QUICK–RESPONSE TRAINING SYSTEM MODIFICATION AND ITS IMPACT ON ARMY AVIATION SUSTAINMENT TRAINING

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ABSTRACT

"Train like we fight, fight like we train" is an age–old axiom of military training. It is a training concept which is easy to grasp and makes sense. However, this training concept presupposes that we do, in fact, know how we are going to fight. In the last two years, the world has undergone significant political, social, and economic upheaval. The military community has had to evaluate the identity and nature of the threat, develop an appropriate set of countermeasures to the threat, and then temper the plan with the fiscal realities of shrinking defense budgets. All of this has meant a change in many mission requirements which must be reflected in the training of the military. This paper discusses the issues of providing sustainment training for aircrews in the face of rapidly changing mission requirements. It discusses the role of political, economic, and technological impacts upon the definition of the threat and of the mission. It then discusses the differences between mission rehearsal and sustainment training and suggests the concept of quick–response modification of existing training systems for sustainment training. Finally, it discusses an actual implementation of the quick–response modification to support rapidly changing sustainment training requirements for Army Aviators.

INTRODUCTION

For the period of time known historically as the Cold War, western military and political doctrine was geared toward a defined threat (the Warsaw Pact) and a defined theater of combat (Europe). Consequently, during this period of time, weapon system development and the accompanying training was geared toward a potential military activity in the European scenario.

During this same period of time, the United States responded to at least 187 international incidents and crises, excluding the Korean, Vietnam, and 1991 Gulf wars.[1] More than ninety percent of these conflicts have occurred in Third World countries. During the Cold War, emphasis was clearly focused upon the Soviets. United States tactics were defined to combat a Soviet advance. The word "threat" became synonymous with the term "Soviet". This is not to say that the emphasis was in error or misplaced. General Carl E. Vuono has stated "...it is clear that the possibilities of direct U.S.–Soviet conflict are running at ebb tide and that our venerable strategy of containment has been victorious".[2] Today's Combined Arms Warfare (CAW) practiced by the tri–services is derived from our understanding of Soviet tactics and equipment capabilities.

Since late 1989, the political structure of the world has changed significantly. This change and the recent military actions in Panama and the Persian Gulf underscore that future CAW tactics must be modified to account for new threats and new environments, as well as for changes in a known threat's behavior and tactics.

The U.S. Army Staff Officer's Handbook states "the science of war is in a constant state of change, driven by new technological developments which can radically change the nature of the battlefield".[3] The science of war is also modified due to massive changes in the world political structure and economic pressures brought about by the fiscal realities of smaller military budgets. The introduction of new threats, often employing non–conventional warfare, also radically alters the nature of battle.

By 1995, the U.S. military structure will most likely be very different from the way it is today. Troop size is expected to be cut by upwards of twenty percent. Tactics will require modification to account for fewer troops, as well as changes in the threat's identity, technology, and doctrine, including countermeasures for non–conventional warfare. In response to the smaller size, each element of the CAW structure will have to take on additional or modified mission requirements.

Training requirements are derived from the mission requirements of units and crews. In a world with rapidly changing mission requirements, appropriate changes to training should also occur.

Unfortunately, the same political, economic, and technological pressures placed on military planners are also being felt by the training community. Additionally, the training community is feeling pressure from environmental issues which make the live practice of tasks such as low-level flight and weapon delivery impractical. Training must not only account for rapidly changing requirements, but must do so efficiently and with consideration to the availability of assets which may be affected by budgetary and environmental constraints.

The change in mission requirements will be felt most by mission-ready crews. During peacetime, crews participate in sustainment training to maintain proficiency in skills which they will need during wartime. Peacetime training, however, is derived from the perceived threat at the time the training requirements are developed. History has shown that actual combat tends to occur against a threat operating under conditions which were not fully accounted for during the sustainment training. The ability to quickly modify training to account for new threats or combat conditions is a major challenge facing the training community in the 1990's and into the 21st century.

SUSTAINMENT TRAINING

Most crews in the armed forces are fully qualified to operate within a wartime environment. These crews are kept at a high state of readiness through sustainment training. Sustainment training is intended to maintain a crew's skills, developed during previous training exercises, at the highest possible level. In a world without change, this can be done with relative ease. Without change, training requirements and systems can be established and refined over time to tightly mesh the crew's skills to the intended mission. Rapidly changing requirements radically alter the face of sustainment training.

