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This document discusses the implementation of TQM by DTIC. It includes TQM concepts, methodology, goals and milestones. The DTIC plan embraces the principles and supports the goals of the DLA TQM Master Plan, the DLA-S TQM Plan and productivity improvement programs.  
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TOTAL QUALITY MANAGEMENT

# Total Quality Management Implementation

at the

DEFENSE TECHNICAL INFORMATION CENTER

September 1989

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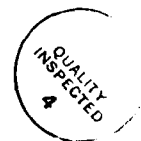
TOTAL QUALITY MANAGEMENT IMPLEMENTATION

AT

THE DEFENSE TECHNICAL INFORMATION CENTER

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FOREWORD  
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This plan is provided as a vehicle for identifying objectives for and the direction of efforts needed to embody a philosophy of quality in the way we think, act, conduct our business, and interact with others, while continuously improving the processes involved in providing scientific and technical information support, services, and products to the DoD research and development community. The DTIC Total Quality Management (TQM) Implementation Plan embraces the principles and supports the goals of the DLA Total Quality Management Master Plan, the DLA-S TQM Plan, Enhanced Efficiency in an Enriched Environment (E4), Futures, and the Productivity Improvement Programs.

TQM is a strategy for continuously improving performance at every level and in all areas of responsibility. As members of the DTIC staff, you and I can affect the quality of the service and products we provide. Having every employee involved in efforts to improve the quality of the output of his/her performance is my personal goal.



KURT N. MOLHOLM  
Administrator

## CONTENTS

|   |   |
|---|---|
| MISSION-AUTHORITY                               | 1 |
| CONCEPTS  |   |
| What is TQM?                                    | 2 |
| Constancy of Purpose                            | 2 |
| Continuous Process Improvement                  | 2 |
| Focus on the Customer                           | 2 |
| Commitment                                      | 3 |
| Process Knowledge                               | 3 |
| Top-Down Implementation                         | 3 |
| Total Involvement                               | 3 |
| Teamwork  | 4 |
| Investment in People                            | 4 |
| METHODOLOGY                                     |   |
| A. TQM Structure                                | 5 |
| 1. Senior Management                            | 5 |
| 2. Middle Management and First-Line Supervisors | 5 |
| 3. Employees                                    | 6 |
| 4. TQM Focal Point                              | 6 |
| 5. Facilitators                                 | 6 |
| B. Process Improvement Cycle                    | 7 |
| GOALS   |   |
| A. Core Goals                                   | 8 |
| 1. Develop a TQM Trained Work Force             | 8 |
| 2. Harmonize Directives                         | 9 |

## CONTENTS

|   |     |
|---|-----|
| 3. Integrate Existing Initiatives   | 9   |
| 4. Sensitize Industry to TQM and Encourage Adoption in Business Strategy                                      | 9   |
| 5. Demonstrate an Uncompromising Commitment to Buying and Supplying the Highest Quality Products and Services | 9   |
| 6. Enhance DTIC Recognition and Award System  | 10  |
| 7. Develop a Feedback and Communication System  | 10  |
| 8. Institutionalize TQM Within DTIC   | 11  |
| EXECUTION   | 12  |
| APPENDIX - GLOSSARY OF TQM TERMINOLOGY  | A-1 |

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MISSION-AUTHORITY

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The authority for this planning initiative is contained within the following:

DLA Total Quality Management Master Plan, January 1989.

DoD Directive 3200.12, DoD Scientific and Technical Information Program, Enclosure 3, Defense Technical Information Center, specifically paragraph B5, Investigation, Experimentation, and Application of Advanced Information Science and Technology. The DTIC shall identify, develop, and carry out programs to perform and monitor experimentation and study for increasing its internal effectiveness and productivity...

DTIC 2000 - A Corporate Plan for the Future, June 1984.

DoD FY 1989 Productivity Improvement Plan, October 1987.

DLA-CO letter, Subject: Productivity in DLA, dated 1 December 1988.

DLA-Q letter, Subject: Total Quality Management, dated 27 December 1988.

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CONCEPTS

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What is TQM?

Total Quality Management (TQM) is the DoD strategy for continuously improving performance at every level and in all areas of responsibility. At DTIC, the concepts of TQM will serve as basic rules for management decisions and actions. These concepts will be used to form expectations and judge behavior.

