QUALITY ASSURANCE AND REVALIDATION: THE CHALLENGE TO MANAGEMENT

K. LARRABEE
Naval Education and Training Program Development Center

INTRODUCTION

The training device Quality Assurance and Revalidation Program (QA&R) as operated by the United States Navy represents a unique approach to assuring adequate training device performance. This program applies to training equipment ranging from flight and weapon systems simulators to aviation physiological training systems such as ejection seat trainers and altitude low-pressure chambers.

The Quality Assurance and Revalidation program had its beginnings in 1967 when Admiral Moorer, then Commander-In-Chief of the Atlantic Fleet, had training device effectiveness reviewed to determine just how well training devices were fulfilling the Navy's needs. The result of these original and early inspections was an internally operated, integrity inspection system. Later, in 1969, Chief of Naval Operations (CNO) issued the first instruction implementing a Quality Assurance and Revalidation Program. The latest Chief of Naval Operations Instruction defines Quality Assurance as a "planned and systematic pattern of actions necessary to provide adequate confidence that training devices will continue to perform satisfactorily."

As pointed out by the theme of this conference "Resource Conservation Through Simulation," the simulation of weapons and flight systems can provide significant reductions in the cost of training and the maintenance of needed operational skills. However, without some guarantee that training systems and simulators provide accurate and up-to-date training, there exists a real danger of providing inadequate, negative, or dangerous training through improperly operating simulators and trainers. By pursuing an active and vigorous Quality Assurance and Revalidation Program throughout the Navy, the Chief of Naval Operations provides adequate safeguards so that management will be informed should training device or simulator capability fall below established minimums.

OBJECTIVES

The primary objective of the QA&R program is to provide confidence in a device's performance and its ability to provide adequate training within a given environment. To accomplish this primary objective, several major elements are necessary.

These major elements are:

a. Ensure that training devices operate within prescribed technical and operational acceptance criteria and meet the training mission requirements of the training agent.

b. Improve safety in operations.

c. Provide feedback data for continual improvement of the logistic support program.

d. Improve maintenance and support techniques and procedures.

e. Uphold the material reliability and integrity of training devices.

f. Forecast requirements for overhaul and/or modernization.

g. Maintain a continuous training device status record.

h. Identify action to correct device deficiencies.

METHODS

The Chief of Naval Operations has designated Commander-in-Chief Atlantic Fleet, Commander-in-Chief Pacific Fleet, Chief of Naval Reserves, Chief of Bureau of Medicine, and Chief of Naval Education and Training as training agents and, as such, has directed them to participate in the Quality Assurance and Revalidation Program. The Chief of Naval Education and Training was designated as overall program coordinator. Participation of the Marine Corps is directed by the Commandant of the Marine Corps. Responsibility of the training agents with regard to the QA&R program may be delegated as appropriate, but not below the third echelon level of command.

At the appropriate level of command, a qualified officer is designated as senior inspector for a particular device inspection. Since simulation techniques employ a wide range of technologies, a technical advisor is provided by a CNET field activity to assist the senior inspector during the QA&R review. During the inspection of the training device, the senior inspector coordinates the user's evaluation of the training system by observing the device in operation in a fully manned situation after which both user and operator personnel are debriefed for comments concerning operation, utilization, and any required product improvement. The technical advisor provides inspections of trainer systems, computers, environmental systems, and logistics support.

Following the conclusion of the inspection all participants are debriefed as to the findings, and action items are delineated for assignment to various commands. A comprehensive report of the findings and recommended actions is prepared by the senior inspector and the technical advisor for submission to the training agent.

THE REPORT

The QA&R report resulting from a device inspection is the action document of the program. The report not only contains all findings of the QA&R inspection team, but it contains action item assignments made by the team to supporting activities for resolution of problems found during the inspection. The body of the report contains five major categories, which are:

a. Activity Evaluation: The activity evaluation portion of the report consists of observations noted by an actual crew test of the training device in operational conditions. Discrepancies are noted from an operational/utilization and operator/instructor standpoint.

It is during this portion of the QA&R that the senior inspector and all the device using activities evaluate the trainer for its ability to provide useful training in the appropriate realm. In the case of flight and weapons simulators, this portion of the report provides a review of the device capability to replicate the real world in both form and function.

b. Logistic Support: During the logistic support review, all major elements of maintenance support are investigated. Included are the training device documentation systems such as handbooks, schematics, and parts lists. Also, since most major training devices and simulators now use digital computers for a major portion of the simulation, all programming documents are reviewed. These documents consist of operational program data for simulation use and supporting logistics programs for computer and device systems repair. During this portion of the inspection particular parts problems are investigated and any chronic supply problems are noted. Along with these elements, training, manning, and support equipment are reviewed for adequacy.

c. Systems Test: The systems test portion of the inspection report consists of the actual revalidation of the training device performance. This revalidation is based on test criteria either generated especially for QA&R or criteria used for original acceptance. Special attention is given to discrepant areas discovered during the activity evaluation to determine the cause of any improperly operating systems. These tests constitute the detailed type of inspection to determine any unusual areas of wear and suggest the need for special maintenance attention or overhaul requirement.

d. Configuration: In modern training devices configuration testing can be applied in a number of areas. The most obvious test of configuration is the one established as replication of the real world. In the case of aircraft and weapons simulators, this portion of the report is prepared by comparing real world operational equipment changes to the simulation system. The report will generally state which real world system is being simulated and what operational differences exist between the real and simulated systems. In a training device, other configurations to be determined and maintained include the configuration of the digital computers and any dedicated processing systems. With the number of different configurations of the same computer systems now being encountered in training devices, actual configuration can sometimes be a significant support factor.

e. Product Improvement: The final portion of the report deals with required product improvement for the training device. Elements contained in this portion of the report are results of several separate investigations. First, various modification systems which represent the actual equipment that is being simulated are reviewed for applicable changes to the training equipment. These include airframe, avionics and powerplant changes for aircraft simulators, and include several other methods used by the Navy to modify actual weapon systems, ships or equipment. Also, during this portion of the report, operator and instructor personnel are interviewed for any change requirements in the trainer which may enhance or add needed training capability. Any maintainability or reliability modifications necessary to increase effectiveness or reliability are also investigated and included for action in this section of the report.

