improvement. Those who do a job know it best; therefore, suggestions to improve the quality of a particular process should come from the employees who work in the process and the managers who work on the process. Communication must be encouraged to allow employees and management to work together to reach the mutual goal of continuous process improvement.

1.4 QUALITY PHILOSOPHIES

1.4.1 The Deming Philosophy

Dr. Deming's philosophy¹⁴ is expressed in his Fourteen Points and his Seven Deadly Management Diseases found in Table 1-2 and 1-3, respectively. At first encounter, his philosophy seems simple, requiring nothing but common sense. And it is not complex. What is complex is its successful application. The important question is, "How do you follow these common sense principles?" Understanding the Fourteen Points, agreeing to their meaning for your organization, and deciding how to implement them is a necessary management responsibility which should follow management's defining quality and excellence. Notice the important, dominant role played by management in Deming's quest to improve organizations and their quality. RAC'S experience shows that employees will be skeptical of management's intent to adopt this philosophy. Only management commitment, demonstrated by new behavior, can hope to overcome their skepticism.

Michael P. Tveite¹⁵ has regrouped and classified Deming's Fourteen Points as shown in Table 1-4; he believes that, "The theory behind the fourteen points is that management should be focused on improvement of processes instead of being focused on judgement of results. " Management may struggle with the applicability of Deming's principles to their organization but this self discovery builds the foundation for the implementation of TQM. This struggle cannot be delegated; management must develop and communicate its TQM philosophy.

¹⁴ Deming, W., Edwards, Out of the Crisis, Cambridge, MA, MIT Press, 1986.

¹⁵ Tveite, Michael, P., The Theory Behind the Fourteen Points: Management Focused Improvement Instead of Judgement, Presented at the Third Annual International Deming User's Group Conference, Cincinnati, OH, August 21-22, 1989, p. 9.

Table 1-2: Deming's Fourteen Points for Management

1. Create constancy of purpose for improvement of product and service
2. Adopt the new philosophy
3. Cease dependence on inspection to achieve quality
4. End the practice of awarding business on the basis of price tag alone
5. Improve constantly and forever the system of production and service
6. Institute training
7. Adopt and institute leadership
8. Drive out fear
9. Breakdown barriers between staff areas
10. Eliminate slogans, exhortations, and targets for the work force
11. Eliminate numerical quotas for the work force and eliminate numerical goals for people in management
12. Remove barriers that rob people of pride of workmanship
13. Encourage education and self-improvement for everyone
14. Take action to accomplish the transformation

Table 1-3: Deming's Deadly Management Diseases

1. Lack of constancy of purpose
2. Emphasis on short-term profits
3. Evaluation of performance, merit rating, or annual review or performance
4. Mobility of management
5. Running an organization on visible figures alone
6. Excessive medical costs
7. Excessive costs of warranty, fueled by lawyers that work on contingency fees

Diseases 6 and 7 are pertinent only to the United States.

Table 1-4: Tveite's Classification and Grouping of Deming's Fourteen Points

THEME	STOP FOCUSING ON JUDGEMENT OF RESULTS	START FOCUSING ON IMPROVEMENT OF PROCESSES
PURPOSE		1. Create constancy of purpose 14. Put everybody to work to accomplish the transformation
LEADERSHIP	11. Eliminate numerical goals and quotas 12. Remove barriers to pride of work 8. Drive out fear	7. Institute leadership
COOPERATION	9. Breakdown barriers between departments 4. End the practice of awarding business on the basis of price alone	2. Adopt a new philosophy
TRAINING & EDUCATION		6. Institute training on the job 13. Institute a vigorous program of education and self improvement
IMPROVEMENT OF PROCESSES	3. Cease dependence on inspection to achieve quality 10. Eliminate slogans and exhortations	5. Improve constantly and forever the system of production and service

1.4.2 Other Quality Philosophies

While the RAC approach to TQM is based in Deming's philosophy, it may be more eclectic than true Deming. Thoughts and ideas from Juran, Crosby and Feigenbaum are found in our approach to TQM. Juran's Ten Steps to Quality Improvement focus on the need to build awareness, set goals, organize, train, report progress, recognize, communicate, keep score, strive for breakthrough, and institutionalize. These requirements are built into the RAC approach. RAC stresses management commitment as does Crosby in his first Step to Quality Improvement. While RAC does not

recommend a "zero defects" program (or any other programs since they do not lead to continuous improvement), it does embrace most of Crosby's philosophy.