Constancy of Purpose:

To achieve our goal of having TQM become the way of life at DTIC, we have established, in our strategic planning, objectives and strategies for adopting this management philosophy. This long-range commitment to total quality will provide a constancy of purpose and focus for our endeavors. The planning initiative helps to ensure our long term commitment to TQM.

Continuous Process Improvement:

The primary objective of TQM is the continuous improvement of every aspect of DTIC's work. Continuous process improvement places emphasis on preventing defects rather than discovering them through product inspection. TQM focuses on the processes--the systematic approaches to accomplishing specific tasks--that create products and services. Cyclical analysis and planned changes in the processes are the means by which we will achieve continuous process improvement.

Focus on the Customer:

Quality is defined as the extent to which a product or service meets customer requirements and is fit for use. To provide quality services and products requires that we thoroughly understand each of our customers needs. DTIC customers are not only the DoD, DoD contractors, other Government agencies and their contractors who are external to us, but also co-workers, supervisors, and other organizations and activities within DTIC that comprise internal customers. We are each both a customer for and supplier to the products and services of other DTIC offices. Each of our activities should ultimately be focused on increased customer satisfaction.

A thorough understanding of the needs of all customers, external and internal, not only provides us a means of assessing our performance, but also helps to establish future directions and goals.

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CONCEPTS  
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**Commitment:**

DTIC management has already begun to demonstrate the commitment and willingness to be active and involved that is required for TQM to succeed. Establishing clear TQM objectives and target goals is the first step in making positive changes and demonstrates commitment to continuous improvement.

**Process Knowledge:**

Before processes can be standardized they must be defined and understood. Positive change is primarily created through process improvement ideas generated by the work force. Management must thoroughly understand the processes which they can influence and for which they are responsible. Working as teams, DTIC will undertake analyses of its major processes.

Process analysis involves looking at the customer requirements, the actual output, the actions in the process, and the input received from suppliers. Through process analysis, we will determine the capabilities of our processes to meet customer requirements, and the effects of any changes input to improve those capabilities.

**Top-Down Implementation:**

The implementation of TQM from the top down is designed to ensure that DTIC leaders understand, demonstrate, provide the necessary resources, and can teach TQM principles and practices. This must be done at each level before full implementation of TQM to the next subordinate level can be fully achieved.

**Total Involvement:**

Since every product and service at DTIC is the result of a process, we must have every individual involved in improving his/her own work processes. Only then can we achieve total quality management.

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CONCEPTS

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**Teamwork:**

TQM is a change in the way we think and the way we deal with people. Positive process improvement will primarily be generated from the ideas of those who participate in the process. DTIC employees will continue to be encouraged to be creative and to make decisions within their areas of expertise. Supervisors will assume the role of team leader. Teamwork will be used to build communications and cooperation, to stimulate creative thought and to provide the structure required to ensure successful implementation of TQM practices. This participative management style will create the new, more flexible environment and culture required to encourage and accept change.

**Investment in People:**

DTIC'S largest and most valuable resource is its people. They provide the knowledge and experience on which the DoD scientific and technical community relies. People, the generators of ideas, are the most essential component of continuous process improvement. Training, team-building, participative management, and worklife enhancements are important elements in creating the environment in which DTIC personnel will grow, gain new experiences and capabilities, and continually contribute to the development of a strong DoD.

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METHODOLOGY  
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TQM is DTIC's methodology for providing the leadership, training, and motivation to continuously improve our management and operations.

A. TQM STRUCTURE:

To ensure institutionalization of TQM, everyone at DTIC must be a part of the TQM effort. All levels of management and employees are involved in the DTIC TQM structure.

1. Senior Management:

The TQM Executive Steering Committee (ESC) reports to the Administrator, is chaired by the Deputy Administrator and all Directorate/Office Chiefs are members. The functions of the ESC are to:

- a. Develop TQM philosophy and policy.
- b. Develop the plan for TQM implementation.
- c. Provide resource support for TQM activities.
- d. Identify and prioritize initial projects.
- e. Name the members of the Quality Management Boards (QMBs).

The involvement of top management and the incorporation of TQM into DTIC strategic planning will ensure continuity of TQM objectives and initiatives.

2. Middle Management and First-Line Supervisors:

Quality Management Boards (QMBs). The QMBs may be interdirectorate or intradirectorate. They are committees of mid-level managers and first-line supervisors whose functions include identifying significant processes and designing process improvements as well as establishing process action teams to review and analyze process problems. QMBs provide crucial structural support for the TQM process. They create a vehicle for interorganization communications as well as for communications up and down the chain of command.