The effort of defining combat-ready tasks (tasks in which proficiency is tantamount to combat readiness) and the method of training and maintaining proficiency in those tasks is relatively academic. The AH-64A Combat Mission Simulator (CMS), as a case in point, was designed with a European stylized terrain data base specifically to train those tasks deemed necessary by the training community for combat readiness. But the changing nature of the threat has added a requirement to sustainment training that it provide a means of instructing modified tactics to crews which are otherwise fully qualified.

AN EXAMPLE

The most common of the tasks that are part of an AH-64 pilot's repertoire of abilities is a simple landing, called a VMC (Visual Meteorological Conditions) approach (Figure 1). The conduct of a VMC approach in certain environmental conditions is a relatively straightforward maneuver:

1. Determine an approach angle of approximately 8 to 10 degrees.
2. Decrease altitude and airspeed simultaneously to arrive at the touchdown point with little or no rate of descent or forward airspeed.

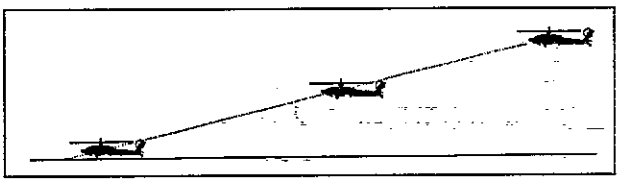

Figure 1 VMC Approach

As our aircrews began operating in the sands of Saudi Arabia during Operation Desert Shield/Storm they quickly discovered that performing this maneuver as they had been taught and trained caused a phenomenon known as brownout. Brownout is the creation of a large dust cloud as airspeed is slowed and the aircraft nears the ground (Figure 2). This dust cloud may obscure all contact with outside references and poses a potentially hazardous situation. During the training prior to Desert Storm, a number of rotary-wing aircraft were lost or destroyed as a result of brownout.

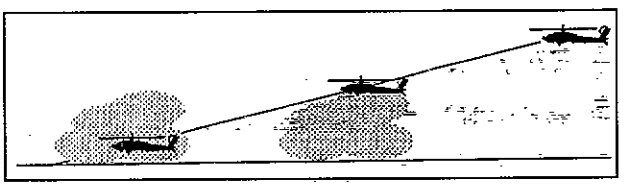

Figure 2 Brownout

Since none of the training systems currently available present this phenomenon, crews had to learn procedures to avoid the problem during actual aircraft operations. During Desert Shield/Storm aviators learned and practiced procedures that minimized the effects of brownout. One technique (Figure 3) involves attaining a much more shallow approach angle and maintaining a faster airspeed to put the dust cloud behind the aircraft.

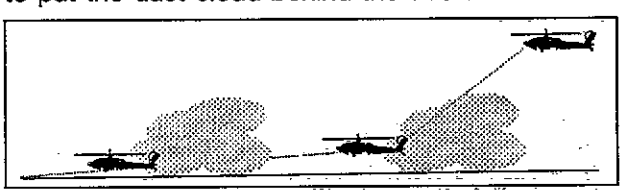

Figure 3 Brownout Avoidance Technique

This example illustrates very poignantly that although the crews were by definition fully combat ready, the training they received did not fully prepare then for operations in a desert environment.

Rapid turnaround simulation technology is one of the issues that has faced the designers of mission rehearsal systems. Mission rehearsal by definition is the training conducted in preparation for a specific mission. It also assumes that those participating in the rehearsal and subsequent mission are already at a high state of proficiency for those tasks, like a VMC approach, necessary for the accomplishment of the mission. Mission rehearsals are then conducted to coordinate those previously proficient tasks into mission accomplishment. Sustainment training is the process of learning and maintaining proficiency in those tasks necessary for mission accomplishment.

THE NEED FOR QUICK RESPONSES

Since 1979, the U.S. has been involved in six major military contingency operations: Operation Eagle Claw (1979–80), Operation Urgent Fury (1983), Operation El Dorado Canyon (1986), Operation Earnest Will (1987), Operation Just Cause (1989), and Operation Desert Storm/Shield (1990–91). Also during this period of time, the British Armed Services became engaged in a conflict with Argentina over control of the Falklands and South Georgia Islands (1982). Each conflict resulted in a quick–reaction contingency operation, with Operations Eagle Claw and Desert Storm having the longest planning to execution cycle. Eagle Claw was planned, practiced, and executed in a period of 172 days,[4] while execution of Desert Storm occurred 171 days after the invasion of Kuwait by Iraq. Urgent Fury, El Dorado Canyon, Earnest Will, Just Cause, and the Falklands conflict were all quick–reaction contingency operations which were planned and executed in a much shorter time period. Existing training doctrine did not fully support the execution of these missions under the conditions in which they were carried out. Furthermore, the sustainment training capabilities of forces during these conflicts, for the most part, continued to enhance crew skills for a conflict scenario which was somewhat unrelated to the conflict at hand.

