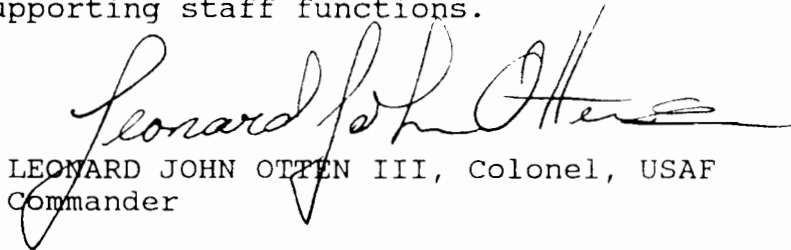


**WL CONTINUOUS IMPROVEMENT PLAN  
MAY 1990**

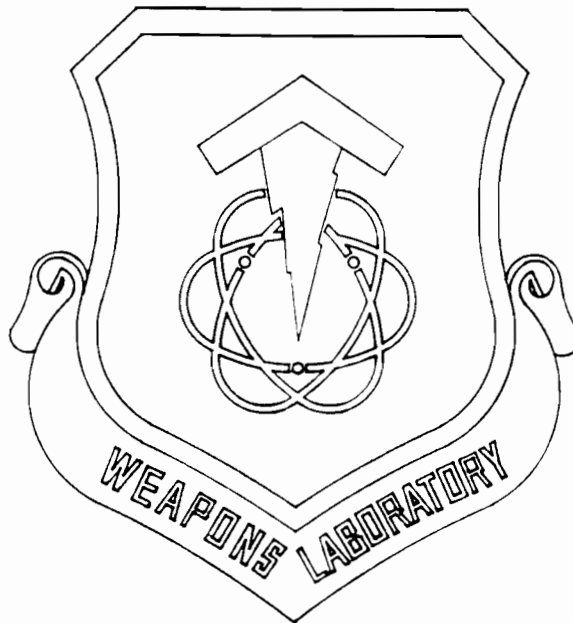
**WEAPONS LABORATORY  
KIRTLAND AFB, NEW MEXICO 87117-6008**

## COMMANDER'S POLICY

I am committed to making the concepts and philosophy embodied in Total Quality Management an integral part of the Weapons Laboratory. A philosophy of continuous improvement has my full support. If we are to be successful in implementing this new philosophy in the Laboratory, we all will need to have a long term dedication to the principles of TQM. To do otherwise is to deny our very best to the people that we serve. For this Laboratory to retain the preeminent role it now holds, each member must look for continued improvements and always remember those whom they support. "Good enough" is just not acceptable in our research or in the supporting staff functions.



LEONARD JOHN OTTEN III, Colonel, USAF  
Commander



**Our Values Are  
Teamwork, Innovation, Trust & Integrity**

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## INTRODUCTION

This plan is intended to give the Weapons Laboratory (WL) team and our customers an introduction on how the WL is implementing Total Quality Management (TQM). It is our desire that the plan become a living document which fosters a culture of continuous improvement.

## DEFINITION

TQM is a leadership philosophy, organizational structure, and working environment that fosters and nourishes a personal accountability and responsibility for quality and encourages a quest for continuous improvement in products, services, and processes. It is an application of human resources and quantitative methods to improve the materials and services supplied to an organization, all the processes within an organization, and the degree to which the needs of the customer are met.

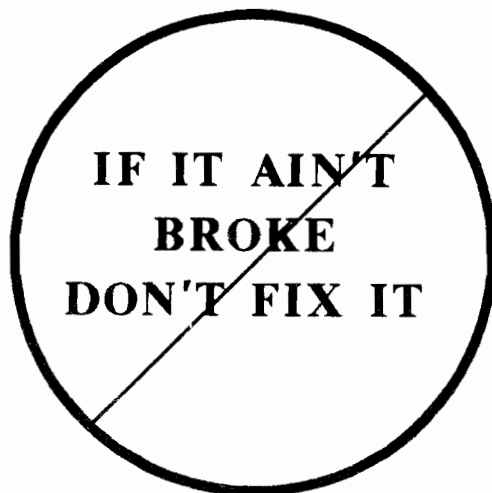
## VISION STATEMENT

Our vision is clear -- the Weapons Laboratory, at the dawn of the 21st century, will be the country's preeminent military research center for high and medium power lasers, optical imaging, spacecraft survivability, and high power microwaves. With an in-house cadre of talented and dedicated professionals, and modern, specialized research facilities -- on hand and under construction -- the Weapons Laboratory stands ready to meet the challenge of technical excellence for the next century.