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METHODODOLOGY  
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3. Employees:

Process Action Teams (PATs)/Quality Circles (QCs). PATs and QCs differ in that PAT team members are appointed based on their knowledge of the process to be studied, QC members are volunteer. The teams are formed by representatives of each work area involved in a process. PATs/QCs utilize group problem solving techniques and statistical analysis tools to collect baseline information on process performance, identify control points in the process, establish measurement devices, and recommend actions to eliminate the cause(s) of problems permanently. A PAT, unlike a QC, is established to work on a pre-determined project. Upon completion of the project, the PAT may be dissolved or reconstituted depending upon the expertise required to tackle the next problem. QCs are usually continuous teams.

4. TQM Focal Point:

The TQM focal point acts as the principal advisor to the Administrator in directing the development, implementation, operation and evaluation of the DTIC TQM process. The focal point has the following responsibilities:

- a. Track implementation of the improvement process.
- b. Communicate lessons learned throughout DTIC.
- c. Determine requirements for TQM-related training and provide for this training.
- d. Foster employee participation in the TQM process.
- e. Publicize and promote TQM throughout DTIC.
- f. Advise the ESC, QMBs and PATs on TQM-related issues.

5. Facilitators:

The function of the facilitator is to monitor the process of group interaction to keep team members on track. Each QMB, PAT and QC is assisted by a facilitator. The facilitator's main concern is not the content of the discussions, but how the group deals with that content in the process of interaction.

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METHODOLOGY  
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Responsibilities of the facilitator include:

- a. Keeping the group focused on the problem.
- b. Training the group leader.
- c. Giving feedback to the group leader.
- d. Encouraging open expression of ideas.

B. PROCESS IMPROVEMENT CYCLE:

Continuous process improvement will be achieved by repetitive use of the following process improvement cycle:

1. Identification of Work Processes
2. Identification and prioritization of opportunities for improvement.
  - a. Select the processes to be improved.
  - b. Establish the boundaries of the process.
  - c. Define the process.
  - d. Identify the customers (internal and external).
  - e. Identify customer requirements.
  - f. Compare requirements with the process.
3. Identification of relevant measurement points.
4. Implementation of the best solutions to improving the process.
5. Monitoring the effectiveness of the change.

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GOALS

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This plan supports the core goals of the DLA Total Quality Management Master Plan and the DLA-S TQM Plan. Additionally, it supports DTIC agency goals as defined in our strategic planning document, DTIC 2000, A Corporate Plan for the Future, as supplemented by the revised goals developed at the DTIC Long-Range Planning Conference and subsequent meetings of the Corporate Management Council, May - June 1989.

The plan further establishes specific goals, actions and milestones necessary to achieve increases in the quality of scientific and technical information services, products and support provided to the DoD research and development community.

In the current climate of constrained resources, we must create a work force within which every employee will accept no less than excellence and will continually strive to reduce the cost of doing business. One of our critical success factors over the long term is to reduce the size of the budget. To achieve this end will require substantial up front investment.

This plan necessarily crosses all functional areas, processes and skills.

A. CORE GOALS:

1. Develop a TQM Trained Work Force.

The first step in creating a TQM environment is to provide everyone in the organization, beginning with management, a full understanding of TQM principles and techniques. Upon completion of the initial training, refresher courses and courses designed to ensure that new employees adopt a quality approach to job performance will be given continuously. DTIC personnel will receive training consisting of the following:

- a. Introduction to TQM Concepts - All
- b. Group Problem Solving Techniques - QMBs and PATs
- c. Statistical Methods of Process Analysis - Managers, QMBs, PATs and facilitators
- d. Initiatives in Excellence - TQM point of contact, facilitators, all interested managers and employees
- e. Facilitator Training - Facilitators

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GOALS

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f. Refresher Training - All

2. Harmonize Directives.

DTIC, in discharging its responsibilities for the collection, storage, and dissemination of DoD technical information, develops/issues procedural guidance in the form of DoD, DLA, and DTIC instructions. As existing and future policies and procedures evolve, inconsistencies within existing directives will be corrected. By eliminating contradictory signals and developing common, consistent approaches to improvement, the TQM philosophy will become our way of doing business.

