Director, Operational Test and Evaluation

FY 2006 Annual Report

December 2006

This report satisfies the provisions of Title 10, United States Code, Section 139. The report summarizes the operational test and evaluation activities (including live fire testing activities) of the Department of Defense during the preceding fiscal year.

Dr. Charles E. McQueary
Director

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INTRODUCTION

Since July 27th, when I was sworn in as the Director, Operational Test and Evaluation, I have reviewed the state of Operational Test and Evaluation (OT&E) and Live Fire Test and Evaluation (LFT&E) within the Department of Defense. I have met with Service Operational Test Agency (OTA) Commanders; participated in programmatic reviews; approved test plans; witnessed tests; and provided my evaluation of programs' test adequacy, operational effectiveness, operational suitability, survivability, and lethality. This introduction provides my initial thoughts on the state of OT&E and LFT&E. It also provides my thoughts on recent legislative language that gives DOT&E additional responsibilities in a changing strategic environment. Finally, I will discuss my goals and priorities to address both the issues I have observed and the recent congressional mandates.

OBSERVATIONS

Title 10, U.S. Code states that the results of IOT&E should *confirm* that the system tested is effective and suitable for combat. I strongly believe that *OT&E should be a process of confirmation and not one of discovery*. Unfortunately, my first observation is that OT&E is too often the place where performance shortcomings and new failure modes are discovered. When problems are found late in the acquisition process, the cost to fix these problems is much higher than if they were discovered earlier. In addition, the time lost when problems are found at this stage can be substantial. When our forces need a new capability, this latter penalty may be more significant than increased cost.

Second, our acquisition and test and evaluation processes must accommodate a more rapid fielding of new weapons systems or improvement to existing systems. In some cases, I have seen this done well. For example, I have seen heroic efforts to quickly test and deliver capabilities to counter the improvised explosive devices (IEDs) prevalent in Iraq and Afghanistan. In other cases, the tempo of system fielding has been too slow, or systems have been fielded (for a number of reasons) that are not effective and/or not suitable to meet the needs of our warfighters. Both the acquisition and test and evaluation communities must work together to deliver capabilities at a pace consistent with the needs of the warfighters, while maintaining a "fly before you buy" (or "fly before you field") mentality.

A third observation is that suitability needs to improve. During the past three years, 9 of our 26 (35 percent) Beyond Low-Rate Initial Production (BLRIP) reports to Congress evaluated the systems as not operationally suitable. Even those reports that assessed the system as "suitable" were often based upon follow-on testing after deficiencies were found in the initial operational testing. I am obviously not alone in recognizing this as a problem. For example, the Secretary of the Navy said in a speech in August:

> …operational suitability is fundamental to any assessment of an acquisition's warfighting contribution. If a product or system cannot perform its intended function in the real world environment, it will not provide value to the warfighter. Worse, if there is an expectation of capability that is not met, this could have disastrous implications for operational plans and execution well beyond the opportunity costs commonly identified.

Both DoD and the Congress have taken initial steps to help address this issue. DoD has made materiel availability a Key Performance Parameter and issued new guidance on how to achieve reliable, maintainable, and available systems. Further, recognizing that technological maturity is a key ingredient in obtaining reliable systems, the National Defense Authorization Act of 2005 requires that:

> A major defense acquisition program may not receive Milestone B approval, or Key Decision Point B approval in the case of a space program, until the milestone decision authority certifies that--
> (1) the technology in the program has been demonstrated in a relevant environment;
> (2) the program demonstrates a high likelihood of accomplishing its intended mission.

FY07 NATIONAL DEFENSE AUTHORIZATION ACT (NDAA)

The Congress included four provisions in the FY07 National Defense Authorization Act that will affect DOT&E's responsibilities.

- REPORTS AT EARLY FIELDING. Whenever the Department decides to proceed to operational use (or make procurement funds available) of a major defense acquisition program before it decides to proceed beyond low-rate initial production, I am required to submit a report to the Congress and the Secretary of Defense with respect to that program as soon as practicable.
- ADDITIONAL INFORMATION IN REPORTS. I may now include in my reports any additional information on operational capabilities that I consider appropriate based on the testing conducted.
- GUIDANCE ON FORCE PROTECTION EQUIPMENT. I am to provide guidance to, and consult with, the Secretary of Defense, the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD (AT&L)), and the Secretaries of the military departments with respect to OT&E and survivability testing of force protection equipment, including non-lethal weapons.
- REVIEW OF TEST AND EVALUATION POLICY. In conjunction with the USD (AT&L), I must review Department of Defense policies and practices on test and evaluation in order to:
  - Reaffirm the test and evaluation principles that should guide traditional acquisition programs.
  - Determine how best to apply appropriate test and evaluation principles to emerging acquisition approaches.

GOALS AND PRIORITIES

Responding to my initial observations and the provisions of the FY07 NDAA, I have formulated the following goals and priorities, toward which my staff and I will work.

Enhance operational realism in early tests, including developmental testing. With changes in the acquisition process focusing on developing and fielding systems on a shorter timeline, I see a need to incorporate operational realism into developmental testing to gain operational insights and identify failure modes as early as possible. It is worth noting that the Service OTA Commanders share this goal. Early identification and correction of problems is the only way to move in the direction of OT&E as confirmation and away from OT&E as the venue for late discovery of problems. I intend to work with the USD (AT&L), the Services, and their OTAs to explore ways of better synchronizing developmental and operational testing to enhance the discovery process during developmental testing, and eliminate surprises in operational testing.

Improve suitability. *It is far more important for a system to be effective when it is needed than when it is available.* Effectiveness and suitability are not conflicting concepts and both must be considered and assessed early in the design and developmental processes. DOT&E must focus the efforts of the program managers and the test community to identify failure modes and impacts early in these processes. As a first step in improving our understanding of this problem, DOT&E is sponsoring studies to determine the actual costs of "unsuitability" and to determine the optimum place in the development cycle to insert resources to enhance suitability. We must also ensure our efforts to improve suitability encompass all aspects including reliability, availability, maintainability, human-machine interfaces, safety, transportability, training, etc

Provide timely performance information to the warfighters. Given the current strategic and operational environments, the acquisition process is changing, and the test community must adapt to those changes. While DOT&E must continue to support full-rate *production* decisions, we must also be able to provide decision makers with assessments that help them make informed *fielding* decisions when systems are being considered for operational use prior to the full-rate production decision. We must also assist the

OTAs in ensuring our joint warfighters and commanders are aware of system capabilities and limitations when systems are fielded early.

Warfighters need to know about the capabilities and limitations of the system with respect to the spectrum of missions, threats, and possible scenarios. They need to know the tactics, techniques, and procedures that are most effective in getting the mission accomplished, especially if there will be rapid fielding. This requires a mission-focused, realistic, operational test. Even when full-scale operational testing is not feasible prior to early fielding, useful information on capabilities, limitations, techniques, and procedures can be developed during developmental testing, albeit with less confidence, if some degree of realism is added to gain operational insights. All this is to suggest that the best way to provide timely, useful information is a continual test and evaluation process that is mission-focused. The key will be early engagement with programs, more careful following of all testing (contractor and early developmental tests), and greater use of modern, sophisticated techniques for collecting, sharing, and evaluating information. Finally, we must recognize the inherent limitations in the evaluation that can be done prior to early fielding and ensure warfighters understand the implications and risks associated with employing such systems in combat.

Support the testing of force protection equipment. As mentioned above, FY07 changes to the U.S. Code now require my guidance and consultation with respect to operational and survivability test and evaluation of force protection equipment, including non-lethal weapons. Members of my staff have already been involved with the testing of force protection equipment, but it has been on an *ad hoc* basis. Specifically, this year they provided guidance and expertise in the joint testing and evaluation of helmet suspension systems. Similarly, my staff recently provided expertise, data sharing, and guidance in development of common test standards for personnel body armor, armor protection of wheeled vehicles, and support for testing against IEDs. The specifics of that support can be found in the LFT&E section of this annual report.

In order to standardize our involvement with force protection programs, I propose to develop a department policy on testing of force protection equipment. My staff will work with the Service OTAs to share expertise, make available technical advice, and provide support to expedite operational and survivability test and evaluation of those systems. I will then be in a position to provide informed counsel with respect to operational and survivability test and evaluation to the warfighting, acquisition, and fielding decision-makers.

I will need to broaden the expertise of my staff to be able to look at the different measures against which these systems, especially the non-lethal systems, will be evaluated. For example, typical programs evaluate system lethality and measure it against a threshold. Non-lethal weapons, on the other hand, must not only achieve an effectiveness threshold, but must also not exceed a safety threshold to ensure they are "non-lethal" in the expected method of employment.

Examine the allocation of operational testing resources. Everyone recognizes that there must be adequate resources dedicated to OT&E to ensure test adequacy and determine operational effectiveness and suitability. We must also recognize that the above initiatives are not "free goods" and that our greater and earlier involvement in testing means we must assess the consequences on our current approach to OT&E and LFT&E. My office has a government staff of about 45 individuals and we currently oversee 293 of the approximately 1,400 DoD acquisition programs. We must determine whether we have the right criteria for determining what programs are placed on oversight and/or whether we have adequate resources to perform our mission. Further, the additional responsibilities and new paradigms may require additional or different training and expertise.

Assist in the review of test and evaluation policy. Within the next seven months, the FY07 legislation requires that DOT&E and USD (AT&L) review test and evaluation policy to reaffirm the test and evaluation principles that guide traditional acquisition programs and determine how best to apply appropriate these principles to emerging acquisition approaches. The policy question is significant, and has concerned the Department for some time. In fact, DOT&E and USD (AT&L) asked the National Academies, through the National Research Council, to study test and evaluation in the new acquisition environment. Their report, *Testing of Defense Systems in an Evolutionary Acquisition Environment*, was published in 2006. It provides a useful starting point from which to address the policy question.

Consistent with many of the thoughts discussed above, the study concluded that testing should be a continuum in which the primary goals should be to experiment, learn about the strengths and weaknesses of newly added capabilities, and facilitate the ability of program managers to use the results to improve overall system performance. To do this, early testing should emphasize the detection of design inadequacies and failure modes. Early detection of potential operational failure modes and the limits of performance will require DoD testing to develop alternative strategies for testing.

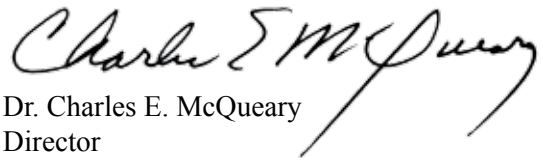
The study also recommended improving developmental testing; requiring contractors to share all relevant data on system performance; formally reviewing technology maturity before using it in a program; and increasing the expertise in areas such as combining information, software engineering, and physics-based and operational-level modeling. The final recommendation was to review proposed changes with a recognition that the current acquisition system already has a counterproductive incentive system and that the "…flexibilities inherent in the evolutionary acquisition process present greater opportunities for these counterproductive incentives to be expressed."

CONCLUSION

At DOT&E, there is a tradition of asking two questions: "Does it work?" and "How do we know?" Those questions mean demonstrating operational effectiveness, suitability, survivability, and lethality in full end-to-end tests with realistic missions, threats, tactics, and operations. To document and sustain that tradition, in FY06 we:

- Monitored 293 Major Defense Acquisition Programs (MDAPs) and special interest programs
- Approved 57 Test and Evaluation Master Plans / Test and Evaluation Strategies
- Approved 7 LFT&E Strategies and Test Plans
- Approved 53 Operational Test and Evaluation Plans for specific test events
- Delivered six Beyond Low-Rate Initial Production Reports (including one in October 2006):
  - EA-6B Improved Capability Three (ICAP III) Weapon System
  - Joint Biological Agent Identification and Diagnostic System
  - MH-60R Multi-Mission Helicopter (combined OT&E / LFT&E report)
  - Common Missile Warning System (classified)
  - Surface Electronic Warfare Improvement Program
  - Small Diameter Bomb Increment One (combined OT&E / LFT&E report)
- Delivered additional reports to Congress on Missile Defense

It is an honor and a privilege for me to be part of an organization that is a "key to weapons that work." With that in mind, I am pleased to present the 2006 Annual Report that follows.



Dr. Charles E. McQueary
Director

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DOT&E Activity and Oversight

Activity Summary

DOT&E activity for FY06 involved oversight of 293 programs, including 136 major defense acquisition programs and 45 major automated information systems. Oversight activity begins with the early acquisition milestones, continues through approval for full-rate production and, in some instances, continues during full production until deleted from the DOT&E oversight list.

Our review of test planning activities for FY06 included approval of 57 Test and Evaluation Master Plans (TEMPs) / Test and Evaluation Strategies, and 53 Operational Test Plans. Live Fire Test and Evaluation (LFT&E) activity included the approval of seven LFT&E Strategies and Test Plans for inclusion in the TEMPs. During FY06 through October 2006, DOT&E prepared six Beyond Low-Rate Initial Production reports for the Secretary of Defense and Congress.

DOT&E also prepared and submitted numerous reports to the Defense Acquisition Board (DAB) principals for consideration in DAB deliberations.

TEST AND EVALUATION MASTER PLANS / STRATEGIES APPROVED

Advanced Deployable System (ADS) - Revision 2

Advanced Threat Infrared Countermeasures/Common Missile Warning System (ATIRCM/CMWS)

Airborne Electronic Attack (AEA) Integration into the F/A-18E/F

Amphibious Assault Ship Replacement (LHA(R))

Amphibious Assault Ship Replacement Program (LHA(R)) - Change 1

Apache Block III

Armed Forces Health Longitudal Technology Application Block 2 - Version 1.2 Update

Ballistic Missile Defense System (BMDS) Integrated Master Test Plan

Baseline IV Tactical Tomahawk Weapon System Program - Revision D

Business Systems Modernization (BSM)

Combat Control System (CCS) AN/BYG-1(V) - Annex F, Revision 3

Combatant Commanders Integrated Command and Control System (CCIC2S) Spiral 2

CVN 21 Future Carrier Program, Revision A - Change 1

Common Submarine Radio Room (CSRR) - Change 1

Common Submarine Radio Room (CSRR) - Change 2

DD(X) Destroyer Program - Revision C

Deployable Joint Command and Control (DJC2) Increment 1, Spiral 1.0

DoD Public Key Infrastructure (PKI) - Version 1.7.3

DoD Teleport

EA-6B Improved Capability (ICAP) III

Expeditionary Fighting Vehicle (EFV) - Change 2

F/A-18 APG-79 Active Electronically Scanned Array (AESA) Radar Upgrade Phase III

F/A-18 Software Qualification Test (SQT) - Revision D

F/A-18E/F Software Qualification Testing (SQT)

Future Combat Systems (FCS)

Heavy Lift Replacement (HLR) Helicopter

Integrated Defensive Electronic Countermeasures (IDECM) - Annex B, Revision A

Internet Protocol - Version 6

Joint Biological Point Detection System (JBPDS) - Change Pages

Joint Chemical Agent Detector(JCAD)

Joint Command and Control (JC2)

Joint High Speed Vessel (JHSV)

Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD) Increment 1

Land Warrior

Large Aircraft Infrared Countermeasures (LAIRCM)

Light Utility Helicopter

Logistics Vehicle System Replacement (LVSR)

LPD 17 Amphibious Transport Dock Program - Revision C

MH-60R Multi-Mission Helicopter Preplanned Product Improvement - Revision C

Mobile Users Objective System (MUOS)

MQ-9 Reaper Hunter-Killer

Ohio Class Conversion (SSGN) Submarine - Revision A

Precision-Guided Mortar Munitions (PGMM)

Small Unmanned Aerial Vehicle (SUAV)

Spider XM7 Network Command Munition

Stryker Mobile Gun System (MGS) - Revision 2

Stryker Nuclear, Biological, and Chemical Reconnaissance Vehicle (NBCRV)

Suite of Integrated Infrared Countermeasures (SIIRCM)

TEST AND EVALUATION MASTER PLANS / STRATEGIES APPROVED

T-AKE Dry Cargo/Ammunition Ship Program - Revision 3.0

Transportation Coordinators' - Automated Information for Movement System II (TC-AIMS II) Block 3

UH-60M Black Hawk Helicopter

U.S. Army Stryker Family of Vehicles - Change Pages

U.S. Marine Corps H-1 Upgrades

V-22 Osprey

Virginia (SSN 774) Class Submarine

XM395 Precision-Guided Mortar Munitions

OPERATIONAL TEST PLANS APPROVED

ALQ-99 Low Band Transmitter Phase II Antenna Group IOT&E Plan

AN/SPY-1D(V) Radar System Operational Evaluation Plan

AN/WLD-1(V)1 Remote Mine-hunting System Program Operational Assessment Plan

B-2 Radar Modernization Program Operational Assessment Plan

Ballistic Missile Defense System (BMDS) Block 06 Operational Assessment Plan

Business Systems Modernization (BSM) Release 2.2 Operational Assessment Plan

C-5 Reliability Enhancement and Re-Engining Program (RERP) Operational Assessment

Combat Control System (CCS) AN/BYG-1 Follow-on T&E Plan

Combatant Commanders Integrated Command and Control System (CCIC2S) Increment 2 Test and Evaluation Master Plan

Common Missile Warning System (CMWS) Event Design Plan – IOT&E

Common Submarine Radio Room (CSRR) *Seawolf* Variant Operational Evaluation Plan

Common Submarine Radio Room (CSRR) *Seawolf* Variant Operational Assessment Plan

Composite Health Care System II (CHCS II) Block I System Assessment Plan

Cooperative Engagement Capability (CEC) Follow-on T&E Plan

CV-22 Operational Utility Evaluation and Cold Weather Evaluation

DDG 51 Flight IIA Destroyer Follow-on T&E Plan

Deployable Joint Command and Control (DJC2) Operational Assessment Plan

Deployable Joint Command and Control (DJC2) Multi-Service OT&E Plan

Dry Cargo/Ammunition Ship (T-AKE) Program Operational Evaluation Plan

E-3 Airborne Warning and Control System (AWACS) Block 40/45 Operational Assessment Plan

E-4B Block I Modification Operational Utility Evaluation Plan

EA-6B Improved Capabilities III (ICAP III) Block II Follow-on T&E Plan

Expeditionary Fighting Vehicle (EFV) Detailed Assessment Plan

Expeditionary Fighting Vehicle (EFV) Special Test Events Plan

F/A-18 Active Electronically Scanned Array (AESA) Radar Integrated Test Plan

F/A-18E/F System Configuration Set H3E Operational Test Addendum

F-15 Joint Mission Planning Systems (JMPS) Version 1.2 Test Plan Revision

Family of Medium Tactical Vehicles (FMTV) Event Design Plan

General Fund Enterprise Business System (GFEBS) System Assessment Plan

Global Command and Control System – Joint (GCCS-J) Version 4.0.2/4.0.3 Operational Assessment Plan

Global Command and Control System – Army (GCCS-A) Operational Assessment Plan

Global Hawk Block 10 Operational Assessment (Revision)

Identification Friend or Foe (IFF) Mark XIIA Mode 5 Operational Assessment Plan

Integrated Defensive Electronic Countermeasures (IDECM) Block 3 (IB-3) Operational Evaluation Plan

Joint Biological Point Detection System (JBPDS) Increment 1 Multi-Service OT&E Plan

Joint Chemical Agent Detector (JCAD) Event Design Plan

Joint Chemical Agent Detector (JCAD) Increment 1 Event Design Plan – Field Simulant Testing

Joint Chemical Agent Detector (JCAD) Increment 1 Event Design Plan – Nuclear, Biological, and Chemical Contamination Survivability Testing

Joint Chemical Agent Detector (JCAD) Increment 1 Event Design Plan – Operational Assessment

Joint Network Node (JNN) IOT&E Plan

Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD) Increment 1 Event Design Plan – Modeling and Simulation

Joint Standoff Weapon (JSOW) Operational Flight Software (OFS) Force Development Evaluation Plan

Land Warrior Event Design Plan – Limited User Test

Littoral Combat Ship (LCS) Early Operational Assessment

OPERATIONAL TEST PLANS APPROVED (continued)

Mk 48 Advanced Capabilities (ADCAP) Phase 1 Common Broadband Advanced Sonar System (CBASS) Torpedo Test and Evaluation Master Plan

Navy-Marine Corps Intranet (NMCI) Detailed Assessment Plan

PATRIOT Event Design Plan – Post Deployment Build and Limited User Test

Rolling Airframe Missile Block I Upgrade Program Follow-on T&E Plan

Ship Self Defense System (SSDS) Mk 2, Mod 1 Follow-on T&E Plan

Small Diameter Bomb (SDB) Increment 1 IOT&E Plan

Small Unmanned Aerial Vehicle (SUAV) Event Design Plan – IOT&E

Stryker Nuclear, Biological, and Chemical Reconnaissance Vehicle (NBCRV) IOT&E Plan

U.S. Marine Corps H-1 Upgrades Operational Evaluation Plan

LIVE FIRE TEST AND EVALUATION STRATEGIES AND TEST PLANS

20 mm PGU-28/B Replacement Combat Round

Amphibious Assault Ship Replacement Program (LHA(R))

Dry Cargo / Ammunition Ship (T-AKE)

Future Aircraft Carrier (CVN 21) – Change 1

Joint Air-to-Surface Standoff Missile (JASSM) Electronic Safe and Arm Fuze

Stryker Mobile Gun System (MGS)

Virginia Class Submarine

BEYOND LOW-RATE INITIAL PRODUCTION (BLRIP) REPORTS TO CONGRESS

Program	Report Type	Date
EA-6B Improved Capability Three (ICAP III) Weapons System	OT&E Report	October 2005
Joint Biological Agent Identification and Diagnostic System (JBAIDS) – Block 1	OT&E Report	February 2006
MH-60R Multi-Mission Helicopter	Combined OT&E / LFT&E Report	March 2006
Common Missile Warning System (CMWS)	OT&E Report	April 2006
Surface Electronic Warfare Improvement Program (SEWIP) – Block 1A	OT&E Report	June 2006
Small Diameter Bomb Increment One (SDB)	Combined OT&E / LFT&E Report	October 2006

During FY06, DOT&E met with Service operational test agencies, program officials, private sector organizations, and academia; monitored test activities; and provided information to the DAB committees, as well as the DAB principals, the Secretary and Deputy Secretary of Defense, the Under Secretary of Defense (Acquisition, Technology and Logistics), the Service Secretaries, and Congress. Active, onsite participation in and observation of tests and test-related activities remains our most effective tool. In addition to onsite participation and local travel, approximately 564 trips outside the National Capital Region supported the DOT&E mission.

Not all programs on DOT&E oversight are identified and evaluated in this report. Security considerations preclude identifying classified programs DOT&E does not report on classified programs and programs without significant operational test activities.

Program Oversight

DOT&E is responsible for approving the adequacy of plans for operational test and evaluation and for reporting the operational test results for all major defense acquisition programs to the Congress, Secretary of Defense, Under Secretary of Defense (Acquisition, Technology and Logistics), and Service Secretaries. For DOT&E oversight purposes, major defense acquisition programs are defined in the law to mean those programs meeting the criteria for reporting under Section 2430, Title 10, United States Code (Selected Acquisition Reports (SARs)). The law (sec.139(a)(2)(B)) also stipulates that DOT&E may designate any other programs for the purpose of oversight, review, and reporting. With the addition of such "non-major" programs, DOT&E was responsible for oversight of a total of 293 acquisition programs during FY06.

Non-major programs are selected for DOT&E oversight after careful consideration of the relative importance of the individual programs. In determining non-SAR systems for oversight, consideration is given to one or more of the following essential elements:

- Congress or OSD agencies have expressed a high level of interest in the program
- Congress has directed that DOT&E assess or report on the program as a condition for progress or production
- The program requires joint or multi-Service testing (the law (sec. 139(b)(4)) requires DOT&E to coordinate "testing conducted jointly by more than one military department or defense agency")
- The program exceeds or has the potential to exceed the dollar threshold definition of a major program according to DoD 5000.1, but does not appear on the current SAR list (e.g., highly classified systems)
- The program has a close relationship to or is a key component of a major program
- The program is an existing system undergoing major modification
- The program was previously an SAR program and operational testing is not yet complete

This office is also responsible for the oversight of LFT&E programs, in accordance with 10 USC 139. DoD regulation uses the term "covered system" to include all categories of systems or programs identified in 10 USC 2366 as requiring Live Fire test and evaluation. In addition, systems or programs that do not meet acquisition criteria referenced in 10 USC 2366, but otherwise meet the statutory criteria, are considered "covered systems" for the purpose of DOT&E oversight.

A covered system, for the purpose of oversight for LFT&E, is a major system, within the meaning of that term in 10 USC 2302(5), that meets one or more of the following criteria:

- User-occupied and designed to provide some degree of protection to the system or its occupants in combat
- A conventional munitions program or missile program
- A conventional munitions program for which more than 1,000,000 rounds are planned to be acquired
- A modification to a covered system that is likely to affect significantly the survivability or lethality of such a system

DOT&E was responsible for the oversight of 106 LFT&E acquisition programs during FY06.

PROGRAMS UNDER DOT&E OVERSIGHT
CALENDAR YEAR 2006
(As taken from the May 2006 Official T&E Oversight List)

ARMY PROGRAMS

Abrams Tank Upgrade (M1/M2)

Advanced Threat Infrared Countermeasures / Common Missile Warning System (ATIRCM/CMWS)

Aerial Common Sensor (ACS)

Armed Reconnaissance Helicopter (ARH) Program

Biometrics

Black Hawk Upgrades (UH-60M) – Utility Helicopter Upgrades

Bradley Upgrade – M2/M3 Fighting Vehicle Systems

CH-47F – Cargo Helicopter (CH-47D Helicopter Upgrade Program)

Defense Support Program (DSP) Multi-Mission Mobile Processor (DM3P)

Distributed Common Ground System - Army (DCGS-A)

Excalibur (Family of Precision, 155 mm Projectiles)

Extended Range / Multi-purpose Unmanned Aircraft System (ER/MP UAS)

Family of Medium Tactical Vehicles (FMTV) (including armor modifications)

Force XXI Battle Command Brigade and Below (FBCB2) Program

Future Cargo Aircraft

Future Combat System (FCS) and all associated systems (and active protective systems), including:

- Network Battle Command
- Infantry Carrier Vehicle (ICV)
- Mk 44 Cannon 30 mm Ammunition
- Command and Control Vehicle (C2V)
- Reconnaissance and Surveillance Vehicle (R&SV)
- Mounted Combat System (MCS)
- Non-Line-of-Sight Mortar (NLOS-M)
- Non-Line-of-Sight Cannon (NLOS-C)
- Medical Vehicle (MV) (Treatment and Evacuation Variant)
- FCS Recovery Maintenance Vehicle (FRMV)
- UAV Class I
- UAV Class II
- UAV Class III
- UAV Class IV (Fire Scout)
- Armed Robotic Vehicle (ARV) Assault (ASLT)
- Armed Robotic Vehicle (ARV) Assault Light (ASLT(L))
- Armed Robotic Vehicle (ARV) Reconnaissance and Surveillance Target and Acquisition (RSTA)
- Multi-Function Utility / Logistics and Equipment Vehicle (MULE) Countermine
- Multi-Function Uitlity / Logistics and Equipment Vehicle (MULE) Transport
- Small Manpackable Unmanned Ground Vehicle (SUGV)
- Unattended Ground Sensors (UGS) (Tactical and Urban UGS)
- Non-Line-of-Sight Launch System (NLOS-LS) – to include Precision Attack Munition (PAM) and Loitering Attack Munition (LAM)
- Intelligent Munitions System (IMS)
- Mid-Range Munitions (MRM)
- Ground Soldier System

Future Tactical Truck System

General Fund Enterprise Business System (GFEBS)

Global Combat Support System – Army (GCSS-A)

Global Command and Control System – Army (GCCS-A)

Guided Multiple Launch Rocket System (GMLRS) – Dual Purpose Improved Conventional Munitions (DPICM)

Guided Multiple Launch Rocket System (GMLRS) – Unitary

Hellfire Missile (Upgrades/Modifications) including Longbow Radio Frequency (RF) and Semi-Active Laser (SAL)

High Mobility Artillery Rocket System (HIMARS) including HIMARS Armored Cab

Identification Friend or Foe Mark XIIA Mode 5 and all associated integration programs

Javelin Anti-tank Missile System – Medium

Joint Common Missile

Joint Heavy Lift Program

Joint Land Attack Cruise Missile Defense Elevated Netted Sensors (JLENS)

Joint Mission Planning System (JMPS)

Joint Network Transport Capability-Spiral (JNTC–S) / Joint Network Node (JNN)

Land Warrior – Integrated Soldier Fighting System for Infantrymen

Light Utility Helicopter

Longbow Apache (AH-64D) Block II

Longbow Apache (AH-64D) Block III

Long Term Armoring Strategy (LTAS) including:

- Fuel Tankers
- Heavy Equipment Transporter (HET)
- Heavy Expanded Mobility Tactical Truck (HEMTT)

ARMY PROGRAMS (continued)

- High Mobility Multi-purpose Wheeled Vehicle (HMMWV)
- M915A3 Family of Vehicles
- M939 General Purpose Truck
- Palletized Loading System (PLS)

Maneuver Control System (MCS) / Joint Tactical Common Operational Picture (COP) Workstation (JTCW) (includes Command Post of the Future (CPOF) and Command and Control Personal Computer (C2PC))

Objective Individual Combat Weapon (OICW) Increment I

Objective Individual Combat Weapon (OICW) Increment II

One – Tactical Engagement Simulation System (One-TESS)

PATRIOT / Medium Extended Air Defense System Combined Aggregate Program (PATRIOT/MEADS CAP)

Precision-Guided Mortar Munitions (PGMM)

Shadow Unmanned Aircraft System (Shadow UAS)

Single Channel Anti-Jam Man-Portable (SCAMP) (Military Strategic, Tactical, and Relay (MILSTAR), Block II)

Single Channel Anti-Jam Man-Portable (SCAMP) System Enhancement Program (SEP)

Small Unmanned Aircraft System (Raven UAS)

Spider XM7 Network Command Munition (formerly Anti-Personnel Landmine Alternative (APLA)/Spider)

Stryker – Armored Vehicle and all associated systems (and active protective systems), including:

- Stryker – Anti-Tank Guided Missile Vehicle
- Stryker – Commander's Vehicle
- Stryker – Engineer Squad Vehicle
- Stryker – Fire Support Vehicle
- Stryker – Infantry Carrier Vehicle
- Stryker – Medical Evacuation Vehicle
- Stryker – Mobile Gun System
- Stryker – Mortar Carrier
- Stryker – Nuclear, Biological, and Chemical Reconnaissance Vehicle (NBCRV)
- Stryker – Reconnaissance Vehicle

Surface-Launched Advanced Medium-Range Air-to-Air Missile (AMRAAM) (SLAMRAAM)

Transportation Coordinators' Automated Information for Movements System II (TC-AIMS II)

Warfighter Information Network-Tactical (WIN-T)

XM307 25 mm Advanced Crews Served Weapon (ACSW) System

XM1022 Long Range Sniper Ammunition

NAVY PROGRAMS

21" Mission Reconfigurable Unmanned Undersea Vehicle (21" MRUUV)

Acoustic Rapid Commerical Off-the-Shelf (COTS) Insertion for SONAR

Active Electronically Scanned Array (AESA)

Advanced SEAL Delivery System (ASDS)

AGM-88E Advanced Anti-Radiation Guided Missile (AARGM) Program

AIM-9X Air-to-Air Missile Upgrade including AIM-9X P3I

Airborne Mine Neutralization System (AMNS)

Airborne Re-supply / Logistics for SeaBasing (AR/LSB)

Air Early Warning (AEW)

AN/AAR-47 V2 Upgrade Missile / Laser Warning Receiver

AN/APR-39A V2 Radar Warning Receiver

AN/WQR-3 Advanced Deployable System (ADS)

AN/WSQ-11 Countermeasure Anti-Torpedo

Ballistic Missile Technical Collection (BMTC)

Broad Area Maritime Surveillance (BAMS)

BYG-1 Fire Control (Weapon Control and Target Motion Analysis)

CG(X) – Next Generation Cruiser

Close-In Weapon System (CIWS) including SeaRAM

Common Link Integration Processor (CLIP)

Cooperative Engagement Capability (CEC) (including P3I effort)

Cobra Judy Replacement (CJR) – Ship-based Radar System

CVN 21 – Next Generation Nuclear Aircraft Carrier

DDG 51 Guided Missile Destroyer

DDG-1000 *Zumwalt* Class Destroyer (formerly DD(X) Future Surface Combatant) including Long Range Land Attack Projectile

Defense Integrated Military Human Resources System (DIMHRS)

Deployable Joint Command and Control (DJC2)

Digital Modular Radio (DMR)

Distributed Common Ground System – Navy (DCGS-N)

E-2C Reproduction Hawkeye Carrier-based Early Warning Aircraft

E-2D Advanced Hawkeye (AHE) / E-2C Radar Modernization Program (RMP)

EA-6B Improved Capabilities (ICAP) III and Multiple Upgrades (Low Band Transmitter, Band 7-8 Transmitter, USQ-113 Communications Jammer)

EA-18G Airborne Electronic Attack (AEA) Variant of F/A-18

Evolved Sea Sparrow Missile (ESSM)

NAVY PROGRAMS (continued)

Expeditionary Fighting Vehicle (EFV)

Extended Range Munition (ERM)

F/A-18 E/F Hornet Naval Strike Fighter (All Upgrades)

Global Combat Support System – Marine Corps (GCSS-MC)

Global Command and Control System – Maritime (GCCS-M)

H-1 Upgrades (4BW/4BN) – U.S. Marine Corps Upgrade to AH-1W Attack Helicopter and UH-1N Utility Helicopter

Identification Friend or Foe Mark XIIA Mode 5 and All Associated Integration Programs

Integrated Defensive Electronic Countermeasure (IDECM)

Joint High Speed Vessel (JHSV)

Joint Maritime Assured Access (JMAC)

Joint Mission Planning System (JMPS)

Joint Standoff Weapon (JSOW) Baseline Variant and Unitary Warhead Variant

KC-130J Aircraft

LHA 6 - New Amphibious Assault Ship

LHD 1 Amphibious Assault Ship

LHD 8 Amphibious Assault Ship

Littoral Combat Ship (LCS)

LPD 17 Amphibious Transport Dock (includes 30 mm ammunition)

Maritime Prepositioning Force (Future) (MPF (F))

MH-60R Multi-Mission Helicopter Upgrade

MH-60S Fleet Combat Helicopter

Mk 48 Torpedo Mods

Mobile User Objective System (MUOS)

Naval Integrated Fire Control-Counter Air (NIFC-CA)

Navy Advanced Extremely High Frequency (EHF) Multi-Band Terminal (NMT)

Navy Enterprise Resource Planning (ERP) (includes Navy Enterprise Maintenance Automated Information System (NEMAIS)

P-8A Multi-Mission Maritime Aircraft

Rapid Airborne Mine Clearance System (RAMICS)

Remote Mine-hunting System (RMS)

Rolling Airframe Missile (RAM) including RAM Block 2 Program

Ship Self Defense System (SSDS)

SSGN *Ohio* Class Conversion

SSN 774 *Virginia* Class Submarine

Standard Missile 2 (SM-2) Block IIIB

Standard Missile 2 (SM-2) Block IV

Standard Missile 6 (SM-6)

Strike Directed Infrared Countermeasures (DIRCM)

Submarine External Communications System (SubECS) / Common Submarine Radio Room (CSRR)

Surface Electronic Warfare Improvement Program (SEWIP)

T-45TS – Undergraduate Jet Pilot Training System

T-AKE *Lewis and Clark* Class of Auxiliary Dry Cargo Ships

Tactical Control System (TCS)

Tactical Tomahawk Weapon System (TTWS) (including Tactical Tomahawk All Up Round (AUR), Tactical Tomahawk Weapons Control System (TTWCS), and Tomahawk Command and Control System (TCCS))

Trident II Missile

V-22 Osprey Joint Advanced Vertical Lift Aircraft

Vertical Take-Off Unmanned Aircraft System (VTUAS)

VH-71 Presidential Helicopter Fleet Replacement Program (formerly the VXX program)

ZCH-53K Heavy Lift Replacement (HLR) Program

AIR FORCE PROGRAMS

20 mm PGU-28/B Replacement Combat Round

Advanced Extremely High Frequency Program (AEHF)

Advanced Medium-Range Air-to-Air Missile (AMRAAM)

Advanced Polar System (APS)

Air Force Distributed Common Ground System (AF DCGS) (including Block 10)

Air Operations Center – Weapons System (AOC-WS)

Airborne Signals Intelligence Payload

Airborne Warning and Control System (E-3 AWACS) Upgrades

ALR-56M Radar Warning Receiver

ALR-69A Radar Warning Receiver

B-2 SPIRIT Advanced Extremely High Frequency Satellite Communications Capability (B-2 EHF)

B-2 Radar Modernization Program (B-2 RMP)

B-52 Re-Engining Program

Battle Control System – Fixed (BCS-F)

Battle Control System – Mobile (BCS-M) (formerly the Tactical Air Control System (TACS))

AIR FORCE PROGRAMS (continued)

C-5 Avionics Modernization Program (AMP)

C-5 Reliability and Re-engining Program (RERP)

C-17A Globemaster III Advance Cargo Aircraft

C-130 AMP – C-130 Avionics Modernization Program

C-130J Hercules Cargo Aircraft (All Variants)

Combat Information Transport System (CITS)

Combat Search and Rescue Replacement Vehicle (CSAR-X) / Personnel Recovery Vehicle (PRV)

Combat Survivor Evader Locator (CSEL) and the PRC Family of Handheld Survivor Radios

Combatant Commanders Integrated Command and Control System (CCIC2S)

Defense Enterprise Accounting Management System (DEAMS)

Deliberate and Crisis Action Planning and Execution Segments (DCAPES)

E-4B Modernization Program

E-8 Joint Surveillance Target Attack Radar System (JSTARS)

E-10A Multi-Sensor Command and Control Aircraft (MC2A) Program

Evolved Expendable Launch Vehicle (EELV)

Expeditionary Combat Support Systems (ECSS)

F-15 Mark XIIA Integration

F-15E Radar Modernization Program

F-22A – Advanced Tactical Fighter

F-35 Lightning II Joint Strike Fighter (JSF)

F-117 Infrared Acquisition and Designation System (IRADS)

Family of Beyond Line-of-Sight Terminals (FAB-T)

Global Broadcast Service (GBS)

Global Command and Control System - Air Force (GCCS-AF)

Global Hawk High Altitude Endurance Unmanned Aircraft System

Global Positioning System III (GPS III)

Identification Friend or Foe Mark XIIA Mode 5 and All Associated Integration Programs

Integrated Strategic Planning and Analysis Network (ISPAN)

Joint Air-to-Surface Standoff Missile (JASSM) and JASSM Extended Range (ER)

Joint Direct Attack Munition (JDAM)

Joint Helmet Mounted Cueing System (JHMCS)

Joint Precision Approach and Landing System (JPALS)

Joint Primary Aircraft Training System (JPATS)

Joint Unmanned Combat Air System (JOINT UCAS) (Includes Air Force and Navy Unmanned Aerial Vehicle programs)

KC-135 Global Air Traffic Management (GATM) Upgrade

KC-135 Tanker Replacement Program (KC-135 Replacement)

Large Aircraft Infrared Countermeasures (LAIRCM)

MILSTAR - Satellite Low/Med Data Rate Communications

Minuteman III Guidance Replacement Program (GRP)

Minuteman III Propulsion Replacement Program (PRP)

Mission Planning System (MPS) including the Joint Mission Planning System (JMPS)

MQ-9 Reaper Hunter-Killer Unmanned Aircraft System (UAS)

Multi-Platform Radar Technology Insertion Program (MP-RTIP)

Multiple Platform – Common Data Link (MP-CDL)

National Airspace System (NAS)

National Polar-Orbiting Operational Environment Satellite System (NPOESS)

NAVSTAR Global Positioning System (GPS)

Navy Extremely High Frequency (NESP) Satellite Communications (SATCOM) Program

Next Generation Long-Range Strike

Orbital Deep Space Imager (ODSI)

Space-Based Infrared System Program, High Component (SBIRS HIGH)

Space Radar (SR) (formerly Space-Based Radar)

Small Diameter Bomb (SDB) includes Increment II

Secure Mobile Anti-Jam Reliable Tactical Terminal (SMART-T)

Theater Battle Management Core System (TBMCS)

Transformational Satellite Communications (TSAT) System

Ultra High Frequency (UHF) Follow-on Satellite

Wideband Gapfiller

OTHER DoD PROGRAMS

Ballistic Missile Defense Program:

- AEGIS BMD and SM-3 BLOCK I
- Ground-Based Midcourse Defense Segment (GMD) (Includes Ground Based Interceptor [GBI], Ground-Based Radar [GBR], and Battle Management C3 [BMC3])
- Space Tracking and Surveillance System (STSS)
- Terminal High-Altitude Area Defense (THAAD)
- YAL-1 Airborne Laser (ABL)

Armed Forces Health Longitudinal Technology Application (AHLTA) (formerly Composite Health Care System II (CHCS II))

Business System Modernization (BSM)

Business System Modernization – Energy (BSM Energy)

Chemical Demilitarization Program – Assembled Chemical Weapons Alternatives (CHEM DEMIL - ACWA)

Chemical Demilitarization Program – Chemical Materials Agency (CHEM DEMIL-CMA)

Chemical Demilitarization Program – Chemical Materials Agency Newport (CHEM DEMIL-CMA Newport)

Commissary Advanced Resale Transaction System (CARTS)

Defense Business Sourcing Environment

Defense Travel System (DTS)

Global Combat Support System Combatant Commander (COCOM) / Joint Task Force (JTF) (GCSS-(CC/JTF))

Global Command and Control System – Joint (GCCS-J)

Global Electromagnetic Spectrum Information System (GEMSIS)

Global Information Grid Bandwidth Expansion (GIG-BE) part of Defense Information System Network – Next Generation

High Performance Computing Modernization (HPCM)

Integrated Architecture Behavior Model (IABM)

Integrated Data Environment / Global Transportation Network 21 (Convergence)

Internet Protocol Version 6 (IPv6)

Joint Battle Management Command and Control (JBMC2) Joint Test and Assessment

Joint Biological Agent Identification and Diagnosis System (JBAIDS)

Joint Biological Point Detection System (JBPDS)

Joint Biological Standoff Detection System (JBSDS)

Joint Chemical Agent Detector (JCAD)

Net-Enabled Command Capability (NECC) (formerly Joint Command and Control (JC2))

Joint Service Light Nuclear, Biological, and Chemical Reconnaissance System (JSLNBCRS)

Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD)

Joint Tactical Radio System (JTRS) Airborne / Maritime / Fixed Station (AMF)

Joint Tactical Radio System (JTRS) Ground Mobile Radios

Joint Tactical Radio System (JTRS) Handheld and Manpack Radio and Small Form Radio

Joint Tactical Radio System (JTRS) Network Enterprise Services (formerly JTRS Waveform)

Joint Warning and Reporting Network (JWARN)

Key Management Infrastructure (KMI)

Multi-Functional Information Distribution System (MIDS) (Includes Low Volume Terminal and Joint Tactical Radio System)

Multi-National Information Sharing (MNIS)

Net-Centric Enterprise Services (NCES)

Public Key Infrastructure (PKI)

Single Integrated Air Picture (SIAP)

Suite of Integrated Radio Frequency Countermeasures (SIRFC) (AN/ALQ-211)

Teleport

Theater Medical Information Program (TMIP)

DoD Programs

DoD Programs

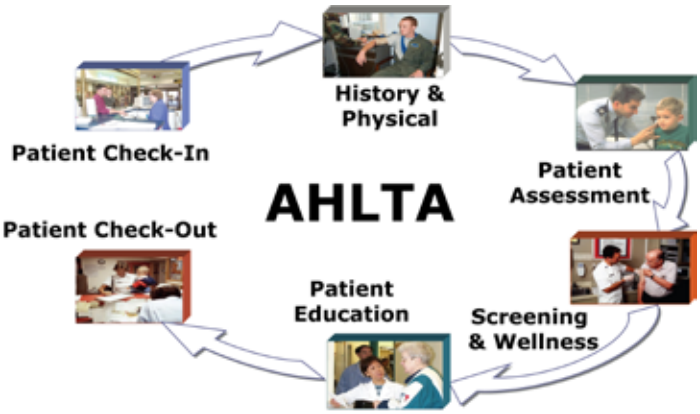
Armed Forces Health Longitudinal Technology Application (AHLTA)

Executive Summary

- The Army Test and Evaluation Command (ATEC) and the Army Medical Department Board (AMEDDBD) completed the operational assessment of the Local Cache capability in February 2006 at Fort Gordon, Georgia, and Goodfellow AFB, Texas. The assessment results showed that the Local Cache capability enabled health care providers to continue electronic patient encounter documentation during wide area network outages.
- ATEC and AMEDDBD observed system acceptance testing of the Clinical Data Repository/Health Data Repository (CHDR) data exchange capability at DoD and Veterans Affairs medical facilities at Fort Bliss, Texas, during July and September 2006. After the functional proponents validated required capabilities and the project manager improved the software, the second round of testing showed that CHDR met the requirements.
- The Program Management Office revised the program schedules during 4QFY06. Block 3 milestones and decision review dates have yet to be determined.

System

- The Armed Forces Health Longitudinal Technology Application (AHLTA), formerly Composite Health Care System II, is a Major Automated Information System that is used in military medical treatment facilities worldwide to support patient care.
- AHLTA links multiple commercial off-the-shelf medical products and introduces new techniques and procedures for recording patient encounters. It standardizes medical and dental information and makes it immediately available to military health care professionals worldwide.
- AHLTA consists of three major functional blocks:
  - Block 1 provides outpatient encounter documentation, order entry, and medical information retrieval.
  - Block 2 integrates medical, dental, and optometry information.
  - Block 3 will replace legacy functions such as pharmacy, laboratory, and radiology functionality. It will also provide inpatient charting and documentation.



- In addition to the three major functional blocks, AHLTA also provides a Local Cache capability and a CHDR interface. The Local Cache capability enables health care providers to continue electronic patient encounter documentation during wide area network outages. The CHDR interface is a joint venture that provides two-way data exchange between DoD's Clinical Data Repository and Veterans Affairs' Health Data Repository.

Mission

- The military health care providers equipped with AHLTA can create and maintain a uniform, comprehensive, legible, secure, electronic health record for all beneficiaries of the Military Health System.
- A comprehensive, integrated electronic medical and dental record is critical to satisfy readiness requirements and provide quality health care services.
- The system manages and records patient encounters, enables calculation of third party billing, and performs or integrates various clinical operations that include order entry, order monitoring, and results retrieval.
- AHLTA is a key enabler to the DoD's Force Health Protection Initiative.

Activity

- ATEC and AMEDDBD conducted the operational assessment of the Local Cache capability during 1QFY06 and 2QFY06. That test was conducted in accordance with the DOT&E-approved Test and Evaluation Master Plan and system assessment plan.
- ATEC and AMEDDBD observed system acceptance testing of the CHDR capability at DoD and Veterans Affairs medical facilities at Fort Bliss, Texas, during July and September 2006.

- The Program Management Office revised AHLTA schedules during 4QFY06, resulting in slippage of the Block 2 Dental Module OT&E further into FY07. Block 3 milestones and decision review dates are yet to be determined.

Assessment

- The operational assessment of Local Cache was completed in February 2006 at Fort Gordon, Georgia, and Goodfellow AFB, Texas. During the assessment, AHLTA was placed under both simulated and actual failover modes to determine whether Local Cache would enable health care providers to continue electronic patient encounter documentation during wide area network outages. The operational assessment confirmed that it could, but differences in implementation procedures and standards among the Services, including strict Air Force "firewall" configurations, complicated the rollout of Local Cache. Working with the Services, the program manager satisfactorily addressed these challenges, including the Air Force firewall issues.
- The CHDR capability was not envisioned when the existing Operational Requirements Document was developed. However, the functional proponents determined and validated its required capabilities. After the project manager improved the software based on the first round of testing, the second round of testing showed that CHDR met the requirements established by the functional proponents.
- The rebaselining of Block 3, with critical milestone and decision dates undetermined, effectively put test planning for Block 3 on hold. Once development resumes in earnest and schedules are established, work on the Block 3 Test and Evaluation Master Plan will resume.

Recommendations

- Status of Previous Recommendations. The program manager has taken action on all of the FY05 DOT&E recommendations.
- FY06 Recommendations.
  1. The AHLTA program manager should ensure that the Block 2 Dental Module successfully completes rigorous developmental testing before declaring its readiness for OT&E.
  2. The AHLTA program manager should continue to work with Veterans Affairs to increase CHDR data exchange rates for medication and allergies.

Business Systems Modernization (BSM)

Executive Summary

- The Joint Interoperability Test Command (JITC) conducted two operational assessments in June and August of 2006 to support the evaluation of Business Systems Modernization (BSM) Release 2.2.
- The operational assessments verified that BSM continued to be operationally effective and suitable in supporting the Defense Logistics Agency's (DLA) missions.
- BSM continues to represent a model for a successful event-driven acquisition of DoD Enterprise Resource Planning (ERP) systems. Program Management Offices (PMOs) for other DoD ERP systems should be encouraged to seek advice from the BSM PMO to leverage lessons learned from the BSM acquisition.

System

- BSM is a supply chain management system designed to support the DLA, its customers, and its suppliers worldwide.
- BSM consists of a suite of commercial off-the-shelf (COTS) hardware and software products. An ERP package serves as the backbone system providing procurement, finance, and order fulfillment business functions.
- An Advanced Planning and Scheduling (APS) COTS package is combined with the ERP package to provide supply and demand planning functions. These two packages support the majority of functional requirements.
- Additional functional requirements are satisfied by a combination of additional COTS applications, existing government off-the-shelf software, and specific software extensions to the ERP package.
- When fully deployed, BSM will support approximately 6,800 DLA employees located primarily at three Defense Supply Centers in Columbus, Ohio; Philadelphia, Pennsylvania; and Richmond, Virginia.
- BSM has replaced the Defense Integrated Subsistence Management System and will replace the Standard Automated Material Management System when fully deployed.

Mission

- The DLA supply centers equipped with BSM will be able to provide the best value logistics and contract management support to U.S. Armed Forces.
- The DLA uses BSM to manage specific outcomes, to allow optimization within given levels of resources, and to enable focused support on product and operating-cost reductions.
- BSM enables the DLA to continuously re-engineer its logistics processes to reflect best business practices.

Activity

- JITC completed an assessment in December 2005 regarding the adequacy of system regression testing to support the implementation of BSM Release 2.2 at initial operational sites.
- In June and August of 2006, JITC conducted two operational assessments at Defense Supply Centers in Philadelphia, Pennsylvania, and Columbus, Ohio, to support continued deployment of BSM Release 2.2 to additional users. JITC conducted the operational assessments in accordance with the DOT&E-approved Test and Evaluation Master Plan and detailed test plan.
- JITC plans to conduct two additional operational assessments in October and December of 2006 to complete the evaluation of BSM Release 2.2.

Assessment

- The operational assessments conducted in June and August of 2006 verified that BSM Release 2.2 continued to be operationally effective and suitable in supporting DLA's materiel management missions.
- BSM continues to represent a model for a successful event-driven acquisition of DoD ERP systems. PMOs for other DoD ERP systems should be encouraged to seek advice from the BSM PMO to leverage lessons learned from the BSM acquisition.

Recommendations

- Status of Previous Recommendations. The PMO has adequately addressed the recommendations from FY05 with one exception:
  FY05 #2: Data presentation continues to be a minor issue that affects usability, especially for new users. Experienced BSM users reported an increase in their abilities to navigate the various input screens as directly attributable to daily use of the system.

- FY06 Recommendations.
  1. The PMO should continue to look for ways to improve data presentation and screen navigation.
  2. The PMOs for other DoD ERP systems should be encouraged to seek advice from the BSM PMO to leverage lessons learned from the BSM acquisition.

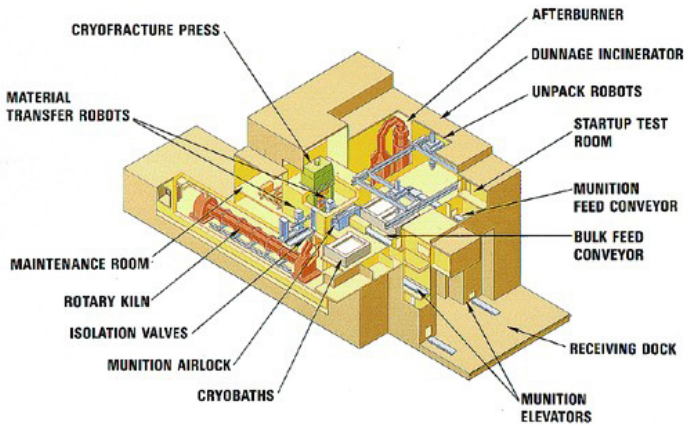
Chemical Demilitarization (CHEM DEMIL) Program

Executive Summary

- Army testing of stockpile and nonstockpile systems in the Chemical Demilitarization Program has been adequate to ensure the safe and efficient disposal of chemical warfare material.
- All operational testing (OT) was conducted in accordance with DOT&E-approved test plans.
- The Army conducted successful testing at Anniston, Alabama; Umatilla, Oregon; and Newport, Indiana, stockpile facilities.
- The Army conducted successful testing of nonstockpile programs for two Explosive Destruction Systems as well as for the Munitions Assessment and Processing System.
- Agent destruction operations were completed at the Aberdeen, Maryland, stockpile facility.
- Based on the current program schedule, disposal operations of the U.S. chemical stockpile will fail to meet both the original Chemical Weapons Treaty deadline of April 2007 and the extension to April 2012.

System

- The Chemical Demilitarization Program involves the destruction of lethal chemical agents, chemical munitions, and nonstockpile chemical warfare material.
- Four stockpile disposal facilities are employing the baseline chemical weapons disassembly and incineration process:
  - Anniston, Alabama
  - Pine Bluff, Arkansas
  - Tooele, Utah
  - Umatilla, Oregon
- Four stockpile disposal facilities are employing, or plan to employ, chemical neutralization of agents followed by post-treatment of the neutralized products:
  - Blue Grass, Kentucky
  - Aberdeen, Maryland
  - Newport, Indiana
  - Pueblo, Colorado
- There are three nonstockpile fixed facilities:
  - Pine Bluff Ton Container Destruction Facility
  - Pine Bluff Binary Destruction Facility
  - Munitions Assessment and Processing System Facility
- There are four nonstockpile transportable systems:
  - Explosive Destruction System – 1
  - Explosive Destruction System – 2
  - Large Item Transportable Access and Neutralization System
  - Single Chemical Agent Identification Set Access and Neutralization System



NOTIONAL DESTRUCTION FACILITY

Mission

- The United States is using the Chemical Demilitarization Program to comply with the Chemical Weapons Convention. This is an arms control and nonproliferation treaty that requires the destruction of the U.S. stockpile of lethal chemical agents, chemical munitions, and nonstockpile chemical warfare material.
- The Nonstockpile Chemical Material Project is responsible for the destruction of nonstockpile chemical warfare material, including the components of binary chemical weapons, miscellaneous chemical warfare material, recovered chemical weapons, former production facilities, and buried chemical warfare material.

Activity

- Chemical Demilitarization Programs are not traditional acquisition programs for DOT&E oversight. DOT&E oversight began in 1999 when Congress directed that DoD oversee these programs as major defense acquisition programs due to cost and schedule overruns.
- The test and evaluation program for each stockpile incineration disposal facility consists of several phases:
  - The developmental testing (DT) phase consists of subsystem component testing without agent.
  - The DT/OT phase employs surrogate agents in all test events, culminating in trial burns of the furnaces and end-to-end operations of the facility.
  - The OT phase consists of agent trial burns and initial operations with agent.
- OT supports a decision to proceed to full operational status for a specific agent/munition campaign. For example, one campaign would destroy eight-inch projectiles equipped

with Sarin nerve agent, another would destroy M55 rockets with Sarin, and a third would destroy one-ton containers of mustard blister agent. After completion of a campaign, the facility reverts to OT status for the next planned campaign. This process is repeated until destruction of all agent/munition configurations in the site's stockpile is complete. DOT&E monitors the test activity and independently analyzes test data for all stockpile facilities and nonstockpile systems.

- The Aberdeen stockpile destruction facility completed one-ton container cleanout in February 2006 and is now in closure operations, where all of the destruction equipment and buildings are dismantled or destroyed. As of August 2006, approximately 40 percent of the total U.S. chemical weapons stockpile (originally 31,496 agent tons) had been destroyed. FY06 test activity for stockpile facilities and nonstockpile systems is summarized in the table below.

Assessment

- Army testing of stockpile and nonstockpile systems in the Chemical Demilitarization Program has been adequate to ensure the safe and efficient disposal of chemical warfare material. The U.S. Army Material Systems Analysis Activity is providing effective independent oversight of the testing of both stockpile and nonstockpile programs. Their expertise and vigilance have resulted in the early identification and resolution of the problems that surface from time-to-time. Fully integrated operational demonstrations that confirm all phases of operations (including preparation, destruction/neutralization, and disposal) remain critical prerequisites before transition to operations with live agents.
- Based on the current program schedule, disposal operations of the U.S. chemical stockpile will fail to meet both the original Chemical Weapons Treaty deadline of April 2007 and the extension to April 2012.

Recommendations

- Status of Previous Recommendations. There were no FY05 recommendations for the Chemical Demilitarization Program.
- FY06 Recommendations. None.

Chemical Demilitarization Test and Evaluation Activity

Facility/System	Technology	FY06 Activity	Agent Tested	Planned FY07 Activity
Anniston	Incineration	OT	VX M55 Rockets	OT
Umatilla	Incineration	OT	Sarin (a.k.a. GB) 8-inch and 155 mm Projectiles	OT
Pine Bluff	Incineration	Operations	Sarin (a.k.a. GB) M55 Rockets	OT
Newport	Neutralization	OT	VX Ton Container Processing	OT
Explosive Destruction System Version 1	Neutralization	OT	Mustard (a.k.a. HD) 4.2-inch Mortar Projectiles	OT
Explosive Destruction System Version 2	Neutralization	DT/OT, OT	Mustard (a.k.a. HD) 4.2-inch Mortar Projectiles	OT
Munitions Assessment and Processing System	Neutralization	OT	Phosgene (a.k.a. CG) 75 mm Recovered Projectiles	OT
Pine Bluff Binary Destruction Facility	Neutralization	OT, Operations	Binary Chemical Munition Precursors in Large Storage Drums	Operations, Facility Destruction
Pine Bluff Ton Container Destruction Facility	Neutralization	OT, DT/OT	Trace Agents during Ton Container Processing	OT, DT/OT

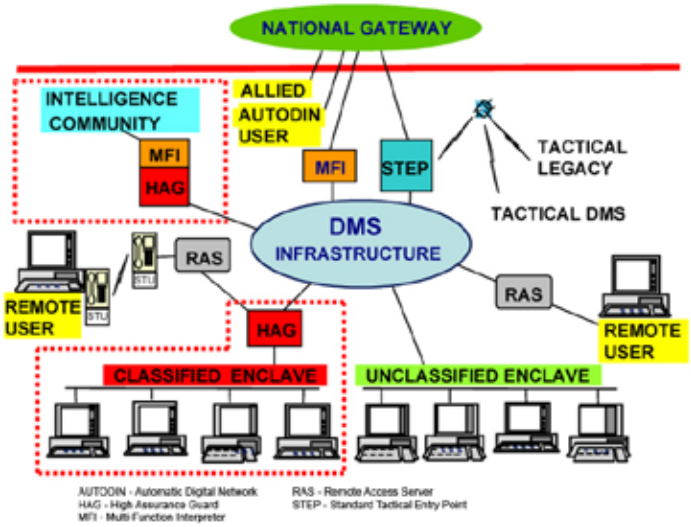
Defense Message System (DMS)

Executive Summary

- The Joint Interoperability Test Command (JITC) conducted a limited user field test October 25 - November 4, 2005, to verify the corrections to the deficiencies previously identified during the Defense Message System (DMS) 3.1 Operational Assessment.
- The limited user field test results showed that the DMS Global Service Manager rectified all previously identified major deficiencies.

System

- DMS is the messaging component of the DoD Global Information Grid. DMS consists of all hardware, software, procedures, standards, facilities, and personnel used to exchange messages electronically between organizations and individuals in the DoD. DMS also includes the interfaces to the messaging systems of other government agencies, allies, defense contractors, and other approved organizations.
- DMS is a secure and accountable writer-to-reader messaging system.
- DMS is to replace the legacy Automatic Digital Network organizational messaging system. During the transition, DMS uses the Multi-Function Interpreter as the primary means of providing interoperability with the Automatic Digital Network.
- Some communities (e.g., small deck Navy ships, non-DoD federal departments, allies, and defense contractors) will continue to operate their legacy messaging systems using the National Gateway Center to communicate with each other and to interface with DMS.



Mission

- DoD users, including deployed tactical forces, use DMS to exchange both classified and unclassified messages.
- DMS also enables DoD users to interface with allies, other government agencies, and defense contractors, as well as other approved activities outside of DoD.

Activity

In accordance with the DOT&E-approved Test and Evaluation Master Plan and detailed test plan, JITC conducted a limited user field test October 25 - November 4, 2005, to verify the corrections to the deficiencies previously identified during the DMS 3.1 Operational Assessment. Test sites included the Network Operations Center in Columbus, Ohio; an Air National Guard Base in Knoxville, Tennessee; the Marine Corps Base in Quantico, Virginia; the National Gateway Center at Fort Detrick, Maryland; and the National Geospatial-Intelligence Agency in Bethesda, Maryland.

Assessment

- The limited user field test results showed that the DMS Global Service Manager had rectified all previously identified major deficiencies. On February 15, 2006, the Designated Accreditation Authority granted security accreditation to DMS 3.1.
- DMS 3.1 is considered operationally effective and suitable for the general service messaging user community.

Recommendations

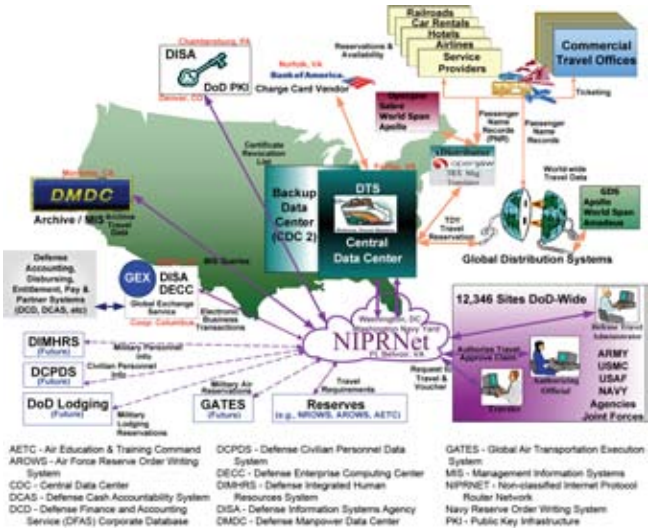
- Status of Previous Recommendations. The DMS Global Service Manager satisfactorily addressed the FY05 recommendations. As recommended, JITC conducted the follow-on test to verify the corrections to the deficiencies previously identified during the DMS 3.1 Operational Assessment. Furthermore, the DMS Global Service Manager worked with the users to resolve previously identified site-related security deficiencies.
- FY06 Recommendations.
  1. The DMS Global Service Manager should implement the recommendations provided in its security accreditation.
  2. The DMS Manager needs to actively monitor the implementation of network scans and vulnerability reporting by the operational sites as directed by the Joint Task Force-Global Network Operations Directive 05-19. This is to make sure that site-related vulnerabilities do not render the DMS infrastructure vulnerable. Aggressive actions are required to protect the DMS infrastructure, including severing any offending sites.

DOD PROGRAMS

Defense Travel System (DTS)

Executive Summary

- The Army Test and Evaluation Command (ATEC) conducted a Limited User Test (LUT) from Fort Hood, Texas, on the Monroe release of the Defense Travel System (DTS) between September and November 2005. The results of the LUT concluded the release was not operationally effective or suitable. Following extensive fixing and retesting by the program manager in a test bed environment, the Component Acquisition Executive (CAE) decided that the release was low risk and authorized fielding in April 2006.
- ATEC completed an operational assessment of the Centrally Billed Account Version 3 in December 2005. ATEC's system assessment report stated "Centrally Billed Account Reconciliation Module Version 3 is effective, suitable, and survivable for low-volume sites" where the local business processes were in place to efficiently handle changes required on travel documents to reconcile the centrally billed accounts. DOT&E decided the module was not operationally effective or suitable without further enhancements to reduce the burden on transportation officers, especially for those sites with high volume transactions. However, the CAE decided that the module may offer immediate benefits to low transaction volume sites and authorized fielding to low transaction volume sites as determined by the Services and Agencies.



System

- DTS is a Major Automated Information System designed to automate and streamline the DoD travel process, support DoD travel requirements, and reduce the associated cost for the Department. With DTS, travelers perform many of the administrative tasks themselves.
- Originally, there were two blocks of software development. Block 1 focuses on Temporary Duty travel. Block 2, which was to focus on Permanent Change of Station travel, has been deferred.
- The program manager is developing DTS in releases of increasing functionality. Each Block 1 release was named after a U.S. President. The Monroe release (the final Block 1 presidential release) has been fielded. DTS will continue to use a spiral development strategy during FY07 to develop the remaining functionality that was not included in the presidential releases.

Mission

- DoD travelers use DTS as a single interface to process their end-to-end travel requirements via an internet connection or a Non-classified Internet Protocol Router Network connection using a Common Access Card with Pubic Key Infrastructure certification. It offers an automated mechanism for travelers to prepare travel authorizations and vouchers, get the documentation approved, and be reimbursed once their travel is completed.
- DTS integrates commercial travel reservation systems and DoD accounting and disbursing systems using secure networks and procedures.

Activity

- ATEC conducted the IOT&E on the DTS Monroe release, in accordance with the DOT&E-approved Test and Evaluation Master Plan and detailed test plan, between September and November in 2005.
- ATEC completed an operational assessment of the Centrally Billed Account Version 3 in December 2005.

Assessment

- For a Major Automated Information System, it is usual to test at selected operational sites with a production system prior to a full fielding decision. Since DTS is a web-based system, the traditional way of conducting an operational test is not practical. Any new release placed on the web server for operational testing is in fact already fielded.

- To mitigate this risk, ATEC conducts a LUT in an end-to-end test environment with production representative hardware and software. More than a dozen real users execute operationally realistic test scenarios developed by ATEC. If the test results are satisfactory, the new release is placed on the operational server for all users. ATEC then conducts a follow-on operational assessment at selected operational sites to confirm the performance of the new release and to identify opportunities for improvement.
- The LUT results for the version of the software tested showed that DTS was not operationally effective or suitable due to a large number of faulty cost computations on obligations, vouchers, debt resolutions, cost entitlements, remittances, waivers, and payroll deductions. These problems led to data exchange rejections by interfacing systems. Unsatisfactory test results led to extensive fixing and retesting by the program manager in a test bed environment, but these fixes were not independently verified by ATEC in a follow-on OT&E.
- Despite the lack of independent verification, the CAE decided that the Monroe release was low risk, primarily because debt management, the major new functionality in the software, was used by only a small percentage of the total users and the remaining components were upgrades to existing functionality in the system, such as Group Travel, Personal Leave in Conjunction with Official Travel, and the Budget Module. The CAE also considered that the follow-on testing to verify fixes, conducted in the test bed environment by the program manager, was sufficient given the perceived adverse impact of further independent OT&E on the program's cost and schedule. Therefore, the CAE fielded the Monroe release in April 2006. ATEC will conduct a follow-on operational assessment of the fielded Monroe capabilities during FY07.
- While the ATEC system assessment report stated that Centrally Billed Account Version 3 was effective, suitable, and survivable for low-volume sites, DOT&E decided it was not operationally effective or suitable due to extra workload placed upon the transportation officers (especially for high-volume transaction sites) for record reconciliation. Further enhancements to reduce the burden on transportation officers are necessary to make it operationally effective and suitable. However, the CAE decided that the module may offer immediate benefits to low transaction volume sites and authorized fielding to low transaction volume sites as determined by the Services and Agencies.

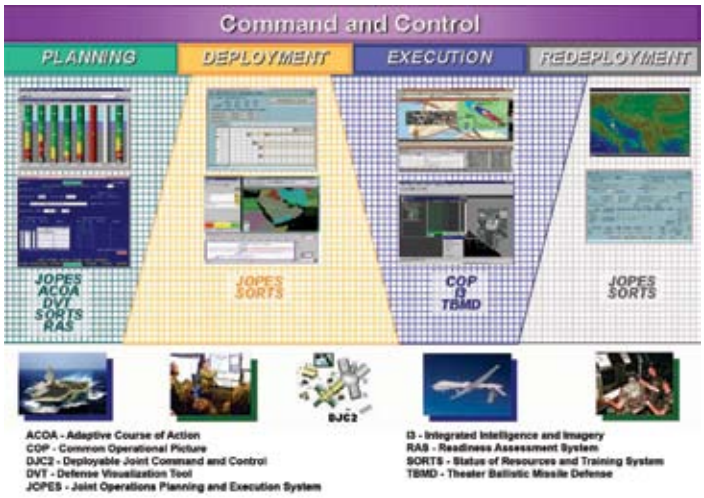
Recommendations

- Status of Previous Recommendations. The following FY05 recommendations were not adequately addressed. Regarding FY05 #2, the program office fielded the Monroe release prior to ATEC retest. FY05 #3 remains valid.
  FY05 #2: The Monroe release should not be fielded until the program manager corrects the deficiencies and ATEC retests the release.
  FY05 #3: The Monroe release operational assessment should include the legacy accounting system to avoid problems that were experienced in the past.
- FY06 Recommendations.
  1. DTS should undergo an operational assessment at operational sites specified in the Test and Evaluation Master Plan.
  2. Future releases or enhancements to DTS should be subject to OT&E as determined through a risk assessment conducted by the operational test agency in accordance with DOT&E policy. Follow-on OT&E should focus not only on new capabilities, but also on other enhancements installed since the last OT&E.

Global Command and Control System – Joint (GCCS-J)

Executive Summary

- The Joint Interoperability Test Command (JITC) conducted operational testing of the Global Command and Control System Joint (GCCS-J) v4.0.2 Global Release from March 20 - 24, 2006, at the Defense Information Systems Agency, and from July 20 - 24, 2006, at U.S. European Command, Germany.
- JITC conducted operational testing of the Joint Operation Planning and Execution System (JOPES) v4.0.2/3 from July 27 - August 4, 2006, at multiple sites.
- Operational testing was adequate and was conducted in accordance with a DOT&E-approved Test and Evaluation Master Plan and operational test plans.
- The GCCS-J v4.0.2 Global Release and JOPES v4.0.2/3 versions are operationally effective, suitable, and survivable.



System

- GCCS-J is the joint command and control system that provides an integrated near real-time picture of the battlespace necessary to conduct joint and multinational operations.
- The GCCS-J is a command, control, communications, computers, and intelligence system consisting of hardware, software (commercial off-the-shelf and government off-the-shelf), procedures, standards, and interfaces.
- GCCS-J consists of three main components supporting the following mission areas:
  - GCCS-J v4.0.2 Global Release (Force Protection, Situational Awareness, Intelligence applications)
  - JOPES v4.0.2/3 (Force Employment, Projection, Planning and Deployment/ Redeployment applications)
  - Status of Resources and Training System (Force Readiness and Sustainment applications)
- GCCS-J consists of a client/server architecture using open systems standards, government-developed military planning software, and an increasing use of World Wide Web technology.

Mission

- Joint Commanders utilize the GCCS-J to accomplish command and control.
- It provides commanders with an integrated, scalable command and control, communications, computers, and intelligence system.
- It links the National Command Authority to the Joint Task Force, component commanders, and Service-unique systems at lower levels of command.
- It processes, correlates, and displays geographic track information on friendly, hostile, and neutral land, sea, and air forces, integrated with available intelligence and environmental information to provide the warfighter a fused battlespace picture.

Activity

- JITC conducted operational testing of GCCS-J Global Release from March 20 - 24, 2006 at the Defense Information Systems Agency, and from July 20 - 24, 2006, at U.S. European Command, Germany. Testing focused primarily on the situational awareness and intelligence mission areas.
- JITC conducted operational testing of JOPES from July 24 - August 4, 2006, at multiple sites, including U.S. Transportation Command, U.S. Joint Forces Command, U.S. Southern Command, U.S. Central Command, U.S. Pacific Command, and at the Joint Staff Support Center, Pentagon. Numerous Combatant Command components and Service Major Commands participated in this version of JOPES operational testing.
- The Defense Intelligence Agency conducted security testing of both GCCS-J Global Release and JOPES.
- JITC conducted interoperability testing of both GCCS-J Global Release and JOPES during all operational test events.

Assessment

- Operational testing of GCCS-J v4.0.2 Global Release was adequate. Common Operational Picture (COP) enhancements performed well with no critical issues. New symbology

relating to low intensity conflict, weather information, and the new joint Blue Force situational awareness capability were all successfully introduced. Operational testing validated all new capabilities and enhancements to the Integrated Imagery and Intelligence applications, targeting support to the COP, tracking of data sources, and video capabilities. Operational users provided positive comments on the improved stability of this version of the COP.

- Operational testing of JOPES v4.0.2/3 was adequate. A crisis action planning scenario was used to successfully generate, source, and validate JOPES movement requirements. A modified permissions (access control) system was successfully tested and allowed the last remaining critical security finding to be closed. All key performance parameter requirements were successfully demonstrated. The system successfully demonstrated the capability to handle loading well beyond the specified requirement using an artificial loading tool.
- JITC adequately tested critical interfaces with GCCS-J v4.0.2 Global Release and JOPES 4.0.2/3. Critical interfaces performed satisfactorily.
- The Defense Intelligence Agency conducted information assurance evaluations of GCCS-J v4.0.2 Global Release and JOPES 4.0.2/3. GCCS-J has no outstanding critical security deficiencies.
- GCCS-J v4.0.2 Global Release system and the JOPES 4.0.2/3 system are operationally effective, suitable, and survivable. The Milestone Decision Authority recommended fielding of both releases. DOT&E concurs.

Recommendations

- Status of Previous Recommendations. The GCCS-J Program Management Office has taken effective action on DOT&E's FY05 recommendation.
- FY06 Recommendations.
  1. JOPES operational testing should be improved by using a test network that mirrors the operational system that includes four surrogates for the strategic-server-enclaves.
  2. Defense Information Systems Agency, JITC, and the Joint Staff Support Center should revalidate the JOPES user load requirement to ensure that artificial loading efforts during testing closely emulates real users' requirements.

Joint Biological Agent Identification and Diagnostic System (JBAIDS)

Executive Summary

- The Joint Biological Agent Identification and Diagnostic System (JBAIDS) is operationally effective for ground-based units. It has yet to be tested to determine if it is operationally effective for shipboard use. Timely identification of an agent (3-4 hours versus 24-48 hours from traditional culturing methods) aids in improved situational awareness, isolation of personnel, and reduced exposure to the agent.
- The system has suitability issues with respect to deployment, reliability, and safety hazards.
- Revised sample preparation protocols that eliminate the use of the large centrifuge to accommodate shipboard size and safety concerns will be evaluated in follow-on operational test and evaluation.

System

- The Services intend the JBAIDS to be a reusable, portable, biological agent identification and diagnostic system capable of identifying multiple biological agents simultaneously.
- JBAIDS is intended to satisfy a need to rapidly identify biological threat agents in clinical specimens and environmental samples, and may interface with computer warning systems.
- It consists of an analytical device, sample preparation kits, reagent kits, laptop computer, centrifuge, and other support equipment.
- The total system with supporting equipment weighs approximately 1,500 pounds and measures 227 cubic feet.

Mission

- Units equipped with JBAIDS can identify biological agents to support a commander's force protection decisions by providing timely information for determining appropriate treatment, effective preventive measures, prophylaxis, and operational decisions.
- JBAIDS is intended to be employed in units such as:
  - Army Area Medical Laboratories, Combat Support Hospitals, and Army Veterinary Service
  - Navy Environmental Preventive Medical Units, and aboard carriers and amphibious assault ships
  - Marine Corps Preventive Medicine units
  - Air Force Forward-Deployed or Forward-Positioned Biological Augmentation Teams
- JBAIDS provides enhanced capabilities to the warfighter against both conventional infectious organisms that occur naturally in the environment and biological weapons threats.
- JBAIDS provides the Services with confirmatory identification capability.

Activity

- The full-rate production decision on March 10, 2006, approved procurement of systems for ground-based units, but did not approve fielding until extraction and inhibition (process quality) controls are developed. JBAIDS was not approved for shipboard use due to the size of the centrifuge, which is being replaced by an alternate sample preparation protocol.
- Fielding to Air Force units is underway at the request of the Air Force Office of the Surgeon General. Fielding to Army units will begin upon completion of extraction and inhibition control in March 2007.
- Revised sample preparation protocols, which do not require a large centrifuge and can be certified for shipboard use, will be evaluated in follow-on operational test and evaluation.

Assessment

- JBAIDS is effective in identifying biological warfare agents in a timely manner (3-4 hours versus 28-48 hours from traditional culturing methods) and aids in improved situational awareness, isolation of personnel, and reduced exposure to the agent.
- Inclusion of extraction and inhibition controls will provide greater confidence on the part of operators and reduce false positive and false negative calls.
- There are suitability issues with the footprint (ancillary equipment and materials) being too large, particularly for shipboard use.
- The JBAIDS system will provide capability to identify ten Block I bio-warfare threat agents, but safety issues such as the requirement of Bio Safety Level II and III facilities

for analyses of some agents may preclude use in some forward-deployed laboratories.

Recommendations

- Status of Previous Recommendations. All FY05 recommendations were resolved except for the following: FY05 #3: Reagent kits have not been optimized to improve limit of detection of the JBAIDS instrument.
- FY06 Recommendations. None.

Joint Biological Standoff Detection System (JBSDS)

Executive Summary
- Joint Biological Standoff Detection System (JBSDS) is a light detection and ranging (LIDAR)-based system that detects aerosol clouds out to 5 kilometers and discriminates clouds with biological content at distances of 1-3 kilometers.
- Completion of the agent/simulant correlation study provided data that has been used to refine the system's processing algorithm.
- The testing of the JBSDS Increment 1 is now underway, and an evaluation of the outcome will be made on completion of the testing in December 2006.

System
- JBSDS is a LIDAR-based system that detects aerosol clouds out to 5 kilometers in a 120-degree arc, and discriminates clouds with biological content from clouds without biological material at distances of 1-3 kilometers. The system operates at night only and would be damaged if operated during daylight hours.
- The Air Force will employ JBSDS in semi-fixed locations and the Army will employ the system on a stationary high-mobility multi-purpose wheeled vehicle, but operate in a stationary mode.
- Increment 1 is a limited production of 25 units to provide an interim stand-off biological detection warning.

Mission
- Commanders use JBSDS to support their contamination avoidance decision-making process.
- The system provides a commander with advance warning of the presence of potential biological weapon aerosol cloud hazards so the commander can implement individual and collective protective measures to protect assigned forces.

Activity
- Sandia National Laboratory has completed an agent/simulant correlation study. The results of this study have been used to define the alarm function of the JBSDS's processing algorithm based on threat agent characteristics.
- Multi-Service Operational Testing (MOT) began July 16, 2006, and completed on October 26, 2006.
- The Air Force portion of the MOT was paused in July after three days because of a high false alarm rate. After changes were made to the system, the Army portion of the MOT was executed. The Air Force portion of the test restarted in October 2006.
- The MOT will be followed by limited performance testing in a littoral environment and false alarm testing at Eglin AFB and Philadelphia, Pennsylvania, at the Philadelphia Naval Business Center (formerly the Philadelphia Naval Yard) during November and December 2006.
- An improved Increment 2 version is currently under study and several technologies have received preliminary performance testing at Dugway Proving Ground, Utah.

Assessment
- Evaluation of operational effectiveness, operational suitability, survivability, and test adequacy are now underway.
- There is no guarantee that the threat will come at night. If the biological warfare agent were released during daylight, the ultraviolet rays would lessen the potency of the agent, yet it would still remain a threat.

Recommendations
- Status of Previous Recommendations. There were no FY05 recommendations for this program.
- FY06 Recommendations. None

Joint Chemical Agent Detector (JCAD)

Executive Summary

- Combined developmental testing/operational testing (DT/OT), completed in FY06, indicates that the Joint Chemical Agent Detector (JCAD) has adequate detection capabilities and acceptable false alarm rates for ground operations. The device's false alarm rate in shipboard operations is not acceptable. Alternate detection schemes for the shipboard environment are being explored.
- The JCAD's DT/OT performance will form much of the basis for the Milestone C low-rate initial production (LRIP) decision in March 2007. The JCAD's Multi-Service Operational Test and Evaluation (MOT&E), also scheduled during FY07, will help determine whether the device is ready for full-rate production.

System

- JCAD is a device that automatically detects, identifies, and warns warfighters of the presence of nerve, blister, and blood chemical agents.
- The Increment 1 is a commercially available, hand-held device that will operate as a stand-alone detector.
- The Increment 2 device is designed to detect extremely low levels of chemical agents and will have a networking capability.
- The total quantity of Increment 1 systems is 60,000 detectors, with 6,000 low-rate initial production. The Joint Acquisition Objective for JCAD is 274,887 detectors.

Mission

- The warfigher equipped with JCAD will be alerted to the presence of chemical agent vapor hazards so that the operator and his chain of command can take protective measures to operate in a chemically-contaminated environment.
- JCAD will be issued to:
  - Army squads
  - Marine platoons
  - Air Force aircraft, base reconnaissance, and ground-service personnel
  - Navy shore installations
- JCAD will be employed in a wide variety of tasks including personal detector, survey instrument, aircraft interior detector, and fixed installation monitor.

Activity

- The program was rebaselined in 2003. The Single Acquisition Management Plan was approved in September 2005. DOT&E approved the Test and Evaluation Master Plan (TEMP) for the rebaselined system during FY06.
- A JCAD operational assessment was conducted during FY06.
- The following DT/OT completed during FY06:
  - Simulant and Agent Relationship: Compared JCAD's response to both actual chemical agents and agent simulants that will be used in field testing of the device
  - Field Simulant Test: Determined JCAD's probability of detection of chemical simulants in an ambient environment and investigates JCAD's integration in selected representative combat vehicles
- The following DT/OT was partially completed during FY06:
  - Gate 2 Chemical Agent Surety Testing: Demonstrated JCAD's ability to detect and identify several concentrations of chemical agents in a series of representative environments of temperature and humidity
  - Weapons Grade Agent: Verified JCAD's ability to detect and identify exposures of explosively-disseminated weapons-grade agents
  - Nuclear, Biological, and Chemical (NBC) Contamination Survivability: Assessed JCAD's capability to withstand the effects of NBC agents, as well as decontamination solutions and processes

  - Standalone Interferents: Determined JCAD's susceptibility to false alarming in the presence of several potential interferents
- Preliminary preparations were made for the following DT/OT:
  - Chemical Agent Surety with Interferents: Determines JCAD's ability to discriminate, detect, and identify chemical agents in the presence of several potential interferents
  - Fielded Detector Comparison: Compares the performance of various fielded detectors with the JCAD; these detectors are the Automatic Chemical Agent Detector Alarm (ACADA), Shipboard-ACADA, and Improved Chemical Agent Monitor (ICAM)
  - Post Field Detection: Determines whether the detection and identification capabilities of JCADs previously used for DT and OT events have been degraded

Assessment

- DT/OT to date indicates that the JCAD has a probability of detecting four chemical agents greater than 90 percent of the time and a probability of detecting another agent 85 percent of the time. In general, average detection response times meet or exceed requirements. Detection response times for very low levels of agent contamination need to be improved.
- JCAD false alarm rates appear to be acceptably low for ground operations, but unsuitably high for afloat operations. They are still to be determined for rotary-wing and fixed-wing air operations.
- During the operational assessment, the warfighters found the JCAD easy to operate, troubleshoot, and maintain. They also liked JCAD's light weight and small size. They reported the following drawbacks:
  - The JCAD's sampling interval is too long for monitoring equipment and personnel for contamination, and was not well suited for on-the-move vehicle operations
  - Vehicle mounting locations need to be selected to provide crewmembers easy visual and hand access to the JCAD
  - JCAD needs both adjustable display illumination and alarm volume controls for use in operations requiring light and noise discipline
  - Battlefield smoke and insect repellent caused the JCAD to false alarm
  - JCAD's confidence checkers leaked in hot and humid field conditions
- During developmental testing, JCAD appears to have displayed acceptable performance in a wide variety of extreme environmental conditions, with the exception of:
  - Salt Fog Testing
  - Full Immersion Testing
  - Low Temperature Operations
- The Program Office is working corrections to address these deficiencies.

Recommendations

- Status of Previous Recommendations. The Program Manager accepted our FY05 recommendations.
- FY06 Recommendations. None.

Joint Service Light Nuclear, Biological, and Chemical Reconnaissance System (JSLNBCRS)

Executive Summary

- The Joint Service Light Nuclear, Biological, and Chemical Reconnaissance System (JSLNBCRS) completed First Article Testing to address integration, power, weight, and overpressure issues to assess readiness for Multi-Service Operational Test and Evaluation (MOT&E).
- Government production verification testing was conducted in FY06 to address vehicle and mission equipment integration and performance.
- The MOT&E was conducted in April 2006 in accordance with the DOT&E-approved Test and Evaluation Master Plan. The test plan approved by DOT&E was not followed with respect to the size of simulant releases for Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD).

System

- The JSLNBCRS is a mobile Nuclear, Biological, and Chemical (NBC) reconnaissance system mounted in two platforms: the Light Armored Vehicle (LAV) for the Marine Corps and the High Mobility Multi-purpose Wheeled Vehicle (HMMWV) for the Air Force.
- NBC sensors and communications are integrated to perform NBC detection, identification, sampling, and reporting of NBC hazards.
- The NBC mission equipment package includes:
  - Joint Biological Point Detection System
  - JSLSCAD system

  - Chemical and Biological Mass Spectrometer (Block II) and Dual Wheeled Sampling System
  - Legacy radiological detectors
  - Automatic Chemical Agent Detection Alarm
  - NATO standard markers

Mission

- Marine Corps NBC reconnaissance squads and Air Force airbase reconnaissance teams use JSLNBCRS to conduct searches, surveys, surveillance, sampling, and reconnaissance (route, area, and zone) to confirm the presence or absence of NBC hazards.
- Reconnaissance units report NBC information to supported Marine Air Ground Task Force and Air Force Wing commanders.