1.5 THE SCIENTIFIC METHOD

The Scientific Method combines a proven logical approach to problem solving and process improvement with sound statistical techniques. While the Scientific Method has been around for ages, it has not been used extensively throughout most organizations. Curiously enough, even engineering organizations rarely use it to the extent demanded in TQM. Chapter 8 of this guidebook is devoted to outlining RAC's interpretation of the Scientific Method. It is sufficient here to state that a logical, systematic approach will be used with the orientation on processes, not projects or problems. This process orientation will be new to most organizations.

1.6 EMPLOYEE INVOLVEMENT

Employee involvement is another cornerstone of TQM. Teams are the device used to assure communication and cooperation between management and the rest of the employees. Through teams, all employees will be allowed to participate and contribute to the improvement of processes. Employees will be asked to share the responsibility for innovation and quality. Chapters 6 and 7 are devoted to teams and their operation. What is an organization if it isn't functioning as a team? It is probably inefficient, ineffective and not satisfying its customers.

1.7 TOTAL QUALITY MANAGEMENT AND CULTURAL CHANGE

Implementing Total Quality Management requires changing the culture of the organization. Culture, the organization's set of beliefs, value and attitudes, affects the perceptions and interpretations of events and actions by organization members. Culture guides the members' behaviors and allows shared interpretations of actions by organization members. The current culture in most organizations separates the responsibility for quality and production; under TQM, there is no separation. The traditional culture generally prevents the employees from working with management to improve processes; this, too, changes with TQM. Within the current culture, management controls the output of a process; process inputs will be controlled under TQM. Under the traditional culture, management manages to specifications and budgets; TQM manages using process capability - - the ability of the process to meet customer's specifications.

The culture change required for TQM will be significant. The biggest mistake usually made when organizations implement TQM is their under-estimation of the cultural changes that must occur and the time required to accomplish these changes. The usual view is that all that is required is the use of a few control charts, with little effort made to change the actual culture of the organization. Wrong! Management must change its philosophy, practices and assumptions about work and people.

Changing culture takes time and effort. First the organization must gain an awareness of the changes to be made. This can be accomplished by reading or viewing tapes (See Appendix B, TQM Resources, for a recommended reading and viewing list). Management needs to develop a definition for quality, a mission statement, and a quality policy statement for delivery to each employee. This will be discussed in Chapter 3. New behaviors must be thought about and embraced. Actions must always follow words to gain the employees' confidence. Management must determine how they are going to establish and maintain contact with their customers to assure they are exceeding their customer expectations. Quality must be seen as demanding everyone's number one priority. Quality must become an obsession. Accomplishing this necessary cultural change will be a continuous long-term challenge. FQI compared a Quality Culture to one that is not in Table 1-5¹⁶. The Department of Defense looks at the cultural change required in Table 1-6¹⁷.

Table 1-5: What Is/Is Not a Quality Culture

IS	IS NOT
<ul style="list-style-type: none"> • Listening to customers to determine their requirements 	<ul style="list-style-type: none"> • Assuming you know your customers' requirements
<ul style="list-style-type: none"> • Identifying costs of quality and focusing on prevention 	<ul style="list-style-type: none"> • Overlooking the hidden costs of poor quality
<ul style="list-style-type: none"> • Doing the right thing right the first time 	<ul style="list-style-type: none"> • Doing it over to make it right
<ul style="list-style-type: none"> • Continuing process improvement 	<ul style="list-style-type: none"> • One-time fix
<ul style="list-style-type: none"> • Taking ownership at all levels of the organization 	<ul style="list-style-type: none"> • Assigning responsibility for quality to one department
<ul style="list-style-type: none"> • Demonstrating executive leadership and commitment 	<ul style="list-style-type: none"> • Assigning responsibility for quality to others

1.7.1 The Federal Government's Total Quality Management Requirement

Total Quality Management is a relatively new concept to the Federal Government and its suppliers. Background information is contained in Appendix C which includes excerpts from the appropriate Executive Order, Office of Management and Budget (OMB) Circulars and FQI brochures.

1.7.2 "Good Enough for Government Work" is Not Good Enough!