3. Integrate Existing Initiatives.

DTIC is currently participating in many initiatives that encompass the principles of continuous process improvement. Owners of the processes, will review the programs to ensure conformance with TQM. Whenever possible, and to the extent practicable, TQM process reviews will be conducted simultaneously with other programs requiring process reviews such as Internal Management Control, Operations Research, Modernization Planning, and QCs. Although DTIC does not intend to duplicate any of its ongoing improvement efforts, we have incorporated some of the goals of the Enhanced Efficiency in an Enriched Environment (E4), Futures, and Productivity Improvement Programs into our TQM planning.

4. Sensitize Industry to TQM and Encourage Adoption in Business Strategy.

Because we service both the DoD and other Government agency contractor communities, DTIC has the opportunity to demonstrate and encourage adoption of TQM methods to a large industry population. DTIC will utilize its customer publication, the DTIC Digest, and meetings of its industry user groups, as well as the contracting process to emphasize the benefits of TQM to the private sector.

5. Demonstrate an Uncompromising Commitment to Buying and Supplying the Highest Quality Products and Services.

DTIC has adopted as one of its strategic goals that we will produce the highest quality products and services in accordance with TQM concepts. This commitment to supplying our customers with products and services that meet their requirements and are fit for intended use is the cornerstone of our TQM effort. Just as we will only supply quality products, as buyers of products and services, we will only accept quality inputs from our vendors.

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GOALS

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6. Enhance DTIC Recognition and Award System.

TQM will be an integral part of the DTIC recognition and award system. Current programs, such as productivity improvement awards, beneficial suggestions, Model Installation Program (MIP) proposals and On-The-Spot awards, will be used to provide rewards and recognition for people who have made significant contributions to the improvement process. These awards should stress the team nature of the improvement process, adequately recognizing and rewarding all the people involved. Awards to facilitators who make outstanding contributions to implementation of TQM will be coordinated by the TQM point of contact through the supervisory chain.

7. Develop a Feedback and Communication System.

DTIC will enhance its feedback and communication systems to include mechanisms for capturing and sharing opportunities for process improvement. Some of the mechanisms to be employed include:

a. Collecting, announcing and disseminating TQM-related documents to the DoD community.

b. Utilizing existing communication channels, i.e., the DTIC Digest, the DTIC News Line, DTIC Summary Sheets and DLA Dimensions to share information on quality improvement.

c. Continuing to support our five user groups comprised of representatives of external customers who advise and make recommendations on specific facets of the DTIC program. The user groups are an excellent source of information on user needs and feedback on our performance.

d. Revising the new employee orientation to emphasize the value of the employee both within DTIC and to our user community.

e. Utilizing the results of the Management Communications Team Committee Report to eliminate perceived barriers to effective communications.

f. Including the status of TQM implementation efforts in DTIC Management Reviews.

g. Utilizing the results of extensive interviews with our user community conducted in connection with the update of the DTIC Baseline Study as input to our improvement process.

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GOALS

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8. Institutionalize TQM Within DTIC.

Incorporating TQM into the everyday life of DTIC is our ultimate goal. Top management's commitment to the philosophy, continuous training activities and process improvement goals provide the basis for the eventual disappearance of TQM as a special emphasis activity. We will achieve this goal when continuous process improvement becomes the routine method of operation for all employees at all levels.

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EXECUTION

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A. CORE GOALS:

1. Develop a TQM-Trained Work Force.

| WHO               | OBJECTIVE 1A: TQM AWARENESS TRAINING  | WHEN                  |
|-------------------|---|-----------------------|
| DTIC-DE           | Introduce TQM principles and the process improvement cycle to senior management.                          | May 89                |
| DTIC-D            | Train TQM focal point in TQM principles and statistical analysis tools.                                   | Jul 89                |
| DTIC-DE<br>DTIC-W | Provide contracted training in TQM principles and statistical analysis tools to managers and supervisors. | Oct-Dec 89            |
| DTIC-DE           | Develop DTIC TQM training module.   | Aug-Oct 89            |
| DTIC-DE           | Conduct TQM awareness training for employees.   | Nov 89 and Continuous |
| DTIC-DE           | Provide statistical analysis tool training for PATs and QCs.  | Dec 89 and Continuous |
| DTIC-DE           | Provide group problem solving techniques training for QMBs and PATs.                                      | Dec 89 and Continuous |

| WHO     | OBJECTIVE 1B: DEVELOP FACILITATORS  | WHEN       |
|---------|---|------------|
| DTIC-DE | Identify facilitators.  | Sep 89     |
| DTIC-DE | Provide facilitators DLA-sponsored facilitator training.  | Sep-Oct 89 |
| DTIC-DE | Utilize applicable training classes and materials sponsored by QCs to further develop facilitators. | Continuous |