Activity

- The contractor performed First Article Testing of a production representative system to address integration, power, weight, and overpressure performance issues stemming from operational testing conducted in FY02.
- Road safety and mobility tests were conducted at the Nevada Automotive Test Center for the Light Armored Vehicle and HMMWV.
- Government production verification testing was completed in FY06 to assess system performance and readiness for MOT&E.
- The Multi-Service Operational Test was completed in April 2006 at the Dugway Proving Ground, Utah, with Marine Corps and Air Force JSLNBCRS teams performing NBC reconnaissance missions under realistic field conditions and simulant agent challenges. The test plan approved by DOT&E was not followed with respect to the size of simulant releases for JSLSCAD. Larger than approved simulant clouds were released. The Army is conducting modeling and simulation activities to better characterize the detection performance of the JSLSCAD in the presence of battlefield backgrounds and interferents.

Assessment

- Although government and contractor technical testing verified key system performance parameters, software stability, and integration of the NBC sensors, these capabilities must be confirmed in the multi-Service operational test evaluation, which is ongoing.
- JSLSCAD detection performance is significantly degraded by the presence of naturally occurring environmental interferents. Even if it meets revised operational requirements for detection and range performance, its critical detection information will not likely provide the battlefield commander with a beneficial standoff detection capability when employed on the move.

This conclusion is derived from the fact that the system completes a search pattern in 45 seconds, but can travel almost 750 meters in 90 seconds. If the detector can only detect out to 500 meters, the platform will have entered the cloud before it will alarm.

- Validation, verification, and accreditation of the JSLSCAD modeling and simulation effort is ongoing.
- The larger than approved simulant clouds were not threat-realistic and would overstate the performance of the detector.

Recommendations

- Status of Previous Recommendations. There were no FY05 recommendations.
- FY06 Recommendations. None.

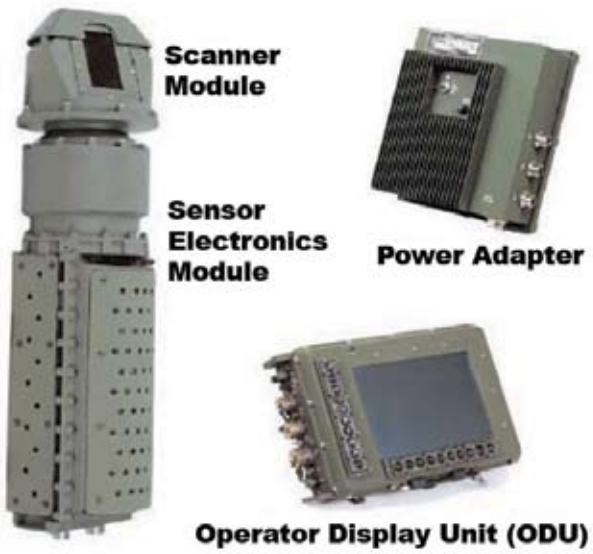
Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD)

Executive Summary

- The Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD) failed to meet its operational requirement and was rebaselined in 2003. The program is designed to have three increments. The original requirements were reduced for Increment 1 to reflect the system's performance as demonstrated by limited Army testing.
- Operational testing of Increment 1 took place in March and April 2006 in conjunction with the Joint Service Light Nuclear, Biological, and Chemical Reconnaissance System (JSLNBCRS).

System

- The JSLSCAD is an infrared passive detector that detects chemical agent vapors. Increment 1 is vehicle-mounted. Development of Increments 2 and 3 has stopped, as the commercial candidates that were being evaluated have not provided any performance improvement. The program office is currently studying new techniques that might improve the performance of Increment 1.
- JSLSCAD Increment 1 weighs 53 pounds.
- JSLSCAD is mounted on the Marine Corps' Light Armored Vehicle variant of the JSLNBCRS and the Army's Stryker NBC Reconnaissance Vehicle.
- The current plan is to refurbish 31 Increment 1 prototype systems and produce an additional 40, for a total of 71 systems for the full-rate production quantity.



- The Joint Acquisition Objective for all increments of JSLSCAD is 2,400 units.

Mission

JSLSCAD is intended to warn commanders of the impending arrival of chemical warfare agent vapor clouds. Commanders then decide on necessary protective measures.

Activity

- The Joint Program Executive Office for Chemical and Biological Defense rebaselined this program in 2003.
- In 2005, the Services revised, and the Joint Requirements Oversight Council validated, the requirement of Increment 1 to detect blister agent vapor with 70 percent probability and nerve agent vapor with 29 percent probability up to 500 meters while the platform is moving or stationary. The requirement had been 90 percent probability of detection out to 5,000 meters.
- The Single Acquisition Management Plan for the program was approved in April 2006. There is an approved Capability Production Document for Increment 1. In April 2006, DOT&E approved a Test and Evaluation Master Plan prior to the Initial Operational Test (IOT).
- JSLSCAD Increment 1 IOT was conducted as part of JSLNBCRS Multi-Service Operational Test and Evaluation (MOT&E) in March and April 2006.
- The program manager has sponsored extensive modeling and simulation studies to understand how the JSLSCAD would function in the field against live chemical agents. The outcome of this modeling and simulation is the subject of ongoing evaluation. The Joint Program Manager and lead Operational Test Agency are conducting additional modeling and simulation to characterize the detection performance of the JSLSCAD when operated with restricted fields of regard to optimize performance when stationary.

Assessment

- JSLSCAD Increment 1 did not perform well in early field tests against simulants. It detected simulants at ranges out to 500 meters instead of the intended 5,000 meters.
- When used in a vehicle-mounted configuration at full speed of 56 kilometers per hour (about 35 miles per hour), the JSLSCAD may provide no warning before entering or passing

through the vapor cloud because of its limited detection range. The system completes a search pattern in 45 seconds, and the vehicle can cover almost 750 meters in 45 seconds. If the detector can only detect out to 500 meters, the vehicle will have entered the cloud or moved beyond the cloud before JSLSCAD will alarm.

- Modeling and simulation indicate that water vapor and ozone can be significant natural interferents for the JSLSCAD Increment 1. This may hamper operational use of this system.
- The evaluation of JSLSCAD's operational effectiveness, operational suitability, survivability, as well as the adequacy of the IOT is ongoing.

Recommendations

- Status of Previous Recommendations. The FY05 recommendations were accepted.
- FY06 Recommendations. None.

Joint Tactical Radio System (JTRS) Capstone

Executive Summary

- The Joint Tactical Radio System (JTRS) program completed management reorganization under the direction of a Joint Program Executive Officer (JPEO). The Navy became the JTRS Executive Agent in July 2006.
- JTRS "clusters" were renamed as "product lines," and a new product line for "Networking Enterprise Services" was added to provide gateways and waveform management.
- The JTRS program is currently restructuring. The program is working critical documentations such as acquisition strategy, enterprise concept of operations, and test strategy.
- The JPEO should ensure adequate funding to test interoperability of the enterprise strategy.

System

- JTRS is a family of software-programmable and hardware-configurable digital radios consisting of several product lines. The product lines are:
  - JTRS Network Enterprise Domain
  - Ground Mobile Radios
  - Handheld/Manpack/Small Form Fit
  - Airborne/Maritime/Fixed
  - Multi-functional Information Distribution System
  - JTRS Enhanced Multi-band Inter/Intra Team Radios
- JTRS is designed to provide increased interoperability, flexibility, and adaptability to support the many diverse warfighter communications requirements.
- The Enterprise Domain product line provides the waveform and networking gateway, which will be the interface to the Global Information Grid, providing a reach and reach-back capability for the warfighting force.
- The JTRS Ground Mobile Radio product line provides ground radios for tactical and vehicular installation.
- The Handheld, Manpack, and Small Form Fit product line provides radios for dismounted operations and embedding into platforms, primarily the Army's Future Combat System (FCS).
- The Airborne, Maritime, and Fixed Station product line provides radios for aircraft, naval vessels, and fixed stations.
- The Multi-functional Information Distribution System will provide theater and tactical digital voice, data link, video communications, navigation, and identification functionality for all host platforms in support of the warfighting force.
- The Multi-band Inter/Intra Team Radio will provide the tactical warfighters with a lightweight handheld radio to meet their diverse communications needs using software radio technology.
- Due to program restructuring, the JPEO was tasked to include Multi-functional Information Distribution System and Multi-band Inter/Intra Team Radio as part of JTRS products lines.

Mission

- Commanders, leaders, and operators from all Services will employ JTRS to communicate and create networks to exchange voice, video, and data during all aspects of military operations.
- JTRS will provide support to combatant commanders and will support joint and coalition operations by providing a capability to communicate across multiple product lines.

Activity

- The JTRS program completed management reorganization under the direction of a JPEO. The Navy became the JTRS Executive Agent in July 2006.
- JTRS "clusters" were renamed as "product lines," and a new product line added "Networking Enterprise Services." This product line provides a gateway and waveform management.
  - JTRS Cluster 1 was renamed the Ground Mobile Radio product line and completed Contractor Development Testing of pre-Engineering Development Models
  - JTRS Cluster 5 was renamed the JTRS Small Form Fit, Handheld, Manpack Product line

  - JTRS Clusters 3 and 4 were merged and renamed Air/ Maritime/Fixed
- Developmental testing of new waveforms and software upgrades is ongoing.
- Waveform development and testing by the JPEO, National Security Agency, and the Joint Interoperability Test Command has started.

Assessment

- Test and Evaluation Master Plans for each product line must be updated as a result of the program restructure.
- The network manager for the JTRS program must be coordinated across the major components to ensure interoperability
- The responsibility for defining installation kits for tactical vehicles needs to be clarified.

Recommendations

- Status of Previous Recommendations. This report combines the FY05 JTRS Cluster 1 and Cluster 5 reports. The program is making progress on FY05 recommendations for Cluster 1 and Cluster 5.
- FY06 Recommendations.
  1. The Army should submit an updated Acquisition Strategy and provide a Test and Evaluation Master Plan for each product line.
  2. The Army should provide an enterprise strategy and multi-level security strategy and develop test concepts for networking waveforms, gateways, and common networking services on all necessary devices.
  3. The JPEO should ensure adequate funding to test interoperability of the enterprise strategy.
  4. The JPEO should ensure a common network manager across the enterprise.

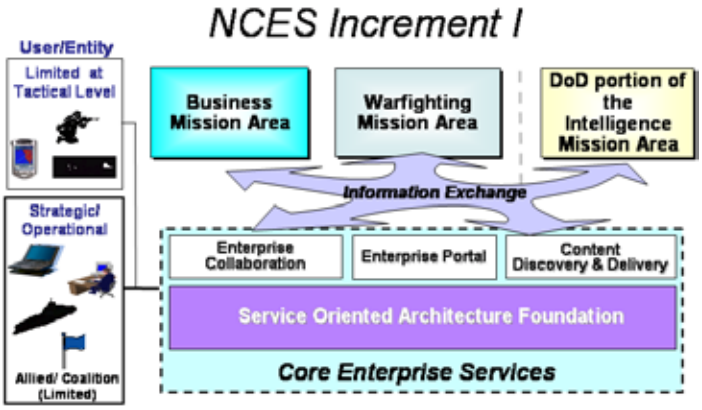
Network-Centric Enterprise Services (NCES)

Executive Summary

- DOT&E approved the Test and Evaluation Master Plan, developed in support of the program's Milestone B decision, in June 2006.
- DOT&E issued a memorandum endorsing the use of a risk assessment process to determine the level of testing required for each commercially managed service. This risk assessment process is normally used for upgrades to systems introduced after the full fielding decision.
- Although there is progress on the test plan, developing a means of testing rapidly evolving, commercially managed enterprise services has proven more difficult than anticipated. Difficulties include:
  - Lack of operational success criteria in the Network-Centric Enterprise Services (NCES) Concept Development Document
  - Evolving information concerning the collaboration service from the vendor and program office
  - Lack of clearly identified user representatives in the role of combat developer

System

- NCES is a suite of capabilities that support automated information exchange across DoD on both classified and unclassified networks. These capabilities include collaboration, discovery, and subscribe tools.
- The warfighting, intelligence, and business communities access NCES capabilities either directly or through a portal that controls access by the use of public key infrastructure profiles. NCES will extend selected services through the Internet to state, local, and authorized coalition users by the end of Increment 1.
- NCES collaboration tools provide all registered users the ability to hold meetings and exchange information by text, audio, and video.
- The discovery capabilities (content, people, services, metadata, publish/subscribe) allow producers of data to post information, alert others to the presence of new information, and evaluate the relevance of the data to their current roles and activities.
- NCES includes security and management capabilities that integrate with, and rely upon:



  - Network operations management capabilities supporting enterprise service/network management
  - Information assurance/computer network defense
  - Content staging/information dissemination management
- Increment 1 services are available to all operational and tactical users that connect to a Defense Information System Network (DISN) point-of-presence. Future increments will expand and refine services to operational and tactical users in bandwidth-restricted, intermittent, and disconnected environments.
- NCES capabilities are intended to be commercially available products managed under a series of Service-level agreements.

Mission

- Joint Force Commanders will use NCES to enable shared understanding, interface with other decision makers, orient forces, assess the situation, and synchronize operations.
- NCES is intended to facilitate information superiority and accelerate decision-making and net-centric transformation by enabling the secure, agile, robust, dependable, interoperable data sharing for DoD warfighter, business, and intelligence users.
- NCES supports DoD's vision of a net-centric environment through the creation of core services developed to interoperate with Programs of Record/Community of Interest developed services, which allows the warfighter to use these capabilities no matter where operations are conducted.

Activity

- DOT&E approved the Test and Evaluation Master Plan, developed in support of the program's Milestone B decision, in June 2006.
- The test plan is under development for the operational test portion of Early User Test 2 scheduled for November 2006. The focus of this test is the collaboration service.

- A multi-Component Mission Thread Working Group, lead by Joint Forces Command and the program office, provided the combined test team with an operational mission context to use for the collaboration service testing.
- DOT&E issued a memorandum endorsing the use of a risk assessment process to determine level of testing required for each commercially managed service. This risk assessment process is normally used for upgrades to systems introduced after the full fielding decision.

Assessment

- The development of a streamlined means of testing rapidly evolving, commercially managed, enterprise services has proven more difficult than anticipated.
- Several challenges impact the development of an adequate test design. They include the lack of operational success criteria in the Concept Development Document, evolving information concerning the collaboration service from the vendor and program office, and the lack of clearly identified user representatives in the role of combat developer.
- Although the commercial sector also uses the selected collaboration service, unique DoD Component network management contracts and policies affect the ability to use the collaboration service across the Enterprise. The Assistant Secretary of Defense for Networks and Information Integration, the Components, and the program office are working to solve these issues. This directly impacts the ability to operationally test the collaboration service in a realistic mission environment in which Component units link in from the various networks that make up the Enterprise network.

Recommendations

- Status of Previous Recommendations. No FY05 report was submitted on NCES.
- FY06 Recommendations.
  1. The Milestone Decision Authority should establish user representative(s) for the NCES program.
  2. The user representative(s), in conjunction with the Services, Agencies, and Combatant Commands, should identify operational success criteria that relate NCES-provided service capabilities to mission or task accomplishment.

Suite of Integrated Radio Frequency Countermeasures (SIRFC) (AN/ALQ-211)

Executive Summary

- The U.S. Army's Special Operations Command (USASOC) is developing and integrating the Suite of Integrated Radio Frequency Countermeasures (SIRFC) on the MH-47G and MH-60K+ helicopters.
- The Navy and Air Force Special Operations Command (AFSOC) are integrating SIRFC on the CV-22 aircraft.
- Early USASOC helicopter and AFSOC CV-22 testing of SIRFC has demonstrated that the Radar Warning Receivers (RWR) effectiveness are sufficiently mature for the respective stage of development, but the Electronic Countermeasures (ECM) jamming is limited in effectiveness as the sole source of protection. However, USASOC regression testing demonstrated that better integration of SIRFC on its MH-47G and MH-60K+ helicopters substantially improved both the performance of the RWR and the stand-alone ECM jamming.
- DOT&E will provide a full report of SIRFC operational effectiveness and suitability as installed on the MH-47G, following completion of the FY07 SIRFC IOT&E.
- FY06 flight testing of SIRFC demonstrated the system's readiness to commence IOT&E in 2QFY07. This testing was conducted with mature software on operationally representative MH-47G and MH-60K+ helicopters.

System

- SIRFC is an advanced radio frequency self-protection system designed for installation on aircraft.
- Major SIRFC subsystems are:
  - Advanced threat RWR
  - Advanced threat radar jammer/ECM

- SIRFC is being developed for use on Army Special Operations MH-47 and MH-60 helicopters and Air Force Special Operations CV-22 tilt rotor aircraft.

Mission

- Special Operations Forces will use SIRFC to enhance the survivability of aircraft on missions that penetrate hostile areas.
- SIRFC is designed to provide self-protection against threat radar-guided weapons systems by:
  - Improving aircrew situational awareness and threat warning
  - Employment of active electronic jamming countermeasures
  - Expending countermeasures (i.e. chaff)

Activity

U.S. Army Special Operations Command

- USASOC conducted development flight tests of SIRFC on operationally representative MH-47G and MH-60K+ aircraft at the Naval Air Warfare Center, China Lake, California, and the Air Force Nevada Test and Training Range.
- The purpose of these tests was to assess SIRFC's effectiveness and suitability, the integration of SIRFC with the new "glass cockpit" MH-47G and MH-60K+, and regression testing of the new detect-band antenna arrays and jamming antenna configurations on the helicopters. This also included assessment of SIRFC integrated with the Common Missile Warning System (CMWS) and AVR-2B laser detector set.
- SIRFC development testing included ground and flight testing of the entire system and testing of the reliability of the redesigned jamming technique generator component in preparation for the 1QFY07 SIRFC IOT&E.
- The IOT&E will support a 2QFY07 full-rate production decision for SIRFC integrated on the MH-47G.
- DOT&E approved USASOC's SIRFC Test and Evaluation Master Plan (TEMP) in January 2006 and all FY06 USASOC testing was conducted in accordance with that TEMP.

Air Force and Navy Test Activity Supporting CV-22 Development

- AFSOC incorporated a phased electronic countermeasures requirement in FY06 to initially field a SIRFC jamming capability on the CV-22 to meet Global War on Terror threats. For the long-term, they plan to implement a jamming

capability for the remainder of CV-22 priority threats. The Air Force and Navy agreed to implement a two-phased testing approach (IOT&E Phase I and II) to test this staggered jamming capability.
- The Navy and Air Force conducted Electronic Warfare Integrated Assessment development flight tests in FY06 to make an initial demonstration of the CV-22's survivability. This was done in a limited radio frequency threat environment using a combination of SIRFC radar warning, electronic jamming, expendable chaff, and tactics.
- The Air Force Operational Test and Evaluation Command (AFOTEC), AFSOC, and the Navy's V-22 program test personnel developed an initial electronic warfare test process for the CV-22 in preparation for the IOT&E. This process includes electronic warfare development flight test periods and precise infrared and ECM end-game effectiveness testing.
- OSD approved a revised V-22 TEMP in FY06, which includes the CV-22.
- FY06 Navy and Air Force testing was conducted in accordance with the DOT&E-approved TEMP using four CV-22 low-rate production special operations variants.

Assessment

Although SIRFC development and testing is being conducted under two separate TEMPS, inter-program communication is good allowing the CV-22 program to benefit from the USASOC SIRFC lessons-learned.

U.S. Army Special Operations Command
- FY06 flight testing of SIRFC demonstrated the system's readiness to commence IOT&E in 2QFY07.
- USASOC's FY06 regression testing confirmed that modifications to the host aircraft for SIRFC integration do significantly improve radar warning and stand-alone ECM effectiveness. However, there are still reliability concerns. SIRFC's baseline RWR and ECM effectiveness still require minor improvement. DOT&E will report on SIRFC operational effectiveness and suitability following the FY07 SIRFC/MH-47G IOT&E.
- Demonstrated survivability of the MH-47G and MH-60K+ consistently improves when electronic countermeasures are combined with tactics and use of expendables.

Air Force and Marine Corps CV-22 Development
- The Navy has not incorporated the SIRFC EW test process and phased IOT&E plan in the draft V-22 TEMP to align electronic warfare test expectations for the CV-22. This phased SIRFC test process was not fully coordinated until after the FY06 V-22 TEMP was approved by OSD.
- Electronic Warfare Integrated Assessment I provided early identification of SIRFC/CV-22 integration concerns. However, it has limited utility due to changing SIRFC configurations and the limited scope of the threat environment used for testing. DOT&E's assessment of SIRFC/CV-22 effectiveness and suitability will not be available until operational representative testing is conducted.

Recommendations

- Status of Previous Recommendations. One of the five previous DOT&E annual report recommendations is unresolved:
  FY05 #5: The Services should employ more realistic short-range radar-guided missile threats which will support adequate testing of self-protection systems against radio frequency guided threats. This recommendation remains valid.
- FY06 Recommendations.
  1. USASOC: None.
  2. The Navy should formally outline the SIRFC electronic warfare test process and phased IOT&E plan in the CV-22 TEMP.

Teleport

Executive Summary

- Follow-on testing is required to evaluate the operational effectiveness and suitability of the full Initial Operations Capability (IOC) 2 functionality. Defense Information System Network (DISN) services for IOC 2 were deferred until 2007 by the Joint Requirements Oversight Council.
- A detailed concept of operations guide for Teleport is required in order to establish a common baseline for the operation of tactical terminals connected to Teleport facilities.
- Additional encryption, switching, multiplexing, and routing functions for connecting data streams to the DISN services must be resolved prior to follow-on testing of IOC 3 capability.

System

- The DoD Teleport sites are globally distributed satellite communications (SATCOM) facilities. The Teleport sites consist of four segments:
  - Teleport earth terminals are SATCOM terminals that operate in X, C, Ku, Ultra High Frequency (UHF), Extremely High Frequency, and Ka frequency bands. The terminals provide the radio frequency links between the Teleport site, the satellite, and the deployed warfighter SATCOM terminal via commercial or military satellites.
  - The base-band segment includes all encryption, switching, multiplexing, and routing functions for connecting data streams or packeted data to the DISN.
  - Network services provide connectivity to the DISN long-haul networks and other interworking functions necessary to meet the warfighter's requirements.
  - Management and mission control provides integrated and automated control and monitoring of Teleport base-band hardware, earth terminal hardware, electronic matrix switch, transmission security, and test equipment.
- The system is globally distributed from six core teleport facilities. The facilities are located at:
  - Chesapeake, Virginia
  - Ramstein and Landstuhl, Germany
  - Lago Patria, Italy
  - Fort Buckner, Japan
  - Wahiawa, Hawaii
  - Camp Roberts, California

Mission

- Combatant Commanders, Services, and deployed operational forces will use the Teleport systems in all phases of conflict to gain worldwide military and commercial SATCOM services.
- Teleport provides deployed forces with standard fixed gateways from anywhere in the world for all six DISN services:
  - Secret Internet Protocol Router Network (SIPRNET)
  - Unclassified-but-Sensitive Internet Protocol Router Network (NIPRNET)
  - Defense Red Switch Network (DRSN)
  - Defense Switched Network (DSN)
  - Video Teleconferences (VTC)
  - Joint Worldwide Intelligence Communications System (JWICS)
- Teleport will expand the Standard Tactical Entry Point (tactical systems) concept to supply warfighters with standard fixed gateways into DISN services.

Activity

- In April 2006, the Joint Interoperability Test Command conducted a Generation One, IOC 2 operational test for the UHF Satellite Communication System at the Teleport site in Wahiawa, Hawaii. Tactical Commands included the 293rd Combat Communication Squadron and the 56th Air Communication at Hickam AFB, Hawaii; the 729th Air Control Squadron at Hill AFB, Utah; the 354th Communication Squadron at Eielson AFB, Alaska; the 305th Communications Squadron at McGuire AFB, New Jersey; Pacific Command Headquarters at Camp Smith, Hawaii; the USS *Comstock* (LSD 45); and the USS *McClusky* (FFG 41).

- Deployed users performed multiple-hops, which are multiple connections over UHF satellite communication terminals, at Wahiawa Teleport facility.
- The test network used three satellite communication circuits (C, X, and Ku bands) to assess the UHF capability to communicate over different frequency bands.
- In July 2006, the Joint Interoperability Test Command conducted a Generation One, IOC 3 operational test for the Extremely High Frequency Satellite Communication System at the Northwest Teleport site, Chesapeake, Virginia. Tactical users included the 612th Air Communications Squadron at Davis-Monthan AFB, Arizona; the 609th Air Mobility Operations Squadron at Shaw AFB, South Carolina; the 83rd Communications Squadron at Langley AFB, Virginia; Central Command J6 at MacDill AFB, Florida; the Joint Communications Support Element at MacDill AFB, Florida; the 60th Communications Squadron at Travis AFB, California; the 21st Air Mobility Operations Squadron at McGuire AFB, New Jersey; the 305th Communications Squadron at McGuire AFB, New Jersey; and the 53rd Communications Squadron at Robins AFB, Georgia.

Assessment

- The operational tests were conducted in accordance with a DOT&E-approved Test and Evaluation Master Plan and test plans.
- The IOC 2 UHF equipment functions as intended and provides a useful multiple-hop capability. The full IOC 2 functionality will not be realized until UHF users can access DISN services, a capability deferred until 2007 by the Joint Requirements Oversight Council.
- A detailed concept of operations guide for Teleport is required in order to establish a common baseline for the operation of tactical terminals connected to Teleport facilities.
- Reporting on IOC 3 testing is being deferred until additional testing is completed at Wahiawa, Hawaii, and Fort Buckner, Okinawa, Japan.
- Tactical users successfully accessed DISN services and demonstrated multiple-hop and cross-banded voice and data exchanges during the IOC 3 test event.

Recommendations

- Status of Previous Recommendations. The Teleport Program Office effectively resolved DOT&E's FY05 recommendation.
- FY06 Recommendation.
  1. The Defense Information System Agency and Teleport Program Office should place a high priority on user development and implementation of a detailed concept of operations guide for Teleport.

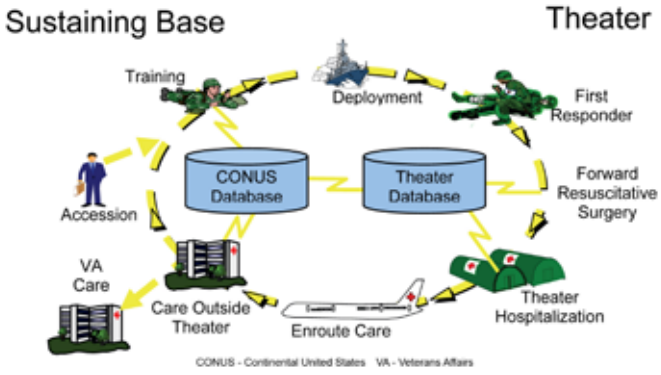
Theater Medical Information Program (TMIP)

Executive Summary

- The Theater Medical Information Program (TMIP) program manager is fielding the system in blocks of increasing capability. The IOT&E of Block 1 reflected a high functional success rate (over 99 percent), but with some significant operational limitations, including occasional loss of data, immunization module deficiencies, inoperable joint medical logistics functions, and human-system integration shortfalls.
- Due to urgent and compelling needs, the Assistant Secretary of Defense (Networks and Information Integration) authorized limited fielding to the Army and Marine Corps in Kuwait, Iraq, and Afghanistan for combat support operations.
- The Army Test and Evaluation Command (ATEC) performed a risk assessment of the Defense Medical Logistics Standard Support, Customer Assistance Module (DCAM). ATEC will conduct an operational assessment of DCAM in early FY07 to support fielding prior to Block 2 IOT&E.
- On September 18 and 19, 2006, ATEC led a joint operational assessment of Block 2 in a test bed environment. The operational test agencies are currently evaluating the data from this operational assessment.

System

- TMIP is a Joint Major Automated Information System that integrates information from sustaining base medical applications into a joint system for use by deployed forces.
- Examples of integrated systems include the Armed Forces Health Longitudinal Technology Application (formerly Composite Health Care System II), Defense Blood Standard System, Defense Medical Logistics Standard Support, and Transportation Command Regulating and Command and Control Evacuation System.
- The Services provide their own infrastructure (networks and communications) and fund the computer hardware to host TMIP software applications in-theater.



Mission

- Theater Combatant Commanders, Joint Task Force commanders, and their medical support staff equipped with TMIP can make informed and timely decisions regarding theater health services.
- TMIP supports command and control, medical surveillance and reporting, and various medical functional areas that include:
  - Medical logistics
  - Blood management
  - Medical intelligence
  - Health care delivery
  - Medical capability assessment
  - Sustainment analysis
- TMIP provides situational awareness down to the lowest level of deployed health care activities, such as:
  - Epidemiology monitoring
  - Bed status
  - Daily disposition
  - Patient status
  - Patient visibility

Activity

- ATEC performed a risk assessment on DCAM, a logistics module to be added to Block 1. ATEC will conduct an operational assessment in early FY07 to support fielding prior to Block 2 IOT&E. ATEC will also test DCAM during the IOT&E of Block 2 planned for September 2007.
- A TMIP Block 2 System Qualifications Test was conducted in September 2006. ATEC led a joint operational assessment following that test. The results are pending.

Assessment

- The TMIP program manager is fielding the system in blocks of increasing capability. IOT&E of Block 1, conducted in FY05, reflected a high functional success rate (over 99 percent), but with some significant operational limitations. Those problems included occasional loss of data, immunization module deficiencies, inoperable joint medical logistics functions, and human-system integration shortfalls.

- Due to urgent and compelling needs, the Assistant Secretary of Defense (Networks and Information Integration) authorized limited fielding to the Army and Marine Corps for combat support operations. The Army and Marine Corps are currently using Block 1 in Kuwait, Iraq, and Afghanistan.
- TMIP clearly shows promise for tactical medical operations. It is progressing toward a goal of making all medical records electronic. Immature Service and joint concepts of operations for using the system is a major concern.
- There is risk that TMIP Block 2 may not complete joint IOT&E as scheduled. In accordance with the revised Acquisition Strategy, the program manager will release the software to the Services upon completion of System Qualification Testing. The software will then undergo eight months of Service System Acceptance Testing prior to the IOT&E. The program manager will have to correct any deficiencies noted by the individual Services, reissue the software, and determine if Block 2 is ready for joint IOT&E.

Recommendations

- Status of Previous Recommendations. The following FY05 recommendations remain valid:
  FY05 #1: DOT&E recommended that the Army be authorized to complete TMIP Block 1 fielding, subject to the incorporation of a message regenerator tool. The Army did not field Block 1 past the limited authorization. IOT&E of Block 2 will determine whether the intermittent problem of lost data has been fully corrected.
  FY05 #2: DOT&E recommended that the Army not be authorized to use the immunization module or the medical logistics functions. The Army does not use the immunization module and the joint medical logistics functions are being held in abeyance in favor of using existing medical logistics capabilities.
  FY05 #3: DOT&E recommended that no other Services be authorized to field Block 1 without successful IOT&E or special authorization to meet wartime necessities. The Marine Corps obtained that special authorization to field Block 1.
- FY06 Recommendations.
  1. The Services should strive to incorporate lessons learned from the Block 2 operational assessment into their integration efforts and work closely with each other and the program manager to prepare for the joint IOT&E.
  2. The Services and Joint Forces Command should continue to develop viable TMIP joint concepts of operations. Immature concepts of operations pose the greatest risk to achievement of TMIP goals.

Army Programs

Army Programs

Advanced Threat Infrared Countermeasures / Common Missile Warning System (ATIRCM/CMWS)

Executive Summary

Common Missile Warning System (CMWS)

- CMWS is the newest Army aircraft missile warning system designed to detect incoming surface-to-air infrared missiles and to command automatic employment of Infrared Countermeasures (IRCM). The fielded CMWS is not integrated with an infrared laser jammer and only cues expendable flares.
- The Army authorized full-rate production of CMWS in May 2006, following the classified DOT&E Beyond Low-Rate Initial Production report to Congress. DOT&E determined that CMWS was operationally effective and suitable for combat operations in Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) when installed on the CH-47, UH-60, and C-12 aircraft.
- Based on follow-on testing, DOT&E assessed that CMWS was also operationally effective and suitable for the OIF/OEF mission environments when coupled with the AH-64 Apache's aircraft navigation system, but with specific platform integration limitations.
- The fielded version of CMWS offers significant advantages in the OIF/OEF environments over the legacy missile warning sensor it is replacing. However, CMWS has substantial effectiveness limitations outside the current OIF/OEF environments. Additional development and testing is needed before CMWS should be deployed for combat operations outside the current OIF/OEF environments.

Advanced Threat Infrared Countermeasures (ATIRCM)

- The Army stopped testing of the ATIRCM laser jammer in FY05 due to significant reliability problems identified while testing.
- The Army incorporated a redesigned ATIRCM system with a planned low-risk schedule. ATIRCM is expected to enter government testing in FY07 and be assessed through a methodical test process to support a planned initial operational capability in FY10.
- DOT&E is unable to make an assessment of ATIRCM performance until adequate government testing is conducted.

System

- CMWS is the newest Army aircraft missile warning system designed to detect incoming surface-to-air infrared missiles and command automatic employment of IRCM. The fielded CMWS is not integrated with an infrared laser jammer and only cues expendable flares.

- The Army will use CMWS as the first missile warning sensor on some aircraft, while augmenting the legacy ALQ-144 passive infrared jammer and replacing the legacy AN/AAR-47 or AN/ALQ-156 missile warning sensors.
- Production CMWS are currently fielded on approximately 500 Army CH-47, UH-60, AH-64, C-12 series, and UC-35 aircraft. The Army is purchasing a total of 1,710 CMWS systems.
- The Army plans to install ATIRCM/CMWS on most H-47 Chinook, H-60 Blackhawk, and H-64 Apache helicopters. CMWS-Only is the planned configuration for Army fixed-wing C-12 and UC-35 series aircraft.
- ATIRCM is a defensive countermeasure system for Army helicopters.
- ATIRCM incorporates an active infrared laser jammer to provide Army helicopters with improved infrared defensive countermeasures. It will be integrated with the CMWS sensor.
- The Army plans to integrate ATIRCM and CMWS in FY09.

Mission

- Combatant Commanders use ATIRCM/CMWS to protect aircraft and crews during normal take-off and landing, as well as during assault, attack, re-supply, rescue, forward arming, and refueling missions.
- ATIRCM/CMWS protect helicopters against shoulder-fired, vehicle-launched, and other infrared-guided missile threats.
- The combined ATIRCM/CMWS suite enhances threat warning and improves defensive countermeasures for helicopters and some fixed-wing aircraft.

Activity

CMWS

- Because the full-threat CMWS effectiveness was not sufficiently mature, the Army delayed development of a full-threat capable CMWS in order to more rapidly field an interim CMWS that supports the current OIF/OEF threat environments.
- The Army revised the ATIRCM/CMWS Test and Evaluation Master Plan (TEMP) to reflect the separation of CMWS from the ATIRCM laser infrared jammer program. DOT&E approved the revised ATIRCM/CMWS TEMP and IOT&E test plan in 1QFY06.
- The Army conducted the CMWS IOT&E on the CH-47 and UH-60 aircraft in 1QFY06.
- The Army conducted additional testing in 2QFY06 to assess CMWS effectiveness during more dynamic attack helicopter mission profiles, based on lessons learned from the IOT&E and earlier development test efforts.
- The Army authorized full-rate production of CMWS in May 2006, following the classified DOT&E report to Congress on CMWS.
- The Army fielded CMWS-equipped AH-64 Apaches in 3QFY06 after conducting follow-on testing of CMWS on the AH-64 Apache at Fort Rucker, Alabama.
- All CMWS testing in FY06 was conducted in accordance with the DOT&E-approved TEMP and test plan.

ATIRCM

- In FY05, the Army stopped testing of the ATIRCM laser jammer due to significant reliability problems identified while testing.
- The Army initiated a fundamental redesign of the ATIRCM laser jammer in FY06.
- The Army has purchased a total of 37 ATIRCM low-rate initial production units.
- In FY06, the ATIRCM contractor began a five-phase reliability growth test to assess the reliability of the ATIRCM design. This testing is scheduled to continue until FY09.

Assessment

CMWS

- Army testing during CMWS IOT&E and follow-on testing was adequate to evaluate operational effectiveness and suitability for CMWS use in OIF/OEF mission environments.
- DOT&E determined that CMWS was operationally effective and suitable for combat operations in OIF/OEF when installed on the CH-47, UH-60, and C-12 aircraft.
- Based on follow-on testing, DOT&E assessed that the CMWS was also operationally effective and suitable for the OIF/OEF mission environments when coupled with the AH-64 Apache's aircraft navigation system, but with specific platform integration limitations.
- The fielded version of CMWS offers significant advantages in the OIF/OEF environments over the legacy missile warning sensor it is replacing. However, CMWS has substantial effectiveness limitations outside the current OIF/OEF environments. Additional development and testing is needed before CMWS should be deployed for combat operations outside the current OIF/OEF environments.
- In FY06, the Army incorporated incremental improvements to CMWS that mitigate some of the limitations reported by DOT&E. The Army's long-term plan is to upgrade the missile warning sensor to be effective for worldwide operations and operationally test a full-threat capable system in FY08.
- The Army has not accredited their end-to-end CMWS simulation model, which has the potential to reduce the flight test requirements of follow-on testing.
- The Army's plan to transition from the interim CMWS fielded in OIF/OEF to the full-threat capable CMWS is not reflected in the approved TEMP.

ATIRCM

- The Army incorporated a redesigned ATIRCM system and is expected to begin government testing in FY07, and have a full system (CMWS and ATIRCM) IOT&E in FY09.
- DOT&E is unable to make an assessment of current ATIRCM performance until adequate government testing of the redesigned system is conducted.

Recommendations

- Status of Previous Recommendations. The Army has taken effective action on the DOT&E recommendations from the FY05 report.
- FY06 Recommendations. The Army should:
  1. Test and report on near-term improvements to CMWS effectiveness and suitability for OIF/OEF mission environments and long-term enhancements to CMWS performance for use in worldwide mission environments. These improvements are identified as recommendations in the classified 2006 CMWS DOT&E report to Congress.
  2. Provide a revised TEMP that clearly describes the development and test efforts required to support assessment of the full-threat capable CMWS and redesigned ATIRCM.
  3. Continue to develop the end-to-end simulation model for ATIRCM and CMWS to support the FY10 ATIRCM/CMWS full-rate production decision.

Armed Reconnaissance Helicopter (ARH)

Executive Summary
- The Armed Reconnaissance Helicopter (ARH) entered System Development and Demonstration (SDD) at Milestone B on July 7, 2005.
- The Army acquisition strategy was to acquire an existing helicopter and integrate existing subsystems. SDD activities since Milestone B have taken more time for developmental and integration testing than anticipated.
- Flight testing of a modified, off-the-shelf Bell 407 aircraft is ongoing in an effort to accelerate integration and testing of mission equipment.

System
- The ARH is a replacement for the OH-58D helicopter. While largely based on the commercial Bell Helicopter 407 design, the ARH incorporates new designs for major components.
- The ARH integrates the Common Avionics Architecture System with target acquisition sensor systems for day, night, and marginal weather operations.
- The ARH will fire 2.75-inch aerial rockets and Hellfire missiles. It will have armored crew stations and will employ Aircraft Survivability Equipment, to include radar, laser, and missile warning systems and chaff/flare dispensers.
- The acquisition objective is 368 aircraft with a full-rate production decision in November 2008. The Army plans to have 10 ARH per troop and 30 per squadron.

Mission
- A regimental aviation squadron, as part of the Multi-Functional Aviation Brigades, employs ARH to conduct aerial armed reconnaissance for collection of combat information and intelligence about enemy and terrain.
- ARH squadrons also provide security and early warning against enemy observation or attack.
- Other ARH troop missions include:
  - Command and control
  - Communications relay
  - Convoy security
  - Nuclear/chemical surveys

Activity
- Army and contractor test pilots are conducting developmental test flights and have flown more than 30 hours in a Bell 407 prototype. Sensor and avionics testing continues as part of a risk reduction effort.
- Additional risk reduction efforts for aircraft engine/airframe integration are being conducted using a Bell 417 aircraft. This helicopter flew with the ARH Honeywell Turbo Shaft (HTS)-900 engine on June 1, 2006.
- SDD test activities are continuing to confirm flight performance and integration of mission equipment (navigation, communications, weapons, and survivability equipment) onto a modified, off-the-shelf Bell 407 aircraft.
- Four SDD prototype aircraft are in various preflight stages at Bell. SDD#1 aircraft completed the ground functional test phase of the integration effort and executed its first flight on July 21, 2006. The remaining three aircraft are at different stages of manufacturing.
- The ARH Test and Evaluation Master Plan (TEMP) and acquisition strategy will be updated for a Milestone C decision scheduled for March 2007. The Milestone C decision to purchase 38 low-rate initial production aircraft will be based upon results from operational and developmental tests.

Assessment
- The Milestone B decision in July 2005 initiated an aggressive ARH schedule. Complexity of system integration caused delays for two events: the Critical Design Review originally planned for July 2006 was moved to September 2006; the Limited User Test originally planned for August 2006 is now scheduled for February 2007.

- The Milestone B decision authority approved an accelerated ARH program schedule based on the Army acquisition strategy to acquire an existing helicopter and integrate non-developmental items subsystems. Since Milestone B, the Army learned that the selected ARH design requires a more significant development and integration effort than originally claimed. Planned systems changes and integration include:
  - HTS-900-2 engine
  - Seat Armor
  - Transmission
  - Aircraft Survivability Equipment
  - Rotor Hub
  - Landing Gear
  - Fuel Cell
  - Improved Data Modem
  - Targeting Sensors
  - Software Blocking
  - Armament
  - Floor
- The Army's ARH TEMP was adequate to support a July 2005 Milestone B decision. The Army is updating the ARH TEMP with additional details following source selection to clarify the scope of developmental and integration testing.
- ARH is a covered system for LFT&E. The LFT&E strategy includes full-up system-level testing and will be updated with platform-specific details now that the Bell 407 has been selected. Most of the initial component/subsystem testing will be performed on static, non-operating test articles because of schedule constraint. These tests will be followed by dynamic testing during the full-up system-level test series.
- The Army plans to conduct IOT&E as troop-level missions with ten ARHs.

Recommendations

- Status of Previous Recommendations. The Army has taken effective actions to resolve the FY05 recommendations.
- FY06 Recommendation.

1. The Army should realign the ARH acquisition strategy and schedule based upon the ARH Critical Design Review. While largely based on the commercial Bell Helicopter 407 design, the ARH incorporates new designs for major components and requires adequate time to test components/weapon systems. The Army should monitor performance and integration and allow sufficient time to correct problems before the IOT&E.

Black Hawk Upgrades (UH-60M) – Utility Helicopter Upgrade

Executive Summary
- On May 24, 2006, the Defense Acquisition Executive designated the follow-on UH-60M Upgrade program as a pre-planned product improvement.
- IOT&E was completed in December 2006.
- Technical risks include system-level integration, digital interoperability, and reliability. The UH-60M Upgrade Test and Evaluation Master Plan (TEMP) is adequate to evaluate these technical issues and determine the operational effectiveness, survivability, and suitability of the UH-60M Black Hawk.

System
- The UH-60M is a modernized UH-60 A or L model Black Hawk medium-lift helicopter.
- The Assault Helicopter Battalion is organized as three companies of ten aircraft each.
- The acquisition objective is for 1,806 UH-60M Black Hawks, with 1,227 projected to be UH-60M variant and the remaining will be UH-60Ls. The program projects that 123 aircraft will be UH-60M Baseline aircraft and the remaining 1,104 will be UH-60M Upgrade aircraft.
- The UH-60M Baseline aircraft include:
  - A Digital Cockpit with Blue Force Tracker
  - Power and airframe improvements with the 701D engine, wide chord blades for enhanced performance, and monolithic machined parts that show improvement over the A/L model Black Hawk
  - Improved survivability with enhanced laser warning and infrared suppression for anti-missile defense
- The planned UH-60M Upgrade design adds:
  - A Common Avionics Architecture System and networked digital connectivity for enhanced commonality with other Army aircraft

  - Improved handling qualities optimized for minimum pilot workload and increased safety in degraded environments
  - Composite Tailcone and Driveshafts

Mission

Assault Aviation and General Support Aviation Battalions will use this aircraft to conduct the following missions:
- Resupply the force through internal and external cargo lift capability
- Provide Air Assault lift for 11 combat soldiers or equipment less than 9,000 pounds
- Conduct aero medical evacuation
- Execute command and control

Activity
- A combined contractor and government test team continued developmental flight and ground testing on seven production-representative aircraft. These tests included more than 1,400 training and developmental flight hours and focused on:
  - Integration of the Automated Flight Control System and the Flight Management System
  - Additional flight testing to include icing tests, as well as Blue Force Tracker, Integrated Vehicle Health Management System, and AVR-2B Laser Detection Set integration
  - Ground testing to include Electromagnetic Compatibility testing and crashworthy external fuel system integration
- A simulation-based exercise, conducted May 22-25, 2006, demonstrated UH-60M digital cockpit functionality and interoperability.
- DOT&E approved the UH-60M Upgrade TEMP on December 13, 2005, and the UH-60M test plan on October 4, 2006. The 248-hour IOT&E was completed in December 2006.

- The Defense Acquisition Executive designated the UH-60M Upgrade as a Preplanned Product Improvement program (and not a separate increment of capability) on May 24, 2006.
- The LFT&E strategy approved by DOT&E in May 2000 includes a waiver from full-up system-level testing. An alternate strategy combines efforts with the Navy's MH-60R and MH-60S programs, as well as DOT&E's Joint Live Fire program. Joint Live Fire testing of the UH-60 engine compartments, crashworthy external fuel system, and onboard oxygen generation system completed in FY05. Testing of the improved gear box completed in FY06. Testing of the new wide chord main rotor blades is the only remaining test under the original Army Live Fire program and is planned for 1QFY07. The Army is extending the LFT&E program to address pre-planned product improvement changes that may affect vulnerability, including changes to the tail cone, tail rotor drive shaft, flight control system, and cockpit.
- The integration of a satellite-based communications system compatible with Army digital architecture matured and is currently planned for the IOT&E. Blue Force Tracker completed developmental testing and has been installed on the IOT&E aircraft.

Assessment

- The UH-60M met or exceeded the Milestone C entrance criteria for troop lift, external lift, and digitization, but did not meet the reliability entrance criterion during the August 2005 Limited User Test. Since then, reliability has improved and currently exceeds requirements, as demonstrated during developmental testing and scored training hours.
- The simulation-based exercise in May 2006 identified pilot interface and workload issues, which are receiving continued attention in the ongoing IOT&E.
- The UH-60M continued to demonstrate improved handling qualities over the UH-60 A/L aircraft during developmental flight testing.
- Technical risks include system-level integration and digital interoperability. The UH-60M Upgrade TEMP is adequate to evaluate these technical issues and determine the operational effectiveness and suitability of the aircraft.
- IOT&E progressed as scheduled and adequately addressed test and evaluation efforts. The IOT&E included five production-representative aircraft conducting realistic combat utility helicopter missions in an operational environment.
- The Army will evaluate the impact of the Common Missile Warning System, the mission equipment packages for medical evacuation and the mine emplacement system, and new communications equipment on the UH-60M in separate test events.
- LFT&E results to date indicate improved survivability over the UH-60 A/L aircraft.

Recommendations

- Status of Previous Recommendations. The Army has effectively resolved issues from FY05 recommendations.
- FY06 Recommendations. None.

CH-47F – Cargo Helicopter

Executive Summary
- DOT&E found that the CH-47F was operationally effective and survivable, but not operationally suitable in FY05.
- In January 2006, the Army modified its previous plan and combined the Phase II IOT&E and Phase III IOT&E into a single 60-flight-hour Phase II IOT&E using two production aircraft. Efforts to update the approved Test and Evaluation Master Plan are ongoing for the Phase II IOT&E to take place from March 12 - April 11, 2007.
- The CH-47F program completed 140 developmental test flight hours to integrate a new Digital Automatic Flight Control System and the Common Avionics Architecture System cockpit. The Army completed developmental testing in July 2006 and the CH-47F meets airworthiness and aircraft handling quality standards needed to enter Phase II IOT&E.

System
- The CH-47F is a remanufactured and modernized CH-47D model Chinook Helicopter.
- The CH-47F is designed to transport artillery and light equipment up to 16,000 pounds, or 31 combat troops.
- The CH-47F program fulfills the Army Aviation Transformation Chinook requirement for upgraded aircraft with both remanufactured and new aircraft. The acquisition objective is 452 CH-47Fs (397 rebuilt aircraft and 55 new aircraft).
- The CH-47F incorporates:
  - A common digital cockpit to increase crew situational awareness and increase cockpit commonality with other Army aircraft
  - A Digital Automated Flight Control System to improve handling qualities and decrease pilot workload

  - Engine upgrades for increased power
  - Fuselage stiffening, corrosion protection, and a new monolithic airframe structure to reduce cockpit vibration and increase airframe durability

Mission
- The CH-47F provides lift capability to the commander to accomplish critical tasks by rapidly projecting tactical airlift support and supply sustainment.
- General Support Battalions of the Multi-Functional Aviation Brigades equipped with the CH-47F will:
  - Conduct air assault missions to transport ground forces
  - Conduct resupply operations to move fuel, ammunition, and other battle-critical cargo
  - Conduct mass casualty evacuation
- CH-47F equipped units will execute air assault and resupply operations as an integrated element of a combined arms team.

Activity
- In January 2006, the Army decided to schedule a 60-flight-hour IOT&E Phase II using two production aircraft from March - April 2007.
- A combined contractor and government test team conducted developmental testing to include the System Integration Laboratory, flight testing on one prototype aircraft, and ground testing. Flight testing focused on integration of a new Digital Automatic Flight Control System and Common Avionics Architecture System. Ground testing included electromagnetic compatibility and vulnerability component testing.
- Software Block I Intra-Army Interoperability Certification Testing was conducted from February 28 - March 2, 2006. Joint Interoperability testing began in February 2006 and is currently ongoing.
- The Army approved the CH-47F Operational Requirements Document on June 6, 2006. This latest requirements document included revisions to clarify the Net Ready Key Performance Parameters, to include digital messaging thresholds and beyond line-of-sight voice communications.
- Live Fire testing during March - May 2006 examined the effectiveness of the CH-47F fire extinguishing system. The test indicated a need for additional testing that is planned for FY07. An analysis of the vulnerability of the CH-47F to man-portable air defense systems began in 2006 and is ongoing. In addition, the Army is studying the changes to

CH-47F vulnerability resulting from the redesign of the cockpit and monolithic airframe structure.

Assessment

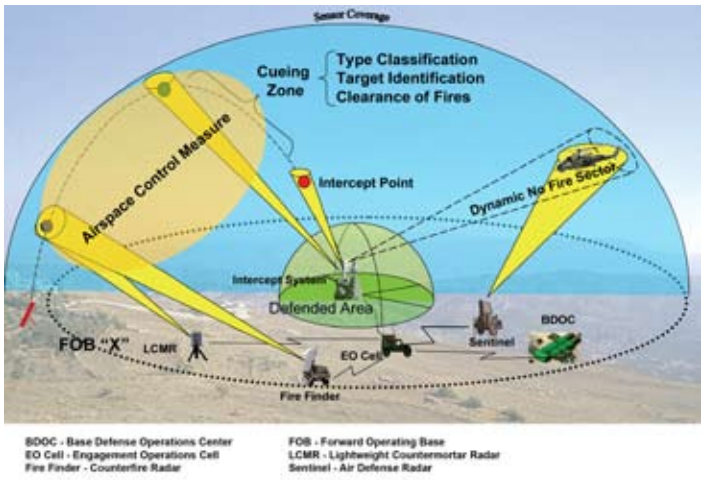
- DOT&E published its combined OT&E/LFT&E report during FY05 and found that the CH-47F was operationally effective and survivable, but not operationally suitable. The CH-47F did not demonstrate adequate communications systems integration, improved digital interoperability, or system reliability during IOT&E Phase I.
- Remaining technical risks include system-level integration, digital interoperability, reliability, and monolithic airframe integration.
- Recent developmental testing resulted in an airworthiness certification and demonstration of acceptable aircraft handling qualities for entry into IOT&E Phase II.
- The digital communications capabilities of the CH-47F during the Software Block 1 testing were encouraging. The CH-47F successfully exchanged digital messages via Blue Force Tracker with various Army aircraft and operations centers in Delaware, Texas, and Alabama.
- Planning for IOT&E Phase II is progressing as scheduled and adequately addresses operational test and evaluation concerns. IOT&E Phase II will include approximately 60 flight hours with two production aircraft conducting realistic cargo missions in an operational environment.
- Plans are in progress for additional developmental testing of the Common Missile Warning System aircraft survivability equipment and for the Net Ready Key Performance Parameter.
- In recent developmental flight testing, improvements in reliability were not observed. The test aircraft did not have the planned improvements to airframe and component reliability expected on the production aircraft.

Recommendations

- Status of Previous Recommendations. The Army has effectively resolved both previous FY05 recommendations regarding CMWS and interoperability issues, and revision of the Test and Evaluation Master Plan to incorporate these plans is ongoing.
- FY06 Recommendations. None.

Counter-Rocket, Artillery, Mortar (C-RAM)

Executive Summary
- The Counter-Rocket, Artillery, Mortar (C-RAM) with Sense and Warn capability deployed to Iraq in February 2005 and the Land-based Phalanx Weapon System deployed to one Forward Operating Base in Iraq in May 2005.
- These actions were taken in response to a June 2004 Joint Urgent Operational Needs Statement from the Multi-National Corps-Iraq.
- Army Test and Evaluation Command conducted effective rapid testing of C-RAM, and the system's deployment is a good model of a Joint Rapid Acquisition Cell action.
- Sense, Warn, and Intercept functions have proven very effective in reducing casualties from enemy indirect fire.
- There are significant technical, resource, organizational, and doctrinal challenges to developing the full range of desired C-RAM capabilities. Current C-RAM employment is based on ad hoc organization and tactics, techniques, and procedures.



System
- C-RAM is a system that integrates Sense, Warn, Intercept, Respond, Shape, and Command and Control functions. It is designed to protect Forward Operating Bases from enemy indirect fire.
- C-RAM's capabilities are modular. The system is intended for incremental deployment to build and then add increasing levels of protection.
- C-RAM integrates multiple Army and joint systems:
  - Army and Marine Counterfire radars
  - Army Airborne Tracking Radar
  - Navy Land-based Phalanx Weapon System
  - Army and joint Battle Command and Control Systems
  - Army and joint acoustic sensors
  - Army and joint infrared and electro-optical sensors
  - Commercial off-the-shelf warning system

Mission
- C-RAM-equipped units are intended to protect Forward Operating Bases from enemy indirect fire.
- C-RAM units provide precise sensing and prediction of indirect fire impact points so that base tenants can seek protective cover.
- C-RAM units are intended to integrate the air and ground common operational picture and give base commanders the option to attack enemy indirect fire in flight without causing collateral damage or aircraft fratricide.
- C-RAM is designed to provide real-time location of indirect fire points of origin, enabling the base commander to determine the best lethal or non-lethal response.

Activity
- In Iraq, Central Command fielded the C-RAM Sense and Warn capability to seven Forward Operating Bases and added C-RAM Intercept capability to one of the Forward Operating Bases. Additional fieldings are planned and funded.
- C-RAM conducted a demonstration in September 2006 at Yuma Proving Grounds, Arizona.

Assessment
- C-RAM is a complex system that was rapidly tested and fielded quickly to support immediate warfighter needs. Sensing and Warning functions have significantly enhanced Forward Operating Base force protection.
- Transitioning C-RAM into the force as a program of record will require a major Service or joint program commitment to overcome technical, resource, organizational, and doctrinal challenges. Such challenges include technology integration, Service ownership and doctrine, and meeting C-RAM manning requirements.
- C-RAM currently uses ad-hoc tactics, techniques, and procedures developed during demonstrations and in-theater.
- C-RAM is neither a joint nor Army program of record.

Recommendations

- Status of Previous Recommendations. No FY05 report was submitted on C-RAM.
- FY06 Recommendations.
  1. The C-RAM program office should continue to test enhancements prior to fielding.
  2. The Army Test and Evaluation Command should continue to provide valuable insights on performance to support the fieldings.

Excalibur XM982 Precision Engagement Projectiles

Executive Summary
- The program continues to operate in accordance with the Excalibur Test and Evaluation Master Plan approved on May 27, 2005.
- Block 1a-1 Sequential Environment Test for Safety, Production Verification Testing, and First Article Testing occurred in 2006.
- A Limited User Test is scheduled for January - March 2007.
- Initial tests indicate accuracy and lethality requirements will be met.
- Excalibur reliability is improving as system developmental tests identify failure modes, which are being fixed by the program before further testing continues. The Army is working to overcome development and production challenges such as reliability, Future Combat System alignment, and integration.

System
- Excalibur is a family of precision-guided, 155 mm artillery projectiles.
- The Army is developing three variants:
  - High explosive, unitary (Block I)
  - Smart (Block II)
  - Discriminating (Block III)
- The Army will develop the high explosive, unitary projectile (Block I) in three spirals of increasing capability (Ia-1, Ia-2, and Ib).
- All variants use Inertial Measurement Unit guidance and Global Positioning System (GPS) technology to achieve enhanced accuracy to impact less than 10 meters from the desired aim point.
- The projectiles are fin-stabilized and will attack point targets to ranges beyond 30 kilometers.

Mission

Artillery units will use Excalibur to provide fire support to combat maneuver units in all weather and terrain, including urban areas.
- The high explosive, unitary projectile (Block I) will be used to attack stationary targets in complex and urban terrain, while minimizing collateral damage.
- The Smart projectile (Block II) will engage moving and time sensitive targets.
- The Discriminating projectile (Block III) will search, detect, and selectively engage individual vehicles by distinguishing specific target characteristics.

Activity
- The contractor completed the Guided Gunfire B developmental test series, firing 17 tactical projectiles against realistic target arrays and a structure target. Guided Gunfire B tests identified several design and production-induced failure modes that the developer addressed.
- The developmental test program also included 15 fully tactical, environmentally-conditioned rounds in a Sequential Environmental Test for Safety. This test series identified vibration-induced faults that require the Block Ia-1 projectile to be transported in containers in tactical support vehicles.
- The program completed Block Ia-1 Ballistic Discard Stability and Warhead Fail Safe tests to ensure projectiles that fail to guide properly do not detonate when they impact.

Assessment
- Excalibur projectiles demonstrated required accuracy, lethality, and the ability to perforate a 4-inch concrete roof under realistic firing conditions.
- The Excalibur program must address further development and production challenges, such as:
  - Continuing coordination with the Future Combat System Non-Line-of-Sight Cannon program to maintain compatibility as the Non-Line-of-Sight Cannon design matures
  - Improving reliability and ramping up production rates
  - Integrating the Enhanced Portable Inductive Artillery Fuze Setter onto U.S. cannon systems

  - Ensuring rounds that do not achieve GPS-aided flight impact in predicted safe areas
  - Production of a reliable Inertial Measurement Unit
  - Enhancing GPS acquisition
  - Integrating base bleed technologies to achieve extended ranges
  - Maturing the manufacturing process; manufacturing problems are partially responsible for low reliability and include failures such as corrupted Inertial Measurement Units, inadequately torqued joints, and faulty sealants
- Environmental tests identified vibration-induced faults that require Block Ia-1 projectiles be transported in containers in tactical support vehicles. This makes Excalibur operational employment less flexible.
- The aggressive Spiral Ia-1 schedule contained little time for failure analysis and implementation of corrective actions. This resulted in delays of the Urgent Materiel Release when failures occurred.
- There is significant risk to achieving required performance during GPS jamming.
- The smart and discriminating projectiles, which are scheduled for Milestone C decisions in FY13, incorporate target discrimination capabilities. Previous efforts to field smart projectiles have been successful against benign targets, but have been less successful against targets that employ active and passive countermeasures.

Recommendations

- Status of Previous Recommendations. The Army is currently adhering to DOT&E's recommendations from last year, but schedule pressures remain to achieve an Urgent Materiel Release for Block Ia-1 as soon as possible. The following FY05 recommendations remain valid:
  FY05 #1: Testing should remain event-driven. Failure to meet specific Army entrance and exit criteria specified in the Test and Evaluation Master Plan prior to progressing to the next stage of testing will add program risk.
  FY05 #2: The Army should incorporate operational realism into the developmental testing whenever possible to reduce program risk. This includes using advanced target location software, soldiers as forward observers, fire direction personnel, and gun crews.
- FY06 Recommendation.
  1. The Army should continue ongoing efforts to capitalize on operational use of other precision-guided weapons (Guided Multiple Launch Rocket System – Unitary) to further develop and refine procedures for targeting, sensor-shooter links, airspace management, and command and control in order to exploit the enhanced accuracy of Excalibur.

Family of Medium Tactical Vehicles (FMTV)

Executive Summary
- The Army conducted Limited User Testing of the Expansible Van and Load Handling System variants of the Family of Medium Tactical Vehicles (FMTV).
- The current production model is the basis for the redesigned cab that will be used for the armored cab version, which will be cut into the production line in 2007 pending results of testing. This new cab will be designed to accept add-on armor and a crew weapon station.

System
- The following three FMTV variant systems were tested during the past fiscal year:
  - The Medium Tactical Vehicle Expansible Van: mounted on the Medium Tactical Vehicle 5-ton chassis to replace existing expansible vans in maintenance and command and control units; expanded volume of 1,450 cubic feet and a payload capacity up to 10,000 pounds
  - Medium Tactical Vehicle - Load Handling System: mounted on the Medium Tactical Vehicle Chassis; intended to replace Dolly systems in medical units; enables the crew to load and off-load 20-foot-long standard shelters/ containers weighing 7.5 to 8.5 tons onto, or off of, trucks and their companion trailers
  - Medium Tactical Vehicle - Load Handling System Trailer: a companion trailer to the Medium Tactical Vehicle - Load Handling System; capable of hauling payloads identical to that of the truck
- The following nine systems are the remaining FMTV variants that have been tested previously:
  - Light Medium Tactical Vehicle Cargo
  - Light Medium Tactical Vehicle Van
  - Medium Tactical Vehicle Cargo
  - Medium Tactical Vehicle Long Wheel Base Cargo
  - Medium Tactical Vehicle Tractor
  - Medium Tactical Vehicle Wrecker
  - Medium Tactical Vehicle Dump Truck
  - Medium Tactical Vehicle Dump Variant
  - Cargo Trailers (Light Medium Tactical Vehicle and Medium Tactical Vehicle)

Mission
The Army employs the FMTV as a multi-purpose transportation and unit mobility vehicle in combat, combat support, and combat service support units. Missions for the units of the FMTV variants tested this year are described below.

- The Army plans to issue the Medium Tactical Vehicle - Load Handling System with its companion Load Handling System Trailer to combat support hospitals. The Load Handling System primarily carries standard shelters associated with the Army Medical Department Deployable Medical System (or Support) and refrigerated shelters of the blood support detachment. The medical units provide support by conducting strategic deployments, relocating units to new operating sites, establishing unit areas of operation, performing combat health support operations, defending assigned areas, and conducting strategic redeployments.
- The Army plans to issue the Expansible Van to medical logistics units, aviation maintenance units, and vehicle maintenance units (direct support and general support). These units will use the van as a mobile office at various echelons in a field environment to support deploying units.

Activity
- A Limited User Test (LUT) on the Expansible Van was conducted at Fort Bragg, North Carolina, from March 27 - April 7, 2006.
- A LUT on the Load Handling System was conducted at Fort Campbell, Kentucky, from April 17 - 28, 2006.

- Test planning continues for the LUT of the 10-ton Dump truck. In addition, test planning continues for the Long Term Armor Strategy as it applies to the FMTV.
- As part of the long-term armor strategy, the current production model is being used as the basis for the redesigned cab that will be used for the armored cab version. Pending results of the testing, it will be cut into the production line in 2007. This new cab will be designed to accept add-on armor and a crew weapon station.

Assessment

- Expansible Van: LUT exposed numerous deficiencies of design that would hamper operational use by soldiers (the Army is acting to correct many of these deficiencies before making a fielding decision). In 20,000 miles of developmental testing, the reliability requirement, 1,800 mean miles between operational mission failures, was exceeded. However, the reliability requirement was not met in 2,043 miles of user testing; the truck demonstrated 186 mean miles between failures. Some failure modes were not seen in developmental testing. Two of those were a direct result of not exercising the function of connecting the Expansible Van to an external generator in developmental testing.
- Load Handling System: The Load Handling System variant with trailer demonstrated that it was operationally effective in supporting the set up of a combat support hospital. Its reliability did not meet the requirement of 2,000 mean miles between operational mission failures in 868 miles of user testing, while it exceeded requirements in 60,000 miles of developmental testing. During the testing, there was a problem with the commercial Caterpillar engines used in all FMTV production. The problem was a result of software in the engine which would automatically slow the vehicle to 5 miles per hour (derate the engine) when it sensed an apparent low fuel pressure condition. This engine derating occurred in both developmental and operational testing when there was adequate fuel in the tank. Caterpillar has since corrected the problem with the software by making the default setting "Off" for this feature.

Recommendations

- Status of Previous Recommendations. There was no FY05 FMTV report.
- FY06 Recommendations. None.

Future Combat Systems (FCS) Overview

Future Combat Systems (FCS) is a networked system-of-systems consisting of 18 individual manned or unmanned systems linked together by an information network. The information network connects FCS via an advanced network architecture that provides joint connectivity and enhances situational awareness, understanding, and synchronized operations. The FCS operates as a system-of-systems and encompasses the FCS program systems as well as other complementary Army and joint systems in order to meet the missions of the Army's FCS Brigade Combat Teams (BCTs).

The Army structured the FCS program to include four different Spin Outs. FCS Spin Outs are a subset of the FCS program focused on providing FCS capabilities to the current force. The Army intends to field a Spin Out 1 capability to Current Force Modular BCTs starting in 2010. Spin Out 1 includes two types of unattended ground sensors, the Non-Line-of-Sight Launch System, the Intelligent Munitions System, and a corresponding information network linking these elements to the BCT. A detailed report on Spin Out 1 is provided following this overview. The Army has not identified the FCS systems for Spin Outs 2-4.

System

The FCS program consists of manned and unmanned platforms that include:

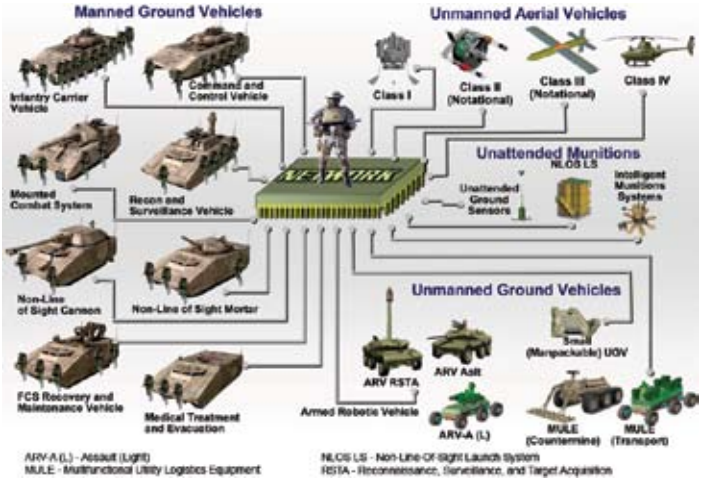
Manned Ground Vehicles (Eight Variants)

- Combat vehicles (Six variants):
  - Command and Control Vehicle
  - Infantry Carrier Vehicle
  - Non-Line-of-Sight Cannon
  - Non-Line-of-Sight Mortar
  - Mounted Combat System
  - Reconnaissance and Surveillance Vehicle
- Maneuver sustainment vehicles (Two variants):
  - Medical Vehicle (Treatment and Evacuation variants)
  - Recovery and Maintenance Vehicle

The Non-Line-of-Sight Cannon (NLOS-C) is the lead vehicle in the development of Manned Ground Vehicles. A detailed report on this system is provided following this overview.

Unmanned Aerial Vehicles (Four variants)

Class	FCS Unit Size	Time on Station	Operational Radius
I	Platoon	50 minutes	8 km
II	Company	2 hours	16 km
III	Battalion	6 hours	40 km
IV	Brigade	24 hours	75 km



The Army intends the FCS Unmanned Aerial Vehicles (UAVs) to be multi-functional and mission tailorable; operable in varying terrain, including urban environments; and teamed with manned aircraft and ground maneuver forces. A detailed report on FCS UAVs is provided following this overview.

Unmanned Ground Vehicles (Three Types)

Type	Functions
Small Unmanned Ground Vehicle (SUGV)	• Reconnaissance of urban and subterranean battlespace
Armed Robotic Vehicle (ARV) (two variants): • ARV-Reconnaissance, Surveillance, and Target Acquisition • ARV-Assault	• Reconnaissance, surveillance, and target acquisition • Line-of-sight and beyond line-of-sight fires
Multi-functional Utility/ Logistics Equipment (MULE) (three variants): • MULE - Transport • MULE - Counter-mine • MULE-ARV - Assault (light)	• Transport of equipment and supplies • Direct fire in support of dismounted infantry • Detection of mines and improvised explosive devices

The Army plans to equip Unmanned Ground Vehicles (UGVs) with the Autonomous Navigation System. This system is intended to provide the capability to operate all UGVs either in a man-in-the-loop mode or in a semi-autonomous mode.

Unattended Munitions (Two Types)

- The Army intends the Non-Line-of-Sight Launch System (NLOS-LS) to provide networked, extended-range

targeting, and precision attack of stationary and moving targets. It consists of a Container Launch Unit (CLU), with self-contained tactical fire control electronics and software for remote and unmanned operations, and the Precision Attack Munition missile. NLOS-LS is intended to be able to fire missiles with the CLU on the ground or mounted on a transport vehicle.
- The Intelligent Munitions System (IMS) is a system of lethal and non-lethal munitions networked with a command and control capability and sensors. IMS is intended to protect soldiers and equipment from ground attacks. The Army plans for IMS to meet the requirements of the 2004 National Landmine Policy.

Unattended Ground Sensors

FCS Unattended Ground Sensors (UGS) are an array of networked sensors capable of target detection, location, and classification. UGS consist of multiple types of sensors to include acoustic, seismic, magnetic, and electro-optical/infrared sensors. UGS is intended to be employed to provide enhanced threat warning and situational awareness.

The FCS UGS program is developing two major sensor subgroups:
- Tactical-UGS (two variants):
  - Intelligence, Surveillance, and Reconnaissance-UGS
  - Chemical, Biological, Radiological, and Nuclear-UGS
- Urban-UGS is an array of small, lightweight sensors emplaced in urban structures.

Battle Command Network

The Battle Command Network is the information network that links together the FCS BCT system-of-systems. The Battle Command Network consists of hardware and software that is intended to deliver video, still images, voice, data, and network control services throughout the FCS BCTs. It is intended to provide an interconnected set of information capabilities for collecting, processing, displaying, disseminating, storing, and managing information on demand with secure and reliable access by soldiers throughout the FCS BCT. This network is intended to include communications payloads on all FCS ground and air platforms and network management software distributed on all platform computers and communications payloads.

Mission

The FCS BCT will perform all tactical operations - offensive, defensive, stability, and support – currently conducted by light infantry, Stryker, and heavy mechanized forces. The Army intends for the FCS BCT to provide a measurable improvement over current brigade combat teams in terms of deployability, maneuverability, survivability, lethality, battle command, sustainability, and joint interoperability.

Activity
- DOT&E approved an updated FCS Test and Evaluation Master Plan (TEMP) in June 2006. This TEMP further refines the FCS test program and addresses both the core program and Spin Out 1. The Army included in the 2006 TEMP additional operational test events to evaluate FCS systems at the individual system level. These evaluations will precede the IOT&E and will enable the IOT&E to focus on the larger system-of-systems issues.
- The Army selected threat munitions for Live Fire testing to verify that the FCS armor ballistic protection will meet operational requirements and contract specifications.
- The FCS program continues to refine the Manned Ground Vehicles (MGV) design concepts. The contractor has conducted some ballistic testing of evolving armor solutions.
- The Army announced its intent to establish an Evaluation Brigade Combat Team (EBCT) at Fort Bliss, Texas. The EBCT will serve as the test unit for all FCS systems. The EBCT is planned to be available to support FCS activities by June 2007.

Assessment
- The establishment of the EBCT will be a positive element of the FCS test program by providing a stable, dedicated brigade-size unit to support FCS throughout the course of its developmental and operational testing.
- The updated TEMP adequately addresses the FCS testing and evaluation program. It provides for a series of operational test events culminating in an IOT&E with a fully equipped FCS BCT. This live brigade-size IOT&E is expected to be adequate to assess the operational effectiveness and suitability of the FCS system-of-systems.
- The updated TEMP also provides for an adequate LFT&E program. There is, however, some risk in the manner in which the Army plans to execute the LFT&E strategy. Live Fire prototype testing will not be complete before Milestone C. Therefore, only a limited system-level vulnerability assessment will be available to support the decision or affect vehicle design prior to low-rate initial production. Additionally, test phases that typically occur in sequential order will be executed concurrently, making it difficult to correct any significant design flaw identified in a test phase before the onset of the next test phase.
- The TEMP is scheduled to be updated again in 2008 to further refine the test and evaluation program as the FCS systems continue to mature.
- The FCS program continues to address the challenges imposed on the manned ground vehicles by the C-130 transportability requirement. Since the publication of the FY05 Annual Report, the Army has clarified the C-130 requirement to mean

"emergency transport" only, rather than a routine operational requirement. The focus now is on a primary requirement of three MGVs being able to deploy on a C-17. However, the C-130 requirement remains a design constraint for MGV weight and volume. The effect of air transportability constraints is most evident with regard to MGV ballistic survivability. As the MGV designs for ballistic protection are, as of this writing, not yet complete, it is not clear whether the MGV will provide a level of protection for onboard mission essential equipment which will meet system requirements. Overall platform survivability will also be heavily dependent upon an effective Active Protection System. While Active Protection System technologies are showing some promise, it is not yet clear whether their performance will make up for lesser levels of MGV armor protection than those found in current force combat vehicles such as the Abrams tank and Bradley fighting vehicle.

- The FCS program has focused efforts aimed at synchronizing Joint Tactical Radio System (JTRS) and Warfighting Information Network -Tactical (WIN-T) systems development schedules with those of FCS. While progress is being made in this area, these non-FCS complementary programs remain a significant risk area for the FCS program. The effectiveness of the FCS battle command network will depend upon satisfactory JTRS and WIN-T performance.

Recommendations

- Status of Previous Recommendations. The updated 2006 TEMP took action on DOT&E's concerns by adding additional operational testing to address individual system performance. Additionally, the Army has focused on synchronizing the development of key non-FCS programs, such as JTRS, with that of FCS. However, the program's air transportability requirements will continue to affect MGV design parameters, particularly as they relate to survivability.
- FY06 Recommendations.
  1. The Army should review all assumptions that underlie current FCS requirements prior to committing to any particular MGV design. This is particularly relevant with regard to vehicle survivability. Recent operational experience should be examined to ensure that optimal design trades are being made to meet competing survivability and transportability requirements. Additionally, current operational experience should be used to re-examine a fundamental hypothesis of the FCS BCT that it will have the capability to "see [the enemy] first." It is not apparent that this hypothesis will be valid at lower tactical levels, particularly in urban terrain or in combat against irregular forces.
  2. The FCS program should ensure that relevant developmental and operational testing is conducted under robust enemy threat conditions. In particular, the Army should focus on the capability of the FBCT to operate when faced with a sophisticated enemy electronic warfare and computer network attack threat.
  3. MGV survivability is highly dependent upon the MGV's Hit Avoidance System, including Active Protection Systems. The FCS program should develop a test program for Hit Avoidance System which will adequately assess the performance of this critical subsystem throughout its development.
  4. The Army should continue its effort to ensure key complementary acquisition programs, such as JTRS and WIN-T, are on track to provide their needed capabilities to the FCS program.

Future Combat Systems (FCS) Spin Out 1 Systems

Executive Summary

There are several technological challenges with Future Combat Systems (FCS) Spin Out 1 systems. These challenges include developing sensors that are able to detect, classify, and track multiple vehicular and personnel targets, communicating over the air to individual communication nodes, and meeting reliability requirements.

System

- Spin Out 1 is a subset of the FCS program.
- Spin Out 1 fielding allows the Army to leverage technology enhancements developed as part of the core FCS program and other developmental program activities to support current forces. The Army plans to field Spin Out 1 systems to Current Force Heavy Brigade Combat Teams (BCT) in FY10 prior to FCS BCT fielding.
- Planned Spin Out 1 capabilities include:
  - Network Capability Integration Kit
    - Integrated Computer System
    - System-of-System Common Operating Environment Standard Edition 1.8 and Battle Command Software Build 1
    - Four Channel Joint Tactical Radio System Ground Mobile Radio
  - Intelligent Munitions System (IMS)
    - IMS is a system of unattended ground sensors linked to lethal and non-lethal anti-vehicle and anti-personnel munitions via integrated and robust command and control systems.
    - The Army plans for the IMS to meet the requirements of the 2004 National Landmine Policy.
    - The IMS-dispensing module will use Handheld Manpack Small Form Factor (HMS SFF) H (two-channel) radio running the Soldier Radio Waveform (SRW).
  - Unattended Ground Sensors (UGS)
    - Tactical UGS include the Intelligence, Surveillance, and Reconnaissance (ISR) and Biological, electro-optical nodes and the Radiological and Nuclear nodes.
    - Tactical UGS will use HMS SFF A (single channel) radios running the SRW.
    - Urban UGS consist of small, lightweight imaging and intrusion detection sensors emplaced in structures such as buildings, caves, and tunnels.
    - Urban UGS will use Zigbee radios for sensor nodes and an HMS SFF A running the SRW for the handheld gateway.
  - Non-Line-of-Sight Launch System (NLOS-LS)
    - The precision attack missile is designed to use uncooled imaging infrared (UCIIR), semi-active laser or grid attack engagements to attack targets (out to 40 kilometers). Without In-Flight Target Updates (IFTUs), the UCIIR range against moving targets reduces.
    - The system includes a Container Launch Unit, which holds 15 missiles and the Computer and Communications System.
    - In Spin Out 1, the battle command for the Non-Line-of-Sight Launch System is the Advanced Field Artillery Tactical Data System or if required, soldiers can manually input a fire mission to the Container Launch Unit. Missiles may be fired from a variety of vehicles or from the ground.
    - The NLOS-LS will use a HMS SFF J radio running SRW.

Mission

- Current Force BCTs will use Spin Out 1 enhancements in all military operations – offensive, defensive, and stability and support.
- FCS network components will be integrated into Current Force BCT vehicles such as Abrams, Bradley, High Mobility Multi-purpose Wheeled Vehicle, and Command and Control Centers such as Warfighter Information Network-Tactical Point of Presence vehicles, and mobile and stationary Tactical Operations Centers.
- The Army intends Spin Out 1 capabilities to enhance BCT situational awareness, force protection, and lethality by using the following systems:
  - Intelligent Munitions System
    - BCT commanders will employ IMS to constrain enemy maneuver, enhance friendly maneuver through economy of force, and protect friendly forces.
    - Units will use IMS to detect, classify, track, and engage targets under man-in-the-loop control or autonomously, as desired by the employing commander.

- Unattended Ground Sensors
  - Units will employ UGS to provide perimeter defense, surveillance, target acquisition, and situational awareness, including ISR, electro-optical, radiological and nuclear warning.
  - Units will deploy UGS to detect and identify objects of interest and automatically populate the common operating picture with intelligence information via Force XXI Battle Command Brigade and Below (FBCB2).
  - Tactical UGS is designed to provide enhanced situational awareness, increased early warning for force protection, and increased surveillance capability to BCT platoons and companies.
  - Urban UGS is designed to provide a leave-behind, network-enabled reporting system to provide situational awareness in urban settings, as well as residual protection for cleared areas in urban environments.
- Non-Line-of-Sight Launch System
  - BCT commanders will use precision attack missiles to attack moving and stationary point targets, such as tanks, armored troop carriers, and non-armored targets out to 40 kilometers. These missiles will use UCIIR, semi-active laser or grid attack, or both to attack targets. Without IFTUs, the UCIIR range against moving targets is reduced.

Activity

Intelligent Munitions System

- The IMS Test and Evaluation Master Plan (TEMP) was approved as Annex I of the FCS TEMP in June 2006. The Army was required to update Annex I in June 2006.
- The program completed a System Requirements Review in August 2006. A System Functional Review is planned for October 2006. A Preliminary Design Review is scheduled for March 2007.

Unattended Ground Sensors

- DOT&E approved the UGS Annex as part of the FCS TEMP in June 2006.
- The program completed Preliminary Design Review I in November 2005. The program completed a second Preliminary Design Review in February 2006 due to issues with system radios.
- The Army delayed the Critical Design Review (CDR) (originally scheduled for September 2006) because of delays in getting government-furnished radios.
- In 2006, the Air Force used Tactical UGS in the Joint Expeditionary Force Exercise. Tactical UGS capabilities demonstrated during this exercise included the ability to detect moving targets and the ability to communicate this information over long and short ranges.

Non-Line-of-Sight Launch System

- The contractor and Army continue to develop the sensor, algorithm, and missile in preparation for the CDR in December 2006. Captive flight tests of the missile's infrared and semi-active laser seeker were conducted in arctic and tropical environments in 2006.
- The Army and contractor continued to develop the user interface for the Container Launch Unit as well as the tactics, techniques, and procedures for employing the system.

Assessment

Intelligent Munitions System

- There are several technology challenges, including: developing sensors that can detect, classify, and track multiple vehicular and personnel targets; meeting reliability requirements; and integrating sensors, command and control, and munitions to achieve effectiveness requirements.
- The IMS program schedule was compressed by a six-month delay in awarding a System Development and Demonstration contract.
- Developmental delays could jeopardize FCS and Landmine Alternative production and deployment schedules.

Unattended Ground Sensors

- Technological challenges include: developing sensors that are able to detect, classify, and track multiple vehicular and personnel targets; communicating over the air to individual communication nodes; meeting reliability requirements; and integrating the command and control suite and individual sensors in order to achieve effectiveness requirements.
- The operational concept for employing both Tactical UGS and Urban UGS is underdeveloped (e.g., how many modules actually make up a system).

Non-Line-of-Sight Launch System

- The program office and the user have identified potential problems with the upcoming test events and have worked to mitigate them. Efforts to develop the soldier interface for the Container Launch Unit should reduce operational testing and fielding problems.
- Flight test technical problems could increase program risks because of the limited time and resources to correct problems and conduct additional testing.

Recommendations

- Status of Previous Recommendations. Recommendations for the Intelligent Munitions System remain valid:
  FY05 #1: The Army must complete and execute a reliability growth plan.
  FY05 #2: The Army should continue to develop and implement a risk mitigation plan in case the Joint Tactical Radio System is not available in time for system integration.

- FY06 Recommendations.

Unattended Ground Sensors

1. The Army should assess UGS suitability during Spin Out 1 operational testing because there are no plans to upgrade UGS between the Spin Out 1 and Spin Out 2 assessments.

Non-Line-of-Sight Launch System

1. The Army should conduct adequate countermeasure testing early in the NLOS-LS flight test program, as countermeasures have proven to be problematic for some systems.

Future Combat Systems (FCS) Manned Ground Vehicles: Non-Line-of-Sight Cannon (NLOS-C)

Executive Summary

- Between June 2005 and February 2006, the Non-Line-of-Sight Cannon (NLOS-C) Demonstrator tested a 38-caliber cannon tube similar to that expected in the final design. Adopting a 38-caliber cannon tube results in NLOS-C having approximately the same range with most munitions as the current M109A6 howitzer.
- The NLOS-C Demonstrator also revealed that a lightweight platform can provide enough stability to mount and fire a 155 mm cannon.
- By the time the NLOS-C Demonstrator ended testing in February, it had fired 2,057 rounds and achieved a sustained rate of fire of six rounds per minute. The current Paladin howitzer has a maximum rate of fire of four rounds per minute for three minutes and a sustained rate of fire of one round per minute thereafter.
- Achieving a weight that supports deployment of three NLOS-C howitzers on a C-17 will be difficult without affecting operational effectiveness, survivability, or suitability.
- It may be a significant challenge for NLOS-C, with an automated ammunition handling system, to meet its reliability requirements.

System

- NLOS-C is a tracked, self-propelled, hybrid-electric drive 155 mm howitzer with a two-man crew.
- It is the lead vehicle for the manned ground systems in the Future Combat Systems (FCS).
- The Army will:
  - Procure six to eight prototypes in 2008 for testing
  - Procure 18 Block 0 systems in FY10-12 for limited fielding and experimentation
- The cannon will fire 6 rounds per minute to ranges of 30+ kilometers.
- NLOS-C units are expected to achieve improved accuracy, even with unguided projectiles. For example, when attacking a target at 20 km, 50 percent of unguided rounds must land within 110 meters of the aim point.
- NLOS-C equipped units are expected to respond to fire mission requests within 20 seconds when stationary and within 30 seconds when moving.

Mission

- NLOS-C units are designed to provide cannon fires in support of FCS Brigade Combat Teams and other mechanized brigade combat teams.
- NLOS-C is intended to fire the entire suite of Army 155 mm munitions, including Excalibur precision munitions, to attack point targets.
- NLOS-C is a member of the FCS family of Manned Ground Vehicle (MGV) systems. Three MGV systems are designed to be deployable on one C-17 aircraft (before installing extra protective armor) to support early deploying forces with cannon fires.

Activity

- In May 2006, OSD approved an update to the FCS Test and Evaluation Master Plan (TEMP). The TEMP did not address NLOS-C Block 0 production. The Army was directed to add the NLOS-C Block 0 information within 180 days.
- The Army intends to deploy three FCS vehicles on a single C-17 aircraft. In 2006, the Army approved a 27.4-ton weight allowance for all FCS MGVs.
- Between June 2005 and February 2006, the NLOS-C Demonstrator tested a 38-caliber cannon tube similar to that expected in the final design. When testing ended in February, NLOS-C had fired 2,057 rounds and achieved a sustained rate of fire of 6 rounds per minute.
- With Design Review 3 (July - September 2006), the Army matured the design and completed a series of design

reviews for NLOS-C Increment 0. Increment 0 will use the best technical approach design for testing the chassis and armament, but will have limited or surrogate communications, survivability, crew station, and energy subsystems.
- Yuma Proving Grounds, Arizona, completed upgrades to the NLOS-C test sites that received the NLOS-C Firing Platform in October 2006. The Firing Platform will have a mission module that is nearly identical to the Increment 1 design, but mounted on a surrogate chassis with no automotive equipment and electronics located in an adjacent structure rather than on the platform. The Army will use the Firing Platform for risk reduction in cannon and mount development, safety certification, and reliability growth of the mission module.
- Mission Equipment Integration Test Stands began operation in May 2006 to support subsystem checkout and control algorithm development for the Firing Platform and Increment 0 mission equipment.