## GOALS

To reach our vision, the Laboratory adopts the following goals:

- a. Develop and maintain the technical and support staff and research facilities that allow the Laboratory to conduct research and development in Lasers, Optical Imaging, Survivability and Vulnerability, High Power Microwaves, Plasmas and Pulse Power.
- b. Reinforce and enhance a positive image of the Laboratory as the premier Department of Defense Laboratory and as center of excellence in the Research and Development community.
- c. Develop and maintain a well qualified and motivated staff committed to in-house research.
- d. Create a pride of ownership in every individual for excellence in understanding and accomplishing their duties through participatory involvement.



**IMPROVE IT!**

### WHY CHANGE?

The way the world does business is changing, and as matter of national survival, we must change with it.

"Wrenching changes at all levels of the organization are necessary if American corporations are to keep pace with international competition, the increasing sophistication of consumers throughout the world, and rapid changes in technology."

'Made in America'  
A 2-year industry MIT study

A shrinking defense industrial base, flat defense budgets, and increasing costs of defense systems clearly point to the necessity for a reevaluation of the way the defense community does business. Key DOD officials have recognized this requirement:

"In the years ahead it is unlikely that defense spending will increase significantly over current levels. Its growth could very well continue to fall behind the rate of inflation. The only way we'll succeed is for DOD and industry to look continuously for ways to improve our operations as well as our products."

John A Betti,  
Under Secretary of Defense  
for Acquisition, 1989

"If we always do what we always did, we will always get what we always got."

## IMPLEMENTATION STRATEGY

The Weapons Laboratory is focusing on a direction that includes continuous improvement and involvement of all employees, with one goal in mind, to satisfy our customers. We all must view anyone to whom we provide data, material or services as a customer. This strategy improves quality by examining the work process in a systematic, integrated, consistent, organization-wide perspective. The strategy focuses on five objectives:

- a. Foster an awareness, through continuing education and training, of and a commitment to the TQM philosophy.
- b. Utilize a team approach to continuous improvement.
- c. Identify, develop and describe tools and techniques that have a positive impact on continuous improvement and cost efficient integration into day-to-day functional processes.
- d. Adopt the TQM philosophy to our research and development processes.
- e. Assess the effectiveness and efficiency of our implementation of continuous improvement.

## CONTINUOUS IMPROVEMENT APPROACH

Changing to a system of continuous improvement is a major change in our thinking and our approaches to many things. It involves risk-taking and challenges for many people. Controlling the illogical, irrational, and emotional aspect of change requires a structured organization which is sensitive to change. The Laboratory approach to continuous improvement relies heavily on the understanding and application of statistical methods and the formation and maintenance of Process Action Teams (PATs).

The Laboratory will identify Opportunities for Improvement and form PATs which will methodically study processes to find permanent solutions to problems. The main purpose of a PAT is to improve a process that the Laboratory has identified as important to change.

## EXECUTIVE COUNCIL

The council acts as the governing body for the implementation of TQM. It develops policy, sets broad goals and objectives, reviews plans and addresses and removes barriers to implementation. The council tasks PATs to address specific improvement issues pertaining to the entire laboratory, provides an avenue for the development of recognition programs, and ensures that consistent, unified policies for continuous improvement are being implemented. The council meets on a regular basis and is chaired by the WL Commander.

The Executive Council is comprised of CC, CV, CA, and the Directors of AR, AW, NT, PR, SC, SU, and TA. When the council is meeting as the Executive Council for TQM, a representative from the Continuous Improvement Center will participate as facilitator and recorder. Council membership will not be delegated. Other individuals may participate on an as required basis. The responsibilities of the Council are:

- a. Provide and approve resources necessary for implementation of TQM at the WL.
- b. Monitor PAT progress and ensure that results and conclusions are reported throughout the Laboratory.
- c. Evaluate the progress of implementation.
- d. Provide liaison to higher organizations.
- e. Meet at least semi-annually to review and update the WL Continuous Improvement plan.

## CONTINUOUS IMPROVEMENT CENTER

The Continuous Improvement Center is established to coordinate and support continuous improvement activities of the WL. The center staff is versed in the tools and concepts of continuous improvement, including approaches that help teams conduct effective and productive meetings. A major task of the center is to assist PATs in all aspects of continuous improvement. Another important task of the center is to observe progress of PATs and use these observations to assist them in improving their processes, including how team members interact during and outside of meetings.