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EXECUTION

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2. Harmonize Directives.

| WHO         | OBJECTIVE 2: Harmonize Directives  | WHEN       |
|-------------|--|------------|
| ALL<br>Mgrs | Review policies and procedures to ensure they do not conflict with TQM principles. | Continuous |

3. Integrate Existing Initiatives.

| WHO                 | OBJECTIVE 3: Identify Existing Productivity Improvement Initiatives as Part of TQM                            | WHEN       |
|---------------------|---|------------|
| ESC                 | Identify initiatives that fall under the TQM umbrella.  | Sep 89     |
| PSEs                | Review identified initiatives to ensure conformance with TQM principles.                                      | Oct 89     |
| QMBS<br>PATs        | Coordinate, when possible, TQM process reviews with those required under other programs, i.e., IMC.           | Continuous |
| QMBS<br>PATs        | Utilize results of previous process reviews conducted under other programs as baseline input for TQM reviews. | Continuous |
| DTIC-DE<br>DTIC-LRE | Utilize skills and training developed in QC Program to further TQM.   | Continuous |
| ESC<br>QMBS<br>PATs | Employ technical skills of DTIC-LO as a resource for TQM implementation.                                      | As needed  |

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EXECUTION

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4. Sensitize Industry to TQM and Encourage Adoption in Business Strategy.

| WHO                         | OBJECTIVE 4A: PUBLICIZE DTIC TQM EFFORTS   | WHEN                  |
|-----------------------------|--|-----------------------|
| DTIC-DE<br>DTIC-B<br>DTIC-W | Publish TQM articles in the DTIC Digest and the DTIC News Line.                                | May 89 and Continuous |
| DTIC-DE<br>DTIC-B           | Prepare a DTIC Summary Sheet on TQM.   | Aug 89                |
| DTIC-DE                     | Submit TQM accomplishments for publication in DLA Dimensions.                                  | Continuous            |
| DTIC-B                      | Include TQM in DTIC exhibits at trade shows, professional society and industry group meetings. | Dec 89 and Continuous |
| DTIC-B<br>DTIC-DE           | Report on DTIC TQM implementation at Annual Users' Conference                                  | Nov 89 and annually   |

| WHO                         | OBJECTIVE 4B: SHARE DOD TQM SUCCESS STORIES  | WHEN                  |
|-----------------------------|--|-----------------------|
| DTIC-F<br>DTIC-B            | Collect, store, announce and disseminate TQM reports.  | Jul 89 and Continuous |
| DTIC-DE<br>DTIC-H           | Establish baseline bibliography of DoD TQM documents in the DTIC TR database and furnish to all DLA TQM Points-Of-Contact (POCs).  | Jul 89                |
| DTIC-DE<br>DTIC-H<br>DTIC-Z | Establish Current Awareness Bibliography (CAB) of TQM documents added to the DTIC TR database after the baseline search and provide to all DLA TQM POCs on a monthly basis (if new documents added). | Jul 89 and Continuous |
| DTIC-DE<br>DTIC-F           | Register all DLA TQM POCs as DTIC users.   | Aug 89                |

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EXECUTION

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5. Demonstrate an Uncompromising Commitment to Buying and Supplying the Highest Quality Products and Services.

| WHO    | OBJECTIVE 5A: IDENTIFY CUSTOMER REQUIREMENTS  | WHEN                  |
|--------|---|-----------------------|
| DTIC-R | Provide results of extensive interviews with DTIC internal and external customers as baseline for ESC decisions on TQM projects.  | Sep 89                |
| ESC    | Establish QMBs to determine needed changes in work processes.   | Jan 90 and Continuous |
| QMBs   | Establish PATs to collect and analyze information about work processes.   | Mar 90 and Continuous |
| DTIC-B | Utilize information developed in the product management program to keep the ESC, QMBs, and DTIC employees informed of changes in usage, trends, and values of DTIC products and services to the user community. | Continuous            |

| WHO    | OBJECTIVE 5B: IDENTIFY REQUIREMENTS TO SUPPLIERS                      | WHEN       |
|--------|---|------------|
| All    | Ensure quality requirements are included in requests for procurement. | Continuous |
| DTIC-W | Coordinate with DASC, DTIC participation in purchase of "Best Value". | Jun 90     |

