ADVANCED PRODUCTION & QUALITY MANAGEMENT

LESSON PLAN

Course Number: PQM 301

Module & Title: Lesson No. 1, New Paradigms

Length (total): 2.5 Hours

Terminal Learning Objective:

Given the lecture, discussions, and exercise the student will be able to define the impact of a changing acquisition reform, quality, and systems engineering paradigms on the DoD acquisition community. This lesson provides students with the opportunity to discuss new paradigms that should be affecting the way they do business. The new paradigms targeted in this lesson include acquisition reform, new quality definitions, and IPPD paradigms. Students will discuss the impact of these changing paradigms as they relate to the acquisition community.

Enabling Learning Objectives:

1. Relate the "new way of doing business" as set forth by USD (A&T) and USD (Acquisition Reform).

2. Compare the old and the new quality paradigms. The students will identify the new emerging paradigm for quality. They will then compare and contrast that paradigm with the old one. Basically we are going from inspecting quality to designing and building it in. Students will use this time to develop their own definitions for quality.

3. Identify the impacts of the new IPPD paradigm on Mfg/QA. The students will identify the new paradigm for systems engineering (IPPD). Discuss and contrast sequential engineering with IPPD concepts.

Learning Method: Lecture/Discussion/Exercise

Student Readings: DoD Deskbook, “Quality,” Section 2.6.E (attached)

Background References: Quest for Quality, Roger Hale, The Tennant Company, Minneapolis, MN

Conduct of the Lesson:

This lesson is conducted primarily by discussion and some lecture as appropriate. The TLO is accomplished in two major parts - The Development of the New Quality Paradigm, The Development of the New Engineering Paradigm.

The section on Developing New Quality Paradigms takes students through discussions of numerous definitions of quality. Some of these definitions reflect the old paradigm (acceptable quality levels) and some of the definitions will reflect the new paradigm (perfect 1st time quality). Students will develop their own definition of quality that will be used in the RFP exercise to drive contractor behavior to reduce cost while improving quality.

The second section takes students through an analysis of the changing paradigm within the engineering community. Classic engineering models have the engineers working in near vacuums to develop products that meet performance and test requirements. Once they meet those requirements the design is thrown over the wall to manufacturing that has to build to print. The problem is that the design is not producible. The new paradigm has design engineering working very closely with all the other functional areas, especially the technical areas. The goal is to create a design that meets performance requirements while optimizing the ease and economy of fabrication, assembly, test, maintenance, reliability, supportability, environmental, safety and health (ESH), affordability, et. al.

Web Sites Related to this Lesson:

Deskbook – http://www.deskbook.osd.mil

DEFENSE ACQUISITION DESKBOOK, SECTION 2.6.E

QUALITY

Quality is the composite of material attributes including performance features and characteristics of a product or service to satisfy a customer's need. The quality of products, or services is determined by the extent they meet (or exceed) requirements and satisfy the customer(s), at an affordable cost. The emphasis and practices to achieve quality have evolved dramatically in recent years. The major shift in defense acquisition is to emphasize development of quality products through the system engineering design process of the product. The key to success is to design quality into the product; define the product or service quality requirements, and then provide the contractor the maximum flexibility to meet these requirements.

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MANDATORY REFERENCES

Federal Acquisition Regulation
FAR Part 46, "Quality Assurance"

Defense Federal Acquisition Regulation Supplement
DFARS Part 246, "Quality Assurance"

Defense Logistics Acquisition Directive 4105.1
DLAD 46 Quality Assurance

Army Federal Acquisition Regulation Supplement
AFARS Part 46, Quality Assurance

Army Corps of Engineers Federal Acquisition Regulation Supplement
EFARS Part 46, Quality Assurance

FORSCOM Federal Acquisition Regulation Supplement
FFARS Part 46, Quality Assurance

Navy Acquisition Procedures Supplements
NAPS Part 5246, Quality Assurance

Air Force Federal Acquisition Regulation Supplement
AFFARS Part 5346, Quality Assurance

Air Force Materiel Command Federal Acquisition Regulation Supplement
AFMCFARS Part 5346, Quality Assurance

National Guard Federal Acquisition Regulation Supplement
NGFARS Part 46, Quality Assurance