One step to take in preparation for implementing TQM is changing the expectations of employees. For example, the expectation that "good enough for government work" is good enough is not acceptable under TQM. Certainly it is not what the government as a customer or the customers of government want or expect. But "good enough for

¹⁶ The Federal Quality Institute, *op. cit.*

¹⁷ DoD 5000.51G, *op. cit.*

government work" is the result management will get from their employees if they do not establish other quality standards. Employees in an organization usually strive to meet management's expectations. Management must change their expectations and require employees to strive for error-free performance.

Table 1-6: Examples of Cultural Changes Required

CATEGORY	PREVIOUS STATE	NEW CULTURE
MISSION	Maximum return on investment management by objectives (ROI/MBO)	Ethical behavior and customer satisfaction. Climate for continuous improvement. ROI a performance measure
CUSTOMER REQUIREMENTS	Incomplete or ambiguous understanding of customer requirements	Use of a systematic approach to seek out, understand, and satisfy both internal and external customer requirements
SUPPLIERS	Unidirectional relationship	Partnership
OBJECTIVES	Orientation to short-term objectives and actions with limited long-term perspective	Deliberate balance of long-term goals with successive short-term objectives
IMPROVEMENT	Acceptance of process variability and subsequent corrective action as the norm	Understanding and continually improving the process
PROBLEM-SOLVING	Unstructured individualistic problem-solving and decision-making	Predominantly participative and interdisciplinary problem-solving and decision-making based on substantive data
JOBS AND PEOPLE	Functional, narrow scope management-controlled	Management and employee involvement; work teams; integrated functions
MANAGEMENT STYLE	Management style with uncertain objectives that instills fear of failure	Open style with clear and consistent objectives, which encourages group-derived continuous improvement
ROLE OF MANAGER	Plan, organize, assign, control, and enforce	Communicate, consult, delegate, coach, mentor, remove barriers, and establish trust
REWARDS AND RECOGNITION	Pay by job. Few team incentives	Individual and group recognition and rewards, negotiated criteria
MEASUREMENT	Orientation toward data gathering for problem identification	Data used to understand and continuously improve processes

1.7.3 Quality Measurement

After defining quality as exceeding customer expectations, measuring quality is the next challenge. Typical quality expectations include timeliness, accuracy, clarity, thoroughness, completeness, usability, physical characteristics, performance, cost, schedule, reliability, availability, and maintainability. Quality measurement is necessary for quality improvement. What gets measured gets attention and becomes important to the organization. Measurement establishes the baseline for evaluating progress.

1.8 EXPECTED BENEFITS

The relationship between quality and productivity has been established. What tangible benefits can an organization expect after implementing TQM? Establishing process ownership and responsibility and internal customer-supplier relationships will result in the first benefit, improved communications. Improved communications between internal customers and suppliers can yield productivity improvements of ten to fifteen percent.

The reduction in rework that occurs by improving processes probably will result in initial cost savings within six to twelve months after TQM implementation. Lower-level measures will show changes first. Individual process parameters will be the first to change. As time passes, higher-level measures, such as reduced cost to produce products and services, will begin to show improvement. A reduction in operating costs of fifteen to twenty-five percent after two to three years is not uncommon. Other benefits, such as reduced absenteeism and improved safety, should also be observed.

1.9 A CASE STUDY: THE AEROSPACE GUIDANCE AND METROLOGY CENTER

Throughout this guide a case study on the implementation of TQM in a federal agency is presented. The Aerospace Guidance and Metrology Center (AGMC) was chosen because its efforts and successes are well documented. Much of the information found here is taken from the United States Air Force Productivity, Reliability, Availability and Maintainability (PRAM) Program Final Report of April, 1988, titled, "Aerospace Guidance and Metrology Directorate of Maintenance." This case study is used to illustrate RAC's recommendations and to offer information about lessons learned at AGMC.

The AGMC is part of the Air Force Logistics Command and is located at Newark Air Force Base, Newark, Ohio. AGMC has a dual mission:

- Depot repair of guidance and navigation systems
- Management of the USAF Metrology and Calibration Program

Following extensive planning, the AGMC Quality-Productivity Improvement (QPI, their selected name for what is now known as TQM) Pilot was initiated in September, 1986. The initial training and implementation lasted 18 months. This Pilot was initiated with these objectives:

- To establish the feasibility of applying the Deming philosophy and Statistical Process Control (SPC) to depot repair within the Air Force
- To prototype the transition of SPC techniques for repair processes and the AFLC in general
- To extend the application of Deming/SPC to all AGMC functions

Many successful applications of Deming/SPC had been reported in manufacturing, but no information was found indicating a depot repair application in government.