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EXECUTION

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6. Enhance DTIC Recognition and Award System.

| WHO              | OBJECTIVE 6A: RECOGNIZE EMPLOYEES  | WHEN       |
|------------------|--|------------|
| All<br>Mgrs      | Include contributions to process improvements in criteria for determining beneficial suggestion, On-The-Spot, productivity improvement, MIP, and performance awards. | Continuous |
| All<br>Mgrs      | Whenever possible, reward the team effort.   | Continuous |
| DTIC-DE<br>Supvs | Recognize outstanding contributions by facilitators to implementation of TQM.  | Continuous |

| WHO    | OBJECTIVE 6B: EMPHASIZE VALUE OF THE EMPLOYEE  | WHEN                     |
|--------|--|--------------------------|
| DTIC-B | Restructure the new employee orientation to emphasize the value of the employee within and to our user community.  | Jan 90 and<br>Continuous |
| DTIC-B | Develop an internal marketing plan to raise the individual DTIC employee's awareness of his/her role in satisfying user interests and needs.                             | Jan 91                   |
| DTIC-W | Develop a supervisory "headstart" program in conjunction with a supervisory assessment center to train potential candidates for future supervisory/managerial positions. | Jan 92                   |

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EXECUTION

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7. Develop a Feedback and Communication System.

| WHO          | OBJECTIVE 7A: DEVELOP A FEEDBACK SYSTEM  | WHEN                  |
|--------------|--|-----------------------|
| DTIC-D       | Continue support of DTIC's user groups as a source of information on user needs and feedback on DTIC performance.                      | Continuous            |
| DTIC-F       | Develop a mechanism to capture and analyze complaints from the complaint desk as a source of input to the ESC on process problems.     | Jun 90 and Continuous |
| QMBS<br>PATs | Utilize feedback from the customer and the process gained in the process improvement cycle to further continuous process improvements. | Continuous            |

| WHO      | OBJECTIVE 7B: IMPROVED COMMUNICATION SYSTEM  | WHEN                  |
|----------|--|-----------------------|
| All      | Utilize existing communications channels to share information on quality improvements:<br><br>--DTIC Digest<br>--DTIC News Line<br>--Public Address System<br>--DTIC Summary Sheets<br>--DLA Dimensions<br>--DTIC Management Reviews | Continuous            |
| All PSEs | Develop workflow displays that depict meaningful information about the status of processes to the employee.  | Jul 90 and Continuous |
| ESC      | Utilize the results of the Management Communications Team Committee Report to develop mechanisms to eliminate perceived barriers to effective communications.  | Feb 90                |

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EXECUTION

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8. Institutionalize TQM Within DTIC.

| WHO            | OBJECTIVE 8: DEVELOP A TQM MEASUREMENT SYSTEM                                       | WHEN                |
|----------------|---|---------------------|
| ESC<br>DTIC-DE | Develop a measurement tool to determine progress in institutionalizing TQM at DTIC. | Mar 90              |
| ESC            | Conduct an annual assessment of progress.   | Sep 90 and Annually |
| ESC<br>DTIC-DE | Revise the TQM Implementation Plan if annual assessment indicates the need.         | As Needed           |

B. STRATEGIC IMPROVEMENT PLANS:

| WHO                                  | OBJECTIVE: IMPROVED USER SERVICES                         | WHEN |
|--------------------------------------|---|------|
| DTIC-B                               | Conduct Current User Survey.                              | FY91 |
| DTIC-B<br>DTIC-Z<br>DTIC-F<br>DTIC-H | Develop Products and Services Based on User Requirements. | FY92 |
| DTIC-H<br>DTIC-Z<br>DTIC-R           | Create a Database of All Management Data.                 | FY91 |
| DTIC-E                               | Provide Access to Additional Data Sources.                | FY93 |
| DTIC-Z                               | Expand Alternatives for Classified Access to Databases.   | FY92 |
| DTIC-F                               | Automate Internal Document Tracking System                | FY93 |