DoD Directive 5000.1, Defense Acquisition
D Policy 2, "Acquiring Quality Products"

DoD 5000.2-R, "Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information System Acquisition Programs
Part 4.3.2, "Quality"

AFI 38-401, The Air Force Suggestion Program;
Chapter 2 Determining Eligibility and Submitting Suggestions and Scientific Achievement Awards
Paragraphs 2-6

Chapter 3 Evaluating Suggestions and Meeting Processing Times

Chapter 4 Awards and Recognition
Chapter 4, Paragraph 4.8
Chapter 4, Paragraph 4-13

AFPD 63-5; Quality Assurance

AFI 63-501; Air Force Acquisition Quality Program

GENERAL GUIDANCE - QUALITY MANAGEMENT SYSTEMS

The responsibility and leadership for creating an environment for effective quality design and manufacturing belongs to the highest levels of management. Program managers must convey the leadership and commitment by their own actions in communicating goals, making process effectiveness a key program management issue, and the commitment of resources.

The following major policy changes have dramatically changed the DoD perspective on quality:

--SECDEF Memorandum of May 10, 1995, subject: "Use of Integrated Product and Process Development and Integrated Product Teams in DoD Acquisition," provides the framework for achieving quality products through integrated product and process development. Quality products are best achieved through integrated development of the product and its associated

manufacturing and support processes, through a systems engineering process. Quality must be an integral part of IPPD implementation and the work of integrated product.

--SECDEF Memorandum of December 6, 1995, subject: "Common Systems/ISO-9000/Expedited Block Changes," and USD(A&T) Memorandum dated December 8, 1995, subject: "Single Process Initiative," provide policy on the use of single processes in a contractor's facility. This policy represents a major DoD initiative allowing industry to be more efficient, improve quality and reduce the overall cost of acquiring products.

--USD(A&T) Memorandum of September 18, 1997, subject: "Requiring Processes on Contract," states that it is the policy not to require processes in solicitations and contracts but to rely on performance based requirements whenever practicable. If the Government team decides to contractually specify a critical process, the program manager shall obtain a waiver from the Service or Agency authority.

Achievement of quality requires an effective quality management process in conjunction with effective business and technical practices. Achievement requires engineering and manufacturing practices that emphasize robust design along with enterprise-wide process maturity through continuous process improvement efforts. Benefits include first time pass quality, decreased cycle time, as well as reductions in rework, engineering changes, and inspections. These benefits translate into improved affordability and reduced production transition risk. A quality management system maybe based on the elements described in ANSI/ASQC-Q9000. A quality management approach should include an assessment of the contractor's quality management process, process controls, inspection, test, and should be focused on preventing, controlling and detecting defects.

Unlike the traditional quality approach, which focused on conformance to specification requirements, product quality is now viewed as an attribute that is controlled by the engineering/design and business processes, as well as the maturation of the associated manufacturing/production process.

Achievement of quality must be the underlying objective in all program matters including source selection, contract administration and supplier management, risk management, engineering, manufacturing and testing processes, etc. Quality is the product of effective implementation of these processes. While final inspection and acceptance, and the need to determine the conformance of the product through end item inspection will continue as long as tax payers dollars are being spent, the focus on how to achieve quality has expanded to one of ensuring the appropriate use of best engineering, manufacturing and management practices.
The result will be the most effective and efficient program to prevent quality problems through sound processes, rather than finding problems later on, and do rework. Use of Integrated Product Teams, bringing together the contractor, program office and the CAS activity as a team, will greatly enhance program success.

To achieve quality products and services, one must focus on the following:
(1) Quality of Design. The effectiveness of the design process in capturing the performance, manufacturing, and operational support requirements, and translating them into robust requirements that can be manufactured, coded, and supported in a consistent manner.
(2) Conformance to Requirements. The effectiveness of the design, coding, and manufacturing functions in meeting the product or process requirements and associated tolerances, process control limits, and target yields for a given product group.
(3) Fitness for Use. The effectiveness of the design, coding, manufacturing, and support processes in delivering a product that meets the operational requirements under all required operational conditions.
(4) Cost. The cost of the product and how the design, manufacturing, and management processes affect unit and life cycle costs