Assessment
- NLOS-C is one member of the FCS family of MGV systems. Achieving a weight that supports deployment of three MGV systems on one C-17 may be difficult without affecting operational effectiveness, survivability, or suitability.
- Adopting a zone 4 cannon chamber with a 38-caliber cannon tube reduces the range of most munitions by 3-5 kilometers when compared to the zone 5 cannon chamber with a 39-caliber tube previously tested. As a result, NLOS-C will have approximately the same range with most munitions as the current M109A6 howitzer.
- It will be a challenge for a two-man crew to conduct continuous 24-hour operations while performing operational missions, maintenance, resupply, and security associated with combat operations.
- The reliability requirement of 512 hours mean time between system aborts is more than an eight-fold increase over the reliability requirement for the Crusader system that was cancelled in 2002. Likewise, it is over 8 times the 62-hour requirement that the current Paladin howitzer was required to achieve at its operational testing in 1992. It will be a significant challenge for NLOS-C, with an automated ammunition handling system, to meet its 512-hour requirement.
- The Army has not yet developed an adequate test and evaluation strategy to support fielding of NLOS-C Block 0 production howitzers.
- Assessing the effectiveness of NLOS-C, within the FCS system-of-systems, will require an adequate real-time casualty assessment system that can accurately determine the impact of indirect fires on combat operations.

Recommendations
- Status of Previous Recommendations. The Army should address the FY05 recommendations, which remain valid for FY06.
  FY05 #1. The Army should ensure that FCS operational test plans include adequate NLOS-C firing exercises. Supported maneuver units will need opportunities to demonstrate that they can plan and coordinate fires, and the NLOS-C units will need to demonstrate they can sustain operations while delivering accurate and timely fires.
  FY05 #2. The Army should develop a real-time casualty assessment system for indirect fires that can accurately assess the effectiveness of NLOS-C fires in system-of-system exercises.
  FY05 #3. The Army should develop a test and evaluation strategy to support the fielding of NLOS-C Block 0 production howitzers, scheduled to begin in FY10.
- FY06 Recommendations. None.

Future Combat System (FCS) Unmanned Aerial Vehicles (UAVs):

Class I - Platoon; Class II - Company; Class III - Battalion; Class IV - Brigade

Executive Summary

- The Future Combat System (FCS) Unmanned Aerial Vehicles (UAVs) are designed to provide enhanced situational awareness to the FCS Brigade Combat Team and its subordinate organizations through a robust, organic suite of systems.
- The Army began System Requirements Review for all four classes of FCS UAVs in 2005 and completed the functional review for Class I and Class IV in February 2006. All four classes of UAVs are part of the core FCS program.
- Test and evaluation activity during FY06 involved Class I and Class IV FCS UAVs. The Army postponed the selection of FCS Class II and III UAVs in order to conduct a UAV study, based on the requirements of each echelon commander, to determine whether the Army needs four classes of UAVs or if the proposed fleets could be combined.

System

- The FCS UAV program consists of four classes of unmanned aerial systems, one each for platoons, companies, battalions, and brigades.
- The Army intends FCS UAVs to be:
  - Multifunctional and tailorable
  - Operable in varying terrain, including urban environments
  - Teamed with manned aircraft and ground maneuver forces

FCS Unmanned Aerial Vehicles

Class	FCS Unit Size	Air Vehicle Weight (lbs)	Time on Station	Operational Radius
I	Platoon	10 to 15	50 minutes	8 km
II	Company	112	2 hours	16 km
III	Battalion	300 to 500	6 hours	40 km
IV	Brigade	3,200	24 hours	75 km

Mission

- Units will use FCS UAVs to conduct reconnaissance, surveillance, target acquisition, and communication relay missions.
- Platoons will use Class I FCS UAVs to collect reconnaissance, surveillance, and target acquisition information for increased situational awareness.
- Companies will use Class II FCS UAVs for reconnaissance, security, early warning, and beyond line-of-sight targeting in support of the ground tactical plan.
- Battalions will use Class III FCS UAVs to conduct beyond line-of-sight and non-line-of-sight targeting, mine detection, and chemical, biological, and radiological monitoring.
- Brigade Combat Teams will use Class IV FCS UAVs to conduct wide aerial surveillance and communications relay.

Activity

- The Army awarded Honeywell a contract to enter System Design and Development of the Micro Air Vehicle (MAV) for the Class I UAV.
- The MAV was originally a Defense Advanced Research Projects Agency (DARPA) Advanced Concept Technology Demonstration (ACTD). In support of the ACTD, DARPA conducted an operational experiment with a platoon from the 3rd Brigade, 25th Infantry Division in August 2005.
- The Army completed the System Functional Review for Class I and Class IV in February 2006.
- The Army and Navy signed a memorandum of agreement to perform combined risk reduction Electromagnetic Environmental Effects testing for the Class IV and Navy Firescout UAVs. The Army is also using information gained from the Navy's component level testing of the rotor hub and landing gear.

- The Army delayed the Class IV UAV program due to lack of funding.
- The Army postponed the selection of vendors for two FCS UAVs (Class II and Class III) until at least the end of FY06 to conduct a UAV study, based on the requirements of each echelon commander, to determine whether the Service needs four classes of UAVs or if the proposed fleets could be combined.

Assessment

- Class I should be able to leverage the ACTD of the MAV operational experiments to develop platoon level tactics, techniques, and procedures.
- MAV will require significant design and development to meet the FCS ORD requirements. Integration of a heavy fuel engine, system weight and size, air vehicle endurance, service ceiling, and acoustic signature are all areas of technological risk.
- Overall operational test strategy and details for FCS UAVs are being developed in the current FCS Test and Evaluation Master Plan.

Recommendations

- Status of Previous Recommendations. No FY05 report was submitted.
- FY06 Recommendations. The Army should:
  1. Continue to leverage the Navy's developmental test activities with Firescout to avoid duplication of efforts for the FCS Class IV UAV.
  2. Include detailed measures and criteria for UAV platform testing in the revision of the FCS TEMP.

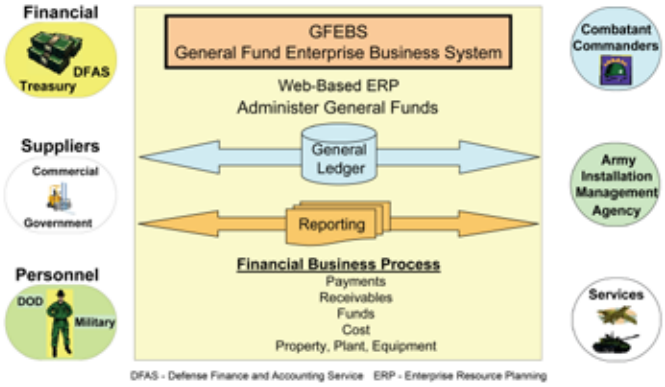
General Fund Enterprise Business System (GFEBS)

Executive Summary

- The General Fund Enterprise Business System (GFEBS) program management office (PMO) developed Release 1.1 for technology demonstration only, and it will not be deployed for operational use.
- The Army Test and Evaluation Command (ATEC) completed an operational assessment of Release 1.1 in 3QFY06.
- Test results showed that 10 of the 17 exit criteria met established requirements, 5 did not meet requirements, and 2 could not be fully assessed. Based on the test results, ATEC completed a risk assessment and recommended risk mitigation approaches.
- The PMO has begun to take actions to mitigate the risks revealed during the operational assessment to improve the likelihood that Release 1.2 and future releases will be operationally effective and suitable.

System

- GFEBS is a Major Automated Information System for administering and managing the U.S. Army's general funds.
- GFEBS will provide web-based real-time transaction and information accessible by all Army organizations worldwide, including the Army National Guard and the Army Reserve.
- GFEBS is required for the Army to meet the requirements of the Federal Financial Management Improvement Act of 1996 and the Defense Finance and Accounting Service Guide to Federal Requirements for Financial Management Systems (the Blue book).
- GFEBS will be developed in four software releases:
  - Release 1.1, which provides Real Property Inventory functionality, was developed for a technology demonstration only and will not be fielded.
  - Release 1.2, the first fieldable release, is being developed for a limited deployment at Fort Jackson, South Carolina, to replace the legacy Standard Finance System (STANFINS).



  - Release 1.3 will provide full STANFINS capability, including the Army National Guard and Army Reserve requirements.
  - Release 1.4 will provide the full capability of the legacy Standard Operations and Maintenance Army Research and Development System.

Mission

- Army financial managers will use GFEBS to compile and share accurate, up-to-the-minute financial management data across the Army.
- GFEBS will provide the Army and DoD leadership with vital, standardized, real-time financial data and information to make sound strategic business decisions that have a direct and positive impact on the warfighter.
- GFEBS provides the Army with the capabilities to satisfy Congressional and DoD requirements for auditing of funds, standardization of financial ledgers, timely reporting, and reduction in costly rework.

Activity

ATEC completed an operational assessment of Release 1.1 in 3QFY06 in accordance with the DOT&E-approved Test and Evaluation Strategy and System Assessment Plan.

Assessment

- The primary objectives of the operational assessment are to assess potential for operational effectiveness and suitability and to identify risks for mitigation.
- Test results showed that 10 of the 17 exit criteria met established requirements, 5 did not meet requirements, and 2 could not be fully assessed. Based on the test results, ATEC completed a risk assessment and recommended risk mitigation approaches.
- The five failed exit criteria include interoperability, availability, response time, training, and software problems.
- Two of the exit criteria, net-centric operations and Internet Protocol Version 6 applications, could not be fully assessed as the required capabilities to support these two areas were not fully developed.
- The GFEBS PMO developed Release 1.1 for technology demonstration only. It will not be deployed for operational use. However, the lessons learned from the operational

assessment provided valuable information for program risk mitigation.

Recommendations

- Status of Previous Recommendations. No FY05 report was submitted for GFEBS.
- FY06 Recommendations. The GFEBS PMO has begun to take actions to mitigate the risks revealed during the operational assessment of Release 1.1 to improve the likelihood that Release 1.2 and future releases will be operationally effective and suitable. The PMO should continue to take action to mitigate risks, and should:
  1. Implement all required external system interfaces for future releases to improve interoperability.
  2. Negotiate and establish Service-level agreements with the Army Knowledge Online portal service for adequate and reliable user access to improve availability and response time.
  3. Institute role-based training and improve the training program as a whole.
  4. Install the current version of the Enterprise Resource Planning software that GFEBS is based on, which will help reduce software problems.
  5. Demonstrate net-centric operations and Internet Protocol Version 6 applications during IOT&E.

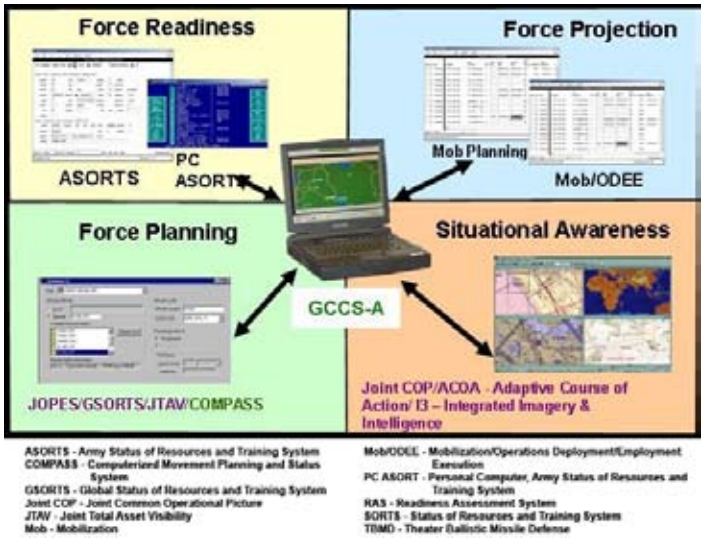
Global Command and Control System – Army (GCCS-A)

Executive Summary

- The Army Test and Evaluation Command (ATEC) observed developmental and low level operational testing of the Global Command and Control System – Army (GCCS-A) in March 2006 at the Consolidated Test Support Facility at Fort Hood, Texas.
- ATEC collected data and reported on an operational test conducted at Headquarters United States Army Europe (USAREUR), Heidelberg, Germany, from May 1 - 18, 2006. This test primarily focused on functionality and connectivity within the architecture.
- The Joint Interoperability Test Command assessed interoperability between GCCS-A and Joint Operational Planning and Execution System (JOPES) during JOPES 4.0.2/3 operational testing from July 27 - August 4, 2006.
- Operational testing was mostly adequate and showed GCCS-A to be effective (with limitations) and suitable (with limitations). Information assurance testing at Fort Hood, Texas, was successful, but there is no nuclear, biological, and chemical contamination survivability strategy other than replacement. Some aspects of survivability and four functional aspects of the system still remain to be tested. Users were able to accomplish their mission.

System

- GCCS-A is the Army implementation of the U.S. Global Command and Control System.
- The GCCS-A system consists of software and computer hardware (commercial off-the-shelf and government off-the-shelf).
- The GCCS-A core system consists of situational awareness, force readiness, force projection, and force planning functionalities.
- Additional subsystems, core upgrades, and new functions can be fielded in future releases allowing GCCS-A to evolve as warfighter requirements change.



- GCCS-A is built in compliance with the Defense Information Infrastructure Common Operating Environment to ensure interoperability with joint and other Army command, control, communications, computers, and intelligence (C4I) systems.

Mission

- Army Commanders utilize GCCS-A to exercise command and control over forces in support of joint and Army operations. Army commanders deploy GCCS-A at fixed command centers and at deployable tactical command centers.
- It provides Army commanders at all echelons of command with a single, integrated, scalable command, control, communications, computers, and intelligence system.
- It processes, correlates, and displays geographic track information on friendly, hostile, and neutral land, sea, and air forces, integrated with available intelligence and environmental information in support of the Army commander.

Activity

- ATEC observed developmental and operational testing of the GCCS-A in March 2006 at the Consolidated Test Support Facility at Fort Hood, Texas. Users from the 18th Airborne Corps performed detailed testing of the Command and Control Personal Computer (C2PC) application, which is used to display the Common Operational Picture (COP) on a desktop client machine. System administrators also carefully assessed installation documentation while loading and configuring the system.
- ATEC collected data and reported on an operational test conducted by USAREUR at Headquarters USAREUR and a subordinate command from May 1 - 18, 2006. Installation procedures, the COP, and the Movement and Planning

Execution Tool applications were assessed during the operational test.
- The Joint Interoperability Test Command assessed interoperability between GCCS-A and JOPES during JOPES 4.0.2/3 operational testing from July 27 - August 4, 2006.

Assessment
- Operational testing at the Consolidated Test Support Facility determined GCCS-A had some problems with new COP symbols used for various aspects of low intensity conflict. Most of these symbols were displayed correctly. Army users stated the remaining problems were not of sufficient magnitude to prevent successful fielding. Information assurance testing at Fort Hood, Texas, was successful. Deployable laptops meet High Altitude Electromagnetic Pulse requirements, but there is no nuclear, biological, and chemical contamination survivability strategy other than replacement with spares.
- Operational testing at USAREUR found GCCS-A effective (with limitations) and suitable (with limitations). Survivability was not assessed at USAREUR. Limitations pertained to the C2PC client inability to display complicated collections of maps and some COP symbol problems. The C2PC application did not properly handle correlations between electronic signals intelligence data and the units with the equipment producing the signals. Users can use GCCS-J workstations if concerned with GCCS-A COP limitations. The System Planning, Engineering, and Evaluation Device (SPEED), Effects Management Tool, All Source Analysis System COP overlays, and the Army Battle Command System Publish and Subscribe Server functional applications need additional testing in an operational environment which uses these capabilities. There were no critical failures in any of the key performance parameters. By using a combination of GCCS-A and GCCS-J workstations, users were able to accomplish their mission.
- GCCS-A performed very well during JOPES interoperability testing in July/August 2006, with no significant problems.

Recommendations
- Status of Previous Recommendations. There was no FY05 report submitted on the GCCS-A.
- FY06 Recommendation.
  1. GCCS-A program should make necessary corrections and perform operational testing of functional applications not assessed during FY06 test events.

Guided Multiple Launch Rocket System (GMLRS) - Unitary and DPICM

Executive Summary

- The Guided Multiple Launch Rocket System (GMLRS) with Dual-purpose Improved Conventional Munitions (DPICM) began full-rate production in June 2005.
- GMLRS Unitary was fielded to Iraq and Afghanistan based on a 2005 Urgent Needs Statement (UNS) from Central Command.
- GMLRS Unitary has been effective in-theater against point targets. In July 2006, the Army approved the additional procurement of an additional 996 rockets.
- Ongoing efforts include:
  - Developing a DPICM self-destruct fuze that meets Joint Requirements Oversight Council dud rates
  - Developing kinetic energy rods as a potential replacement for DPICM
  - Developing a common insensitive munition compliant rocket motor

System

- There are two variants of GMLRS munitions: a Unitary warhead rocket and a DPICM rocket, the M30. Both variants have ranges over 60 kilometers and use inertial guidance and the Global Positioning System (GPS) to enhance accuracy.
- The M30 rocket carries a payload of 404 DPICM submunitions. The Unitary version has a single 196-pound high explosive warhead.
- The procurement objective for GMLRS was reduced in FY06 from 140,004 Unitary and DPICM rockets to 43,560 total rockets. The ratio between Unitary and DPICM rockets is expected to be 80 percent Unitary and 20 percent DPICM.
- Both systems have common guidance and control, canards, rocket motor, and tail fins. They also have common maintenance and support systems.
- Two multiple-launch rocket system launchers, the M270A1 and High Mobility Artillery Rocket System (HIMARS), are capable of firing GMLRS rockets.
- GMLRS Unitary will have three fuze settings to attack different target types at extended ranges:
  - Proximity fuze for use against personnel in the open
  - Delay fuze for lightly fortified bunkers and structures
  - Point detonating fuze for single, lightly armored targets
- Both GMLRS rockets provide a day and night engagement capability in virtually any terrain or weather condition.

Mission

- Commanders will use GMLRS-DPICM rockets to attack lightly armored, stationary targets such as personnel, artillery, air defense, and communications sites.
- Commanders will use GMLRS Unitary rockets to attack targets requiring precise, individual aim points and reduced collateral damage.

Activity

- The Army fired 16 Unitary rockets in 12 missions as part of the Phase 2 contractor testing. There was one flight test failure due to the rocket using false data from a GPS satellite undergoing maintenance. The program office changed the rocket guidance software to prevent this in the future.
- The Army started its production qualification tests of the objective Unitary rocket in August and plans to complete testing prior to the March 2007 Milestone C low-rate production decision review.
- First Quarter Fiscal Year 2007 testing for a self-destruct fuze for the DPICM rocket will aim at meeting the Joint Requirement Oversight Council-required dud rates. The project office is also investigating the use of kinetic rods to

replace bomblets, eliminate the occurrence of unexploded ordinance, and improve insensitive munition compliance.
- During development of insensitive munition compliant rockets, two rocket motor cases failed proof testing as part of quality control testing. Based on additional testing, the contractor will change some production processes.
- Through September 30, 2006, U.S. forces fired 122 GMLRS Unitary rockets in Iraq. The rockets achieved a high reliability rate and desired effects while minimizing collateral damage. In July 2006, the Army approved an additional 996 rockets to support current operations in Central Command Area of Operations.
- The Army is working to develop an updated Test and Evaluation Master Plan for GMLRS Unitary.

Assessment
- The May 2005 DOT&E Beyond Low-Rate Initial Production Report found GMLRS-DPICM to be operationally effective and suitable. While the DPICM rocket has a significantly lower dud rate than legacy systems, it still does not meet the DoD standard of less than 1 percent submunition dud rate. It also does not meet the standard for dud rates, as amended by the Joint Requirements Oversight Council for this munition, of less than 4 percent at ranges less than 20 km. It does meet the Joint Requirement Oversight Council-amended standards for dud rates at ranges beyond 20 km.
- Testing of the rocket continues to show the system is highly accurate and lethal if it is aimed close to the intended target.
- Initial insensitive munition testing shows the rocket motor does not meet all levels of insensitive munition requirements. The motor will be better than existing MLRS rocket motors.
- Both DPICM and Unitary rockets are:
  - Dependent on accurate long-range sensors and targeting systems
  - Dependent on enabling command and control and airspace management architecture in an increasingly complex operational environment

Recommendations
- Status of Previous Recommendations. This report combines the FY05 DPICM and Unitary reports. The Army addressed all FY05 DOT&E recommendations for both rockets.
- FY06 Recommendation.
  1. The Army should capitalize on operational use to further develop and refine procedures for targeting, sensor-shooter links, airspace management, and command and control in order to exploit the accuracy and range of GMLRS munitions.

High Mobility Artillery Rocket System (HIMARS)

Executive Summary

- The High Mobility Artillery Rocket System (HIMARS) is operationally effective and suitable. HIMARS entered full-rate production in June 2005.
- The Army fielded the second HIMARS battalion in the Tennessee Army National Guard in 2006.
- HIMARS can avoid enemy counterfire. The current configuration does not provide ballistic crew protection and is vulnerable if engaged by enemy fire; however, deployed systems are retrofit/equipped with armored cabs.
- Several HIMARS modification efforts are funded and ongoing, including: Family of Medium Tactical Vehicles (FMTV) fleet enhancements, undercarriage fire protection, a removable machine gun mount, modified software and fire control systems, enhanced command and control of sensor to shooter missions, Global Positioning System (GPS) enhancements, and upgraded armor to provide increased crew protection.

System

- HIMARS, the newest artillery system in the Multiple Launch Rocket System (MLRS) family, entered full-rate production in June 2005.
- It fires all MLRS rockets, to ranges over 60 kilometers (km), and Army Tactical Missile System (ATACMS) missiles, to 300 km.
- Each HIMARS system includes a wheeled launcher, two resupply vehicles, and two resupply trailers.
- Each launcher carries six rockets or one ATACMS missile.
- The Army plans to buy 450 launchers to field 21 HIMARS battalions. The Marine Corps plans to buy 40 launchers to field two battalions.

Mission

- Commanders will use HIMARS to attack enemy command and control nodes, artillery, air defense sites, light armor, and other high-value targets at long-range and in urban and open terrain.
- Commanders can use the HIMARS deployment and mobility capabilities (transportable in C-130 aircraft) to:
  - Provide early deploying forces with long-range rocket and missile fires against area and point targets
  - Provide special operations forces with the ability to attack high-value targets at long range

Activity

- The Army fielded the second HIMARS battalion, 1-181 Field Artillery of the Tennessee Army National Guard.
- As an interim armor solution, the program executed an Urgent Materiel Release of the HIMARS Low Signature Armored Cabs (LSAC-H) for Army and Marine Corps launchers scheduled for operations in Iraq.
- The program continues to assess HIMARS field reliability. An October 2005 certification exercise found HIMARS reliability to be 250 hours mean time between system abort. A July 2006 update showed field reliability between 259 and 296 hours. This exceeds the HIMARS reliability requirement of 58 hours mean time between system abort. The program is working to correct travel lock actuator and cable assembly radio connector problems.
- The program continues with ongoing modifications, including: FMTV fleet enhancements (limp home, remote start, battery disconnect), and undercarriage fire protection.
- System upgrade development and verification testing activities include:
  - Removable machine gun mount for the armored cab
  - HIMARS Fire Control System software upgrade to operate Black GPS cryptographic keying materiel with initial production planned for FY07
  - GPS Advanced Masking Ring to block low elevation GPS jammers
  - HIMARS Fire Control System upgrade to mitigate obsolescence; flight tests are scheduled for January 2007, with production starting in FY07

- The program initiated development of upgrades for:
  - Enhanced Command and Control to execute fire missions received directly from various sensor platforms
  - Armored cab to provide all launchers with increased protection to the crew from small arms, fragments, and blast; production is scheduled to begin in FY08, with fielding to begin in FY09
- Conducted LSAC-H Cab Live Fire testing against small arms, rocket-propelled grenades, mines, and improvised explosive devices.

Assessment

- The IOT&E of the HIMARS system was adequate to support an evaluation of the system's operational effectiveness, operational suitability, and survivability.
- HIMARS is operationally effective and suitable. It does have some cross-country limitations when compared to tracked MLRS launchers.
- The HIMARS configuration tested in the IOT&E exposed pneumatic rubber hoses under its chassis that were vulnerable to flame and high heat created when rocket exhaust generated grass fires in dry conditions at the firing points. The production line added a fire retardant wrap to protect exposed hoses.
- HIMARS can fire its munitions and depart the firing location fast enough to avoid enemy counterfire. If the enemy can target and engage HIMARS, the current configuration is vulnerable to artillery and mortar fragmentation, improvised explosive devices, rocket-propelled grenades, and small arms fire. The LSAC-H mitigates this risk as an interim solution. The objective configuration is the Improved Crew Protection Cab that is under development.
- HIMARS achieved satisfactory results during tests involving electromagnetic radiation threats, near strike lightning, and direct strike lightning.
- Current MLRS munitions are not compliant with DoD insensitive munition requirements against ballistic threats and may explode if exposed to enemy fire such as improvised explosive devices, rocket-propelled grenades, small arms fire, or mortar/artillery fragments.

Recommendations

- Status of Previous Recommendations. The Army has begun to address DOT&E's FY05 recommendations and should continue efforts in the following areas:
  FY05 #2: Assess the ability of the crew and maintenance personnel to repair the system after battle damage. The Army intends to do this during LFT&E of the armored cab.
  FY05 #3: Continue efforts to mitigate the safety risks posed by MLRS munitions' non-compliance with insensitive munitions standards. Ongoing efforts include reviewing and adjusting tactics, techniques, and procedures for: tactical operations, commercial and military transportation, resupply, storage, dispersion, and security.
- FY06 Recommendations. The Army should:
  1. Capitalize on current HIMARS operational uses to develop and refine tactics, techniques, and procedures for employment, targeting, sensor-shooter links, airspace management, and command and control.
  2. Continue to improve and test the Increased Crew Protection Cab.

Joint Network Node (JNN)

Executive Summary
- Joint Network Node (JNN) does not comply with the "fly-before-buy" provisions of Title 10 United States Code and is not yet a program of record.
- The Army fielded JNN to eight of ten active Army Divisions and is procuring Lots 8 and 9 in advance of an acquisition decision by the Defense Acquisition Executive, without appropriate reports to Congress.
- The Army conducted an IOT&E in May and June 2006.
- DOT&E approved the IOT&E test plan to support a procurement decision for Lot 8, but the plan was not adequate to support a full-rate production decision for all lots of JNN.

System
- JNN is a commercially-based Ku-band satellite communications system supporting Army tactical forces, as well as joint and coalition forces, for exchange of voice, data, and video from theater to battalion levels.
- At division level and below, JNN architecture is designed to provide voice, data, and video exchanges. This capability is to be operational in 30 minutes or less. JNN is a suite of communications equipment housed in transportable shelters, associated transit cases, satellite vans, and generator trailers.
- The JNN system consists of the following five major components: Unit Hub Node, Baseband shelter, Time Division Multiple Access (TDMA) shelter, Frequency Division Multiple Access (FDMA) shelter, and JNN Communications shelter.
- The Unit Hub Node provides end-to-end satellite link network connectivity and gives JNN access into a standardized tactical entry point or Teleport facility, allowing use of the Defense Information Switch Network (DISN) services.

- JNN replaces capability provided by the Mobile Subscriber Equipment and is currently deployed with forces in Iraq.

Mission
- Unit commanders will use JNN to provide high-speed voice, data, and video information services and exchanges to the warfighting force from theater to battalion levels.
- The Army intends for JNN to provide communications at the "quick halt," or 30 minutes of set-up time on the battlefield.

Activity
- The Army Test and Evaluation Command (ATEC) conducted a two-phased JNN IOT&E in May and June 2006. These events were limited in that they were added to a combat division's pre-deployment training efforts.
- In phase one, ATEC tested the TDMA functionality of the JNN network (division to brigade) at the National Training Center at Fort Irwin, California. The second phase was conducted in conjunction with a division level Mission Readiness Exercise at Fort Hood, Texas, and tested the FDMA functionality of the network (corps to brigade).

Assessment
- During the IOT&E, JNN missions were performed in a stability and support operations environment – a stationary event. The test event identified a significant issue in that JNN may not meet the bandwidth needs of the Army without architectural changes or augmentation with other satellite systems, the High Capacity Line-of-Sight system, and a fiber backbone.
- JNN requires additional operational testing to evaluate full-spectrum operations in a major theater of war, the complete division-level network, network operations procedures, and theater-level operations.
- JNN operations and logistics support is dependent on contractor support. Continuing reliance on contractor-provided support has a negative effect on operator training and troubleshooting skills.

- Significant difficulties were encountered in collecting and reducing the data during the test. The difficulties indicate that development of measures, instrumentation, and data reduction techniques are needed to test large, high-speed data networks where the network nodes, as well as subscribers, are on the move.
- DOT&E approved the IOT&E test plan to support a procurement decision for Lot 8, but the plan was not adequate to support a full-rate production decision for all lots of JNN.
- JNN has an approved joint capabilities document, but does not have an approved acquisition strategy or an approved Test and Evaluation Master Plan. The Army awarded sole source procurements for JNN Lots 8 and 9 prior to establishing a program of record.
- JNN does not comply with the "fly-before-buy" provisions of Title 10 United States Code.

Recommendations

- Status of Previous Recommendations. No FY05 report was submitted on JNN.
- FY06 Recommendations. The Army should:
  1. Develop an acquisition strategy, concept of operations, and test strategy for the transition from JNN to Warfighter Information Network-Tactical.
  2. Establish JNN as a formal Program of Record with appropriate documentation.
  3. Conduct adequate operational testing for future lots of JNN.

Land Warrior

Executive Summary
- Land Warrior may enhance small unit tactical maneuvers and assist in shaping and controlling the tactical battlespace of Stryker Infantry companies and platoons.
- The Land Warrior Ensemble demonstrated reliability growth when supported by contract logistics personnel. This assessment is based on demonstrated performance in developmental testing, the Limited User Test (LUT), and a Force Development Test.
- The Land Warrior program completed a Force Development Test in FY06, will finish a LUT in early FY07, and will conduct a Milestone C decision later in FY07.

System
- Land Warrior is an integrated combat fighting system used by dismounted combat Soldiers on the digitized battlefield. It includes a laser rangefinder, visual displays, integrated load carrying equipment with ballistic protection, protective clothing, a helmet, a speaker, a microphone, a computer, navigation tools, a radio, mission data support products, and a Stryker vehicle installation kit.
- The system is modular to permit tailoring for mission requirements and will interface with the M4 Carbine, M203 40 mm Grenade Launcher, and M249 Squad Automatic Weapon.
- The current Army plan is to field Land Warrior from Stryker Infantry company to fire team level.

Mission
- Dismounted infantry units will use Land Warrior to close with the enemy by means of fire and maneuver to defeat or capture him, or to repel his assault by fire, close combat, and counter-attack.
- Land Warrior does this by:
  - Enhancing small unit leaders' situational awareness through Blue Force Tracking
  - Providing voice communications between companies, platoons, and squads
  - Enhancing collaborative mission planning

Activity
- The Army integrated the Dismounted Battle Command System (DBCS) capability into the Land Warrior system.
- The Army conducted a Force Development Test with the 4th Stryker Brigade Combat Team at Fort Lewis, Washington, in FY06.
- OSD approved and updated the Test and Evaluation Master Plan (TEMP) to support operational testing scheduled for FY06 and FY07.
- The Land Warrior LUT was conducted from September 5 - November 10, 2006. During the LUT, a Stryker Infantry company conducted squad, platoon, and company missions.

Assessment
- During a communications exercise, voice and text messaging were successfully transmitted over 350 Land Warrior systems and 55 Stryker vehicles. The effective communications range of the Land Warrior radio is limited to 500-700 meters in close or heavily vegetated terrain.
- The LUT plan was adequate to provide the necessary information to support a low-rate initial production decision.
- Based on observed performance during the LUT, Land Warrior may enhance small unit tactical maneuvers and assist in shaping and controlling the tactical battlespace of Stryker Infantry companies and platoons.
- During the LUT, Stryker Infantry squads were at 60 percent strength (five out of nine infantrymen). The current plan is to outfit the Land Warrior Lethality System to team leaders and above.
- Emerging test results suggests that the Land Warrior Lethality System may be more effective if a different basis of issue plan were used (e.g., to squad leaders and above) in a fully-manned squad (nine out of nine infantrymen).
- The Land Warrior Ensemble demonstrated reliability growth based on demonstrated performance in developmental testing, the LUT, and a Force Development Test. This reliability assessment is based solely on interim contractor logistics support, as contractor personnel provided all of the unit

maintenance supply support in both the LUT and the Force Development Test.

Recommendations

- Status of Previous Recommendations. No FY05 report was submitted for the Land Warrior program.
- FY06 Recommendations. The Army should:
  1. Find a solution to increase the range of the Land Warrior radio.
  2. Determine the Land Warrior Basis of Issue for the Lethality System. Currently, the Lethality System is distributed to fire team leaders and above. Early results from operational testing suggest that the Land Warrior Lethality System may be more effective if limited to squad leaders and above.
  3. Determine the appropriate mix of interim contractor logistics support personnel and unit maintenance personnel.

Light Utility Helicopter (LUH)

Executive Summary
- The Light Utility Helicopter (LUH) is a commercial off-the-shelf aircraft that has been certified by the Federal Aviation Administration for use in civil airspace.
- LUH units will perform Homeland Security and medical evacuation missions in permissive environments. The Army intends to employ the LUH worldwide, but only in non-hostile operational environments.
- The Army selected the European Aeronautic Defence and Space Company (EADS) North America, UH-145 helicopter as the LUH.

System
- The LUH is a commercial aircraft certified by the Federal Aviation Administration for use in civil airspace.
- The Army plans to procure 322 systems beginning in May 2007 to replace UH-1H and OH-58 A and C model aircraft in the Active Army and National Guard inventory.
- The LUH is certified for instrument flight with a Global Positioning System to operate in day, night, and adverse weather conditions.
- The LUH must support a variety of configuration options to include night vision goggles; nuclear, biological, and chemical gear; Air Warrior ensemble; 600-pound hoist; fire bucket; external loads; and patient litters.

Mission
- LUH units will perform Homeland Security and medical evacuation missions in permissive environments. The Army intends to employ the LUH worldwide, but only in non-hostile operational environments.
- LUH-equipped units will provide general aviation support, respond to terrorist events, conduct civil search and rescue, support damage assessment, support test and training centers, perform medical evacuation, and provide support to counter-drug operations.
- LUH units will provide general administrative aviation and aerial sustainment missions, as well as execute tasks as part of an integrated effort with joint forces, government agencies, and nongovernmental organizations.

Activity
- The Army conducted a Source Selection Performance Demonstration during January - May 2006 for each of the four potential helicopters. Army pilots flew candidate aircraft for approximately 30 hours each to evaluate performance and handling characteristics.
- DOT&E approved the Test and Evaluation Master Plan (TEMP) on March 31, 2006. This TEMP contains an adequate test strategy to support the LUH full-rate production decision.
- The Army selected the EADS North America UH-145 helicopter on June 30, 2006, as the LUH.

Assessment
- The current TEMP and the test plan for the IOT&E, scheduled for February 2007, are adequate to confirm operational effectiveness and suitability in order to support the full-rate production decision.
- Production plans are to move current UH-145 production from Donauworth, Germany, to Columbus, Mississippi. The initial LUHs will be built in Germany and shipped to Columbus for final assembly. The Mississippi plant will undergo a major expansion to accommodate the LUH program. The plant will begin with partial assembly, followed by full assembly, and finally the subsequent U.S. manufacture of major subsystems. The Army predicts that full-up assembly capability of the Columbus, Mississippi, plant will be achieved by August 2007.
- The UH-145 LUH is not a covered system for Live Fire test and evaluation because the Army intends for the aircraft to operate only in non-hostile environments.

Recommendations
- Status of Previous Recommendations. No FY05 report was submitted on LUH.

- FY06 Recommendations. The Army should:
  1. Conduct the LUH IOT&E in accordance with the DOT&E-approved TEMP or resubmit a modified TEMP after analysis of LUH reliability and performance using existing commercial data, vendor data, data from source selection flights, or additional flight testing by Army pilots.
  2. Ensure production and assembly of the LUH at the EADS North American Columbus, Mississippi, facility duplicates the production build of the Donauworth, Germany, production line.

PATRIOT / Medium Extended Air Defense System Combined Aggregate Program (PATRIOT/MEADS CAP)

Executive Summary

- The Army conducted six PATRIOT flight tests from November 2005 to June 2006 and achieved four successes.
- The Army conducted a major PATRIOT operational test, the Post-Deployment Build-6 Limited User Test, 4QFY06 through 1QFY07. That event included three flight tests during which PATRIOT successfully intercepted tactical ballistic missile targets and a cruise missile target.

System

- PATRIOT/Medium Extended Air Defense System (MEADS) Combined Aggregate Program (CAP) develops the MEADS system and evolves the PATRIOT missile system to include MEADS components. MEADS is an international co-development program that includes participation from Italy, Germany, and the United States.
- The PATRIOT air and missile defense system includes:
  - A mix of PATRIOT Advanced Capability-3 (PAC-3) hit-to-kill missiles and PAC-2 Guidance Enhanced Missile (GEM) blast-fragmentation warhead missiles for negating air and missile threats
    - The newest version of the PAC-3 interceptor is the Cost-Reduction Initiative (CRI) missile. In addition, the Army is developing the PAC-3 Missile Segment Enhancement (MSE) missile to increase range and altitude capabilities.
    - The newest version of the GEM interceptor is the GEM-T. It is designed primarily to counter aircraft including low-radar cross-section cruise missiles and has improved capability against high-speed short-range ballistic missiles.
  - C-band phased-array radars for detection, acquisition, tracking, classifying, identifying, and discriminating targets
  - Battalion Information and Coordination Centrals, Battery Command Posts, and Engagement Control Stations for battle management

  - Communications Relay Groups and Antenna Mast Groups for communicating with battery and battalion assets
- Planned MEADS development and improvements include:
  - Battle management, command, control, communications, computers, and intelligence elements; Ultra High Frequency-band 360-degree surveillance radars; X-band 360-degree multi-function fire control radars; missile launchers and reloaders
  - MSE missiles developed under the PATRIOT program

Mission

Combatant commanders deploying PATRIOT will have the capability to defend deployed forces and critical assets from missile and aircraft attack and to defeat enemy surveillance air assets, such as unmanned aerial vehicles, in all weather conditions, clutter, and electronic countermeasure environments.

Activity

- November 11, 2005. PATRIOT fired three PAC-3 CRI missiles at a short-range aerodynamic ballistic missile. None of the missiles intercepted the target.
- November 17, 2005. The Army and the Missile Defense Agency (MDA) conducted a test demonstrating integration of PATRIOT with the Ballistic Missile Defense System Command, Control, Battle Management, and Communication (C2BMC) element. PATRIOT detected, acquired, tracked, and engaged a short-range ballistic missile target and shared data with the C2BMC via the Link-16 communication network. However, the GEM missile failed to intercept the target.
- January - August 2006. During Post Deployment Build-6 developmental testing, the Army successfully engaged three tactical ballistic missile targets, a cruise missile target, and a subscale aircraft target during four separate flight tests.

- August - November 2006. The Army conducted the Post Deployment Build-6 Limited User Test, which consisted of the following:
  - August - September 2006 – Mobile flight mission simulator hardware-in-the-loop system software testing conducted at Fort Bliss, Texas.
  - September 2006 – Interoperability testing conducted at the Joint National Integration Center in Colorado.
  - November 2006 – Sustained operations testing at McGregor Range, Fort Bliss, Texas.
  - August - November 2006 – Three flight tests during which GEM, GEM-T, and PAC-3 missiles engaged short-range tactical ballistic missile targets and a low-radar cross-section cruise missile target. Preliminary results indicate all targets were successfully intercepted.
- The Army has not yet conducted the Test and Evaluation Master Plan-required PATRIOT flight test against a threat-representative anti-radiation missile target due to difficulties in obtaining an appropriate target. A suitable target was procured through the Navy, but was diverted for a higher priority initiative. This test is important to evaluate the PATRIOT self-defense capability and to demonstrate the capability to defend the Terminal High-Altitude Area Defense system from this threat.

Assessment

- Of the four PATRIOT developmental flight tests the Army conducted against ballistic missiles in FY06, two were successful and two were failures. In one flight test, there were three missile and launcher problems that led to three PATRIOT failures to intercept the target. Missile and ground system software has been modified to prevent similar failures. The problems did not appear in the repeat of the flight test. In another flight test, the PATRIOT interceptor had a reliability failure shortly after launch. PATRIOT successfully intercepted tactical ballistic missile targets in two Limited User Test flight tests in October 2006.
- Both of the FY06 PATRIOT flight tests against air-breathing targets were successful. One of the flight tests used a PAC-2 missile miss bias and maximum fuse delay to conserve the target, to test the kill assessment logic, and to test the shoot-look-shoot capability. The Army conducted a flight test against a low-radar cross-section cruise missile target during the Limited User Test. Preliminary results indicate success.
- Reliability: PATRIOT did not meet its reliability requirements during Post Deployment Build-6 Developmental Test and Evaluation. The PATRIOT battery mean time between critical mission failure was 7.8 hours. This is 2.7 times smaller than the threshold requirement of one critical mission failure per 21 hours and 2.5 times smaller than the mean time between critical mission failure measured during the PAC-3 IOT&E in 2002. The main contributor to low reliability was the radar.
- Maintainability: PATRIOT also did not meet its maintainability requirements during Post Deployment Build-6 Developmental Test and Evaluation. The 16 reliability-relevant mission essential failures for which maintenance was performed had a mean time to repair of 7.3 hours. This is 3.6 times larger than the threshold requirement of 2 hours and 2.1 times larger than the mean time to repair measured during PATRIOT Advanced Capability-3 IOT&E in 2002. The main contributor to low maintainability was the radar.
- Only one flight mission simulator hardware-in-the-loop system was available for the Post Deployment Build-6 Limited User Test. The Army is unable to conduct a robust battalion-level evaluation of PATRIOT performance until a second hardware-in-the-loop system is acquired. Two flight mission simulators should be available for the 2008 Limited User Test. The Army will use them to stress load the PATRIOT system with tactically-representative types and numbers of targets, including friendly aircraft and electronic countermeasures. These simulators will also be useful for training, verifying hardware and software fixes, and minimizing the occurrences of random problems.

Recommendations

- Status of Previous Recommendations. The Army has taken action on all but one of the FY05 DOT&E recommendations. FY05 #2: Air and missile defense testing should occur during joint and coalition exercises that include large numbers of different aircraft types; sensors; Battle Management Command, Control, Communications, Computers, and Intelligence; and weapon systems.
- FY06 Recommendations. The Army should:
  1. Upgrade the existing and new hardware-in-the-loop systems to model electronic countermeasures and identification, friend or foe systems.
  2. Update the Test and Evaluation Master Plan to address changes in the acquisition and supporting test strategies for the MSE missile and MEADS.

Small Unmanned Aerial System (SUAS)

Executive Summary
- The Army conducted the Small Unmanned Aerial System (SUAS) IOT&E from May 22 - June 16, 2006, at Fort Bliss, Texas. DOT&E approved the SUAS test plan on April 24, 2006.
- A Beyond Low-Rate Initial Production Report, published by DOT&E in late 2006, found the SUAS to be operationally effective, but not operationally suitable. Survivability with respect to enemy engagements against the aerial vehicle was not assessed in the IOT&E, but the SUAS is susceptible to visual and audible detection.

System
- The SUAS is a rucksack-portable unmanned aerial system.
- The SUAS consists of five basic component types:
  - Three air vehicles
  - One ground control station
  - One Remote Video Terminal
  - Payload, optics, and infrared capability
  - One field Repair Kit
- The SUAS is an Acquisition Category III program. The acquisition objective is for 2,812 systems, which includes 2,464 systems for the Army and 348 systems for U.S. Special Operations Command (USSOCOM).
- Fifteen SUASs will be issued to each Brigade Combat Team.
- SUAS is a hand-launched vehicle required to operate within a 10-kilometer radius, provide 90 minutes of total flight time, and have an operational altitude of up to 500 feet above ground level.
- The air vehicle accommodates a modular payload to include a day and night electro-optic/infrared sensor.

Mission
- Army infantry and mechanized companies will use SUAS for reconnaissance, surveillance, and target acquisition missions.
- Units will conduct tasks using the SUAS to:
  - Increase situational awareness by conducting reconnaissance and surveillance of the company and platoon battle space
  - Gather day and night imagery of open, rolling, and urban environments
  - Improve force protection by utilizing the SUAS beyond line-of-sight capabilities for real time intelligence, target acquisition, and battle damage assessment

Activity
- After a competitive proposal competition, the Army Project Office selected the Raven B Unmanned Aerial Vehicle system in October 2005 as the SUAS.
- In December 2005, the Army validated and verified technical manuals and conducted a logistics demonstration, to include flights conducted in chemical and biological protective gear.
- From February 3 - March 17, 2006, USSOCOM successfully conducted an airborne certification customer test for both the Army and USSOCOM at Fort Bragg, North Carolina.
- In May 2006, the Joint Interoperability Test Command tested the reconnaissance, surveillance, targeting, and acquisition kit and Global Positioning System functionality with favorable results.
- The Army conducted the Small Unmanned Aerial System IOT&E from May 22 - June 16, 2006, at Fort Bliss, Texas. DOT&E approved the SUAS test plan on April 24, 2006.

Assessment
- The SUAS is operationally effective. An infantry company equipped with SUAS benefits from enhanced situational awareness, more operational options to choose for planning and executing missions, and increased force protection. The SUAS provided a positive contribution to the commander's and unit's situational awareness and understanding.
- The SUAS sensors can recognize man-sized objects and can distinguish tracked from wheeled vehicles, but the sensors lack resolution to identify armed versus unarmed personnel or to find improvised explosive devices.
- SUAS is not operationally suitable because an SUAS-equipped unit cannot sustain itself in prolonged combat and the AV is not reliable. The primary measures for operational suitability are reliability, availability, and maintainability. The test did not dictate that the unit sustain 24-hour combat operations and

artificially co-located the forward repair area with infantry unit. These test artificialities provided an overly optimistic estimate for operational availability.
- The SUAS is susceptible to acoustic and visual detection.

Recommendations
- Status of Previous Recommendations. No FY05 report was submitted on SUAS.
- FY06 Recommendations. The Army should:
  1. Improve the reliability of the air vehicle. Increase the number of parts in the spares package, and re-examine the allocation of spares between operators and depot maintenance.
  2. Consistent with the mission or type unit, consider adding more aerial vehicles until the reliability of the aerial vehicles increases.
  3. Exploit full potential of the SUAS by developing and refining tactics, techniques, and procedures for dismounted and mechanized infantry to fully utilize the SUAS, to include airspace de-confliction procedures.

Spider XM7 Network Command Munition

Executive Summary
- During FY06, the Spider program completed developmental testing, received OSD approval of a Test and Evaluation Master Plan, completed a Milestone C decision review, and entered the low-rate initial production phase of its acquisition program.
- Early test and evaluation identified reliability and hardware/software complexity problems, which moved the IOT&E to January - March 2007 and the full-rate production decision to 2QFY08.
- The Milestone C Test and Evaluation Master Plan provides an adequate strategy to support the rescheduled IOT&E and full-rate production decision schedules.

System
- Spider is a landmine alternative that satisfies the anti-personnel munition requirements of the 2004 National Landmine Policy. That policy directs the DoD to:
  - End use of all persistent landmines after 2010
  - Incorporate self-destructing/self-deactivating technologies to develop alternatives to current persistent landmines
- The Army intends to achieve an initial operational capability with Spider in 2008.
- A Spider munition field includes:
  - Up to 63 munition control units, each housing 6 miniature grenade launchers
  - A remote control station, allowing the operator to direct the munitions to act autonomously in response to intruders or maintain "man-in-the-loop" control
  - A communications relay device or "repeater" for use in difficult terrain or at extended ranges

Mission
- Maneuver or engineer units will employ Spider, by itself or in conjunction with other networked munition systems, to accomplish these missions:
  - Force protection
  - Battlefield shaping
  - Early warning
  - Delay enemy forces
  - Attrite enemy forces
- Soldiers can employ Spider in all environments and in all terrains.
- Spider incorporates self-destructing and self-deactivating technologies to reduce residual risks to non-combatants after hostilities cease.

Activity
- A Limited User Test (LUT) occurred at Fort Leonard Wood, Missouri, in September 2005. The program completed pre-Milestone C developmental and operational testing at Cold Region Test Center in Fort Greely, Alaska, in January and February 2006.
- In early test and evaluation, the Army identified reliability and hardware/software complexity issues that the program must resolve prior to entering full-rate production.
- DOT&E approved an updated Test and Evaluation Master Plan in February 2006. This update rescheduled the IOT&E to January - March 2007 and moved the full-rate production decision to 2QFY08.
- The program completed an Army Milestone C review and awarded a low-rate initial production contract in June 2006.
- Government validation testing of fixes continued through the end of FY06.
- At the end of FY06, the Army was:
  - Continuing validation testing of system fixes
  - Completing preparations for a January 2007 Force Development Test in which soldiers will employ and fire tactical Spider systems in preparation for the IOT&E
  - Preparing an IOT&E test plan for DOT&E approval in December 2006

Assessment
- The February 2006 Milestone C Test and Evaluation Master Plan provides an adequate strategy to address system issues and test the resulting system prior to the full-rate production.

- Government testing during FY06 indicated that the Spider system should be ready to enter IOT&E in January 2007.
- The program made excellent use of early test and evaluation to identify and fix failure modes prior to IOT&E.

Recommendations

- Status of Previous Recommendations. The program addressed one of the two DOT&E recommendations from FY05, but the other recommendation remains valid.

  FY05 #2: DOT&E recommended that the Army ensure Spider meets all relevant criteria for entrance into the initial operational testing, to include validation of all hardware and software changes made since the LUT.
- FY06 Recommendations. None.

Stryker - Mobile Gun System (MGS)

Executive Summary

- DOT&E is concerned that the Army plans to field the Mobile Gun System (MGS) to two Stryker Brigades and deploy Mobile Gun System-equipped units into combat before demonstrating performance in planned developmental, Live Fire, and required operational testing.
- Before operational testing, hardware and software fixes need to be applied to the MGS.
- MGS vehicles in developmental testing have shown significant quality control problems and ongoing design issues.
- The MGS survivability assessment is ongoing. DOT&E is concerned that delays in the current LFT&E schedule will affect the program's ability to adequately support the full-rate production decision scheduled for July 2007.

System

- The Stryker Family of Vehicles consists of two basic variants: the Infantry Carrier Vehicle and the MGS.
- The MGS is undergoing a separate acquisition program because the system needs additional development.
- The MGS mission equipment includes:
  - M68A1E7 105 mm cannon system with an ammunition handling system
  - Coaxial 7.62 mm machinegun and a secondary M2HB, .50-caliber machinegun
  - Full solution fire control system with two-axis stabilization
  - Low-profile turret designed to provide survivability against specified threat munitions
- The MGS has a three-man crew.

- The system integrates the Driver's Vision Enhancer and Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance components as government furnished equipment.
- The MGS provides the crew with levels of protection against small-arms, fragmenting artillery, mines, and rocket-propelled grenades. Rocket-propelled grenade protection is provided by Slat armor (steel flat stock arranged in a spaced array).

Mission

- The Stryker Brigade Combat Team equipped with the MGS can create openings in walls, destroy bunkers and machinegun nests, and defeat sniper positions and light armor threats. The primary gunnery systems are intended to be effective against a range of threats up to T-62 tanks.
- The MGS operates as a three-vehicle platoon organic to the Stryker infantry company or as a single vehicle in support of a Stryker platoon.

Activity

- The Army began fielding MGS vehicles, without all required modifications, to its first Stryker Brigade in late FY06.
- The Army made significant design changes to prototype vehicles. These changes included a redesigned ammunition handling system, a redesigned turret drive system, and a survivability upgrade for the gun pod that houses the 105 mm main gun and parts of the autoloader.
- The Army conducted Mobile Gun System Production Verification Testing – Contractor (PVT-C) in FY06 to assess the vehicle's preparation to enter government PVT.
- MGS government PVT began in April 2006 with seven vehicles supporting reliability and performance testing, three supporting Live Fire testing, and two supporting the logistics demonstration.
- OSD approved an updated Test and Evaluation Master Plan to support the IOT&E and LFT&E scheduled for FY06 and FY07, respectively.
- The MGS LFT&E program is currently ongoing:
  - The Army completed MGS unique armor characterization testing and ammunition vulnerability characterization in FY06.
  - The Army began ballistic hull and turret testing in 3QFY06 and full-up system-level testing in 4QFY06. The full-up system-level test program was delayed due to the various design changes to the vehicle. Not all of the design changes can be integrated onto Live Fire full-up system-level assets. As a result, the Army is executing an alternative plan to

evaluate the impact of design changes on the ballistic vulnerability of the MGS.
- Battle damage assessment and repair exercises will occur concurrently with full-up system-level events.
- Automatic fire extinguishing system testing and controlled damage experimentation will commence in FY07.

Assessment

- DOT&E is concerned that the Army plans to field the MGS to two Stryker Brigades and deploy MGS-equipped units into combat before demonstrating performance in planned developmental, Live Fire, and required operational testing.
- To date, MGS performance in government PVT has revealed that there are still hardware and software fixes to be applied before operational testing (e.g., adding a brushless motor configuration in the turret drive system). In particular, vehicles in government PVT have shown significant quality control problems and ongoing design issues. Because more than 70 percent of the failure modes identified in government testing are new, the Army suspended government PVT for a short period while the Stryker Program Manager worked with the contractor to address these new failures.
- Demonstrated results from PVT-C showed that the MGS could achieve 47 mean rounds between system aborts, versus a growth expectation of 49 mean rounds between system aborts. Subsequent government PVT results were well below that level of performance, placing mean rounds between system aborts' performance below its growth curve expectations (approximately 8-10 mean rounds between system aborts).
- Demonstrated performance during PVT shows that the system may not achieve its initial operational test entrance criteria.
- The MGS survivability assessment is ongoing. DOT&E is concerned that delays in the current LFT&E schedule will affect the program's ability to adequately support the July 2007 Milestone III decision.

Recommendations

- Status of Previous Recommendations. The Army has not taken action on all of DOT&E's FY05 recommendations.
  FY05 #1: DOT&E recommended that the Army take corrective action on the February 2004 Beyond Low-Rate Initial Production Report recommendations. The Army has taken corrective action on 13 of 24 recommendations (6 are in the process of being corrected; 5 are either partially funded or not funded at all). These recommendations remain valid.
- FY06 Recommendations. The Army should:
  1. Consider a testing program that is event driven as opposed to schedule driven.
  2. Validate fixes identified during testing before deploying the system to combat.

Stryker - Nuclear, Biological, and Chemical Reconnaissance Vehicle (NBCRV)

Executive Summary

- Government developmental testing in 1QFY06 indicates that performance, safety, and reliability improvements are needed before fielding.
- Stryker – Nuclear, Biological, and Chemical Reconnaissance Vehicle (NBCRV) performance during the September/ October 2006 Initial Operational Test will provide much of the basis for the full-rate production decision in July 2007.
- The Stryker NBCRV LFT&E program is currently ongoing.

System

- The NBCRV is one of ten specialized systems of the Stryker family of vehicles in the Stryker Brigade Combat Team. The NBCRV uses a modified Infantry Carrier Vehicle chassis.
- NBC sensors and communications are integrated with the Stryker base vehicle to perform NBC detection, identification, marking, sampling, and reporting of NBC hazards.
- The NBCRV's armor provides ballistic protection to the crew against small arms, mines, and artillery fragments. The vehicle is also equipped with a filtering and over-pressure system that provides protection from NBC threats.
- The NBC mission equipment package includes:
  - Joint Biological Point Detection System
  - Joint Service Lightweight Standoff Chemical Agent Detector
  - Chemical and Biological Mass Spectrometer liquid agent ground detector and Dual Wheeled Sampling System
  - Chemical Vapor Sampling and Storage System
  - NATO standard markers and deployment system

Mission

- Stryker Brigade NBC reconnaissance platoons will use the NBCRV to perform tactical reconnaissance and surveillance operations in support of Stryker Brigade Combat Teams. The platoon, part of the early entry combat force, is capable of independent operations or as a subordinate maneuver element within the Division or Corps.
- NBCRV teams report information to the Reconnaissance Squadron and other units within the Stryker Brigade Combat Team.

Activity

- DOT&E approved the revised NBCRV Test and Evaluation Master Plan (TEMP) in April 2006.
- Government production verification tests began in 1QFY06 and will continue through 3QFY07.
- Army testers successfully completed a test event in July 2006 to demonstrate the vehicle's capability for deployment on a C-130 transport aircraft. The crew prepared the vehicle for air transport and loaded it onto the aircraft. After the aircraft flew a standard flight pattern, the crew reconfigured the vehicle for ground operations and then performed a series of NBC reconnaissance missions.
- The Army's NBCRV LFT&E program is ongoing:
  - NBCRV-unique armor characterization began in 2QFY06.
  - The Army plans to begin executing ballistic hull and full-up system-level testing in 1QFY07.
  - Battle damage assessment and repair exercises will occur concurrently with full-up system-level test events.
  - NBCRV Automatic Fire Extinguishing System testing and controlled damage experimentation will commence in FY07.

Assessment

- The ability of the NBC reconnaissance platoon, equipped with NBCRVs, to accomplish missions is key to the assessment of the unit's success and will be the main focus of the Initial Operational Test.
- The mission equipment package is provided to this system as government-furnished equipment by the Joint Program Executive Office for Chemical and Biological Defense. It is not sufficient for the NBCRV program to demonstrate mere

integration without degradation of the sensors; operational testing must confirm that the NBCRV can support the brigade commander with timely warning and accurate battlefield NBC information.

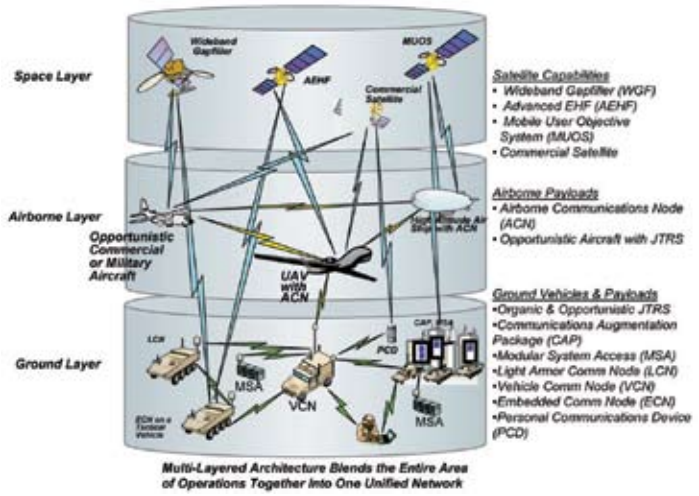
- The Production Verification Test illuminated several areas where the vehicle must be improved:
  - The integration of NBC sensors with base vehicle continues to pose significant challenges to developers
  - The 400-amp alternator and drive belt system is not sufficient for the imposed loads
  - The meteorological sensor compass cannot be reliably calibrated within required tolerances
  - Crewmember speech intelligibility inside the crew compartment is hindered by ambient vehicle noise
  - Crew compartment fumes cause the onboard Automatic Chemical Agent Detector Alarm to false alarm
  - The vehicle climate control system struggles to maintain required crew compartment temperatures in very hot and very cold environments; important because NBC sensors operate reliably only within certain temperature ranges
  - The system start-up time exceeds 55 minutes from cold start
- The evaluation of the IOT is ongoing.

Recommendations

- Status of Previous Recommendations. The Army accepted the FY05 recommendation.
- FY06 Recommendations. None

Warfighting Information Network-Tactical (WIN-T)

Executive Summary
- The Army does not have an acquisition strategy, test strategy, or concept of operations for the transition from Joint Network Node to the Warfighter Information Network-Tactical (WIN-T).
- WIN-T conducted a limited demonstration of capabilities at Fort Huachuca, Arizona. The network tested was limited in size, consisted of scripted events, and was largely contractor-controlled. The demonstration was sufficient to indicate that the concept of an "on-the-move" WIN-T network is feasible.
- The Army strategy to insert WIN-T capability into the current force is not expected to be defined until March 2007.
- Efforts to synchronize WIN-T development with the Joint Tactical Radio System (JTRS) and the Future Combat System (FCS) are ongoing.



Multi-Layered Architecture Blends the Entire Area of Operations Together into One Unified Network

System
- The WIN-T system is designed to be the Army's tactical intranet.
- The Army intends the WIN-T system to provide reliable, secure, and seamless video, data, imagery, and voice services. WIN-T is a high-speed and high-capacity backbone communications network. WIN-T will support communications from the fixed-station sustaining base to FCS Brigade Combat Teams and Modular Brigade Combat Teams.
- WIN-T has ground, airborne, and space layers:
  - The ground layer key components are:
    - JTRS Ground Mobile Radio
    - JTRS Handheld, Man-pack, Small Form-Fit
    - Personal communications device
    - Secure wireless local area network
  - The airborne layer consists of:
    - Warrior Extended Range/Multi-purpose Unmanned aerial vehicles
    - Tethered air vehicles with a WIN-T airborne communications node
  - The space layer utilizes:
    - Commercial satellites such as C-band or Ka-band satellites
    - Military satellites such as the Wideband Gapfiller or Advanced Extremely High Frequency satellites to provide reach-back via the Global Information Grid
- The Army intends for the current force to use WIN-T to provide commercial satellite access and commercial off-the-shelf systems to satisfy bandwidth and network service demands.

Mission
- WIN-T will provide commanders at all echelons with the ability to communicate on the move and at remote locations.
- WIN-T will support mobile commanders by integrating communications capabilities into maneuver platforms to support dispersed operations at extended ranges.
- The Army intends for commanders in the current force and FCS Brigade Combat Teams to use WIN-T to integrate terrestrial, airborne, and military satellite-based communications capabilities into a network infrastructure to provide connectivity across an extended non-linear battlespace.

Activity
- The WIN-T program conducted a limited demonstration of capabilities at Fort Huachuca, Arizona, in November 2005.
- Army re-baselining efforts, to define an adequate evolution strategy from Joint Network Node to WIN-T, will continue until the Defense Acquisition Board in 1QFY07.
- Efforts to synchronize WIN-T development with the JTRS and the FCS are ongoing.

Assessment
- The WIN-T configuration items tested at Fort Huachuca, Arizona, were not production-representative items. These configurations will require additional development, integration, and testing.
- The network tested was limited in size, consisted of scripted events, and was largely contractor-controlled.

The demonstration was sufficient to indicate that the concept of an "on-the-move" WIN-T network is feasible.

- Significant difficulties were encountered in collecting and reducing the data during the test. The difficulties indicate that development of measures, instrumentation, and data reduction techniques is needed to test large, high-speed data networks where the network nodes, as well as subscribers, are on the move.

Recommendations

- Status of Previous Recommendations. The FY05 recommendation remains valid.

FY05 #1: DOT&E recommended the Army actively synchronize JTRS, FCS, and WIN-T programs. This activity is ongoing.

- FY06 Recommendations. The Army should:
  1. Provide an updated acquisition strategy, concept of operations, and Test and Evaluation Master Plan for the evolution from Joint Network Node to WIN-T.
  2. Ensure the WIN-T program includes a funded airborne layer. Due to the demand on the satellite resources, the WIN-T is highly dependent on the airborne layer.

Navy Programs

Navy Programs

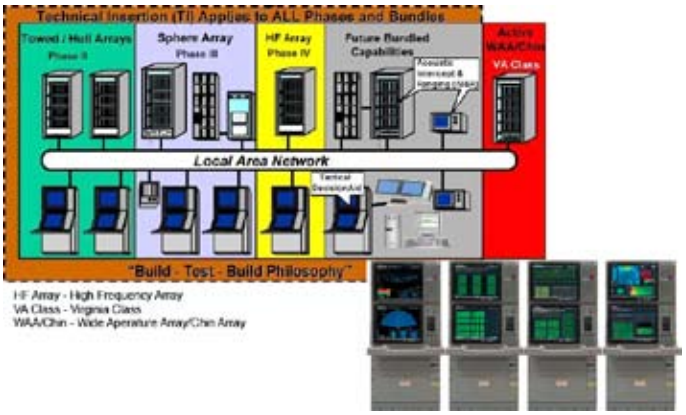
Acoustic Rapid Commercial Off-the-Shelf (COTS) Insertion for SONAR AN/BQQ-10 (V) (A-RCI)

Executive Summary

- The Navy completed follow-on operational test and evaluation (FOT&E) of Acoustic Rapid Commercial Off-the-Shelf (COTS) Insertion (A-RCI) Advanced Processor Build (APB)-03 sonar in September 2006. The APB-03 system demonstrated some performance improvements over the APB-00 baseline system, but failed to meet performance thresholds against diesel submarines and for mine detection and avoidance. Also A-RCI remained unsuitable due to software reliability and maintainability, training, tactics, documentation, and auxiliary equipment shortfalls.
- The Navy continues to field new A-RCI variant sonars on submarines before conducting operational testing.
- The Navy does not have an effective process for operational evaluation of these new systems before they are fielded and deployed.

System

- A-RCI is an open architecture sonar system designed to maintain the acoustic advantage over threat submarines.
- A-RCI utilizes legacy sensors and replaces central processors with COTS computer technology and software. It includes:
  - A sonar system for the *Virginia* class submarine
  - A replacement sonar system backfit into *Los Angeles*, *Trident*, and *Seawolf* class submarines
  - Schedule-driven annual software upgrades (APBs) and biannual hardware upgrades (Technology Insertions)
- Improvements are intended to provide expanded capabilities for anti-submarine warfare and mine warfare, particularly in littoral waters and against diesel submarines.



Mission

Submarine crews equipped with the A-RCI sonar can complete the following submarine force missions:

- Search, detect, and track submarine and surface vessels in open-ocean or littoral sea environments without being counter-detected
- Search, detect, and avoid mines or other submerged objects either on the ocean bottom or in the water volume
- Covertly collect acoustic Intelligence Surveillance/ Reconnaissance information
- Covertly conduct Special Forces Operations missions
- Conduct under-ice operations

Activity

- In January 2006, the Navy conducted dedicated FOT&E to evaluate A-RCI performance against diesel submarines.
- In March 2006, the Navy conducted FOT&E of the high-frequency Mine Sonar to determine if the APB-03 variant corrected deficiencies identified in the FY03 operational test of the APB-00 high-frequency Mine Sonar.
- The Navy continues to field A-RCI systems on operational submarines. By October 2006, the Navy was installing eight A-RCI APB-04 systems and started installing A-RCI APB-05.
- Neither the requirements document nor the draft Test and Evaluation Master Plan (TEMP) for APB04/APB05 have been approved by the Navy.
- In September 2006, Commander, Operational Test and Evaluation Force (COMOPTEVFOR) issued a combined operational test report evaluating all completed testing on A-RCI APB-03 and prior systems.
- Test and evaluation and Navy testers continue to participate in at-sea fleet exercises and laboratory testing in an attempt to obtain insights into A-RCI system performance.
- Operational testing of A-RCI APB-04 is scheduled to start in 1QFY07. This testing will include arctic operations, which have not been tested to date and end-to-end testing of the *Trident* SSGN class submarine system.

Assessment

- The Navy completed operational testing of A-RCI APB-03 and prior variants for *Los Angeles* class submarines. Test completion was possible because the submarine force

committed dedicated assets to complete the evaluation. The Navy's efforts to combine A-RCI operational testing with other fleet activities resulted in inadequate testing and increased the test time to resolve effectiveness and suitability issues. Too often, test objectives were lower priority or conflicted with exercise and training objectives.

- The Navy successfully avoids system hardware obsolescence through the use of technical insertions. Also, the use of commercial equipment simplifies the logistics tail and allows for regular system upgrades as processing power and other improvements are developed by the commercial sector.
- COMOPTEVFOR's FOT&E report on A-RCI APB-03 identified several performance parameters that were below threshold and evaluated the system as not effective against diesel submarines or for mine detection and avoidance. The report also determined A-RCI APB-03 as not suitable due to continued software reliability, training, tactics, and documentation deficiencies. DOT&E agrees with this assessment. Although A-RCI is an improvement over the legacy sonar systems, no sufficient test data exists to suggest that A-RCI improves capability between APBs. Navy post-test data analysis does indicate the targets signals were present. DOT&E assesses the operator was not provided the tools or training to better his detection performance. Suitability areas related to crew training, tactics, documentations, and software reliability have not improved and contributed to the not effective rating.
- Operational testing of the A-RCI mine detection and avoidance system demonstrated poor system performance against some mine types and identified the lack of an adequate testing and training minefield.
- Lack of submarine test assets, poor system reliability, and a low priority on operational testing continues to prevent adequate evaluation of A-RCI upgrades.

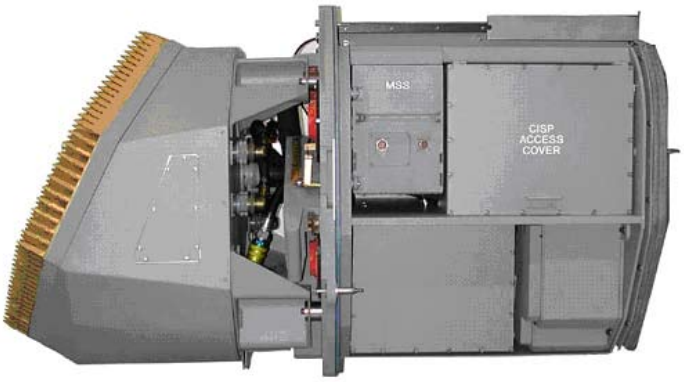
Recommendations

- Status of Previous Recommendations. The Navy is taking effective action on two of the four FY05 recommendations. The following FY05 recommendations remain valid:
  FY05 #1: The Navy should develop event-based A-RCI spirals vice annual spirals.
  FY05 #4: The Navy should develop appropriate platform-level requirements and performance metrics with thresholds and accomplish end-to-end testing for A-RCI upgrades.
- FY06 Recommendation.
  1. The Navy should develop, produce, and maintain a representative testing and training minefield.

Active Electronically Scanned Array (AESA)

Executive Summary

- Operational evaluation of the Active Electronically Scanned Array (AESA) radar system as installed on the F/A-18E/F Super Hornet began in July 2006 and continued through December 2006.
- The Navy deferred some functionality from the initial software build (Software Configuration Set (SCS) H3E) in order to conduct the operational evaluation while supporting the first AESA-equipped squadron transition schedule.
- The first deployment of AESA-equipped F/A-18F's is planned for early 2008 with SCS H4E.



System

- The APG-79 AESA radar system is an upgrade to the F/A-18E/F Super Hornet, replacing the APG-73 mechanically-scanned planar array radar. The APG-79 radar is one of several sub-systems that comprise the F/A-18E/F planned common avionics suite upgrade (Block 2), which will be integrated into Lot 26 aircraft and beyond.
- The APG-79 AESA radar system was designed to correct current APG-73 deficiencies while supporting a continued growth path for the Super Hornet as an integrated weapon system.
- The antenna, consisting of a fixed array of more than 1,100 transmit/receive modules, does not scan back and forth like a conventional radar antenna. The radar beam is "steered" electronically by the aircraft's mission computers. Reliability should be significantly better than older radars because of the elimination of moving parts, which have historically been the leading cause of failures.
- The fixed array of transmit/receive modules provides a total radiated power, which is much greater than that of conventional radars, thus enhancing initial detection ranges. Failure of several modules does not significantly degrade overall system performance.
- Operational requirements are being implemented in three phases:
  - Phase I supports initial operational capability.
  - Phase II adds electronic warfare upgrades.
  - Phase III adds additional capability upgrades as funded or desired.

Mission

- The operational commander whose force employs the F/A-18E/F fitted with AESA should have the capability to detect and track enemy air and ground targets at longer ranges than current systems, increasing operational effectiveness and survivability.
- The radar simultaneously tracks airborne targets and provides data link information to missiles in-flight.
- Aircrews equipped with the APG-79 AESA radar use this system to locate all air-to-air threats while developing situational awareness of surface targets. AESA also supports the concept envisioned for the F/A-18F of allowing each cockpit to conduct separate air-to-air and air-to-ground tasks. Conventional radars are capable of doing only one of these missions at a time.

Activity

- The Navy conducted an operational assessment during October and November 2005. Two aircraft flew 19 flights for a total of 26.7 flight hours. Additional data were collected during 22 developmental and combined developmental/operational test sorties.
- Because of remaining concerns with system performance and readiness for operational test, the operational test squadron (VX-9) conducted a Developmental Test Assist in May 2006, which consisted of three missions from the operational test plan flown using four AESA-equipped aircraft and the latest software build, SCS H3E.
- Four live AIM-120 missiles were fired in three scenarios of integrated testing prior to the commencement of operational testing during 2-3QFY06.
- DOT&E approved the Test and Evaluation Master Plan (TEMP) No. 0201-07 (Revision C) for F/A-18 APG-79 AESA and its associated operational test plan in July 2006. The TEMP and test plan are adequate to complete the operational evaluation. A new TEMP and test plan will be submitted to address follow-on operational testing to be conducted in FY07.

Assessment

- During the fall 2005 operational assessment, poor reliability, inconsistent air-to-air detection and track performance, and immature built-in test detection and isolation were observed. Additionally, poor AIM-120 data link support during missile flight was observed. Overall system stability and inconsistencies in air-to-air and air-to-ground performance adversely impacted accomplishment of key Air Warfare and Strike Warfare missions. The Navy concluded that while AESA warranted continued development, it was not ready for operational evaluation. While improvements in reliability and performance had been seen in radar software builds since the operational assessment conducted in 2004, overall system performance remained well below important operational thresholds. The Navy recommended the addition of a formal Developmental Test Assist period in order to mitigate risk entering operational test.
- During the three Developmental Test Assist missions conducted in May 2006, only one instance of software instability was observed; however, other inconsistent performance was still apparent. This included inconsistent detection range, dropped track files at missile firing, poor short-range search performance, and poor track performance on maneuvering targets.
- The live AIM-120 shots verified AESA radar integration with the missile while also demonstrating the capability to support multiple missiles in-flight.
- The AESA operational evaluation is ongoing. Emerging results indicate that system stability remains a concern. The Navy issued anomaly reports for poor reliability, immature built-in test, and erratic gun reticle behavior in both air-to-air and air-to-ground modes. However, when the radar is operating consistently, performance has been better than that of the APG-73. In particular, the air-to-ground modes produce high quality imagery and exceptional weapons delivery accuracy.

Recommendations

- Status of Previous Recommendations. The Navy completed action on the two FY05 DOT&E recommendations.
- FY06 Recommendation.
  1. The Navy must correct AESA deficiencies, particularly the reliability deficiency, prior to commencement of AESA follow-on test and evaluation.

AIM-9X Air-to-Air Missile Upgrade

Executive Summary

- The AIM-9X program plans to complete development of software updates to the baseline missile in FY07.
- The program office halted developmental testing to review mission failures of two new capabilities: lock-on-after-launch and a rudimentary air-to-ground capability.
- Program office efforts to identify technical risks and conduct thorough developmental testing highlight the value of realistic, end-to-end testing prior to operational testing.
- The Services should carefully consider the results of the lock-on-after-launch and air-to-ground operational testing before committing to fielding the new capabilities.
- Future (beyond FY12) AIM-9X operational testing will not be adequate without a full-scale target. The Services should begin a target development program as soon as practical.

System

- AIM-9X is the latest generation short-range, heat-seeking, air-to-air missile.
- It is highly maneuverable, day/night capable, and includes the warhead, fuse, and rocket motor from the previous AIM-9M missile.
- AIM-9X adds a new imaging infrared seeker, vector-controlled thrust, digital processor, and autopilot. It can be carried by F-15C/D, F/A-18 C/D, and F/A-18 E/F aircraft and includes a container for storage and maintenance.

Mission

- Air combat units use the AIM-9X to:
  - Conduct short-range offensive and defensive air-to-air combat
  - Engage multiple enemy aircraft types using passive infrared guidance in the missile seeker, using external cues (other than the missile seeker itself) from multiple aircraft systems, including radar and the Joint Helmet Mounted Cueing System
  - Seek and attack enemy aircraft at large angles away from the launch aircraft
- AIM-9X helps close the gap in short-range combat capability between U.S. aircraft and primary enemy threat aircraft.

Activity

- The AIM-9X program continued development of software updates to the baseline missile.
- The program completed several flights in support of development as well as recurring weapon system evaluation flight tests. A number of these missions failed to destroy the target, even though the missile functioned correctly.
- Before entering operational testing, the program office halted developmental testing to verify the technical risks and the incremental steps in adding the new capabilities.
- The program office conducted an extensive review of all failures and test environments and verified that remaining testing would provide the desired information to evaluate the improved capabilities.
- The program resumed developmental testing in October 2006, and will begin the next phase of operational testing in 2007.
- DOT&E received the operational test concept briefing from the Commander, Operational Test and Evaluation Force test team in July 2006. The program is coordinating a Test and Evaluation Master Plan page change update to document the test approach. DOT&E expects to approve the related operational test plan shortly thereafter, prior to the December start of operational testing.

Assessment

- The ongoing AIM-9X development is intended to rectify the two most significant deficiencies found during operational testing. The development also provides the first step in reaching a lock-on-after-launch capability. In addition, the Air Force requested a Wartime Rapid Acquisition Program to develop a rudimentary AIM-9X air-to-ground capability.

AIM-9X needs hardware and software updates to fully achieve the lock-on-after-launch (and possibly air-to-ground) capability.

- Analysis and review of two failed missions found the tests occurred during environmental conditions (not obvious to the test crews) that provide the greatest challenge to any infrared missile.
- Early analysis indicates that the lock-on-after-launch capability may be too challenging for the current software and hardware design.
- The missile may not achieve a useful capability against ground targets without more extensive development and software/ hardware changes that exceed the rapid acquisition program's schedule and funds.
- The test results indicate the value of robust, end-to-end developmental testing at the limits of hardware and software capabilities, prior to producing and delivering missiles for operational testing.
- The AIM-9X program has sufficient assets for near-term testing. However, full-scale targets will not be available after FY12. Future development and ongoing fleet evaluations will require a new full-scale target for adequate operational testing.

Recommendations

- Status of Previous Recommendations. The program took action on all but one of the FY05 DOT&E recommendations: FY05 #3: DOT&E recommended that the program plan a robust, event-driven test strategy for the next increment in the program. Planning for this increment is not yet complete.
- FY06 Recommendations.
  1. The Services should carefully consider the results of the lock-on-after-launch and air-to-ground operational testing before committing to fielding the new capabilities.
  2. The next AIM-9X increment (referred to as Block II) will add new hardware and software capabilities well beyond the current system. The program should plan a test strategy to conduct robust, end-to-end testing at the limits of capability before producing and delivering missiles for operational testing.
  3. The program should not commit beyond initial production of the next increment until operational testing and reporting is complete.
  4. The Services should begin planning and development of a full-scale target for program testing beyond FY12.

AN/AAR-47 A(V)2 Upgrade Missile / Laser Warning Receiver

Executive Summary

- The Navy's AAR-47 A(V)2 is the upgrade to the widely fielded AAR-47 V(2). It is designed to reduce vulnerability to bright light sources. The AAR-47 A(V)2 is in full production following adequate testing on the KC-130J in FY06.
- The Navy's FY06 testing of AAR-47 A(V)2 on the KC-130J demonstrated that this upgraded sensor can be operationally effective at enhancing aircraft survivability when integrated properly into the host platform. However, all versions of the AAR-47 have a substantial limitation in certain environments that may significantly degrade threat detection, the details of which are classified. This limitation is independent of the specific platform installation.
- The Navy and Air Force need to ensure the pilots and crews relying on a version of the AAR-47 for protection clearly understand this common limitation.
- Although the Navy executed adequate ground-based missile simulation procedures for the FY06 tests, the Navy still has not formally incorporated standardized procedures.

System

- The AAR-47 is a defensive system that warns pilots of missile threats and commands dispensing of flares as an infrared countermeasure. This legacy missile warning sensor is installed on many aircraft, including C-130, C-5, C-17, AH-1, UH-1, H-46, H-60, P-3, H-47, H-53, and MV-22.

- The AAR-47 V(2) sensor upgrade program is designed to improve missile warning sensor performance and incorporates laser warning functionality.
- The new AAR-47 A(V)2 missile warning sensor incorporates an additional detector into the widely fielded AAR-47 V(2) sensor designed to reduce vulnerability to bright light sources.
- This is a Navy-led joint program with active Air Force and U.S. Special Operations Command participation.

Mission

Combatant commanders utilize AAR-47 A(V)2 to enhance survivability of several types of fixed- and rotary-wing aircraft against shoulder-fired, vehicle-launched, and other portable infrared-guided missile threats.

Activity

The AAR-47 A(V)2 is in full production as both the Navy's and Air Force's long-term upgrade to optimize missile warning sensor effectiveness, while limiting the warning sensors' sensitivity to bright light sources.

Navy

- The Navy's upgrade of the widely fielded AAR-47 V(2), designated the AAR-47 A(V)2, is in full production following testing on the KC-130J in FY06.
- The Navy conducted AN/AAR-47 A(V)2 sensor baseline and upgrade testing on the KC-130J in 1QFY06 at Naval Air Station Patuxent River, Maryland, to assess missile warning sensors sensitivity to bright light sources.
- Commander, Operational Test and Evaluation Force, the Navy's operational test agency, finalized planning for the 1QFY07 AAR-47 A(V)2 testing on the KC-130T.
- The Navy informally incorporated use of standardized ground-based missile simulator procedures to support a successful FY06 KC-130J/AAR-47 A(V)2 test.
- The Navy's testing of AAR-47 A(V)2 in FY06 was conducted in accordance with the Navy Test and Evaluation Master Plan (TEMP) approved by DOT&E in FY03.

Air Force

- The Air Force's Air Mobility Command tested the interim "smart" cable AAR-47 V(2) configuration on the C-130J in FY05 and reported these results in FY06.
- In FY06, the Air Force's Air National Guard Air Force Reserve Command Test Center (AATC), without informing DOT&E, conducted an operational utility evaluation of the AAR-47 V(2) as integrated on a different platform, the A-10 aircraft. This AAR-47 testing was a planned integration effort under the direction of the Air Force Air Combat Command, but was conducted without the Air Force Operational Test Command's (AFOTEC) involvement or DOT&E oversight.
- The Air Force fielded a unique version of AAR-47 V(2) that used "smart cables" to limit the sensors' exposure to bright light sources.

- In FY06, the Air Force transitioned the majority of C-130Js from the unique "smart cable" AAR-47 V(2) configuration to the long-term AAR-47 A(V)2 configuration, while initiating the upgrade on C-17s.

Assessment

Navy

- DOT&E assessed the AAR-47 A(V)2 as operationally effective, including reduced sensitivity to bright light sources, when integrated on the KC-130J.
- The AAR-47 A(V)2 is operationally effective, although its warning capability can be significantly degraded in certain environments, the details of which are classified. This substantial limitation is a function of the AAR-47's older warning sensor design technology. This limitation is independent of the specific platform integration.
- The Navy's KC-130J/AAR-47 A(V)2 testing in FY06 was adequate, including the use of ground-based missile simulation procedures. The Navy conducted this test because previous operational testing of the KC-130J/AAR-47 in 2004 was not adequate due to poor ground-based missile simulation procedures. The event also tested recent upgrades incorporated on the AAR-47 A(V)2.
- Although the Navy executed adequate ground-based missile simulation procedures, standardized procedures still have not been formally incorporated by the Navy, which increases the potential for future test adequacy issues.

Air Force

- The Air Force conducted the operational utility evaluation of AAR-47 as integrated on the A-10 aircraft in FY06 without the required DOT&E or AFOTEC oversight or involvement. DOT&E views this as very serious because of the dependence of self-protection system operational effectiveness and suitability on proper aircraft integration for new mission environments.
- DOT&E assessed the Air Force's AAR-47 interim "smart cable" configuration missile warning sensor as operationally effective on the C130-J. This was based on the Air Mobility Command flight tests conducted in FY05.
- Although testing of the AAR-47 A(V)2 upgrade on the C-130J is not complete, the Air Force can apply Navy test results of AAR-47 A(V)2 on the KC-130J to the C-130J because of the commonality of the platforms and AAR-47 integration.

Air Force and Navy

- There is not a revised AAR-47 TEMP that aligns the Air Force and Navy's test efforts or addresses who will conduct follow on testing of AAR-47 integration on new platforms. Additionally, there are still no formally standardized ground-based missile simulation procedures.

Recommendations

- Status of Previous Recommendations. One DOT&E recommendation from the previous annual report remains unresolved.
  FY05 #2: The Navy should strive to standardize ground-based missile simulator procedures and equipment across the joint test environment to maximize test efficiency. The Navy did informally incorporate improved ground-based missile simulation procedures for one test in FY06, but the procedures have not been formally standardized to support future tests. This recommendation remains valid.
- FY06 Recommendation. The Navy and Air Force should:
  1. Ensure the pilots and crews relying on the AAR-47 for protection clearly understand the one common limitation that may significantly degrade threat detection in certain environments.
  2. Gain DOT&E approval of an AAR-47 TEMP in FY07 that clearly aligns the:
     - Test strategies and Service responsibilities
     - Responsibility for follow-on testing of AAR-47 on new platforms
     - Use of standardized ground-based missile simulation procedures

AN/WLD-1(V)1 Remote Mine-hunting System (RMS)

Executive Summary
- The Remote Mine-hunting System (RMS) came under DOT&E oversight in April 2006.
- The system underwent an operational assessment in August 2006.
- The mine-hunting vehicle demonstrated improved reliability compared to prior testing results.
- Performance of the AQS-20A sonar and the system's ability to locate and classify mine-like objects could not be determined based on the most recent testing.

System
- RMS is a naval mine detection system.
- RMS includes an unmanned, diesel-powered, semi-submersible vehicle called the remote mine-hunting vehicle (RMV) that tows a variable depth sensor.
- The RMV is launched and controlled remotely from select DDG 51 Flight IIA class ships that are outfitted with a launch and recovery subsystem and from Littoral Combat Ships (LCS) equipped with a mine warfare mission package.
- A data link subsystem provides continuous, real-time communications between the host ship and the RMV for command and control and transmission of sensor data.
- Missions are planned and controlled and data are processed, displayed, and recorded using a remote mine-hunting functional segment integrated into the host ship's combat system.

Mission
- A ship equipped with RMS will employ it to detect, classify, and identify moored and bottom mines in shallow and deep water, allowing host ships to determine whether potential sea routes and operating areas contain mines.
- An RMS-equipped ship gives the Maritime Component Commander some organic or "in-stride" mine countermeasures capability. Mine avoidance decisions may be possible without waiting for dedicated mine countermeasures ships or helicopters.