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APPENDIX - GLOSSARY OF TQM TERMINOLOGY  
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|                   |  |
|-------------------|--|
| Cause             | An established reason for the existence of a defect.   |
| Common Cause      | A source of variation in the process output that is inherent to the process and will affect all the individual results or values of process output.  |
| Control           | The set of activities employed to detect and correct deviation in order to maintain or restore a desired state.  |
| Correction        | The totality of actions to minimize or remove variations and their causes.   |
| Cost of Quality   | The sum of the cost of prevention, appraisal and failure. The key financial measurement tool that ties process control and process optimization into a total process management effort. It can be used both as an indicator and a signal for variation (more often, patterns of variation), as well as a measure of productivity and efficiency. |
| Corrective Action | The implementation of effective solutions that result in the elimination of identified product, service, and process problems.   |
| Culture           | A prevailing pattern of activities, interactions, norms, sentiments, beliefs, attitudes, values, and products in an organization.  |
| Customer          | The recipient or beneficiary of the outputs of your work efforts or the purchaser of your products and services. May be either internal or external to your organization. The recipient that must be satisfied with the output.  |
| Data              | Information or a set of facts presented in descriptive form. There are two basic kinds of data: measured (also known as variables data) and counted (also known as attribute data).  |

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APPENDIX - GLOSSARY OF TQM TERMINOLOGY

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|                        |  |
|------------------------|--|
| Defect                 | Any state of nonconformance to requirements.   |
| Deviation              | Any nonconformance to a standard or requirement.   |
| Effectiveness          | A process characteristic indicating that the process output (work product) conforms to requirements.   |
| Efficiency             | A process characteristic indicating that the process produces the required output at a perceived minimum cost.   |
| External Failure Costs | These are the costs incurred when an external customer receives a defective product.   |
| Goal                   | A statement of attainment/achievement that one proposes to accomplish or attain with an implication of sustained effort and energy directed to it over a longer range. |
| Input                  | Materials, energy, or information required to complete the activities necessary to produce a specified output (work product).  |
| Internal Failure Costs | These are the costs generated by defects found within the organization, prior to the product reaching the external customer.   |
| Measurement            | The act or process of measuring to compare results to requirements. A quantitative estimate of performance.  |
| Objective              | A statement of the desired result to be achieved within a specified time. By definition, an objective always has an associated schedule.                               |
| Output                 | The specified end result required by the recipient.  |
| Outputs                | Materials or information provided to others (internal or external customers).  |

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APPENDIX - GLOSSARY OF TQM TERMINOLOGY

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| Performance         | The term performance is used as an attribute of the work product itself and as a general process characteristic. The broad performance characteristics that are of interest to management are quality (effectiveness), cost (efficiency), and schedule. Performance is the highly effective common measurement that links the quality of work product to efficiency and productivity. |
| Prevention Costs    | These are the costs associated with actions taken to plan the product or process to ensure that defects do not occur.   |
| Process             | A system in operation to produce an output of higher value than that of the sum of its inputs. A process is also defined as the logical organization of people, materials, equipment, and procedures into work activities designed to produce a specified end result (work product).  |
| Process Capability  | Long-term performance level after the process has been brought under control.   |
| Process Control     | The set of activities employed to detect and remove special causes of variation in order to maintain or restore stability (statistical control).  |
| Process Improvement | The set of activities employed to detect and remove common causes of variation in order to improve process capability. Process improvement leads to quality improvement.  |
| Process Owner       | A designated person within the process, who has authority to manage the process and responsibility for its overall performance.   |
| Process Performance | A measure of how effectively and efficiently a process satisfies customer requirements.   |

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APPENDIX - GLOSSARY OF TQM TERMINOLOGY  
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| Process Review      | An objective assessment of how well the methodology has been applied to your process. Emphasizes the potential for long-term process results rather than the actual results achieved.   |
| Productivity        | The value added by the process divided by the value of the labor and capital consumed.  |
| Requirements        | What is expected in providing a product or service. The "it" in doing it right the first time. Specific and measurable customer needs with an associated performance standard.  |
| Special Cause       | A source of variation in the process output that is unpredictable, unstable, or intermittent. Also called assignable cause.   |
| Specification       | A document containing a detailed description or enumeration of particulars. Formal description of a work product and the intended manner of providing it. (The provider's view of the work product.)  |
| Statistics          | The branch of applied mathematics that describes and analyzes empirical observations for the purpose of predicting certain events in order to make decisions in the face of uncertainty. Statistics, in turn, are based on the theory of probability. The two together provide the abstraction for the mathematical model underlying the study of problems involving uncertainty. |
| Statistical Control | The status of a process from which all special causes of variation have been removed and only common causes remain. Such a process is said to be stable.  |