## CONTINUOUS IMPROVEMENT CENTER (CONT)

The responsibilities of the Center are:

- a. Disseminate continuous improvement policies, goals and objectives developed by the Executive Council to Laboratory personnel.
- b. Collect and maintain data relating to Laboratory PAT activities. Purpose, team members, status, and process flow diagrams are examples of collected and maintained data.
- c. Process Opportunities for Improvement from Laboratory personnel and from individuals outside of the Laboratory.
- d. Report monthly to the Executive Council the status of all Laboratory PATs, Opportunities for Improvement, and process improvement data.
- e. Assist Laboratory PAT leaders in developing and implementing successful PATs. Work with process managers to plan meetings, develop measurable criteria, understand data gathering and analysis techniques, develop personal skills, and as required rehearse team presentations.
- f. Coordinate training activities, including team training, use of TQM tools, and progress reporting.
- g. Serve as a repository of lessons learned and keep a master file of PATs to ensure optimal use of scarce resources in solving problems common to various Laboratory offices.
- h. Assist process managers with overcoming roadblocks and help keep PATs on track.

## PROCESS MANAGERS

A process manager is an individual who is trained in technical tools, data gathering and analysis techniques, interpersonal skills, and the structure of a PAT. The function of the process manager is to assist PATs, coaching team members in needed skills and tools, but not to participate directly in the PAT's activities. The process manager will present the PAT training session prior to any formal PAT activities.

## OPPORTUNITY FOR IMPROVEMENT

An Opportunity for Improvement is an idea generated by anyone at any level for improving Laboratory processes. The Continuous Improvement Center will process all Opportunities for Improvement within two working days after receipt. After processing, the Executive Council will review the opportunity to determine the resources required to study the opportunity. Items such as training needs, budget, equipment, quantity of Laboratory personnel, time required, and impact on normal work assignments will be considered by the Executive Council. Using a set of established criteria, the Executive Council will select the processes the Laboratory will study and provide the necessary resources. Shown in figure 1 is a flow diagram of the Opportunity for Improvement process.

## PROCESS ACTION TEAMS (PATs)

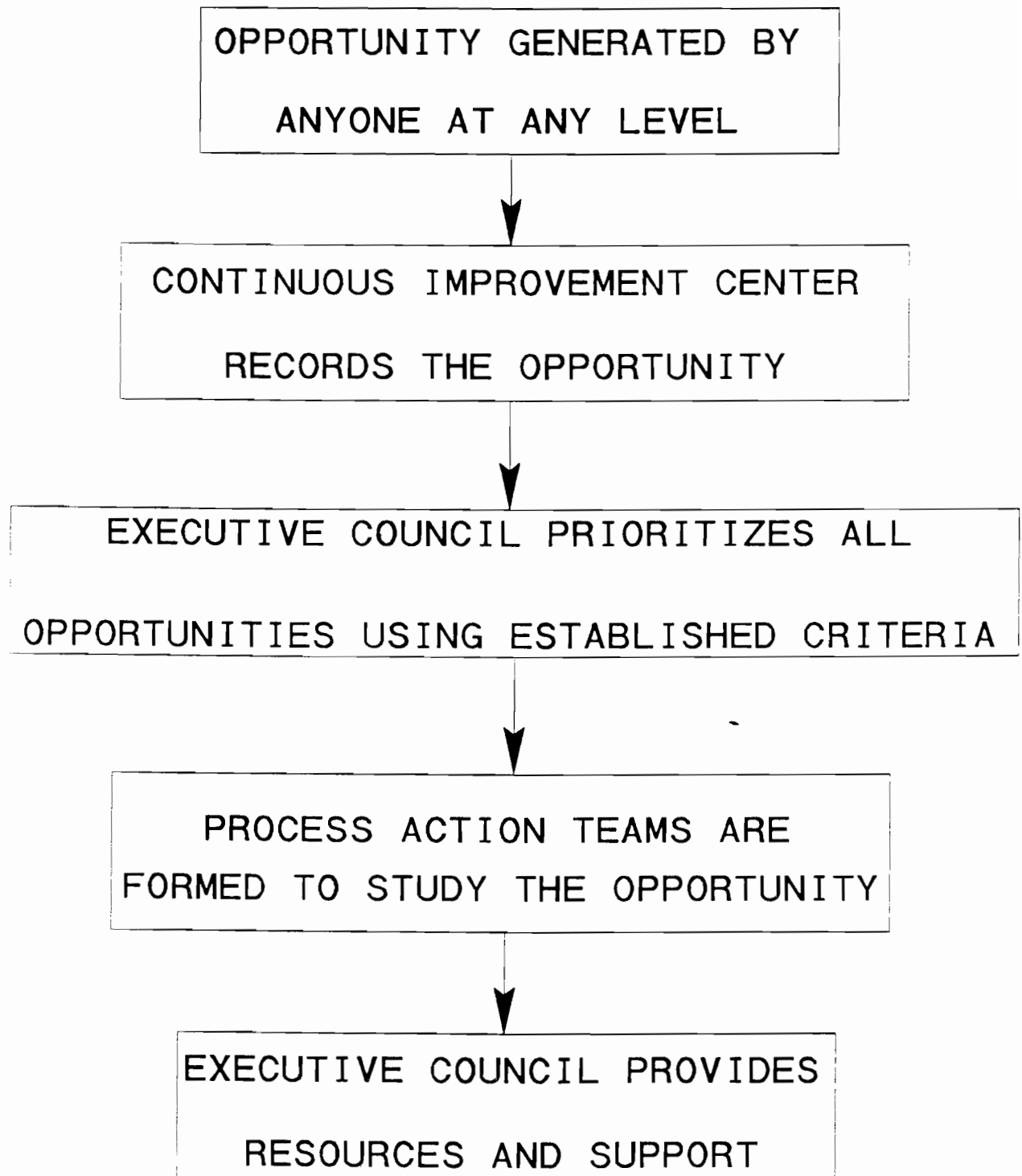
The Executive Council appoints the PAT membership. Membership is usually composed of people who work closely with some aspect of the process under study. The teams are formed for the purpose of applying process improvement methods and tools to identified processes. Teams, using established scientific methods, analyze selected processes for areas of potential improvement, develop strategies for change and perform process evaluations. The team reports progress, results, and conclusions to the Continuous Improvement Center. A PAT will submit a written report to the Continuous Improvement Center at the conclusion of the action, for recording and forwarding to the Executive Council.