The AGMC QPI Pilot was conducted in the Directorate of Maintenance and applied to the FB-111/N-16 Inertial Reference Unit depot maintenance workload. The FB-111/N-16 was chosen for three reasons:

1. There were a high number of customer complaints
2. Rework and recycles were high
3. The N-16 was a typical inertial system and representative of all AGMC workloads

There were three main tasks involved in the QPI Pilot:

Task 1: Contractor Selection

AGMC decided that they needed help in planning for the QPI Pilot and Training. A two-step solicitation approach was used. The first stage allowed prospective contractors to comment on the Statement-Of-Work (SOW). Draft SOWs were provided to known sources of TQM services for comments and recommendations. The SOW was revised based on contractor inputs. Then the Request-For-Proposal (RFP) was sent to over 75 contractors. Fifteen proposals from 14 contractors were received. Following evaluation, these were divided into two categories: those responsive to the RFP and those non-responsive. Five contractors were deemed responsive; the contract was awarded to IIT Research Institute.

Task 2: Training

The reported training approach includes the Statement of the Problem, Findings, Schedule, and Course contents. The changes made to the courses as a result of the pilot and other recommendations are included in the Report.

One of the important lessons learned, that is not found in the PRAM Report, was the change from mass training to just-in-time training. The pilot teams were trained between October 1986 and December 1986, then activated in January 1987. Learning and enthusiasm were lost between the training and team activation. Training is now considered part of implementation and scheduled just before a team is implemented.

The responsibility for training was successfully transferred to AGMC after the pilot and they continue to train new teams today.

Task 3: Implementation

AGMC's approach to implementation is also described in the PRAM Report. The original schedule was adopted with little change. Their QPI structure paralleled their existing organizational structure. Their Executive Committee (now the Quality Council) and Steering Committees operate essentially as outlined in Chapter 3 of this guidebook. AGMC's QPI Teams are the equivalent of the Process Action Teams (PATs) as explained in Chapter 6. Their QPI Teams have always been known for their enthusiasm and emotion. Their QPI Teams did not use the self evaluation checklists, found in Chapter 8, because these checklists were developed after AGMC's QPI Pilot was completed.

The contractor's original systematic approach to problem solving is outlined in the Report. The eight-stage Continuous Improvement Strategy, found in Chapter 8, is a refinement of the original strategy based on what was learned at AGMC and with other customers.

AGMC's thoughts on institutionalization are also discussed. The emphasis is on management participation and commitment. Many ideas on QPI Team (PAT) operation are discussed. AGMC's recommendations concerning implementation again emphasizes the importance of management participation and commitment.

The AGMC QPI Pilot did not change the Quality Assurance and Reliability Division in the Directorate of Maintenance. They were responsible for facilitating and supporting the QPI teams. However, a significant change had been made to this organization prior to the QPI Pilot. All inspectors were made Quality Assurance Specialists (QAS) (actually the number of QAS was about half the number of inspectors). AGMC had implemented the Production Acceptance Certification Program. Repair technicians were certified to self-inspect their work. Inspection of products was replaced by process and system audits performed by the Quality Assurance Specialists. This change set the tone for the AGMC QPI Pilot. The Quality Assurance and Reliability Division was now in the business of improving processes, not pointing fingers at repair technicians.

The case study clearly shows that TQM can be successfully applied to a government depot repair organization. Following the completion of the pilot, AGMC continued the process of process improvement. It expanded its scope from the Directorate of Maintenance to all functional areas and from the four initial PATs to (at last count) 55 teams. Improvements in both white collar areas (accounting, supply, purchasing, etc.) and in the repair processes have been seen.

The actual benefits gained at Aerospace Guidance and Metrology Center have been documented in the Economic Summary of the PRAM Report and a Department of Transportation (DOT) Site Report (March 1988). The PRAM Report shows a gross first year savings of \$1,476,000 (\$490,000 verified, \$768,000 projected and \$218,000 intangible from reduction in recycles). The net first year savings was \$720,000 (\$1,476,000 less the \$317,000 for 18 months contract support, \$106,000 for project implementation and \$333,000 for time away from the job during training). The DOT Report shows a three-year gross savings of \$2,342,000.

There is gold out there to be mined!