SIMULATION AND QUICK RESPONSE

Quick–reaction contingency operations rarely involve changes to the operational doctrine or tactics of an armed force. Since training requirements are derived from this doctrine, a quick–reaction change to training syllabi rarely occurs. Therefore, the simulation training community finds itself essentially unable to respond to short–term, quick–reaction situations. In a world undergoing rapid political, economic, and social changes, the failure to react can be fatal.

When the terms "quick–response" and "simulation" are used together, they generally refer to mission rehearsal. Mission rehearsal, though, is only one element of mission training. Wiggers, et al.[5] refer to a hierarchy of mission training including mission preparation, mission preview, and combat mission training, in addition to mission rehearsal. Monette, et al.[6] expand these categories to include traditional "school–house" training as well as advanced graduate level (continuation) training. Quick–response modification is applied solely to graduate level training, since we can assume that all crews participating in a contingency operation are qualified at the graduate level. The issue that remains is how to prioritize which modifications should take place in the limited time period available in contingency operations.

Courtice[7] has divided the combat tasks of the warrior into three categories: his ability to accurately perceive all essential elements of the combat environment, his ability to make accurate decisions, and his ability to make decisions in a timely manner. Any quick–response simulation must support these three categories of combat tasks to be effective. Miller[8] suggests the application of tactical significance when analyzing the requirements for training mission–ready crews. Tactical significance is the degree of importance an environmental event or condition has upon tactical decisions that are made. Tactical significance was the tool which was applied when defining requirements for our case example of quick–response modification: Project Desert STAARS.

DESERT STAARS: A CASE EXAMPLE

Early in Operation Desert Shield, it became obvious that a means of providing ab initio and sustainment training to crews located in the Persian Gulf was necessary. Additionally, the need to continue to prepare crews for Middle Eastern conditions prior to deployment was also required. The Desert Sustainment Training for Army Aviation Readiness through Simulation (Desert STAARS) program was intended to provide both of these capabilities for U.S. Army Aviation crews.[9] Implementing a quick–response modification program such as Desert STAARS is more complex than is apparent at conceptualization. Since many of the tasks to be trained have, in fact, rarely been performed, defining the training requirements is, at best, a dynamic process. The dynamic nature of training requirements is brought about by an unclear understanding of the

requirements by both the user and system designer at the time of conceptualization. High-level concepts of a *potential* plan do not uncover the necessary intricate detail of a plan which is often exposed as the plan is implemented.

As AH-64 crews were being fielded in Southwest Asia, the immediate need was to provide a system that would allow AH-64 crews to perform systems employment sustainment training. These switchology and procedural skills were determined to be the most volatile due to a somewhat limited availability of training assets and environments.

A major training and operational obstacle confronting allied forces upon their arrival and subsequent training in Southwest Asia was an inability to visualize the area where the fighting was expected to occur. Desert flying presents aircrews with phenomena that are not encountered during normal training in either the aircraft or the training devices. Extremely high ambient air temperatures, blowing sand and dust, desert haze, and the effects of rotor downwash on terrain (brownout) were identified as crucial environmental conditions that had tactical significance and were therefore required as part of Desert STAARS. The lack of detailed maps (some crews were reported to have trained using tourist road maps) prevented even a cursory topographical inspection of the battle area.

Geospecific visual data base technologies have become a major point of interest in the training industry. Although the technology is not fully developed, it was decided that a Kuwait Theater of Operations (KTO) data base would be built. The KTO data base provided crews the ability to visualize a potential battle area, thus providing mission-similar training. Once the KTO data base was decided upon, it became clear that further enhancements would not only prepare crews for the theater of operations, but might also provide mission-specific, and potentially mission rehearsal, capabilities. This presumes that Desert STAARS was afforded access to the latest Desert Storm mission plans. Since Desert Storm was still in the early planning stages when Desert STAARS was conceptualized (December 1990 I/ITSC Conference), and since the plans were highly sensitive at the time of Desert STAARS contract award (January 14, 1991), a complete set of mission specific locations was not incorporated and mission rehearsal was not provided in the Desert STAARS baseline.

The existing CMS design allows target vehicles to be positioned only at certain predefined, unchangeable locations. The ability to present actual or realistic threat/friendly vehicle posturing drove the requirement for target site relocation capabilities. This enhancement allows crews during training to engage known, suspected, or hypothetical formations at desired locations.