The responsibilities of PAT members are:

- a. Contribute as fully to the process as possible.
- b. Share knowledge and expertise freely and openly.
- c. Actively participate in all meetings and discussions.
- d. Use the concepts and philosophies embodied in TQM.
- e. Work for the common good of the Laboratory

# FIGURE 1

## OPPORTUNITY FOR IMPROVEMENT



## PROCESS ACTION TEAM PROCEDURES

Process Action Teams are formed -- typically five to six members per team -- to study an Opportunity for Improvement. The members are appointed by the Executive Council in consultation with the Continuous Improvement Center. Members of the team can be of various ranks and grades, position classifications, and work areas. A trained process manager will be assigned to each PAT.

The success of a PAT depends largely on how well preliminary functions are established. Preliminary functions are team building activities, establishing team tasks, team role clarification, and team ground rules. After preliminary functions are established, a systematic process improvement can begin. Process improvement includes a thorough understanding of the process, data gathering and analysis, developing process improvements, ensuring process statistical control, and reporting the status of the study to the Executive Council.

## PROCESS SELECTION

Using PATs to study carefully selected projects insures the greatest chance of continuous improvement. The Executive Council, using internally generated criteria, will select the processes the Laboratory will study. General guidelines for selecting projects are:

- a. Direct impact on the Laboratory's internal and external customers.
- b. Process is not in transition.
- c. Laboratory resources available.
- d. Significant importance to the Laboratory.

Process selection begins with an opportunity submitted from anyone at any level. The Opportunity for Improvement is forwarded to the Continuous Improvement Center for recording and presentation to the Executive Council. The Executive Council evaluates all submitted Opportunities for Improvement and selects processes the Laboratory will study.

## MEASURES OF PROGRESS

Disciplined statistical methods will be used to assess TQM implementation and continuous improvement in research and support staff functions. Some methods will apply to both research and support functions and TQM implementation, others only to TQM implementation, and others only to research and support functions. In either case, measurements will monitor deviations from customer needs, rather than conformance to customer needs.

TQM implementation measures are:

- a. Funds expended on implementation.
- b. Number of participants in awareness training.
- c. Number of PATs.
- d. Number of PAT members.
- e. Statistical analysis of continuous improvement surveys.
- f. Number of process improvements.

Research and support continuous improvement activities can be measured by evaluating data collected by each staff office and technology directorate. Following is a list of measurements that can be used by research and support functions.

- a. Late reports.
- b. Calculation errors.
- c. Misfiled data/information.
- d. Utilization of available resources.
- e. Design errors.
- f. Planning process.
- g. Engineering changes.
- h. Length of processing time.
- i. Number of documentation reworks.
- j. Failure to meet suspense dates.
- k. Contract errors.
- l. Interaction with customers.