Activity
- The RMS program was redesignated an Acquisition Category 1C program from Acquisition Category II in April 2006 due to increased development spending. The program came under DOT&E oversight at that time.
- The system underwent operational assessment in August 2006 in accordance with a DOT&E-approved test plan. The Test and Evaluation Master Plan (TEMP) was approved by the Navy prior to RMS coming under DOT&E oversight.
- The Navy approved a low-rate initial production (LRIP) procurement of four additional RMS units in September 2006. Three other LRIP units were previously authorized.
- IOT&E is scheduled for June 2007.

Assessment
- The testing during the operational assessment was adequate. Objectives were primarily related to operational availability and reliability of the RMV.
- The operational assesssment demonstrated that the RMV Engineering Development Model (EDM) improved operational availability and reliability compared to that documented in pre-oversight test reports. The first LRIP RMV will be ready in early 2007 and will be used for IOT&E in June 2007.
- Ground truth regarding the location of some mine shapes placed for the test was suspect. As a result, the true performance of the AN/AQS 20A sonar sensor and the

system's ability to locate and classify objects could not be accurately assessed. Test planning for IOT&E will require a higher level of detail than previous RMS testing.
- Examination of the program documents indicates that some critical mine warfare related requirements must be clarified or specified. In particular, the Operational Requirements Document (ORD) does not detail conditions under which achieved search level and achieved search rate are to be measured. These parameters refer to the confidence that all expected mines were located as well as the speed of the search, based on what kind of mines are expected. They are inversely related and can be influenced by the test design.
- The ORD does not specify a maximum false classification density, or the number of non-mine-like objects erroneously classified as mine-like per square mile. Without an upper limit, the RMS can satisfy its requirements even if it falsely classifies too many objects as possible mines, potentially causing a Maritime Commander to avoid an area unnecessarily. The high false classification density observed during the operational assessment may have been attributed to operator training as well as system deficiency.
- The ORD states that RMS will be operated from select DDG 51 class ships. The Navy intends to make the Littoral Combat Ship the primary host for RMS. The recent operational assessment employed fleet operators aboard a surrogate vessel, but IOT&E must be conducted from a commissioned ship to be adequate.
- The TEMP for this program must be updated before additional testing takes place.

Recommendations
- Status of Previous Recommendations. There was no FY05 report submitted on RMS.
- FY06 Recommendations. The Navy should:
  1. Ensure future test planning includes sufficient time and resources to establish ground truth positions of mine shapes and other objects in the test area before testing, as well as to reconfirm positions afterward.
  2. Clarify the ORD to state the condition under which achieved search level and achieved search rate are to be measured and assign threshold and objective values for the false classification density.
  3. Update the TEMP for OSD approval to reflect future testing, including IOT&E and possible follow-on testing.

Common Submarine Radio Room (CSRR) (Includes Submarine Exterior Communications System (SubECs))

Executive Summary

- The Navy has shifted to incremental development of the Common Submarine Radio Room (CSRR), principally due to performance shortfalls and schedule slips in component programs that are integrated into CSRR. The system is projected to meet full capability when Increment 3 is fielded in FY13.
- The Navy is buying and installing low-rate numbers of CSRR. A full-rate production decision for CSRR Increment 1 is scheduled for July 2007. Currently fielded versions do not have full Increment 1 capability.
- The Navy completed Technical Evaluation and an operational assessment of the *Seawolf* SSN CSRR variant in June 2006. Operational Evaluation of the *Seawolf* variant began on September 11, 2006; Operational Evaluation results will be available in December 2006.
- The Navy plans to complete Operational Evaluation of the Guided Missile Submarine and Ballistic Missile Submarine variants of CSRR prior to the July 2007 full-rate production decision.
- Due to funding constraints, the Navy delayed the first *Los Angeles* class installation to FY15.

System

CSRR/Submarine Exterior Communications System (SubECS) is an umbrella program that integrates smaller communications equipment acquisition programs and commercial off-the-shelf components into a submarine communications network.

- It provides a common communication system across all classes of submarines and is designed to support the steady infusion of new technology with modernization and software replacement of obsolete equipment.
- It establishes common hardware and software baselines.
- *Virginia* class CSRR is developed and integrated as part of new construction. Other submarine class radio rooms are backfitted with CSRR variants to establish a common radio room baseline.

Mission

The Submarine Force utilizes the CSRR/SubECS to provide a common radio room capable of secure, reliable, and covert communications across all classes of submarines to accomplish assigned missions. CSRR:

- Manages, controls, and disseminates command, control, communications, computers, and intelligence information routed to and from submarines in an open architecture
- Enables Net-Ready communications and operations

Activity

- The Navy has CSRR variants installed on the three *Seawolf* class submarines, the Trident Training Centers, the *Ohio* Class Guided Missile Submarine conversions, and the *Virginia* class submarines. Although significant land-based integration facility testing had been conducted, these CSRR units were installed before the program completed initial developmental test reporting or an independent operational assessment.
- The Navy completed Technical Evaluation and an operational assessment of the *Seawolf* class CSRR variant in June 2006. Based on test results, the Program Executive Officer, Command, Control, Communications, Computers, and Intelligence, authorized low-rate production of an additional four CSRR units in August 2006.
- IOT&E of the *Seawolf* variant, originally scheduled for FY03, began in September 2006. The *Seawolf* variant will be the first CSRR to complete IOT&E. To permit the deployment of USS *Seawolf* prior to full operational testing, the Commander,

Operational Test and Evaluation Force completed a satisfactory Quick Reaction Assessment in May 2006.

- The Navy approved a Capability Production Document (CPD) for CSRR in May 2006. This CPD implemented Net Ready interoperability requirements and updated some of the original CSRR performance requirements. The CPD calls for an incremental development for the CSRR due to component program performance shortfalls and schedule slips. The system is not projected to meet full capability until Increment 3 is fielded in FY13.
- DOT&E approved Change 2 to the CSRR Test and Evaluation Master Plan (TEMP) Revision 1, incorporating the CPD performance objectives to support initial operational testing of the *Seawolf* class CSRR/SubECS variant. Revision 2 to the TEMP, fully incorporating CPD requirements and reflecting other program changes, will be approved prior to operational testing on all other CSRR variants.

Assessment

- The CSRR program made significant progress toward testing and correction of deficiencies in FY06. While not all operational Measures of Effectiveness were demonstrated during the *Seawolf* variant Technical Evaluation and concurrent operational assessment, extensive circuit testing was conducted both dockside and at sea. Technical Evaluation deficiencies were numerous, but minor. DOT&E concurred with the assessment that the CSRR variant was ready for Operational Evaluation.
- The CSRR has been a high-risk program because it integrates several high-risk component programs. These component programs are often behind schedule or deliver less than the required capability. Most of the CSRR schedule slippage can be attributed to poor supporting component program performance or late delivery, which requires CSRR redesign to substitution legacy equipment.
- Primarily as a result of schedule delays in component programs, the Navy shifted to incremental development of the CSRR. The system is not projected to meet full capability until Increment 3 is fielded in FY13. Due to funding constraints, the Navy delayed the first *Los Angeles* class installation to FY15.
- The Navy is procuring low-rate numbers of CSRR systems and installing the systems onboard submarines. Each CSRR system is slightly different based on the state of the CSRR and supporting component program and software development at installation. The shift to incremental development and strict adherence to an established configuration within each increment can help ensure that operational testing is adequate as the program moves forward.

Recommendations

- Status of Previous Recommendations. The Navy has taken effective action on all previous DOT&E recommendations.
- FY06 Recommendation.

1. The Navy should ensure each CSRR variant completes operational testing before the hosting ship deploys.

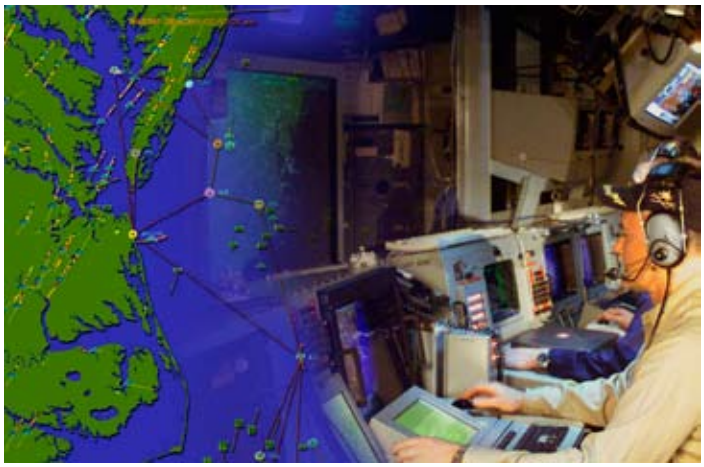
Cooperative Engagement Capability (CEC)

Executive Summary
- The surface ship version of Cooperative Engagement Capability (CEC) (USG-2) is operationally effective and suitable as demonstrated in the 2001 operational evaluation.
- A planned Follow-on Operational Test and Evaluation (FOT&E) end-to-end test of the USG-2 integrated with the Ship Self Defense System (SSDS) Mark 2, Mod 1 has been delayed to the next phase of CEC FOT&E.
- Electromagnetic compatibility, hardware reliability, and operational availability deficiencies remain uncorrected in the aircraft version of CEC (USG-3).

System
- The CEC is a system of hardware and software that allows surface ships and E-2C aircraft to share radar data. It consists of two main hardware pieces:
  - Cooperative Engagement Processor (CEP) to collect and fuse radar data
  - Data Distribution System (DDS) to exchange the CEP data with other CEC-equipped units
- An open architecture upgrade using commercial off-the-shelf (COTS) components is under development.

Mission

Ships and aircraft equipped with CEC:
- Accomplish air defense missions by sharing a comprehensive situational awareness of all air contacts



- Have a higher likelihood of air defense mission accomplishment because a CEC-equipped ship can fire missiles at a hostile air contact without that ship having actual radar contact

Activity
- The Commander, Operational Test and Evaluation Force (COMOPTEVFOR) conducted FOT&E in USS *Ronald Reagan* from October to November 2005 to examine the integration of CEC with the SSDS Mark 2, Mod 1. COMOPTEVFOR published the test report in June 2006.
- COMOPTEVFOR also assessed corrections to the CEC USG-3 deficiencies identified in previous testing during this phase of FOT&E.
- COMOPTEVFOR initiated planning for FOT&E of CEC integrated with SSDS Mark 2, Mod 2, to be conducted on LPD-17 class ships, and testing of the open architecture CEC upgrade.

Assessment
- The USG-2 version of CEC remains operationally effective and suitable when integrated with the SSDS Mark 2, Mod 1. However, uncorrected SSDS deficiencies made completion of a planned end-to-end test of CEC impossible. In addition, inadequate CEC operator proficiency in multi-ship operations did not allow an evaluation of CEC integration and interoperability with a strike group composed of an aircraft carrier and CEC-equipped Aegis destroyers.
- Documentation, logistic support, and data transfer rate deficiencies identified in the USG-3 version of CEC, as installed in the E-2C aircraft, were corrected. Hardware reliability, electromagnetic compatibility, and operational availability deficiencies remain uncorrected.
- The Navy is developing an open architecture upgrade to CEC, which is intended to correct outstanding deficiencies. Developmental testing of this upgrade is ongoing and operational testing is planned for FY08.

Recommendations
- Status of Previous Recommendations. The Navy satisfied one of the two recommendations from FY05, but the following recommendation has not been resolved and requires further attention.

FY05 #1: DOT&E recommended that the Navy continue to correct deficiencies from earlier testing. This recommendation remains valid.

- FY06 Recommendation. The Navy should:
  1. Ensure CEC operators are proficient in multi-ship operations prior to the next phase of FOT&E.
  2. Update the Test and Evaluation Master Plan to include:
     - Completion of the end-to-end test of CEC integrated with the SSDS Mark 2, Mod 1
     - FOT&E of CEC integrated with SSDS Mark 2, Mod 2 on LPD-17 class ships
     - FOT&E of the CEC open architecture upgrade

CVN 21 - Next Generation Nuclear Aircraft Carrier

Executive Summary
- The Navy conducted a four test series in support of LFT&E.
- The existing Test and Evaluation Master Plan (TEMP) does not adequately address testing the Sortie Generation Rate Key Performance Parameter or the ship's entire combat system.
- The Navy conducted an operational assessment of the risk levels associated with the CVN 21 design to date. The final assessment is pending.

System
- CVN 21 is a new class of nuclear powered aircraft carrier that has the same hull form as the *Nimitz* class, but many ship systems inside the hull and on the flight deck are new.
- The newly designed nuclear power plant will reduce manning by 50 percent and produce significantly more electricity when compared to a current CVN 68 class ship.
- CVN 21 will incorporate electromagnetic catapults (vice steam powered) and a smaller island with Multi-Mode Radar.
- Weapons stowage, handling spaces, and elevators have all been redesigned.
- Its Integrated Warfare System will be adaptable to technology upgrades and varied missions throughout the ship's projected operating life.

Mission
- Carrier Strike Group Commanders will use the CVN 21 to:
  - Conduct power projection and strike warfare missions using embarked aircraft

  - Provide force protection of friendly units
  - Provide a sea base as both a command and control platform and an air capable unit
- CVN 21 is designed to increase sortie generation capability of embarked aircraft and have increased self-defense capabilities when compared to current aircraft carriers.

Activity
- The Navy's Commander, Operational Test and Evaluation Force (COMOPTEVFOR) Total Ship Test Team conducted an operational assessment of CVN 21 from April - September 2006.
- The Navy initiated a revision to the Test and Evaluation Master Plan in preparation for the FY07 Defense Acquisition Board Program Review. This Program Review supports the construction contract award.
- The Navy conducted a four test series in support of the LFT&E program in FY06:
  - Fire and smoke spread testing on the ex-Shadwell fire safety research and test facility replicated fires in the hangar bay
  - Testing at Aberdeen Proving Ground, Maryland, "test pond" of a 1/4-scale section of the CVN 21 replicated an underwater explosion test event on the ex-America (a decommissioned aircraft carrier)
  - Ballistic penetration testing of armored sections of the CVN 21 using 1/8th-scale projectiles examined the vulnerability to certain threat weapons
  - Electromagnetic Aircraft Launching System magnetic signature testing occurred at the Naval Air Engineering Station, Lakehurst, New Jersey

Assessment
- Due to the level of maturity of CVN 21 lead ship design (IOT&E is not scheduled until FY16), the operational assessment conducted by COMOPTEVFOR consisted primarily of government and contractor briefings to subject matter experts. It will be difficult to provide a realistic assessment of risk based on contractor briefings. Formal results from COMOPTEVFOR are pending.
- The current CVN 21 program TEMP does not adequately address the evaluation of the entire combat system other than

what is being evaluated in the Navy's Capstone Ship Self Defense Air Warfare TEMP. Additionally, a Threat D target is required for adequate evaluation of defense against cruise missiles, yet the Navy lacks an adequate Threat D target.

- The current TEMP does not adequately address the evaluation of the Sortie Generation Rate Key Performance Parameter. A modeling and simulation effort that currently centers around six different federated models has potential to reduce risk, but does not mitigate the need to actually exercise and test the Sortie Generation Rate Key Performance Parameter.
- The comprehensive CVN 21 LFT&E will be based on CVN survivability studies, lessons learned from battle damage and flight deck accidents, relevant weapon effects tests, extensive surrogate testing, probability of kill versus probability of hit studies, damage scenario-based engineering analyses of specific hits, a total ship survivability trial, and a full ship shock trial.
- Significant progress continues on the vulnerability assessment report based on the Navy's extensive modeling and simulation analyses comparing data to the ex-America sinking exercise during the summer of 2005.

Recommendation

- Status of Previous Recommendations.
  FY05 #1: DOT&E recommended that the CVN 21 design program thoroughly evaluate the recommendations in the COMOPTEVFOR Letter of Observation in the design process. This remains a valid recommendation.
- FY06 Recommendations. The Navy should:
  1. Incorporate an adequate evaluation of the entire combat system in the next TEMP update.
  2. Develop an adequate Threat D target.
  3. Include an adequate Sortie Generation Rate test in the next TEMP update.

DDG 51 Guided Missile Destroyer

Executive Summary
- DDG 51 is operationally effective in open ocean battle space, although its execution of the anti-air warfare mission is limited by Standard Missile reliability and performance problems.
- DDG 51 is less effective in littoral waters where it may encounter asymmetric, high-speed surface threats.
- Aegis Weapon System (AWS) Baseline 7.1.1.1 and the AN/SPY-1D(V) radar are not operationally suitable due to deficiencies in human systems integration, documentation, and training.

System

The DDG 51 Guided Missile Destroyer is a combatant ship equipped with:
- The AWS AN/SPY-1 three dimensional (range, altitude, and azimuth) multi-function radar
- SQQ-89 Undersea Warfare suite that includes the AN/SQS-53 sonar, SQR-19 passive towed sonar array, and the SH-60B or MH-60R Helicopter (DDG 79 and newer have a hangar to allow the ship to carry and maintain its own helicopter)
- Five-inch diameter gun
- Harpoon anti-ship cruise missiles
- The Vertical Launch System that can launch Tomahawk land attack missiles, Standard surface-to-air missiles, Evolved Sea Sparrow Missiles, and Vertical Launch Anti-Submarine Rocket missiles

Mission

The Maritime Component commander can employ DDG 51 to:
- Conduct Anti-Air Warfare, Anti-Surface Warfare, and Anti-Submarine Warfare

- Conduct land attack warfare when armed with Tomahawk missiles
- Conduct offensive and defensive warfare operations simultaneously when necessary
- Operate independently and with Carrier or Expeditionary Strike Groups as well as with other joint or coalition partners

Activity
- The Commander, Operational Test and Evaluation Force (COMOPTEVFOR) conducted operational testing and evaluation of ships with AWS Baseline 7.1.1.1 software installed (hulls 91-102) in October and November 2005.
- COMOPTEVFOR also conducted operational test and evaluation of the AN/SPY-1D(V) radar with the AWS testing.
- The DDG 51 Test and Evaluation Master Plan (TEMP) 801 is being updated for follow-on test and evaluation of the next AWS Baseline (7.1R) in DDG 51 class Destroyer hulls 103 through 112.

Assessment
- Operational testing was adequate and conducted in accordance with DOT&E-approved test plans.
- Ships with AWS Baseline 7.1.1.1, employing the new AN/SPY-1D(V) radar, have increased capability in both open ocean and littoral waters.
- Anti-air warfare effectiveness is limited due to Standard Missile reliability and performance problems.
- While some improvement was evident, the AWS continues to have limited effectiveness in littoral waters against high-speed surface threats.
- AWS Baseline 7.1.1.1 and the AN/SPY-1D(V) radar are not operationally suitable due to deficiencies in human systems integration, documentation, and training.

Recommendations

- Status of Previous Recommendations. The Navy has closed three of the four recommendations from FY05, but the following recommendation has not been resolved and requires further attention.
  FY05 #1: DOT&E recommended that the Navy complete testing of the Baseline 7.1 ships. This recommendation remains valid.
- FY06 Recommendations. The Navy should:
  1. Complete the revision of the DDG 51 TEMP for testing the AWS 7.1R baseline in DDG 51class hulls 103–112.
  2. Continue to improve the AWS ability to counter high-speed surface threats in littoral waters.
  3. Correct the Standard Missile reliability and performance deficiencies that limit air warfare effectiveness.
  4. Correct the AWS and AN/SPY-1D(V) radar training and human systems integration deficiencies in addition to providing appropriate tactical documentation to support effective combat system employment.

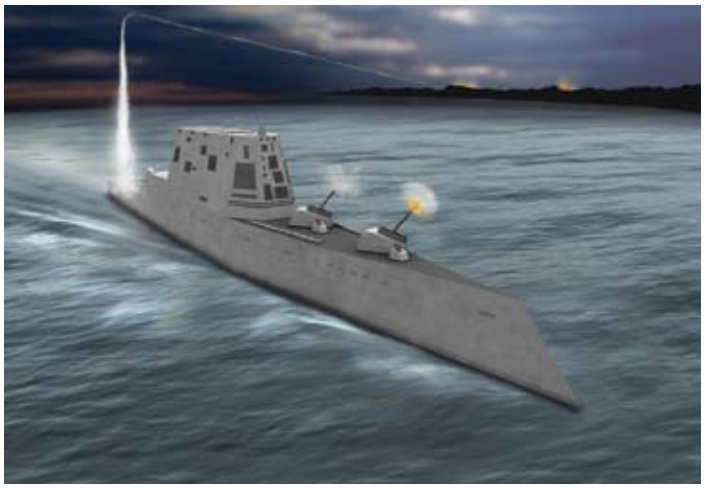
DDG 1000 *Zumwalt* Class Destroyer (formerly DD(X))

Executive Summary
- The program continued effective technology risk reduction in FY06 through developmental testing and Engineering Development Model demonstrations.
- The program is conducting an active LFT&E program to gain survivability insights.
- IOT&E is expected in 2013.

System

DDG 1000 is a new combatant ship with a hull form that is designed to be difficult to detect on radar. It is equipped with:
- Two Advanced Gun System (AGS) 155 mm guns that fire the Long-Range Land Attack Projectiles (LRLAP)
- Dual Band (X-band and S-band) radar
- Eighty vertical launch cells that can hold a mix of Tomahawk missiles, Standard (anti-air) Missiles, Vertical Launch Anti-Submarine Rockets, or Evolved Sea Sparrow Missiles
- Integrated Undersea Warfare system with high- and medium-frequency sonar to detect submarines and assist in avoiding mines
- An ability to embark and maintain MH-60R helicopters with a capacity to carry vertical take-off unmanned aerial vehicles

Mission
- The Joint Force Maritime Component Commander can employ DDG 1000 to accomplish:
  - Land Attack Warfare using LRLAP or Tomahawk cruise missiles



  - Surface Warfare
  - Anti-Air Warfare
  - Undersea Warfare
- DDG 1000 can operate independently or in conjunction with an Expeditionary or Carrier Strike Group.

Activity
- The program conducted no operational testing in FY06.
- The Navy completed the initial vulnerability assessment report in September 2005 and is actively working on modeling and simulation gaps identified in the report.
- The System Development and Demonstration phase of the LFT&E program is almost fully defined.
- Guided flight-testing of the LRLAP continued in FY06. The LRLAP design team has conducted a total of nine flight tests from a land-based test site at Point Mugu, California.
- The Multi-Function Radar was installed on the Self Defense Test Ship for observation of its performance at sea.

Assessment
- Commander, Operational Test and Evaluation Force maintains access to all developmental test events as appropriate to gain insight to DDG 1000 operational capabilities. The program has what appears to be an effective developmental test program.
- The Multi-Function Radar was observed to perform satisfactorily at sea.
- The Navy has not identified adequate facilities for measuring and calibrating magnetic, acoustic, and radar signatures, though these facilities will not be needed until approximately 2013. The Navy has not identified an appropriate range for conducting operational end-to-end testing of the AGS with LRLAP against realistic targets.
- DDG 1000 will have a crew of less than 150. This is small compared to a DDG 51 crew of more than 300. Current shore support infrastructure and Navy manpower management policies are not fully suited for the unique requirements DDG 1000 will have. DDG 1000 will lack onboard administrative and maintenance personnel and facilities traditionally assigned to ships. The Navy has not specified how shore-side logistics, administrative, and maintenance support will work, or how training and assignment strategies will ensure all personnel arrive ready to operate systems and

equipment. Several Navy initiatives and pilot programs are in progress that may address these challenges for DDG 1000.
- A high priority test resource shortfall for DDG 1000 and other ship programs including LHA 6 and CVN 21 is the lack of a Threat D-representative target. This target would act as a surrogate for a foreign weapon known to be a threat to this ship. Without it, adequate testing of the vessel's self-defense capability against anti-ship cruise missiles cannot be conducted. DOT&E will not approve the Test and Evaluation Master Plan revision recently forwarded by the Navy until the target is funded.

Recommendations
- Status of Previous Recommendations. The Navy has addressed three of the four previous recommendations. The following FY05 recommendation remains valid.

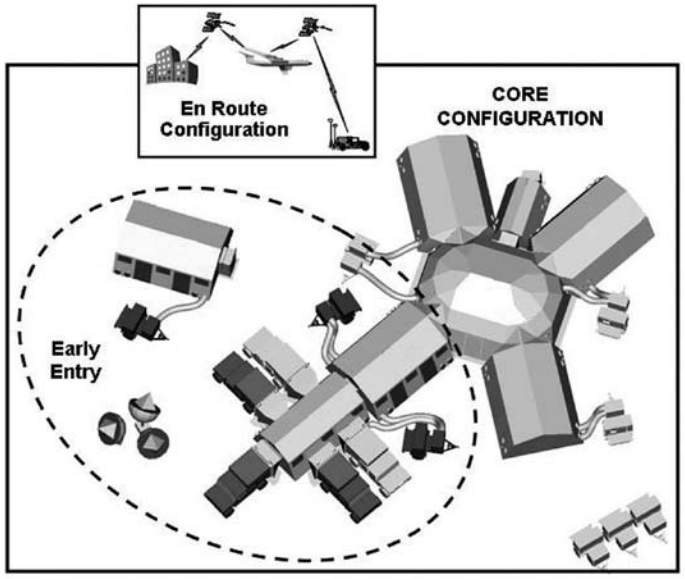
FY05 #1: The Navy should continue its detailed analysis of manpower and human capital policies to ensure DDG 1000 can be properly manned and maintained upon introduction to the Fleet.
- FY06 Recommendation.

1. The Navy should develop and field a Threat D-representative target. Delays in fielding this target puts adequate testing of DDG 1000 self defense capability at risk.

Deployable Joint Command and Control (DJC2)

Executive Summary

- The Deployable Joint Command and Control (DJC2) program successfully completed Multi-Service Operational Test and Evaluation (MOT&E) of Increment I, Spiral 1.0 Early Entry and Core configurations in June 2006 to support a Full-Rate Production Decision Review in December 2006.
- DJC2 Spiral 1.0 is assessed as operationally effective, but not operationally suitable by the Navy's Commander, Operational Test and Evaluation Force. Shortfalls in documentation, reliability and additional testing for transportability, environmental effects, and electromagnetic environmental effects not being complete in time for the report contributed to the not suitable rating.
- A risk assessment of the Increment I, Spiral 1.1 design determined that a combined developmental and operational test event (Level 2 test) would be conducted in December 2006 to support a Material Release decision in early 2007.
- DOT&E continues to work with the Joint Program Office to define appropriate levels of testing and test strategies for future spirals of the DJC2 system.



System

- DJC2 is a deployable integrated family of systems consisting of shelters, generators, environmental controls, information technology, software applications, databases, networks, and communication support systems.
- DJC2 consists of three basic configurations:
  - A 10- to 20-position En Route configuration located on an aircraft
  - A 20- to 40-position Early Entry configuration
  - A 60-position Core configuration
- The Early Entry configuration is integrated with and becomes part of the larger Core configuration.
- For Increment I, selected Combatant Commands will receive two Cores and one En Route system.
- The next development for DJC2 is Spirals 1.1 and 1.2 in Increment I. Spiral 1.2 introduces a two-man deployable Rapid Response Kit configuration for first responders and small control teams that can be carried on commercial aircraft.

Mission

- The Joint Task Force commander uses DJC2 to plan, control, coordinate, execute, and assess operations across the spectrum of conflict.
- It provides tools and environments for collaborative planning, predictive battlespace situational awareness, dynamic asset synchronization and oversight, and executive battle management and control.
- The En Route configuration allows commanders to maintain situational awareness and perform limited command and control as they transit into the theater of operations.
- The Early Entry configuration allows the command to establish communications and command and control capabilities for a small 20-man forward element immediately upon getting into the theater of operations.
- The Core configuration provides limited communications and command and control capabilities to support planning and execution tasks performed by the Standing Joint Force Headquarters staff or Joint Task Force commander.

Activity

- The Navy's Commander, Operational Test and Evaluation Force completed the operational assessment of the Increment I, Spiral 1.0 Early Entry and Core configurations in March 2006 at the Joint Forces Command, Suffolk, Virginia, during U.S. Southern Command Exercise Blue Advance 2006.
- The U.S. Southern Command Standing Joint Force Headquarters and the 612th Air Communications Squadron supported the multi-Service operational test of the Increment I, Spiral 1.0 Early Entry and Core configurations conducted in June 2006 at Davis-Monthan Air Force Base, Arizona.
- Environmental qualification testing, transportability certification testing, and portions of the electromagnetic environmental effects testing of the DJC2 Increment I, Spiral 1.0 were conducted from July - October 2006.

- Risk assessment determined the level of testing needed for Increment I, Spiral 1.1 as a combined developmental and operational test event, referred to as a Level 2 test. Testing is scheduled for December 2006.
- The DJC2 Joint Program Office moved testing and delivery of the En Route configuration to a later spiral in Increment I due to delays in the Secure En Route Communications Package – Improved (SECOMP-I) program. Testing the DJC2 En Route configuration depends upon delivery of the Army's SECOMP-I program.

Assessment

- The DJC2 Increment I, Spiral 1.0 demonstrated significant progress in resolving issues with training, communications, and logistics supportability that contributed to system de-certification for operational testing in the September 2005 MOT&E.
- The DJC2 Increment I, Spiral 1.0 successfully completed an operational assessment and the MOT&E this fiscal year to support the full-rate production decision in December 2006.
- The DJC2 supported the Standing Joint Force Headquarter operations using the Early Entry and Core configurations.
- The testing was adequate to determine that DJC2 is operationally effective, but not operationally suitable. Findings affecting the suitability assessment were documentation of preventive maintenance procedures, troubleshooting procedures, and installation of the secure Global Broadcast System; maintenance and reliability of generators; and system design issues in the areas of satellite signal strength monitoring and grounding.
- Environmental testing, conducted by the Air Force's 46th Test Squadron subsequent to the MOT&E, identified issues with snow loading and operating in extreme temperatures that require additional design work and documentation updates. The generators have challenges operating in extremely hot and cold temperatures.
- Various transportability tests, to include rail impact, conducted by the Army at Aberdeen Proving Grounds, Maryland, have identified no significant issues to date. The Program Office is expecting a transportability certification from the Surface Deployment and Distribution Command, Transporation Engineering Agency.
- A portion of the electromagnetic environmental effects testing was conducted in September at the Joint Pre-Flight Integration of Munitions and Electronic Systems test facility at Eglin Air Force Base, Florida. The remaining testing is scheduled for spring 2007. No significant problems were noted during the operational tests completed in 2006.
- The DJC2 program is implementing the DOT&E risk assessment methodology to identify appropriate levels of testing to support acquisition decisions of future spirals beginning with Increment I, Spiral 1.1.

Recommendations

- Status of Previous Recommendations. The Joint Program Office took effective action on the FY05 DOT&E recommendation and identified appropriate test venues for the operational assessment and the multi-Service operational test events. Planning for testing of future spirals and the En Route configuration is a continuing process.
- FY06 Recommendations. The Joint Program Office should:
  1. Continue application of the risk assessment process to determine appropriate levels of testing for all remaining DJC2 Increment I spirals.
  2. Complete electromagnetic environmental effects testing.
  3. Conduct an assessment of the existing generators and determine if they should be replaced.

E-2D Advanced Hawkeye (AHE) to include Radar Modernization Program (RMP)

Executive Summary
- The E-2D Advanced Hawkeye lacks a coherent test strategy.
- The Navy has not updated the Test and Evaluation Master Plan (TEMP), as recommended last year.
- The Navy must develop an adequate full-scale aerial target.
- Critical design review completed in October 2005. Production of the first System Development and Demonstration aircraft is approximately 65 percent complete.
- Milestone C is scheduled to occur during FY09 with IOT&E in FY12.

System
- The E-2D Advanced Hawkeye is a carrier-based Airborne Early Warning and Command and Control aircraft.
- Significant changes to this variant of the E-2 include replacement of the radar system, the communications suite, the mission computer, and the incorporation of an all-glass cockpit.
- The radar upgrade replaces the E-2C mechanical scan radar with a radar array that has combined mechanical and electronic scan capabilities.
- The upgraded radar provides significant improvement in Hawkeye littoral, overland, clutter management, and surveillance capabilities.

Mission
The combatant commander, whether operating from the aircraft carrier or from land, uses the E-2D Advanced Hawkeye to accomplish the following missions:
- Theater air and missile sensing and early warning

- Battlefield management, command, and control
- Acquisition, tracking, and targeting of surface warfare contacts, in addition to the ability to prosecute targets over land
- Surveillance of littoral area objectives and targets
- Tracking of strike warfare assets

Activity
- Critical design review completed in October 2005.
- The Joint Staff certified the E-2 Information Support Plan in September 2006.
- Production of the two System Development and Demonstration aircraft is approximately 65 percent complete and on track for first flight in the fourth quarter of FY07.
- The Advanced Hawkeye program office completed calibrated loads evaluation on an E-2C aircraft as risk reduction for the increase in the gross weight of the E-2D airframe.
- Additional risk reduction flights, using the Advanced Development Model radar system aboard the NC-130H, were scheduled to begin in the fourth quarter of FY06, but have been moved to the second quarter of FY07.

Assessment
- Due to the extensive changes in the E-2C Hawkeye 2000 beyond the Radar Modernization Program, a TEMP update is needed to address testing of the entire aircraft. An update to the E-2D Advanced Hawkeye TEMP was due February 2004. Currently, there is no Joint Requirements Document that covers the entire platform. Additionally, there is no Concept of Operations that outlines how the expanded capability of the E-2D Advanced Hawkeye will be employed. Both are needed to ensure an adequate test strategy is formulated. The Navy initiated development of these documents with a delivery goal of the third quarter of FY07.
- Critical aspects of E-2D Advanced Hawkeye operational testing will include joint interoperability and information

assurance. The current TEMP does not include the joint interoperability and information assurance aspects outlined in the updated Information Support Plan, nor does it include the resources to test them adequately. The current TEMP does not outline the specific test strategy or resources to adequately assess the E-2D Advanced Hawkeye's increased capabilities, including a full-scale aerial drone target, that adequately represents fifth generation threat aircraft characteristics. The strategy and resources are required to conduct an adequate operational test.

Recommendations

- Status of Previous Recommendations.
  FY05 #1, 2, 3: DOT&E recommended that the Navy update the TEMP to include plans for addressing information assurance, joint interoperability, and adequate resourcing of test assets. These recommendations are still valid.
- FY06 Recommendations. The Navy must:
  1. Complete a Joint Requirements Document that encompasses the entire E-2D Advanced Hawkeye.
  2. Complete a Concept of Operations.
  3. Ensure the TEMP update includes an integrated test strategy per direction from Commander, Operational Test and Evaluation Force.
  4. Develop an adequate full-scale aerial target.

EA-6B Upgrades / Improved Capability (ICAP) III and Low Band Transmitter (LBT)

Executive Summary

- The Navy's improvement to the EA-6B aircrew's battle-space awareness was demonstrated in the Improved Capability (ICAP) III Block 2 Follow-on Test and Evaluation (FOT&E) conducted in FY06. This included assessment of the ICAP III's digital link/Multi-Function Information Distribution System (MIDS).
- The ICAP III weapons system provides better crew situational awareness and improved electronic threat, identification, and locating capability for the suppression of enemy radar-guided threats compared to the legacy EA-6B ICAP II system.
- The Navy's second operational assessment of a new Low Band Transmitter (LBT) antenna configuration demonstrated a strong path to achieve future operational effectiveness. The demonstrated poor LBT reliability and one safety concern indicate that LBT suitability needs significant improvement prior to the FY07 LBT IOT&E.
- Limited testing during the Navy's Quick Reaction Assessment of the LBT consisted of only two flights. LBT integrated with the aircraft systems demonstrated on one of the two flights that it can be effective for its intended mission. LBT effectiveness was not demonstrated on the other flight due to LBT reliability issues.

System

- The legacy EA-6B ICAP II aircraft is a four seat, carrier/land-based, tactical jet aircraft with an onboard receiver, external jamming pods, a communication jammer, and a High Speed Anti-Radiation Missile (HARM).
- EA-6B ICAP III improvements are designed to provide:
  - Enhanced reliability
  - A new receiver, processor, and antenna system (ALQ-218)
  - New tactical displays/interfaces
  - New joint mission planner
  - Better external communications
- LBT improvements over legacy low band pods are designed to:
  - Expand frequency coverage
  - Provide better reliability - simplified design replaces three low-reliability transmitters

Mission

- Combatant commanders use the EA-6B to support friendly air, ground, and sea operations by suppressing enemy radars and communications.
- Both EA-6B ICAP II and ICAP III capabilities allow suppression of enemy radar-guided threats with HARM and jamming of integrated air defenses, in addition to supporting emerging asymmetric missions.
- EA-6B ICAP III mission improvements include:
  - Counters to emerging threats
  - More flexible and effective protection of strike aircraft
  - More accurate HARM targeting
  - Improved battle management
  - Selective reactive jamming capability to allow automatic detection and jamming of threats as they become active
  - Streamlined mission planning and post flight analysis
- LBT and other EA-6B assets jam radars and communications.

Activity

EA-6B ICAP III

- DOT&E provided a report to Congress in early FY06 that assessed the system as operationally effective and suitable. This supported the Navy's FY06 ICAP III full-rate production decision and initial operational deployments of EA-6B ICAP III squadrons, including the first EA-6Bs equipped with MIDS connectivity.
- The Navy conducted FOT&E of the ICAP III Block 2 configuration in FY06 to assess the integration of the MIDS,

early versions of the new Joint Mission Planning System (JMPS), and other improvements. This testing was conducted as part of the Air Force's Red Flag large force exercise at Nellis AFB, Las Vegas, Nevada; the Naval Air Warfare Center, Patuxent River, Maryland; and the Naval Air Weapons Center, China Lake, California.
- The Navy assessed the functionality of an early version of the JMPS for EA-6B ICAP III as part of the FY06 FOT&E, while separately commencing IOT&E of the production JMPS on EA-6B ICAP II aircraft.
- The Navy initiated planning for the EA-6B's upgraded USQ-113 (V) 4 communications jammer and ICAP III Block 3, which incorporates LBT functionality.
- EA-6B ICAP III testing in FY06 was conducted in accordance with DOT&E-approved TEMP (FY06 REV A) and test plans.

Low Band Transmitter (LBT)
- The LBT is in System Development and Demonstration phase in preparation for separate early operational capability and full-rate production decisions in FY07.
- The Navy conducted a second operational assessment on LBT Phase II in FY06 at the Naval Air Warfare Center, China Lake, California. The purpose of this test was to assess potential effectiveness of the new horizontal high-band antenna for radar jamming, while also continuing suitability evaluations.
- A Quick Reaction Assessment of LBT, designed to support specific operational missions, was conducted late in FY06 on legacy EA-6B ICAP II aircraft that incorporated software upgrades needed to support LBT.
- The Navy continued planning for a LBT IOT&E in FY07.
- LBT testing in FY06 was conducted in accordance with DOT&E-approved TEMP and test plans.

Assessment

EA-6B ICAP III
- The Navy's improvement to the EA-6B aircrew's battle-space awareness was demonstrated in the ICAP III Block 2 FOT&E. This included assessment of the ICAP III's digital link/MIDS. A Navy operational test report is expected early in FY07 after the test completes.
- The tactical employment for EA-6B ICAP III selective reactive jamming is still not mature.
- The ICAP III weapons system combines better crew situational awareness with improved speed and accuracy of electronic threat detection, identification, and locating to enhance the suppression of enemy radar-guided threats compared to legacy EA-6B ICAP II systems.
- The current process of constructing mission intelligence files does not provide EA-6B operators with sufficient confidence in emitter identification accuracy and intercept performance for uncharacterized threats.
- Operational testing revealed that integration of MIDS with the selective reactive jamming capability to achieve autonomous functionality would benefit the warfighter.
- Although the Navy's report is not finalized, functionality of JMPS on the EA-6B ICAP III appears adequate, but usage for ICAP IIII test sorties revealed deficiencies that were not apparent when the simpler legacy EA-6B ICAP II mission planning was conducted.
- The Navy's Advanced Multiple Emitter Environment Simulators (AMES III) has been unable to consistently support assessment of the ICAP III's advanced capabilities for which it was designed. AMES III is a laboratory threat signal simulator whose full capability is also critical to timely testing of the EA-18G.

Low Band Transmitter (LBT)
- The Navy's second operational assessment in FY06 of LBT's horizontally polarized high-band antenna configuration demonstrated a strong path to achieve future operational effectiveness. Navy testing revealed poor LBT reliability and one safety issue. This test indicates LBT suitability needs significant improvement prior to the FY07 LBT IOT&E.
- Limited testing during the Navy's Quick Reaction Assessment of the LBT consisted of only two flights. LBT integrated with the aircraft systems demonstrated on one of the two flights that it can be effective for its intended mission. LBT effectiveness was not demonstrated on the other flight due to LBT reliability issues.

Recommendations
- Status of Previous Recommendations. One of the four issues from previous DOT&E recommendations is unresolved. FY05 #1: The Navy should address the deficiencies found in the process used to develop EA-6B ICAP III mission intelligence files. This recommendation remains valid.
- FY06 Recommendations.

  EA-6B ICAP III. The Navy should**:**
  1. Continue tactics development to operationally employ the ICAP III's selective reactive jamming capability.
  2. Correct Advanced Multiple Environment Simulator III threat simulator deficiencies to adequately support future EA-6B and EA-18G testing.
  3. Although above specified requirements, the Navy should consider integrating MIDS with the selective reactive jamming capability to achieve autonomous functionality.

  Low Band Transmitter (LBT). The Navy should:
  1. Improve LBT reliability to support a LBT early operational capability and entry into IOT&E.
  2. Update the TEMP in FY07 to support planning for the IOT&E.

EA-18G Growler (Electronic Attack Variant of F/A-18)

Executive Summary
- The Navy flew the first government flight of the EA-18G ahead of schedule in October 2006.
- The Navy's testing focused on supporting the 3QFY07 Milestone C/low-rate initial production (LRIP) decision.
- The schedule remains aggressive because the Navy plans to fully assess the primary risk areas to achieve initial operational capability in FY09. However, EA-18G testing, as outlined in the 2005 Test and Evaluation Master Plan (TEMP) (Revision A), is adequate to support the Milestone C/LRIP decision.
- The primary EA-18G risks center on integrating the Airborne Electronic Attack (AEA) weapons system onto the F/A-18F platform, developing an entirely new digital auxiliary receiver system, incorporating a new communications countermeasures set, and employing the EA-18G weapons system with a two-person crew instead of the four-person crew in the EA-6B.
- The approved TEMP (Revision A) incorporated event-based performance assessments prior to each major acquisition decision point to assess system and integration maturity growth.

System
- The EA-18G Growler is a carrier-based radar and communication jammer.
- The two-seat EA-18G replaces the Navy's four-seat EA-6B. The new ALQ-218 receiver, improved connectivity, and linked displays are the primary design features implemented to reduce the operator workload in support of the EA-18G's two-person crew.
- Integration of AEA capability into the F/A-18F includes:
  - Modified EA-6B Improved Capability (ICAP) III ALQ-218 receiver system
  - Advanced crew station
  - Legacy ALQ-99 jamming pods
  - New communications countermeasures receiver set
  - Expanded digital Link 16 communications network
  - Electronic Attack Unit
  - Voice Interference Cancellation System

- Additional systems include:
  - Active Electronically Scanned Array (AESA) radar
  - Joint Helmet Mounted Cueing System
  - High Speed Anti-radiation Missile (HARM)
  - AIM -120 Advanced Medium-Range Air-to-Air Missile (AMRAAM)

Mission
- Combatant commanders use the EA-18G to support friendly air, ground, and sea operations by suppressing enemy radar and communications.
- EA-18G capabilities include:
  - Jamming integrated air defenses
  - Supporting non-integrated air defense missions and emerging non-lethal target sets
  - Enhancing crew situational awareness and mission management
  - Enhancing connectivity to national, theater, and tactical strike assets
  - Providing the operators with enhanced lethal suppression through more accurate HARM targeting
  - Providing the EA-18G crew air-to-air self-protection with AMRAAM

Activity
- The EA-18G is in the System Development and Demonstration phase with testing focused on supporting the 3QFY07 Milestone C decision.
- EA-18G acceptance and ground testing began in FY06.
- The primary contractor flew the first EA-18G in August 2006 with a Naval Flight Officer onboard.
- The Navy flew the first government flight of the EA-18G one month ahead of schedule in October 2006.
- The Navy conducted aero-mechanical ground and flight testing on modified F/A-18 E/F testbed aircraft to determine EA-18G flying qualities and carrier landing loads qualification.

- The Navy's operational test agency, Commander, Operational Test and Evaluation Force, began detailed planning for the EA-18G operational assessment, which will support the FY07 Milestone-C/LRIP decision.
- A Design Advisory Group comprised of fleet operators, test community representatives, and contractors identified and prioritized crew mission tasks.
- The Navy initiated a second revised TEMP (Revision B) to support EA-18G testing under the Integrated Test and Evaluation (IT&E) concept.
- The FY07 Defense Budget reduced the FY07 EA-18G LRIP from 12 to 8 aircraft, while the FY08 LRIP quantities remained at 18. Total LRIP quantities are 26 of the 90 production EA-18G aircraft.
- FY06 testing was conducted in accordance with the USD (AT&L) and DOT&E approved TEMP (Revision A).

Assessment

- The schedule remains aggressive because the Navy plans to fully assess the primary risk areas to achieve initial operational capability in FY09. However, EA-18G testing as outlined in the 2005 TEMP (Revision A), is adequate to support the Milestone C/LRIP decision. The EA-18G program's testing is on schedule based on early delivery of the first EA-18G (EA-1), software build timing, and adequate operational assessment planning. Additionally, the Navy recently accelerated delivery of the second mission software build (build 1.5) to better support the in-flight spot jamming assessment for the Milestone C/LRIP decision.
- The primary EA-18G risks center on integrating the AEA weapons system onto the F/A-18F platform. Specific risk areas include:
  - Effective operation of the ALQ-99 external jammer pods and ALQ-218 wingtip pods in the high vibration F/A-18F under-wing and wing tip environments
  - Modified F/A-18E/F mission planning system
  - New communications countermeasures set
  - Revised ALQ-218 receiver (new digital auxiliary receiver) design and component modifications for form and fit
  - Operator workload of the two man crew in electronic attack and electronic support missions currently performed by the four-person EA-6B
- The Navy will not test all primary integration risk areas prior to Milestone C.
  - The Navy will test the EA-18's basic threat signal identification and simple jamming in-flight, while utilizing the initial version of the mission planning system and two-person crew prior to Milestone C.
  - The Navy will not test the new communications countermeasures set functionality, low band functionality, precision threat locating, and complex threat identification and jamming prior to Milestone C.
- The approved TEMP (Revision A) incorporated event-based performance assessments prior to each major program decision point to assess system and integration maturity.
- The approved TEMP describes the general need for large force exercises but does not precisely identify the key resources needed through IOT&E to support evaluation of the EA-18G missions described in the Navy's EA-18G concept of operations.
- USD (AT&L) and DOT&E approved the TEMP (Revision A) to support Milestone C but directed that a second revised TEMP (Revision B) be approved by OSD prior to Milestone C. That TEMP should incorporate more defined long-term operational suitability plans.
- The draft TEMP (Revision B), which introduces an integrated test and evaluation strategy, is expected to be submitted to OSD in 1QFY07 for approval. This draft TEMP preserves adequate independent operational testing, while offering the benefits of early operational test personnel involvement, improved test efficiency, and early identification of problems.

Recommendations

- Status of Previous Recommendations. The Navy has taken effective action on the FY05 DOT&E recommendations.
- FY06 Recommendations. The Navy should:
  1. Provide a revised TEMP prior to Milestone C that adequately defines operational suitability plans through IOT&E.
  2. Incorporate detailed resource requirements available via large force exercises to support evaluation of the EA-18G missions described in the Navy's EA-18G concept of operations.

Expeditionary Fighting Vehicle (EFV)

Executive Summary
- The Expeditionary Fighting Vehicle (EFV) is intended to replace the aging Amphibious Assault Vehicle.
- A recent operational assessment demonstrated poor system reliability, availability, and maintainability.
- The operational assessment also indicated an inability to get the EFV on plane reliably at high operating weights.
- Because the test vehicles are rapidly aging, new developmental vehicles should be produced and tested. Only if improved reliability can be demonstrated should the program proceed into low-rate initial production (LRIP).

System
- The EFV is an amphibious combat vehicle for the U. S. Marine Corps.
- The EFV is intended to be capable of high-speed water transit at over 20 knots and have land mobility capabilities comparable to the M1A1/2 tank after transitioning out of the water.
- The EFVP (personnel variant) is operated by a crew of 3 and carries a reinforced rifle squad of 17 Marines.
- The EFVC (command variant) is operated by a crew of three and transports a commander and his staff (nine Marines).
- The EFVP carries a stabilized 30 mm chain gun and coaxial machine gun in the turret.

Mission
- Units equipped with EFVs will transport elements of an amphibious assault force from ships over the horizon to inland objectives.

- The personnel variant will act as an armored fighting vehicle ashore in support of land combat providing transportation, protection, and direct fire support.
- The command variant will provide command, control, and communications capabilities to support ground combat tactical command posts.

Activity
- The Marine Corps Operational Test and Evaluation Activity conducted an operational assessment in 2006 using three EFVPs and one EFVC, all System Development and Demonstration prototypes. Operational assessment events included gunnery, amphibious operations, sustained operations on land, and force-on-force engagements against a simulated threat unit.
- LFT&E activities in FY06 included technical and validation testing of redesigned armor components and subsystem technical testing.

Assessment
- EFV did not demonstrate successful mission performance during the operational assessment. The system was rarely able to complete planned end-to-end operational mission profiles during the amphibious operations, land mobility, and gunnery phases of the operational assessment.
- Low reliability and the resultant poor system availability were major factors contributing to the unsuccessful mission performance. Reliability and availability were well below user requirements and program office predictions derived from the EFV's reliability growth plan. In addition, the maintenance burden was very high, despite significant and unplanned levels of contractor maintenance personnel augmentation during the test. Poor vehicle performance precluded gaining expected operational insight into tactics, techniques, and procedures for the EFV.
- Water performance, a Key Performance Parameter, is questionable. Despite the removal of approximately 2,000 pounds of armor before the start of the operational assessment,

EFVs could not consistently get on plane when combat-loaded unless the drivers employed a "hands-free" procedure in which vehicle drivers had to accelerate without steering. This technique typically led to large, unpredictable turns in the water. This is an unsafe condition for combat. The program has not demonstrated that the vehicle design can be modified to both get on plane and maintain the required ballistic protection.

- There were some encouraging results in the operational assessment, however. Once on plane, the EFV was able to meet the high-water speed requirement. Once ashore, the vehicle was able to keep up with M1A1 tanks. If poor reliability is fixed, the EFV's 30 mm autocannon and thermal sight could provide an improvement in combat capability compared to the currently fielded amphibious assault vehicle. However, the EFV did not show that it could dependably provide these capabilities in an operational environment.

Recommendations

- Status of Previous Recommendations. The Marine Corps took effective action on DOT&E's FY05 recommendation.
- FY06 Recommendations.
  1. Although the complete results from the EFV operational assessment are not yet available, enough information is known that DOT&E does not recommend that the program proceed now into production in accordance with the approved acquisition strategy.
  2. Before proceeding into LRIP, the Marine Corps should conduct a second operational assessment on the current System Development and Demonstration-phase prototypes, modified with planned reliability-related upgrades, to demonstrate improved reliability, availability, and maintainability (RAM).
     - The operational assessment would not have to be as lengthy as the first operational assessment, but should include the same type of end-to-end missions.
     - Results of this operational testing will be directly comparable to data from the recently completed operational assessment, allowing informed decisions to be made concerning the effectiveness of the fixes applied, and the likelihood of the system ultimately achieving the required reliability.
  3. If ongoing programming and budget discussions dictate production of new developmental prototypes in the latest design configuration, then an operational assessment on those vehicles should also be conducted to confirm correction of RAM and weight/power issues before a Milestone C.
     - This lot of vehicles may not be capable of demonstrating the full required performance specified in the Capability Production Document, but should demonstrate measurable growth in performance and reliability towards the required values.
     - Vehicle fabrication, acceptance, and developmental test schedules should support completion of this operational assessment, and reporting on its results, in time to support the subsequent production decision point.
  4. Following successful completion of an operational assessment and verification of entrance criteria into LRIP, 14 LRIP vehicles should be provided to conduct IOT&E and 3 LRIP vehicles provided to support LFT&E. Prototype vehicles fabricated in the FY07-08 timeframe may not be production-representative and therefore not adequate for IOT&E or LFT&E.
  5. The Marine Corps and the EFV program should appoint an executive-level independent review panel, like the Blue-Ribbon Panel for the V-22. The panel should examine at least the following:
     - Vehicle RAM
     - Vehicle design stability and producibility
     - Vehicle weight and balance
     - Program schedule realism

F/A-18 E/F Hornet Naval Strike Fighter (All Upgrades)

Executive Summary
- Operational evaluation of the latest F/A-18E/F Software Configuration Set (SCS), H3E, began in June 2006 following a year-long period of integrated test.
- Testing of both the Advanced Targeting and Designation Forward-Looking Infrared (ATFLIR) system and the Shared Reconnaissance Pod (SHARP) continued throughout 2006.
- The Test and Evaluation Master Plan (TEMP) for SCS 20X was signed by DOT&E in September 2006.

System
- The Super Hornet is replacing earlier F/A-18 Hornets and F-14 Tomcats in the Navy's carrier air wings. The F/A-18E is a single-seat aircraft and the F model has two seats.
- The H3E software upgrade provides functionality essential to the integration and operation of all Super Hornet Block 2 hardware upgrades. These upgrades provide capabilities including:
  - Single pass multiple targeting for Global Positioning System (GPS) weapons
  - Use of all AIM-9 series infrared-guided missiles, AIM-120 and AIM-7 radar-guided missiles
  - Off-board target designation
  - Improved data link target coordinate precision
  - Implementation of air-to-ground target points
- The APG-79 radar is one of several sub-systems that comprise the F/A-18E/F planned common avionics suite upgrade (Block 2), which will be integrated into Lot 26 aircraft and beyond.
- The aircraft carries the ATFLIR system that the aircrew uses in order to locate surface and airborne targets. The ATFLIR will have an infrared marker and laser target designator/ranger capability in addition to being able to provide infrared and/or electro-optical streaming video via data link. The laser target designator/ranger provides the F/A-18E/F with the ability to obtain GPS-guided weapons quality target coordinates. The laser designator/ranger can also be used for delivery of laser-guided bombs while the infrared marker provides air-to-ground cueing to both ground and aerial observers equipped with night vision devices.
- The Super Hornet is also fitted with the Shared Reconnaissance Pod, the Multi-Function Information Distribution System for Link 16 tactical data link connectivity, the Joint Helmet Mounted Cueing System, and the Integrated Defensive Electronic Countermeasures system. The Joint Mission Planning System–Maritime is the fleet mission planning system.

Mission
- Carrier Strike Group Commanders and Joint Force Air Component Commanders use the F/A-18E/F to:
  - Conduct air combat missions
  - Attack ground targets with most of the U.S. inventory of GPS-guided, laser-guided, and free-fall weapons, as well as the 20 mm cannon
  - Fire the High Speed Anti-Radiation missile (HARM) at enemy radar systems
  - Provide in-flight refueling for other tactical aircraft
- The SHARP system provides the fleet with an organic tactical reconnaissance capability available for tasking by the Carrier Strike Group Commander and supported Joint Task Force.

Activity
- DOT&E approved the TEMP, Revision D, for the H3E software upgrade and Follow-on Test and Evaluation (FOT&E) 4 in December 2005. The Operational Test Addendum to the Integrated Test Plan was signed in February 2006. Revision E of the TEMP is currently being coordinated to address the H4E Software Qualification Testing and F/A-18E/F FOT&E 5. Since this test period is intended to resolve the remaining two deferrals from the F/A-18E/F

operational evaluation, this will be the last scheduled FOT&E period for the program.
- The dedicated operational test period for the latest F/A-18E/F SCS, H3E began in June 2006 and is ongoing. Thus far, the operational test period has included interoperability testing conducted during an Air Force Weapons School Mission Effectiveness phase and an air-to-air weapons detachment to Naval Air Station Key West, Florida.
- Other systems concurrently in test on the F/A-18E/F include:
  - Joint Mission Planning System – Maritime (reported on separately in this annual report)
  - Aft-cockpit Joint Helmet Mounted Cueing System
  - Aft-cockpit crew station improvements
  - ATFLIR Block 2, ALR-67(v)3 radar warning receiver
  - Integrated Defensive Electronic Countermeasure Block 3 (reported on separately in this annual report)
  - APG-79 Active Electronically Scanned Array radar (reported on separately in this annual report)
  - AIM-120 and AIM-9X (reported on separately in this annual report)
  - Multi-Function Information Distribution System (reported on separately in this annual report)
- The Navy conducted SHARP operational evaluation (OPEVAL) from August 16 - November 3, 2005, for the Medium Altitude Sensor. An additional period from February 28 - March 9, 2006, was required to re-rate OPEVAL imagery using the National Imagery Interpretability Rating Scale (NIIRS). The High Altitude Sensor will be tested in 2007.
- The Navy conducted Quick Reaction Assessments for the ATFLIR Data Link and the Infrared Marker. A Developmental Test Assist for the radar warning receiver ALR-67(v)3 was conducted during FY06.
- The Navy began initial planning and development for the F/A-18E/F SCS H4E TEMP and its associated Test Plan during 4QFY06.

Assessment
- The F/A-18E/F Super Hornet is a system-of-systems, which integrates capabilities provided by ATFLIR, Joint Helmet Cueing System, SHARP, and each new software configuration set. It is paramount that all of these systems interoperate properly in order to allow for optimal operational effectiveness and suitability.
- The Navy issued Fleet Releases this year for SCS H2E+, ATFLIR video downlink capability, and the Joint Helmet Mounted Cueing System on Lot 23-29 aircraft. They also approved a verification of correction of deficiencies for the voice terminal functions of the Multi-Function Information Distribution System. As of this year, the Super Hornet now has a fully integrated Joint Helmet Mounted Cueing System and AIM-9X capability.
- The Navy rated the SHARP Medium Altitude Sensor as operationally effective, but not operationally suitable upon completion of OPEVAL. The Navy did not recommend Fleet initial operational capability at this time.
- The H3E software upgrade is still in test; however, the Navy issued a number of anomaly reports concerning weapons integration deficiencies with the AIM-120 missile.
- The risk in the SCS H4E timeframe is that all of the cost and schedule will be consumed without having reduced or minimized the outstanding deficiencies.

Recommendations
- Status of Previous Recommendations. The FY05 DOT&E recommendations remain valid:
  FY05 #1: DOT&E recommended that Commander, Operational Test Force continue its efforts to refine and codify its Integrated Test Framework for use by other Navy programs in future testing. An established process for handling the administrative procedures is still being formalized.
  FY05 #2: DOT&E recommended that the Navy strengthen efforts to relieve the shortages of trained personnel at the test squadrons at China Lake, California. Progress was made in FY06 towards relieving trained maintenance personnel shortages within both VX-9 and VX-31. However, planned VX-9 aviator staffing for FY07 is forecasted to become critical.
- FY06 Recommendations. The Navy must:
  1. Ensure that program manager funding of follow-on testing for SCS H4E is not reduced and that all deficiencies are addressed prior to proceeding to follow-on test and evaluation.
  2. Ensure that adequate test resources (ATFLIR and SHARP) are made available to VX-9 during the operational evaluation of SCS 20X and SCS H4E. The program manager must ensure that these resources are included in the H4E TEMP.

H-1 Upgrades (4BW/4BN) – U.S. Marine Corps Upgrade to AH-1W Attack Helicopter and UH-1N Utility Helicopter

Executive Summary
- The program to upgrade two U.S. Marine Corps H-1 aircraft is nearing a full-rate production decision after 10 years in development.
- Poor subsystem performance, integration, and availability adversely impacted mission effectiveness and suitability in operational testing.
- Operational testing will continue in FY07 after improvements to the current design are implemented.

System
- This program upgrades two U.S. Marine Corps H-1 aircraft:
  - The AH-1W attack helicopter becomes the AH-1Z
  - The UH-1N utility helicopter becomes the UH-1Y
- The aircraft have identical twin engines, drive trains, four-bladed rotors, tail sections, digital cockpits, and helmet-mounted sight displays (HMSD).
- The AH-1Z has a new high-fidelity targeting sensor for delivery of air-to-ground and air-to-air missiles, rockets, and guns.
- The UH-1Y has twice the payload and range of legacy UH-1N aircraft; it can deliver 8 combat-ready Marines 110 nautical miles and return without refueling.

Mission
- Marine light/attack helicopter squadron detachments are typically deployed with a mixture of UH-1 and AH-1 helicopters.

- Detachments equipped with the AH-1Z attack helicopter conduct rotary-wing close air support, anti-armor, armed escort, armed/visual reconnaissance, and fire support coordination missions.
- Detachments equipped with the UH-1Y utility helicopter conduct command, control, assault support, escort, air reconnaissance, and aeromedical evacuation missions.

Activity
- Operational Evaluation Phase One began on May 9, 2006, and is ongoing. The test is using two UH-1Y and two AH-1Z developmental aircraft at the Naval Air Warfare Center, China Lake, California, and western test ranges. Phase Two operational testing will occur in late FY07 to support a full-rate production decision in FY08.
- Live Fire testing for the AH-1Z and UH-1Y completed this year. The LFT&E strategy included testing of both airframes, as well as taking advantage of the significant commonality between aircraft. Full-up system-level Live Fire test of the AH-1Z completed in June 2006. For this test, the Navy shot an operating helicopter, loaded with weapons and fuel, in a captive hover at the Naval Air Warfare Center, China Lake, California. The Navy tested the UH-1Y in a slightly less loaded, "nearly" full-up system-level Live Fire test in March 2006. Analysis of the results continues, and DOT&E will publish an assessment in a combined Operational Test/ Live Fire Test report in FY07.

Assessment
- While the UH-1Y is capable of substantially better lift capacity than the aircraft it replaces, system availability during OT&E has been unexpectedly low. More analysis is needed, but leading causes of low readiness include parts availability and a significant number of main rotor yoke, tail rotor assembly, and intermediate gearbox failures.
- AH-1Z effectiveness has been limited by poor Targeting Sight System reliability, excessive pilot workload to use the system improvements, and restrictions in rocket delivery rate of fire and airspeed.
- Employment of both aircraft has been limited during OT&E by poor performance of a key weapon system upgrade, the HMSD. The visual acuity of the HMSD does not support

shipboard landings at night, depth perception cues are misleading, and HMSD components are not reliable. HMSD performance was so poor that the Marine Corps opted to revert to an existing night vision system for future OT&E and fielding.

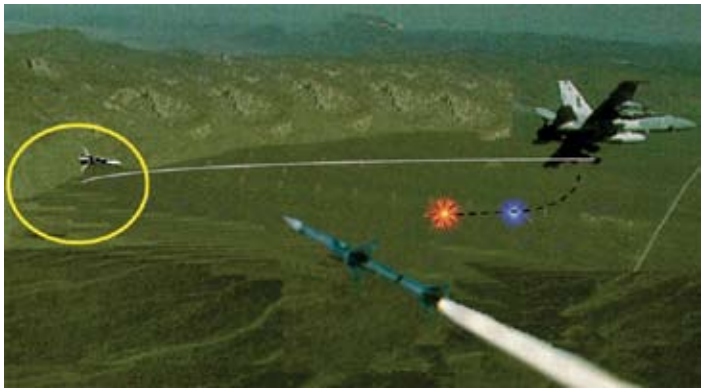
Recommendations

- Status of Previous Recommendations. The FY05 recommendations remain valid.
  FY05 #1: The program should continue its pursuit to fix HMSD deficiencies as it develops the optimized Topowl configuration HMSD.
  FY05 #2: The program should conduct additional developmental testing of infrared signature, radar cross section, and aircraft survivability equipment.
  FY05 #3: The program must have appropriate publications available for operational evaluation.
- FY06 Recommendations.
  1. For the UH-1Y, the Navy should identify and correct the sources of low system readiness.
  2. For the AH-1Z, the Navy should identify and correct the sources of Targeting Sight System failures:
     - Develop software that reduces pilot workload, especially during weapons employment
     - Enable the rapid firing of rockets (current restriction is 2 seconds between rockets).

Integrated Defensive Electronic Countermeasure (IDECM)

Executive Summary

- The Navy commenced Integrated Defensive Electronic Countermeasures (IDECM) Block III (IB-3) IOT&E in June 2006 to determine the operational effectiveness and suitability of the system as installed in the F/A-18 E/F. This supports a 2QFY07 Milestone III full-rate production decision for IB-3's new off-board electronic jammer, the ALE-55 Fiber Optic Towed Decoy.
- The Navy suspended the IB-3 IOT&E flight testing in September 2006 because of significant reliability problems that appeared early in operational test.
- The Navy should improve ALE-55 Fiber Optic Towed Decoy reliability prior to resuming IOT&E.



System

- The IDECM system is a radio frequency, self-protection electronic countermeasure suite on F/A-18 E/F aircraft. The system is comprised of onboard components, which receive and jam radar signals, and off-board electronic jammers.
- There are three IDECM variants: Block I (IB-1), Block II (IB-2) and Block III (IB-3). All three variants combine an onboard radio frequency self-protection receiver and jammer installed on the F/A-18 with an expendable towed decoy that functions as an off-board self-protection radio frequency jammer.
  - IB-1 combined the legacy onboard system (ALQ-165) with the legacy (ALE-50) off-board towed decoyed (fielded FY02).
  - IB-2 combined the improved onboard system (ALQ-214) with the legacy (ALE-50) off-board towed decoy (fielded FY04).
  - IB-3 combines the improved onboard jammer (ALQ-214) with the new (ALE-55) off-board fiber optic towed decoy.

Mission

- Combatant commanders will use IDECM to improve the survivability of Navy F/A-18 E/F strike aircraft against radio frequency guided threats while on air-to-air and air-to-ground missions.
- IB-3 adds an ALE-55 Fiber Optic Towed Decoy that is more integrated with the advanced onboard receiver/jammer (ALQ-214). This provides a complex off-board jamming capability to increase survivability for the warfighter against modern radar-guided threats.

Activity

- In FY06, the Navy began dedicated flight testing of IB-3 on the F/A-18 E/F. The Navy used open air flight testing to assess safe flying qualities of the fiber optic towed decoy, while using laboratory and flight tests to evaluate on- and off-board system jamming effectiveness in challenging mission environments.
- Additionally, the Navy used a science and technology resource, the Airborne Seeker Test Bed, to qualitatively assess IB-3 effectiveness against modern radar-guided threats with complex guidance systems.
- The Navy commenced IB-3 IOT&E in June 2006 to determine the operational effectiveness and suitability of the system as installed in the F/A-18 E/F in support of a 2QFY07 Milestone III full-rate production decision.
- The Navy suspended IB-3 IOT&E flight testing in September 2006 because of significant reliability problems that appeared early in operational testing.
- IDECM testing was conducted at:
  - The Naval Air Warfare Center's Electronic Combat Simulator Emitter Laboratory (ECSEL) in Point Mugu, California
  - The Naval Air Warfare Center's Electronic Combat Range (ECR) in China Lake, California

  - The Air Force's Electronic Warfare Evaluation Simulator (AFEWES) in Fort Worth, Texas
  - The Air Force's Nevada Test and Training Range (NTTR)
- DOT&E approved the Navy's revised Test and Evaluation Master Plan (TEMP) and the IB-3 IOT&E Plan in FY06.
- IDECM testing in FY06 was conducted in accordance with the DOT&E-approved TEMP and test plans.

Assessment

- IDECM demonstrated reliability well below expectations (three of four decoys failed upon being expended), which caused the Navy to suspend the IB-3 IOT&E. The Navy will make a decision to resume IOT&E or stop test early in FY07, following analysis of the primary failure mode.
- Only 53 percent of key threats are available for high quality testing due to test resource availability on open air ranges and in hardware-in-the-loop facilities. However, the four main categories of threats will be adequately represented via development and operational tests conducted prior to the full-rate production decision.
- The primary test resource limitation is the lack of a modern threat using a complex guidance system, which was needed to provide a full quantitative assessment of the primary IB-3 key performance parameter. This limitation is noted in the approved TEMP, and the adequate alternative method of test was utilized to generate a qualitative assessment. Test resources for threats using more traditional guidance systems have been used to test IDECM Block III.
- The Navy's IB-3 fiber optic towed decoy has demonstrated improved operational effectiveness compared to the legacy ALE-50 towed decoy, but reliability is adversely impacting operational effectiveness.

Recommendations

- Status of Previous Recommendations. The Navy has taken effective action on the FY05 DOT&E recommendations.
- FY06 Recommendations.
  1. The Navy should improve ALE-55 Fiber Optic Towed Decoy reliability prior to resuming the IOT&E.
  2. The Services should provide a validated end-to-end advanced radio frequency guided threat test capability to quantitatively assess airborne self-protection suites.

Joint Standoff Weapon (JSOW) Baseline Variant and Unitary Warhead Variant

Executive Summary

- The Navy and Air Force undertook evaluation of new operational flight program (OFP) software common to both Joint Standoff Weapon (JSOW) variants. Testing began in FY06 and will continue through 2007. The new OFP software is designed to address previously identified deficiencies in IOT&E and Unitary performance.
- The Air Force restricted use of the Baseline variant to emergency combat use only due to concerns over accuracy limitations revealed in FY05 testing.
- Testing to address deficiencies identified in the 2004 DOT&E report on IOT&E and LFT&E of JSOW Unitary remains to be accomplished. Although ongoing OFP testing will address some of the shortfalls, a test to verify JSOW Unitary survivability modeling with live weapons flown through realistic integrated air defenses has not been accomplished.

System

JSOW is a family of 1,000-pound class, air-to-surface glide bombs intended to provide low observable, standoff precision engagement with launch and leave capability. All variants employ a tightly coupled Global Positioning System/Inertial Navigation System.

- The IOT&E payload consists of 145 BLU-97/B combined effects submunitions.
- JSOW Unitary utilizes an imaging infrared seeker and its payload consists of an augmenting charge and a follow-through bomb that can be set to detonate both warheads simultaneously or sequentially.

Mission

- Combatant commanders use JSOW to conduct pre-planned attacks on soft point and area targets such as air defense sites, parked aircraft, airfield and port facilities, command and control antennas, stationary light vehicles, trucks, artillery, and refinery components.
- Combatant commanders use JSOW Unitary to conduct pre-planned attacks on point targets vulnerable to blast and fragmentation effects and point targets vulnerable to penetration such as industrial facilities, logistical systems, and hardened facilities.

Activity

- Air Force and Navy operational testing was conducted in accordance with DOT&E-approved Test and Evaluation Master Plans (TEMPs) for both the Baseline and Unitary JSOW variants.
- The Air Force restricted use of the Baseline variant to emergency combat use only due to concerns over accuracy limitations revealed in FY05 testing.
- Navy and Air Force testing to assess effectiveness and suitability of new OFP software common to both JSOW Baseline and JSOW Unitary was ongoing throughout FY06. The common OFP software addresses some of the Baseline variant accuracy concerns raised by the Air Force in FY05. Navy and Air Force OFP test completion is anticipated in FY07.

Assessment

- Navy and Air Force testing of new OFP software common to both the AGM-154A and C variants is ongoing. Capabilities remain to be validated through testing that concludes in late 2007. Initial test results suggest potential improvements in Baseline variant accuracy; however, testing in target area wind conditions that adversely affect submunitions pattern accuracy remains to be accomplished.
- DOT&E's 2004 report on IOT&E and LFT&E of JSOW Unitary found that the system was effective but not suitable. Key findings were:
  - JSOW Unitary's mission planning system did not consistently complete the computational process nor allow the user to plan weapon impact parameters. Furthermore, target images could not be transferred into the system

during land-based operations, and JSOW Unitary could not accept the mission planning-developed fuze delay setting from the aircraft data transfer device.

- JSOW Unitary survivability models had not been validated by actual weapons delivery in the appropriate threat environment. Ongoing OFP testing will assess improvements in the mission planning deficiencies, but survivability model validation has yet to be addressed as part of follow-on testing.

Recommendations

- Status of Previous Recommendations. FY05 recommendations concerning IOT&E accuracy and JSOW Unitary mission planning shortfalls are being reevaluated in ongoing FY06 OFP testing. However, confirmation of combat effectiveness, suitability, and survivability through operational testing of live JSOW Unitary weapons flown through realistic integrated air defenses has not been accomplished. The Navy should identify a test venue to confirm these capabilities.
- FY06 Recommendations. None.

KC-130J Aerial Tanker / Airlift Aircraft

Executive Summary

- DOT&E has not fully characterized the KC-130J in a worldwide threat environment because adequate testing has not been accomplished on the integration of the ALR-56M radar warning receiver.
- Since initial deployment, aircraft have been upgraded with the AN/AAR-47 Missile/Laser Warning System.
- Operational evaluation of the Sargent Fletcher aerial refueling pod system successfully completed in FY06.
- A Navy analysis showed that retroactive installation of an Onboard Inert Gas Generator System (OBIGGS) to mitigate the removable fuselage fuel tank hydrodynamic ram vulnerability is not feasible.

System

- The KC-130J is a medium-size, four-engine turboprop aerial refueling aircraft capable of operating from short, unimproved airfields.
- The KC-130J has a removable fuselage fuel tank and reconfigurable cargo compartment.
- It is equipped with improved Sargent Fletcher aerial refueling pods that contain a hose with a drogue. The hose is connected to a retractable inertia reel system inside the pod.
- It has enhanced defensive systems and foam in fuel tanks for increased survivability in non-permissive environments.

Mission

- Combatant commanders can use this aircraft to provide an aerial refueling capability for fixed-wing, rotary-wing, and tilt-rotor aircraft.

- The aircraft has the added capability to provide rapid-ground refueling for helicopters, ground vehicles, and fuel caches.
- Secondary missions include:
  - Transportation of personnel and cargo for airland or airdrop delivery
  - Emergency aero-medical evacuation
  - Special operations mission support

Activity

- Operational Test-IIIC Phase I was conducted in FY04 to evaluate the operational effectiveness and suitability of selected KC-130J defensive systems. Additional testing of the AN/AAR-47 sensor completed in October 2005.
- Operational units began Operational Test-IIIC Phase II for the redesigned, Sargent Fletcher aerial refueling pods in August 2005. Testing was suspended shortly thereafter when cracks were found in the refueling pod pylons. A redesign of the pylon was conducted at the end of 2005 and the system was recertified for operational evaluation in January 2006.
- The Navy conducted an OBIGGS feasibility analysis in FY06. The analysis showed that retroactive installation of an OBIGGS to mitigate vulnerability of the removable fuselage fuel tank to hydrodynamic ram is not feasible.
- The Navy plans to revise the Test and Evaluation Master Plan and submit it to OSD in 3QFY07.
- The Navy conducted an analysis which showed that retroactive installation of an OBIGGS for ullage inerting is not feasible. Testing of a ballistic foam liner is scheduled at China Lake, California, during FY07. Ballistic foam will be installed in the removable fuselage fuel tank if testing shows that it reduces hydrodynamic ram damage.

Assessment

- Defensive systems testing conducted during Phase II in 1QFY06 to assess AN/AAR-47 characteristics as installed on the KC-130J was adequate. AN/AAR-47 is operationally effective as installed on KC-130J. However, there is one significant limitation, the details of which are classified.
- The ALR-56M radar warning receiver has not been fully characterized as installed on the KC-130J because the system is not mature enough to commence operational test and

evaluation. Although deficiencies in the ALR-56M radar warning receiver have been identified and discussed with the Air Force for incorporation and/or correction in future software builds, coordinated planning between the Navy and Air Force for this phase of testing has not been initiated.

- The Navy identified deficiencies in false alarm indications within the built-in-test system of the KC-130J. These are to be corrected in later software upgrades but are not funded.
- The removable fuselage fuel tank is vulnerable to hydrodynamic ram damage from ballistic threat impacts.

Recommendations

- Status of Previous Recommendations. The Navy has acted on two of the four FY05 DOT&E recommendations. The following recommendations remain unresolved:
  FY05 #3: DOT&E recommended the Navy develop plans for testing the ALR-56M in an operationally realistic environment. The Navy has not initiated this planning.
  FY05 #4: DOT&E Live Fire test and evaluation recommended that the Navy consider ullage inerting or ballistic foam to reduce or eliminate the ballistic vulnerability of the removable fuselage fuel tank.
- FY06 Recommendations. The Navy should:
  1. Consider ballistic testing to evaluate the effectiveness of a foam liner for the removable fuselage fuel tank.
  2. Complete adequate operational evaluation for characterizing ALR-56M performance as installed on the KC-130J in coordination with Air Force C-130J ALR-56M test and evaluation.
  3. Revise the TEMP to include funding and physical resources for test events to include testing of the KC-130J with ALR-56M installed.

LHA 6 (formerly LHA(R)) - New Amphibious Assault Ship

Executive Summary
- Both the Test and Evaluation Master Plan (TEMP) and TEMP update were approved by OSD.
- The Milestone B decision was made in January 2006.
- No analyses have been provided that explain how LHA 6 will execute traditional and future Expeditionary Strike Group or Marine Expeditionary Unit missions.

System
- The LHA 6 is a large-deck amphibious ship designed to support up to 28 MV-22 tilt rotor aircraft or 23 F-35 Joint Strike Fighter aircraft (Short Take-Off, Vertical Landing variant). It can also facilitate operations of all U.S. Marine Corps and Navy helicopters, as well as several types of Army and Air Force helicopters.
- It does not have a well deck, which traditionally is used for amphibious operations.
- The combat system is the Ship Self Defense System. It uses the Rolling Airframe Missile weapon system, the NATO Sea Sparrow Missile System with the Evolved Sea Sparrow Missile, and the Close-In Weapon System for self defense against anti-ship cruise missiles.
- Propulsion is by two marine gas turbine engines and two controllable pitch propellers. Diesel generators provide electric power.

Mission
- The Joint Maritime Component Commander employs the LHA 6 as:
  - The centerpiece ship of the Expeditionary Strike Group

  - An afloat headquarters for Marine Expeditionary Unit, Amphibious Squadron, or other Joint Force commands using its command, control, communications, computers, and intelligence facilities and equipment
  - The primary Expeditionary Strike Group aviation platform, with space and accommodations for U.S. Marine Corps vehicles, cargo, ammunition, and more than 1,600 troops
- LHA 6 class ships will be part of the Maritime Prepositioning Force (Future), serving as an aviation support platform.

Activity
- DOT&E conditionally approved the Milestone B LHA 6 TEMP in January 2006, subject to the Navy submitting a TEMP revision that provided details for testing Key Performance Parameters approved by the Joint Requirements Oversight Council. The TEMP revision was subsequently approved in June 2006.
- An Integrated Test Team (ITT), comprised of representatives from the Navy's Commander, Operational Test and Evaluation Force (COMOPTEVFOR), the LHA 6 Program Office, and the Marine Corps Operational Test and Evaluation Activity, worked to conduct a detailed mission analysis for the ship, focusing primarily on the ship's amphibious warfare mission.
- DOT&E approved the LFT&E Management Plan in January 2006. The Deputy Undersecretary of Defense (AT&L) certified the waiver from full-up systems-level LFT&E to support the Defense Acquisition Board Milestone B decision made in January 2006.
- The Navy and OSD reached an agreement to conduct an underwater explosive test on LHA 2 after the ship is decommissioned in January 2007. Two underwater explosive test shots will be conducted; one at two-thirds and one at the full explosive level the ship is built to withstand. A full ship shock trial is not deemed necessary on LHA 6.

Assessment
- As design details of LHA 6 have matured, both the program office and COMOPTEVFOR are gaining a better understanding of the ship's expected capabilities and potential limitations. However, the principal concern remains that no analyses have been provided that explain how Expeditionary

Strike Group operating concepts will be revised to compensate for loss of the well deck in LHA 6. Capabilities and requirements documentation still list execution of contemporary and future Marine Expeditionary Unit missions as its primary purpose. It is unclear that the ship can perform such missions.

- LHA 6 is the first ship program to fully engage in a mission-based integrated test approach using an ITT. This testing concept is showing promise to better harmonize developmental and operational testing efforts.
- The Navy declared LHA 6 class ships would be included as part of the Maritime Prepositioning Force (Future) program. This variant will likely be manned by civilian mariners of the Military Sealift Command or a mix of Navy, Marine, and civilian mariner personnel. It will be tested based on capabilities documents associated with that program.
- The LFT&E test program will continue into 2013 and will provide data to support a comprehensive evaluation of the survivability of the LHA 6 class of ships based on:
  - Surrogate testing
  - Damage-Based Scenario Engineering Analysis
  - Modeling and Simulation
  - Total Ship Survivability Trials
- Testing of the ship's combat systems will be done mostly under the auspices of the Navy's Enterprise Anti-Air Warfare Ship Self Defense Test and Evaluation Strategy. This will leverage testing of similar combat direction and weapons systems and will save the Navy time and money.
- A major concern is that the Navy has not funded development of a Threat D-representative target. This target would act as a surrogate for a foreign weapon known to be a threat to this ship. Without it, adequate testing of the vessel's self- defense capability against anti-ship cruise missiles cannot be conducted.

Recommendations:

- Status of Previous Recommendations. The Navy addressed three of the four prior recommendations. The following from FY05 remains valid:
  FY05 #1: Conduct detailed analyses of studies that include modeling and simulation efforts to better understand what design adjustments or doctrinal changes should be made to LHA 6 to appropriately accommodate Marine Expeditionary Unit-level amphibious operations. These analyses should also be applied to more clearly define cargo, vehicle, and passenger flow routes throughout the ship to support troop embarkation, debarkation, backload, and weapons safety.
- FY06 Recommendations. The Navy should:
  1. Determine what design changes or modifications will be necessary to adapt LHA 6 for support of the Maritime Prepositioning Force (Future) mission.
  2. Fund the development and production of a Threat D-representative target.

Littoral Combat Ship (LCS)

Executive Summary
- The Navy is pursuing purchase of at least 15 baseline configuration or "Flight 0" ships through FY09, up from 13 reported in FY05.
- The Test and Evaluation Strategy is inappropriate for the proposed acquisition strategy.
- Early Operational Assessment (EOA) reports indicate high-level risks in systems integration, manning, and survivability.

System
- The Littoral Combat Ship (LCS) is a new class of ship designed to operate in the more shallow waters of the littorals in which larger ships cannot maneuver as well. It can accommodate a variety of individual warfare systems (mission modules) assembled and integrated into interchangeable mission packages.
- There are two competing basic ship (seaframe) designs:
  - The Lockheed Martin design is a steel monohull.
  - The General Dynamics design is an aluminum tri-maran style hull.
- The designs propose different combat systems for self defense against anti-ship cruise missiles.
- Both designs use combined diesel and gas turbine engines with waterjet propulsors.
- More than a dozen individual programs of record, involving sensor and weapon systems and other off-board vehicles, have been chosen to be LCS mission modules. All but three are Acquisition Category (ACAT) II and ACAT III programs.

Mission
- The Maritime Component Commander can employ LCS to conduct Mine Warfare, Anti-Submarine Warfare (ASW), or Surface Warfare (SUW), based on the mission package fitted into the seaframe. Mission packages are designed to be interchangeable, allowing the Maritime Component Commander flexibility to reassign missions.
- LCS can be employed in a maritime presence role regardless of the mission package based on capabilities inherent to the seaframe.
- LCS can be deployed alone or in conjunction with other ships.

Activity
- The Navy conducted an EOA of the General Dynamics Flight 0 LCS ship design and the ASW and SUW mission packages from February to June 2006. The test was conducted in accordance with a DOT&E-approved test plan. The EOA report was issued in October 2006.
- Integrated Test Teams have been working to coordinate test objectives and events to maximize the efficiency of individual mission module and seaframe/mission package testing.
- The Lockheed-Martin and General Dynamics teams have both conducted underwater explosion testing of sample materials as part of the Live Fire testing program.

Assessment

The latest proposed acquisition strategy profile calls for at least 15 Flight 0 ships of both designs through FY09. This effectively nullifies the approved test and evaluation strategy that was based on going to a new, Flight 1 design after the first four Flight 0 ships. The Navy has not proposed a test and evaluation strategy that allows acquisition decisions to be informed by timely reporting of adequate operational test results. DOT&E will not approve the Test and Evaluation Master Plan for a Milestone B decision in early 2007 with this disconnect.

The EOA testing for the General Dynamics design with the ASW and SUW mission packages was adequate for this stage of development. The report highlighted risks to operational effectiveness and suitability. Several high-risk areas were found to be similar to those identified in a Lockheed-Martin EOA conducted in FY05, though the specific equipment or systems may be of different vendors. Risk areas include:
- Inadequate integration of several combat system elements to reduce susceptibility to inbound high-speed airborne threats; automation will be necessary to prevent watchstanders from being overtasked

- Uncertain capability and coverage of the proposed surface and air search radar in a littoral environment
- Inadequate integration of the mission packages with the core combat system to efficiently conduct missions with the intended manning
- Inadequate integrated Logistic Support planning and shore infrastructure for the seaframe and mission packages
- Personnel safety concerns, as identified in analysis of equipment designed for launch/recovery and control of off-board vehicles
- Survivability concerns as a result of manning levels that may be too low to support battle damage repairs
- Lack of automation of many damage control elements that would be critical to rapidly recover in the event of battle damage; it is not certain this design will meet the minimal survivability standards envisioned for this class of ship

DOT&E previously recommended the Navy assess the risks to be sure Level 1 survivability is sufficient for a class of small combatants. Level 1 calls for minimal survivability features and is the standard for auxiliary vessels. Most combatant ships are Level 2. The Navy maintains its intent for LCS to have Level 1 survivability.

DOT&E also previously recommended the Navy conduct analysis to ensure 75 is the appropriate number of personnel necessary to accomplish LCS missions. The Navy conducted some manpower studies, but did not determine by analysis that 75 personnel is the correct number with which to man LCS. Initial conclusions indicate manning levels do not portend success in a stressing mine warfare scenario. Unanticipated damage control efforts and other contingencies may lead to excessive fatigue and failure to accomplish tasks.

The Navy intends to deploy LCS 1 within nine months of taking delivery. This self-imposed urgency led to a post delivery schedule for LCS 1 that omits significant events normally associated with lead ships. These events include acoustic, magnetic, infrared, and radar cross-section signature measurement; analysis of performance characteristics; and sensor accuracy testing. The schedule does not allow time for an adequate IOT&E to make informed decisions.

Recommendations

- Status of Previous Recommendations. The Navy fully addressed two of the five prior recommendations and is making progress on another. The following recommendations from FY05 remain valid:
  FY05 #2: Examine ashore support infrastructure to ensure its consonance with LCS manning policies; of particular concern is proper maintenance support.
  FY05 #4: Perform analysis to determine the minimum number of Mine Warfare mission module programs of record that will be sufficient to provide genuine Mine Warfare capability.
- FY06 Recommendations. The Navy should:
  1. Revise the test and evaluation strategy to conduct IOT&E on the lead ships of each design. Doing so will align the testing and evaluation strategy with the proposed acquisition strategy.
  2. Revise LCS lead ship post delivery schedules to include test events such as signature measurement, analysis of performance characteristics, and sensor accuracy to determine basic performance baselines before deployment.
  3. Continue detailed manning analyses to determine the appropriate number of personnel necessary to man LCS, with mission packages, given its level of automation and systems integration.