The following guidelines for establishing and maintaining an effective quality management program are further discussed:

Application and use of commercial quality management standards
Encouraging use of a single quality process in a contractor's facility
Recognizing and encouraging the appropriate use of practices and tools that lead to acquiring a quality product
Establishing and implementing efficient and effective oversight
Deficiency Reporting

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APPLICATION AND USE OF COMMERCIAL QUALITY STANDARDS

Policy and guidance on the application of quality standards is provided in the FAR Part 46; DFARS Part 246; SECDEF Memorandum of June 29, 1994, subject: "Specifications and Standards-A New Way of Doing Business;" and USD(A&T) Memorandum of December 8, 1995, subject: "Single Process Initiative."

DoD organizations are authorized to use ANSI/ASQC Q-9000, and/or the ISO-9000 series standards in all new contracts, and follow-on work for existing programs, provided contractors are given the flexibility to respond with their own quality systems. The ANSI/ASQC documents covered under ANSI/ASQC Q-9000 represent different levels of quality requirements outlined as follows:

ANSI/ASQC-Q9001 "Quality Systems - Model for Quality Assurance in Design/Development, Production, Installation, and Servicing"

ANSI/ASQC-Q9002 "Quality Systems - Model for Quality Assurance in Production and Installation"

ANSI/ASQC-Q9003 "Quality Systems - Model for Quality Assurance in Final Inspection and Test"

ANSI/ASQC Q-9001, Q-9002 and Q-9003 are the U.S. equivalents and equal to the international quality standards ISO 9001, ISO 9002, and ISO 9003, respectively. The guidance herein applies equally to both the ANSI/ASQC Q-9000 series and the ISO-9000 series documents. Additional guidance on the non-government standards, such as ISO 10005, "Quality management - Guidelines for quality plans," is available through ISO 9000 and 10000 series documents listed the DoD Index of Specifications and Standards.

The elements of ANSI/ASQC-Q9001 represent a framework for a quality system and are used in defining the fundamental requirements for a quality system. However, ANSI/ASQC Q-9001, Q-9002 and Q-9003, standards should not be viewed as the only commercial quality specifications available, nor the most effective quality system requirements. Some industry quality standards (i.e. the QS-9000, AS-9000) are more effective than ANSI/ASQC Q-9000 quality standards because of supplemental quality elements (commonly referred to as ISO 9000 plus) required in commodity sectors.

Offerors should be given the opportunity to use their normal quality systems whenever they meet acquisition needs. Quality systems may be more comprehensive than the ANSI/ASQC Q-9000 series standards; or such standards may be tailored to the specific acquisition needs of the Government and offeror. The key decision is to select and recognize a quality system that satisfies acquisition needs,, whether the system is modeled on military, commercial, national, or international quality system standards.

Users of the ANSI/ASQC Q-9000 standards should be aware that these documents have a number of limitations in that they address the elements of a contractor's quality system, but do not address the application of such a system to the specific products or processes of a particular contract.

REQUEST FOR PROPOSAL STRUCTURE

This section introduces a process to structure the RFP to allow offerors to provide information that will enable the source selection team to assess risk of performance. It allows the offeror to identify those practices he deems important to the project in terms of the risk mitigation. The risk assessment will be based on the ability of the offeror to carry out program requirements and evidence of demonstrated effectiveness. The language presented here is general in nature, and the user should consider tailoring the language to optimize its use for the specific product.

Suggested Language for Section L, Instructions to Offerors:

“Quality Management System Requirements - Offerors shall describe the proposed quality management approach, comparing it to the elements in ANSI/ASQC-Q9000, explaining how it will be applied to reduce program risk, and specifically address (as a minimum) the role of the proposed quality management approach in design and development (with particular emphasis on addressing key product characteristics), manufacturing planning, and key program events (as applicable).

Suggested Language for Section M, Evaluation Factors for Award:
“The offeror's approach will be evaluated based on:
(1) The acceptability of the proposed quality management approach in comparison to the "Basic Elements of Quality" described in the ANSI/ASQC-Q9000 documents, as applied to satisfy program objectives.
(2) The effectiveness of practices, when proposed, that mitigate program risk. Consideration will be given to the extent to which:
(a) The proposed approach reflects the integration of risk reduction efforts into the planning for this program.
(b) The contractor employs a disciplined, structured process to identify and mitigate risks.