New threats were added to complement the existing library by providing vehicles which would likely be encountered by allied forces operating in the KTO.

It was also felt that the ability of crews to interact with an integrated threat force, including command, control, communications, and intelligence (C^3I) reporting chains and procedures, had tactical significance.

A sustainment training capability has little value if the personnel for whom it was intended are unable to get to the training. Desert STAARS originally intended to deploy training to fielded units participating in Desert Shield. Early in the program, it became apparent that deploying a complex, full-fidelity Combat Mission Simulator a distance of over 3,000 miles into possibly hostile territory would not be easy. The deployment issue had the potential to seriously impact the Desert STAARS development schedule, if not considered separately. The effort was divided into two operations: an engineering design and development effort and a simultaneous (or subsequent, if conditions warranted) deployment.

As Desert Shield progressed, it became apparent that the device might never be deployed. This raised the question: How do we use a system for sustainment training if we can't get the device to the users? The obvious answer: Bring the users to the device. A number of alternate sites were considered, including locations in Southwest Asia, Europe, and the continental U.S.

CONCLUSIONS

The radical changes in the world in the last two years, and their implications for U.S. military training and doctrine, have underlined the need to be able to respond quickly to international incidents and crises. U.S. military doctrine is based upon a concept of a threat which is rapidly becoming obsolete. There are no firm rules describing the methods of fighting against a new, and fundamentally different, political/military structure, as is currently evolving in Eastern Europe. How, then, can a specific training requirement be defined, especially for a short-term basis?

The invasion of Kuwait, which precipitated Operation Desert Shield, created a requirement for quick response from the training industry. Quick-response training is dependent on the accuracy of the preliminary mission requirements available. At the

conceptualization of Desert STAARS, we realized that we were faced with this dilemma as we tried to translate preliminary operational requirements into a set of training requirements.

Although the speed with which Operation Desert Storm terminated overshadowed the need for a sustainment training capability and the immediate use of the Desert STAARS project, several recommendations can be made from the lessons learned during this development.

First, quick-response modification of training systems is possible. The Desert STAARS contract called for a 90-day development and implementation time period. Desert STAARS was developed and operational on a CMS on the 90th day. Quick-response modifications to fielded devices suggest the need for a development device. Desert STAARS was fortunate to have the AH-64 CMS No. 1 device in-house and operational at the CAE-Link facility in Binghamton, New York, to support around-the-clock development during the very tight program schedule. It is necessary for a joint commitment between contractor and government to provide a dedicated device, even on a part-time basis, for quick-response modification. For future contracts, it is necessary to design in system flexibility.

The user must identify requirements quickly in order to meet short turnaround times. Distinction must be made between user needs and user desires and then the list must be prioritized based upon funds and time available. Industry must at the same time keep the government abreast of current technological limits and trends.

Efforts must be made to publicize the quick-response modification concept. With knowledge of the concepts and their availability, military planners can include training systems in their operational and logistical plans.

There are currently several interoperability initiatives under way in the training community. For the rapid modifications which were required for Desert STAARS, significant time could have been saved if these interoperability initiatives had been completed. The visual data base was constructed from available DMA data and then enhanced through the use of scanned photographs and drawings. A library of visual data bases, such as the one proposed for Project 2851, would have been immensely helpful in reducing the data base development timeline. It should be noted that Project 2851 did develop a KTO data base, but it was completed well after it was required for Desert STAARS. A fair amount of effort went into developing the networking interface between the CMS, FLS, and MULTISIM nodes. The MULTISIM baseline accounted for many of the data requirements of Desert STAARS, but had not accounted for geospecific network information, such as the existence of blowing sand from rotor downwash. The DIS standards, if completed and available, might have reduced the amount of time required to develop the network interface.

Quick-response modification implies the need for flexibility of design. Desert STAARS provided training aspects with the flexibility to train missions for which it was specifically intended as well as providing a quick response to an entirely new mission requirement. Incorporating quick-response modification to a training system, and positioning the system so that crews would have access, not only provides a method to sustain basic "switchology" and procedural skills but also provides a capability to train in an environment that

1. Depicts real-world conditions
2. Allows the safe conduct of training
3. Cuts down on training costs
4. Improves the overall quality of training

Based upon initial reactions of crews returning from the Persian Gulf to a demonstration of the Desert STAARS project, the application of quick-response modification to simulation can provide the deployed or deploying unit an unparalleled ability to improve and sustain combat skills. The training community needs to continue pursuing quick-response modification capabilities so that fielded units can, in fact, "train like we fight."

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