LPD 17 *San Antonio* Class Amphibious Transport Dock

Executive Summary
- IOT&E is scheduled to commence in summer 2007.
- Confirmation of self-defense capability against Anti-Ship Cruise Missiles (ASCM) requires an adequate number of high-diver surrogates.

System

The LPD 17 class ship is a diesel engine powered ship designed to embark, transport, and deploy ground troops and equipment. The troops and equipment move ashore by way of air-cushion landing craft (LCAC), by displacement utility landing craft (LCU), by helicopter, or by MV-22 tiltrotor aircraft.
- The LPD 17 has a floodable well deck for LCACs.
- Flight deck and hangar facilities accommodate the Navy and Marine Corps helicopters and the MV-22.
- For self defense against ASCMs, the Ship Self Defense System Mark 2 (with Cooperative Engagement Capability) is the combat system that integrates weapons (Rolling Airframe Missile and Mk 53 electronic Nulka decoys) and radars (AN/SPQ-9B short-range radar and AN/SPS-48E long-range radar, housed in the Advanced Enclosed Mast Structure (AEM/S) to reduce detection of the ship by enemy radars).
- Two Mk 46 (30 mm) gun systems and smaller caliber machine guns defend against small surface threats.
- Command and Control facilities and equipment to support Marine Corps Landing Force operations are part of the program of record.

Mission

The Expeditionary Strike Group Commander employs LPD 17 class ships to conduct Amphibious Warfare. In this role, the ship can:
- Accommodate combat and support elements of a Marine Expeditionary Unit or Brigade

- Embark, discharge, and recover LCACs, LCUs, amphibious assault vehicles, and expeditionary fighting vehicles for seaborne assault missions
- Participate in aerial assault by embarking Marine Corps aircraft
- Carry and discharge combat service support elements and cargo to sustain the landing force
- Support non-combatant evacuation operations
- Be loaded and configured to conduct various crisis response missions such as humanitarian assistance

Activity
- The ship underwent no operational testing in FY06.
- DOT&E approved an updated Test and Evaluation Master Plan (TEMP) in February 2006.
- Post delivery test and trials (PDT&Ts) continue to demonstrate functionality of the ship's amphibious warfare systems, hull, mechanical and electrical systems, and combat systems. Commander, Operational Test and Evaluation Force (COMOPTEVFOR) representatives have observed most PDT&T events.
- The LPD 17 test and evaluation community is actively planning the total ship survivability trial (TSST) on LPD 17, scheduled for FY07, and the full ship shock trial on LPD 19, scheduled for FY08.

Assessment
- COMPOTEVFOR's observations of PDT&T events will be used to scope IOT&E to avoid duplicating events that may have already confirmed performance. Once equipped with fully integrated and tested systems, LPD 17 should provide considerable amphibious lift as well as improved information technology, reduced susceptibility, and enhanced living conditions for the crew and embarked Marines.

- The LPD 17 IOT&E amphibious warfare phase is scheduled to be conducted in summer 2007. Two capabilities essential to these primary mission operations include the ability to control landing operations and to provide command, control, communications, computers, and intelligence (C4I) support to the Marine Corps landing force. Shortfalls in these two areas currently exist:
  - The AN/KSQ-1 Amphibious Assault Direction System, the ship's primary system for controlling the surface assault element, was removed from LPD 17 in preparation for a scheduled upgrade. The upgraded system will be installed in December 2006.
  - There are concerns regarding current C4I capabilities. The Digital Wideband Transmission System, which allows high capacity line-of-sight data transmission to support Amphibious and Landing Force operations, has not been installed. The availability and required location of Secret Internet Protocol Router Network (SIPRNET) connections and the readiness of the ship's tactical satellite communications systems are concerns. Critical developmental test of landing force-related C4I systems will not occur until just before the IOT&E begins, which is inherently risky.
- PDT&T to date has shown the ship to have credible capability to defend against small manned surface threats, but has not confirmed the capability to defend against ASCMs. The IOT&E will include a ship self-defense phase focused primarily on the ship and crew's capability to defend against ASCMs. Currently, there are too few high-diver targets. PDT&T has identified serious integration problems with the AN/SPS-48E radar performance while enclosed in the AEM/S. The Navy is conducting an AN/SPS-48E - AEM/S characterization study. However, it is too early to determine what mitigation will be required.
- The survivability of the LPD 17 class ships should be improved over the 1970's-era amphibious ships they will replace. The increased survivability is attributed to reduced radar cross-section signature design features, strengthened hull girder design, improved bulkhead connections, improved fragmentation protection, fire insulation at fire zone boundaries, and redundant and separated vital systems.
- Based on proposed changes in the LPD 17 schedule, there is potential that TSST will not be conducted in advance of the lead ship deployment. DOT&E believes the TSST should be done before deployment as it can provide the Navy valuable data to characterize the ship's survivability and response to damage.

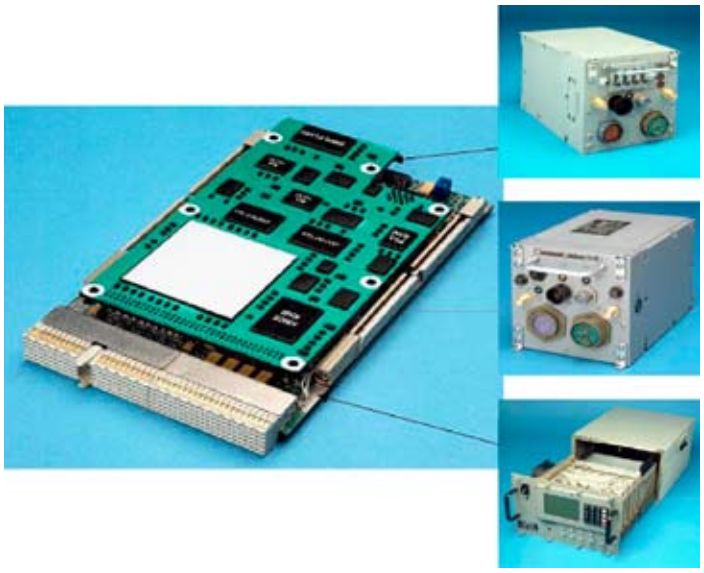
Recommendations

- Status of Previous Recommendations. There were no recommendations made in FY05.
- FY06 Recommendations.
  1. Performance of the AN/SPS-48E radar is critical to the ship's capability to control aircraft and to defend itself. The Navy should investigate and understand the impact of the AEM/S configuration before deploying the ship.
  2. The Navy should conduct the TSST in close sequence with IOT&E before deploying the lead ship.
  3. The Navy should procure the necessary number of high-diver targets.

Mark XIIA Identification Friend or Foe (IFF) Mode 5

Executive Summary

- There is no coherent acquisition or test strategy for Mode 5 in the Department of Defense.
- Each Service has initiated one or more programs to independently develop and field Mode 5 transponders and/or interrogators.
- The Navy approved a low-rate initial production decision based on an under-resourced operational assessment and without a DOT&E-approved Test and Evaluation Master Plan (TEMP).
- With multiple programs and multiple vendors, there is significant risk that the Mode 5 equipment integrated into some combat systems may not be interoperable and may be ineffective in preventing fratricide.



System

- The Mark XIIA Identification Friend or Foe (IFF) Mode 5 is an identification system that uses interrogators and transponders located on host platforms to send, receive, and process friendly identification data.
- Mode 5 is a military-only identification mode, which will replace Mode 4 and allows secure encryption of interrogations and replies. Primary features include:
  - A lethal interrogation format, which is a final "wake-up" interrogation sent just prior to weapons release and intended to reduce fratricide
  - A random-reply-delay, which prevents distorted replies from closely spaced platforms
- Mode 5 offers more modern signal processing, compatibility with legacy Mode 4 IFF systems and civilian air traffic control, and data exchange through the new waveform.

Mission

- The combatant commander employs the Mode 5 to provide positive, secure, line-of-sight identification of friendly platforms equipped with an IFF transponder.
- Mode 5 serves as a component of a combat identification process used on ground- and sea-based systems such as PATRIOT, Aegis-equipped ships, and all military aircraft to include the E-3 Airborne Warning and Control System.
- This system's information will be combined with other cooperative and non-cooperative combat identification techniques in order to provide identification of all platforms – enemy, neutral, and friendly.

Activity

- In August 2005 and February 2006, DOT&E asked the Services to update the test strategy status for their separate Mode 5 programs. None of the Services had an adequate strategy to test any of their Mode 5 systems. DOT&E asked the Navy to submit an updated TEMP prior to the low-rate initial production decision scheduled for June 2006. DOT&E also asked the Services to update their requirements documents and work together on a concept of operations for the capability.
  - There was no effort to update the requirements for the capability
  - The Navy declined to update their TEMP and received a waiver to update requirements prior to their low-rate initial production decision
  - Joint Forces Command has an effort in progress to create a concept of operations for the capability
  - The Service test communities are coordinating informally to find test opportunities
- In March 2006, DOT&E asked the Defense Acquisition Executive to define an overarching governance process for Mode 5. DOT&E also asked the Chairman of the Joint Requirements Oversight Council to define the requirements for the capability to further synchronize the Services' efforts.
- The Navy's Commander, Operational Test and Evaluation Force conducted an operational assessment on the Navy's Mode 5 developmental hardware using the test plan approved by DOT&E in support of a low-rate initial production decision.

- Lacking an approved TEMP, joint governance, or updated requirements the Navy approved low-rate initial production for Mode 5.
- The Navy low-rate initial production decision included acquisition of nearly one-third of Army Aviation's total Mode 5 purchase. Currently no Mode 5 TEMP exists for Army Aviation.
- The Air Force Operational Test and Evaluation Command suspended all work on any Mode 5 testing because the Air Force lacks an acquisition strategy. Currently, no Mode 5 TEMP exists for any Air Force Mode 5 system.

Assessment

- The Navy does not have an adequate strategy to conduct an IOT&E of the Mode 5 capability, but is proceeding with low-rate initial production.
- The Navy's operational assessment conducted for their low-rate initial production decision was under-resourced due to funding cuts. Although Mode 5 demonstrated potential to be a significant upgrade to Mode 4, the test was inadequate to provide a full assessment.
- The Navy's operational assessment was not adequate to support purchase of hardware for Army Aviation systems.
- The Mode 5 equipment used in the Navy operational assessment does not meet NATO or U.S. standards, significantly increasing the risk that the Navy's equipment may not be interoperable with other Service or Allied equipment.
- The Navy's operational assessment showed significant risk areas with the integration of the Mode 5 interrogation equipment into Aegis combat systems. This highlights the integration challenges to other programs.
- The Air Force intends to make fielding decisions associated with the integration of Mode 5 on aircraft without any adequate operational testing.
- Lacking any synchronization among the Services in fielding this capability and without a coordinated strategy to provide an adequate operational test of the system, there is great risk that Mode 5 may be ineffective in preventing fratricide.

Recommendations

- Status of Previous Recommendations. The recommendations from FY05 have not been resolved and require further effort. FY05 #1: The Services' Program Managers must integrate their test schedules and look for opportunities to test in a joint environment. This will ensure interoperability between all interrogators, transponders, and dual interrogator transponders. FY05 #2: Service Program Managers must ensure that all systems being developed interoperate properly as follows:
  - Coordinate testing between each of the Services' operational test agencies
  - Develop a capstone TEMP between all of the Services for Mark XIIA IFF
- FY06 Recommendations. DoD should:
  1. Create a coherent strategy to synchronize and fund Mode 5 to include:
     - An Acquisition Decision Memorandum to guide the efforts and provide a mandate for the synchronization and interoperability of the capability across the Services
     - A validated requirement for the capability to include a timeline for Initial and Full Operational Capability and an emphasis on interrogators as well as transponders to bring the independent efforts into alignment
  2. Identify a lead Service to:
     - Coordinate testing between each of the Services' operational test agencies
     - Develop a capstone TEMP between all of the Services for Mode 5

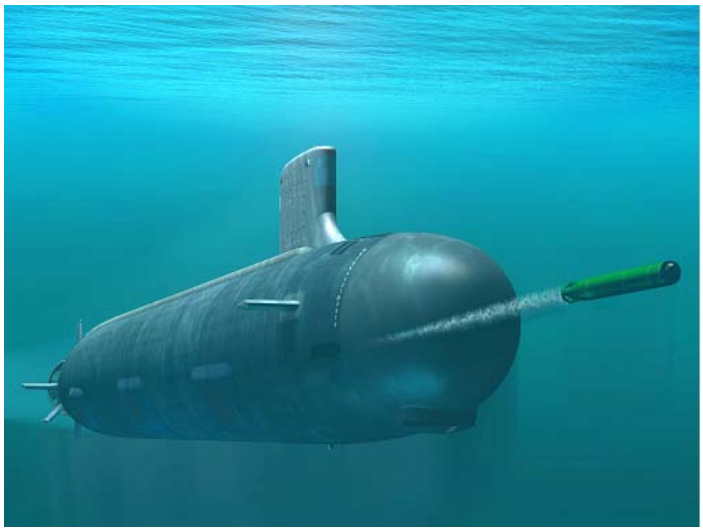
Mk 48 Advanced Capability (ADCAP) Torpedo Mods

Executive Summary

- Mk 48 Advanced Common Torpedo Guidance and Control Box (ACOT-GCB) completed operational testing in January 2006. The Mk 48 ACOT-GCB torpedo performance is equivalent to the Mk 48 Advanced Capability (ADCAP) Mod 6 torpedo.
- The Mk 48 Common Broadband Advanced Sonar System (CBASS) torpedo successfully completed shallow water operational testing in May 2006. The torpedo's shallow water performance is equivalent to the Mk 48 ADCAP Mod 6 torpedo.
- Deep-water Anti-Submarine Warfare (ASW) and Anti-Surface Warfare (ASUW) performance remains to be verified by operational testing.

System

- The Mk 48 ADCAP torpedo is the primary anti-submarine and anti-surface ship weapon for the submarine force.
- Mk 48 ADCAP torpedo mods are a series of hardware and software upgrades to the Mk 48 torpedo.
- Mk 48 Mod 4, Mod 5, Mod 6, and Mod 6 ACOT-GCB are fielded torpedoes.
- Mk 48 ACOT-GCB replaces obsolete Mod 6 hardware and rewrites the software allowing for an open architecture torpedo design to allow future software upgrades.
- Mk 48 ACOT-GCB is designed to have the same performance as the Mk 48 Mod 6.
- Mk 48 CBASS upgrades the Mk 48 ACOT-GCB with new sonar to improve torpedo effectiveness through future software upgrades. Mk 48 CBASS is a co-development program with the Australian Navy.
- Future software upgrades called Advanced Processor Builds (APB) are planned to improve torpedo performance.



Mission

The Submarine Force employs the Mk 48 ADCAP torpedo as a long-range, heavy weight weapon:

- For destroying surface ships or submarines
- In both deep-water open-ocean and shallow-water littoral environments

Activity

- The Navy completed ACOT-GCB side-by-side comparison testing with the Fleet baseline Mk 48 Mod 6 torpedo using the accredited Weapons Analysis Facility (WAF) simulation and at-sea operational testing in January 2006. The Commander, Operational Test and Evaluation Force (COMOPTEVFOR) reported the ACOT-GCB performance was equivalent to the Mk 48 Mod 6 torpedo.
- DOT&E approved a change to the Mk 48 CBASS Test and Evaluation Master Plan on February 24, 2006. This change restructured the CBASS operational evaluation, dividing it into two parts.
  - The first phase consisted of in-water firings to evaluate the weapon's shallow-water performance and supported a production decision for CBASS modernization kits.
  - The second phase used the WAF simulation to conduct a side-by-side comparison of CBASS to the legacy Mk 48 Mod 6. This test was designed to ensure that CBASS did not degrade baseline performance in deep-water anti-submarine and anti-surface warfare scenarios.
  - Together the in-water and WAF testing would support an Initial Operating Capability decision.
- The Navy conducted shallow-water combined developmental and operational testing of the Mk 48 CBASS torpedo with the Australian Navy in December 2005. The Navy conducted dedicated shallow-water operational testing in the Gulf of Mexico in March 2006. In May 2006, COMOPTEVFOR reported CBASS performance as equivalent to the Mk 48 Mod 6 in shallow water. COMOPTEVFOR is waiting for additional in-water verification and validation torpedo firings to complete their accreditation of the WAF to support side-by-side comparison testing. Accreditation and WAF testing should complete in early 2007.
- The Navy approved initial production of Mk 48 CBASS warshot torpedoes in June 2006.

- The Navy fielded the Mk 48 CBASS without completing the WAF simulation deep water operational testing required by the Test and Evaluation Master Plan in November 2006.
- The Navy conducted a successful Mk 48 ADCAP Mod 6 warshot Sink Exercise in July 2006.

Assessment

- Mk 48 ACOT-GCB WAF side-by-side comparison tests with Mk 48 ADCAP Mod 6 appear to be adequate when validated by in-water testing. In-water firings were essential for adequate torpedo testing and evaluation, especially for resolving suitability. It was only through at-sea testing that a critical hardware design flaw was identified. The flaw led to the inadvertent erasure of program memory modules, resulting in a dud weapon. This has been corrected and verified in testing. DOT&E agrees with the Navy's evaluation that the torpedo's performance in shallow-water is equivalent to the Mk 48 Mod 6 torpedo.
- CBASS in-water test results indicate CBASS has similar shallow-water performance relative to the legacy Mk 48 Mod 6 torpedo. However, the original 1998 CBASS Operational Requirements Document (ORD) demanded a considerable effectiveness improvement in more challenging scenarios. The Navy revised the ORD in 2002, requiring that the first phase of CBASS merely match current Mod 6 performance. As noted in DOT&E's 2001 Annual Report, the Mk 48 Mod 6 did not meet its own requirements thresholds. Thus, the effectiveness goal set for the CBASS operational test was modest. In addition, the operational test was conducted at two sites, which were known to be acoustically less challenging than previous tests. Overall, current CBASS performance does not appear to be measurably better or worse than that of the Mk 48 Mod 6 weapon.
- Mk 48 ADCAP performance has remained relatively stagnant for more than a decade, despite multiple hardware and software upgrades. The Navy now hopes to achieve ambitious effectiveness improvements with CBASS delivering full capability by the end of the decade via a software APB process.
- In response to two Mk 48 ADCAP failures during a 2003 Ship Sink Exercise, the Navy conducts annual warshot test firings to verify the inventory. Three torpedoes were successfully fired in 2005, while only one of four scheduled tests was conducted in 2006. This program needs to continue to verify performance of the inventory of torpedoes.

Recommendations

- Status of Previous Recommendations.
  The FY05 #1 and FY05 #2 recommendations remain valid. The Navy should continue to address reducing test delays and improve the WAF simulations.
- FY06 Recommendations. The Navy should:
  1. Provide necessary resources for testing and lay out a credible plan to achieve effectiveness improvements with CBASS, delivering full capability by the end of the decade via an APB software upgrade process.
  2. Begin planning to provide appropriate threat emulation to ensure adequate testing. The CBASS requirements document specifies the need for new threat resources (surrogate countermeasures, conventional submarines, etc.) to test future software upgrades.

Multi-Functional Information Distribution System (MIDS)

Executive Summary

- Follow-on test and evaluation is ongoing for the Multi-Functional Information Distribution System (MIDS)-on-Ship and EA-6B host platform integration.
- It remains unclear until all the EA-6B data is analyzed whether the integration will be rated as operationally suitable. This is due to a number of operational mission failures and the comparatively small number of flight hours obtained from the single EA-6B aircraft that was available for test. The Navy, however, has already deployed the system.
- The Navy is developing MIDS-Joint Tactical Radio System (JTRS) as part of the JTRS product line.

System

- MIDS is a family of digital voice, data link, video communications, and navigation terminals with modular functionality for integration into both theater and tactical host platforms.
  - MIDS-Low Volume Terminal (LVT) 1 is primarily for aircraft and shipboard integration (MIDS-on-Ship).
  - MIDS-LVT 2 is primarily for integration into ground-based host platforms (Army Air Defense units).
  - MIDS–JTRS is for integration into host platforms requiring use of the JTRS family of legacy and future communications, navigation, and identification waveforms.
- Acquisition plans include 1,880 terminals for the MIDS-LVT 1 and MIDS-LVT 2 to retrofit on 13 separate host platform types.

Mission

- Joint Force Air Component Commanders employ MIDS-LVT to provide Link 16 (a tactical data link) digital voice and video communications, data link, identification, and Tactical Air Navigation (for fighter aircraft) capabilities.
- MIDS-JTRS will provide theater and tactical digital voice, data link, video communications, navigation, and identification functionality for all host platforms.
- MIDS provides host platform interoperability with legacy Link 16-equipped host platforms.

Activity

- The F/A-18 program conducted follow-on test and evaluation from July 2005 to March 2006 to verify correction of deficiencies identified in the IOT&E report. Testing was conducted in accordance with the DOT&E-approved test plan.
- The EA-6B program conducted operational testing of the integration of MIDS-LVT 1 (in conjunction with the EA-6B Improved Capability III (ICAP III) Block 2 testing) from March - June 2006 to support a fielding decision. Testing was conducted in accordance with the DOT&E-approved Test and Evaluation Master Plan and operational test plan. The final report is in preparation; however, the Navy has already deployed the system.
- Operational testing of MIDS-LVT 1 integration onboard ship was to begin in FY06, but was delayed until FY07. Specific integration issues identified in developmental testing include a unique cabinet design, maintainability features, and coupling with the host ship's Link 16 1,000-watt high power transmitter amplifier. This is the last major integration effort for MIDS-LVT.
- Development of the MIDS-JTRS test strategy for terminal level and lead host platform integration testing has been completed.
- The DoD reorganized the entire JTRS portfolio. MIDS-JTRS is now part of DoD's JTRS Enterprise consisting of multiple product lines, each of which will need aligned test strategies.

Assessment

- Although the final report is not yet released, the F/A-18 preliminary test results indicate that previous effectiveness and suitability issues have been addressed.
- The EA-6B test results will be used to support the decision to field MIDS-LVT 1 to the EA-6B operational fleet. Quick look test results indicate most test objectives were satisfied; however, some essential electromagnetic interference

compatibility testing was deferred due to test asset scheduling conflicts. Testing in a jamming environment was also deferred and still needs to be conducted.

- Data analysis is ongoing and it remains unclear until all the data is analyzed whether the integration will be rated as operationally suitable. This is due to a number of operational mission failures and the comparatively small number of flight hours obtained from the single EA-6B aircraft that was available for test.

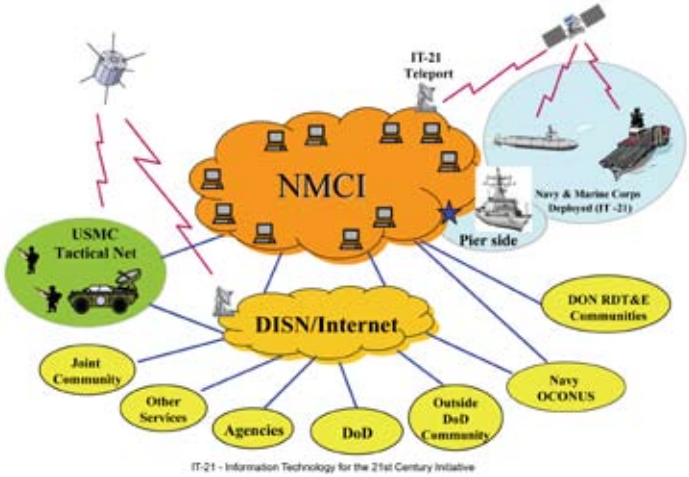
Recommendations

- Status of Previous Recommendations. The Navy is following all of DOT&E's previous recommendations and should continue to adhere to them in the future.
- FY06 Recommendations.
  1. The Navy should complete EA-6B integration testing to demonstrate the operation of Link 16 during electronic jamming operations to meet operational suitability threshold requirements.
  2. The JTRS Enterprise should develop an Enterprise Test Strategy that includes MIDS-JTRS to capitalize on JTRS product line lessons learned.

Navy-Marine Corps Intranet (NMCI)

Executive Summary

- The Marine Corps Operational Test and Evaluation Activity (MCOTEA) completed an assessment of the Navy-Marine Corps Intranet (NMCI) Aviation Proof of Concept (APOC) for the operations of Marine Aviation Logistics Squadrons (MALS) Information Systems in an NMCI environment.
- Assessment results showed that MALS information systems can operate in the NMCI environment to support MALS deployment and return-from-deployment activities, but with deficiencies in the areas of training, deployment procedures, contractor support, quality control of deployment pack-up-kits, and contract requirements for deployment support.
- The assessment was limited to the NMCI support to MALS only and did not address the NMCI performance in totality.



System

- NMCI is an information technology services contract to provide reliable, secure, and seamless connectivity for the Navy and Marine Corps business functions in order to support operational forces.
- NMCI is designed to support the Navy and Marine Corps bases, camps, stations, and activities in the Continental U.S., Alaska, Hawaii, Puerto Rico, and Guantanamo Bay, Cuba, with an estimated 455,000 seats.
- A total of 72 server farms, 4 Network Operations Centers, and 2 Help Desk centers are required to provide service for the estimated user base.
- With the exception of deployable laptop computers, NMCI infrastructure and services will not extend to afloat units.

Mission

- NMCI is an information technology infrastructure designed to provide a comprehensive end-to-end information service to the Department of the Navy through a common computing and communications infrastructure.
- NMCI is designed to reduce information technology costs and enhance system security and interoperability, which in turn enhances the information exchange capability for the Navy and Marine Corps.

Activity

- MCOTEA completed an assessment of the NMCI APOC in 1QFY06 to verify that MALS information systems can operate in the NMCI environment to support deployment and return-from-deployment activities.
- MCOTEA completed the NMCI APOC in accordance with the DOT&E-approved Test and Evaluation Strategy Plan and Detailed Assessment Plan.

Assessment

- The MALS information systems can operate in the NMCI environment to support MALS deployment and return-from-deployment activities.
- MALS operations in the NMCI environment will improve substantially with enhanced training, establishment of standard deployment coordination procedures, responsive NMCI contractor support, expanded quality control for deployment pack-up-kits, and modification of the NMCI contract to include specific requirements for deployment support.
- The assessment was limited to the NMCI support to MALS only and did not address the NMCI performance in totality.

Recommendation

- Status of Previous Recommendations. The following recommendation has not been resolved by the Navy and requires further attention:
  FY05 #1: The Navy should conduct follow-on operational tests on new capabilities such as voice and video teleconferencing when they become available.
- FY06 Recommendations.
  1. NMCI and Marine Aviation should take actions to address the deficiencies identified by MCOTEA.
  2. MCOTEA should oversee a MALS deployment to verify the correction of the deficiencies.

P-8A Multi-Mission Maritime Aircraft (MMA)

Executive Summary
- The System Development and Demonstration phase began in May 2004 and is ongoing.
- Thirty-four aircraft were approved for low-rate initial production out of a total aircraft buy of 115. Seven of those aircraft are test assets.
- DOT&E approved the Test and Evaluation Master Plan (TEMP) in October 2006.
- Contractor developmental Live Fire ballistic vulnerability testing identified candidate dry bay fire suppression system designs and evaluated the vulnerability of high-pressure oxygen bottles.

System
- The Multi-Mission Maritime Aircraft (MMA) is the Navy's next generation maritime patrol aircraft that will replace the P-3C.
- The MMA is based on the Boeing 737-800 aircraft, but uses the 737-900 extended-range wing.
- It carries and employs anti-ship missiles, air-to-surface weapons, depth bombs, torpedoes, naval mines, sonobuoys, and other expendables.
- The P-8A carries onboard sensors, including radar, electro-optic sensors, and a magnetic anomaly detector.
- Survivability enhancement and vulnerability reduction features are incorporated into the P8-A design.
  - Susceptibility is reduced with an integrated Aircraft Survivability Equipment (ASE) suite that consists of a radar warning receiver, chaff/flare dispenser, directed infrared countermeasures (DIRCM) and Tactical Data Unit (TDU) to control the system. Radio frequency countermeasures, based on a towed decoy, are planned for spiral development with installation provisions (including wiring and mounting pylons) incorporated into all production aircraft.

  - Vulnerability is reduced through the addition of fuel tank inerting systems and fire protection systems for the vulnerable dry bays that surround aircraft fuel tanks.

Mission

Units equipped with the MMA will perform a wide-range of patrol missions including:
- Armed anti-submarine warfare
- Armed anti-surface warfare
- Intelligence collection, processing, evaluation, and dissemination to Naval and joint forces
- Maritime and littoral reconnaissance missions

Activity
- The contractor completed MMA weapons separation wind tunnel tests in February 2006.
- The updated TEMP was submitted to OSD for approval. DOT&E is currently reviewing it.
- The contractor conducted developmental ballistic testing during FY06, which included:
  - Testing of the vulnerability of crew high pressure oxygen supply bottles
  - Testing that evaluated candidate fire suppression system designs for MMA dry bays

Assessment
- The large low-rate initial production buy (34 of 115) of aircraft will necessitate a significant amount of test and evaluation prior to the Milestone C decision to reduce risk.
- The evaluation will be based on a P-8A Design Reference Mission, a representative set of combat and non-combat situations in which the P-8A is expected to accomplish its missions.
- Major risks to the planned timeline include the integration of onboard sensors, data processing capabilities, system

software integration of weapons stores, weight growth, and interoperability with the Navy's family of intelligence, surveillance, and reconnaissance systems. For example, MMA integration with the Navy's Broad Area Maritime Surveillance Unmanned Aerial Vehicle is required in order to accomplish all of the missions currently conducted by the Navy's P-3 fleet.

- Vulnerability testing of the oxygen bottles showed that aluminum/composite material bottles present significant explosion and shrapnel hazards when hit by threat munitions. Consideration is being given to moving the bottles to safer locations in the aircraft.
- Preliminary vulnerability evaluations indicate that MMA vulnerable area will fall within required levels assuming that the actual performance of vulnerability reduction systems meets predicted levels.

Recommendations

- Status of Previous Recommendations. The Navy has taken action on DOT&E's FY05 recommendation.
- FY06 Recommendation.
  1. Planning for future full-scale vulnerability testing of the structural test article and 737 wings should begin as early as possible.

Ship Self Defense System (SSDS)

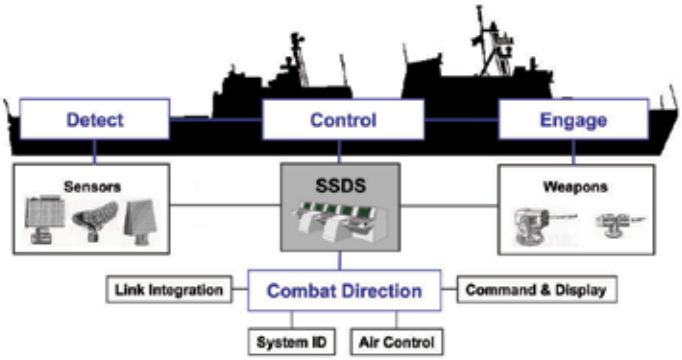
Executive Summary

The Ship Self Defense System (SSDS) Mark 2, Mod 1 integration of sensor and weapons systems enhances ship self defense and battle force command/control. However, significant deficiencies with sensor coverage, multi-ship interoperability (command and control), weapon integration, hardware/software reliability, and training must be corrected before the system is operationally effective and suitable.

System

SSDS is a fiber-optic local area network that uses open computer architecture and standard Navy displays to integrate a surface ship's sensor and weapon systems.

- SSDS Mark 1 is fielded as the combat system in LSD 41/49-class ships.
- SSDS Mark 2 has four variants:
  - The Mod 1 is in development for CVN 68 class aircraft carriers.
  - The Mod 2 is in development for LPD 17 class amphibious ships.
  - The Mod 3 is in development for LHD class amphibious ships
  - The Mod 4 is in development for LHA-replacement amphibious ships.



Mission

Navy surface forces use the SSDS to provide automated engagement capabilities for faster and more effective accomplishment of self defense missions.

- Mark 1 and Mark 2 are designed to provide automated and integrated detect-to-engage capability against anti-ship cruise missiles.
- Mark 2 will also provide faster and more effective command and control for air and surface warfare areas.

Activity

- The Commander, Operational Test and Evaluation Force (COMOPTEVFOR) conducted Follow-on Operational Test and Evaluation (FOT&E) of the SSDS Mark 2, Mod 1 in accordance with DOT&E-approved test plans in early FY06. Testing was conducted aboard the USS *Ronald Reagan* (CVN 76) in conjunction with the USS *Ronald Reagan* Carrier Strike Group. COMOPTEVFOR published the test report in May 2006.
- COMOPTEVFOR completed planning for FY07 SSDS Mark 2, Mod 2 FOT&E testing to be conducted aboard the LPD 17 and the Self Defense Test Ship (SDTS). The Navy initiated planning for SSDS Mark 2 FOT&E testing to be conducted aboard the LHD 8, CVN 68, and LHA 6.

Assessment

- The SSDS Mark 2, Mod 1 is not operationally effective or suitable. Significant deficiencies exist in the areas of training (including senior watch standers), weapons system integration, sensor coverage, software/hardware reliability, and multi-ship interoperability.
- Realistic operational testing of SSDS Mark 2 requires threat-representative anti-ship cruise missiles (ASCM) surrogates, but the Navy has not procured critical surrogates. These surrogates are required for testing the SSDS Mark 2 combat system onboard the Self Defense Test Ship beginning in FY07.
- As a result of deferred SSDS Mark 2 interfaces to the Global Command and Control System-Maritime and TPX-42A(V) command and control systems, operators must manually fuse the air and surface pictures displayed on the SSDS console with the blue force picture on the separate consoles. This increases the likelihood of blue-on-blue engagements.

Recommendations

- Status of Previous Recommendations. The Navy has not resolved four recommendations from FY05. The following recommendations remain valid:
  FY05 #1: The Navy should address the outstanding computer program trouble reports for future CV/CVN deployments.
  FY05 #2: The Navy should procure all required ASCM surrogates as outlined in the TEMP for the SSDS Mark 2, Mod 2 FOT&E in FY07.
  FY05 #3: The Navy should update the Test and Evaluation Master Plan (TEMP) to address the FOT&E of the Evolved

Sea Sparrow Missile integration with SSDS Mark 2, Mod 1, in addition to Mark 2 Mods in LHD 8, CVN 68, and LHA 6.
FY05 #4: The Navy should fund deferred SSDS Mark 2 interfaces to the Global Command and Control System-Maritime and the TPX-42A(V) command and control systems.

- FY06 Recommendations. The Navy should:
  1. Correct the identified deficiencies in weapon system integration, sensor coverage, hardware/software reliability, and multi-ship interoperability.
  2. Correct training deficiencies and develop a training program for senior watch standers.
  3. Develop and/or procure all threat representative ASCM surrogates required for future SSDS Mark 2 FOT&Es.

SSGN *Ohio* Class Conversion

Executive Summary

- The first two strike and special operations submarine (SSGN) conversions completed sea trials and conducted final modernization, maintenance, and training prior to FY07 operational testing.
- The Navy's Operational Test and Evaluation Force evaluated the risk for a successful SSGN operational evaluation as high in an operational assessment of SSGN in April 2005. Further developmental testing and corrective action have reduced this risk, but the program continues to have a number of minor issues that place a successful operational evaluation at risk.
- The Navy will not complete operational testing of the Advanced SEAL Delivery System (ASDS) on SSGN prior to Initial Operating Capability as a result of ASDS reliability and performance problems.

System

- This program involves the conversion of four *Ohio* class ballistic missile submarines into strike and special operations platforms.
- In a Full Strike configuration, an SSGN is intended to carry up to 154 Tomahawk cruise missiles for land attack strike, with 22 missile tubes carrying 7 missiles per tube. In the standard configuration planned for normal operations, an SSGN is intended to carry one mated Dry Deck Shelter (DDS) or ASDS, embarked SEAL teams, and 105 Tomahawk cruise missiles in 15 tubes.
- The SSGN is designed to carry up to two ASDS and/or DDS, allowing submerged lockout and delivery of large numbers of Special Forces personnel. Additionally, two SSGN missiles were converted to allow submerged delivery of smaller numbers of Special Forces without use of ASDS or DDS.
- The conversion includes extensive modernizations to forward electronics, radio, navigation, sonar, and fire control systems. It also develops an extensive payload capability for future off-board systems and weapons.

Mission

The Maritime Force Commander can employ the *Ohio* class SSGN for:

- Land attack strike mission, capable of launching Tomahawk cruise missiles
- Special operations missions including all support and planning for two SEAL submersible vehicles
- All traditional attack submarine missions

Activity

- USS *Ohio* and USS *Florida*, the first two SSGN conversions, completed sea trials and are conducting final modernization, maintenance, and training prior to operational testing in FY07.
- DOT&E approved Revision A to the SSGN Test and Evaluation Master Plan (TEMP) on January 4, 2006. The SSGN program is executing testing per the TEMP and is on track for operational testing in FY07.
- The Navy conducted developmental testing of a redesigned Tomahawk missile Capsule Closure Assembly (CCA) as well as end-to-end developmental testing of the SSGN Tomahawk Weapon Control System in FY06.
- The SSGN diver lockout chamber design was changed as a result of problems identified during developmental testing.
- The Navy hosted several Total Ship Survivability Trial meetings and issued the second installment of the detailed design Vulnerability Assessment Report in support of the SSGN LFT&E program. The SSGN Total Ship Survivability Trials are planned for summer 2007. The final installment of the Vulnerability Assessment Report is scheduled for issue in late FY07.
- In response to earlier DOT&E comments, the Navy initiated monthly test and evaluation working groups and readiness reviews to improve coordination and communication between the program and test personnel.
- The Navy instituted a Target Threat Validation process, per the TEMP, to ensure appropriate emulation of threat systems

during operational evaluation and to provide a context for assessment.

Assessment

- As a result of the significant number of deficiencies identified during an April 2005 operational assessment, the Navy's operational testers evaluated risk to a successful operational evaluation as high. Most deficiencies related to the Strike Mission and to submarine support systems. Many of these deficiencies have been addressed, but the program continues to have a number of minor issues that place a successful operational evaluation at risk.
- Many of the remaining SSGN concerns are with the submarine's electronics system modernization programs. Deficiencies in Acquisition Category II, III, or IV modernization programs, that have a poor history of adequate operational testing, can affect the ability of SSGN to complete her mission. For example, the Acoustic Rapid Commercial Off-the-Shelf Insertion (A-RCI) Sonar, assessed elsewhere in this annual report, is a concern.
- Land- and sea-based testing of the SSGN Multiple All-Up-Round Canisters and modified Tomahawk Capsule Closure Assemblies indicate that these components should support the loading and launch of Tomahawk missiles from a SSGN. Acoustic and hydrodynamic trials were also satisfactory.
- The Navy's goal is to maintain the original ballistic missile submarine level of survivability by completing conversion to SSGN without introducing any new survivability deficiencies. Although they are likely to achieve this goal, DOT&E is concerned that the change in the submarine's operational profile from an open ocean strategic mission to a littoral mission may introduce new susceptibilities.
- As a result of significant reliability and performance problems with the first ASDS, the Navy determined that the ASDS program cannot support operational testing on SSGN in FY07. This delay will significantly reduce SSGN special operations capability, although the remaining capability is expected to provide a significant improvement over existing platforms. DOT&E is working with the Navy to determine a realistic schedule for completion of ASDS developmental and operational testing, with the goal of completing as much as possible prior to SSGN Initial Operating Capability in early FY08.
- The Navy's SSGN Program Office is coordinating the schedules of the conversion and modernization programs. The time allocated for testing, repairing, and retesting of some modernization system programs is often shorter than will be required, based on previous experience.

Recommendations

- Status of Previous Recommendations. The Navy has taken effective action on two of the three previous DOT&E recommendations, but the following recommendation requires further attention:
  FY05 #1: The Navy improved coordination between the SSGN conversion program and submarine modernization programs as recommended by DOT&E. However, the Navy must ensure full operational testing of submarine modernization programs installed on SSGN. The operational test of the SSGN, in each mission area, is designed to be an end-to-end test. SSGN mission-area performance cannot reasonably be separated from the performance of submarine modernization systems that contribute to the mission area.
- FY06 Recommendation.
  1. The Navy should aggressively pursue developmental and operational testing of ASDS on SSGN as soon as practicable.

SSN 774 *Virginia* Class Submarine

Executive Summary

- The Navy completed builder's trials, delivered the second ship of the class, and commissioned the ship as USS *Texas* in September 2006. Both the crew and ship performed well.
- The USS *Virginia* started a Post-Shakedown Availability to complete deferred new construction work and to correct trial deficiencies. Schedule delays are already reducing the time planned for completing OT&E scheduled to start in late 2008.
- The operational performance of supporting programs, such as the Acoustic Rapid Commercial Off-the-Shelf Insertion (A-RCI) sonar, towed arrays, and the torpedo has increased the risk of successfully meeting performance thresholds in some mission areas.
- DOT&E approved the Navy's revised LFT&E plan, which deleted the full ship shock trial.

System

The *Virginia* class submarine is the replacement for the aging fleet of *Los Angeles* class submarines. The *Virginia* class:

- Is capable of targeting, controlling, and launching Mk 48 Advanced Capability torpedoes, Tomahawk cruise missiles, and future mines
- Has sonar capability similar to the *Seawolf* submarine class with improvements to the electronic support suite and combat control systems
- Has a new design propulsion plant incorporating proven components from previous submarine classes
- Utilizes a modular design and significant commercial off-the-shelf computer technologies and hardware

Mission

The Maritime Mission Commander will employ the *Virginia* class submarine to enable open-ocean and littoral covert operations in support of the following submarine mission areas:

- Strike warfare
- Anti-submarine warfare
- Intelligence, surveillance, and reconnaissance; indications and warnings; and electronic warfare
- Anti-surface ship warfare
- Special warfare
- Mine warfare
- Battle Group Operations

Activity

- The Navy conducted the first test of the Total Ship Survivability Trial on the USS *Virginia* in January 2006 in Groton, Connecticut.
- The Navy successfully completed builder's sea trials and commissioned the second ship of the class as USS *Texas* in September 2006.
- The lead ship, USS *Virginia*, started a Post-Shakedown Availability (PSA) in January 2006 to complete deferred construction installations and to correct initial trial deficiencies.
- Commander, Operational Test and Evaluation Force completed an Operational Assessment Report of USS *Virginia* on May 26, 2006.
- The Navy completed both actions per the Navy/OSD agreement to delete the full ship shock trial from the approved LFT&E program, namely:
  - Complete the verification, validation, and accreditation of the Transient Shock Analysis Process
  - Conduct a bottoms-up review of the entire *Virginia* class LFT&E program to identify any data voids and additional testing and/or analysis that may be needed to better understand the survivability of the *Virginia* class submarine
- DOT&E approved the revised LFT&E Management Plan in September 2006 as a result of the above actions.

Assessment

- The USS *Texas* completed initial trials with few deficiencies, but was delivered almost a year behind schedule. Other *Virginia* program schedule slips have put pressure on the Milestone and future deployment dates, causing the Navy to seek to postpone some operational testing. DOT&E believes the Navy should complete adequate evaluations of all mission areas and major capabilities as a part of the IOT&E.
- The Navy's operational assessment evaluated *Virginia* Anti-Submarine Warfare search and attack, Special Warfare,

and Battle Group Support mission areas as having high performance risk for operational effectiveness largely due to deficiencies with programs that are not Acquisition Category 1 programs. DOT&E agrees with this assessment. The reports of the A-RCI Sonar and Mk 48 Advanced Capability Torpedo Mods in this Annual Report provide additional details.

- The Navy plans to upgrade many of the spiral development Non-Propulsion Electronics Systems during the 2007 modernization availabilities. The timing and selection of the version for installation in spiral development programs is a balance between adding modernization capability, increased cost, and system stability. The *Virginia* program has chosen system stability. This will result in more modern and capable versions already being introduced to the fleet prior to *Virginia*'s operational test.
- The Navy proposed conducting *Virginia* weapons testing at the Atlantic Underwater Test Evaluation Center range in the Bahamas. The range saves time by allowing multiple weapons to be tracked, located, and recovered at the same time; however, the range represents a very different environment from the noisy, high contact, and littoral areas for which the *Virginia* submarine was designed. DOT&E requires open-ocean weapons testing in littoral environments to adequately evaluate *Virginia* weapon performance.
- DOT&E anticipates a comprehensive survivability evaluation will result from a successful completion of the revised LFT&E program.

Recommendations

- Status of Previous Recommendations. The following FY05 recommendations remain valid:
  FY05 #1: DOT&E recommends that the Navy complete all developmental and operational testing before conducting further deployments.
  FY05 #2: Navy operational tester should ride all ship underway periods to ensure familiarity with *Virginia* systems and to support the rapid completion of operational evaluation.
  FY05 #3: The Navy should consider installing upgraded supporting systems before operational evaluation.
- FY06 Recommendation.
  1. The Navy should invest in a capability and develop procedures to conduct:
     - Realistic shallow-water and littoral testing and training to include a robust open-ocean weapon locating and recovery capability
     - Realistic minefield training and testing

Surface Electronic Warfare Improvement Program (SEWIP)

Executive Summary
- The AN/SLQ-32 Electronic Warfare System (EWS), equipped with the Surface Electronic Warfare Improvement Program (SEWIP) Block 1A upgrade, is substantially improved in the primary areas of detection, recognition, classification, response time, logistics supportability, and human systems integration.
- Preparations for a Milestone B decision for the SEWIP Block 1B increment continue with DOT&E participation.

System
- The SEWIP is an incremental development program that is intended to improve the electronic warfare capability of the Navy's AN/SLQ-32 EWS.
- The first increment (Block 1A) consists of an improved operator console and replacement of obsolete digital processors and tracking modules.
- The second increment (Block 1B) consists of modifications to improve emitter identification, situational awareness, and crew training.

Mission
Navy surface ships will use SEWIP to enhance their AN/SLQ-32 EWS anti-ship missile defense, counter-targeting, counter-surveillance, and electronic data collection capabilities.

Activity
- The Commander, Operational Test and Evaluation Force conducted operational testing of the AN/SLQ-32 EWS with the SEWIP Block 1A upgrade from June - October 2005. The testing was conducted onboard USS *Ramage* (DDG 61) in the Virginia Capes operating area.
- Testing included operationally representative activities and scenarios using representative Navy enlisted operators.
- Hardware/software reliability and hardware maintainability tests were emphasized to ensure correction of deficiencies found during previous operational assessments.
- All operational testing was conducted in accordance with DOT&E-approved test plans.
- DOT&E issued a Beyond Low-Rate Initial Production (BLRIP) report for SEWIP in June 2006.
- Preparations for a Milestone B decision for the Block 1B increment of SEWIP continue with DOT&E participation.

Assessment
- The AN/SLQ-32 EWS, equipped with the SEWIP Block 1A upgrade, is substantially better than the legacy equipment in the primary areas of detection, recognition, classification, response time, logistics supportability, and human systems integration.
- The test duration was not sufficient to demonstrate with high confidence that the hardware reliability threshold was attained.
- Although an improvement over the legacy system, stressing scenarios with high pulse densities and large numbers of emitters uncovered some deficiencies in properly recognizing and classifying emitters.
- Software reliability demonstrated during the test period is comparable to the legacy system reliability, but was below the stated requirement. Software reliability maturity indicators project that the requirement will be met with the software to be provided for the system's initial operating capability.
- The aerial targets used during the test period do not have the capability to fully represent the profiles, maneuvers, or threat seeker fidelity resident in actual anti-ship cruise missiles.
- Per the June 2006 DOT&E BLRIP report, the SEWIP Block 1A upgrade does not make the AN/SLQ-32 EWS operationally effective or suitable. It does, however, significantly enhance its ability to protect Navy ships by improving situational awareness and engagement support in addition to laying a good foundation for future upgrades. An operational evaluation of the full AN/SLQ-32 EWS will be conducted in conjunction with a future SEWIP block upgrade that includes improvements to the antenna/receiver system.

Recommendations

- Status of Previous Recommendations. The Navy has not resolved the following recommendation from the FY05 Annual Report:
  FY05 #1: DOT&E recommended that the Navy update the Capability Development Document and Test and Evaluation Master Plan to reflect the SEWIP Block 1B program in preparation for a Milestone B review. This recommendation remains valid.
- FY06 Recommendation. The Navy should:
  1. Review and modify the SEWIP detection and classification algorithms to correct deficiencies discovered while operating in dense pulse and emitter environments. Verify the correction of these deficiencies during follow-on operational test and evaluation.
  2. Continue to collect in-service SEWIP Block 1A hardware reliability data to gain a higher degree of confidence regarding achievement of this requirement.
  3. Continue to review and modify the SEWIP software to improve its reliability. Verify the correction of this deficiency when the deployment-ready software has been delivered to the initial operating capability ship.
  4. Use a location other than the Virginia Capes operating areas for conduct of the SEWIP Block 1B operational test and evaluation in order to assess performance in an electromagnetic propagation environment that differs from that seen in the SEWIP Block 1A operational test. The Navy should review SEWIP Block 1A performance in this new environment.
  5. Develop threat representative aerial target/threat seeker combinations and/or procure actual threat anti-ship cruise missiles for more realistic testing of future SEWIP block upgrades and other electronic warfare systems.

T-AKE *Lewis & Clark* Class of Auxiliary Dry Cargo Ships

Executive Summary

- The Navy took delivery of T-AKE 1 in June 2006. The second ship of the class, T-AKE 2, was launched the same month. The Navy plans to build 11 ships for the Combat Logistics Force and expects to build 3 slightly modified ships for the Maritime Prepositioning Force (Future).
- IOT&E, integrated with developmental testing, began in August 2006.

System

T-AKE *Lewis & Clark* is a class of non-combatant ships designed to carry dry cargo, ammunition, and fuel (in limited amounts) for naval combat forces at sea. The T-AKE *Lewis & Clark* is:

- Constructed to commercial standards (American Bureau of Shipping) with some additional features to increase its survivability in hostile environments
- Operated by civilian mariners from the Military Sealift Command
- Propelled with a single shaft and propeller; the shaft will be turned with electric motors powered by diesel generators like many modern commercial cargo ships
- Designed to employ a computerized cargo inventory management system for both ordnance and non-ordnance cargo

Mission

The Maritime Component Commander will employ the T-AKE *Lewis & Clark* class of ships to:

- Re-supply other ships while connected underway using Standard Tensioned Replenishment Alongside Method rigs and embarked helicopters

- Serve as a shuttle ship to move cargo and ammunition between a port and a larger consolidating replenishment ship, which stays with the strike group
- Be included in the hybrid combination of ships of the Maritime Prepositioning Force (Future)

Activity

- Operational testing, integrated with post delivery test and trial events, is ongoing.
- The program began Operational Test-IIC, IOT&E in August 2006. Testing is being conducted in accordance with a DOT&E-approved test plan.
- The Navy performed an extensive T-AKE survivability analysis in FY06. Efforts included modeling and simulation and subject matter expert analysis to support the detailed design vulnerability assessment report.

Assessment

- IOT&E will occur in 16 event phases, most of which coincide directly with post delivery test and trials events, which were planned with Commander, Operational Test and Evaluation Force involvement. Testing is time and cost efficient, as there is minimal duplication of major events. Test planning was adequate.
- Most test events completed to date appear to have been adequately conducted. Other events have not yet taken place

or data has not been assessed to fully determine adequacy at the time of this report.
- Acoustic testing involving the torpedo decoy system could not be conducted due to a system malfunction.
- The infrastructure is not in place to conduct full testing and calibration of the Advanced Degaussing System, which is intended to reduce the ship's magnetic signature. Additional facilities will not be completed before FY08.
- Correction of deficiencies to the computerized cargo management system is proceeding slower than expected due to technical challenges. The Navy's intent is to defer testing of the computerized cargo management system until T-AKE 2. IOT&E will require that T-AKE 1 demonstrate the ability to conduct cargo management using legacy information and data systems.
- The T-AKE is being constructed to commercial American Bureau of Shipping standards, using commercial construction materials and processes not as robust as those used in constructing combatant ships. The LFT&E program will assess whether these standards are adequate for T-AKE to accomplish its mission The Navy is incorporating some additional survivability features, such as emergency power and communications, which exceed the American Bureau of Shipping standards.

Recommendations

- Status of Previous Recommendations. The Navy has taken action on one of the two FY05 recommendations and is making progress addressing the second.
- FY06 Recommendations. The Navy should:
  1. Conduct acoustic testing with the installed acoustic decoy during the scheduled IOT&E period or during follow-on testing and evaluation.
  2. Schedule follow-on testing and evaluation to accomplish adequate testing of the cargo management system, as well as the Advanced Degaussing System.

Tomahawk Missile and Tomahawk Command and Control System

Executive Summary

- The Tactical Tomahawk (Baseline IV) missile and Tomahawk Command and Control System (TC2S) remain operationally effective and suitable if operated with Baseline III tactics and procedures. However, the Navy has not yet demonstrated the improvement in communications bandwidth, operator training, and system documentation required in order for the system to reach its full potential.
- Two test launches in FY06 failed to achieve successful launch of Baseline IV missiles from submarine torpedo tubes. Analysis of these failures revealed production quality control problems that the Navy is addressing with several quality control initiatives.
- The planned post-launch command and control capability for Tomahawk Baseline IV remains high risk due to system complexity and the requirement for reliable communications. The Navy is conducting robust developmental testing to correct these problems prior to operational testing in FY07.
- DOT&E considers the planned Operational Test Launch program for both the Baseline III and Baseline IV missile variants to be adequate for continued verification of system reliability and accuracy.

System

- Tomahawk Land Attack Missile is a long-range, land attack cruise missile designed for launch from submarines and surface ships. Submarine launch can be accomplished from either standard submarine torpedo tubes or separate vertical launch tubes.
- Tomahawk Baseline III completed production. There are currently three fielded variants delivering a nuclear warhead (not deployed), a conventional warhead, or a conventional warhead with submunitions.

- Tactical Tomahawk (Baseline IV) is currently in production as the follow-on to the Baseline III conventional warhead variant. These missiles are produced at lower cost and provide added capability, including the ability to communicate with and retarget the missile during flight. Although Baseline III weapons can be launched from submarine torpedo tubes, the initial Baseline IV delivery did not include this capability.
- The Tomahawk Command and Control System provides for targeting, mission planning, and distribution of Tomahawk tactical data.

Mission

The Maritime Force Commander can employ the Tomahawk missile for long-range, precision strikes against land targets.

Activity

- The Navy continues to conduct Follow-On Testing and Evaluation (FOT&E) on both Baseline III and Baseline IV Tomahawk missiles, their associated weapon control systems, and the TC2S. A total of seven Tomahawk missile test launches were conducted during FY06.
- DOT&E approved Revision D to the Baseline IV Test and Evaluation Master Plan (TEMP) on March 10, 2006, to cover planned FOT&E through FY09. The revised TEMP provides for testing of Baseline IV torpedo tube launch capability and weapon control system upgrades, verification of corrective action for deficiencies identified during IOT&E, and a continuing program of Operational Test Launches to confirm weapon reliability and accuracy.
- The Navy successfully demonstrated missile navigation using Small Cell Terrain Contour Matching during a test flight in February 2006 with a Baseline III missile. This capability is applicable to both Baseline III and Baseline IV Tomahawk missiles.
- Two test flights in FY06 failed to achieve successful launch of Baseline IV missiles from submarine torpedo tubes. A missile launched in February 2006 successfully achieved cruise flight, but lost power after approximately 3 minutes

of flight. A second missile, launched in May 2006, failed to achieve cruise flight. The Navy plans a test launch in FY07 to demonstrate torpedo tube launch capability following completion of analysis and corrective action for these failures.
- The Navy delayed a comprehensive operational test of Baseline IV Tomahawk mission planning and post-launch control due to software interface problems in the TC2S and the Tactical Tomahawk Weapon Control System. This event, originally scheduled for 2QFY06, is now planned for 2QFY07 following completion of extensive developmental testing.

Assessment
- The Baseline IV missile and TC2S remain operationally effective and suitable if operated with Baseline III tactics and procedures. However, the system continues to require improvement in communications bandwidth, operator training, and system documentation in order to reach its full potential. The planned post-launch command and control capability for Baseline IV remains high risk due to system complexity and the requirement for reliable communications. The Navy is conducting robust developmental testing to correct these problems prior to operational testing in FY07.
- Efforts to field a submarine torpedo tube launch capability for Baseline IV have been unsuccessful. Initial analysis of the two failed test launches in FY06 revealed production quality control deficiencies. The Navy is addressing this issue through several quality control initiatives.
- DOT&E considers the planned Operational Test Launch program for both the Baseline III and Baseline IV Tomahawk variants to be adequate for continued verification of system reliability and accuracy. Successful execution of this program depends on continued funding and availability of fleet ships and submarines.

Recommendations
- Status of Previous Recommendations. This system was not covered in the FY05 Annual Report.
- FY06 Recommendation.
  1. The Navy should continue to adequately fund the Tomahawk Operational Test Launch program and place high priority on providing fleet ships and submarines to support program execution. This is particularly important in light of the quality control concerns identified as a result of the failed Baseline IV torpedo tube test launches.

V-22 Osprey Joint Advanced Vertical Lift Aircraft

Executive Summary
- The V-22 is now an evolutionary acquisition program; Block B is currently in production and will be the first variant to deploy.
- Adequate testing is planned for the Block B upgrades in FY07.
- An Operational Utility Evaluation (OUE) of the Air Force CV-22 revealed unique capabilities, but marginal operational availability.

System
- The MV-22 is the replacement for aging medium-lift CH-46E and CH-53D helicopters.
- It is a tilt-rotor aircraft capable of conventional wing borne flight and vertical takeoff and landing.
- It operates from shipboard or shore bases.
- It can carry 24 combat-ready Marines 228 nautical miles (nm) and return.
- It can carry a 10,000-pound external load 40 nm ship-to-shore and return.
- The V-22 can self-deploy up to 2,400 nm with one aerial refueling.
- The CV-22 variant will augment Air Force Special Operations MC-130 aircraft. It has terrain-following, terrain-avoidance radar and a more robust electronic defense suite.
- Block B upgrades include several unrelated airframe changes, a ramp-mounted weapon system, a retractable aerial refueling probe, and a personnel hoist.

Mission
- Squadrons equipped with the MV-22 will provide medium lift of Marines and equipment in support of:
  - Ship-to-Objective Maneuver
  - Sustained Operations Ashore
  - Tactical recovery of aircraft and personnel
  - Self-deployment
  - Amphibious evacuation
- Air Force squadrons equipped with the CV-22 will provide high-speed, long-range insertion and extraction of special operations forces to and from high-threat objectives.

Activity
- The V-22 program is executing the planned Block upgrades. The manufacturer has delivered ten Block B aircraft as of August 2006. Each aircraft has increasing capability per the planned spiral development program.
- The Air Force Operational Test and Evaluation Center (AFOTEC) conducted an OUE of the CV-22 variant in June - July 2006. The scope of the test was to evaluate the effectiveness and suitability of the CV-22 for the Air Education and Training Command's mission of training combat aircrews. At DOT&E's request, AFOTEC expanded its evaluation (but not the scope of flying events) to address the potential combat effectiveness and suitability of the aircraft.
- The OUE comprised 41 flights (74 flight hours) using four CV-22 aircraft based at Kirtland AFB, New Mexico.
- Because of the limited scope of the OUE, AFOTEC could make only a partial assessment of potential combat effectiveness.
- The Navy's Operational Test squadron, VMX-22, is currently testing the MV-22 Block B aircraft using an incremental approach, testing each new capability as it is incorporated. Testing conducted this year included external load certifications, the personnel hoist, the ramp-mounted weapon system, and the air refueling retractable probe.

Assessment
- Effectiveness of the CV-22 for both training missions and potential combat missions was degraded by poor aircraft availability. Frequent part and system failures, limited supply support, and high false alarm rates in the built-in diagnostic systems caused frequent flight delays and an excessive maintenance workload.
  - Some of the degradation in reliability may be attributable to the extended exposure to the desert operating environment that the Air Force used during the OUE.

- Combat effectiveness is expected to be enhanced by the speed and range capabilities of the V-22, a well-designed cockpit, and an effective multi-mode radar that enables low-level flight at night and in poor visibility.
- Design weaknesses were identified in radio navigation systems, defensive electronic countermeasures, the aircraft fuel system, and the cabin cooling system.
- The inherent speed and range of the V-22 aircraft enhances the ability to self-deploy the CV-22 on short notice. Limitations associated with airframe and navigation systems degraded this capability, however.
- Emerging results indicate the MV-22 Block B hoist, aerial refueling probe, and ramp-mounted weapon system are functional in the current configuration. Operational testing conducted in FY07 will assess operational effectiveness and suitability of these subsystems prior to the first MV-22 deployment.
- The MV-22 Block B fuel system has exhibited poor performance, similar to that observed with the CV-22.

Recommendations

- Status of Previous Recommendations. The program has taken effective action on five of the seven recommendations in DOT&E's 2005 report on Operational and Live Fire Test and Evaluation. The following two recommendations remain valid:
  - Determine the effectiveness of the engine bay fire extinguishing system against actual threat induced fires.
  - Devise/improve cabin wall battle damage repair methods and procedures. Damage to this wall by threat impact can make the aircraft unavailable for an extensive period.
- FY06 Recommendations. The program should:
  1. Correct the aircraft deficiencies noted in the CV-22 OUE report prior to IOT&E in FY08.
  2. Extend or modify the planned training before IOT&E to allow for degraded aircraft availability.
  3. Execute the planned defensive electronic countermeasure upgrade and testing.
  4. Continue to monitor operational suitability of the Block B aircraft to determine discrepancy between CV-22 performance during their OUE and the performance reported for the MV-22 operational evaluation last year.

VH-71 Presidential Helicopter Fleet Replacement Program (formerly the VXX program)

Executive Summary
- The VH-71 is the replacement for existing presidential helicopters.
- Perceived urgency drives the program.
- Increment 1 will provide seven test articles and five slightly modified pilot production aircraft in the near term.
- Increment 2 will provide the remaining 18 production aircraft in 2015.

System
- The VH-71 aircraft replaces the current U.S. Marine Corps fleet of 11 VH-3D and 8 VH-60N Helicopters flown by Marine Helicopter Squadron-One to perform the Presidential lift mission.
- The VH-71 is a dual-piloted, multi-engine helicopter based on the Eurocopter EH-101.
- It is intended to be capable of operating worldwide in day, night, or adverse weather conditions.
- The communications system will provide the ability to simultaneously conduct short- and long-range secure and non-secure voice, data, and video communications. It can also exchange situational awareness information with outside agencies, organizations, and supporting aircraft.
- Procurement of Increment 1 aircraft will include seven test articles and five pilot production (low-rate initial production) aircraft.
- Procurement of Increment 2 aircraft will include ten low-rate initial production aircraft and eight full-rate production aircraft. If it proves impractical to retrofit the five pilot production aircraft, five more production aircraft will be added at the end of Increment 2 production.

Mission
- Provide safe and timely transport of the President and Vice President of the United States, Foreign Heads of State, and other parties as directed by the Director of the White House Military Office.
- The VH-71 is required to operate from commercial airports, military airfields, Navy ships, and austere sites throughout the world.

Activity
- Little flight testing has been conducted beyond preliminary antenna pattern and downwash developmental testing on leased, pre-production EH-101 prototypes. The first test articles will be delivered in mid-FY07.
- An LFT&E Strategy has been approved and testing has begun.
- The Navy has formed an integrated test team at the principal flight test facility at Naval Air Warfare Center, Patuxent River, Maryland. This team includes operational test personnel from the test and user squadron, Marine Helicopter Squadron One.

Assessment
- Intense schedule pressure to replace the current VH-3 aircraft threatens to reduce the amount of testing possible before fielding the Increment 1 aircraft in October 2009. Increment 1 aircraft will be less capable than those of Increment 2.
- The current design is overweight. Increment 1 performance will likely fall short of required range and airspeed.
- As capabilities are dropped from the Increment 1 configuration, it becomes ever more likely that those five low-rate initial production aircraft will not be useful for the Presidential Support mission and will have to be replaced.
- DOT&E is working with the program office and Integrated Test Team to maximize test efficiency without degrading future mission capabilities. The program is considering a new schedule for Increment 2 that addresses DOT&E concerns.

Recommendations
- Status of Previous Recommendations. DOT&E did not submit an FY05 report on VH-71.
- FY06 Recommendation.
  1. The program should execute the VH-71 program on an event-based, rather that a schedule-driven, basis.

Air Force Programs

Air Force Programs

Advanced Extremely High Frequency Program (AEHF) Satellite Communications System

Executive Summary

- The Advanced Extremely High Frequency (AEHF) system continues to make progress on the four major technology risk areas of the program.
- Continued effort is required to achieve AEHF program performance and information assurance. Progress must be demonstrated to ensure the program is ready for Multi-Service Operational Test and Evaluation (MOT&E).
- The aggressive synchronization of the AEHF User Segment Terminals with the other segments of the program remains essential and vital for effective mission performance and MOT&E.

System

- The AEHF system will follow the Military Strategic, Tactical, and Relay (Milstar) program as the protected backbone of DoD's integrated military satellite communications architecture. The AEHF is expected to increase system throughput capacity by a factor of ten.
- The overall AEHF system has three segments:
  - Space segment
  - Mission Control segment
  - Terminal (or User) segment
- The first flight of the AEHF satellite, called "Pathfinder," is expected in FY08. Pathfinder will operate initially as a Milstar II satellite in order to complete the Milstar II constellation.
- The second flight will launch in FY09. It will operate on-orbit as a fully capable AEHF satellite.
- The Defense Acquisition Board authorized:
  - Fabrication and assembly of the first three satellites and development of the Control and User segments
  - Potential advanced procurement for two additional satellites within the Future Years Defense Program

Mission

- Combatant commanders and operational forces worldwide will use the AEHF system to provide secure, responsive, and survivable space-based military communications.
- AEHF represents the third generation of Extremely High Frequency Satellite Communications capability for strategic and tactical communications protected from nuclear effects and jamming activities.

Activity

- The Integrated Test Team continued development of the system test and evaluation strategy and drafted additional modifications to the Test and Evaluation Master Plan for the AEHF program.
- The Air Force successfully conducted initial pre-integration AEHF equipment testing for the anti-jam nulling antennas, helping to characterize this information assurance feature of the system.
- The Air Force continued developing the operational test strategy to evaluate the capability of AEHF to command and control both the existing Milstar constellation and the new AEHF satellites.
- The Air Force is also developing an operational test strategy to evaluate the capability of the AEHF Mission Planning Element (MPE) to generate a combined Milstar and AEHF mission schedule. Additional objectives include verifying that legacy terminals are compatible with AEHF satellites and that AEHF will crosslink with existing Milstar satellites using MPE-generated materials.

Assessment

- The system is making satisfactory progress on the four major technology risk areas: nuclear hardening and shielding, performance of the nuller anti-jam spot beam for information assurance, performance of the phased array antenna, and electric propulsion.
- The AEHF program reduced risk to both the test program and the launch of Space Vehicle One by introducing an interim command and control system. This allows time for adequate and integrated operational testing of the capability to control both the Milstar and AEHF constellations.
- Aggressive synchronization of the AEHF Space, Mission Control, and User segment terminals remains essential for effective mission performance and successful MOT&E.
- The test agencies will need a more robust validation effort, using test data to reduce the information assurance risks associated with using current program modeling data. The test community also needs to expand the direct evaluation of system features such as anti-jam nuller operational performance and visibility.
- The User segment terminals are experiencing increased difficulty in retaining standardized and consistent configurations with the operational system baseline. If unresolved, the new AEHF terminals risk a lack of compatibility with both the spacecraft payload and with each other.

Recommendations

- Status of Previous Recommendations. The Air Force has made progress on the FY05 DOT&E recommendations, resolving FY05 #1 and #2, with work continuing on FY05 #3 to #5.
- FY06 Recommendations. None.

Advanced Medium-Range Air-to-Air Missile (AMRAAM)

Executive Summary
- AIM-120C-7 Advanced Medium-Range Air-to-Air Missile (AMRAAM) operational testing is ongoing and is scheduled to continue through mid-FY07.
- AIM-120D is currently in developmental testing.

System
- The AIM-120 AMRAAM is an all-weather, radar-guided air-to-air missile with capability in both the beyond-visual-range and within-visual-range arenas.
- The AMRAAM program develops and incorporates phased upgrades periodically.
- The latest version, the AIM-120C-7, is currently in operational test. It incorporates an upgraded antenna, receiver, signal processor, and new software algorithms to counter new threats. The use of smaller system components creates room for future growth.
- The AIM-120D, the next upgrade to the AMRAAM, is currently in development and will deliver performance improvements over the AIM-120C-7 through the use of an internal Global Positioning System, an enhanced data link, and new software.

Mission
- The Air Force and Navy, as well as several foreign military forces, use various versions of the AIM-120 AMRAAM to shoot down enemy aircraft.

- All U.S. fighter aircraft use the AMRAAM as the primary beyond-visual-range air-to-air weapon to shoot down enemy aircraft.
- A single launch aircraft can engage multiple targets with multiple missiles simultaneously.

Activity
- AIM-120C-7 operational testing started in February 2005 and was originally scheduled to complete in March 2006. Operational testing to date discovered two software deficiencies that the program has corrected. The lead test agency, Air Force Operational Test and Evaluation Center (AFOTEC), combined delayed operational testing with a previously planned software upgrade into the current operational test period that is scheduled for completion in June 2007.
- Developmental testing of AIM-120D, the next variant of AMRAAM, continues. The AIM-120D is planned to provide significant improvements in capability, to include Global Positioning System-assisted guidance and data link.

Assessment
- The AIM-120C-7 is more than two years behind the originally planned development and operational test schedule.
- With the exception of the timeline, testing to date has been in accordance with the DOT&E-approved Test and Evaluation Master Plan and associated test plan.
- AIM-120D developmental and operational testing have been impacted by AIM-120C-7 developmental delays. The model for AIM-120C-7 must be validated prior to evaluation of AIM-120D.
- Range scheduling priorities between several major defense programs have caused significant delays in completing Live Fire and captive carry tests.

Recommendation
- Status of Previous Recommendations. The following FY05 recommendation remains valid:
  FY05 #1: DOT&E recommended that the program office include enough test missiles to adequately characterize effectiveness and suitability for the AIM-120D. DOT&E

remains concerned that the current number of shots planned may be insufficient to address all requirements and fully characterize operational effectiveness.

- FY06 Recommendations.
  1. The Navy and Air Force must establish an independent validation plan for the models used for effectiveness evaluation. This plan must be approved by DOT&E prior to use.
  2. The Range Commander's Council, in coordination with all test ranges and laboratories, must incorporate a seamless exchange of information between the various range complex and laboratory system matter experts and provide better access to test resource capabilities.

ALR-69A Radar Warning Receiver (RWR)

Executive Summary

- The ALR-69A Radar Warning Receiver (RWR) program is in the System Development and Demonstration phase, in preparation for a 2QFY07 low-rate initial production (LRIP) decision.
- The DOT&E-approved ALR-69A operational assessment, which will support the LRIP decision, began in June 2006 after a 13-month delay and is scheduled to conclude in November 2006. This delay primarily was due to the lack of software maturity.

System

- The ALR-69 is a RWR that detects, identifies, and locates threat electronic signals.
- The Core ALR-69A RWR is designed to improve performance over the Air Force's primary RWR system, the ALR-69, by enhancing:
  - Detection range and time
  - Accuracy of threat identification
  - Location of threat emitter systems
  - Performance in a dense signal environment
  - Reliability and maintainability
- It is designed for fighter and transport aircraft. Lead platforms are the MC-130E and F-16C Block 30.
- Core ALR-69A RWR components include:
  - Digital quadrant receivers
  - Countermeasures computer
  - Control indicator
  - Azimuth indicator
- The Air Force incorporated spiral developments, which are incremental improvements to the core system, to provide the most significant new ALR-69A capabilities. These ALR-69A spirals are designed to improve the Core ALR-69A's threat-locating capabilities, which enable the following:
  - Spiral 1: Accurate threat-locating capability by single aircraft

The bottom left picture is of the legacy ALR-69 components
The bottom right picture is of the primary ALR-69A components

DQR - Digital Quadrant Receiver
MCC - Modular Countermeasures Computer

  - Spiral 2: Location of threat emitters through a multi-aircraft network, accurate enough for destruction with Global Positioning System-guided munitions
  - Spiral 3 (Unfunded): Specific Emitter Identification. Currently RWRs classify threats as general threat systems, but the Specific Emitter Identification is designed to "fingerprint" a specific threat.
- Spiral 1 is temporarily unfunded and development is on hold. Spiral 2 is part of the program of record and being assessed as an advanced concept technology demonstration effort. Spiral 3 is unfunded.

Mission

- Combatant commanders will use ALR-69A to enhance the survivability of transport, fighter, and special operations aircraft on missions that penetrate hostile areas.
- ALR-69A provides aircraft self-protection by warning pilots of radar threats, supporting threat avoidance, or permitting timely use of defensive countermeasures.

Activity

- The ALR-69A is in the System Development and Demonstration phase, with an LRIP decision planned for 2QFY07.
- The 2005 operational assessment was delayed 13 months, primarily due to the lack of software maturity.
- Government testing of the core system began in June 2006 and is scheduled to conclude in November 2006. This is an operational assessment to support the Milestone C/LRIP decision to acquire 50 low-rate initial production units of the 254 total ALR-69A systems.
- The Air Force Operational Test and Evaluation Center conducted an operational assessment beginning in 3QFY06 to support the Milestone C decision.
- FY06 Air Force testing included lab testing at the Electronic Warfare Avionics Integrated Support Facility, Warner Robins AFB, Georgia; the Integrated Demonstration and Applications Laboratory, Wright-Patterson AFB, Ohio; aircraft integration on the C-130/MC-130 at Benefield Anechoic Facility, Edwards AFB, California; and contractor/development test flights on the MC-130E.

- FY06 testing was conducted in accordance with the DOT&E-approved Test and Evaluation Master Plan (TEMP) and test plan.

Assessment

- The ALR-69A experienced software instability problems as demonstrated by inconsistent detection performance and numerous system lock-ups/re-starts during contractor testing at its Systems Integration Laboratory. However, the system software stability improved, allowing commencement of government testing.
- The system hardware is stable, as evidenced by the government's acceptance testing of the system design. However, this stability needs to be verified during government chamber and flight testing.
- Initial ALR-69A integration flight testing on the MC-130 will be redone, as it resulted in numerous system problems.
- An accurate assessment of the ALR-69A system's maturity, required to support the 2QFY07 LRIP decision and progress towards the FY07-08 IOT&E, will not be available until the system is adequately assessed in government tests.
- As directed by DOT&E in 2005, the Air Force continued development of a revised ALR-69A TEMP, including identification of the Air Force's lead platforms for ALR-69A integration.

Recommendations

- Status of Previous Recommendations. There were no recommendations from the FY05 DOT&E annual report.
- FY06 Recommendation.
  1. The Air Force must clarify the lead platforms for ALR-69A integration in a revised TEMP prior to low-rate initial production to support adequate IOT&E planning.

B-2 Radar Modernization Program (B-2 RMP)

Executive Summary
- B-2 Radar Modernization Program (RMP) developmental efforts were ongoing in FY06 in support of RMP System Development and Demonstration. Delays in hardware deliveries and discovery of deficiencies during developmental testing resulted in a Milestone C slip from February 1, 2007, to April 17, 2007.
- Based on delays experienced in FY06, there is very little margin for the program to meet its classified operational fielding date.

System
- The B-2 is a multi-role, low-observable bomber capable of delivering conventional and nuclear munitions. It has four turbofan engines and twin side-by-side weapons bays.
- The B-2 RMP features an Active Electronically Scanned Array radar operating on a new frequency.
- System avionics include a multi-mode radar, Global Positioning System-aided navigation, and a Defensive Management System for radar warning functions.
- The bomber's current principal weapons are the 2,000-pound and 500-pound Joint Direct Attack Munition.

Mission
- Combatant commanders use the B-2 aircraft to attack global targets during the day or at night, in all weather, in highly defended threat areas at the strategic, operational, and tactical levels of warfare.
- The B-2 engages high-value, heavily defended target sets including: command and control facilities, airfields, industrial complexes, logistical and air defense systems, lines of communication, and battlefield forces and equipment.

Activity
- B-2 RMP testing was conducted in accordance with the January 2004 DOT&E approved B-2 Capstone Test and Evaluation Master Plan.
- Developmental test and evaluation, as part of the System Development and Demonstration, was ongoing throughout FY06.
- The Air Force Operational Test and Evaluation Center began an operational assessment of RMP capabilities in October 2006. The operational assessment is evaluating RMP progress towards meeting operational effectiveness and suitability in advance of Initial Operational Testing scheduled to begin in late FY07.

Assessment

The program is progressing toward Milestone C. Delays in hardware deliverables and discovery during developmental testing in 2006 leaves little schedule margin for the program to meet the required classified fielding date.

Recommendations
- Status of Previous Recommendations. There are no outstanding recommendations from FY05.
- FY06 Recommendations. None.

Battle Control System – Fixed (BCS-F)

Executive Summary

- The Battle Control System – Fixed (BCS-F) is used in North American Aerospace Defense (NORAD) air defense sectors (ADS) and regional air operations centers (AOC) to provide surveillance, identification, and control of U.S. and Canadian airspace.
- BCS-F transitioned from Acquisition Category II (ACAT II) to Acquisition Category 1AC (ACAT IAC) this year, placing it on oversight in the middle of Spiral 2 testing. This transition designated BCS-F as a Major Automated Information System program.
- The Air Force and Combatant Commander Northern Command (NORTHCOM) and Pacific Command (PACOM) approved fielding BCS-F Spiral 2 at Hawaii and Alaska regional AOCs in May 2006. Western and Northeastern ADS Commanders are not comfortable fielding BCS-F Spiral 2 without the current NORAD Contingency Suite operating in tandem. The two systems currently share the operational mission workload at the Western and Northeastern ADS facilities. Commander, Air Combat Command expects to declare the BCS-F System Initial Operational Capability (IOC) in October 2006.

System

- BCS-F is a tactical air battle management command and control system.
- BCS-F is intended to replace the legacy AN/FYQ-93 radar system and the operator control system, and will eventually replace the NORAD Contingency Suite. The NORAD Contingency Suite was put in place at the Western and Northeastern ADS facilities after September 11, 2001, to incorporate the interior radars operated by the Federal Aviation Administration into the Air Defense Mission. However, BCS-F (the system of record) provides the mainland U.S ADS', including Hawaii and Alaska regional AOCs, with common hardware and software, using commercial off-the-shelf hardware and an open architecture software configuration.

- Spirals 1 and 2, developed through May 2006, have satisfied many of the BCS-F requirements. Spiral 3 will include transition to a Linux operating system and an improved graphical user interface. It will share much of the software used on BCS-Mobile system.
- Each BCS-F system requires some customization due to the different facility interfaces required.
- BCS-F is a bi-national program with Canada and is operated at the Canadian ADS at 22 Wing, North Bay Canada.

Mission

- NORAD and Homeland Defense forces use BCS-F to monitor and control U.S. and Canadian airspace.
- Forces use the BCS-F to monitor air traffic in and approaching U.S. airspace and pass information on to air defense and national command authorities.
- The Air Force uses the BCS-F to control air defense assets, including fighters, to identify and intercept potential air threats to the U.S.

Activity

- BCS-F transitioned from ACAT II to ACAT IAC this year, placing it on oversight in the middle of Spiral 2 testing.
- The BCS-F team conducted combined developmental and interoperability testing, and Force Development Evaluation at the Test, Training, and Transition Facility at Tyndall AFB, Florida, and operational testing at the Northeast ADS, Western ADS, Canadian ADS, and at the Hawaiian and Alaskan regional AOCs.
- The BCS-F team conducted combined developmental and operational testing, as well as trial period activities, at all five of the air defense facilities.
- The BCS-F team conducted regression testing to verify fixes to problems observed during developmental and operational trial periods.

Assessment

- The Air Force and combatant commanders expect to approve fielding BCS-F for shared mission operations with the NORAD Contingency Suite at the Western ADS and Northeast ADS in October 2006.
- Commanders at both the Western and Northeastern ADS facilities are not comfortable with BCS-F Spiral 2 taking the place of the NORAD Contingency Suite. However, commanders at the Hawaii and Alaska regional AOC facilities accepted its capability, having never had the NORAD Contingency Suite.
- DOT&E's emerging results are that the testing was adequate to demonstrate that the BCS-F Spiral 2 was an improvement over the legacy air defense command and control software, the FYQ-93, but not as effective as the current NORAD Contingency Suite.
- ADS commanders continue to find the NORAD Contingency Suite necessary. BCS-F deficiencies include:
  - The inability to connect to the National Capital Region Sentinel radar network
  - The lack of a remote display capability for higher headquarters
  - Insufficient operator handbook
  - Issues with importing, storing, and displaying flight plans from the Federal Aviation Administration
  - Occasional server auto switchovers
  - Capacity limits being reached due to constraint errors causing system re-launches during operational test events
- Testing was not accomplished per a DOT&E-approved Test and Evaluation Master Plan or operational test plan since the tests were conducted during the transition to DOT&E oversight.

Recommendations

- Status of Previous Recommendations. No FY05 report was submitted for the BCS-F program.
- FY06 Recommendations. The Air Force should:
  1. Review and update its test planning documentation and submit to DOT&E for approval.
  2. Update the Operational Requirements Document to reflect changes in BCS-F's mission requirements. The current Operational Requirements Document was developed prior to September 11, 2001, with annex updates dated February 20, 2003.
  3. Consider eliminating funding upgrades to the NORAD Contingency Suite, as the BCS-F is the objective system for the ADS and Regional AOC facilities.
  4. Consider keeping the NORAD Contingency Suite in-place at both the Western and Northeastern ADS facilities until Spiral 3 is fielded.

Battle Control System – Mobile (BCS-M)

Executive Summary
- The Battle Control System-Mobile (BCS-M) program came under DOT&E oversight during FY06.
- The Air Force completed Spiral 3 operational testing during 2006 on the BCS-M Remote Radio Secure Voice System (RRSVS).
- The overall BCS-M test and evaluation strategy and DOT&E's independent evaluation plan is currently in development.

System
- BCS-M, formerly the Control and Reporting Center, is the modernization of the mobile tactical Command and Control execution element of the Ground Tactical Air Control System for the Joint Task Force/Joint Forces Air Component Commander. The BCS-M is a deployable theater and tactical aircraft warning and control system that includes:
  - Operational shelters, communications switches, workstations, and computer servers with updated and open architecture systems
  - RRSVS to improve survivability and to extend line-of-sight communications capability
- The BCS-M Radar Improvement Program will replace the legacy organic radar sensor and Identification Friend or Foe Interrogation System.
- The BCS-M systems move into the intended theater of operations using strategic and tactical airlift or sealift. BCS-M forward deploys overland using organic vehicles and provides deep support to a dynamic air battle.

Mission
- The Air Component and Joint Forces Air Component Commanders will use the BCS-M with a modular set of deployable theater and tactical ground-based systems. These include persistent aircraft early warning, air surveillance, air object identification, integrated air-to-air and surface-to-air battle management, and aircraft control systems. The BCS-M serves as the alternate Air Operations Center combat operations division.
- Once deployed, the BCS-M is the senior air defense and air control element in the assigned region or sector and is responsible for coordinating the integrated air defenses and common air identification and surveillance view.

Activity
- The Air Force completed combined developmental and operational testing of the BCS-M RRSVS Spiral 3 capability during the spring of 2006, and the operational test during June 2006.
- Since these events occurred during transition to DOT&E oversight, this testing was not conducted with a DOT&E-approved Test and Evaluation Master Plan (TEMP) or operational test plan. After meeting with DOT&E in October 2006, it was agreed that any future RRSVS testing strategy would be written into the BCS-M TEMP and approved by DOT&E.
- The BCS-M test strategy is currently in development.

Assessment
- Not all required operational communications capabilities, specifically the remote Ultra-High Frequency Radio and Satellite Communications were available for 2006 operational testing. The user agreed with DOT&E that tests of these capabilities should be deferred until development and integration is complete between the legacy system and BCS-M.
- DOT&E received the operational testing for BCS-M RRSVS Spiral 3. The analysis of effectiveness and suitability is ongoing.
- The BCS-M Operational Requirements Document is currently "grandfathered" in lieu of an Initial Capabilities Document.

The Capabilities Production Document is being developed, and will include any changes that may differ from the ORD.

Recommendations

- Status of Previous Recommendations. BCS-M was not on DOT&E oversight prior to this report.
- FY06 Recommendations. The Air Force should:
  1. Plan to conduct additional operational tests of BCS-M RRSVS Spiral 3 capability for those areas not evaluated during 2006 and to validate the fixes to other deficiencies indicated in the June 2006 test report.
  2. Review the BCS-M Operational Requirements Document and staff a BCS-M Capabilities Production Document that includes the operational requirements emerging from the ongoing user and developer working groups, as well as those documented in the Systems Capabilities Description.
  3. Develop an updated BCS-M TEMP for DOT&E approval that defines the test strategy for all BCS-M requirements.

C-5 Avionics Modernization Program (AMP) / Reliability Enhancement and Re-engining Program (RERP)

Executive Summary

- The C-5 fleet is undergoing a two-phase modernization program. The first phase – an Avionics Modernization Program (AMP) – completed developmental and initial operational testing (B-model only) and is currently in production. The AMP production decision was made in February 2003 prior to the completion of developmental test in August 2005. The second phase – a Reliability Enhancement and Re-engining Program (RERP) – started development and completed first flight with a B-model aircraft on June 19, 2006.
- The Test and Evaluation Master Plan (TEMP) for AMP deficiency correction and RERP completion needs revision.
- The existing acquisition strategy is no longer executable due to cumulative program delays and funding shortfalls. An updated C-5 acquisition strategy should include RERP completion and programmed correction of AMP.
- The Air Force Operational Test and Evaluation Center (AFOTEC) started AMP OT&E on September 7, 2005, and suspended testing in October 2005. The C-5B AMP OT&E restarted in April 2006 and completed in June 2006. A C-5A/C AMP operational test is scheduled for January 2007.
- The observed performance of the C-5 AMP modifications is not adequate as a baseline for RERP.
- The C-5 AMP modifications are not operationally suitable.
- Live Fire tests showed the wing leading edge dry bay fire suppression system did not suppress ballistic fires from all threats tested.

System

- The C-5 is the largest four-engine, military transport aircraft in the United States. The C-5 has 36 pallet positions and can carry a maximum payload of 270,000 pounds. The typical crew size is seven.