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USE OF A SINGLE QUALITY PROCESS IN A CONTRACTOR’S FACILITY

DoD Policy on the use of single processes in a contractor's facility is provided in SECDEF Memorandum of December 6, 1995, subject: "Common Systems/ISO-9000/Expedited Block Changes," and USD(A&T) Memorandum of December 8, 1995, subject: "Single Process Initiative." These memos were intended, in part, to expedite the shift from military quality standards to commercial (ISO/ANSI/ASQC) standards. The goal is to preclude requiring, in a single facility, multiple quality, business or technical processes designed to accomplish the same purposes. The implementation of the single process initiative has coincided with the formulation of local management councils (consisting of representatives of the buying activity, ACO, DCAA and contractor) at affected contractor facilities to assess process issues. Contractor proposed implementation will be initiated based on submission of concept papers. The PM should support contractor Single Process Initiative proposals and other efforts to implement a single quality management system throughout their facilities.

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ENCOURAGING THE APPROPRIATE USE OF ENG & MFG PRACTICES

The prevention of defects, rather than the detection of defects, is the primary goal of the Department. This can be achieved by timely application of engineering, manufacturing, and management practices that emphasize the prevention of defects. Such practices need to be defined within a specific organizational context, not as a stand-alone list. What may be appropriate for a design, or low rate production enterprise, may not be for a commodity manufacturer, and vice versa. Some of the more commonly used practices in industry include:

1. Identification and control of key characteristics.
2. Design to manufacturing process capability.
3. Design for manufacturing and assembly (DFMA).
4. Robust design.
5. Geometric Dimensioning and Tolerancing.
6. Process Variability reduction, of stable, capable manufacturing processes as the basis for product acceptance.
7. Control of variation in the measurement system.
8. Failure reporting analysis and corrective action system.
9. Continuous Process Improvement.
10. Other tools such as use of modeling and simulation, CAD/CAE/CAM, and use of maturity models, etc.

The contractors ability to effectively implement the appropriate and effective application of the above type of development and manufacturing practices and tools, to meet product or service requirements, is fundamental to achieving quality products; i.e. products that meet the user requirements at an affordable cost.

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ESTABLISHING EFFECTIVE & EFFICIENT CONTRACTOR SURVEILLANCE

The cognizant CAS activity verifies that contractors have processes and a quality system that meet contract quality requirements and produce quality products. In coordination with effected Program Manager Offices and buying commands, the CAS activity:

- Identifies critical processes.
- Develops and maintains a written risk based surveillance plan.
- Performs necessary surveillance.
- Performs data analyses and adjusts surveillance accordingly.

By working in the integrated product team environment, the Program Management Offices/buying commands and the CAS activity can minimize the disruptive impact of DoD surveillance efforts on contractor operations, and reduce DoD's costs of surveillance.

The CAS activity derives confidence from credible contractor data, when feasible, but performs sufficient product audits to maintain confidence in that contractor data. DCMC performs independent product audits to verify product conformance with contract technical and quality requirements. When contract non-compliance is observed, the CAS activity requests, evaluates, and verifies contractor corrective actions. The CAS activity also encourages contractors to self-audit and pursue process maturity and effectiveness, waste minimization and continuous improvement.

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DEFICIENCY REPORTING.

DoD Components should establish a product deficiency reporting and correction system to track and record the status of the products' ability to meet user requirements with feedback to the system developer. This system should be supported by appropriate contractor defect identification and corrective action systems. These contractor systems should identify the root cause(s) of manufacturing, material, and design problems found in-plant and in the field and promote design/process changes necessary to prevent their recurrence.

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Why are we here???

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1 NewParadigms26/1/99

How “Doing Business” Has Changed

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2 New Paradigms26/1/99

How Defense “Acquisition Business” Has Changed

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5NewParadigms26/1/99

Quality is…

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The Four “Eras” of Modern Quality

- The Americans go to Japan
- The Japanese adapt and improve
- Back in America in the 70’s and 80’s
- Quality in the 90’s

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Quality Paradigm

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New Engineering Paradigm

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