## COMMUNICATION

At predetermined milestones, PATs report progress to the Process Owner. In addition, an oral report is given to the Executive Council at specifically scheduled meetings. At the completion of the project, a formal briefing is made to the Executive Council by the team with the process owner present. The formal briefing includes a written report.

A central database of all current and completed continuous improvement activities will be established and maintained by the Continuous Improvement Center.

The Continuous Improvement Center will communicate information pertaining to upcoming seminars, workshops, training opportunities, and PAT progress to Laboratory personnel in conjunction with the Laboratory training office. The Continuous Improvement Center reviews and determines the best vehicle for this communicate. Generally, a printed bulletin and the Laboratory E-Mail system are the appropriate vehicle for this type of communication.

## TRAINING

Training will be developed and conducted in conjunction with the Laboratory Training Office. Continuous improvement training strategies are designed to achieve the objectives of Laboratory implementation objectives.

Continuous improvement training activities are:

- a. TQM Orientation, 30 minute presentation

The objective of the orientation is to introduce TQM philosophies and principles, and to provide an overview of the implementation process. The TQM orientation presentation is incorporated into the WL Newcomers Orientation Briefing. All military and civilian personnel will receive the orientation from a representative of the Continuous Improvement Center.

- b. TQM Awareness Training, 2 - 4 hours

The objective of awareness training is to build a foundation of TQM principles and philosophies, Laboratory implementation strategies, and TQM benefits. It also provides participants with hands-on experience with selected TQM tools and techniques. The training is conducted by Process Managers and presented to all Laboratory personnel.

## TRAINING (CONT)

### c. Process Manager Training, 8-10 Days

The objective of this program is to train a critical mass of personnel to serve as process managers. These individuals will serve as both trainers and resources to the Laboratory, ensuring a systematic approach to continuous improvement. Problem-solving skills, statistical tools, interpersonal skills and continuous improvement implementation techniques are components of this training. Interpersonal communication training includes learning activities to strengthen facilitator skills and demonstrates ways to improve interpersonal relationships within work groups. Implementation training allows process managers to develop action plans for their assigned PATs.

### d. Process Action Team (PAT) Training, 2 - 4 hours

The objective of PAT training is to provide team members with the tools and skills needed to make process improvements. Training includes an integration of the Deming principles, effective meetings skills, problem-solving techniques, and the interpersonal skills necessary to improve the work process. The training is presented by a process manager.

### e. Effective Meetings, 30 minute presentation

The objective of this presentation is to present the characteristics of bad meetings and guidelines for conducting effective meetings. This presentation will provide participants with effective meeting guidelines and skills. All Laboratory personnel will receive this presentation from a representative of the Continuous Improvement Center.

## SUGGESTED READING

Deming W. Edwards, "Quality, Productivity and Competitive Position", Cambridge, Mass.: MIT, Center for Advanced Engineering Study, 1982.

Deming, W. Edwards, "Out of the Crisis", Cambridge, Mass.: MIT, Center for Advanced Engineering Study, 1986.

Ishikawa, Kaoru, "Guide to Quality Control," Asian Productivity Organization, Revised Edition, 1976.

Peters, Tom, "Thriving on Chaos," Alfred A. Knopf, New York, 1988.

Ford Motor Company, "Continuing Process Control and Process Capability Improvement," (80-01-251), 1983.

## TRANSFORMATION THROUGH APPLICATION OF THE FOURTEEN POINTS

BY DR. W. EDWARDS DEMING

1. Create constancy of purpose toward improvement of product and service.
2. Adopt the new philosophy. We are in a new economic age. Western management must awaken to the challenge.
3. Cease dependence on inspection to achieve quality.
4. End the practice of awarding business on the basis of price tag. Instead, minimize total cost.
5. Improve constantly and forever the system of production and service, to improve quality and productivity, and thus constantly decrease costs, improve profit.
6. Institute training on the job.
7. Institute leadership (see Point 12). The aim of leadership should be to help people and machines to do a better job.
8. Drive out fear, so that everyone may work effectively for the company.
9. Break down barriers between departments. Optimize the company as a system.
10. Eliminate slogans, exhortations, and targets for the work force.
11. Eliminate work standards (quotas). Eliminate management by objective. Eliminate management by numbers, numerical goals.
12. Remove barriers that rob the hourly worker of his right to pride of workmanship. Remove barriers that rob people in management and in engineering of their right to pride of workmanship. This means, inter alia, abolishment of the annual or merit rating.
13. Institute a vigorous program of education and self improvement.
14. Put everybody in the company to work to accomplish the transformation.