- The AMP incorporates a mission computer, a glass cockpit with digital avionics (including autopilot and autothrottles), and state-of-the-art communications, navigation, and surveillance components for air traffic management functionality.
- The RERP provides 50 reliability enhancements, including new commercial engines, nacelles, thrust reversers, and pylons.

Mission

- Units equipped with the C-5 perform strategic airlift, emergency aero-medical evacuation, transport of brigade-size forces in conjunction with other aircraft, and delivery of outsize or oversize cargo to the warfighter.
- The C-5 must be able to execute missions at night, in adverse weather conditions, and in civil-controlled air traffic environments around the world.
- The C-5 receives in-flight aerial refueling for extended-range missions.

Activity

- The C-5 B AMP OT&E began on September 7, 2005, approximately one year behind schedule. The AFOTEC Commander paused testing on October 10, 2005, because seven operational AMP airlift missions were attempted and none completed successfully. The C-5 AMP OT&E restarted in April 2006 and completed in June 2006.
- The OT&E consisted of 48 airlift sorties and 22 local training sorties for a total of 376 flight hours.
- The C-5 B AMP operational test plan included real-world airlift transport missions, maintenance demonstrations, and information assurance evaluations. Real-world operational missions for OT&E provided opportunities to evaluate the aircraft in typical environments.
- The first flight of the C-5 RERP occurred on June 19, 2006, using a B-model aircraft. A second B-model and an A-model

are currently in modification scheduled for completion in late 2006.
- Both the content and timeline of the RERP developmental flight tests are undergoing modification.
- DOT&E approved a C-5A/C AMP test concept brief in September 2006. Operational testing is scheduled to begin in January 2007.
- Live Fire ballistic tests provided data to evaluate the effectiveness of wing leading edge dry bay fire suppression systems.

Assessment
- The observed performance of the C-5 AMP modifications is not adequate as a baseline for RERP. The instability of the flight management system, information assurance vulnerabilities, and frequent autopilot disconnects are contributing factors. Operator workarounds increased crew workload and impacted operational effectiveness. However, situational awareness regarding navigation and other air traffic improved. Navigation and data link capabilities performed well in OT&E.
- The C-5 AMP is not operationally suitable. High AMP component failure rates, inadequate integrated diagnostics, lengthy technical order trouble shooting times, and high maintenance man-hours per flight hours impacted the ability to generate aircraft missions.
- AMP development included unrealistic schedules, unstable software systems, and immature systems integration. These problems affected the resolution of AMP deficiencies, the AMP OT&E schedule, and the RERP development timeline. There is no program documentation showing that lessons learned from the AMP development are being applied to the RERP.
- The AMP/RERP acquisition strategy is no longer executable due to program delays and funding shortfalls. The developmental program timeline is not realistic. Correction of AMP deficiencies, inclusion of the 14 delayed AMP capabilities, and RERP completion are not part of the current program of record.
- Wing leading and trailing edge dry bays are vulnerable to threat induced fires. The fire suppression system is not effective against the threats tested.

Recommendations
- Status of Previous Recommendations. The Air Force has taken action on one of the three previous DOT&E recommendations. The remaining two are still valid.
  FY05 #1: The Air Force has not delivered an updated executable acquisition strategy as previously recommended.
  FY05 #3: DOT&E recommended that the Air Force consider development of improved dry bay fire suppression systems in the wing leading edge and evaluate them against expected ballistic threats. The C-5 System Group has stated that they will consider LFT&E recommendations after the conclusion of the LFT&E program.
- FY06 Recommendations.
  1. The Air Force should apply lessons learned from C-5 AMP development to RERP.
  2. The C-5 acquisition strategy should include RERP completion and programmed correction of AMP deficiencies.

C-130 Avionics Modernization Program / Common Avionics Architecture for Penetration (C-130 AMP/CAAP)

Executive Summary

- Since 1999, six program offices, in addition to the C-130 systems group, and two major Air Force commands have been responsible for this program. This has created nearly continuous programmatic and managerial challenges, including major technical and schedule risks.
- The C-130 Avionics Modernization Program (AMP)/Common Avionics Architecture for Penetration (CAAP) acquisition strategy has been out of date for two years. A current and credible acquisition strategy and test program are essential to the success of this program. The test program has an unresolved need for production representative test articles.
- The Air Force needs to submit an update to the Test and Evaluation Master Plan (TEMP).

System

- Legacy C-130s (excluding the C-130J) are four-engine turboprop aircraft used by the Air Force, Navy, Marines, and Special Operations units. Crew size varies from 4 to 13 depending on aircraft mission.
- The AMP adds glass cockpits, integrated digital avionics, and an integrated defensive systems suite. It also provides Communications, Navigation, and Surveillance (CNS) capabilities for Air Traffic Management (ATM) functions.
  - Special Operations aircraft build upon the AMP foundation and add CAAP functionality, to include secure communications, enhanced situational awareness, and Terrain Following/Terrain Avoidance capability.
  - Combat delivery C-130 AMP aircraft have six pallet positions.
  - See the table on the next page for C-130 AMP variants and associated special tests, listed by Mission Design Series (MDS).

Mission

- Units equipped with the C-130 primarily perform the tactical portion of the airlift mission, flying shorter distances and using austere airfields within combat zones.

- Combat Delivery includes:
  - Airdrop of paratroopers and cargo (palletized, containerized, bulk, and heavy equipment)
  - Airland delivery of passengers, troops, and cargo
- Specialized missions for C-130 variants include:
  - Covert operations
  - Aerial and rapid ground refueling
  - Emergency aeromedical evacuation
  - Combat search and rescue
  - Weather reconnaissance
  - Fire-fighting
  - Natural disaster relief
  - Antarctic sustainment and re-supply missions

Activity

- The Air Force Operational Test and Evaluation Center (AFOTEC) developed a test concept for the C-130 AMP and CAAP OT&E activities based on an acquisition strategy that is out of date.
- The first flight of a C-130 H2 developmental test aircraft occurred on September 19, 2006.
- An integrated government/contractor test team is performing developmental test flights. AFOTEC personnel will

participate as part of the government contingent in preparation for an AMP OT&E
- A low-rate initial production decision (Milestone C) for both AMP and CAAP should have occurred in February 2006 as part of the original acquisition strategy. It did not take place. Full-rate production decisions for both the AMP and CAAP were to be in mid-2008 and late 2008, respectively. Without an approved acquisition strategy, it is unknown when the milestone or full-rate production decisions are planned.
- AFOTEC postponed an operational assessment of the AMP to support a Milestone C decision. AFOTEC tasks will be reassessed after a new acquisition strategy has been approved.

Assessment
- DOT&E approved a C-130 AMP/CAAP TEMP in September 2002 based upon the original acquisition strategy. The approval required an update to the TEMP prior to the start of developmental testing because of program changes that affected the sequence, scope, and duration of planned tests. The update has not been submitted.
- Impacts on test resources and test planning have been significant due to funding issues, engineering change proposals, and changes to the pool of aircraft to be modified.
- AFOTEC's original test concept requires a revision following adoption of a new AMP acquisition strategy.
- There are programmatic and oversight challenges. Besides the C-130 systems group, six other program offices and two major Air Force commands are responsible for the basic C-130 AMP/CAAP. Many of the candidate aircraft are in Air National Guard and Air Force Reserve units.
- Major issues include:
  - Mitigating technical and schedule risks
  - Establishing multiple full-rate production decision dates
  - Determining low-rate initial production quantities
  - Updating of the Operational Requirements Documents
  - Approving an adequate TEMP
- Production representative aircraft in appropriate mission configurations are required for adequate operational testing of the C-130 AMP variants.

Recommendations
- Status of Previous Recommendations. Both of the FY05 recommendations remain valid.
  FY05 #1: Because of the technical and programmatic challenges of the C-130 AMP, DOT&E recommended that a comprehensive review of developmental and operational test and evaluation lessons learned from the C-5 AMP should be applied.
  FY05 #2: DOT&E recommended in the 2004 and 2005 Annual Reports that since the acquisition strategy and the testing and evaluation strategy were not consistent, a rationalization of the program should be completed before the Special Operations Force demonstration flights began in March 2005. A credible acquisition strategy is essential prior to TEMP approval. Neither the rationalization nor the acquisition strategy were provided.
- FY06 Recommendation.
  1. The Air Force should submit an updated TEMP based on a credible acquisition strategy.

Mission Design Series	Nomenclature	Special Tests
C130/H/H1/ H2/H3	Combat Delivery	CNS/ATM Capabilities, Traffic Alert and Collision Avoidance System, Terrain Awareness Warning System, Night Vision Imaging System, Flight Management System
AC-130H/U	Gunship	Gunfire Accuracy, Enhanced Situational Awareness, Defensive Systems
EC-130H	Compass Call	Mission Unique
HC-130N/P	Combat Rescue	Mission Unique
MC-130H	Combat Talon II	Terrain Following/Terrain Avoidance Navigation, Enhanced Situational Awareness, Defensive Systems
MC-130P	Combat Shadow	Mission Unique
LC-130H	Ski	Mission Unique

C-130J Aircraft

Executive Summary
- There are no milestone decision reviews planned for the C-130J. The current multi-year contract expires in February 2008.
- The C-130J is effective in performing single ship airland and airdrop missions in a permissive threat environment.
- The C-130J, in the current configuration, is not effective in performing formation airdrop missions in Instrument Meteorological Conditions where the use of Station Keeping Equipment is required.
- The C-130J is not effective for worldwide operations in a non-permissive threat environment.
- The C-130J has shortfalls in meeting user suitability requirements, due to maintainability issues.
- C-130J operational testing will likely continue past 2010 because the program has shifted to spiral development.

System
- The C-130J is a medium-sized four-engine turboprop tactical transport aircraft.
- Compared to previous models, the cockpit crew requirement is reduced from four to two on the J model; loadmaster requirements vary (one or two), depending on mission need.
- Compared to legacy models, the C-130J has approximately 70 percent new development. Enhancements unique to the C-130J include a glass cockpit and digital avionics, advanced integrated diagnostics, a new propulsion system, improved defensive systems, and an enhanced cargo handling system.
- The C-130J has two different lengths denoted as a long and a short body. The long body carries eight standard pallets; the short carries six.

Mission
- Combatant commanders use the C-130J within a theater of operations for combat delivery missions which include:
  - Airdrop of paratroopers and cargo (palletized, containerized, bulk, and heavy equipment)
  - Airland delivery of passengers, troops, and cargo
- Combat Delivery units operate in all weather conditions, use night-vision lighting systems, and may be required to operate globally in civil-controlled airspace.
- Combat Delivery aircraft can perform emergency aeromedical evacuations.

Activity
- Four C-130Js were deployed to Southwest Asia and are being used for tactical airlift missions.
- The Air Force completed Phase II OT&E in January 2006 with emphasis on evaluating the airdrop mission area. Using long- and short-body aircraft, testing included an assessment of the crew workload, formation airdrop training flights, a simulated deployment to support a joint training exercise, cold weather operations in Alaska, and maintenance activities.
- Operational testing included mission planning, pre- and post-flight operations, en route operations, tactical airland and airdrop, multi-ship formations, sustainment, sortie generation, and self-deployment to representative operational environments.
- Preparation for Block 6.0 developmental and operational testing is ongoing. Developmental testing is scheduled to begin spring 2007.
- C-130J Engine Nacelle Fire Suppression System Testing is currently scheduled for December 2006 at Wright Patterson AFB, Ohio. This will complete the C-130J Live Fire test program.

Assessment
- The C-130J is effective in performing single ship airland and airdrop missions in a permissive threat environment. Both capabilities were successfully demonstrated in Phase II OT&E.
- The C-130J is not effective in performing formation airdrop missions using Station Keeping Equipment in Instrument Meteorological Conditions. Frequent Station Keeping Equipment anomalies were observed during OT&E.
- The C-130J is not effective for worldwide operations in a non-permissive threat environment.

  - The AAR-47 infrared missile/laser warning system is operationally effective as installed on the C-130J but has one significant classified limitation.
  - The ALR-56M radar warning receiver has not been fully characterized because it was not ready for operational testing.
- The C-130J has shortfalls in meeting user suitability requirements due to maintainability issues. The integrated diagnostics false alarm rate is high and the poor performance of the portable maintenance aid impacted the ability to generate sorties. The Air Force reported more than 90 open deficiencies at the end of Phase II OT&E.

Recommendations

- Status of Previous Recommendations. The Air Force has taken action on both FY05 recommendations.
- FY06 Recommendation.
  1. The Air Force should submit an updated Test and Evaluation Master Plan to include follow-on testing of the ALR-56M, formation flight capabilities, and correction of maintenance deficiencies.

Combat Search and Rescue Replacement Vehicle (CSAR-X) / Personnel Recovery Vehicle (PRV)

Executive Summary

- The Combat Search and Rescue Replacement Vehicle (CSAR-X) program submitted a Test and Evaluation Master Plan (TEMP). OSD directed the program to re-submit the TEMP including an updated LFT&E strategy within 90 days of source selection.
- A Defense Acquisition Board (DAB) met on October 31, 2006, and approved implementation of the program at Milestone B.
- Shortly after the DAB, an Air Force source selection board announced selection of the Boeing H-47 helicopter for the CSAR-X program.
- A government review of the source selection process will delay detailed test planning.
- The program has a test strategy that provides for an operational assessment prior to the low-rate initial production (LRIP) decision. Based on DOT&E's experience with other programs, the CSAR-X program retains schedule risk in achieving the desired capabilities before the proposed LRIP decision point.

System

The CSAR-X (formerly called the Personnel Recovery Vehicle (PRV)) will replace aging Air Force HH-60 Combat Search and Rescue (CSAR) helicopters. The program intends to field a new vehicle capable of meeting the Air Force CSAR requirements and increase the inventory of available rescue helicopters based on updated needs analyses. The primary program requirements are:

- Two hundred and seventy-five nautical miles (nm) combat radius
- Downwash that does not impede safe and successful recovery of personnel

- Ready for deployment within three hours of tasking, ready for flight operations within three hours of arrival, and worldwide operations capable within 24 hours of departure
- Self-defense, survivability, and vulnerability capabilities that support CSAR
- Lethal and electronic threat engagement
- Capacity to carry 2,900 pounds; usable cabin space for aircrew, recovery team, four non-ambulatory patients, and mission equipment

Mission

- Operational units equipped with CSAR-X recover isolated personnel and downed aircrew.
- Time is the single most important factor in successful recovery of personnel. The purpose of the CSAR-X is to help operational units conduct the recovery mission operational tasks (i.e. rapid deployment, refueling, self-protection, and self-sustainment) more quickly than current systems, thus minimizing the overall time to recover personnel.

Activity

- The CSAR-X program submitted a TEMP for Milestone B prior to source selection. Out of concern that the TEMP be updated to account for competitor-specific testing, OSD directed the program to re-submit the TEMP, including an updated LFT&E strategy, 90 days after source selection.
- A DAB met on October 31, 2006, and approved implementation of the program at Milestone B. Shortly after the DAB, an Air Force source selection board announced selection of the Boeing H-47 helicopter for the CSAR-X program.
- The program implemented a number of DOT&E suggestions in their test strategy, including an operational assessment prior to the LRIP decision and use of production representative aircraft for operational testing.

Assessment

- The test program appears adequate with sufficient test assets to support an LRIP decision and IOT&E. An operational assessment using available developmental testing information will support the LRIP decision.

- The program schedule delivers the first test assets approximately two years after development begins. DOT&E is concerned about schedule risk with respect to developing and producing a survivable, capable helicopter that meets requirements within the relatively short span between program initiation and the proposed LRIP decision point.
- The Air Force requested offers from three companies with aircraft that come close to the Air Force requirements for a new rescue helicopter. There is sufficient variation in the proposed aircraft such that USD (AT&L) and DOT&E believe that the TEMP required significant changes in testing and LFT&E strategy depending on the aircraft selected. The original direction for this required 90 days from source selection; however this will be delayed as the Air Force and Government Accountability Office review the source selection process for the program.

Recommendations

- Status of Previous Recommendations. The program took effective action on all of the DOT&E recommendations from the previous annual report.
- FY06 Recommendations. The CSAR-X program should:
  1. Continue with a strategy and TEMP that matches those submitted for the Milestone B decision. The program should retain the operational assessment prior to committing to LRIP and complete sufficient test planning to support adequate operational testing.
  2. Shift from a calendar-driven to event-driven approach if development identifies significant deficiencies that might delay or impact operational testing.

Combat Survivor Evader Locator (CSEL) and the PRC Family of Handheld Survivor Radios

Executive Summary

CSEL

- The Combat Survivor Evader Locator (CSEL) program corrected, verified, and closed deficiencies identified in previous operational testing.
- The CSEL program is developing a web-based application for virtual rescue center capability. Testing and fielding will occur in FY07.
- The program is beginning development of Terminal Area Communication (TAC) and Terminal Area Guidance (TAG) capabilities. Testing and fielding will occur in FY08.
- The program should complete development prior to initial production, conduct adequate operational testing led by the Air Force Operational Test and Evaluation Center (AFOTEC) and supported by units from all Services, and commit to full production only after operational testing completes.

PRC

- Multiple DoD agencies procured 1,350 PRC radios this year. Coalition partner and other international customer nations purchased 520 PRC radios this year. The developer adds capabilities to PRC radios each year, but previous versions cannot be updated with the new capabilities. Operational units receive a more capable PRC radio, but this process complicates the overall search and rescue mission by increasing supportability (training, maintenance, and programming) and increasing the number of radio variants fielded.

System

The CSEL is a radio system that allows a survivor to contact rescue forces, report status, and communicate for recovery. It includes:

- A handheld radio that includes a military Global Positioning System (GPS) receiver and navigation system
- A satellite communication system
- Encrypted data and voice capability on multiple programmable frequencies
- Ultra High Frequency base station computers that route the data messages to rescue command and control elements
- Equipment to program and update the handheld radios

PRC radios are similar to CSEL radios. There are several variants of PRC radios that are fielded, including the 112B, 112D, and 112G J001. PRC radios include:

- Commercial GPS and navigation system
- Line-of-sight communication with unique receivers carried on theater force aircraft
- Commercially-encrypted data and voice capabilities on programmable frequencies

The latest version is the PRC-112G J002. This radio incorporates new features including an over-the-horizon data messaging capability, more software-programmable waveforms for beacons and messages, and an option for military-only GPS.

Mission

Rescue forces equipped with CSEL or PRC 112 systems use them to identify, locate, and authenticate isolated persons quickly and accurately.

- CSEL sends a data message from the survivor via satellite to a central rescue center. The center forwards that message to rescue forces, who then communicate with the survivor via voice communications to facilitate recovery.
- PRC sends a data message from the survivor that is received by aircraft pre-positioned in theater and specially equipped to receive PRC messages. These aircraft may be rescue forces or support aircraft that pass the messages to rescue forces. Rescue forces contact the survivor via either data or voice communications, in order to facilitate recovery.

Activity

CSEL

- The CSEL program corrected, verified, and closed the remaining deficiencies identified during the Multi-Service Operational Test and Evaluation in 2004. Verification lagged the corrections process because the test teams lacked an efficient venue in which to test the corrections. A letter from

AFOTEC outlining the verifications is in draft and will be submitted to the Air Force program office and DOT&E by late November.
- The CSEL program completed the last retrofits of radios that received a potentially defective circuit card.
- The CSEL program is developing a web-based application that will allow the creation of virtual rescue centers at locations where secure internet terminals exist. This capability will increase operational flexibility in setting up rescue centers to monitor and react to CSEL survivor messages, without impacting or affecting the previously-fielded capabilities. The program originally intended to complete operational testing of this new capability in FY06 and fielding in January 2007. The testing will now occur in early 2007 with fielding in June 2007.
- The CSEL program outlined their new approach for developing, testing, and fielding TAC and TAG capabilities. Users identified these capabilities (unfunded prior to this year) as the most important new capability to pursue. Development is underway and testing is planned for fall 2007.

PRC
- The PRC-112 developer sold 1,350 radios to multiple DoD agencies in FY06. In addition, the developer sold 520 radios to coalition partner and other international customer nations.

Assessment

CSEL
- DOT&E supports the current deficiency correction and verification effort, as well as the future development and operational testing strategy outlined by the program office and AFOTEC. This approach will provide adequate operational testing prior to production and fielding of new CSEL capabilities.
- CSEL has demonstrated better capability than PRC radios, except for the lack of TAC and TAG. The addition of these capabilities will fulfill that shortfall.
- The Army and Navy developed procedures to replace legacy radios with CSEL radios, which reduce the number of fielded radio variants. There is no Service-wide strategy for replacing radios in the Air Force. Some Air Force units are developing replacement procedures. Other Air Force units desire to wait until TAC/TAG is available before they commit to replacing PRC-112G and other legacy radios.

PRC
- Each year, the PRC developer updates the PRC-112G radio with new or updated features and capabilities such as over-the-horizon capability or military GPS. These radios are not backward compatible (previously procured versions cannot be updated with the latest capabilities). Previous operational testing of multiple radios indicated that reducing the number of radio variants and increasing the global interoperability will increase the likelihood of successfully recovering personnel in a wide-range of environments. While some of the new capabilities add to the overall capability of the PRC radio, procurement of annually-updated PRC radios adds to the number of radio variants in operational units, complicates the supportability (training, maintenance, and programming), and decreases the overall global interoperability of Combat Search and Rescue radios.

Recommendations

- Status of Previous Recommendations. The program took effective action on the previous DOT&E recommendations for follow-on operational testing and management of the CSEL architecture.
  FY05 #2: The Army and Navy developed strategies for updating and replacing the oldest survivor radios with CSEL advanced radios. However, the Air Force still does not have a Service-wide strategy.
- FY06 Recommendation.
  1. The CSEL program should continue development and testing of the web-based rescue center application, development and testing of the terminal area capabilities, followed by adequate operational testing supporting production and fielding.

E-4B National Airborne Operations Center (NAOC)

Executive Summary
- Developmental testing combined with operational testing identified a number of deficiencies during FY06.
- The majority of deficiencies were corrected and operational testing completed in July 2006. Data analysis is ongoing.

System
- The E-4B National Airborne Operations Center (NAOC) is a command and control system for the National Command Authority onboard a Boeing-747 aircraft.
- The E-4B NAOC provides three separate improvements to the existing four aircraft E-4B fleet:
  - Global Air Traffic Management Phase II supports flight access to international airspace
  - The Audio Infrastructure Update provides a digital communications switch and operator workstation, while updating onboard mission communications interface systems
  - The Senior Leadership Communications System provides a video teleconferencing capability and additional secure communications capability

Mission
- The National Command Authority uses the E-4B NAOC as an Alternate National Military Command Center. National Command Authority support forces provide flight and communications capabilities to support national contingency response, national leadership continuity, and strategic defense.
- The E-4B NAOC can operate while on the ground or in-flight worldwide. The in-flight air refueling capability augments the in-flight missions.

Activity
- The Air Force completed contractor developmental testing with government assistance in order to evaluate component functionality. Testing occurred both in the laboratory and on the parked test E-4B, with additional integration testing conducted while the modified E-4B flew.
- Combined developmental and operational tests, including evaluation of information assurance vulnerabilities, completed during FY06 in accordance with the DOT&E-approved Test and Evaluation Master Plan.
- Operational testing completed in July 2006 in accordance with the DOT&E-approved Test and Evaluation Master Plan and operational test plan.

Assessment
- The results of combined developmental and operational testing, along with the dedicated operational test, should support Modification Block I kit production and fielding decisions for the E-4B fleet and placement of the modified aircraft on operational alert status.
- Combined developmental and operational testing results provided the developer with information on deficiencies and retest results. The test results ultimately supported the decision to enter into dedicated operational test.
- Emerging results from operational tests indicate objectives were completed. However, the user deferred test of one requirement due to a previously identified critical deficiency concerning communications performance.
- DOT&E is still conducting data analysis, but the emerging results indicate:
  - The operational availability threshold was not demonstrated for the Senior Leadership Communications System and there are concerns about logistics supportability when deployed overseas. Specifically, there are no spares, little training, and no technical orders with which to repair it. Additionally, testing data indicates that overall Modification Block I Mean Repair Time does not meet the threshold requirement.
  - While the Modification Block I system provides the crew increased situational awareness of the communications circuits, test data reveals there are “connection time” and “communication success rate” issues, which will affect DOT&E’s overall evaluation of operational effectiveness.

Recommendations

- Status of Previous Recommendations. No FY05 report was submitted for the E-4B NAOC program.
- FY06 Recommendation.
  1. The Air Force should plan to conduct follow-on test and evaluation of the mitigation of the communications performance deficiency and any other deficiencies indicated by the final operational test report.

E-8 Joint Surveillance Target Attack Radar System (JSTARS)

Executive Summary

- The FY08 Qualification Operational Test and Evaluation (QOT&E) intends to test the Joint Surveillance Target Attack Radar System (JSTARS) Block 30 upgrades, including improvements in Close Air Support and alternate Air Support Operations Center capabilities and fixes to some of the JSTARS' E-8C radio problems. However, no OT&E has been conducted thus far.
- Major upgrades to the JSTARS E-8C aircraft, including the Enhanced Land Maritime Mode (ELMM)/Affordable Moving Surface Target Engagement (AMSTE) capability and advanced battle management capabilities, will require operational testing beyond the planned QOT&E.

System

- JSTARS' E-8C is an airborne target acquisition and tracking system.
- JSTARS consists of an Air Force E-8C aircraft, Army and Marine JSTARS Common Ground Work Stations, and a Surveillance and Control Data Link connecting them.
- JSTARS has Moving Target Indicator Radar and Synthetic Aperture Radar systems; a High Frequency, Ultra-High Frequency, and Very-High Frequency Satellite Communications suite; a multi-data link capability; 18 operator workstations; and an air refueling capability.
- The Block 30 upgrade includes an air-to-ground attack support upgrade, which includes Airborne Command and Control Center (ABCCC) replacement software and hardware.

Mission

- Air and ground commanders use JSTARS for battlefield surveillance, ground-to-ground and air-to-ground battle management, and intelligence indications and warnings.
- Warfighting commanders use JSTARS to find, detect, track, and classify time-sensitive moving and stationary ground targets.

Activity

- Ground and laboratory testing of JSTARS upgrades took place during much of FY06 while the JSTARS test aircraft was in scheduled maintenance.
- Initial flight testing began on the ELMM/AMSTE upgrade, which consists of new radar modes, a new tracking algorithm, nearly a million lines of additional software, a new processor, new antennas, a guidance control unit for Joint Direct Attack Munitions, and a new concept of maritime operations.
- The JSTARS Test Team performed engineering analyses and tests to identify and resolve the radio communications problems that the JSTARS' E-8C was having with other aircraft and ground stations.
- The JSTARS program made modifications to operator manuals and the concept of operations to address the serious shortfalls in conducting Close Air Support and alternate Air Support Operations Center missions.
- The plan to re-engine the JSTARS E-8C aircraft is near source selection.

Assessment

- Proven during Operations Enduring Freedom and Iraqi Freedom, JSTARS continues to provide commanders surveillance and situational awareness that was not available without JSTARS over the battlespace. However, JSTARS aircrews could not effectively conduct all mission tasks previously assigned to the decommissioned ABCCC system.
- The ELMM/AMSTE and battle management upgrades to JSTARS are significant in cost and scope and require operational testing. Thus far, there has not been a test plan submitted.
- The modifications to fix the shortfalls in conducting Close Air Support and alternate Air Support Operations Center missions and to fix the radio problems require operational testing. Thus far, no OT&E has been conducted.

Recommendations

- Status of Previous Recommendations. The Air Force completed all of the FY05 recommendations, with the following exception:
  FY05 #5: DOT&E recommended that the Air Force's Air Combat Command conduct further operational test and evaluation with JSTARS, fighter aircraft, and ground elements in order to resolve the issues identified during Close Air Support and alternate Air Support Operations Center testing. In addition, Phase II testing of the attack support upgrade should demonstrate Link 16 software capabilities.
- FY06 Recommendations.
  1. The ELMM/AMSTE and battle management upgrades should be operationally tested and the Test and Evaluation Master Plan should be updated.
  2. The Air Force, Army, and Marine Corps should review and evaluate whether current and planned upgrades to JSTARS meet their warfighting requirements and enhance the ability to conduct their missions.
  3. The fixes to JSTARS E-8C radio problems and shortfalls in conducting Close Air Support and alternate Air Support Operations Center missions should be tested during the QOT&E, scheduled to start in 2008.

F-22A – Advanced Tactical Fighter

Executive Summary
- The F-22A successfully demonstrated air-to-ground mission roles capability during Follow-on Test and Evaluation (FOT&E) using 1,000-pound Joint Direct Attack Munitions.
- Many of the deficiencies highlighted in IOT&E were resolved, but additional deficiencies in air-to-ground weapons integration and defensive avionics suite capabilities were identified in follow-on testing.
- Defensive avionics deficiencies highlighted in user tests suggest the need for a comprehensive approach to address defensive suite shortfalls and assess improvements in follow-on test venues commensurate with follow-on F-22A operational flight program software releases.
- Modest improvements in some suitability measures were observed, but sortie generation capability remains hampered by low diagnostics accuracy, long repair times, and subsystem reliability that does not meet user requirements.

System
- The F-22A is an air superiority fighter that combines low observability to threat radars, sustained high speed, and integrated avionics sensors.
- F-22A low observability reduces threat capability to engage with current weapons.
- It maintains supersonic speeds without the use of an afterburner.
- Avionics that fuse information from the Active Electronically Scanned Array radar, other sensors, and data-linked information for the pilot enable employment of medium- and short-range air-to-air missiles and guns.
- It is intended to be more reliable and easier to maintain than current fighter aircraft.

- Its air-to-air weapons are the AIM-120C radar-directed missile and the AIM-9M infrared-guided missile.
- Its air-to-ground precision strike capability consists of two 1,000-pound JDAMs.
- The F-22A program is designed to deliver capability in increments.

Mission
- A unit equipped with the F-22A should be able to:
  - Provide air superiority over friendly or enemy territory
  - Defend friendly forces against fighter, bomber, or cruise missile attack
  - Escort friendly air forces into enemy territory
- Its air-to-ground capability includes counter-air, strategic attack, counter-land, and eventually, enemy air defense suppression missions.

Activity
- The Air Force Operational Test and Evaluation Center (AFOTEC) completed the first F-22A FOT&E in December 2005. Testing assessed F-22A air-to-ground mission capability using the 1,000-pound variant of the JDAM.
- Air Combat Command completed a series of user Force Development Evaluation (FDE) tests in January 2006 aiding in tactics development and assessment of F-22A defensive avionics suite capabilities.

Assessment
- At the conclusion of IOT&E in December 2004, DOT&E determined that the F-22A was operationally effective in the air-to-air mission role but not operationally suitable. AFOTEC FOT&E and Air Combat Command FDE testing conducted in FY05-06 led to the DOT&E determination that the F-22A was operationally effective in the air-to-ground mission role against fixed targets using JDAMs. However, the F-22A is still not operationally suitable.
- AFOTEC FOT&E and Air Combat Command FDEs revealed that:
  - The F-22A is operationally effective at air-to-ground missions against fixed targets and has resolved many of the deficiencies found in IOT&E.
  - Additional deficiencies were found in air-to-ground weapons integration that need to be addressed in future development efforts. Improvements require evaluation in follow-on operational testing.

- Air Combat Command FDE results highlighted shortfalls in defensive avionics suite capabilities to include threat identification, system response time, symbology resolution, and reliability. These shortfalls affect fundamental aspects of effectiveness in the operational environment in which the F-22A performs.

• While there were modest improvements in a few suitability measures, sortie generation capability is still hampered by low diagnostics accuracy, long repair times, and subsystem reliability that does not meet user requirements.

Recommendations

• Status of Previous Recommendations. FY05 recommendations to address IOT&E test limitations, as well as test the F-22A against adversary aircraft and other threat systems representative of the intended operational environment, are being incorporated in the AFOTEC FOT&E testing scheduled for FY07.

• FY06 Recommendation.

1. The Air Force should pursue a comprehensive approach to address the defensive avionics suite shortfalls and assess improvements in FOT&E and FDE venues commensurate with follow-on F 22A operational flight program software releases.

F-35 Lightning II Joint Strike Fighter (JSF)

Executive Summary

- The F-35 Lightning II program continues to make progress on the first System Design and Development aircraft. First flight is expected to occur in mid-December 2006.
- Work on a Test and Evaluation Master Plan revision continues. The revised document needs to incorporate more detail on test content and adequate resources for operational test and evaluation.
- The Air Force and Navy FY08 Program Objective Memoranda do not support an adequate full-scale aerial target replacement necessary for F-35 weapons integration testing. The operational test planning for the F-35 is not adequate without a credible full-scale aerial target.
- The Air Force and Navy operational test agencies completed an operational assessment of F-35 development in late 2005. Issues raised in the assessment are under review by the program office and require follow-up.
- Live Fire ballistic vulnerability testing:
  - Evaluated candidate dry bay fire extinguisher designs
  - Determined the extent of fire migration from the roll duct to the engine

System

- The F-35 Lightning II program is a joint, multi-national, single-seat, single-engine family of strike aircraft consisting of three variants:
  - F-35A Conventional takeoff and landing (CTOL)
  - F-35B Short takeoff and vertical landing (STOVL)
  - F-35C Aircraft carrier takeoff and landing (CV)
- It is designed to survive in an advanced threat (year 2010 and beyond) environment using a blend of advanced technologies with improved lethality compared to legacy multi-role aircraft.
- Using an Active Electronically Scanned Array radar and other sensors, the F-35 is intended to employ precision-guided bombs such as the Joint Direct Attack Munition and Joint Standoff Weapon, AIM-120C radar air-to-air missiles, and AIM-9 infrared air-to-air missiles.
- The F-35 is under development by a partnership of countries: the United States, Great Britain, Italy, the Netherlands, Turkey, Canada, Australia, Denmark, and Norway.

Mission

- A force equipped with F-35 units should permit the combatant commander to attack targets day or night, in all weather, in highly-defended threat areas at the strategic, operational, and tactical levels of warfare.
- Targets include: fixed and mobile land targets, enemy surface units at sea, and air threats, including cruise missiles.

Activity

- The program began using the F-35 ground lab system, which contains actual aircraft systems. The lab connects missions systems with air vehicle systems to operate as an aircraft allowing test and trouble shooting on the ground.
- Using the initial software as checked out in the ground lab system, the first System Design and Development aircraft completed engine operations from idle power to full afterburner and pre-mission power-on checks. First flight is expected to occur in mid-December 2006.
- Engine ground tests accumulated approximately 6,100 hours on 11 F135 engines and 240 hours on 2 F136 engines.
- Development of the Cooperative Avionics Test Bed continues; it is a structurally modified Boeing 737 commercial airline aircraft fitted with an F-35 simulator cockpit, mission systems sensors, and avionics. It includes 20 engineering workstations to assess mission systems performance. Flight testing with F-35 mission systems avionics is planned to begin in 2007.
- The operational test agencies completed an operational assessment in November 2005 and reported results to the program office and the Defense Acquisition Board in May 2006.

- DOT&E is reviewing the Test and Evaluation Master Plan revision completed by the program office. It has not been formally submitted to DOT&E for approval.
- Negotiations have begun with interested partner nations to define involvement in combined operational test and evaluation.
- Live Fire ballistic vulnerability testing and analyses included:
  - Dry bay fire suppression system tests to evaluate the fire suppression systems' performance against high explosive incendiary rounds
  - Roll duct fire migration testing to evaluate the extent of fire migration from the roll duct to the engine
- The Joint Strike Fighter program office made the decision to remove five of the six dry-bay fire suppression systems.

Assessment

- The Test and Evaluation Master Plan revision lacks details on test content, measures for performance, and does not establish specific resource requirements for adequate opposing forces and targets in open air and modeled test events.
- The Air Force and Navy FY08 Program Objective Memoranda do not support an adequate full-scale aerial target replacement necessary for F-35 weapons integration testing. The operational test planning for the F-35 is not adequate without a credible full-scale aerial target.
- The issues cited by the operational test agencies in the operational assessment warrant continued follow-up and further assessment. The program office is studying resolution of the helmet mounted display integration, thermal management issues, flight test schedule executability, instrumentation for operational testing, and maintainability issues.
- Given the high degree of concurrency in F-35 development, a commitment to event-driven decisions and ensuring readiness to begin operational test and evaluation is critical.
- Live Fire testing and evaluation revealed:
  - The fire suppression system successfully suppresses dry bay fires in the protected bays and successfully reduces fire migration into surrounding bays
  - Threat induced fires in the roll duct bay can migrate into the engine bay generating high temperatures
- The Joint Strike Fighter program office's recent decision to remove five of the six dry bay fire suppression systems from each variant will significantly increase the vulnerability of the aircraft to ballistic threat induced fires. It will also adversely affect the safety of the aircraft from non-ballistic induced fires.

Recommendations

- Status of Previous Recommendations. The joint program office and Services have made satisfactory progress on FY05 recommendations, with the exception of:
  FY05 #2: DOT&E recommended that the program identify all test resource shortfalls in opposing force/threats and present a solution that mitigates these. No progress has been made on this recommendation. The Test and Evaluation Master Plan revision should establish these test resource needs before being submitted for approval by DOT&E.
  FY05 #4: DOT&E recommended that the program develop a predictive model to determine how test data on engine performance following "quick dump" fuel ingestion at the sea level test site could be extrapolated to predictions for higher operating altitudes. No action has been taken.
- FY06 Recommendations. The program should:
  1. Ensure follow-up on the issues cited by the operational test agencies in the recent operational assessment.
  2. Consider opportunities to conduct IOT&E at an earlier point in initial production with operationally representative weapons systems.
  3. Follow the framework for partner operational test planning outlined by the Defense Acquisition Board in May 2006.
  4. Fund an adequate full-scale aerial target replacement in order to ensure the resources will exist to confirm F-35 operational effectiveness.
  5. Conduct additional full-up, system-level Live Fire ballistic tests to determine the vulnerability of the F-35 with only one dry bay fire suppression system.

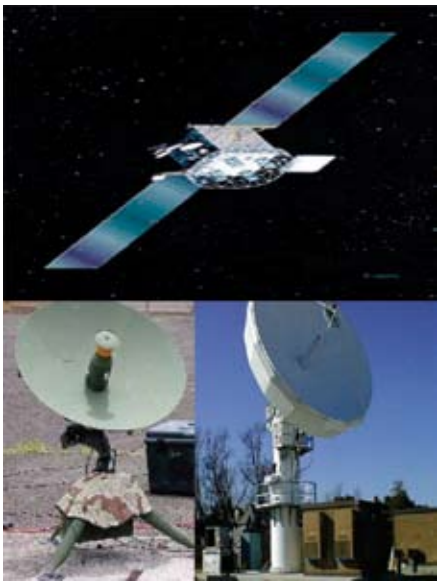
Global Broadcast Service (GBS) System

Executive Summary

- Global Broadcast Service (GBS) Multi-Service Operational Test and Evaluation (MOT&E) was conducted by the Air Force Operational Test and Evaluation Center (AFOTEC) and occurred in September and October 2005.
- DOT&E determined operational testing was adequate to confirm:
  - The GBS space and transmit segments are operationally effective and suitable.
  - The GBS receive segment is operationally effective when personnel are available to man the receive suites; the intended operating concept was for unattended use.
- DOT&E determined testing was adequate to confirm the GBS receive suite of the receive segment is not operationally suitable.
- The Army-modified receive suite was a change to the program of record terminal prior to fielding.
- AFOTEC required nine months to provide GBS MOT&E data to DOT&E for the Beyond Low-Rate Initial Production (BLRIP) report.
- The DOT&E GBS BLRIP report is expected in late 2006.

System

- The GBS is a satellite-based broadcast system providing near worldwide, high capacity, one-way transmission of operational military data.
- The GBS system consists of three segments:
  - The space segment includes four GBS transponders on each of three Ultra-High Frequency follow-on satellites and additional government-leased satellite capability to meet operational demand
  - The transmit segment broadcasts data streams and manages the flow of selected information through the orbiting satellites for broadcast to the appropriate theaters of operation; has fixed Primary Injection Point and mobile Theater Injection Point antennas



  - The receive segment has fixed and mobile terminals and extracts the appropriate information for distribution to the end users within selected areas of operation
- The GBS is being developed to augment and interface with other military communications systems such as DoD Teleport.

Mission

- Combatant commanders and operational forces worldwide use GBS to provide a continuous high-speed and high-volume flow of data, audio, imagery, and video at multiple classification levels for sustained operations.
- The GBS capability to provide intelligence and battlespace weather information increases the joint operations mission data available to deployed and garrisoned military forces across the globe.

Activity

- AFOTEC conducted the GBS MOT&E-I from September 16 - October 28, 2005, in accordance with DOT&E-approved test plans. Results provided the basis for DOT&E's BLRIP report.
- Operational testing locations included Hanscom Air Force Base, Massachusetts; Norfolk, Virginia; Fort Drum, New York; Fort Hood, Texas; Fort Monmouth, New Jersey; Hurlbert Field, Florida; Duke Field, Florida; and Camp Pendelton, California.
- During MOT&E-I, DOT&E identified Army modifications to the program of record receive suites before fielding.
- MOT&E-II testing scheduled for 2007-2008 focuses on the full military functionality of GBS. This includes testing the Theater Injection Points of the Transmit segment and end-to-end effectiveness and suitability.

Assessment

- DOT&E determined operational testing was adequate to confirm:
  - The GBS space and transmit segments are operationally effective and suitable.
  - The GBS receive segment is operationally effective when personnel are available to man the receive suites; the intended operating concept was for unattended use.
- DOT&E determined testing was adequate to confirm the GBS receive suite of the receive segment is not operationally suitable.
- The GBS upgrade transition to an Internet Protocol capability is making progress toward delivering increased volumes of high-speed data, compared to the previous mission configuration.
- The Army receive suites modifications have not been integrated into the program suitability baseline.
- The Wideband Gapfiller Satellite (WGS) MOT&E is continuing to integrate with the testing of the final mission capability requirements of the GBS Phase II and related system programs. The GBS MOT&E-II test strategy may require updates to meet the needs of system users.
- The GBS Theater Injection Points of the Transmit segment will need to examine baseline configurations that more directly address the needs of joint military forces.

Recommendations

- Status of Previous Recommendations. The Air Force has made progress on the two FY05 DOT&E recommendations; both remain valid.
  FY05 #1: The Air Force should determine if the GBS MOT&E-II test strategy requires updating to meet the current user expectations for an Initial Operational Capability declaration.
  FY05 #2: The GBS Theater Injection Points should be configured and tested consistent with the implementation configurations identified by U.S. Joint Forces Command and U.S. Strategic Command.
- FY06 Recommendations. The Air Force should:
  1. Standardize and validate the Army-modified 88XR User segment receive suite equipment configurations, training, and technical orders.
  2. Correct and retest system performance shortfalls and reliability deficiencies, including the receive suite unattended mode.
  3. Complete the updated Interactive Electronic Technical Manual for current full-rate production equipment configurations and standards.
  4. Complete GBS System Security and information assurance corrective measures and actions to meet the established standards of the system certifying authorities.
  5. Provide current system documentation, training, and technical orders so that GBS operators and maintainers can properly accomplish their duties.
  6. Complete the review and release of the Joint Integrated Logistics Plan to sustain integrated GBS operations and fielding of the system.
  7. Conduct scheduled MOT&E to confirm corrective actions for current and emerging features of the GBS full-rate production program baseline.

Global Hawk High Altitude Endurance Unmanned Aerial Vehicle, RQ-4

Executive Summary

- Global Hawk Block 10 performance, as observed through developmental test and deployed operations, indicated fixes are needed to improve imagery processing and communications.
- Development of a new Global Hawk air vehicle continues to progress towards a first flight of the larger, heavier aircraft that is intended to support greater payloads for the Block 20, 30, and 40 systems.
- The Air Force is developing a new program baseline following the June 2006 Nunn-McCurdy Certification. Documentation should include a Test and Evaluation Master Plan (TEMP) that complies with the test strategy worked out with DOT&E in the certification process.

System

- Global Hawk is a long-range surveillance and reconnaissance system.
- The Global Hawk system includes:
  - An Unmanned Aerial Vehicle (UAV) capable of high-altitude (above 60,000 feet) and long endurance (greater than 24 hours) operations
  - Launch/recovery ground station and mission control ground station
- The current Block 10 payload includes infrared, optical sensors, and synthetic aperture radar, all of which image ground targets and areas of interest.
- Ground crews use satellite and radio communications to control the air vehicle and transmit collected data.
- The Global Hawk mission control ground station receives, processes, and transmits imagery to distributed ground stations for exploitation to meet the theater commander's intelligence needs. Signals intelligence will be processed in a similar manner.
- The program plans to produce improved air vehicles (Blocks 20, 30, and 40) capable of greater payloads that add:
  - Improved imagery intelligence (Block 20)
  - Multi-Intelligence: Imagery and Signals intelligence (Block 30)
  - Radar surveillance (Block 40)

Mission

- A unit equipped with this system would provide surveillance and reconnaissance imagery to the theater commander's exploitation assets, such as the Distributed Common Ground Station. Ground personnel assigned to exploit the collected material then develop the intelligence products to support theater operations.
- It enables persistent intelligence gathering when other assets are not available through long-range and long-loiter capability.
- The theater intelligence network tasks Air Force Global Hawk reconnaissance squadron detachments to collect imagery in order to answer essential elements of information identified by the theater commander.

Activity

- The Air Force Operational Test and Evaluation Center continued the operational assessment of the Block 10 system (imagery intelligence), which began in FY05. The following events were completed:
  - Observation of deployed operations
  - A maintenance demonstration
  - An information assurance assessment
- The Air Force plans to complete the Block 10 assessment in November 2006, after conducting missions to ranges in Alaska and Florida. These missions, which will image targets in various environments, will use new production ground segment software.
- The program office continued Block 10 developmental testing in parallel with the operational assessment. Major efforts

included communications, navigation, and crosswind landing testing.
- Block 20 developmental testing is building to a first flight of the new air vehicle, which has been slipped from November 2006 to January 2007. Ground testing included power-on functionality checks by the contractor, taxi tests, wind tunnel tests, and ultimate load testing on major components of the aircraft structure.
- The Air Force proposed a TEMP revision in September 2006. A revised TEMP is needed for the new program baseline, following the June 2006 Nunn-McCurdy certification.

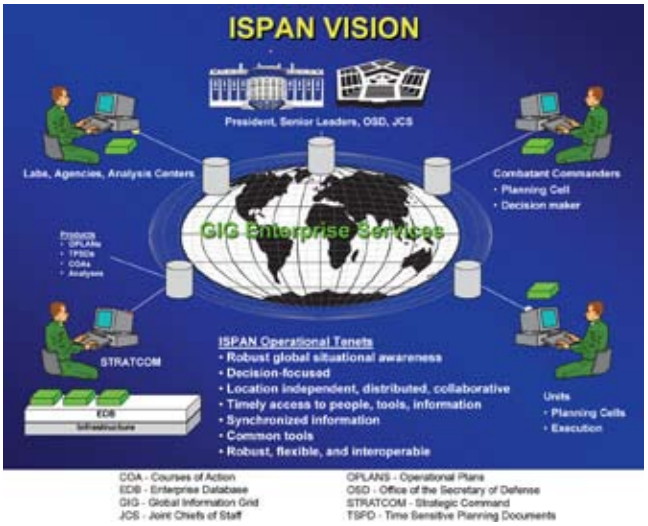
Assessment
- Though fielded, the performance of the Block 10 system indicated the system lacked maturity in several areas:
  - Communications problems delayed the initial deployment (as reported in the FY05 annual report) requiring continued trouble shooting and test.
  - Deployed operations were temporarily halted after the discovery of a disbonded fuel bracket in one of the deployed aircraft's wings; this reduced availability of the system until all aircraft were inspected and fixed.
- Image processing problems affecting image quality, which were seen during the pre-deployment assessment flights in August 2005, were again observed. Time delays in ground station to exploitation station dissemination appear to have been corrected, however.
- The maintenance demonstration highlighted the dependency on contractor maintenance. Only a relatively small number of tasks could be demonstrated. The lack of spares, support equipment, and technical order data used to conduct military unit level maintenance at Beale AFB, California, has impaired the development of an organic maintenance capability.
- Testing and analysis leading to first flight of the Block 20 air vehicle uncovered a failure condition that could result in lateral instability of the aircraft. To correct the lateral instability problem, the contractor is modifying the new air vehicle design to add ventral fins as well as changing the flight control software.
- As part of the Nunn-McCurdy certification process, DOT&E identified to the Defense Acquisition Executive several necessary improvements to the operational test and evaluation strategy and the need to control the expansion of low-rate initial production quantities.

Recommendations
- Status of Previous Recommendations. The Air Force has made progress in Block 10 operational assessment events in accordance with one of the DOT&E recommendations, but the following recommendations remain valid.
  FY05 #2: Contrary to DOT&E's recommendation to conduct a review and correct deficiencies in the intelligence, surveillance, and reconnaissance network in which Global Hawk operates, no comprehensive review has taken place, nor is one known to be planned by the Air Force. The Air Force's final assessment of Block 10, expected to be complete early in 2007, may provide more insight into deficiencies in the network.
  FY05 #3: In response to DOT&E's recommendation that low-rate initial production quantities should not be increased until after an adequate IOT&E of the Block 20 and Block 30 systems, the proposed acquisition strategy authorizes three additional lots of systems but reduces annual quantities of air vehicles to five per year until FY09.
- FY06 Recommendations. The Air Force should:
  1. Establish mission and levels of performance for Block 20, 30, and 40 systems when first acquired and fielded; and, ensure the evaluation framework for each Block uses these thresholds.
  2. Conduct Block 20/30 IOT&E (including a multi-intelligence Block 30 system) for the purpose of receiving a Beyond Low-Rate Initial Production report from DOT&E before a full-rate production of the Block 30 system and fielding of the Block 20 system. Conduct a Block 40 IOT&E for the same purpose.
  3. Establish a central government-managed archive of Global Hawk test and operational performance data and reports.
  4. Revise the TEMP so that it provides a detailed, resourced, and integrated test plan that incorporates all Global Hawk test and evaluation activities, and complies with the test strategy agreed to in the Nunn-McCurdy certification process.

Integrated Strategic Planning and Analysis Network (ISPAN)

Executive Summary

- United States Strategic Command (STRATCOM) fielded the maintenance portions of the Integrated Strategic Planning and Analysis Network (ISPAN) Block 1, Spiral 2 in January 2006 after successful Combined Test Force (CTF) testing. Additionally, the modernization framework software was installed in the STRATCOM Experimental Planning Laboratory for user familiarization and development testing.
- STRATCOM fielded the maintenance portions of ISPAN Block 1, Spiral 3 in July 2006 after successful CTF testing. The program delayed the testing of the modernization portions of Spiral 3 until January 2007 to allow a new STRATCOM user time to assess the proposed new capabilities.
- STRATCOM is developing Joint Capability Integration and Development System documents for ISPAN Block 2, although little progress has been made.



System

- ISPAN is the modernization program for STRATCOM's operational information technology planning and analysis network.
- Fielded operational system ISPAN (referred to as legacy ISPAN) provides dedicated planning and analysis to create the national deterrence war plan for all U.S strategic nuclear forces. Legacy ISPAN is maintained by semi-annual software maintenance changes.
- ISPAN modernization expands planning and analysis to new mission areas including the use of non-nuclear forces and the employment of the full spectrum of kinetic and non-kinetic weapons into strategic and theater plans.
- Modernization occurs incrementally, along with maintenance changes, with new capabilities fielded as spirals every three to six months. The first block consists of six spirals. ISPAN modernization has three blocks scheduled to complete in 2011.
- ISPAN operates in multi-level classification environments at Offutt AFB, Nebraska.

Mission

STRATCOM uses ISPAN to perform deliberate and adaptive strategic, nuclear, and non-nuclear planning and analysis.

- It helps develop the national deterrence war plans providing both nuclear and non-nuclear weapon options.
- It helps develop an integrated capability to provide planning and analysis for Global Strike and integration with Global Missile Defense; Global Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance; Space and Information Operations; and other new mission areas assigned to STRATCOM in support of the Joint Theater Commanders.

Activity

- STRATCOM and Air Force Test and Evaluation Center (AFOTEC) conducted ISPAN Block 1, Spiral 2 maintenance and modernization testing in accordance with the DOT&E-approved Test and Evaluation Master Plan (TEMP) during December 2005 to January 2006. This evaluated:
  - Converting from the legacy SYBASE database to an ORACLE database management system
  - Automating the process of integrating select conventional weapons into the planning and analysis process
  - Enhancing the production of Theater/Global Strike support documents
  - Testing of the initial framework software
- The maintenance portion of Spiral 2 was fielded to the legacy ISPAN system in January 2006 while the modernization framework software portions were installed in the STRATCOM Experimental Planning Laboratory for user familiarization and developmental testing.

- STRATCOM fielded the maintenance portions of ISPAN Block 1, Spiral 3 in July 2006 after successful CTF combined developmental and operational testing. The program delayed testing of the modernization portions of Spiral 3 until January 2007 due to reorganization within STRATCOM.
- The program office and STRATCOM expanded ISPAN Block 1 from five to six developmental spirals. This was caused by unplanned program budget cuts and software development and testing delays.
- DOT&E approved the required TEMP update in December 2006.

Assessment

- Prior to each spiral test, AFOTEC leads a risk assessment, which analyzes the modernization content of the spiral, the risk, and the impact to the legacy ISPAN system. The results of the assessments allow the test organizations to scope the spiral test and plan an adequate test. The risk assessment process is adequate, but could be enhanced by incorporating best practices from DoD's new Risk Management Guide for DoD Acquisition.
- The ISPAN maintenance portions of Spiral 2 and Spiral 3 installed minor software fixes and completed the conversion to the ORACLE database. The maintenance spirals were low-risk to the legacy ISPAN system. The AFOTEC and CTF reports were adequate to support the maintenance spiral fielding decisions.
- Spiral 3 modernizations include installing optimizers, task managers, and the software framework for the time-sensitive planning processes. Spiral 3 modernizations will be evaluated by an AFOTEC-led operational assessment to support a Spiral 3 final fielding decision. This assessment is scheduled to be conducted in January 2006.
- The ISPAN Operational Requirements Document does not adequately define the modernization requirements, capabilities, or performance measures for each of the ISPAN blocks. STRATCOM is beginning to write a Capability Development Document for Block 2, but no usable draft has yet been released. Development of the requirements documents for Block 2 is behind schedule.

Recommendations

- Status of Previous Recommendations. One of the three previous DOT&E recommendations has been completed. Two are unresolved and remain valid.
  FY05 #1: DOT&E recommended that STRATCOM complete requirements documents for Block 2 to define capabilities to be developed in Block 2.
  FY05 #2: DOT&E recommended that the program complete a revision to the TEMP as ISPAN Spiral 3 modernization testing will not begin without an approved TEMP revision.
- FY06 Recommendation.
  1. AFOTEC should revise the risk assessment methodology to incorporate the best practices identified in DoD's new risk management for acquisition systems guide.

Joint Air-to-Surface Standoff Missile (JASSM) and JASSM Extended Range (ER)

Executive Summary

- The Joint Air-to-Surface Standoff Missile (JASSM) program continued development of a new fuze variant and the extended range variant. The Air Force stopped testing the new fuze after failures in sled track and qualification testing.
- The JASSM program is not executing a DOT&E-approved test plan. DOT&E has not approved the Test and Evaluation Master Plan (TEMP) for the extended-range variant due to an inadequate test strategy.
- JASSM testing of baseline missiles confirmed previous estimates of low missile reliability.
- Based on analysis from one of the baseline missile failures, the JASSM program directed operational commands not to use fielded JASSM missiles until a safety-related failure mode is corrected or mitigated.
- Other proposed variants (data link and maritime) should not begin development until the user resolves questions about operational employment and requirements.
- The JASSM program should draft executable strategies for each variant to conduct sufficient developmental and adequate operational testing prior to production and fielding.

System

- The baseline JASSM is a stealthy cruise missile that flies a preplanned route from launch to a target, using Global Positioning System (GPS) satellite information and an internal navigation system. JASSM:
  - Has a 1,000-pound penetrating warhead
  - Has an imaging infrared seeker that can be used for greater accuracy and precision; the seeker uses image templates planned by a rear echelon intelligence unit
  - Can be launched by B-1, B-2, B-52, and F-16 aircraft
  - Includes a container that protects the weapon in storage and aids ground crews in moving, loading, and checking the missile
  - Uses the same Air Force mission planning systems used for aircraft and other weapons
- There are four other potential increments, which add new capabilities to the baseline JASSM missile.
  - JASSM Extended Range (ER) is intended to fly longer ranges using a more efficient engine, larger capacity fuel tanks, and other modified components (all within the same outer shape)
  - JASSM Electronic Safe and Arm Fuze (ESAF) adds a more reliable fuze with the same capabilities as the baseline fuze
  - JASSM Weapon Data Link (WDL) is intended to add capabilities for two-way communication that support battle damage assessment and in-flight re-targeting

  - JASSM Maritime will build on WDL capabilities and add the capability to attack maritime targets under certain circumstances

Mission

- Operational units equipped with JASSM can employ the weapon from multiple aircraft platforms against high value or highly defended targets from outside the lethal range of many threats. JASSM is designed to:
  - Destroy targets with minimal risk to flight crews and support air dominance in the theater
  - Strike a variety of targets from up to 200 miles away
  - Execute missions using automated preplanned or manual in-flight mission planning
  - Attack a wide-range of targets including soft, medium, or very hard (not deeply buried) targets
- JASSM ER is intended to support the same missions and expand the reachable targets with a range more than twice the baseline JASSM.
- JASSM ESAF has the same capabilities as the current fuze, namely multiple delay settings to attack a wide-range of targets. The new fuze is intended to improve the reliability beyond the current fuze.
- JASSM WDL will allow planners to remotely re-plan JASSM missions electronically while the missile is airborne, either when carried by the launch aircraft or after launch while en route to the target.
- JASSM Maritime will increase the number of sea-borne targets that theater planners can attack.

Activity

- Baseline JASSM: The Air Force Weapon System Evaluation Program conducted eight operational JASSM tests with operational tactics and test organizations. Range safety destroyed one missile purposely early due to a test instrumentation failure (scored as a "no-test"). Four missiles flew their preplanned mission successfully and destroyed their targets. Three of the missiles failed shortly after launch; one failed to start the engine, and two failed to properly deploy the wings.
- Additional analysis of one failure identified a potential safety issue with all previously produced missiles. The program office is working with the developer to correct all fielded missiles as soon as practical and has notified operational commands not to use any JASSMs until the corrections are completed. Some units may be permitted to employ JASSM using a limited employment launch envelope that reduces the risk of failure.
- JASSM ER, ESAF, and WDL: The JASSM program is not executing a DOT&E-approved test plan for any of the JASSM increments.
- JASSM ER completed one developmental test flight and one integrated test flight. The flights were intended to address climb performance identified during previous baseline missile operational testing and to prepare for entry into initial production.
- JASSM ESAF restarted sled track testing this year after stopping testing last year due to failures. The first new corrected fuze failed during a sled track test. This, in combination with failures in reliability and qualification testing, led the program office to again stop ESAF developmental testing.
- JASSM WDL began development in January 2006. In July, the program stopped test planning for this increment to address conflicting user operational concepts and requirements.
- JASSM Maritime: there is very little information about this increment.

Assessment

- Testing of JASSM baseline missiles confirmed the previous estimates of low reliability for the early production lots. This low reliability will require operational units employing JASSM to fly more sorties, re-plan more missions, and re-strike targets multiple times in order to achieve operational objectives.
- The program is taking steps to correct all fielded missiles after testing identified a safety-related failure mode. For previous failures, the program mitigated the failure using restrictions or changed procedures, or simply accepted the risk of the failure.
- JASSM testing to date identified issues that will impact JASSM ER readiness for production and operational testing, including missile climb performance, missile mission range (a Key Performance Parameter), and missile reliability.
- JASSM ESAF testing failures repeated the mistakes made in FY05. The previous effort showed that concurrent testing and development lead to problems in finding and correcting deficiencies before production and operational testing begin. The program intends to propose a new test strategy to address these issues. DOT&E has not received the detailed plan for this new approach.
- DOT&E has not approved the JASSM TEMP due to concerns with test planning. The TEMP includes minimal developmental testing prior to initial production and will likely lead to discovery of new failure modes during operational testing (after production begins). In baseline JASSM testing, this approach led to the fielding of immature missiles before development was completed. Fielded missiles required extensive corrections. Cuts in funding slowed production and fielding, forcing the user to accept the risk that production missiles may not function as needed. The program intends to submit a new TEMP for approval by May 2007, after the majority of JASSM ER development is complete.
- There is very little information about requirements, acquisition strategy, or test planning for JASSM WDL or Maritime variants.

Recommendations

- Status of Previous Recommendations.
  FY05 #1: The program did not adopt an event-driven strategy for ESAF, ER, or WDL testing.
  FY05 #2: The program has not yet demonstrated progress in reducing mission planning times.
  FY05 #3: DOT&E recommended that the program complete fuze testing as planned, based on a stop test in fuze testing last year. The program began an updated, DOT&E-approved strategy for ESAF testing and correctly stopped the effort when test results indicated they must correct problems and re-accomplish testing.
- FY06 Recommendations.
  1. The JASSM ER program should obtain TEMP approval before progressing further.
  2. JASSM ER should conduct robust, realistic developmental testing, determine Key Performance Parameter capabilities or shortfalls, and correct deficiencies prior to initial production and operational testing.
  3. JASSM ESAF needs a revamped LFT&E test strategy that eliminates concurrent testing and adequately tests the fuze in progressively challenging environments before Live Fire testing, flight testing, and production.
  4. JASSM WDL and Maritime need to identify conflicts in user operations concepts and requirements before beginning deliberate planning for acquisition and test strategies.

Joint Direct Attack Munition (JDAM)

Executive Summary
- Joint Direct Attack Munition (JDAM) aircraft integration and testing of the 1,000-pound and 500-pound JDAM variants continued to demonstrate satisfactory performance consistent with historic JDAM accuracy and reliability.
- The JDAM Multi-Service Operational Test and Evaluation completed with the Air Force certification of the 1,000 pound JDAM variant on the F-22A.

System
- The JDAM is a low cost, autonomously controlled, adverse weather, accurate guidance kit tailored for Air Force/Navy general purpose bombs to include:
  - 2,000-pound Mk 84 and BLU-109 bombs
  - 1,000-pound Mk 83 and BLU-110 bombs
  - 500-pound Mk 82 bomb
- An inertial navigation system provides primary guidance to the weapon. Enhanced accuracy is provided by augmenting the JDAM inertial navigation system with the Global Positioning Satellite (GPS) system signals.
- Guidance and control is designed to enable accuracy of less than 13 meters when GPS is available and less than 30 meters when GPS is absent or jammed after release.

Mission
- Combatant commanders use JDAMs employed by fighter, attack, and bomber aircraft to engage targets day or night, in all weather at the strategic, operational, and tactical levels of warfare.
- JDAM is employed against fixed and relocatable, soft and hard targets to include command and control facilities, airfields, industrial complexes, logistical and air defense systems, lines of communication, and all manner of battlefield forces and equipment.

Activity
- Test and evaluation was conducted in accordance with the August 2004 DOT&E-approved JDAM Test and Evaluation Master Plan.
- The Air Force certified the 1,000-pound JDAM variant on the F-22A. This completed the JDAM Multi-Service Operational Test and Evaluation.
- Air Combat Command's operational F-22A squadron participated in an investigative demonstration of JDAM capabilities as part of the Command's Air-to-Ground Weapon System Evaluation Program. The operational unit achieved satisfactory results consistent with historic JDAM performance.
- The Air Force certified the 1,000-pound JDAM variant for use on the F-117A and the 500-pound JDAM variant for use on the B-1.
- The Navy did not certify JDAM on the BRU-55 smart weapons rack due to problems with the rack unassociated with the JDAM weapon.

Assessment
- Aircraft integration and testing of the 1,000-pound and 500-pound JDAM variants continued to demonstrate satisfactory performance consistent with historic JDAM accuracy and reliability.
- The Navy's BRU-55 smart weapons rack problems were isolated to the rack itself and not related to JDAM suitability. Although inability to use the BRU-55 rack precludes the Navy from carrying a load out of eight 500-pound JDAMs on the F/A-18C/D, the limitation is operationally insignificant under current user employment scenarios.

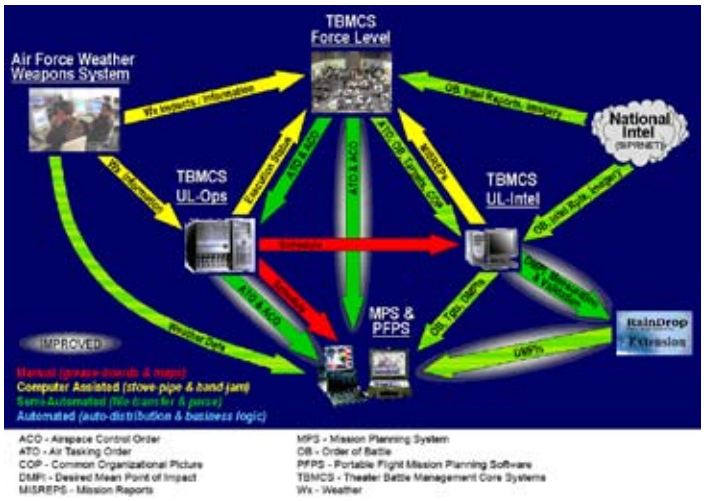
Recommendations
- Status of Previous Recommendations. There are no outstanding recommendations from FY05.
- FY06 Recommendations. None.

Joint Mission Planning Systems (JMPS)

Executive Summary
- Initial Joint Mission Planning System (JMPS) Mission Planning Environments (MPEs) have shown mixed results in OT&E.
- Service JMPS developers must give more attention to fixing critical deficiencies and improving system stability prior to submitting MPEs for OT&E.

System
- JMPS is a Windows 2000, PC-based common solution for aircraft mission planning for all the Services.
- The JMPS system is built in modules, starting with a Unique Planning Component (UPC) for a specific aircraft type (e.g., F-15E or F/A-18) and adding additional common components (e.g., Global Position System-guided weapon, navigation planner, etc.) that together form the MPE.
- The system operates as either a stand-alone PC or laptop, or as a secure, networked system supported by servers.
- The Navy and Air Force are initial users of MPEs built on JMPS framework versions 1.1 and 1.2.

Mission
- Aircrews use JMPS to plan all phases of their missions and then save required aircraft, navigation, threat, and weapons data on a data transfer device so they can load it into their aircraft before flight.
- All JMPS users will eventually be able to collaborate on mission planning, even when operating from different bases.
- The Army and U.S. Special Operations Command eventually plan to transition to JMPS.



Activity

Air Force
- F-15:
  - The Air Force Operational Test and Evaluation Center (AFOTEC) operationally tested the F-15 MPE Version 1.1 during the first quarter of FY06. The MPE failed most of the critical operational issues. AFOTEC, however, did not assess effectiveness and suitability as specified in the approved test plan. Despite the results, the Air Force fielded the F-15 MPE citing urgent operational need to deploy Small Diameter Bomb, which is supported by the MPE.
  - The Air Force is going to produce a Version 1.2 to address the significant shortfalls from Version 1.1. This version will receive the same scope of testing as Version 1.1. DOT&E will hold the submission of a Beyond Low-Rate Initial Production report until the completion of the MPE Version 1.2 operational test, which is planned for November 2006.
- B-1B: The mission planning suite that supports the B-1B aircraft weapons system software upgrade SB-10 uses the In-Flight Re-planning portion of JMPS. The 28th Test Squadron operationally tested this mission planning suite in October 2005. Air Combat Command issued a test report in December 2005, stating that the overall planning suite's performance was satisfactory, however of four major discrepancies, three were due to JMPS. The next B-1B weapons system software upgrade (SB-11) will be entirely dependent on the JMPS B-1B MPE and will enter IOT&E in third quarter of FY07. While other users frequently comment that JMPS lacks desired functionality and ease of use, the B-1B MPE benefits from periodic "early look" developmental test events for operational users.

Navy
- F/A-18: Commander, Operational Test and Evaluation Force (COMOPTEVFOR) conducted IOT&E on F/A-18 MPE Version 1.2 from March 2005 through January 2006. The IOT&E report in August 2006 found the MPE operationally effective and suitable.
- AV-8B: COMOPTEVFOR conducted IOT&E on AV-8B MPE Version 1.1 from July 2005 - February 2006. The IOT&E report in July 2006 found the MPE operationally effective and suitable, despite the fact that one of the Key Performance Parameters (Mission Planning Time) was not satisfied.

- EA-6B: COMOPTEVFOR assessed the EA-6B MPE as part of follow-on test and evaluation of the Improved Capabilities (ICAP) III Block 2 weapon system. This assessment did not follow the DOT&E-approved test plan for JMPS. The Navy subsequently deployed JMPS to support ICAP III Block 2. Operational testing, in accordance with the DOT&E-approved Test and Evaluation Master Plan and test plan, will take place between September 2006 and January 2007 using ICAP II Block 3.

Army

- The Army is developing its Test and Evaluation Master Plan and test plan to support a third quarter FY07 operational test of the UH-60M helicopter.

Assessment

- Operational testing of the F-15 MPE revealed problems with route creation and manipulation, weapons planning, mission rehearsal, system stability, interoperability, and security. Lack of software system stability was the key to the majority of the system failures. Because this is an incremental acquisition program, instability in one increment flows into the next. Recent developmental test user evaluations have shown improved system performance, but stability is still a concern.
- The F/A-18 MPE met all operational requirements. However, an extended operational test period beyond the approved test plan, along with continued development to the software, was needed to reach that conclusion.
- The AV-8B MPE did not satisfy critical operational issues requirements for mission planning, reliability, and training. However, it was more effective than the legacy AV-8B mission planning system, and aircrews could plan missions in accordance with the AV-8B's concept of operations.
- The EA-6B MPE has not yet been tested according to the DOT&E-approved JMPS test plan. Additional testing is required to make a determination whether the current fielded MPE meets JMPS performance requirements.

Recommendations

- Status of Previous Recommendations. The following FY05 recommendations remain valid:
  FY05 #1: DOT&E recommended that Operational Test Agencies should not accept JMPS MPEs for operational test prior to confirmation in development testing that the development program has been adequate and complete, and that critical deficiencies have been eliminated. Due to pressures on Service program managers to deliver aircraft MPEs aligned with the supported platform operational flight program, the recommendation remains valid.
  FY05 #2: DOT&E recommended that JMPS developers need to pay more attention to installation and operating instructions, training, system administration, and security settings. The four Services have made progress on this recommendation but it is not solved and this recommendation remains valid.
  FY05 #3: The Services should conduct risk assessments for follow-on JMPS MPEs to help define the amount of operational testing necessary to mitigate these risks. This recommendation remains valid.
- FY06 Recommendations.
  1. The Air Force should strengthen the responsibility and accountability for system engineering and integration in all stages of MPE development.
  2. The Air Force should address system stability concerns.
  3. The Air Force should improve training, which is updated to reflect the current platform concept of operations.
  4. The Air Force should involve operational users very early in the development process.
  5. The Navy should ensure that the EA-6B MPE is fully tested for both the ICAP II Block 3 and the ICAP III Block 2 variants.

Large Aircraft Infrared Countermeasures (LAIRCM)

Executive Summary

- The Large Aircraft Infrared Countermeasures (LAIRCM) Phase I system is fielded and, as stated in DOT&E's May 2005 Beyond Low-Rate Initial Production (BLRIP) Report, is operationally effective and suitable. The Air Force began full-rate production in May 2005.
- The DOT&E-approved operational assessment of Phase II is nearly complete. The Air Force Operational Test and Evaluation Center (AFOTEC) is leading this test to support separate 2QFY07 low-rate initial production decisions for the Guardian Laser Jamming Turret and Next Generation (NexGen) Missile Warning Sensor (MWS).

System

- LAIRCM is a defensive system for large transport aircraft and combines the Air Force's newest MWS and infrared laser jammer countermeasure systems.
- LAIRCM Phase I is fielded.
  - It delivers a system of proven and available subsystems.
  - Key components include ultra-violet MWS, countermeasures processor, and infrared laser jammer.
  - The infrared laser jammer is the Small Laser Transmitter Assembly.
  - Platforms with LAIRCM include C-17, C-130, and MH-53.
  - Future integration on C-5 and C-40 is planned.
- LAIRCM Phase II is in development and incorporates:
  - A new infrared MWS called the NexGen MWS
  - Miniaturized Laser Jammer Turret Assembly (called the Guardian)
- The Phase II NexGen MWS is designed to provide higher performance warning compared to Phase I MWS through:
  - Earlier threat warning
  - Improved detection in challenging urban and natural environments
  - Enhanced capability against emerging threats
- Phase II Guardian Laser Jamming Turret offers:
  - Smaller and lighter packaging
  - Reduced cost
  - Reliability improvements

Mission

Combatant commanders use LAIRCM to provide automatic protection to crews and large transport aircraft against shoulder-fired, vehicle-launched, and other infrared-guided missiles. Such protection is needed during normal take-off and landing, assault landings, tactical descents, air drops, low-level flight, and aerial refueling.

Activity

LAIRCM Phase I

- LAIRCM Phase I is fielded. The Air Force authorized full-rate production for 163 LAIRCM systems in May 2005, following the DOT&E report that determined LAIRCM to be operationally effective and suitable.
- In FY06, the Air Force reported on follow-on tests and evaluations to assess the correction of deficiencies discovered during the IOT&E and earlier test periods.

LAIRCM Phase II

- LAIRCM Phase II is in the System Development and Demonstration phase, in preparation for separate 2QFY07 low-rate initial production (LRIP) decisions for the Guardian Laser Jamming Turret and NexGen MWS.
- AFOTEC began the DOT&E-approved operational assessment in 1QFY06 on two competing NexGen MWS designs and one Guardian Laser Jamming Turret design to support the LRIP decisions.
- The Air Force has taken delivery of early versions of both NexGen MWS contractors' respective Digital System Models, which are designed to assess MWS detection performance in various mission environments.
- Air Force test organizations conducted live missile firing tests to assess both NexGen MWS and Guardian at Nevada Test and Training Range in 3QFY06. This included testing of LAIRCM NexGen against both surface-to-air and air-to-air infrared missiles.

- Air Force test units conducted NexGen MWS flight tests on C-130s at Eglin AFB, Florida, and Guardian Turret flight tests on a C-17 at Edwards AFB, California.
- The Joint Mobile Infrared Countermeasures Test System (JMITS) is a new ground-based missile simulator that has been used to support LAIRCM Phase II testing. JMITS is being developed under the OSD-sponsored Central Test and Evaluation Investment Program to test the advanced design of the NexGen MWS. Additionally, OSD and AFOTEC are developing a Towed Airborne Plume Simulator to support future LAIRCM testing.
- DOT&E approved the LAIRCM revised Test and Evaluation Master Plan (TEMP) in August 2006 to support testing of Phase II up to, but not including, IOT&E.
- Testing in FY06 was conducted in accordance with the DOT&E-approved TEMP and test plans.

Assessment

LAIRCM Phase I

- The LAIRCM Phase I system is operationally effective at enhancing aircraft survivability, and is much less susceptible to degradation under certain conditions compared to the system initially fielded.
- DOT&E assessed that the Air Force's modifications to LAIRCM, after the full-rate production decision in 2005, enhanced performance and mitigated the primary suitability problem identified in IOT&E.

LAIRCM Phase II

- DOT&E expects the operational assessment of Phase II to complete on time to support the separate 2QFY07 LRIP decisions for the Guardian Laser Jamming Turret and NexGen MWS.
- The live missile fire and flight tests were conducted adequately, with performance reports expected to be available 1QFY07 for the NexGen MWS source selection.
- The OSD-sponsored development of JMITS is expected to be available to support operational testing in 1QFY07.
- DOT&E directed the Air Force to provide a revised TEMP by January 2007 to clarify evaluation plans for the IOT&E.

Recommendations

- Status of Previous Recommendations. The Air Force addressed the DOT&E recommendations from previous annual reports.
- FY06 Recommendations.
  1. LAIRCM Phase I: None
  2. LAIRCM Phase II: The Air Force should provide a revised TEMP by January 2007 to clarify the suitability evaluation plan for the IOT&E.

MQ-9 Reaper Hunter-Killer Armed Unmanned Aircraft System (UAS)

Executive Summary
- The MQ-9 Predator B was officially renamed the MQ-9 Reaper in 4QFY06.
- Reaper testing to date has not been conducted in accordance with the DOT&E-approved Test and Evaluation Master Plan (TEMP).
- Air Combat Command directed early fielding of this system to commence in FY07. The decision to field this system requires an update to the current TEMP as it is not clear that adequate testing will be conducted prior to fielding.
- A full-rate production decision will be made during 2QFY09.

System
- The MQ-9 is a remotely piloted, armed, unmanned aerial vehicle (UAV) that uses optical, infrared, and radar sensors to attack ground targets.
- This system includes ground stations for launch/recovery and mission control of sensors and weapons.
- This MQ-9 is a medium-sized UAV that has an operating ceiling up to 50,000 feet, an internal sensor payload of 800 pounds, an external payload of 3,000 pounds, an endurance of approximately 24 hours, and stronger landing gear than its predecessor, the MQ-1 Predator.
- The MQ-9 shares command and control characteristics with the MQ-1 Predator.
- The MQ-9 is commanded by ground elements via Ku-band satellite and C-band line-of-sight data links.
- It carries Hellfire II anti-armor missiles (AGM-114) and 500-pound laser-guided or Global Positioning System-guided bombs.

Mission
- The combatant commander uses the MQ-9 to conduct armed reconnaissance and pre-planned strikes. This system can find, fix, track, target, engage, and assess critical emerging targets (both moving and stationary) using the air vehicle's onboard sensors and weapons.
- The MQ-9's secondary mission is to conduct aerial intelligence gathering, reconnaissance, surveillance, and target acquisition for other airborne platforms.

Activity

This is an Acquisition Category 2 program currently in the System Development and Demonstration phase. The following are highlights of developmental testing for this year:
- The developmental test squadron completed AGM-114P Hellfire integration and ground tests in 4QFY06. Airborne flight testing is scheduled to begin in 1QFY07.
- The Air Force conducted ground testing of the digital electronic engine control during FY06. Airborne testing is to complete during early FY07.
- The MQ-9 Joint Reliability and Maintainability Evaluation Team began collecting and reviewing suitability data.
- The Air Force revised the Capabilities Production Document (CPD) and it has been submitted to the Joint Requirements Oversight Council.

Assessment
- Operational testing has not been conducted in accordance with the DOT&E-approved TEMP. Therefore, DOT&E cannot assess the operational effectiveness and suitability of the MQ-9 Reaper system at this time.
- The current TEMP requires a revision in order to address changes made in the revised CPD and to outline the operational test strategy for this system.
- The Air Force program manager has developed a schedule to meet Air Combat Command's acceleration direction for early fielding in mid-2007. Operational evaluation of significant air-to-ground capability, to include the AGM-114P Hellfire, the GBU-12 Laser-Guided Bomb, and GBU-38 Joint Direct Attack Munition has not been scheduled to support characterizing these capabilities for this early fielding.

Recommendations

- Status of Previous Recommendations. The Air Force addressed two of the FY05 DOT&E recommendations. The following recommendation remains unresolved:
  FY05 #3: DOT&E recommended that the acquisition and fielding strategies be revised in order to permit more focused and effective operational testing. Although initial agreements were made during 4QFY06 to conduct an operational evaluation, the details have not been defined.
- FY06 Recommendations. The Air Force must:
  1. Update the current TEMP to address the operational evaluation schedule with respect to the Air Force Air Combat Command request for early fielding of this system.
  2. Ensure that operationally representative test articles are made available for adequate operational test prior to fielding.
  3. Complete planned integrated system evaluations I and II in order to prepare for IOT&E in FY08.

NAVSTAR Global Positioning System (GPS)

Executive Summary
- The second NAVSTAR Global Positioning System (GPS) Block IIR-M satellite launched in 2006.
- The test planning effort by the NAVSTAR GPS test community requires substantial refinement.
- The NAVSTAR GPS Modernized System needs to integrate operational end-to-end testing of the Space, Control, and GPS modernized (Military-code) receivers on realistic combat platforms.

System
- The NAVSTAR GPS is an Air Force-managed joint Service precision navigation and timing space program used for DoD and non-DoD operations.
- The NAVSTAR GPS consists of three operational segments:
  - Space Segment: the NAVSTAR GPS spacecraft constellation consists of 24 operational satellites in semi-synchronous orbit
  - Control Segment: the control segment consists of the GPS master control station, operational system control antennas, a pre-launch compatibility station, and geographically dispersed operational monitoring stations
  - User Segment: there are many versions of the NAVSTAR GPS mission receivers hosted on a multitude of operational systems and combat platforms
- The system is being modernized with a Military-code (M-code) enhanced capability to better meet the needs of operational users.
- The Air Force Space Command has launched three blocks of NAVSTAR GPS satellites and has two blocks of spacecraft in development:

  - Block I (1982-1992)
  - Block II/IIA (1990-1997)
  - Block IIR/IIR-M (Modernized) (1997-present)
  - Block IIF development (follow-on spacecraft)
  - Block III development (replacement spacecraft)

Mission
- Combatant commanders, U.S. military forces, allied nations, and various civilian agencies use the NAVSTAR GPS system to provide highly accurate, real-time, all-weather, passive, common reference grid positional data and time information to operational users worldwide.
- The NAVSTAR GPS provides force enhancement for combat operations and military forces in the field on a daily basis.
- It is vital to a wide variety of global strategic, operational, and tactical missions.

Activity
- Initial spacecraft orbital eclipse testing for the first Block IIR-M satellite, which launched in 2005, concluded in October 2006.
- The Air Force launched the second NAVSTAR GPS Block IIR-M (Modernized) satellite in September 2006 and conducted early-orbit testing.
- Test strategy development and test planning continued for a NAVSTAR GPS Operational Utility Evaluation scheduled for January - April 2007.
- The Integrated Test Team developed a draft Test and Evaluation Master Plan for the Block IIIA-D satellites.

Assessment
- To ensure effectiveness for combat, the NAVSTAR GPS Modernized User Equipment (MUE) receivers must be integrated into representative platforms (e.g., ships, aircraft, and land vehicles) and tested in realistic operational environments that include appropriate electronic warfare and information assurance conditions.
- The test planning by the NAVSTAR GPS test community requires substantial refinement to accommodate adequate Block IIR/IIR-M, Block IIF, and Block III testing. The test planning must also integrate end-to-end testing of the Space, Control, and GPS receivers (including MUE) in realistic operational environments.
- Development of modernized M-code-capable user equipment has not been synchronized with the development of the NAVSTAR GPS Space and Control Segments. This increases the risk of substantial delays in realistic operational testing and

fielding of Block IIR-M system capabilities and the Blocks IIF and III that follow.
- The second Block IIR-M satellite launched in 2006, but prototype NAVSTAR GPS MUE will not be available until at least 2010 to conduct basic Block IIR-M developmental test events. This is a schedule delay of two years from the FY05 findings.
- The operational testing for Blocks I, II, and IIA spacecraft was thorough. The new capabilities and features of the Block IIR/IIR-M, and subsequent NAVSTAR GPS spacecraft Blocks, must also complete realistic end-to-end testing to demonstrate adequate levels of effectiveness and suitability.

Recommendations

- Status of Previous Recommendations. The Air Force has made limited progress on the previous FY05 DOT&E recommendations. All five remain valid.
  FY05 #1: The Air Force should synchronize development of the three NAVSTAR GPS segments and integrate production-representative MUE onto operational platforms for OT&E.
  FY05 #2: The Air Force should refine and integrate the NAVSTAR GPS system test strategy to include more rigorous end-to-end testing of the space, control, and MUE user segments with operationally representative platforms, and then update the Test and Evaluation Master Plan.
  FY05 #3: The Air Force should integrate appropriate electronic warfare environments into testing of NAVSTAR GPS to ensure M-code capabilities are demonstrated under realistic combat conditions.
  FY05 #4: The Air Force should evaluate information assurance in realistic testing.
  FY05 #5: DOT&E continues to advocate the operational testing of new and legacy NAVSTAR GPS receivers as early in the program as possible to ensure that maximum capability is consistently provided to operational users.
- FY06 Recommendations. None.

Small Diameter Bomb (SDB) Increment I

Executive Summary

- The Small Diameter Bomb (SDB) underwent IOT&E from November 2005 through July 2006. Testing was adequate to assess operational effectiveness and suitability.
- The DOT&E SDB Combined OT&E and LFT&E Report assessed SDB as operationally effective and suitable with some limitations due to bomb rack reliability and deficiencies in software used to predict optimum fuzing solutions for certain targets.
- The Air Force certified SDB for combat use by operational F-15E units in August 2006 and the system was subsequently deployed to Southwest Asia. However, in mid-October 2006, SDB flight operations were suspended due to weapon hardware component failures not observed in IOT&E. Air Force inspection and investigation are ongoing, and repairs are underway to return SDB to operational status.

System

- The SDB is a 250-pound air launched weapon using deployable wings to achieve standoff range.
- SDB uses a combination of Global Positioning System (GPS) and internal inertial navigation system guidance to achieve precise guidance accuracy.
- The SDB warhead is a penetrator design with additional blast and fragmentation capability. Integral fuzing is initiated by warhead impact, with or without a specified function delay, or by reaching a preset height above the intended target.
- SDBs are employed from a four-weapon carriage assembly mounted on F-15E aircraft.
- SDB is supported by the Accuracy Support Infrastructure (ASI) system, a ground-based, theater-deployable, differential GPS system, designed to increase SDB accuracy. ASI collects GPS satellite positioning error data and broadcasts target location corrections to the SDB through the F-15E data link prior to weapon release.

Mission

- Combatant commanders use SDB to attack fixed or relocatable targets that remain stationary from weapon release to impact.
- SDB engages both soft and hardened targets to include communications facilities, aircraft bunkers, industrial complexes, and lightly armored ground combat systems and vehicles.
- SDB permits an increased weapons load out per aircraft compared to conventional air-to-ground munitions for employment against offensive counter-air, strategic attack, interdiction, and close air support targets in adverse weather.
- SDB minimizes collateral damage while achieving kills across a broad range of target sets by precise accuracy, small warhead design, and focused warhead effects.

Activity

- Test and evaluation was conducted in accordance with the December 2004 DOT&E-approved Test and Evaluation Master Plan.
- Air Force Operational Test and Evaluation Center (AFOTEC) conducted the SDB IOT&E from November 2005 through July 2006. Test events included mission planning exercises, ASI deployment and operations, logistics activities and demonstrations, and flight test missions carrying and delivering both live and inert SDBs. AFOTEC conducted testing using production-representative weapons and carriage assemblies against realistic targets.
- IOT&E included operationally representative weapons employment events in a GPS jamming environment. These events characterized SDB performance capabilities in the threat environment likely to be encountered at system operational fielding.
- SDB achieved its IOT&E objectives, and the Air Force certified SDB for combat use by operational F-15E units in August 2006. The system was subsequently deployed to Southwest Asia. However, in mid-October 2006, SDB flight operations were suspended due to weapon hardware component failures not observed in IOT&E. Air Force inspection and investigation are ongoing, and repairs are underway to return SDB to operational status.
- DOT&E issued its report on SDB OT&E and LFT&E in October 2006 in support of the SDB full-rate production decision.