ACTION

Upon completion of the inspection, the senior inspector and technical advisor conduct a debrief for all personnel involved in the inspection or on site device support. During this debrief all sections of the QA&R report are reviewed for accuracy.

At this time, action assignments are determined to correct the discrepancies included in the report. Through the report, various activities involved in support of the training device are assigned action to respond to the findings of the inspection. The decision of action item assignment responsibility is based on which activity can best resolve the problem discovered. Following this debrief the senior inspector and technical advisor prepare a formal report, with action assignments, for submission to the appropriate training agent.

Under present QA&R instuctions, activities with actions assigned have 60 days from the date of the inspection report to respond by letter to the training agent with action taken. Action assignments are reported every 60 days until resolved. Figure 1 depicts the flow of the report submission and action item response.

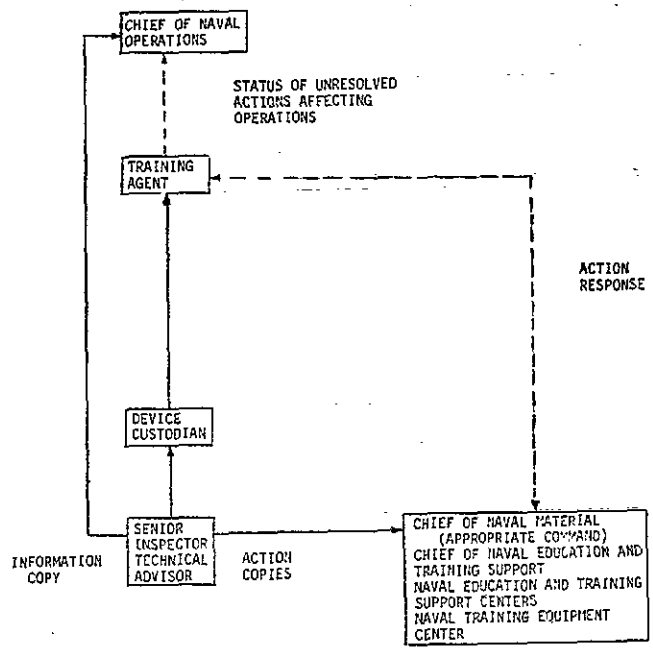

Figure 1. Report Distribution and ACTION ITEM RESPONSE

It is significant that the QA&R inspection team is not involved in any action taken to correct the problems found, nor the necessary response to the training agents. These are management oriented actions between organizations supporting the device and the training agent. This procedure preserves the needed objectivity of the QA&R team. Also note the response chain from the training agent to CNO. This line of communications is established to provide data concerning the status of unresolved discrepancies affecting training device operation. This line of communication provides a built-in warning system since, in instances where use of operational equipment is being avoided by simulation, a substantial impact on funds requirement may be encountered if simulation equipment problems are not quickly resolved.

THE CHALLENGE

It is at this point that the QA&R report becomes strictly a management document. The challenge to management is simply this, prioritize and apply appropriate resources to the action items assigned by the QA&R report. Management must always bear in mind that QA&R in finding discrepancies and assigning them as action items to those best suited to solve the problems is not engaged in simple fault finding but rather attempting to assign action to the organization best suited to resolve the problem and assure equipment in proper order to facilitate training. There may be times when action item assignments made by QA&R may appear to be embarrassing but management must maintain a professional attitude towards these action item assignments, and be assured that the Q&AR inspection aim is optimum device operating capability. The senior inspector and technical advisor who complete the inspection and the report are only interested in properly operating and supported devices that reflect current training need and configuration. As with any quality assurance organization, nothing can be accomplished to correct improper operation, defective systems, or poor logistics without constant and vigilant management attention.

Resource conservation through simulation is an attainable goal but only provided that simulators and training systems provide accurate, up-to-date, and continuous simulation through proper logistics and attention to training requirements. Without these elements the use of simulation becomes dangerous, unsafe and conserves nothing. To provide accurate simulation is the goal of all commands using simulation as a means to provide operational training. The Quality Assurance and Revalidation system is the only third party reporting organization providing action data to these commands. Management action on QA&R reports can and must provide better and more accurate use of simulators and simulation systems.

ABOUT THE AUTHOR

MR. K. G. LARRABEE is Head of the Quality Assurance and Revalidation Division for the Naval Education and Training Program Development Center. He has nearly 20 years of military and civilian experience with flight simulators and training devices. He was part of the team that formulated concepts, organized, and prepared the course of instruction for simulator technicians for the U.S. Air Force. He has worked in design, development, and logistic support of simulators and training systems for the Navy, Air Force, and NATO. Since entering Federal Service, he has been a Senior Field Engineering Representative and Digital Systems Support Coordinator prior to present position. He received his education at University of Maryland, California Polytechnic Institute, and Illinois Institute of Technology.