Assessment

- The IOT&E of the SDB system was adequate to support evaluation of the system's operational effectiveness and suitability.
- In the OT&E and LFT&E Report, DOT&E assessed SDB as operationally effective and suitable with some limitations:
  - The BRU-61/A carriage assembly did not meet the Air Force's IOT&E reliability mean time between failure requirement of 250 hours. The SDB program office is in the process of taking corrective action to ensure the BRU-61/A reliability meets the operational requirement.
  - SDB effectiveness and lethality are highly dependent on selection of the optimum weapon fuzing option for targets such as field artillery and lightly armored ground combat vehicles. The currently fielded version of the Joint Munitions Effectiveness Manual Weaponeering Software (JWS) does not accurately predict the optimum fuzing solution for these type targets. Although interim guidance was published, JWS must be improved with accurate SDB effectiveness data to enable successful mission planning without interim work arounds.
  - Additional live weapons event data using impact fuzing is required to validate forthcoming improvements in the FY07 JWS version. This data is necessary to provide a more robust set of empirical data to better characterize the range of SDB capabilities and limitations.
  - IOT&E ASI deployment and operation proved cumbersome and did not meet the Air Force concept of autonomous operational employment. Although the system provided nominal guidance accuracy improvements, it did not influence SDB effectiveness and lethality during IOT&E.
- The root cause of hardware component deficiencies that led the Air Force to suspend SDB flight operations is under investigation. The SDB program office is aggressively engaged in resolving this problem.

Recommendation

- Status of Previous Recommendations. There are no outstanding recommendations from FY05.
- FY06 Recommendations. To address and correct deficiencies and limitations identified in the OT&E and LFT&E Report, the Air Force should:
  1. Improve BRU-61/A bomb rack reliability to meet the operational mean time between failure requirement.
  2. Correct deficiencies in JWS SDB effectiveness data to facilitate accurate and effective mission planning. JWS improvements should provide correct fuze option selection for optimum lethality against all targets.
  3. Conduct follow-on Live Fire testing using impact-fuzed SDBs to validate JWS improvements and to provide a more robust set of empirical data to better characterize the range of SDB capabilities against ground combat systems such as field artillery and lightly armored air defense systems.

Space-Based Infrared System Program, High Component (SBIRS HIGH)

Executive Summary
- The Space-Based Infrared System (SBIRS) Increment 1 and related system deliveries continue to perform better than the legacy system.
- The Increment 2 test planning effort is ongoing and will require additional modifications to accommodate program restructuring and schedule delays.
- The concepts of operations being used by the developmental and operational communities are not the same. The concepts of operations should be standardized.

System
- The SBIRS program is being developed to replace the Defense Support Program (DSP) satellites and is being developed in two system increments:
  - Increment 1 uses the SBIRS Control Segment and User Segment, operating with DSP satellites, to provide current military capability. Initial Operational Capability for Increment 1 was attained in December 2001, consolidating the operations of the DSP and Attack and Launch Early Reporting missions.
  - Increment 2 develops new software and hardware for the Mission Control Segment to conduct integrated SBIRS spacecraft operations.
- The SBIRS Space Segment consists of two hosted payloads in Highly Elliptical Orbit (HEO) and four satellites in Geosynchronous Orbit (GEO). The launch of SBIRS satellites for Increment 2 has not yet started.

Mission
- Combatant commanders, deployed U.S. military forces, and allies will use SBIRS to conduct missions that require improved space sensors and operational launch detection capabilities.
- The SBIRS system will provide enhanced data quality and more timely reporting to joint combat forces in four key areas:
  - Provide timely and responsive space-based missile warning and detection
  - Provide launch detection for missile defense operations
  - Provide Technical Intelligence
  - Improve battlespace characterization

Activity
- The SBIRS Integrated Test Team is updating the core Test and Evaluation Master Plan (TEMP) and preparing Annexes 3 and 11 that identify detailed system message and performance level certification for the HEO mission in order to meet the standards of U.S. Strategic Command. The core TEMP and Annexes are scheduled to be submitted to DOT&E for approval in FY07.
- During 2006, the SBIRS program continued to conduct pre-integration testing of the GEO payloads for the Space Segment.
- The SBIRS program initiated development of automated testing and modeling capabilities that are vital to HEO message certification.

Assessment
- The SBIRS Control Segment of Increment 1, operating with the current generation of DSP satellites, is demonstrating improved performance over the earlier DSP control system.
- As SBIRS spacecraft begin integration and deployment, the test and evaluation focus will transition from DSP-related

operations to the new operational capabilities provided by SBIRS.
- The operational requirements for each SBIRS System Annex need better definition in order to develop an integrated test strategy that can meet the current program schedule.
- The initial delays in the development of SBIRS test scenarios and contracting of simulations increased the risk of exceeding current program timelines.
- There are emerging differences between the concepts of operations being used during the developmental and operational communities for the program. This reduces synchronization in the structure of the overall test program, thus it should be standardized.

Recommendations

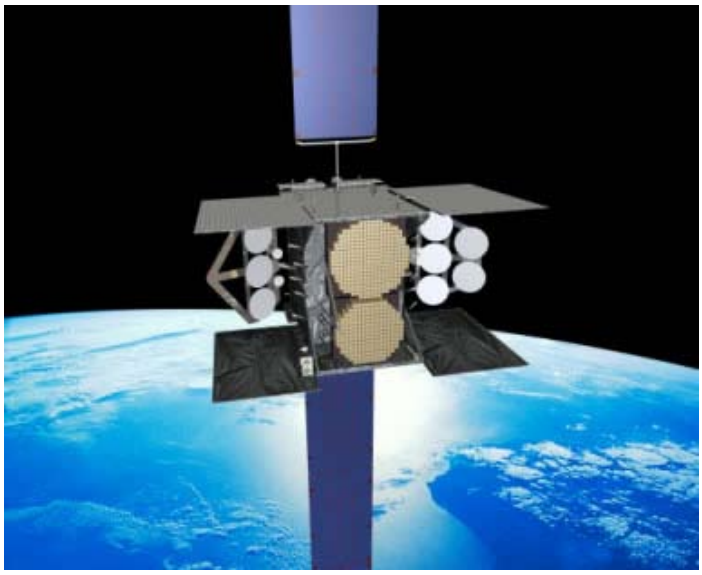
- Status of Previous Recommendations. The Air Force has made progress on the FY05 DOT&E recommendations, resolving the FY05 #2 recommendation. The rest remain valid.

FY05 #1: The Air Force should adequately specify the operational requirements for each SBIRS Effectivity to achieve the timely development of the corresponding TEMP Annexes.
FY05 #3: The Air Force should resolve the differences in the concepts of operations being employed for the different phases of SBIRS testing in order to meet the integrated needs of the test program.
FY05 #4: The Air Force should conduct integrated operational testing of SBIRS HEO message certification for the System Effectivity 3/11 to meet the needs of certification and operational acceptance by U.S. Strategic Command.
- FY06 Recommendations. None.

Wideband Gapfiller Satellite (WGS)

Executive Summary
- Recent testing identified technical problems that could impact the scheduled launch of the first Wideband Gapfiller Satellite (WGS).
- The combined test force must work efficiently together to maximize use of all on-orbit test opportunities to meet the needs of the WGS user community and provide operationally realistic testing.
- Test planning for WGS Multi-Service Operational Test and Evaluation (MOT&E) is continuing to make progress.

System
- WGS is the next generation wideband component in the DoD's future military Satellite Communications (SATCOM) architecture and provides communications in both the X-band and Ka-band frequencies.
- WGS combines vital capabilities onto a single satellite for tactical X-band communications, augments the Global Broadcast Service (GBS) Phase II system, and provides new two-way Ka-band service.
- The WGS system will be composed of three segments:
  - The Space Segment is being procured in a block of three or more satellites under the Federal Acquisition Regulation Part 12 rules for commercial item acquisition. First launch is projected by the Air Force for FY07 with the second and third launches following at about six-month intervals.
  - The Control Segment equipment and components will be integrated with existing satellite communications control assets to provide an integrated WGS satellite constellation control capability.
  - The Terminal Segment consists of both existing and programmed terminal types acquired under Service and agency terminal programs.



Mission
- Combatant commanders, U.S. joint warfighters, and allied partners will use the capabilities of the WGS space-based communications system for all military operations short of nuclear war.
- The Air Force is introducing this new service to alleviate the spectrum saturation of X-band, to provide increased single-user data rate availability, and to increase total satellite capacity over current Defense Satellite Communications System III satellites.
- The Military Satellite Communications (MILSATCOM) Joint Program Director is responsible for integrating the WGS and the GBS space and control capabilities.

Activity
- Production facility testing, completed on Space Vehicles One and Two, included vibration, acoustic, and thermal testing. Production facility quality testing revealed faulty solder joints on Space Vehicle One and potential microwave power amplifier anomalies on Space Vehicle Two.
- The Combined Test Force accomplished the initial WGS System Configuration Control Element integration testing during 2006.
- The draft WGS MOT&E plan is being revised to reflect launch schedule and test program changes. The Air Force Operational Test and Evaluation Center has reviewed the Payload Characterization Test matrix to maximize the opportunities for combined system testing.

Assessment
- The Combined Test Force has made significant progress in synchronizing the WGS test agencies in the implementation of combined developmental and operational testing, while preserving the dedicated operational testing period.
- The revised WGS program schedule and emerging user requirements could place pressures on the program to reduce the period dedicated to operational testing.
- WGS program risks still exist in the areas of operational frequency reuse, satellite orbital placement, and space launch system availability.
- Recent system quality control testing at the production facility identified technical problems in the assembly of WGS Satellite One and Two. A program delay could result in order

to fix these problems. Inspection of Satellites One and Two will likely be required to verify that those corrections were properly completed.
- The WGS MOT&E is continuing to integrate with the testing of the final mission capability requirements of the GBS Phase II and related system programs. The interoperability features of these systems will need to be evaluated.

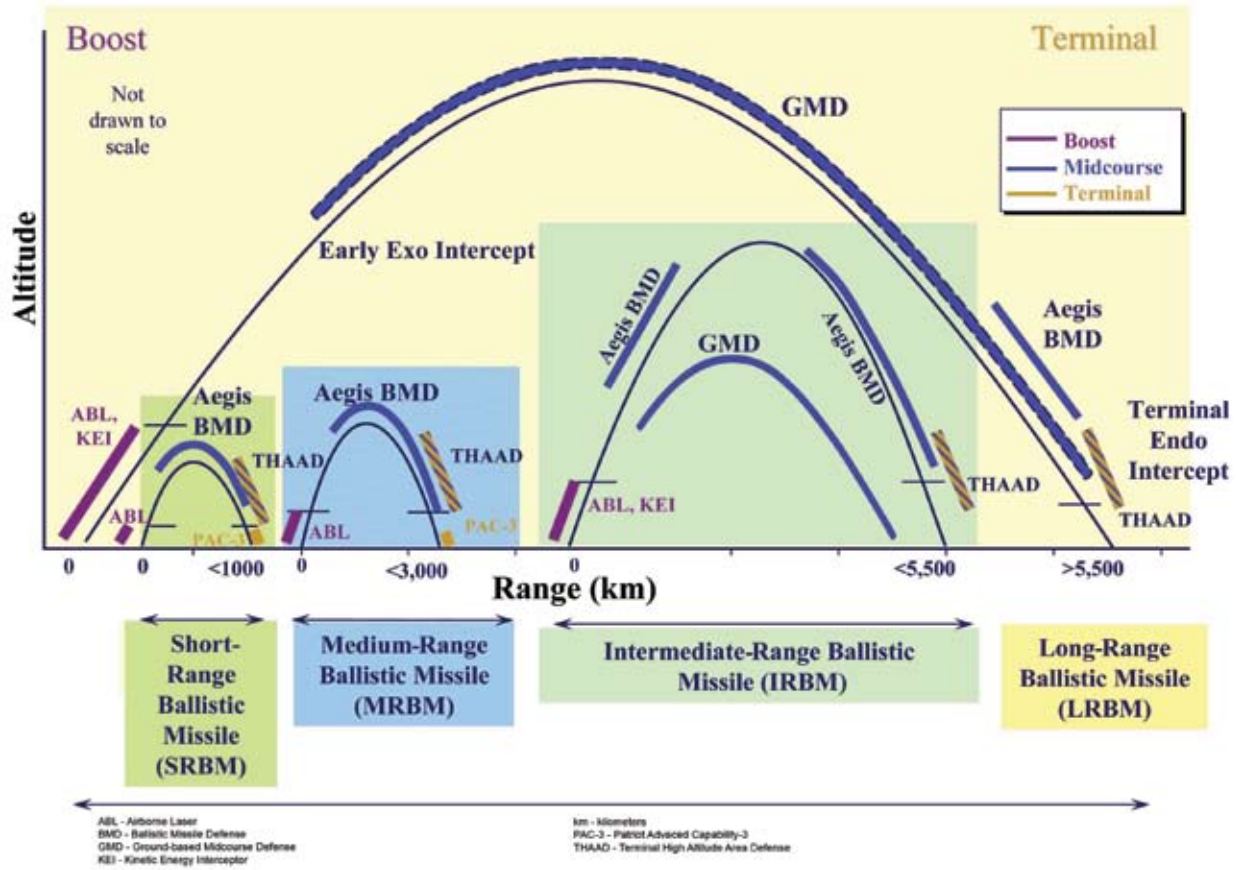
Recommendations
- Status of Previous Recommendations. The Air Force has made progress on the FY05 DOT&E recommendations. All three remain valid.

  FY05 #1: The Air Force and the Combined Test Force should maximize the application of combined development and operational testing for WGS, but preserve the previously scheduled periods needed for dedicated operational testing.
  FY05 #2: The Air Force should continue to carefully control WGS program risks associated with frequency reuse, satellite orbital placement, and launch system availability.
  FY05 #3: The Air Force should integrate the WGS-related operating capabilities of the GBS Phase II system into the WGS Multi-Service Test and Evaluation Strategy.
- FY06 Recommendations. None.

Ballistic Missile Defense System

Ballistic Missile Defense System

Ballistic Missile Defense Overview



In January 2002, the Secretary of Defense established the Missile Defense Agency (MDA) to develop defenses capable of defending the U.S., deployed forces, allies, and friends against threat ballistic missiles of all ranges, and in all phases of flight. Threat missiles are grouped by range, as follows:

- Short-range (less than 1,000 kilometers)
- Medium-range (less than 3,000 kilometers)
- Intermediate-range (less than 5,500 kilometers)
- Long-range (greater than 5,500 kilometers)

Defenses are described in terms of three phases of the threat missile's flight:

- Boost – from launch to booster burnout
- Midcourse – exoatmospheric flight between boost and reentry
- Terminal – from reentry to impact

The Ballistic Missile Defense System (BMDS) includes elements designed to have capability against threats in a particular phase of flight:

- Boost Phase
  - Airborne Laser (ABL)
  - Kinetic Energy Interceptor (KEI)
- Midcourse
  - Ground-Based Midcourse Defense (GMD)
  - Aegis Ballistic Missile Defense (Aegis BMD)
  - Kinetic Energy Interceptor (KEI)
- Terminal
  - Terminal High-Altitude Area Defense (THAAD)
  - Aegis Ballistic Missile Defense (Aegis BMD)
  - PATRIOT

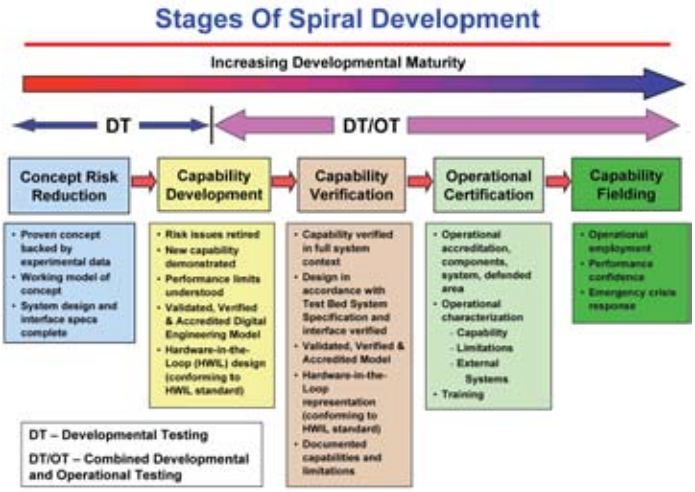
For intermediate and intercontinental ballistic missile threats, KEI is shown as a boost phase system because it has a unique capability to intercept boosting threats. This requires the system be employed close to threat missile launch points. However, KEI's versatile design may have considerable midcourse capability.

Furthermore, MDA is developing additional elements and components to improve BMDS' performance and defensive capability. They will add specific functionality to an integrated BMDS, and include:

- Forward-Based X-band-Transportable (FBX-T) radar
- Sea-Based X-Band radar (SBX)
- Command, Control, Battle Management, and Communications (C2BMC) system

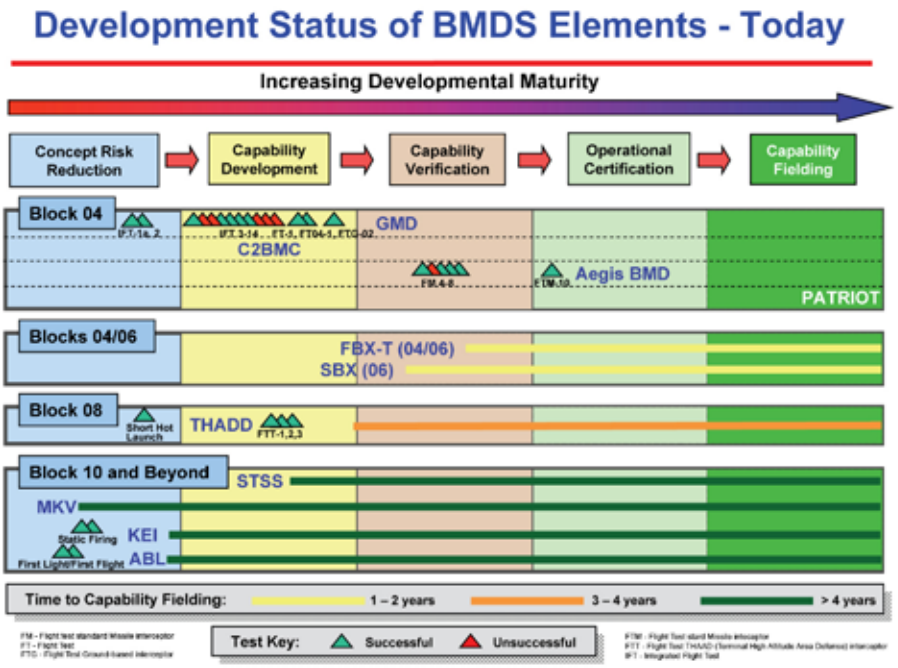
- Multiple Kill Vehicle (MKV) program
- Space Tracking and Surveillance System (STSS)

MDA uses a spiral development acquisition approach to develop and acquire the BMDS. Spiral development allows MDA to deliver missile defense capability in stages. The Agency explores, develops, verifies, certifies, and fields BMDS capabilities while conducting a comprehensive test program. Early testing - exploration and development - is element-centric. Later testing - verification, certification, and fielding - is BMDS-centric. The chart to the right defines the characteristics of each stage and their relationship to developmental testing and combined developmental and operational testing, in developing and maturing the BMDS.



Using spiral development acquisition, MDA develops technology and BMDS operational elements in two-year blocks. The BMDS Block 04 fielded a test bed architecture consisting of GMD, Aegis BMD, C2BMC (situational awareness capability only), and PATRIOT. Also part of Block 04, MDA fielded the initial FBX-T capability at Shariki, Japan, operationally designated AN/TPY-2 (FB). The BMDS Block 06 adds additional sensors, including SBX and new capability for FBX-T, and continues to evolve the C2BMC from situational awareness to battle management. The BMDS Block 08 will add THAAD to the BMDS architecture and continue the evolution of C2BMC.

The BMDS Block 10 and beyond currently intends to insert the technology programs into the BMDS architecture if these programs prove to have affordable and sustainable capabilities. Based on the definitions for each stage, the following chart depicts the DOT&E estimate of where each technology and developmental element maturity is today within this construct. The MDA test program is designed to mature each element over time.



This assessment report focuses on the current BMDS fielded architecture, including the sensor and technology programs, and associated developmental and combined developmental/operational testing. PATRIOT has transitioned to the Army and is reported as an Army program.

Ballistic Missile Defense System (BMDS)

Executive Summary

- Testing is successfully moving from element-centric to Ballistic Missile Defense System (BMDS)-centric.
- Three successful Ground-Based Midcourse Defense (GMD) flight tests culminated with a live target intercept using an operational interceptor, kill vehicle, and primary radar sensor for the first time.
- Terminal High-Altitude Area Defense (THAAD) and Aegis Ballistic Missile Defense (BMD), theater elements of the BMDS, made good progress this year. A warfighter procedural error prevented a successful engagement during the December 2006 Aegis BMD test.
- Command, Control, Battle Management, and Communications (C2BMC) continues to improve display accuracy and situational awareness.
- Sensor fusion remains untested with end-to-end intercept tests; battle management capability is in early development.

System

- The current BMDS architecture integrates ballistic missile defense capabilities against all ranges of threats.
- BMDS is a distributed system currently composed of four elements and six sensor systems:
  - Elements
    - Aegis BMD
    - C2BMC
    - GMD
    - PATRIOT Advanced Capability 3 (PAC-3)
  - Sensors
    - Cobra Dane
    - Upgraded Early Warning Radars (UEWR) – Beale and Fylingdales
    - Forward-Based X-band Transportable (FBX-T) Radar
    - Sea-Based X-Band (SBX) Radar
    - Space-Based Infrared System (SBIRS)/Defense Support Program (DSP)
- BMDS is employed as part of an integrated strategic defense plan
- Future blocks of the BMDS may include:
  - Airborne Laser (ABL)
  - Kinetic Energy Interceptor (KEI)
  - Multiple Kill Vehicle (MKV)
  - Space Tracking and Surveillance System (STSS)
  - THAAD

Mission

- U.S. Strategic Command is responsible for overall ballistic missile defense and will employ the BMDS to defend the U.S. territory, deployed forces, friends, and allies against ballistic missile threats of all ranges, in all phases of flight. Initial capability will permit defending the U.S. territory against ballistic missile threats.
- U.S. Strategic Command and U.S. Pacific Command will maintain situational awareness across the full mission space using the C2BMC system.
- The Army employs PAC-3 to provide theater defense for the deployed forces against short- and intermediate-range threats. The Missile Defense Agency (MDA) transitioned PAC-3 to the Army; PAC-3 is reported as an Army program.

Activity

- MDA conducted seven BMDS-centric ground tests during FY06.
- Aegis BMD completed two successful intercept flight tests against simple-separating medium-range targets in November 2005 and June 2006. It also participated in two target-of-opportunity events to test its long-range surveillance and track capabilities.
- C2BMC conducted developmental and integration testing and participated in three war games and eight Aegis BMD, GMD, PATRIOT, and other inter- and intra-agency flight tests.
- GMD had several "firsts:"
  - December 2005 - Launched the operational Ground-Based Interceptor (GBI) for the first time in Flight Test 1 (FT-1)

  - April 2006 - Flew a threat representative target missile through the Beale UEWR search volume for the first time during FT 04-1
  - September 2006 - Completed the first intercept with an operational GBI and operational radar sensor during Flight Test GBI 02 (FTG-02)
- PATRIOT conducted five flight tests from November 2005 to June 2006; three were successful.
- The Army conducted a Limited User Test of the PATRIOT Post Deployment Build 6 software (PDB-6), August - November 2006.
- THAAD returned to flight testing after a five-year hiatus. The program completed three successful tests, two without targets, and the third culminating with a successful intercept of a unitary target in July 2006.

Assessment

- BMDS defensive capability is still very basic, but is increasing as it matures and is demonstrating capability through disciplined ground and flight testing.
- GMD flight tests are providing data to verify, validate, and accredit models and simulations. The robust ground test campaign series is demonstrating BMDS capability and interoperability. The program still needs additional flight test data under stressing conditions to validate models and simulations and to increase confidence in the models, simulations, and assessment of system capability.
- C2BMC continues to add new functionality. Communications and situational awareness deficiencies have improved, but adding new sensors and shooters creates new challenges.
- Significant changes in both test and evaluation philosophy and structure should result in a more stable, efficient, and effective test program.

Recommendations

- Status of Previous Recommendations. MDA has addressed all but one of the FY05 DOT&E recommendations. The following recommendation requires further attention: FY05 #5: MDA is slowly improving reliability, availability, and maintainability data collection for the BMDS, as recommended by DOT&E. Improvement is still needed in this area.
- FY06 Recommendations. None.

Aegis Ballistic Missile Defense (Aegis BMD)

Executive Summary

- Aegis Ballistic Missile Defense (BMD) intercepted two medium-range separating targets during tests in FY06. During the third flight test, a warfighter procedural error prevented a successful intercept of a short-range, unitary target in the low exoatmosphere.
- Aegis demonstrated simultaneous BMD and ship self defense capabilities.
- Aegis demonstrated long-range surveillance and track capability and interoperability with the BMDS during FY06 exercises, including real-world observations.
- Involvement of operational test and warfighter communities in flight tests has proven valuable in planning operationally-realistic tests and in exposing operational design and training issues.

System

- Aegis BMD is a highly-mobile, sea-based missile defense system that employs the multi-mission shipboard Aegis Weapon System with new radar and missile capabilities to engage ballistic missile threats.
  - AN/SPY radar computer program modifications allow long-range surveillance and tracking of long-range ballistic missiles.
  - The modified Aegis vertical launcher system stores and fires the new, larger Standard Missile-3 (SM-3) missiles.
  - The SM-3 design delivers a maneuverable kinetic warhead to an intercept point in the upper atmosphere or in space.
- Aegis BMD is capable of autonomous missile defense operations and can accept external cues and tracks over tactical data links.

Mission

The Navy can accomplish three missions using Aegis BMD:

- Provide forward-deployed radar capabilities to enhance defense against long-range ballistic missile threats
- Provide all short- to long-range ballistic missile threat data to the Command, Control, Battle Management, and Communications system for dissemination to U.S. Strategic Command and U.S. Pacific Command to ensure situational awareness
- Defend deployed forces and allies by engaging and intercepting short- and medium-range theater ballistic missiles

Activity

- In FY06, the Aegis BMD test program continued to assess engagement and long-range surveillance and track capabilities. The program entered a combined developmental test/operational test (DT/OT) phase that will support transition of the Aegis BMD Block 04 system to the Navy in FY08.
- The Aegis BMD program completed two successful intercept flight tests against medium-range, simple-separating targets in November 2005 and June 2006. The program planned to conduct a multiple simultaneous engagement against a short-range, unitary target and an anti-ship cruise missile target in December 2006. During the test, a warfighter procedural error prevented successful engagement.
- Aegis BMD employed for the first time the multi-warfare version of the Aegis BMD combat system. This version enables simultaneous ship self defense and BMD capabilities. In June 2006, Aegis BMD conducted simulated firings against short-range ballistic missile and anti-ship cruise missile targets, demonstrating this simultaneous BMD and ship self defense functionality.
- Aegis BMD participated in the following tracking exercises of theater and intercontinental ballistic missile-class targets:
  - Two Air Force intercontinental ballistic missile tests: Safety Enhanced Reentry Vehicle-3 in February 2006 and Glory Trip-191 in June 2006; Aegis BMD plans to participate in a third Air Force intercontinental ballistic missile test in 2QFY07
  - Real-world events in the May - July 2006 timeframe
  - Two critical measurements and countermeasures tests in April 2006

  - Sea trials and tracking exercises in November 2005 and June 2006 using short- and medium-range Aegis Readiness Assessment Vehicles
- During the tracking exercises, Aegis BMD routinely collected data for Block 06 BMD signal processor and enhanced discrimination algorithm development.
- In March 2006, Aegis BMD demonstrated the stability and control of a proof-of-concept SM-3 nosecone, which employed a lightweight clamshell design developed by the Japan Defense Agency. The test supported research and development to enhance future SM-3 BMD capability.
- Aegis BMD conducted ground design verification tests of upgraded SM-3 Block IA missile components.
- Aegis BMD participated in flight and ground tests to enable an assessment of Aegis BMD interoperability and support to the BMDS. Aegis BMD plans to participate in a BMDS/Ground-Based Midcourse Defense (GMD) intercept test in FY07.

Assessment

- In FY06, the Aegis BMD test program took a significant step forward by conducting flight tests against medium-range, simple-separating targets. Previous flight tests used short-range unitary targets. Over the entire program history, Aegis BMD accomplished seven successful intercepts in eight attempts. The successful intercepts consisted of five short-range unitary targets and two medium-range simple-separating targets. The failed FM-5 attempt occurred in June 2003 and was attributed to a malfunctioning kinetic warhead divert valve.
- For the first time, flight tests in FY06 used an SM-3 missile equipped with a newly designed third-stage rocket motor. To date, neither the Block 04 design of the kinetic warhead divert system nor the zero-pulse mode of the third-stage rocket motor has been exercised in flight tests. However, the new kinetic warhead divert system is planned to be flight tested in FY07.
- In FY06, the Aegis BMD program enhanced the operational realism of its suite of flight test targets. During the June 2006 flight test, the Aegis BMD program flew a medium-range target that was modified to mitigate a non-threat representative behavior that had previously limited testing of the full endgame functionality of Aegis BMD. Use of the modified target in future flight tests will enable more realistic endgame scenarios. Tracking exercises in FY06 established the Aegis Readiness Assessment Vehicle target as an affordable risk reduction target for intercept tests. The program collected valuable data on the behavior and threat realism of the Aegis Readiness Assessment Vehicle toward its eventual use as an operationally realistic intercept target.
- To date, Aegis BMD has yet to participate in a GMD flight test in which Aegis BMD data contributes in real-time to the development of a GMD weapon task plan.
- The Aegis BMD program is progressively increasing the operational realism in its flight test program. In FY06, Aegis BMD began a combined DT/OT test phase, during which the Navy Operational Test Agency will evaluate the operational performance of the Block 04 system to support its transition to the Navy. Aegis BMD benefits from the active participation of the operational test and warfighter communities, as their recommendations are incorporated in system design modifications; tactics, techniques, and procedures; fleet training; and follow-on flight missions.

Recommendations

- Status of Previous Recommendations. The program completed one of the two DOT&E recommendations from FY05, but the following recommendation requires further attention:
  FY05 #2: DOT&E recommended that Aegis BMD participate in flight tests to provide real-time support to the development of GMD weapons task plans (no plans currently exist to do this). This remains a valid recommendation.
- FY06 Recommendations.
  1. Before the completion of the DT/OT phase, the Missile Defense Agency should flight test the multi-pulse modes of the kinetic warhead divert system against a medium-range target and the zero-pulse mode of the third-stage rocket motor.
  2. The Missile Defense Agency should continue to conduct increasingly stressing endgame scenarios during flight tests using the modified medium-range target.
  3. The Missile Defense Agency should continue efforts to accredit the Aegis Readiness Assessment Vehicle target for use as a threat-representative flight test target.
  4. The Missile Defense Agency should conduct a long-range surveillance and track event using the intended tactical BMDS architecture for a theater mission.

Command, Control, Battle Management, and Communications (C2BMC) System

Executive Summary

- The Command, Control, Battle Management, and Communications (C2BMC) capability, interactions with other elements, and the number of installations grew rapidly in FY06.
- The Missile Defense Agency (MDA) corrected many C2BMC display inaccuracies and improved data presentation. However, MDA will need to conduct more tests in stressing scenarios for a full assessment.
- C2BMC is still primarily a situational awareness tool that is slowly developing into a battle management capability. MDA is developing a Global Integrated Fire Control capability as part of C2BMC.

System

- C2MBC is the warfighter's interface to the fully integrated Ballistic Missile Defense System (BMDS).
- Initial configuration includes C2BMC data terminals at the Joint National Integration Center, Cheyenne Mountain, Colorado; Fort Greely, Alaska; Strategic Command, Northern Command, Pacific Command, and the National Command Authority.
- The current C2BMC system provides situational awareness data only. The C2BMC terminals provide warfighters and the National Command Authority with information on missile events, BMDS status, and system coverage. Aegis Ballistic Missile Defense (BMD) and Ground-Based Midcourse Defense (GMD) elements use their own command, control, battle management systems, and mission planning tools.
- The Block 06 C2BMC is intended to provide integrated command and control for the entire BMDS.

Mission

U.S. Strategic Command and U.S. Pacific Command currently use the C2MBC to provide communications necessary to support ballistic missile defense engagements, as follows:

- Deliberate planning
- Collaborative dynamic planning
- Situational awareness
- Consequence management
- Network management

Activity

- During FY06, MDA improved the capabilities of C2BMC, including:
  - Upgraded all installations with software Spiral 4.5, which upgraded situational awareness and battle management features, as well as sensor management of the Forward-Based X-band -Transportable (FBX-T) radar
  - Installed a second U.S. Pacific Command C2BMC suite
  - Developed software Spiral 6.2; testing begins in December 2006
  - Conducted Aegis BMD radar cueing tests using other sensor data
  - Established an independent interface with the Space-Based Infrared System/Defense Support Program (SBIRS/DSP)
- MDA began improving the suitability and survivability of C2BMC through activities, such as:
  - Interoperability exercises with SBIRS/DSP, PATRIOT, and Aegis BMD
  - Integration of C2BMC into the online Distributive Multi-Echelon Training System for the warfighters in June 2006
  - Testing of data fusion, track correlation, and discrimination capabilities using real data from flight tests
- MDA increased the participation of C2BMC in test events, including:
  - Seven GMD-centric and BMDS-centric ground tests
  - Aegis BMD, GMD, and PATRIOT flight tests

- Wargames, such as Amalgam Phantom 06 and Vigilant Shield 07
- Interoperability exercises, such as a demonstration with PATRIOT in May 2006, and a System Integration Test with SBIRS/DSP conducted July - October 2006
- Data fusion, track correlation, and discrimination tests using real data, such as GMD flight tests, countermeasures flight tests, and unscheduled missile launch targets-of-opportunity
- C2BMC participated in real-world events during the May and July 2006 timeframe

Assessment

- C2BMC is a critical component of the BMDS. Its installations, capabilities, and interactions with other elements significantly increased and improved last year.
- MDA reduced the shortcomings that exist in C2BMC situational awareness capabilities. Warfighters are experiencing better data accuracy and, based on data from ground and flight tests, are suggesting access and display content improvements.
- C2BMC is essential to use the FBX-T. Although C2BMC correctly passed on the radar data to Ground-Based Midcourse Defense Fire Control in eight tests, it did not do this over the operational communications networks. MDA plans to demonstrate management of FBX-T using operational communication paths in December 2006.
- C2BMC demonstrated limited interoperability with theater assets, but requires more extensive tests in order to support development of tactics, techniques, and procedures. C2BMC correctly received PATRIOT data during the December 2005 PATRIOT flight test and the Limited User Test in August 2006, but is not yet capable of tasking the PATRIOT radar.

Recommendations

- Status of Previous Recommendations. MDA has taken action on all of the FY05 DOT&E recommendations.
- FY06 Recommendations. MDA should:
  1. Review and improve the processes and procedures its contractors use for tracking and reporting on C2BMC problems and performance.
  2. Implement quantitative analysis of C2BMC track accuracies and track correlations between data from multiple radar sensors.
  3. Include assessments of information assurance during BMDS-centric C2BMC testing.

Ground-Based Midcourse Defense (GMD)

Executive Summary

- The Missile Defense Agency (MDA) successfully intercepted a "simple" threat representative target for the first time with an operational interceptor launched from an operational silo using data from an operational radar sensor.
- Robust integrated ground testing continues to provide valuable insight into system behavior and capability.
- The lack of flight test data to validate and update end-to-end models and simulations used in ground testing limits confidence in assessments of Ground-Based Midcourse Defense (GMD) defensive capabilities.
- Robust testing and model and simulation validation are limited by the immaturity of some BMDS components.
- Future program and fielding decisions should stress reliable and repeatable performance in integrated system testing.

System

GMD is the principal element of the Ballistic Missile Defense System (BMDS). The current distributed GMD configuration consists of the following elements:

- Cobra Dane Upgrade radar at Eareckson Air Station (Shemya Island), Alaska
- Upgraded Early Warning Radars (UEWR) at Beale Air Force Base, California, and Fylingdales, United Kingdom
- Ground-Based Interceptor missiles at Fort Greely, Alaska (11 interceptor missiles), and Vandenberg Air Force Base, California (2 interceptor missiles)
- GMD Fire Control/Communications at the Joint National Integration Center; Schriever Air Force Base, Colorado; and Fort Greely, Alaska
- GMD Communications Network
- External interfaces include Aegis BMD; Cheyenne Mountain Operations Center, Colorado; Space-Based Infrared System (SBIRS)/Defense Support Program (DSP) at Buckley Air Force Base, Colorado; and a Forward-Based X-band Transportable (FBX-T) radar in Japan.

Mission

U.S. Strategic Command operators will use the GMD system to defend U.S. territory, deployed forces, friends, and allies against threat intercontinental ballistic missiles.

Activity

- The GMD program is in the development phase. MDA testing included:
  - December 2005 - Flight Test 1 (FT-1). An interceptor-only flight test that was part of the Mission Readiness Task Force remediation plan.
  - February 2006 - FT 04-1. A long-range target launched from Kodiak Island, Alaska, across the search volume of the UEWR at Beale Air Force Base, California, to evaluate changes to the radar software to support the missile defense mission.
  - September 2006 - Ground-Based Interceptor (GBI) Flight Test 02 (FTG-02). A planned seeker characterization flight test that resulted in a successful intercept of the target.
  - Seven GMD-centric and BMDS-centric ground tests.
- MDA cancelled two ground tests due to delays in fielding Fylingdales UEWR and Sea-Based X-Band radar capabilities. They incorporated the test objectives from these tests into future planned ground tests.
- Warfighter personnel operated the GMD system over multiple fixed-duration periods during warfighter-sponsored Capability Demonstrations and during real-world operations.
- MDA emplaced 4 additional test bed interceptors at Fort Greely, Alaska, bringing the total number of operational interceptors to 11.
- MDA upgraded the GMD Fire Control (GFC) software.

Assessment

- More robust GMD ground and flight testing increased confidence in its ability to perform the BMDS mission.
  - FT-1 demonstrated silo launch and fly out of an operationally-configured interceptor and kill vehicle.
  - FT 04-1 demonstrated performance of an operational radar, radar interoperability with GMD, and GMD simulated engagement of a long-range ballistic threat target. The radar tracked the target and transmitted target data via the Ground-based Communications Network to the Joint National Integration Center in Colorado Springs, Colorado, and to the C2BMC. GMD simulated system response up to, and including, development of an intercept solution. GMD simulated the interceptor for this test.
  - FTG-02 demonstrated end-to-end performance in a flight test using warfighter operators, an operational midcourse sensor, and an operationally-configured GMD system. Although not a primary or secondary objective of the flight test, GMD intercepted the target.
- During Capability Demonstrations and real-world operations, GMD demonstrated day-to-day system operations over multiple extended periods.
- MDA's more robust pre-flight ground testing, initiated in response to Mission Readiness Task Force recommendations, identified and mitigated serious challenges to flight test success.
- FTG-02 incorporated operational realism consistent with the maturity of the GMD system in this developmental flight test:
  - First use of a production GBI and production kill vehicle against a "simple" threat representative target.
  - First use of an operational sensor to support a GBI weapon task plan.
  - A successful "single-thread" (one engagement sequence group) end-to-end system test of the BMDS - one sensor providing the GMD Fire Control with tracks of the threat. Achieving an intercept was not a primary or secondary test objective. It was not an operationally realistic end-to-end test of the total integrated BMDS, which includes many of the other elements (e.g., multiple sensors (radars) requiring accurate sensor fusion and track correlation by the operationally-relevant GMD Fire Control). As the system matures, these artificialities should disappear allowing for more realistic, operational end-to-end tests.
  - Warfighters operated the GFC and all command and control nodes except the Beale UEWR, the primary intercept sensor. Two contractors and a warfighter subject matter expert setup and monitored the radar which operated in its automatic mode.
- Testing is limited by the lack of maturity of some components that are still in early development.
- Challenging, integrated BMDS demonstrations remain an important objective for future testing.

Recommendations

- Status of Previous Recommendations. MDA has taken actions on five of the seven FY05 DOT&E recommendations. The following recommendations remain valid:
  FY05 #2: MDA has put processes into place and is developing an evaluation-based test strategy. MDA has made contractual and test program changes, and continues to do so to reach full implementation.
  FY05 #3: Through contract modifications and user forums, MDA continues to work to maximize data collection to determine the GMD systems operational reliability, availability, and maintainability. MDA needs to develop and implement systematic data collection, analysis, and reporting procedures for all BMDS elements.
- FY06 Recommendations. None.

Terminal High-Altitude Area Defense (THAAD)

Executive Summary
- The Terminal High-Altitude Area Defense (THAAD) ground and flight test programs continue to make progress.
- The Missile Defense Agency (MDA) will begin integrating THAAD into the Ballistic Missile Defense System (BMDS) in FY07.
- The program is on track to support the transition of two fire units to the Army in FY09 and FY11.

System
- The THAAD ballistic missile defense system consists of five major components:
  - Missiles
  - Launchers
  - Radars
  - THAAD Fire Control/Communications (TFCC)
  - Unique THAAD support equipment
- THAAD will accept target cues from the Aegis Ballistic Missile Defense System, satellites, and other external sensors.
- THAAD will complement the PATRIOT system.

Mission

U.S. Strategic Command will employ THAAD to protect critical assets worldwide. THAAD is designed to destroy the full-range of theater ballistic missile threats to troops, military assets, and allied territories using hit-to-kill technology. The THAAD Kill Vehicle can intercept an incoming threat ballistic missile in the high endoatmosphere or exoatmosphere, minimizing the effects of weapons of mass destruction on battlefield troops and civilian populations.

Activity
- MDA continued planning, testing, and qualifying THAAD ground and flight test components:
  - November 22, 2005 - Flight Test THAAD 01 (FTT-01). A component-level missile characterization flight (no target). This test demonstrated missile egress, booster/kill vehicle (KV) separation, KV shroud separation, Divert and Altitude Control System operation, and KV control.
  - May 11, 2006 - FTT-02. This test demonstrated integrated THAAD radar, launcher, TFCC, and Interceptor closed-loop operations and engagement functions against a simulated unitary target.
  - July 12, 2006 - FTT-03. The first fully integrated THAAD flight test that successfully demonstrated seeker characterization as it intercepted a unitary target.
  - September 13, 2006 - FTT-04. The first intercept test planned against a separating target with warfighters conducting all operations. The test was only partially completed because the target failed during flight and was destroyed by range safety personnel. THAAD demonstrated integrated radar, launcher, fire control, and missile closed loop operations. The radar tracked the target and completed discrimination on the target after range-commanded destruction. The THAAD interceptor was not launched. Due to the lack of another target, MDA is addressing FTT-04 test objectives in a later flight test.
  - MDA also completed the developmental high-speed sled track tests of the kill vehicle.
- THAAD and PATRIOT completed radio frequency interoperability and compatibility exercises.
- MDA restructured the ground test program into two parts (pre- and post-fire unit fielding) to expedite fielding of the first fire unit.

Assessment
- THAAD remains in the early stages of developmental testing. Operational capability is largely unproven.
- MDA conducted a disciplined test program to qualify the missile for the first flight test. This approach surfaced several problems that were corrected and resulted in three successful flight tests this year.

- MDA is progressively integrating warfighters as operators of the THAAD radar, launcher, and fire control components, allowing the users to effectively begin developing and validating tactics, techniques, and procedures early in the development phase.
- THAAD has not yet participated in any integrated BMDS tests. MDA plans to integrate THAAD into the BMDS when THAAD flight testing begins at the Pacific Missile Range Facility, Hawaii, in April 2007.
- The current ground and flight test program is designed to incrementally (simple to complex) evaluate THAAD capabilities. Planned testing will support MDA's plan to transition two fire units to the Army in FY09 and FY11.
- While the test program is comprehensive, the test schedule is ambitious and success-oriented to support fielding the first fire unit. Actual and projected delays in target development and production are already causing schedule turbulence and test program changes.

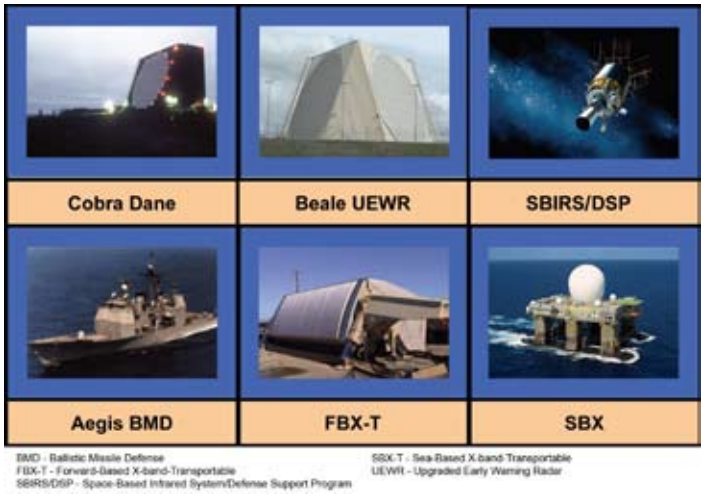
Recommendations

- Status of Previous Recommendations. There were no FY05 recommendations submitted for THAAD.
- FY06 Recommendation.
  1. MDA should review its priorities and processes for target development and procurement to ensure timely production of targets to support THAAD flight testing.

Sensors

Executive Summary

- The Ballistic Missile Defense System (BMDS) sensors provide target detection, track, and discrimination data to both the Ground-Based Midcourse Defense (GMD) Fire Control (GFC) and the BMDS Command, Control, Battle Management, and Communications (C2BMC) system.
- GFC uses data from these sensors to generate GMD weapon task plans and for situational awareness. BMDS C2BMC uses sensor data for situational awareness, but, as it matures, will use sensor data for battle management.
- For the Ground-Based Interceptor (GBI) Flight Test 02 (FTG-02) intercept flight test in September 2006, the Missile Defense Agency (MDA) used an operational sensor, the Beale Upgraded Early Warning Radar (UEWR), for the first time to provide the GFC with radar data to generate a weapon task plan.
- Cobra Dane observed "targets of opportunity" as part of its legacy mission. It has not yet been used to transmit track data to the GFC as part of an intercept flight test. It has passed simulated target data.
- No BMDS sensors have high-fidelity performance models and simulations validated and accredited for use by the Joint Operational Test Agency to assess operational capability.



System

The BMDS sensors are:

- Cobra Dane - an L-band single-face (120 degree azimuth field of view), phased array radar located at Shemya, Alaska
- Sea-Based X-band (SBX) Radar: an X-band single-face, phased array radar on a movable mount, positioned on a fifth generation twin-hulled, semi-submersible, self-propelled ocean-going platform, home-ported at Adak, Alaska
- Upgraded Early Warning Radars: Ultra High Frequency (UHF) fixed site, fixed orientation, phased array radars located at Beale Air Force Base, California (2 faces, 240 degree azimuth field of view), and Fylingdales, England (3 faces, 360 degree azimuth field of view)
- Forward-Based X-band-Transportable (FBX-T) Radar: a Terminal High-Altitude Area Defense (THAAD) high resolution, X-band, phased array radar with modified software to provide post-boost acquisition and tracking of long-range ballistic missiles. The operationally deployed radar at Shariki, Japan, is designated AN/TPY-2 (FB).
- Aegis Ballistic Missile Defense (BMD) Radars: Aegis AN/SPY radars modified to provide surveillance and tracking of long-range ballistic missiles
- Space-Based Infrared System (SBIRS)/Defense Support Program (DSP): an infrared satellite constellation and ground station that provides the BMDS with the initial notification of a ballistic missile launch and defended area determination

Mission

U.S. Strategic Command warfighters will use the BMDS sensors to:

- Detect, track, and classify ballistic missile threats targeting the United States, its allies, and its friends
- Provide situational awareness data to the BMDS C2BMC element
- Generate weapon task plans for ballistic missile defensive systems such as Aegis BMD and GMD

Activity

- Cobra Dane: Due to its location and field-of-view, Cobra Dane cannot participate in BMDS intercept flight test events. During the past year, it participated in seven ground tests and acquired and tracked targets of opportunity.
- SBX: SBX spent most of 2006 in transit to the Pacific and undergoing early checkout and calibration of its radar. During this development and early testing, SBX only tracked satellites. On September 1, 2006, MDA used SBX to track both the target and interceptor during the FTG-02 intercept flight test. SBX collected endgame radar data; it did not support GMD weapon task plan generation or send data to C2BMC and the BMDS.
- UEWRs: The BMDS will use several UEWRs for radar detection, tracking, and classification. On February 23, 2006,

during Flight Test 04-1 (FT04-1), the Beale UEWR tracked a flight test target for the first time as part of a risk reduction test for FTG-02. Then, on September 1, 2006, MDA used the Beale UEWR radar data to generate a weapon task plan for the interceptor during FTG-02, a first for an operational sensor. The Beale UEWR also participated in numerous ground tests during 2006. MDA used most of 2006 to upgrade and test the Fylingdales UEWR.

- FBX-T: During development and checkout, FBX-T frequently tracked space objects and satellites as well as two ballistic missile targets of opportunity. MDA also used FBX-T in eight ground tests to demonstrate integration into the BMDS. The FBX-T is currently deployed to an operating location in Japan.
- Aegis BMD: Aegis participated in more than a dozen live tracking exercises, ground tests, and real-world operations during FY06. These events exercised the long-range surveillance and track capability of the Aegis BMD radar and demonstrated interoperability with the BMDS.
- SBIRS/DSP participated in seven ground tests culminating in the hardware-in-the-loop GTI-01 test event in September 2006 and in the distributed ground test GTD-01 in November 2006. These tests exercised SBIRS/DSP connectivity to both the GMD hardware-in-the-loop facility and the direct operational interface to C2BMC. This interface enables C2BMC to get early warning data directly from SBIRS/DSP instead of having to go through a GMD communications network. SBIRS/DSP also participated in seven BMDS system-level flight test events by providing early warning data.

Assessment

- Cobra Dane: Performance estimates for Cobra Dane are limited to the ground test results and missile targets of opportunity that fly through the radar search volume. These estimates rely on models and simulations that are not yet validated and accredited for use in operational evaluations. To validate and accredit these models and simulations and confirm software corrections from a previous flight test, MDA will need to fly another target through the Cobra Dane radar field of view.
- SBX: SBX successfully collected data on both the interceptor and the target during FTG-02. MDA is analyzing that data. SBX has not yet supported a live intercept as the primary sensor, nor has it operated from its planned home port in Adak, Alaska.
- UEWRs: As the primary sensor during FTG-02, the Beale UEWR provided the radar intercept data used by the GFC to generate the weapon task plan that resulted in a successful intercept. FTG-02 was the first time a BMDS operational sensor supported a GMD intercept test. MDA is still analyzing the data; however, early results show excellent performance by the radar. Fylingdales UEWR will not achieve operational capability for the missile defense mission until MDA upgrades it with the Beale modifications, tests it, and integrates it into the BMDS in FY07.
- FBX-T: MDA deployed the first FBX-T in early 2006. Prior to deployment, MDA conducted simulated intercepts using FBX-T data, but did not accomplish any live intercept testing with the FBX-T operating as the primary sensor. MDA will demonstrate FBX-T integration with the BMDS, including operational communication links from its deployed location in Japan in December 2006. FBX-T still needs to demonstrate its capability to support a GMD flight test.
- Aegis BMD: Aegis BMD continues to evaluate its interoperability and support BMDS testing and real-world activities. Aegis BMD collected valuable data during long-range surveillance and track exercises and real-world events for performance analysis relative to supporting the BMDS mission. Aegis BMD has yet to participate in a BMDS flight test that uses AN/SPY-1 radar data in real-time to develop a GMD weapon task plan.
- SBIRS/DSP: SBIRS/DSP has demonstrated the ability to provide limited support to the BMDS. MDA and the Air Force will improve capability when they install new software changes at the SBIRS/DSP ground station.

Recommendations

- Status of Previous Recommendations. MDA has taken actions on all of the FY05 DOT&E recommendations.
- FY06 Recommendations.
  1. MDA should fly another target through the Cobra Dane field of view to verify the software fixes that resulted from FT 04-5 and provide data for validating and accrediting Cobra Dane models and simulations. The target should use a variety of countermeasures and target dynamics to provide crucial performance data.
  2. Using a variety of countermeasures and target dynamics, MDA should fly a target through a UEWR field of view to gather crucial data on performance for validating and accrediting models and simulations.
  3. MDA should use both SBX and Aegis BMD as the primary engagement support sensor for generating the radar intercept data during flight tests that culminate in an actual target intercept using a GMD interceptor.
  4. Before deploying the second FBX-T, MDA should use it as the primary sensor generating the radar intercept data during a flight test that culminates in an actual target intercept using a GMD interceptor.
  5. MDA should conduct a system-level ground test using the actual communications links and planned personnel to demonstrate that the deployed FBX-T can support the BMDS mission.
  6. MDA should accelerate SBIRS/DSP ground station software upgrades to improve its support to testing, training, and operations.

Technology Programs

Executive Summary

- The Missile Defense Agency's (MDA) four major technology programs made progress this past year.
- After completing its 2005 Knowledge Points in December 2005, the Airborne Laser (ABL) completed the optics subsystem refurbishment and test – one of its 2006 Knowledge Points. Delays are likely in the completion of the two remaining 2006 Knowledge Points (the low-power active ground test and the first in-flight atmospheric compensation test).
- Ground testing of the two Space Tracking and Surveillance System (STSS) spacecraft in FY06 discovered payload hardware issues that slipped the tandem launch of the two spacecraft from 2QFY07 to 1QFY08.
- The Kinetic Energy Interceptor (KEI) program completed separate static firings of both the first and second stages of the booster as well as wind tunnel tests of the nose cone design.
- The Multiple Kill Vehicle (MKV) program completed a System Concept Review.

Systems

Airborne Laser (ABL) is a prototype missile defense weapon system consisting of:

- A modified Boeing 747-400F commercial aircraft
- A megawatt-class chemical oxygen-iodine laser
- A laser turret on the aircraft nose and two illuminator lasers on a bench in the fuselage
- Optical benches with highly sensitive cameras, sensors, and mirrors
- Hardware and software for battle management, command, control, communications, computers, and intelligence
- Ground support equipment for storing, mixing, handling, and loading laser chemicals

Space Tracking and Surveillance System (STSS) is a research and development system that will consist of:

- Two flight test satellites in low-earth orbit
- The Missile Defense Space Experimentation Center (MDSEC), Colorado Springs, Colorado (the primary control center)
- The Low Satellite Operations Center, Redondo Beach, California (the backup control center)

Kinetic Energy Interceptor (KEI) is planned as a land-based, air-transportable battery with the following components:

- Transportable erector launcher
- High acceleration and high burnout-velocity booster rocket
- High divert velocity kill vehicle that can identify the threat re-entry vehicle in the presence of a bright plume during boost phase and among countermeasures during midcourse phase

- KEI fire-control/communications (KFC/C) suite that includes a KEI Interceptor Communications System

Multiple Kill Vehicle (MKV) plans for many small kinetic kill vehicles to be carried aboard a Carrier Vehicle. Key features of the Carrier Vehicle include:

- Kill vehicle restraints and dispense mechanisms
- Communications with kill vehicles and endgame management
- Command and control of the kill vehicles, especially assignment of targets and prevention of fratricide
- Infrared and visible sensors

Missions

Airborne Laser (ABL) - Combatant commanders will use the ABL to destroy threat ballistic missiles in the boost phase before they have an opportunity to deploy reentry vehicles, submunitions, or countermeasures. ABL accomplishes this by:

- Using passive infrared sensors to autonomously acquire and track threat ballistic missiles
- Using the illuminator lasers to establish precise track on the missile nose and an aim point on the propellant tank
- Placing laser thermal energy on the tank or motor case to weaken the casing, allowing internal pressure to rupture the tank and destroy the missile

Space Tracking and Surveillance System (STSS) - U.S. Strategic Command will use the STSS, a space-based sensor element of the Ballistic Missile Defense System (BMDS) to:

- Acquire, track, assess, and report ballistic missile and intercept events from lift-off to reentry
- Provide a space node to support data fusion, over-the-horizon radar/sensor cueing, interceptor handover, and fire control

Kinetic Energy Interceptor (KEI) - U.S. Strategic Command will use the KEI as a primary intercept missile in the BMDS to:
- Intercept threats in boost, ascent, and midcourse phases of flight
- Intercept medium-, intermediate-, and long-range ballistic missiles
- Independently exercise command, control, battle management, and communications at the battery level, access sensor data, and communicate with the kill vehicle
- Boost alternate kill vehicles toward the interception point

Multiple Kill Vehicle (MKV) – The U.S. Strategic Command will use the MKV as the primary kill mechanism for the interceptors deployed in the BMDS to:
- Intercept long-range ballistic missiles and countermeasures in the midcourse phase of flight
- Mitigate the target discrimination problem by destroying all major objects in the field of view using many small kill vehicles

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Knowledge Point Progress

For the technology programs, MDA uses knowledge points to measure development progress by focusing on the set of critical activities that define each program's risk. This approach allows MDA to make informed decisions on advancement of a development activity.

ABL
- Knowledge Point #1: Complete Low Power System Integration-Active Ground Test. MDA did not achieve the commit date of August 31, 2006, because of unanticipated difficulties encountered during integration of beam control/fire control software and hardware.
- Knowledge Point #2: First in-flight atmospheric compensation with the tracking illuminator laser beam on the ABL and a beacon illuminator laser beam on the NKC-135 Big Crow diagnostics-equipped aircraft. MDA cannot accomplish this flight test series until Knowledge Point #1 is completed. It is unlikely MDA will meet the November 30, 2006, commit date.
- Knowledge Point #3: Complete laser optics subsystem refurbishment and test. MDA completed this knowledge point on September 28, 2006, which was well before the commit date of December 31, 2006.
- Transition Knowledge Point: System Demonstration (negate a threat representative ballistic missile during the boost phase). This year, MDA slipped the date for this event about one month to December 2008.

STSS
- Knowledge Point #1 - Ground Acceptance Test. MDA qualified Build 2.4 of the ground software. MDA delayed Acceptance Test 2 from May 2006 to January 2007 due to funding pressures.
- Knowledge Point #2: Space Vehicle Integration. MDA delayed Space Vehicle 1 Integration from March 2006 to November 2006. MDA has concerns with Space Vehicle 1 Integration and Thermal Vacuum tests. MDA is investigating excessive gimbal friction in the Space Vehicle 2 sensor.
- Transition Knowledge Point: Successful Flight Tests. MDA will conduct these tests in 2008 using dedicated strategic and theater targets after the tandem launch of the two spacecraft in December 2007. MDA is considering canceling the second strategic test due to target cost overruns.

KEI
- Knowledge Point #1: Direct Downlink and Sensor Fusion. MDA successfully completed a second demonstration of this capability in April 2006. The demonstration involved direct downlink from overhead and terrestrial sensors; extraction of data from the Joint National Integration Center; message exchange with the Command, Control, Battle Management, and Communications system at the Joint National Integration Center; and data fusion and computation of fire control solutions, including uplinks of the solutions to a simulated interceptor.
- Knowledge Point #2: Static Firings. MDA completed a static firing of the second stage of the booster in January 2006, wind tunnel tests of the nose cone design in March 2006, and a static firing of the first stage of the booster in August 2006.
- Transition Knowledge Point: Booster Flight. Scheduled for 4QFY08. Based on this test, MDA will assess whether to pursue KEI as a boost phase system, either as a supplement or an alternative to the ABL.

MKV
- There are no Knowledge Points scheduled for MKV in the near term. MKV completed a System Concept Review in August 2006.
- Knowledge Point #1: Ability to Manage the Engagement. Details are classified. Completion date is 4QFY09.
- Knowledge Point #2: Ability to Build and Deploy Kill Enhancement Devices. MDA must develop requirements for the devices, design and build prototypes, and conduct processor-in-the-loop testing. Completion date is 4QFY09.

Recommendations
- Status of Previous Recommendations. MDA has taken actions on all of the FY05 DOT&E recommendations.
- FY06 Recommendation.
  1. MDA should include tests of the KEI kill vehicle plume-to-hard body capability (i.e., finding the aim point on the threat payload during its boost phase) in its long-range test plans.

Information Assurance

Information Assurance

Information Assurance (IA) and Interoperability (IOP) Evaluations

Summary

- DoD continues to improve the Information Assurance (IA) and Interoperability (IOP) postures of warfighter networks, but the threat to these networks continues to grow significantly.
- Operational assessments of IA/IOP during Combatant Command (COCOM) and Service exercises promote identification and resolution of problems that could impact warfighter mission accomplishment. These assessments have also contributed to improved methods and metrics for assessing IA/IOP during both exercises and acquisition OT&E.
- A full assessment cycle of Blue, Green, and Red teaming provides the most comprehensive assessments and the greatest opportunity to improve IA/IOP postures for assessed units.
- Many of the vulnerabilities and network weaknesses identified in these assessments are fundamental problems for which solutions are readily available. Some problems require more extensive enterprise solutions.
- Exercise authorities appreciate and desire more OT&E expertise during their exercise planning, execution, and assessment phases. There has been more senior-leadership emphasis on IA during most exercises this fiscal year resulting in improved IA performance, but more acceptance of aggressive Red Teaming is needed.
- Assessments and remediation efforts in support of units deploying to Iraq and Afghanistan were tailored by the Operational Test Agencies (OTAs) and conducted during three exercises this fiscal year. Four assessments with deploying units are planned for FY07.
- Coordination across DoD organizations that assess IA and IOP is leading to improved metrics and common standards for the assessment of IA and IOP readiness and investments.
- The IOP assessment methods, which have lagged the IA methods, are maturing. The remediation process for identified IOP problems remains less effective than the Enterprise Solutions Steering Group effort for IA.

Background

The FY03 Appropriations bill directed that the COCOMs and Services conduct operationally realistic IA and IOP evaluations during major exercises. The bill directed the Service OTAs, the Service Information Warfare Centers, and the National Security Agency (NSA) to assist in the planning, conduct, and evaluation of these exercises. DOT&E oversees these efforts and provides annual updates on DoD's progress based on results of the exercise evaluations and acquisition OT&E.

The bulk of the FY06 IA/IOP funds were distributed to the OTAs, who in turn assembled teams with the proper expertise to perform IA and IOP assessments before and during exercises. These teams plan, execute, collect data, analyze, and report the results of all activities associated with IA and IOP assessments. Primary execution elements include:

- Blue Teams -- Perform network scans and surveys of network personnel and policy.
- Green Teams -- Assist the exercise authority in understanding the nature, priority, and remedial activities needed for identified vulnerabilities. They also provide remediation support and training.
- Red Teams -- Design and execute a comprehensive Red Team scenario overlaid on an exercise scenario to examine the performance of blue networks and operators when subjected to information operations attacks.

FY06 Assessment Activities

The OTA teams that lead the IA/IOP assessments continued to build relationships with the COCOMs and other critical partner organizations, such as the Services' Information Warfare Centers (IWCs), the NSA, the Defense Intelligence Agency (DIA), the Defense Information Systems Agency (DISA), and the Joint Task Force – Global Network Operations (JTF-GNO). The OTA teams and their support elements were included in the Information Operations (IO) Cells that the COCOMs used to plan and conduct each exercise.

In order to expedite enterprise-wide solutions to enterprise-wide issues, the results of IA assessments are analyzed and identified trends are documented and briefed to the cognizant agencies, including the Joint Staff (JCSJ6X), the DoD Chief Information Officer (CIO)-Defense Information Assurance Program (DIAP), the National Security Agency Global Information Grid IA Portfolio Office, and specific Service CIOs and program offices, as required. Principal amongst the groups taking action on these issues is the DISA/DIAP/U.S. Strategic Command-sponsored Enterprise Solutions Steering Group (ESSG). This group is directly responsible for the rapid fielding of DoD Enterprise scanning and remediation tools, host-based security tools, network sensors, and other tools within the last year. Trends, as well as specific program issues, are briefed to the ESSG who then procures solutions. The IA/IOP assessment teams assess those solutions after fielding. In addition, under the leadership of the ESSG and the Joint Staff, a DoD-wide effort to standardize IA metrics and establish a common framework for network performance evaluation is underway with full participation from the IA assessment teams. Similar lines of feedback and communication are in development to address interoperability issues, although no central action group similar to the ESSG currently exists for IOP shortfalls.

Although a variety of methods for managing vulnerabilities and shortfalls exists within DoD, DOT&E has instituted the use of a Vulnerability and Shortfall Matrix (VSM). This matrix identifies the vulnerability or interoperability shortfall, proposes a remedy, and includes a statement of the operational impact if remedies are not applied. The matrix is updated following every Blue, Green, or Red Team assessment to reflect the current state of observed vulnerabilities and shortfalls. This tool is used to monitor correction of vulnerabilities and shortfalls, support trend analyses across theaters, and assist in the identification of issues to be reviewed or validated in subsequent events. Several COCOMs have chosen to employ this matrix as their own tracking tool.

During selected exercises, the Red Teams deployed special units to test the physical security of protected facilities, in addition to the network attacks that are routinely performed. These combined attacks along multiple axes provide a more realistic threat portrayal in which to assess the IA posture of the exercise unit. The following summarizes accomplishments by the assessment teams during FY06:

- Performed IA assessments during 11 COCOM, 1 Joint Staff, and 3 Service exercises (see Table 1)
- Performed full Blue, Green, and Red Team assessments for 11 exercises
- Performed three assessments for units preparing to deploy to Iraq and Afghanistan
- Developed a VSM for all IA assessments to consolidate vulnerabilities, identify remedies, and track resolution for the COCOMs; the OTAs disseminated the VSMs to COCOM and Service commanders and network personnel after completion of the IA assessments, providing a ready guide for establishing priorities and performing remediation
- Coordinated with U.S. Special Operations Command (SOCOM) and Central Command (CENTCOM) for IA assessment support during future SOCOM and CENTCOM exercises; with the addition of these exercise events, all COCOMs will be involved in the IA and IOP assessment program

The IA and IOP assessment effort made the following improvements to the planning, assessment, and reporting method during this fiscal year:

- Identified a master list of core IA preparedness metrics that are observable in the exercise environment and suitable for performing baseline assessments and trend analyses
- Identified operational metrics for exploration by assessment teams to enhance the characterization of IA posture with metrics more meaningful to warfighters
- Improved common methods and reduced differences among OTAs in terminology, processes, and depiction of assessment results

Table 1 - Information Assurance and Interoperability Exercise Events in FY06

Exercise Authority	Exercise	Lead OTA	Support OTA
Joint Staff	Bulwark Defender 06	JITC	ATEC, AFOTEC, MCOTEA, COTF
CENTCOM	*No exercises this FY*		
EUCOM	Flexible Response 06	ATEC	AFOTEC, MCOTEA
	Coalition Warrior Interoperability Demo	JITC	MCOTEA, COTF
JFCOM	Unified Endeavor 06-1*	JITC	ATEC, MCOTEA
	Unified Endeavor 06-2*	JITC	MCOTEA
PACOM	Terminal Fury 06	COTF	JITC, ATEC, AFOTEC, MCOTEA
	Reception, Staging, Onward-movement, and Integration 06	COTF	ATEC
SOUTHCOM	Blue Advance 06	ATEC	None
	Fuertas Defensas 06 Joint Task Force Guantanamo 06	ATEC	None
SOCOM	*No exercises this FY*		
TRANSCOM	Turbo Distribution 06	JITC	AFOTEC, MCOTEA
STRATCOM	Global Lightning/Global Shield 06	JITC	AFOTEC, MCOTEA, COTF
NORTHCOM	Ardent Sentry 06	AFOTEC	None
Services	I Marine Expeditionary Force Exercise 06*	MCOTEA	None
	Joint Task Force Exercise 06-2	COTF	None
	Cobra Gold 06	ATEC	None

*Pre-deployment assessment events in FY06.

CENTCOM – Central Command
EUCOM – European Command
JFCOM – Joint Forces Command
NORTHCOM – Northern Command
PACOM – Pacific Command
SOUTHCOM – Southern Command
SOCOM – Special Operations Command
STRATCOM – Strategic Command
TRANSCOM – Transportation Command
ATEC – Army Test and Evaluation Command
AFOTEC – Air Force Operational Test and Evaluation Center
COTF – Commander, Operational Test and Evaluation Force
JITC – Joint Interoperability Test Command
MCOTEA – Marine Corps Operational Test and Evaluation Activity

DOT&E increased the focus on IA as an evaluation issue for systems on the OT&E oversight list. DOT&E identified a dozen acquisition programs in FY06 that required an expanded review of the adequacy of IA evaluation planning to confirm appropriate IA OT&E metrics were in use. This effort included review of Test and Evaluation Master Plans, test plans, and Defense Information Technology Security Certification and Accreditation Process documentation. The OTAs are performing similar efforts on selected acquisition programs. Efforts to heighten IA awareness in acquisition program planning will continue in FY07.

The DOT&E policy for IA evaluations implemented in 1999 remains in effect. An update is in final coordination. The update incorporates new metrics and lessons learned from this initiative that are appropriate for acquisition OT&E, while maintaining compatibility with DoD policies for IA and IOP.

Assessment

Although DoD has made progress in improving IA/IOP for warfighter networks, assessment teams continue to find shortfalls relating to personnel and training, configuration management, network Continuity of Operation (COOP) and recovery, firewalls and intrusion detection systems, and physical security. Trends across FY06 events include the following:

- Vulnerabilities have been found by every Blue and Red Team
- Most problems found are basic (e.g., unprotected servers and open ports, Intrusion Detection Systems not installed or improperly configured, etc.) and easily remedied by trained system administrators
- Improved emphasis on IA existed within all commands; some local practices and innovations have taken place which have resulted, through the process of assessment feedback, in overall improvements to policies and configurations within the entire DoD community
- Network COOP plans need to be improved; network COOP plans should be stressed to exercise "react" and "restore" processes and provide insights into the potential operational impacts of cyber attacks on mission accomplishment
- Additional effort and resources are needed to remedy COCOM IA/IOP deficiencies and to establish an enterprise interoperability solutions program

Specific trends in more detailed assessment areas include the following:

- **Personnel and Training.** No standard manning policies exist that account for network complexity, operational requirements, and joint integrated operations, often resulting in reliance upon un-trained or un-designated personnel. DoD IA training standards have been revised to improve the quality of training available and take advantage of commercial certification standards known to be effective. Joint and organizational training has improved through the introduction of more in-depth joint training events.
- **Configuration Management and Interoperability.** Most networks are equipped with basic security controls, but standards remain complex and difficult to implement, resulting in inconsistent execution. New technologies continue to complicate enforcement of configuration standards. Wide use of collaborative tools, as well as rapid integration of applications, frequently leads to new operational capabilities that have not been tested or certified. DoD has invested in improved network sensors, scanning and remediation tools, and configuration management tools.
- **Physical Security.** Exercise opposition forces continue to penetrate existing physical perimeter safeguards, either due to inadequacy or lack of compliance with procedures. Valuable information remains vulnerable to exploitation of security practices, printed material handling, and general physical protection of network components, often leading to network compromise. Incorporation of assessment findings into Operational Security (OPSEC) planning is being addressed by DoD.
- **Policy Compliance.** Most commands do not possess complete documentation and policies for installed networks. Few commands have COOP and Recovery Plans or have not exercised them. Many classified networks, already protected by cryptographic barriers, lack basic network security tools. Continued challenges with Information Assurance Vulnerability Advisory compliance and expanded use of internal trusted networking increase the risk of compromise, while reducing the likelihood of intruder detection. Improved configuration management tools within DoD will partially address this issue, as will the ongoing development of Network COOP and recovery standards.

FY07 Goals and Planned Assessment Activities

The response from COCOM and Service exercise authorities continues to be very positive. Assessment plans for FY07 include 15 exercises with active Blue, Green, and Red Teams (full assessment support) and 6 additional exercises with lesser efforts (see Table 2). Fourteen of these exercises will include an interoperability assessment. Assessment and remediation support to units preparing to deploy to Iraq and Afghanistan will continue as a priority effort, and four of these assessment events are planned for FY07 (these events are designated with an asterisk in Table 2). Assessment resources will be stretched to the limit in FY07 and mission growth has been curtailed in order to execute the above assessments to an appropriate standard.

The following are specific areas of emphasis for FY07:

- Inclusion of IA as a training objective with the full range of threat-representative Red Team actions during COCOM and Service exercises
- Additional training on mission-oriented operational concepts of operations, processes, and information flows for IA and IOP assessment planners; data collectors and observers; and analysts
- Systematic and mission-oriented IOP assessments during at least one exercise in each COCOM
- Evaluation of network COOP preparation, testing, and effectiveness to determine the capability to recover mission critical network systems, data, and support services

Acquisition program support will continue to expand during FY07 and DOT&E plans to begin integrating IA and IOP problems identified during acquisition OT&E into the IA/IOP VSM. This information will assist in preparing for and executing assessments by knowing where problems may be expected and where new software or procedures may be introduced to remedy those problems. In coordination with the Joint Staff, DOT&E intends to track the delivery and adequacy of solutions promised by program managers at milestone decisions when capabilities are fielded with known deficiencies. Although this mission is traditionally performed via dedicated follow-on operational test and evaluation for major programs, many software upgrades are introduced into the operational forces without an operational test to confirm desired capabilities have indeed been delivered. DOT&E believes that COCOM and Service exercises can provide a venue where training and follow-on test objectives can be simultaneously satisfied, with ensuing cost savings to the DoD.

Table 2 – Planned Information Assurance and Interoperability Exercise Events for FY07

Exercise Authority	Exercise	Lead OTA	Support OTA
Joint Staff	Bulwark Defender 07	JITC	ATEC, AFOTEC, MCOTEA
CENTCOM	Bright Star 08 Planning	ATEC	None
JFCOM	Unified Endeavor 07-1*	JITC	ATEC, MCOTEA
	Unified Endeavor 07-2*	JITC	ATEC, MCOTEA
	Unified Endeavor 07-3*	JITC	ATEC
EUCOM	Sharp Focus 07	ATEC	None
	Flexible Leader 07	ATEC	None
	Coalition Warrior Interoperability Demo 07	JITC	MCOTEA, COTF
Service	Joint Task Force Exercise 07	COTF	None
	II Marine Expeditionary Force Exercise*	MCOTEA	None
	Federation of Systems 07	MCOTEA	None
NORTHCOM	Vigilant Shield 07	AFOTEC	JITC, MCOTEA
	Ardent Sentry/Northern Edge 07	AFOTEC	JITC, MCOTEA
PACOM	Terminal Fury 07	COTF	JITC, ATEC, AFOTEC, MCOTEA
	Reception, Staging, Onward-movement, and Integration 07	COTF	ATEC, MCOTEA, JITC
	Talisman Saber 07	COTF	MCOTEA
SOUTHCOM	Blue Advance 07	ATEC	None
	Fuertas Defensas 07	ATEC	None
SOCOM	Able Warrior 07-1	MCOTEA	None
STRATCOM	Global Lightning 07	JITC	MCOTEA
TRANSCOM	Turbo Challenge 07	JITC	MCOTEA

*Pre-deployment assessment events planned for FY07

Recommendations

- Status of Previous Recommendations. The DoD has taken action on DOT&E's FY05 recommendations. However, more action is needed to create representative threat environments in which full operational assessments of IA can be performed. Although IA was included in the scenarios and storylines of every COCOM exercise assessed under the IA/IOP initiative this year, ground rules governing Red Teams actions usually confine the teams to actions that would not "harm" the network or disrupt the training exercise. Consequently, the training audiences lack exposure to a fuller range of threat-representative Red Team actions and they are not presented with situations to compel them to detect intrusions and restore disrupted networks, services, or corrupted files.
- FY06 Recommendations.
  1. The Joint Staff request that COCOM and Service exercise authorities:
     - Permit more aggressive Red Team attacks representative of projected information-operations activities from adversaries
     - Permit Red Teams to conduct threat representative activities in close coordination with the exercise opposition force
     - Have mature network COOP plans and be prepared to execute them

2. The importance of live-system functionality and corresponding staff activity at selected exercise events should be emphasized by the COCOM leadership and/or the exercise authority. IA and IOP training and assessments require a realistic environment.

3. The Joint Staff should institutionalize a process so that IOP assessment findings are addressed by the appropriate system/process owners and valid workarounds for known IOP problems are promulgated to effect enterprise solutions.

Joint Test & Evaluation

Joint Test & Evaluation

Joint Test and Evaluation Program

The Joint Test and Evaluation (JT&E) program is designed to provide quantitative information for analysis of existing joint military capabilities and potential options for increasing military effectiveness. The program is complimentary to, but not part of, the weapons acquisition process.

The JT&E program provides products to enhance the military effectiveness of fielded systems. JT&E products include joint or multi-Service tactics, techniques, and procedures (TTP); joint Service training programs; operational and technical testing methods; test and training range procedures; and joint and multi-Service data archives and analysis tools.

The JT&E program instituted a Quick Reaction Test (QRT) capability. A QRT responds to emergent warfighter needs and issues identified by a Combatant Commander (COCOM), Service, or National Agency sponsor. A QRT has a short duration without giving up the rigors of test and evaluation. A QRT is lead by a designated Operational Test Agency. The five active QRTs during FY06 were:

- Joint Shipboard Ammunition and Ammunition Boards (JSAABR)
- Joint Interoperability for Maritime Interdiction (JIMI)
- Joint Counter Remote-Control Improvised Explosive Devise (IED) Warfare (JCREW)
- Joint Contingency Operations Base Force Protection (JCOB)
- Joint Theater Ballistic Missile Early Warning (JTBMEW)

The JT&E program sponsors traditional JT&E projects, which address requirements of Joint Vision 2020 and/or focus on meeting the emergent needs of today's warfighter engaged in the Long War on Terror. The eight active Joint Tests are:

- Joint Space Control Operations - Negation (JSCO-N)
- Joint Fires Coordination Measures (JFCM)
- Joint Command and Control for War on Terror Activities (JC2WTA)
- Joint Mobile Network Operations (JMNO)
- Joint Test and Evaluation Methodology (JTEM)
- Joint Integrated (Interagency and International) Command and Control for Maritime Homeland Defense (JICM)
- Joint Airspace Command and Control (JACC)
- Joint Command and Control of Net Enabled Weapons (JC2NEW)

Five JT&E projects completed this year:

- Joint Logistics Planning Enhancements (JLOG/PE)
- Joint Datalink Information Combat Execution (JDICE)
- Joint Integration and Interoperability of Special Operations (JIISO)
- Joint Low Altitude Aircraft Survivability (JLAAS)
- Joint Forward Operating Base Force Protection (JFOB)

QUICK REACTION TESTS

JOINT SHIPBOARD AMMUNITION AND AMMUNITION BOARDS (JSAABR)

Test Description

JSAABR is sponsored by U.S. Special Operations Command (USSOCOM) and will complete testing in March 2007. This project will evaluate and make recommendations on how the Services and USSOCOM can safely use non-Naval ordnance when operating from Navy ships. Operations from ships present a unique ordnance challenge because of the concentration of electronic emitters that generate electromagnetic signals. JSAABR intends to provide recommendations to improve shipboard safety procedures when using non-Naval ordnance, as well as recommendations on how Services can make their weapon systems more compatible with the shipboard environment. JSAABR will also determine how the newly formed Joint Weapons Safety Technical Advisory Panel may facilitate certification of non-Navy ordnance for shipboard use. Commander, Operational Test and Evaluation Force (COMOPTEVFOR) leads this effort.

Test Activity

Mini-Test One (MT-1, February - April 2006) developed and tested a process to catalog USSOCOM ordnance into the Navy system. Mini-Test Two (MT-2, May - November 2006) validated a process for joint approval of a non-Naval weapons system and identified synergies that may be realized with the Joint Weapons Safety Technical Advisory Panel or other joint safety weapons board initiatives.

Benefits to the Warfighter

JSAABR's interim products include inputs for Navy Ordnance Pamphlet 4, published by the Naval Ordnance Safety and Security Activity organization, and Joint Publication 3-04, Shipboard Helicopter Operations, a joint staff level publication; developing a Joint Ammunition Cataloging Request system in collaboration with the Naval Operations Logistics Support Center-Ammunition organization, which streamlines the process

for bringing non-Navy ordnance onto Navy ships; working with the Weapon System Explosives Safety Review Board to formalize the reoccurring use of Special Operations Air Regiment aircraft and weapon systems on Navy ships. JSAABR continues to work on joint TTP that are needed to safely transport and store non-Navy munitions on Navy ships.

JOINT INTEROPERABILITY FOR MARITIME INTERDICTION (JIMI)

Test Description
JIMI is sponsored by U.S. Pacific Command (USPACOM) and ends in December 2006. The test will investigate, evaluate, and recommend solutions to Link-16 (a tactical datalink) interoperability shortfalls that are critical to successful execution of maritime interdiction. COMOPTEVFOR leads this effort.

Test Activity
JIMI's primary data collection event was during Exercise Valiant Shield 2006. JIMI developed TTP for E-2C, F/A-18, F-15E, and F-16CJ aircraft. The final JIMI test event was conducted in September 2006 and validated TTP refinements resulting from data assessment following the Valiant Shield Exercise.

Benefits to the Warfighter
JIMI provides a joint concept of operations and messaging standard to provide Link-16 information across joint tactical users to display and monitor seagoing surface vessels. JIMI evaluates joint technical and operational concepts and recommends improvements.

JOINT COUNTER REMOTE-CONTROL IMPROVISED EXPLOSIVE DEVICE ELECTRONIC WARFARE (JCREW)

Test Description
JCREW is sponsored by the Army and will consolidate Counter Remote-Control Improvised Explosive Device (IED) Electronic Warfare (CREW) employment training and training material for CREW jammers. A consolidated training manual (including an online version) will be provided to deploying units to ensure they receive standard instructions for CREW jammer use. The Army Test and Evaluation Command (ATEC) leads this effort.

Test Activity
JCREW is developing a CREW training handbook for publication by December 2006. A decision will be made by fall 2006 if active field testing of the procedures is required.

Benefits to the Warfighter
Standardized training information regarding IED employment will increase warfighter combat capability and will improve CREW performance, potentially resulting in fewer lives lost to IEDs, the primary cause of fatalities in Operation Iraqi Freedom (OIF).

JOINT CONTINGENCY OPERATIONS BASE (JCOB)

Test Description
JCOB (initiated in August 2006) is sponsored by the Army to develop joint TTP for U.S. military contingency camps for security, stability, transition, and reconstruction (SSTR) operations. JCOB will develop guidance on site selection, perimeter security, standoff, dispersion, compartmentalization, sidewall protection, and overhead cover. It will also recommend defensive measures against the threat of IEDs, rockets, artillery, and mortars. This TTP will enhance security, streamline camp set-up, and allow military units to focus on the mission. JCOB will observe and conduct research at counter rocket, artillery, and mortar exercises in August to October 2007. ATEC leads this effort.

JOINT THEATER BALLISTIC MISSILE EARLY WARNING (JTBMEW)

Test Description
JTBMEW (initiated in August 2006) is sponsored by the Army. It is intended to develop joint TTP that provide precise theater ballistic missile early warning to Combined Forces Command (CFC). This test will examine the Korea Theater of Operations theater ballistic missile early warning architecture to determine weaknesses, shortfalls, stovepipes, and single-points-of-failure involving all platforms and current methods of information collection, processing, reporting, and dissemination. JTBMEW team members are attending planning meetings for an integration exercise that they will use for data collection, projected to be held in March 2007. ATEC leads this effort.

ACTIVE JOINT TEST AND EVALUATION PROJECTS

JOINT SPACE CONTROL OPERATIONS - NEGATION (JSCO-N)

Test Description
The Air Force sponsored JSCO-N (initiated in February 2004) to evaluate improvements to command and control processes and joint TTP associated with the space control negation (SC-N) mission. Its primary focus is on integrating the SC-N functions into the joint targeting cycle at the COCOM level.

Test Activity

During FY06, JSCO-N conducted Field Test Two (FT-2) in conjunction with USPACOM exercise Terminal Fury 2006 (TF06). FT-2 examined and recommended improved processes that included joint TTP, command and control processes, intelligence community support, and other critical elements of SC-N operations. In September 2006, JSCO-N conducted Field Test Three (FT-3) in conjunction with U.S. European Command's (USEUCOM) Austere Challenge 2006 (AC06). FT-3 evaluated recommended changes in procedures in a very different environment (physical venue and operational scenario) from Terminal Fury. This test enabled JSCO-N to evaluate the global applicability of its recommended procedures and advance the standardization of processes across multiple COCOMs. JSCO-N is scheduled to complete testing on March 31, 2007.

Benefits to the Warfighter

JSCO-N produced the following test products for the warfighter:

- Recommended changes that were incorporated into Contingency Plan 8035-06, Space Control Operations that provides guidance to the space control operational elements reporting to the U.S. Strategic Command (USSTRATCOM). Additional recommendations have been provided to improve Joint Publication 3-14, Space Operations, Strategic Directives (SD 504-3)
- Provided an exercise planning guide to enhance realistic training of this mission area and improve integration with other capabilities. This guidance will be finalized and published as a handbook upon completion of USEUCOM's AC06
- Provided Information Operations Joint Munitions Effectiveness Manual Working Group command and control processes, TTPs, and proof of concept software models to evaluate target - weapon pairings, which improved the integration of Information Operations into the joint force commanders' targeting cycle
- Assisted U.S. Joint Forces Command (USJFCOM) and USSTRATCOM in conducting a series of workshops on collaborative command and control processes involving Information Operations
- Provided feedback and organized a series of workshops to better organize and enhance intelligence support to the SC-N mission area
- Improved individual training by providing curriculum inputs to Air Force National Security Space Institute and Army Functional Area-40 courses

JOINT FIRES COORDINATION MEASURES (JFCM)

Test Description

The Air Force sponsored JFCM (initiated in February 2005) to investigate, evaluate, and recommend improvements to the effectiveness of joint fires areas (JFAs) by providing TTP. JFCM's two principal test issues are to determine:

- The extent to which JFCM-developed TTP enable a joint force commander (JFC) to plan and establish a JFA
- The adequacy of the current or near-term command, control, communications, and computer (C4) systems to enable the JFC to plan and establish a JFA

Test Activity

During FY06, JFCM conducted a risk-reduction event, executed two mini-tests, and began detailed test planning for the final field test. JFCM is scheduled to complete testing on March 31, 2008.

Benefits to the Warfighter

The JFCM will develop and provide new TTPs that standardize JFAs as an effective and efficient fire support coordinating measure using existing C4 systems to more fully integrate fires with maneuver, thus reducing the risk of fratricide. As interim products, JFCM participated in working groups to update the Air Land Sea Application Center's Kill Box Employment multi-Service TTP and provided inputs to USJFCOM to update Joint Publication 3-09, Joint Fire Support.

JOINT COMMAND AND CONTROL FOR WAR ON TERROR ACTIVITIES (JC2WTA)

Test Description

The Navy sponsored JC2WTA (initiated in February 2006) to develop, test, and evaluate joint TTP that enable a joint task force (JTF) commander to conduct distributed command and control of joint forces. This will allow a JTF commander, from a small clandestine forward-based command center and using a reachback capability to a rear command and to intelligence centers, to rapidly plan and execute Long War on Terror missions. The two principal test issues are:

- To what extent do TTP enable the JTF commander to command and control assigned forces from a clandestine forward location?
- To what extent do TTP enable intelligence in support of operations for Long War on Terror missions assigned to a JTF commander operating from a clandestine forward location?

Test Activity

During FY06, JC2WTA established their test team and initiated test development and planning for Mini-Test One (MT-1) scheduled for December 2006 at the Naval War College (NWC). MT-1 will use war-gaming techniques to test mission execution utilizing initial TTP for timeliness, accuracy, and completeness. Mini-Test Two (MT-2) will test mission execution using revised TTP and additional aspects of distributed Command, Control, and Intelligence (C2I) in a more challenging joint exercise environment. MT-2 will be conducted during exercise Talisman Saber 2007 in June 2007. The Field Test is the final JC2WTA test event. It will test all aspects of the joint TTP, including command and control of forces. The Field Test is scheduled for March 2008 aboard a guided missile nuclear submarine (SSGN) operating with an embarked JTF and Special Operations Forces (SOF). JC2WTA is scheduled to complete on December 31, 2008.

Benefits to the Warfighter

JC2WTA will develop, test, and evaluate new joint TTP that can support a JTF commander in conducting distributed command and control clandestinely from a small, forward deployed platform, in a limited communications bandwidth environment.

JOINT MOBILE NETWORK OPERATIONS (JMNO)

Test Description

The Marine Corps sponsored JMNO (initiated in February 2006) to identify, test, validate, and recommend network operations (NETOPS) procedures that enhance interoperability of mobile networks employed in joint, interagency, and coalition operations.

JMNO will develop joint TTP to establish network interoperability and improve joint forces' ability to access information and network services when crossing from one network to another network. The two test issues are:

- What is the level of network interoperability achieved between different Services at the tactical level?
- To what extent do JMNO-developed mobile NETOPS joint TTP enable a tactical user to access information resources and network services via a different Service's (host) network?

Test Activity

JMNO is currently researching the concepts for mobile NETOPS employed by the four Services, as well as industry and academia (for example, Massachusetts Institute of Technology and Naval Post Graduate School). It will then develop initial, mobile NETOPS joint TTP to address the test issues.

Benefits to the Warfighter

JMNO will provide validated, standardized, mobile NETOPS joint TTP that will:

- Integrate tactical and Service component networks
- Improve mobile network access and maintain current performance by identifying and developing joint TTP
- Enhance user connectivity to the user's information resources while maneuvering through the battlespace
- Enable interoperability and information assurance between different Services' networks
- Provide input to future concepts employing mobile NETOPS on the asymmetric battlefield
- Maintain quality of service across network boundaries

JOINT TEST AND EVALUATION METHODOLOGY (JTEM)

Test Description

The DOT&E sponsored JTEM (initiated in February 2006) to develop processes and test methods for testing in a joint environment. Specifically, JTEM will develop and evaluate methods and processes for defining and using a distributed live, virtual, constructive (LVC) joint test environment to evaluate system performance and joint mission effectiveness. The three principal test issues are:

- How effective are the proposed methods and processes for designing and executing tests of a system of systems in the joint mission environment?
- How suitable are the proposed methods and processes for designing and executing tests of system of systems in the joint mission environment?
- How effective are the proposed methods and processes for assessing performance as it pertains to capabilities supporting joint missions?

Test Activity

JTEM has selected 11 processes for product development. These processes are focused on determining the joint mission environment requirements for a particular test event and the subsequent joint mission effectiveness evaluation. The project uses process development teams composed of individuals from the requirements definition, acquisition, and test communities along with a series of tabletop exercises to develop the 11 processes. The tabletop exercises involve client programs (representative users) conceptually walking through the different processes at approximately one month intervals during FY06. JTEM is scheduled to complete testing on June 30, 2009.

Benefits to the Warfighter

JTEM intends to propose processes and test methodologies that can institutionalize testing in a joint mission environment. The project will demonstrate the viability of test and evaluation methods and processes in realistic joint mission environments as part of the overarching acquisition process. JTEM products will include methods and processes templates, handbooks for the testing and acquisition communities, recommended changes to the acquisition instructions, and directives that would facilitate testing in a joint environment.

JOINT INTEGRATED COMMAND AND CONTROL FOR MARITIME HOMELAND DEFENSE (JICM)

Test Description

The U.S. Northern Command (USNORTHCOM) sponsored JICM (initiated in March 2006) to test and evaluate Maritime Homeland Defense (MHD) command and control processes used to carry out USNORTHCOM roles and responsibilities in Maritime Awareness and Threat Response (MATR). The scope is focused on maritime command and control TTP, both DoD and non-DoD, from the strategic to the operational level.

Test Activity

The team executed its observation plan during Ardent Sentry 2006 (May 2006) and conducted a risk-reduction event during Frontier Sentinel 2006-2 (June 2006). The team participated in multiple planning conferences for Field Test One, Vigilant Shield 2007 and Field Test Two, Ardent Sentry/Northern Edge 2007. JICM is scheduled to complete testing on June 30, 2008.

Benefits to the Warfighter
JICM test products will include recommendations to improve DoD and intergovernmental command and control interoperability, maritime concept of operations, and joint TTP. It will also provide inputs into the Joint Capabilities Integration and Development System (JCIDS) to enhance MATR.

THE JOINT COMMAND AND CONTROL OF NET-ENABLED WEAPONS (JC2NEW)

Test Description
The Air Force sponsored JC2NEW (initiated in August 2006) to address the operational concepts, processes, and procedures for employment of net-enabled weapons in the net-centric battlespace. Specifically, JC2NEW will enhance Joint Force operational concepts, command and control, and TTP for employment of net-enabled weapon capabilities against time sensitive, stationary, and moving targets.

Test Activity
The test team was formed at Eglin Air Force Base, Florida, and is now working on a program test plan and draft concept of operations and joint TTP. The first test of the draft TTP is tentatively scheduled for fall 2007.

Benefits to the Warfighter
JC2NEW intends to define and incorporate operational concepts and command and control processes to enable the joint force commander and supporting forces to effectively integrate and employ net-enabled weapons as a force multiplier. JC2NEW will provide interim test products to the COCOMs and the Joint National Training Capability to allow their incorporation into exercise venues to facilitate net-enabled weapons joint doctrine changes and training that should have immediate and positive impact on the warfighters' combat capabilities.

JOINT AIRSPACE COMMAND AND CONTROL (JACC)

Test Description
The Army sponsored JACC (initiated in August 2006) to provide solutions for airspace deconfliction for immediate missions supporting forward operating bases (FOB) and maneuver elements in response to trigger events.

Test Activity
The test team was established at Fort Bliss, Texas, in September 2006. JACC will conduct Field Test One in FY08 to set the baseline, and Field Test Two in FY09 to evaluate the enhanced processes. Key nodes of the Tactical Air Ground System will be evaluated within a joint task force exercise or equivalent scenario.

Benefits to the Warfighter
The primary goal of JACC is to deliver airspace command and control process enhancements to the warfighter. To achieve this, JACC will pursue the following objectives:
- Identify problems and concerns with the joint airspace command and control process for immediate missions generated in support of FOBs and maneuver elements
- Provide recommendations and products to the warfighter that support an enhanced airspace command and control process for missions generated in support of FOBs and maneuver elements

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JOINT TEST AND EVALUATION PROJECTS COMPLETED IN FISCAL YEAR 2006

JOINT LOGISTICS PLANNING ENHANCEMENTS (JLOG/PE)

Test Description
The Army sponsored JLOG/PE (initiated in October 2002) to improve joint operational capabilities through enhancements in logistics sustainment information and processes. JLOG/PE coordinated with COCOMs and their logistics staffs to develop and test a variety of methods to enhance joint logistics. JLOG/PE closed on March 31, 2006.

Benefits to the Warfighter
JLOG/PE improved integrated logistics sustainment planning and management system performance through:
- The Rolling Brief - a web-based briefing that continually scrolls across a projection screen in the logistics operations center providing real-time situational awareness of selected types of supply
- The Joint Logistics Training Package (Munitions) - a self-paced educational package, focused on Joint Force J4 staff officers responsible for managing joint theater-level logistics operations
- Modifications to the National Level Ammunition Capability - to create joint munitions decision support tools and methods for using real-world reporting systems in a combat environment

These test products were successfully implemented in the USPACOM, U.S. Central Command, USEUCOM, USJFCOM, and U.S. Forces Korea.

JOINT DATALINK INFORMATION COMBAT EXECUTION (JDICE)

Test Description
The Air Force sponsored JDICE (initiated in April 2003) to test and evaluate joint TTP and associated Link-16 network architecture modifications to provide actionable data to all types of tactical shooters. The joint TTP is designed to improve

tactical-level offensive and defensive deconfliction and targeting information to shooter platforms by employing 'man-in-the-loop' to place actionable data onto the Link-16 network. JDICE closed on October 1, 2006.

Benefits to the Warfighter

JDICE improved the warfighters' capability to provide actionable targeting and blue force tracking data to warfighters using Link-16. JDICE also:

- Identified significant flight software anomalies in several airborne platforms that applicable System Program Offices are correcting
- Produced and trained joint TTPs that are already playing an important role in operations of deployed forces
- Supported the USJFCOM role in transformation of doctrine to allow forces to make rapid, decentralized decisions based upon near real-time information
- Developed architecture integrating the Army's National Training Center at Fort Irwin, California, and ranges at Nellis Air Force Base, Nevada, helping to create a joint training/testing venue
- Pioneered the incorporation of a PATRIOT battery's capabilities with Link-16 connectivity into the joint tactical database for reducing the chance of fratricide between Air Force and Army units
- Introduced Combat Search and Rescue techniques to utilize Link-16 data to locate and recover downed airmen

The value of JDICE is evidenced by its transition from a JT&E project to a permanent Air Force organization, Joint Digital Integration for Combat Engagement, on October 1, 2006.

JOINT INTEGRATION AND INTEROPERABILITY OF SPECIAL OPERATIONS (JIISO)

Test Description

USSOCOM sponsored JIISO (initiated in February 2004) to improve and streamline a joint force commander's integration and interoperability (I&I) of conventional forces and SOF during planning and execution of maneuver and fire support operations. JIISO closed on November 30, 2006.

Benefits to the Warfighter

JIISO test products reduce the potential of fratricide and enhance situational awareness between SOF and conventional forces. JIISO introduced the Effects Management Tool, which allows the SOF and conventional forces to integrate indirect fires between the Advanced Field Artillery Tactical Data System (conventional forces) and the Command and Control Personal Computer (SOF). The I&I Handbook and the I&I Checklist were instrumental in guiding the development of the Headquarters, USJFCOM Joint Training Article entitled Support Conventional and Special Operations Forces Integration and Interoperability, and in updating six other Joint Training Articles. They were used by the Navy Warfare Development Command to update their Joint Force Maritime Component Commander Tactical Memorandums. Additionally, JIISO produced three handbooks that are in various stages of publication. These include:

- Conventional Forces and Special Operations Forces Integration and Interoperability Handbook
- Tactical Situation Awareness Systems Guide
- Procedures for Deconfliction of Tomahawk Land Attack Missile with Conventional Forces and SOF Aircraft

QUICK REACTION TESTS COMPLETED IN FISCAL YEAR 2006

JOINT LOW ALTITUDE AIRCRAFT SURVIVABILITY (JLAAS)

Test Description

The Air Force sponsored JLAAS (initiated in September 2004) to assess the effectiveness of selected arrival and departure TTP for one fixed-wing and one rotary-wing aircraft against the SA-16 Man-Portable Air-Defense Systems. In addition, JLAAS developed and documented a process to quantify joint TTP effectiveness. It was lead by the Air Force Test and Evaluation Center. JLAAS closed in December 2005.

Benefits to the Warfighter

The primary product from JLAAS is the quantified assessment of the selected pre-launch TTP identified by the first Joint Warfighter Advisory Group. Additionally, JLAAS produced databases that validated missile fly-out models used during evaluation of select TTP. These databases and TTP evaluation processes are potentially useful to joint tactics developers in COCOMs, component commands, and at the Air Land Sea Application Center. U.S. Central Command is responsible for appropriate implementation of the test products.

JOINT FORWARD OPERATIONS BASE FORCE PROTECTION (JFOB)

Test Description

The Army sponsored JFOB (initiated in February 2005) to develop and publish a Force Protection Handbook for current operations in Iraq. Test data was collected from the Army's Base Camp Survivability Program; the passive defense tests in the Counter Rockets, Artillery, and Mortars program; and other DoD sources, including best practices in the theater of operations. The test data focused on mitigation efforts on selection of a defensible site; perimeter security; access control; full-height sidewall protection, overhead cover, compartmentalization of high-occupancy facilities; and dispersion to reduce effectiveness of attacks. JFOB closed in November 2005.

Benefits to the Warfighter

JFOB delivered a handbook of TTP for defense against rockets, artillery, mortars, and vehicle-borne IEDs in Iraq, and recommended changes to joint publications for JFOB defense.

Live Fire Test & Evaluation

Live Fire Test & Evaluation

Live Fire Test and Evaluation Program

EXECUTIVE SUMMARY

U.S. Code Title 10, Section 2366, requires realistic survivability testing of major conventional air, land, and sea platforms and realistic lethality testing of major munitions and missile systems. Title 10, Section 139, states that the Director, Operational Test and Evaluation (DOT&E) shall monitor and review the Live Fire testing activities of the Department of Defense provided for in Section 2366. Section 139 requires the Director to prepare an annual report summarizing the operational test and evaluation activities (including Live Fire testing activities) of the Department of Defense during the preceding fiscal year. This section of the DOT&E Annual Report to Congress satisfies that requirement.

LFT&E survivability assessments emphasize personnel injury with the goal of providing sufficient data and analysis to affect system design and or tactics, techniques, and procedures to prevent or minimize injuries. LFT&E encompasses testing and evaluation throughout the acquisition cycle of a system, typically leveraging contractor, developmental, and operational testing. Early identification of ballistic vulnerability deficiencies allows time to affect design trades and make changes before systems reach their final configuration. If it is impractical and unreasonably expensive to conduct tests against a fully operational system, a waiver provision exists within Section 2366 allowing for DOT&E to approve an alternative approach for completing LFT&E. Strategies for completing LFT&E without full-up system-level testing rely more heavily on early component and subsystem-level testing, as well as significant leveraging with validated and accredited modeling and simulation.

In addition to satisfying acquisition program oversight requirements (Section 2366 of Title 10), the LFT&E program funds and exercises technical oversight of investment programs for developing joint munitions effectiveness data; development of advanced technologies and analytical methods to increase aircraft survivability; vulnerability test and evaluation of fielded air, land, and sea platforms; and munitions lethality testing. Specifically, LFT&E investment programs enabled DOT&E to respond to these warfighter needs in FY06:

- **Joint Technical Coordinating Group for Munitions Effectiveness (JTCG/ME).** This group publishes weapon effectiveness manuals that enable the warfighter's weaponeering process. The JTCG/ME is also instrumental to the development of improved and validated collateral damage estimation tools urgently requested by mission planners in Operations Enduring Freedom (OEF) and Iraqi Freedom (OIF). DOT&E oversight of the JTCG/ME and its connection to acquisition programs ensures that weapons effectiveness data are available to warfighters when the Services field new weapons.
  - In support of increasing combined and coalition operations in OEF and OIF, the JTCG/ME published a revised Joint Munitions Effectiveness Manual that integrates air-to-surface with surface-to-surface weapons effectiveness data. The manual also incorporates updated and improved weaponeering tools to provide a single product for warfighter use.
- **Joint Aircraft Survivability Program (JASP).** The JASP serves as the Department's focal point for aircraft survivability, establishing survivability as a design discipline, and furthering the advancement of aircraft survivability by investing in development and implementation of new technologies.
  - The Joint Combat Assessment Team (JCAT) of the JASP continued its deployment to OIF in direct support of the 2nd and 3rd Marine Air Wings, expanding its support role to the Army's Aircraft Shoot-Down Assessment Team and to the Combined Explosive Exploitation Cells. JCAT uses data gathered from combat, threat exploitation, and Live Fire testing to provide combat commanders information to influence mission planning and tactics.
- **Joint Live Fire (JLF).** The Office of the Secretary of Defense (OSD) established the JLF program in 1984. JLF is a formal program to test and evaluate fielded U.S. systems against realistic threats. The program places emphasis on addressing urgent needs of deployed forces, testing against emerging threats, and assisting acquisition programs by testing legacy systems and identifying areas for improvement. DOT&E funds, establishes goals and priorities, and oversees the efforts of the JLF program.
  - During FY06, JLF continued its support to the Joint Improvised Explosive Device (IED) Defeat Organization and to deployed forces through extensive characterization of improvised explosive munitions. JLF leveraged intelligence information to conduct testing in a manner representative of threat conditions experienced by deployed coalition forces. Characterization of threat weapons is a fundamental step in designing countermeasures to defeat them.

In addition to the above-mentioned efforts, each of these investment programs has elements that contribute directly to warfighters engaged in OEF and OIF. Examples of such direct support include:

- Updated collateral damage estimation tools with sufficient accuracy to allow local theater commanders to approve strike missions

- In-theater aircraft battle damage assessment training of maintenance personnel
- Characterization of fragmentation and blast effects of emerging threat weapons such as foreign unguided rockets and buried, multiple-IED clusters

The JTCG/ME, JASP, and JLF programs described above are formal programs funded by DOT&E. In addition to these programs and its statutory oversight responsibilities, DOT&E participates in several focused initiatives that directly support warfighters deployed to OEF/OIF. These efforts are described in the Quick Reaction section below.

In FY06, DOT&E executed oversight of 106 LFT&E survivability and/or lethality acquisition programs. LFT&E published the MH-60R Multi-Mission Helicopter Beyond Low-Rate Initial Production Report. DOT&E also supported quick-reaction efforts in FY06, including Congressional inquiries, and managed several survivability and lethality technology investment programs.

QUICK REACTION

Joint Improvised Explosive Device Defeat Organization (JIEDDO)

DOT&E continued to support the JIEDDO through participation on the Joint Test Board. DOT&E continues to fund IED and military operations in urban terrain (MOUT) test programs. The Joint Test Board coordinates and synchronizes IED test and evaluation events across the Services to maximize utility and reduce redundancy. The Joint Test Board maintains a classified web-based database of IED defeat systems that have been tested, are under test, and those to be tested. The database also contains capabilities and limitations reports on platform survivability for systems that are fielded in OEF/OIF. An extensive FY06 task for the Joint Test Board was the production of test protocols for counter-IED testing. These protocols apply to all the Services and private agencies conducting testing and assessment of counter-IED systems and help to ensure the standardization of test processes, enabling accurate comparison of potential solutions.

Blunt Impact Testing of Fielded Combat Helmets

On June 20, 2006, the House Armed Services Committee requested the Department conduct testing on the currently fielded Marine Lightweight Helmet and the Army's Advanced Combat Helmet. The Committee was concerned about the blunt impact protection afforded Service members by each of the helmets, and specifically the difference in blunt impact protection between the suspension systems within each of the helmets. The Marine Lightweight Helmet utilizes a sling suspension system, whereas the Army helmet uses a pad system, similar to that of commercial bike and sport helmets. The premise of the Committee was that the padded system used by the Army provided enhanced blunt impact protection over that provided by the Marine Lightweight Helmet. USD (AT&L) and DOT&E partnered with the Army and the Marine Corps to plan, fund, and execute a test program to provide the data necessary to address the Committee's concerns. DOT&E chose the Army's Aeromedical Research Laboratory (USAARL) at Fort Rucker, Alabama, to conduct the independent testing based upon their expertise in helmet testing and because they conducted blunt impact testing of the Army Advanced Combat Helmet during its development and acquisition. DOT&E prescribed that the same test standards used for the prior Advanced Combat Helmet testing be duplicated for this effort to allow direct comparison of test data and to ensure that the two helmets could be assessed side-by-side. Fort Rucker, Alabama, initiated testing in mid-August 2006 and completed testing in September. DOT&E and USAARL is scheduled to complete data reduction and analysis in December 2006. DOT&E and USD (AT&L) will assess the data and present a report to the Committee in early 2007.

Tactical Ground Vehicle Up-Armoring

DOT&E continues to monitor and support the Army's up-armoring efforts. This critical program addresses urgent armoring needs of deployed forces and new acquisition programs through aggressive testing of potential tactical ground vehicle armor solutions. Lessons learned through both ballistic testing of armor solutions and follow-on limited operational testing of up-armored systems has led the Army to develop a Long Term Armoring Strategy (LTAS). The LTAS provides for a building-block approach to meet warfighter needs depending on the threat environment encountered. The strategy is founded on the principal that new production ground vehicles will incorporate sufficient chassis strength to accommodate chassis-mounted and bolt-on armor packages, will include armor in areas not easily accessible once the systems are fielded, and will include mounting brackets to easily accept bolt-on armor packages. This baseline package is termed A-Kit and will be the standard on all future ground tactical vehicles. The bolt-on armor packages are termed B-Kit. B-Kits will be threat-specific armor packages that can be installed in-theater or prior to deployment. DOT&E encourages the Army and the Marine Corps to work together to ensure that acquisition programs for all future ground tactical vehicles adopt the LTAS armoring approach.

As noted in last year's report, test infrastructure limitations at Aberdeen Proving Ground, Maryland, restricts the Army's ability to conduct realistic operational testing of up-armored vehicles. Specifically, the Army lacks a high-speed vehicle test track to demonstrate the safety, compatibility, reliability,

durability, and maintainability of up-armored vehicles when operated at high speeds consistent with current OIF tactics, techniques, and procedures. Since last year, the Army completed 35 percent of the design for the test track, received site approval for construction, appropriate wetlands permits from the state and federal governments, an aeronautical waiver, and has completed the safety site plan. Congress appropriated $8.8 Million in FY07 for the high-speed test track. DOT&E continues to support the Army's effort to develop the much-needed capability of a high-speed test track at Aberdeen Proving Ground.

Small Caliber Rifle Cartridge Lethality

DOT&E continued its participation in an ongoing joint investigation of the wounding potential of small caliber, off-the-shelf cartridges. The investigation team is seeking an increase in lethality over the currently fielded M855 cartridge against the lightly clothed enemy that deployed forces are encountering. In parallel with this effort, DOT&E is supporting a Joint Service Wound Ballistics Integrated Product Team to standardize small caliber lethality testing and assessment. The joint team completed the first phase of testing in FY06 and expects to publish their report during FY07.

Personnel Body Armor

DOT&E examined the root cause of inconsistencies in personnel body armor effectiveness estimates and found that personnel body armor test facilities use different qualification test procedures. Though this effort was planned for completion in early calendar year 2006, it was extended due to the need to test additional promising test-article mounting techniques that were introduced late in the effort. In addition, several key participants were fully engaged with more pressing issues during this reporting period, thus delaying this effort. During late FY05 and throughout FY06, DOT&E, the Army, and the Marine Corps co-sponsored a series of body armor tests to identify and select the best soft body armor qualification test procedure. The Army and Marine Corps have agreed to incorporate the testing methodology selected by this group in future soft body armor requirements. A final alternate test method underwent testing in 4QFY06. Analysis of the data concluded in November 2006, after which the group selected the best test method. The Army's Aberdeen Test Center is writing the Test Operating Procedure that will become the Department's standard for soft body armor testing. Presently, the Department utilizes a National Institute for Justice (NIJ - part of the Department of Justice) standard for soft body armor testing. The NIJ, as well as other government and private industries, are participating in this effort and have tentatively agreed to use the new standard developed from this effort.

JOINT TECHNICAL COORDINATING GROUP FOR MUNITIONS EFFECTIVENESS (JTCG/ME)

The Joint Logistics Commanders chartered the JTCG/ME in 1968 to ensure development of consistent, credible effectiveness estimates for conventional munitions across the DoD. The primary application is weaponeering, the detailed technical planning of a weapon strike that occurs at multiple levels in the operational chain of command before actual combat application. The JTCG/ME produces, distributes, and regularly updates Joint Munitions Effectiveness Manuals (JMEMs). JMEMs provide the warfighter with computerized operational tools and data for rapid evaluation of alternative weapons and their delivery against specific targets. JMEMs help the warfighter effectively accomplish mission objectives, while considering collateral damage, and are critical enablers to the warfighter's weaponeering process.

The JTCG/ME prioritizes its efforts based on annual Joint Staff (J-8) data calls, the Munitions Requirements Process, the Military Targeting Committee, and Operational User's Working Groups. This process ensures focus on the highest priority data for current and future operations.

In FY06, the JTCG/ME addressed collateral damage estimation techniques in response to critical combatant commanders' requirements. They accredited and published a revised methodology in accordance with new Chairman, Joint Chiefs of Staff policy (CJCS memo 3160.01A). They then automated this methodology and fielded it in the Joint Advanced Deep Operations Coordination System used to support current operations.

The JTCG/ME continued to convert JMEMs from a weapon-centric weaponeering tool to one that is target-centric. Joint Staff, mission planners, and weaponeers throughout the combatant commands have identified target-centric JMEMs as a critical priority. In support of increasing combined and coalition operations, the JTCG/ME developed and released JMEM Weaponeering System (JWS) CD-ROM v1.1 (1,250 copies to 850 accounts) that provides air-to-surface and surface-to-surface weaponeering tools. In addition, the JTCG/ME also released the Joint Anti-Air Combat Effectiveness Air Superiority CD-ROM v3.2 (250 copies to 210 accounts). This JMEM supports the community of fighter pilots concerned with the air superiority mission. These releases provided weapons effectiveness data to warfighters for high-priority weapon-target pairings.

The JWS CD-ROM v1.1 release provided the operational community with updated and accredited Collateral Damage Estimate Effective Miss Distance reference tables and methodology. These tables were also automated in the Joint Advanced Deep Operations Coordination System and Fast Assessment Strike Tool-Collateral Damage tools. These accredited tables and operational tools supported the Military Targeting Committee-sponsored Collateral Damage Effects Analysis of Alternatives.

JOINT AIRCRAFT SURVIVABILITY PROGRAM (JASP)

The Joint Aeronautical Commanders Group (JACG) established the JASP by charter in January 2003, integrating the efforts of four separate activities (the JTCG on Aircraft Survivability, the Joint Live Fire Aircraft Systems program, the Joint Combat Assessment Team, and the Joint Accreditation Support Activity). The JASP is sponsored and funded by DOT&E and is chartered by the Naval Air Systems Command, Army Aviation and Missile Command, and Air Force Aeronautical Systems Center. DOT&E establishes program objectives and priorities for the JASP as well as exercising oversight of the program.

The JASP focuses on establishing aircraft survivability as a design discipline and furthering aircraft survivability research, development, test, and evaluation. The JASP:

- Develops vulnerability and susceptibility reduction technologies
- Provides and enhances standard models to assess aircraft survivability
- Supports combat survivability education
- Collects combat damage data for analysis

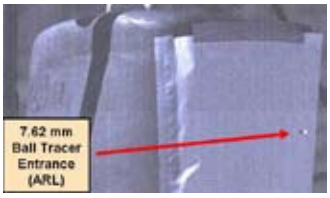
In FY06, the JASP worked with the defense acquisition community, the Department of Homeland Security, the Federal Aviation Administration, the Transportation Security Administration, and the National Aeronautics and Space Administration to identify critical issues regarding aircraft survivability. Accordingly, JASP funded approximately 60 multi-year survivability projects for $9 Million and delivered 49 technical reports in FY06.

Vulnerability Reduction:

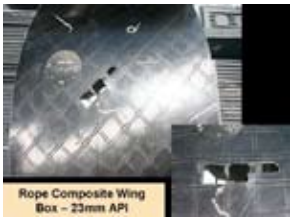
- Man-Portable Air-Defense Systems (MANPADS). This project demonstrated the kinetic energy and detonation effects of a MANPADS impact on a CF6-50 engine. JASP funding enabled the coupling of commercial hydrocode software that replicated the actual damage from the impact to an operating engine model. This JASP approach is an innovative means of predicting MANPADS damage effects for LFT&E and vulnerability reduction design.

  As part of the MANPADS Miss Distance Project, the project team collected video imagery of over 100 MANPADS missiles to triangulate miss distance as a function of missile type and provided those data to JASP and the Army Program Manager for Aircraft Survivability Equipment.

- Ballistic Evaluation of Projectile Tracer Ignition. The Army Research Laboratory completed Live Fire testing to investigate the potential of aircraft fuel cell ullage ignition due to the tracer element on a variety of projectiles. The 18 test events conducted during the evaluation established the potential for fuel cell ullage ignition due to the tracer.

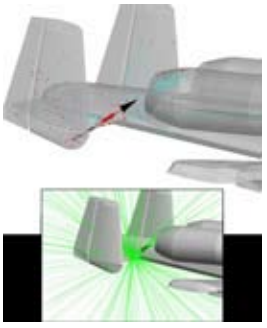


- Ballistic Testing on Unmanned Aerial Vehicle (UAV) Wings. The 46th Test Wing completed the ballistic evaluation of UAV wing panels and spar sections as part of the UAV Hydrodynamic Ram Mitigation project. The testing determined the fuzing and incendiary characteristics of various high explosive incendiary and armor piercing incendiary projectiles on the distinctive, light structure of a typical unmanned system.



Survivability Assessment:

- The JASP completed a project to identify and correct errors in the ignition portion of the Fire Prediction Model. This task used an independent subject matter expert review to assess the validity and applicability of the Fire Protection Model algorithms. Engineers gathered test data from ongoing C-5 and F-35 Live Fire testing and several tests specific to this effort. A related JASP effort is underway to collect all existing information on the Fire Protection Model verification, validation, usage history, and accreditations to develop an Accreditation Support Package and long-term Configuration Management Plan for the Fire Protection Model.
- The JASP is co-funding an effort with the Army to obtain experimental data to support the development of an Army structural-response-to-blast model and to validate an Air Force model that predicts blast overpressure loads on various structures. These tools are being developed as modules that software developers can easily integrate into system-level vulnerability/lethality codes. The first phase of this project collected data on helicopter tail booms. The second phase of this project will collect data on typical aircraft structures as found in modern fixed wing aircraft, as well as rotary wing aircraft.



- Responding to a high priority need from the Joint Combat Assessment Team, the JASP developed and fielded an automated Damage Assessment Tool in four months. The personal computer-based tool provides a three dimensional geometric representation of a threat weapon fragmentation pattern on an aircraft. With this tool, the JCAT is able to more quickly determine the threat that engaged an aircraft and assess the resulting effects. There is also considerable interest in using the tool for planning and predicting Live Fire test events. The JASP continues to update the tool's data set and capability to address JCAT requirements.

- The JASP successfully merged two divergent versions of the Enhanced Surface-to-Air Missile Simulation (ESAMS). ESAMS supports system design for survivability and tests for specification compliance, developmental and operational testing, training system simulations, and mission planning systems.

Susceptibility Reduction:
The JASP is at the forefront of susceptibility reduction technology efforts through relevant projects and coordination of technology development.

- Reduced Optical Signature Emission Solution (ROSES) addresses an Army requirement for flares that minimize the illumination of aircraft as they dispense. The JASP community developed and tested several advanced infrared decoy flares this year, leading to an Acquisition Decision Memorandum that will immediately help the warfighter.
- This year the Common Service Exciter (CSE) completed development and demonstration of a jammer exciter based on commercial Field Programmable Gate Array technology. This capability promises a significant improvement in instantaneous bandwidth and signal fidelity over current technology. The goal of this joint Air Force/Navy project is to provide U.S. forces with an increased capability to effectively jam advanced radars with parameter agilities. The CSE has proven so effective, the Navy has already transitioned a prototype version into fleet training assets.
- Efforts to advance directed energy infrared countermeasures (DIRCM) technologies continue with completion of several projects this year. One project is addressing the high cost of DIRCM systems by implementing two methods for a low cost laser tracker system. The first method modifies a currently fielded U.S. infrared missile seeker and has the potential to significantly lower the pointer tracker cost. A second method, using fiber bundles, promises even greater cost reductions and improved reliability since there are almost no moving parts. The Navy has already programmed this missile seeker technology to transition into the next generation of DIRCMs.

JOINT COMBAT ASSESSMENT TEAM (JCAT)

The Joint Combat Assessment Team continued its deployment to OIF in FY06 in direct support of the 2nd and 3rd Marine Aircraft Wings. JCAT continued to expand its reach and presence in theater by assisting the Army's Aircraft Shoot Down Assessment Team (ASDAT) and Combined Explosive Exploitation Cell (CEXC) on 60 Army rotary wing incidents. JCAT accomplished this by inspecting damaged or destroyed aircraft, acquiring available maintenance documentation, and conducting interviews with aircrew and intelligence personnel. JCAT provided consultation to weapons, tactics, and logistics personnel and provided comprehensive briefings to commanders in charge of daily air operations. These efforts provided valuable information to commanders allowing them to adjust their tactics, techniques, and procedures based on accurate threat assessments. All JCAT assessment reports are archived in the Survivability/Vulnerability Information Analysis Center.

In a second effort, JCAT provided combat forensics training to maintenance personnel in theater who directly work on battle-damaged aircraft. This increased the JCAT's effectiveness by allowing the maintainers to provide battle damage data to the JCAT for assessment when the team was unable to reach an incident site before the maintenance crew initiated repairs.

JOINT LIVE FIRE (JLF)

The Joint Live Fire (JLF) program consists of three groups: Aircraft Systems (JLF/AS), Armor/Anti-Armor (JLF/A/AA), and Sea Systems (JLF/SS). Following are a few examples of projects funded by JLF.

Aircraft Systems Program

JLF/AS FY06 projects provided survivability data on currently fielded U.S. aircraft in order to obtain a better understanding of their vulnerability and identify ways to reduce that vulnerability. These efforts provided information to aid in combat mission planning, increased aircraft and aircrew combat survival and effectiveness, and provided battle-damage assessment repair training and design recommendations to reduce the ballistic vulnerability of current and future U.S. aircraft.

OH-58D Kiowa Warrior. JLF/AS initiated testing on OH-58D Kiowa Warrior components and subsystems to address damage suffered by this class of helicopters in OEF/OIF. The program included gunfire tests versus cockpit components, fuel system components, and main and tail rotor components to obtain a basic understanding of the potential for subsystem degradation/disablement and system kills.

A-10 Warthog. The A-10 wing and fuselage dry bay foam, installed to reduce the potential for fire, was changed to increase affordability and maintainability. JLF/AS tested the new dry bay

foam with a combination of airflow and ballistic weapon testing. The A-10 program office consulted on weapons, tactics, and logistics to provide comprehensive, tactical information to optimize the test setup conditions. Test results indicate the new foam does not reduce platform survivability, nor does it increase maintenance procedures.

CH-53E Super Stallion. JLF/AS completed the third year of a multi-year investigation into the vulnerability of the CH-53E platform. In FY04, JLF/AS conducted tests against CH-53E rotor and drive subsystems under flight-representative dynamic loads. In FY05, JLF/AS used those tests to perform post damage-operating endurance testing on dynamic components to evaluate the reduction of dynamic flight-load capability. In FY06, JLF/AS conducted testing on the CH-53E fuel systems to evaluate potential fire and explosion vulnerabilities. In addition, this testing demonstrated new fuel system vulnerability reduction technologies. These efforts contribute to the Navy's efforts to reduce the vulnerability of the fielded CH-53E, as well as identifying areas to improve the new CH-53K.

UH-60 Black Hawk. JLF/AS completed tests to evaluate UH-60 dry bay foam alternatives and the improved durability gearbox run-dry capability. The program included gunfire tests and controlled damage experiments. The results of these projects are applicable to all tri-Service H-60 aircraft and to future production variants, including the Army's UH-60M model and the Navy's MH-60R and MH-60S.

Enhanced Powder Panel Validation. The JASP began investing in powder panel development in the early 2000's with the goal of developing an advanced passive fire extinguishing technology. Enhanced powder panels offer significant improvement in passive fire extinguishing and provide a reliable and low-maintenance means of fire mitigation for aircraft dry bays. Baseline testing of these panels demonstrated their ability to increase powder release, provide better powder dispersion over longer periods, and provide greater design flexibility. JLF/AS completed effectiveness testing and is currently conducting flight certification testing of this technology. Once completed, it can be available to retrofit current aircraft.

Predator. Phase I, completed in FY05, investigated component-level vulnerability testing of two different UAV engine types, a gasoline engine and a heavy fuel engine. Phase II, completed in FY06, investigated component-level vulnerability testing of the fuselage and wing fuel tanks of the Predator B. JLF is supporting the UAV Program Office in identifying vulnerability reduction improvements to present and future blocks of the aircraft. Although unmanned, and thereby exempt from Title 10 LFT&E, the survivability of UAVs is increasingly critical to battlefield situational awareness and mission success.

Rocket-Propelled Grenades (RPGs). In recent armed conflict, adversaries are using non-traditional weapons, such as anti-tank RPGs, against aircraft. The JLF/AS continues to investigate the vulnerability of front-line rotorcraft to this threat. The goal of this effort is to understand the damage mechanisms of this threat and to identify survivability enhancements. This effort paralleled an effort that characterized the RPG in a fragment arena environment. The survivability community has used the results from the first three phases of the program to update threat databases. The final phase of the program will further investigate the damage mechanisms of a free-flight RPG impacting the fuel cell of an AH-1 Cobra aircraft. This will complete this test program. The results will update threat weapons effects and platform vulnerability databases for use in designing future aircraft.

MANPADS. JLF/AS initiated a multi-phase effort to assess large aircraft vulnerability to MANPADS, starting with a quick-look investigation of MANPADS damage effects on aircraft control surfaces. Test engineers performed live missile tests on C-17 and commercial horizontal tails. Based on damage sustained and NASA wind-tunnel tests, NASA developed estimates of the aircraft's ability to fly and land safely.

AH-64 Engine Nacelle Fire Extinguishing. JLF/AS initiated a project to evaluate the performance of new, active solid propellant gas generators in extinguishing engine nacelle fires. Testing was performed on an AH-64 Apache helicopter. Engineers will use a stainless steel, surrogate test article of the engine nacelle for repeated fire tests under realistic airflow conditions. Surrogate testing will be followed by testing conducted on the actual production rotorcraft.

F-35 Aircraft - Armor Piercing Incendiary (API) Functioning. The initiation of fires caused by armor piercing incendiary (API) projectiles within dry bay areas of aircraft is a vulnerability concern. The functioning characteristics (flash intensity and duration) of API projectiles on the F-35's new advanced composite materials are not known. This effort is designed to

produce a method for consistently and accurately quantifying the characteristics of ballistic impacts against graphite epoxy test panels of similar construction to those being used on the F-35. Testing initiated in FY06 and will conclude in early FY07. Results from this testing will increase the accuracy and reliability of defining the threat-functioning characteristics of concurrent and future composite ballistic testing. Results from this testing will enhance the final vulnerability assessment of the F-35 aircraft as well as other aircraft using advanced composite construction materials.

Armor/Anti-Armor Program

Fragment Penetration Testing and Analysis for Masonry. Little data exist for weapons effects and collateral damage properties (i.e., behind wall debris) against masonry structures. This project collected information on the physical properties of threat projectiles following impacts with masonry walls and wall debris properties (weight, speed, and direction) following threat impact. These data expanded the capabilities of an engineering model (Fast Air Target Encounter Penetration - FATEPEN) used to predict residual impactor properties, target damage, and target debris properties. Analysts can use residual impactor and debris properties to assess damage to personnel and materiel behind walls. This test program is coordinated with a Defense Threat Reduction Agency program that is collecting complementary data and performing the FATEPEN expansion. The work is coordinated with military operations in urban terrain (MOUT) work across the Services. FATEPEN is used in higher-level MOUT analysis codes such as the Integrated Munitions Effects Assessment and the Modular Effectiveness/Vulnerability Assessment models.

IED Characterization for Blast and Fragmentation. IED characterization testing continued into FY06, building upon FY05's pioneering work. Testing consisted of three arena tests to collect fragmentation and blast overpressure data. These tests captured ground surface effects of an IED configuration representative of the emplacement conditions observed in OIF. The resultant data supports current and future up-armoring designs, predictive analyses, increased vulnerability/lethality modeling accuracy, and will maximize survivability enhancements to current and future weapon platforms.

FATEPEN and Project THOR Penetration Algorithm Evaluation Using High Explosive Artillery Fragments. FATEPEN and THOR are key algorithms used to model the penetration characteristics of artillery fragments. Testing evaluated the accuracy and utility of the FATEPEN and THOR methodologies. The Army Research Laboratory made predictions using the FATEPEN and THOR algorithms and subsequently fired fragments from former Soviet 122 mm and 152 mm and U.S. 155 mm artillery rounds through mild steel target material, collecting residual mass and velocity data. Experimental results will be compared to the model predictions. The Army Research Laboratory will use the analysis to improve artillery fragment lethality predictions against hard and soft targets and aid in determining the vulnerability/lethality of U.S. and foreign weapon systems.

IED Characterization and Mitigation Techniques against Tactical Wheeled Vehicle Fuel Tanks. JLF/A/AA initiated an evaluation to determine if effects from an IED can cause a fuel tank explosion or fire in tactical wheeled vehicles. This testing will provide vulnerability reduction recommendations to both warfighters and to the design community to mitigate fuel fires in tactical wheeled vehicles.

MOUT Secondary Debris Characterization. Testing of direct fire munitions (tank rounds and shoulder-fired weapons) continued against walls of different materials (concrete, triple brick, and brick/block) to collect secondary debris data. This year's work expands the amount of characterized debris field per shot, includes oblique shots likely to be seen in the urban fight, and continues to populate an initial debris characteristics database. The work specifically benefits the DoD joint target community, the personnel vulnerability community, operational tests, the Joint Army/Air Force's Modular Effectiveness/Vulnerability Assessment simulation, and the JTCG/ME's ongoing collateral damage estimation efforts. The Army Research Laboratory is also using the data collected to increase the fidelity of personnel vulnerability models such as the Operational Requirements-based Casualty Assessment model.

Middle East Masonry Structures (MEMS) Program. JLF/A/AA is conducting testing against representative masonry structures typically seen in the Middle East region of the world. Software developers and lethality analysts will use data from this effort to modify existing lethality models to obtain accurate collateral damage estimates for conventional weapons against these types of targets. Initial testing, using western style standard brick walls as a comparative baseline, began in FY06. Future testing will use targets constructed with characteristic Middle-Eastern masonry materials and construction techniques.

Sensor-Fuzed Weapon (SFW) Cold-Target Effectiveness. Testing of the SFW evaluated its ability to identify, target, and defeat solar-heated-only "cold targets." SFW is an air-delivered weapon designed to defeat heavy armor targets. SFW is not designed to be effective against a "cold" target, such as a

Homing-All-The-Way-Killer (HAWK) battery or an aircraft sitting on a ramp. However, these types of "cold" targets have become high-priority targets. The JTCG/ME will use the results of this test to update their Joint Munitions Effectiveness Manuals. The program included sensor test and evaluation, as well as vulnerability modeling of HAWK battery components and an F-15. Initial results demonstrated sufficient solar heating to allow the sensor to recognize the target and issue a fire command against HAWK components. The results of signature analysis and testing of the F-15 demonstrated sufficient solar loading that allowed the sensor to recognize the target and issue a fire command.

Sea Systems Program

JLF/SS, initiated by DOT&E in 2005, has made significant progress toward assessing the survivability of surface ships and submarines. Particular progress has been made in the area of fire fighting and fire mitigation techniques and it is in this area that lessons learned from JLF-Sea are shared most with the other Services. Examples of these and other efforts are discussed below.

Hydraulic Fluid Hazard Analysis. This project examined the probability of a hydraulic fluid fire or explosion onboard surface ships and submarines. The Naval Research Laboratory researched hydraulic fluid fires by reviewing results of shock test trials, examining casualty and maintenance reports, and conducting interviews with active duty and retired Navy personnel. A vulnerability analysis considered possible ignition sources and determined that hydraulic fires are a serious concern for submarine and surface ships. The analysis provided engineers with an assessment of the probability of hydraulic fires and their relevant impact to overall vessel survivability.

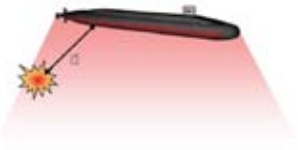
Shipboard Space Fire Testing. This project is examining the potential for fire in enclosed shipboard spaces by considering ignition sources and fire sustainability due to materials and equipment stowed within those spaces. The Navy will use data from this effort to improve the design of shipboard spaces. The tests are providing empirical data to improve, verify, and validate fire models.

Damage Control Readiness Evaluation. This project initiated the development of metrics for evaluating damage control readiness. Improving initial and refresher damage control training for shipboard crews is also an objective.

Ship Response to Terrorist Attack. JLF/SS initiated a two-year project in cooperation with Germany to validate a simulation tool for assessing ship survivability to surface-borne threats. A U.S.-built destroyer, recently decommissioned by the German Navy, was the subject of a series of explosive tests. JLF provided funding to add an additional surface explosion test to the nine-shot matrix, effectively leveraging a joint U.S./German investment of nearly $15 Million. The first three shots were conducted in May 2006, and the remaining five shots were conducted in September and October 2006. Data from these tests will increase the fidelity of models, validate existing models and simulations, increase the accuracy of survivability assessments, and improve design capabilities to mitigate the effects of blast overpressure.

Survivability of Ships Built to Commercial Standards. Based on historical evidence, commercial hull structures are more susceptible to underwater shock damage than hull structures built to Navy standards. Although the Navy has conducted limited side-by-side comparison testing between a Navy-designed hull and a commercial hull, little is known about the resistance of commercial hull structures to underwater explosive loadings. This project will use testing and models to assess the survivability of ships built to commercial standards, thereby improving the fidelity of future ship survivability assessments. This will directly benefit ongoing acquisition programs, such as the Joint High-Speed Vessel.

Submarine Susceptibility to Mines. This project will improve the current capability to predict threat mine actuation ranges for various mines against submarines. Through testing and susceptibility analysis, improvements will be made to survivability assessment methods. In August 2006, the first successful mine actuation trial was conducted by a submarine to demonstrate the mine actuation system used for evaluating mine susceptibility. This effort will improve future survivability assessments and the test and evaluation program for the *Virginia* and SSGN submarine classes.



Test Alternatives to Underwater Explosion (UNDEX). This project is evaluating a less expensive and more environmentally acceptable alternative to UNDEX shock testing. It leverages a Navy Phase II Small Business Incentive Research program that is demonstrating the utility of a seismic air-gun array. The primary objective is to assess the array's potential as a surrogate for the traditional full-ship shock trial. In May 2006, test engineers used the air-gun array to generate shock against a Navy barge in a quarry. Future testing will compare water vehicle response to air-generated shock and explosive shock.

Net-centric Operations

Net-centric Operations

Net-centric Operations

Net-centric operations have become central to Defense concepts, but the programs are run as individual efforts. To understand the significance of the findings on individual programs requires knowledge of how all the pieces fit together. This section is designed to provide that perspective. Discussion of individual programs are in the appropriate Service or DoD sections of this report.

Background

Net-centric operations is an information superiority concept that generates increased combat power by networking sensors, decision makers, and operators to achieve enhanced situational awareness, increased speed of command, higher tempo of operations, greater lethality, increased survivability, and a degree of self-synchronization.[1] The idea of information technology (IT) as an enabler of joint decision making was brought to the forefront of military thinking in 1996 with the publication of the Chairman, Joint Chiefs of Staff's, *Joint Vision 2010*. With *Joint Vision 2010*, and its follow-on *Joint Vision 2020*, decision superiority became a key warfighting concept.

The concept continues to mature. It is expected that net-centric operations will enable the agility needed by U.S. forces to meet the uncertainty and unpredictability of today's strategic environment. The agility afforded by net-centric operations results from enterprise-wide solutions across battlefield applications, defense operations, intelligence functions, and business processes; and structure that allows access, sharing, and collaboration across the force. The emphasis is shifting from moving users to the data, to moving data to the users.

Global Information Grid

The Global Information Grid (GIG) is the material solution that is the underpinning of net-centric operations. It is the organizing construct for managing IT throughout the DoD. GIG policy, governance procedures, and supporting architectures are the basis for developing and evolving IT capabilities, IT capital planning and funding strategies, and management of legacy (existing) IT services and systems.

The GIG is the globally interconnected, end-to-end set of capabilities, processes, and personnel for collecting, processing, storing, disseminating, and managing information. The GIG includes all IT and National Security Systems throughout the DoD and their interfaces to allied and coalition forces, industry, and other Federal agencies. All DoD information systems that currently exist or that have been approved for implementation comprise the GIG. Every DoD acquisition program that has an IT component is a participant in the GIG. Each new IT-related acquisition program replaces, evolves, or adds new capabilities to the GIG.

A key aspect in making net-centric operations a reality is the execution of the DoD Data Strategy. The Data Strategy provides the basis for implementing and sharing data in a net-centric environment. It describes the requirements for inputting and sharing data, metadata, and forming dynamic communities to share data. The intent of this strategy is to share data as widely and as rapidly as possible, consistent with security requirements. The DoD established Community of Interest working groups in key areas such as finance, logistics, and command and control to develop common data definitions and standards.

For the many IT capabilities that comprise the GIG, addressing the interdependencies of system design, development, and deployment becomes critical in executing net-centric operations. The current DoD processes that acquire GIG components as stand-alone capabilities have not been effective in addressing these interdependencies.

Portfolio Management

The Quadrennial Defense Review and the follow-on Strategic Planning Guidance emphasize the need to manage groups of like-capabilities across the enterprise to improve interoperability, minimize redundancies and gaps, and maximize capability effectiveness. To this end, the DoD is experimenting with Capability Portfolio Management. The Deputy Secretary of Defense established Portfolio Managers for Joint Command and Control and Joint Network Operations (JNO). A majority of the core set of programs in both the Command and Control and JNO portfolios are on DOT&E operational test oversight. This section of the Annual Report focuses on the JNO portfolio, which is made up of all elements that comprise the GIG. The JNO portfolio manager manages a core set of enabling programs and associated capabilities and the development of material and non-material solutions to ensure timely, synchronized, and integrated delivery of JNO capabilities. Portfolio management stops looking at programs as individual, loosely connected elements, and starts assessing what is needed to ensure they contribute to an overall capability.

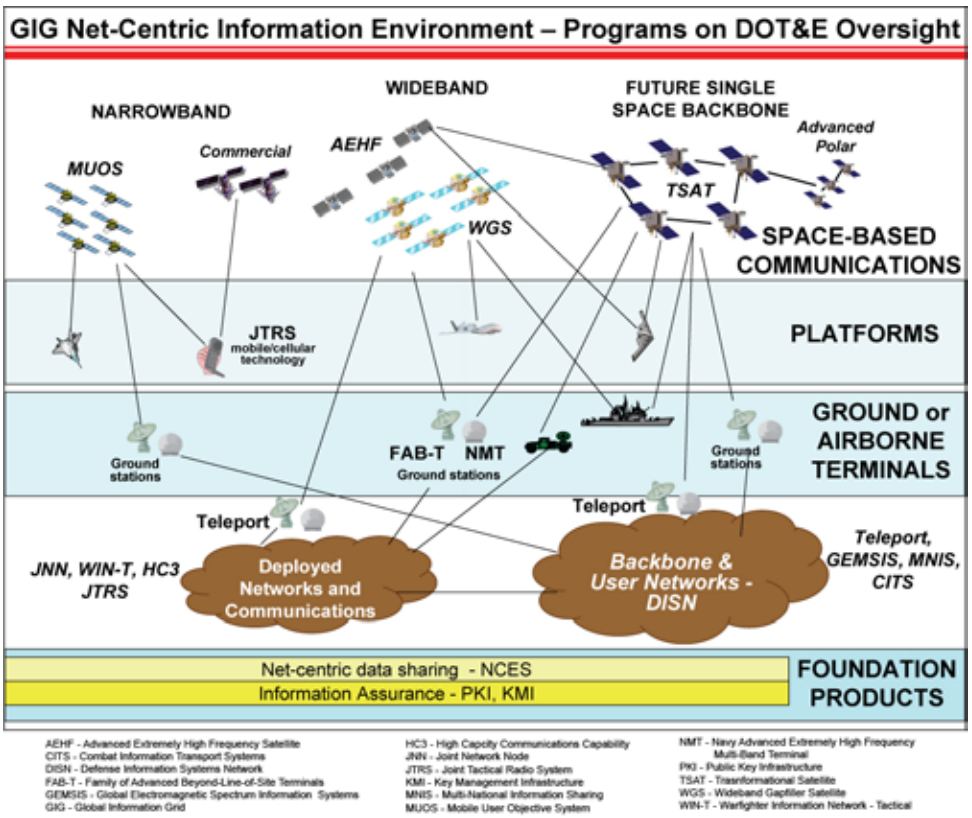
From a test perspective, this places more emphasis on integrated testing of programs early in their development, and end-to-end assessments of operational effectiveness, suitability, and survivability. End-to-end testing and integrated program testing require a test infrastructure that supports routine testing in a joint environment where all the elements that contribute to an overall capability are present. Test infrastructure elements needed include: the Joint Mission Environment Test Capability,

[1] Chairman, Joint Chiefs of Staff, *Net-Centric Environment Joint Functional Concept*, version 1, April 7, 2005

improved modeling and simulation, strengthened links between testing and training, and revised methods for identifying and evaluating how one system contributes to the capability provided by a portfolio of systems or to the accomplishment of a mission.

Joint Network Operations Portfolio

The JNO core programs that are on DOT&E test oversight fall into four basic categories: foundation products, backbone networks, deployed networks, and space-based communications. Although developed separately, these programs are interdependent, in that they each contribute to a greater capability than they bring individually. The capabilities provided by all these individual JNO/GIG programs, and others not on DOT&E oversight, integrate to provide the enabling infrastructure for net-centric warfare. The many command and control, intelligence and surveillance, and weapons systems outlined in this report will all rely on the integrated capability provided by these programs to realize the concepts of information superiority: enhanced situational awareness, increased speed of command, higher tempo of operations, greater lethality, increased survivability, and self-synchronization.



Foundation Products

The Net-Centric Enterprise Services (NCES) program, transitions DoD to a service-oriented architecture (SOA). The NCES program has three basic areas where it will be developing reusable services for the entire DoD IT infrastructure – collaboration; content discovery and delivery; and SOA services that are designed to support network operations such as security and network management.

The SOA serves as the foundation for the integrated GIG enterprise network. SOA is a collection of standards-based interfaces to warfighting and business functions. Applications leverage SOA through open standards and comprise already existing systems and processes. An SOA consists of service and event interfaces to both legacy systems and newer applications. SOA services are software chunks, or components, constructed so that they can be easily linked with other software components. The idea is to assemble software code into a "chunk" that can be shared and reused in many different applications.

Another foundation for net-centric warfare is ensuring the protection of DoD networks and data. Information assurance is even more critical as we transition to a networked force, where information sharing across multiple networks and between individual platforms increases our risk to organized information operations attacks.

The Public Key Infrastructure program provides the security services for the NCES program in the areas of credential issuance, management, validation, operational enabling of electronic/digital representations of identity for digital signature,

and encryption services. The most visible product of the Public Key Infrastructure program has been the Common Access Card issued to DoD employees.

Modernization of the DoD cryptographic capabilities across the GIG is another facet of improving the net-centric information assurance posture. The Key Management Infrastructure program enables the provisioning of cryptographic key products, symmetric and public keys, and security services. The Key Management Infrastructure program will develop a single, automated, network-accessible, electronic-based Key Management and, predominately, electronic cryptographic product delivery infrastructure.

Backbone Networks

The backbone network of the GIG is the Defense Information System Network (DISN). The DoD primary internets, the Secret Internet Protocol Router Network (SIPRNET), and Unclassified but Sensitive Internet Protocol Router Network (NIPRNET) are part of the DISN. In 2005, the GIG-Bandwidth Expansion (GIG-BE) program completed operational testing and became part of the DISN. GIG-BE connected key sites around the globe with fiber optic network capabilities, essentially providing unlimited bandwidth for the movement of time sensitive intelligence and operations data to our forces. GIG-BE allows the DISN to support the reach and richness of data sharing envisioned by the GIG.

The Air Force Combat Information Transport Systems (CITS) program is developing the next-generation Air Force network for more than 100 locations worldwide. The CITS program focuses on modernizing worldwide fixed-base communications infrastructure with high-speed, high-capacity, reliable, digital information transport. CITS uses commercial off-the-shelf hardware and software, providing network management and information assurance capabilities, effectively modernizing voice-switching systems, and sustaining operations through help desk operator training and technical orders.

Spectrum management continues to be a pressing issue for the DoD as our global society becomes more dependent on information and communications technologies. The Global Electromagnetic Spectrum Information System program intends to develop a tool to dynamically manage frequency use among emitters. It will reduce communication interference by deconflicting frequency assignments, enhance situational awareness by geographically depicting interference areas, and deliver robust modeling and simulation of electromagnetic spectrum for joint operational mission planning. It will be used to provide the spectrum management capabilities for programs like Joint Tactical Radio System (JTRS) and Warfighter Information Network – Tactical (WIN-T).

Multi-national information sharing has become the norm for DoD today. Coalition operations make it imperative that critical information be shared. However, current policies do not support access to SIPRNET by coalition partners. In response to this need, the Combatant Commands developed, and are using, the Combined Enterprise Regional Information Exchange System network to share information between U.S. forces and coalition partners. The multi-national information sharing program will provide services and applications for the future GIG enterprise information environment and facilitate information sharing among DoD components and eligible foreign nations in support of planning and execution of military operations.

The Teleport program is designed to move information from the DISN down to the deployed networks and vice versa. Teleport is a telecommunications collection and distribution point. It provides deployed warfighters with multiband, multimedia, and worldwide reach-back capabilities to DISN. The system integrates, manages, and controls a variety of communications interfaces between the DISN terrestrial and tactical satellite communications (SATCOM) assets at a single point of presence.

Deployed Networks and Communications

Currently, the deployed networks under OSD oversight and DOT&E test oversight include three programs being developed by the Army. These programs support an increased capability to share and move data around the battlefield by improving bandwidth capacity, communications on the move, and reach-back capabilities. Although not on OSD acquisition oversight, the Air Force, Navy, and Marine Corps all have programs and initiatives to improve the capability of their deployed networks to support net-centric operations concepts and support the vision and goals of the GIG.

- The Joint Network Node (JNN) is currently provided to deploying Army forces to replace the Mobile Subscriber Equipment communication nodes. It is an integration of commercial off-the-shelf technologies (Ku satellite communications system) and increases bandwidth. The Army views JNN as the bridge between the older Mobile Subscriber Equipment communications link and the WIN-T program that is still under development. Unit commanders use JNN to provide reliable, high-speed information services and information exchanges to the warfighting force, and as their primary means to control battlefield tempo. JNN is intended to provide communications at the quick halt for Army tactical forces, as well as joint and coalition forces, for the exchange of voice, data, and video from theater to battalion levels.
- The WIN-T system is to be the Army's future high-speed and high-capacity backbone communications network or tactical intranet. It is intended to provide reliable, secure, and seamless video, data, imagery, and voice services. WIN-T will support communications from the sustaining base down to the Future Combat Systems Brigade Combat Team. WIN-T has ground, airborne, and space layers. Key components of the ground layer are the JTRS Ground Mobile Radio, a personal communications device, and a secure wireless local area network. The airborne layer consists of unmanned aerial vehicles or tethered air vehicles in the WIN-T airborne communications node, providing beyond line-of-sight communications. The space layer includes commercial and

military satellites such as the Wideband Gapfiller Satellite (WGS) or Advanced Extremely High Frequency (AEHF) satellites to provide reach-back via the GIG.
- Army Future Force concepts include bringing integrated voice, video, and data from joint forces to troops on the ground. This vision requires high data rate, wideband SATCOM operating at extremely high frequencies. High Capacity Communications Capability is expected to result in low-cost SATCOM terminals and an efficient, scalable system that is compact and maximizes available power for the transmit distances needed by warfighters – essentially reducing amplifier size and weight and improving affordability for SATCOM on-the-move systems at the High Mobility Multi-purpose Wheeled Vehicle and Future Combat Systems vehicle level.

The JTRS program provides the future communications devices that will use WIN-T and other Service networks to enable net-centric operations. JTRS is a software programmable device that can be integrated into ground, air, and sea platforms, as well as fixed sites. JTRS is designed to provide increased interoperability, flexibility, and adaptability to support the many diverse warfighter communications requirements for voice, data, and video. The Enterprise Domain product line provides the waveform and networking gateway, which will be the interface to the GIG, providing a reach-back capability for the warfighting force. The JTRS program is divided into several product lines: Network Enterprise Domain, Ground Mobile Radio, Handheld/Man-pack/Small Form Fit, Airborne/Maritime/Fix, Multi-functional Information Distribution System, and JTRS Enhanced Multi-band Intra Tactical Radios.

Space-Based Communications

The final piece of the GIG designed to support net-centric operations concepts are the space-based communications programs. As the amount of information flow increases, and the need to reach-back to remote support sites becomes the norm, the bandwidth provided by these programs becomes critical. These programs provide wide- and narrow-band communications capabilities and link with commands, services, agencies, or individual platforms, either directly or through ground terminals. Satellite programs normally have three basic elements: the space-based satellite itself, the mission control segment, and the ground or airborne terminal (user) segment.

Wideband satellite programs under development include the AEHF and the WGS programs.

- The AEHF system will follow the Military Strategic, Tactical, and Relay (Milstar) program as the protected backbone of DoD's integrated military satellite communications architecture. The AEHF is expected to increase system throughput capacity by a factor of ten over the existing Milstar satellites. Data rates range from 75 bits per second to approximately 8 Mega-bits per second. Combatant commanders and operational forces worldwide will use the AEHF system to provide secure, responsive, and survivable space-based military communications. AEHF provides connectivity across the spectrum of mission areas, including land, air, and naval warfare; special operations; strategic nuclear operations; strategic defense; theater missile defense; and space operations and intelligence. AEHF represents the third generation of Extremely High Frequency (EHF) SATCOM capability for strategic and tactical communications protected from nuclear effects and jamming activities.
- WGS is the next generation wideband component in the DoD's future military SATCOM architecture and provides communications in both the X-band and Ka-band frequencies. WGS combines vital capabilities onto a single satellite for tactical X-band communications, augments the Global Broadcast Service Phase II system, and provides new two-way Ka-band service. WGS should alleviate the spectrum saturation of X-band to provide increased single-user data rate availability and to increase total satellite capacity over current Defense Satellite Communications System III satellites.

The DoD's narrow-band satellite program is the Mobile User Objective System (MUOS). MUOS is the next generation Ultra High Frequency (UHF) Military Satellite Communications (MILSATCOM) system. It supports the worldwide transport of voice, data, simultaneous voice/data, and streaming video (including access to the GIG) to enable dominant maneuver and information superiority. For the last 30 years, UHF MILSATCOM has operated over individual 5-kHz and 25-kHz bandwidth transponders. MUOS departs from this by adapting a commercial third generation Wideband Code Division Multiple Access (WCDMA) cellular phone architecture using satellites in place of cell towers. Use of WCDMA allows MUOS to increase UHF communication capacity and availability to a level far in excess of what is currently achievable using the existing UHF MILSATCOM system. This technology enables a number of mobile communications devices to include handheld terminals, laptops, and personal communications devices such as JTRS.

The Transformational Satellite program is the DoD's future vision for a single space-based communications backbone. The aim of the program is to provide real-time, high bandwidth connections between military assets – ships, planes, drones, units, even individual ground vehicles – anywhere in the world, providing a critical component of network-centric operations. The Transformational Satellite will provide survivable, protected high capacity Internet-like connectivity for Airborne Intelligence, Surveillance, Reconnaissance, Communications On-the-Move services, and protected strategic communications. The system is intended to be interoperable with deployed and infrastructure networks and provide superior network information assurance.

The net-centric force has evolved around the concept of the common operational picture. Having this picture depends on time-stamped, position-location information on our forces in the field. The satellites that comprise the Global Positioning System (GPS) have become the standard for DoD in providing this data. The GPS III satellite program objective is to develop and deploy an improved systems architecture for the NAVSTAR GPS to assure reliable and secure delivery of enhanced position, velocity, and timing signals for the evolving needs of GPS civil and military users. GPS III eliminates numerous existing

shortcomings and vulnerabilities inherent in the current GPS architecture that threaten to severely impact vital civil commerce, transportation, public safety, as well as military operations in the future.

To provide the link between the satellite, individual platforms, and networks, are the terminals. There are two key ground-based terminal programs on DOT&E oversight.

The Family of Advanced Beyond Line-of-Sight Terminals (FAB-T) advances EHF capabilities to aircraft, and ground and airborne command post terminals. FAB-T provides a multi-mission capable family of terminals that is based on a common design and open system architecture so it can communicate with different satellites. Once operational, FAB-T is intended to provide critical, protected beyond line-of-sight communications for warfighters via the new AEHF system satellites. In subsequent increments, FAB-T is expected to enable interchange with other beyond line-of-sight and national satellite communications systems such as the WGS.

The Navy AEHF Multi-band Terminal (NMT) Program is initially developing Q-band SATCOM submarine and shipboard terminals in support of the U.S. Navy's ForceNet concept. ForceNet is the Navy's approach to network-centric operations. NMT provides an integrated communications capability that supports EHF/AEHF Low Data Rate/Medium Data Rate/Extended Data Rate, Super High Frequency band, military Ka band, and Global Broadcast Service receive-only communications. The resulting NMT terminal will replace current single- and dual-band terminals.

Summary

Networking sensors, decision makers, and operators achieve situational awareness, increased speed of command, higher tempo of operations, greater lethality, increased survivability, and a degree of self-synchronization. The Command and Control Capability Integration Board manages groups of like-capabilities across the enterprise and oversees Portfolio Managers for Joint Command and Control as well as JNO. This section of the Annual Report focused on the "network" side of net-centric operations. To show the broader scope of the Command and Control Capability Integration Board portfolio, the table on the next page lists the core programs in both the Command and Control and JNO portfolios. The table further identifies those on DOT&E operational test oversight, and those included in the Service and DoD sections of this Annual Report.

Net-centric Command and Control and JNO Portfolios

Portfolio	Program (P)/ Initiative (I)	DOT&E Oversight	2006 Annual Report Section
JOINT COMMAND AND CONTROL			
Standing Joint Task Force Headquarters	I		
Turnkey Command and Control	I		
Deployable Joint Command and Control	P	X	DoD
Global Command and Control System - Joint	P	X	DoD
Global Command and Control System - Army	P	X	Army
Global Command and Control System - Maritime	P	X	
Theater Battle Management Core Systems	P	X	
Theater Battle Operations Net-Centric Environment	I		
Common Operational Picture	I		
Net-enabled Command and Control	P	X	
Adaptive Planning	I		
Integrated Strategic Planning and Analysis Network	P	X	Air Force
Combatant Commanders Integrated Command and Control System	P	X	
Joint Airspace Control Center	I		
Integrated Fires	I		
JOINT NETWORK OPERATIONS			
Content Delivery System	I		
Transformational Satellite Communications System	P	X	
Wideband Gapfiller Satellite	P	X	Air Force
Family of Beyond Line-of-Sight Terminals	P	X	
Mobile User Objective System	P	X	
Global Positioning System III	P	X	Air Force
Advanced Extremely High Frequency	P	X	Air Force
Navy Advanced Extremely High Frequency Multi-band Terminal	P	X	
Warfighter Information Network - Tactical	P	X	Army
Joint Network Node	P	X	Army
High Capacity Communications Capability	P	X	
System-of-Systems Common Operating Environment	I		
Joint Tactical Radio System	P	X	DoD
Key Management Infrastructure	P	X	
Public Key Infrastructure	P	X	
High Assurance Internet Protocol Encryptor	I		
Crypto Modernization	I		
Network-Centric Enterprise Services	P	X	DoD
Teleport	P	X	DoD
Global Electromagnetic Spectrum Information System	P	X	
Defense Information Systems Network - Next Generation	I		
Multinational Information Sharing	P	X	
Joint Network Management System	P		
Integrated Network Management System	P		

Test & Evaluation Resources

Test & Evaluation Resources

Test and Evaluation Resources

As the Services develop budgets to support the Long War on Terror, Test and Evaluation (T&E) capability improvements compete for resources in a constrained funding environment, notwithstanding the emergence of such new threats as:

- Increased accuracy and maneuvering capabilities of modern ballistic and supersonic sea-skimming missiles
- Improvised explosive devices and unmanned vehicle delivered weapons
- Advanced air-to-air and surface-to-air missile systems
- Proliferation of counter-capabilities, including GPS and communications denial and threat operations against our warfighting and support networks
- Armed small craft and advanced naval mines and torpedoes in the littorals

During Fiscal Year 2006, DOT&E challenged the T&E community to ensure the DoD's test capabilities meet the demands of new warfighting technologies and evolving operational concepts. DOT&E worked with the newly staffed Test Resource Management Center (TRMC) to ensure that T&E strategic planning reflects the required capabilities of DoD's T&E ranges and facilities and that Service budgets are adequate to support these required capabilities.

DOT&E's critical interest items continue to include: the adequacy of aerial and ground targets to allow operationally realistic testing, real-time casualty assessment and instrumentation programs, the realism of test environments and threat models, and the challenges presented in the testing of networked joint operations. Other significant items of interest include: self defense, electronic warfare and counter-weapon test capabilities, chemical and biological defense test capabilities, test and training range sustainability, and the health of the operational test agencies.

Targets

DoD is facing critical anti-ship cruise missile target and full-scale aerial target capability shortfalls. Specifically, a unique high interest threat anti-ship cruise missile target has not been funded by the Navy and the envisioned QF-4 full-scale aerial target drone replacement, funded by the Air Force and Navy, does not fully address fifth generation threat aircraft characteristics. These threat-representative test resources are necessary for test adequacy to determine the operational effectiveness of at least 16 Major Defense Acquisition Programs, including: F-35, F-22, F-18, F-15, E-2D, AIM-9, AIM-120, PAC-3/Medium Extended Air Defense System, SM-6, Evolved Sea Sparrow Missile, Rolling Airframe Missile, DDG 1000, CVN-21, LHA, Ship Self Defense System. Without funding to support the development and procurement of these target capabilities, DOT&E will not be able to approve the associated Test and Evaluation Master Plans and operational test plans of these Major Defense Acquisition Programs as adequate to determine operational effectiveness and suitability.

Likewise, affordable ground targets with multi-spectral signature attributes and representative mobility and maneuverability are critical to testing precision weapon systems. DOT&E is pursuing a tri-Service Multi-Spectral Mobile Ground Target initiative for a new family of low-cost, threat-realistic target facades mounted on modified commercial truck chassis. These targets will implement an open architecture and standards-based approach to a common control system in an effort to attain economies in acquisition, maintenance, and training. This Army/Navy-led demonstration program has the potential to yield a repeatable and reconfigurable threat-realistic target presentation for weapons and sensor testing at significantly lower cost to the Department. DOT&E similarly sponsored a study and demonstration project with the Army and Marine Corps for realistic, low-cost, pop-up threat vehicle targets for evaluating sensors and ground weapon systems.

Real-Time Casualty Assessment and Range Instrumentation

Real-Time Casualty Assessment (RTCA), complemented with a federation of integrated combat simulations, is essential to the testing of the Army's Future Combat System (FCS). The Army's One Tactical Engagement Simulation System (OneTESS), currently under development, is intended to provide a combined arms force-on-force (live and simulated) instrumentation capability for data collection and analysis for both test and training. DOT&E added OneTESS to the list of acquisition programs under oversight as it will be the core of the FCS tactical simulation system.

The availability of secure, non-intrusive, and cost-effective instrumentation is also critical to assessing the effectiveness of our future forces. The TRMC, together with the Services, identified the system requirements for a development program to provide a range data system with state-of-the-art capabilities for Time Space Position Instrumentation accuracy, data throughput, radio frequency spectrum efficiency, miniaturization, and encryption. DOT&E endorsed the Common Range Integrated Instrumentation System project of the Central Test and Evaluation Investment Program in order to provide these capabilities.

Emerging Battlefield Environments

DoD needs to be able to test combat systems in warfare environments with the realistically representative densities, structures, and clutter of urban and littoral battlefields. The Army Urban Environment study in FY06 identified necessary T&E infrastructure enhancements and instrumentation for the planned Combine Arms Collective Training Facility at Fort Bliss, Texas. The Army is also improving its other limited urban environment

test and training sites by adding telemetry and upgrading their instrumentation.

However, the fragmented approach to providing littoral test capabilities necessary to test new, agile, and stealthy naval surface and underwater combatants and amphibious combat systems remains a problem. The Navy and Marine Corps need to be able to conduct instrumented surface and underwater testing, including live weapons firing, with a variety of manned and unmanned air, surface, and subsurface vehicles associated with such new ship classes as DDG-1000, LPD-17, SSN-774, and LCS-1. This testing needs to be conducted in operationally realistic littoral environments. Delays in littoral range initiatives, such as the East Coast Undersea Warfare Training Range, increase program costs and force workarounds to move testing to other, less operationally-representative ranges.

Networked and Joint Operations

The continuing transformation of our forces to employ joint weapons in net-centric operations presents a significant challenge to the ability of the operational test community to assess the overall mission effectiveness of these "systems-of-systems." Realistic, operational testing of networked systems requires robust transmission performance monitoring and referee systems, as well as the ability to replicate real world clutter, jamming, and urban radio frequency interference utilizing distributed information operations and assurance capabilities. DOT&E, together with the Air Force and Army, is sponsoring development of three Central Test and Evaluation Investment Program subprojects to provide command and control network performance monitoring and portable communications jamming capabilities for testing the Department's networked systems.

However, Federal Communications Commission frequency spectrum restrictions continue to limit network testing in the Very High Frequency/Ultra High Frequency radio bands. To address this problem, DOT&E initiated a study to investigate the requirements for future radio frequency testing and to identify alternative actions to accommodate the security concerns involved.

Self-Defense, Electronic Warfare, and Counter Weapon Test Capabilities

Our enemies seek to protect high value targets with air defense systems; degrade or deny our use of GPS; and use camouflage, concealment, and deception, or combinations thereof, to impede or defeat our precision weapons. Additionally, Electronic Warfare is evolving to incorporate integrated defensive systems that feature decoys and multi-spectral detection and warning systems, as well as specialty detection radars with embedded electronic warfare capability. Assessing weapons effectiveness in these environments requires robust integrated threat-representative hardware simulators and validated software models and simulations. DOT&E led a joint Service study to determine the resources necessary for testing sensors and weapon systems in unique radio frequency environments, and has worked with the TRMC to include this requirement in their Strategic Plan.

Signature reduction is a feature of new weapon systems that are intended to operate in littoral battlefield environments. Upgrades to T&E infrastructure are required to adequately measure the reduced signatures of modern naval platforms. DOT&E, in coordination with the Navy, sponsored an upgrade to the Norfolk, Virginia, magnetic signature facility that will allow more realistic operational testing in FY07. DOT&E is initiating similar efforts in acoustic measurements by leveraging Navy upgrades for submarine noise testing capabilities and applying them to surface ship testing. Similar upgrades to radar cross-section measurement facilities will be required to adequately validate the stealth or radar return minimizing designs of new ships such as the DDG-1000. DOT&E worked with the Navy to define the necessary initial test requirements, as accurate measurement capabilities will be needed to test ship effectiveness and survivability and to validate the Navy's ship self-defense models.

Chemical and Biological Defense Test Capabilities

During FY06, DOT&E worked with the Joint Program Executive Officer for Chemical and Biological Defense to establish a Joint Threat Coordinating Group to examine test and employment techniques for the use of threat-realistic simulants.

The Chemical and Biological Defense Program made substantial progress with the approval of the Department's Joint Chemical/Biological Investment Plan. DOT&E's long-standing concerns for the adequacy of agent simulants and the capacity and capabilities of live agent test facilities are now recognized in the Army's investment program plan.

Test and Training Range Sustainability

Working through the Sustainable Ranges Overarching Integrated Process Team (OIPT), DOT&E prepared the February 2006 Memorandum of Understanding (MOU) between DoD, the Department of Energy, and the Department of Interior's Bureau of Land Management to implement the 2005 Energy Policy Act. This MOU establishes DoD as a "Cooperating Agency" and recognizes that DoD has an interest in not only those lands and airspace within its "jurisdiction and control," but also in certain airspace that is above state and private properties.

DOT&E chaired the Working Integrated Process Team Energy Subgroup that completed a review of the 11 Western States Programmatic Environmental Impact Statement outlines and schedules. Recognizing the potential problem of energy corridor encroachment on DoD test and training ranges, DOT&E led the formation of a Quick Reaction Office, consisting of members from the Office of the Secretary of Defense (OSD) and the Services, to address this problem. This team's efforts precluded significant encroachment problems such that only 199 miles, of the 14,902 total miles designated as energy corridors, involve DoD lands.

Outreach to the civil sector is a critical component in sustaining test and training ranges over the long term. DOT&E played a key role in developing DoD Directive 3200.15, Sustainment of Ranges and Operating Areas, which authorizes sponsorship and

participation in national level outreach efforts to promote test and training needs. This directive provided the basis to better provide the public with information on DoD's efforts to preserve natural habitat and open space. Among such efforts has been sponsorship of the annual meeting of the Land Trust Alliance (LTA). At the most recent meeting of the LTA, key members of the Alliance visited test facilities at the Arnold Engineering Development Center in Tullahoma, Tennessee, for an on-site look at the compatibility of a major DoD T&E installation with its surrounding neighbors. Similarly, as Co-Chair of the Sustainable Range OIPT, DOT&E worked with OSD and Service representatives to promote partnerships with the private sector, as well as with state and local governments to enhance test and training range sustainability.

Health of the Operational Test Agencies

DOT&E examined the resources available to the DoD Components' Operational Test Agencies (OTAs), which include the Army Test and Evaluation Command (ATEC), the Navy Operational Test and Evaluation Force (OPTEVFOR), the Marine Corps Operational Test and Evaluation Activity (MCOTEA), the Air Force Operational Test and Evaluation Center (AFOTEC), and the Joint Interoperability Test Command of the Defense Information Systems Agency. This is an area that will require close scrutiny to ensure resources are available in the future to conduct adequate operational test and evaluation.

Though the number of acquisition programs remains relatively constant, the OTAs' workload continues to increase at a time when they face constrained, if not declining, budgetary and staffing resources. The increased workload is the result of a number of factors, including the OTAs' earlier involvement in the acquisition cycle and their participation in Service and joint experimentation and tactics development, as well as additional short-notice testing required to support ongoing operations. Operational deployment of test agency military personnel to Operation Iraqi Freedom and Operation Enduring Freedom has further reduced OTA staff personnel availability, compounding the problem of a shrinking pool of experienced testers.

ATEC appears to be the OTA that has been most seriously affected by shortages in civilian staffing and shortages of mid-grade officers available for operational test assignments. Currently, only about 20 percent of major and minor Army acquisition programs have military personnel available for evaluating operational test results. The realignment move of ATEC headquarters (by the Base Realignment and Closure Commission) will likely exacerbate the civilian staffing shortfalls as personnel choose not to relocate with their ATEC positions.

AFOTEC is now facing similar manning constraints as the Air Force seeks to reduce infrastructure costs and shift funding to higher priority programs. OPTEVFOR and MCOTEA may soon face similar issues. DOT&E will continue to monitor the organizational health of the OTAs and advocate additional resources where warranted to meet increasing workloads that include "non-traditional" T&E of systems being rapidly pushed into theater in response to warfighter urgent needs.

BLRIP Executive Summaries

BLRIP Executive Summaries

Overview

DOT&E prepared six Beyond Low-Rate Initial Production (BLRIP) reports for the Secretary of Defense and Congress between October 2005 and October 2006. Five of the executive summaries from these reports are included in this section. One is not included due to classification issues: the Common Missile Warning System (CMWS).

REPORTS TO CONGRESS

Program	Report Type	Date
EA-6B Improved Capability Three (ICAP III) Weapons System	OT&E Report	October 2005
Joint Biological Agent Identification and Diagnostic System (JBAIDS) – Block 1	OT&E Report	February 2006
MH-60R Multi-Mission Helicopter	Combined OT&E / LFT&E Report	March 2006
Common Missile Warning System (CMWS) (*Executive Summary is not included.*)	OT&E Report	April 2006
Surface Electronic Warfare Improvement Program (SEWIP) – Block 1A	OT&E Report	June 2006
Small Diameter Bomb Increment One (SDB)	Combined OT&E / LFT&E Report	October 2006

ANNEX - BLRIP EXECUTIVE SUMMARIES

EA-6B Improved Capability Three (ICAP III) Weapons System

The EA-6B Improved Capability Three (ICAP III) system provides the aircrew with more situational awareness and more accurate threat emitter and location information. This results in a measurable increase in the efficacy of jamming. Data are presented in this report in approximate values to remain at the unclassified level. The ICAP III system incorporates:

- ALQ-218 receiver/antenna suite.
- Cockpit displays.
- Communication interfaces.

Adequacy

Testing was adequate to evaluate operational effectiveness and suitability. The system required significant modifications to correct deficiencies identified during the operational evaluation (OPEVAL) in 2004. An additional post-OPEVAL test phase, called the verification of correction of deficiencies (VCD), was conducted during May - July 2005. The VCD consisted of 122 flight hours and was augmented with more than 400 hours of additional reliability, availability, and maintainability data from four low-rate initial production systems. Operational testing was in accordance with the DOT&E-approved Test and Evaluation Master Plan.

Operational Effectiveness

The EA-6B ICAP III is operationally effective for combat. The system demonstrated improvements in the following areas:

- Identification and location of threats in jamming and non-jamming environments.
- Crew situational awareness and mission coordination.
- Cueing and management of external jamming pods.

Operational Suitability

The ICAP III system is operationally suitable for combat. The ICAP III system met all availability and maintainability requirements. Although the system did not meet reliability requirements during the VCD test, its reliability growth allowed ICAP III to meet the requirements during post-test fleet training. The post-test fleet data shows that the system meets reliability requirements of 17 hours or greater between operational mission failures.

Reliability, joint interoperability, mission planning, human factors, and documentation are areas of concern that need to be addressed in follow-on testing.

An early release of the new EA-6B mission planner under the Joint Mission Planning System (JMPS) was used in the VCD. The mission planner will be operationally tested in FY06. Initial assessment of the new mission planner demonstrated it is more useful than the legacy planner.

Recommendations

The Navy should:

- Standardize procedures and controls necessary to develop intelligence files.
- Establish crew procedures in order to maximize cockpit efficiency and eliminate duplicate tasks.
- Explore procedures or hardware modifications to enable aircrew wearing night vision devices to be able to set brightness levels on their displays sufficient for readability without the adverse affects of canopy glare.

The Navy should evaluate the merits of additional improvements, which are not validated requirements:

- Integrating selective reactive jamming with the Multi-functional Information Distribution System (MIDS) to achieve autonomous functionality.
- There is no stated requirement to reduce the dependence on the operator with ICAP III. However, upgrading the receiver suite to improve automatic receiver system functionality would provide a reduction in operator task loading. The Navy should consider improving autonomous capability of the identification and location functions of the receiver suite.

ANNEX - BLRIP EXECUTIVE SUMMARIES

Joint Biological Agent Identification and Diagnostic System (JBAIDS) – Block 1

The Joint Biological Agent Identification and Diagnostic System (JBAIDS) is operationally effective and suitable for ground-base operations. It is not operationally effective or suitable for shipboard operations. There are problems, which must be corrected, and additional testing is required to demonstrate that the corrective actions have been made. Here is a brief summary of each section of the report.

System Overview

JBAIDS is intended to be a reusable, portable, modifiable biological agent identification and diagnostic system capable of simultaneous reliable identification of multiple biological warfare agents and other biological agents of operational significance. Early identification of biological warfare agents will support field commanders' ability to make timely decisions regarding risk assessments, medical treatment, restriction of troop movements, and countermeasures. The system includes a Real-Time Polymerase Chain Reaction (RT-PCR) ruggedized machine and laptop with sample preparation kits, reagent kits, and support equipment.

Test Adequacy

Testing was adequate to support the evaluation of JBAIDS' operational effectiveness and suitability for ground-based units. Testing was not adequate for shipboard units; however, testing provided some data for evaluation purposes. This report is based on developmental and multi-Service operational test and evaluation (MOT&E) data.

The JBAIDS MOT&E was conducted in two concurrent phases. Phase I of MOT&E consisted of joint Air Force, Army, and Marines Corps operations from May 9 through May 19, 2005. The MOT&E was conducted in accordance with the DOT&E-approved Test Plan.

Phase II of MOT&E, conducted aboard ship, was not adequate because the Beckman Allegra X-22 centrifuge was not certified for shipboard use by the Navy, no air, water, blood, buffer, or food samples could be processed. No RNA virus samples were processed during Phase II.

Operational Effectiveness

JBAIDS is operationally effective for ground-based units; it is not operationally effective for shipboard use. Timely identification of an agent (3-4 hours versus 24-48 hours from traditional culturing methods) aids in improved situational awareness, isolation of personnel, and reduced exposure to the agent.

Operational Suitability

JBAIDS is operationally suitable for ground-based units. It is reliable, and easy for operators to use and maintain. It is not suitable for shipboard operations because the centrifuge necessary for sample preparation was not certified by the Navy because of safety concerns. For both ground-based and shipboard operations, some operational suitability issues merit attention such as the large footprint for small expeditionary units, information assurance, and electromagnetic interference.

Recommendations

DOT&E recommends additional testing to confirm JBAIDS operational effectiveness and suitability that may result from implementing the recommendations below.

The Joint Program Executive Officer for Chemical Biological Defense the Service user community should consider the following recommendations:

Operational Effectiveness

To improve operational effectiveness:

1. Replace the sample preparation kit that requires the large centrifuge with an alternative protocol and conduct operational testing to confirm its operational effectiveness.
2. Complete additional testing to better bound the system's capabilities of the agents where the results in developmental testing and operational testing differ.
3. Perform additional testing of the powder samples where there may have been some sample spiking issues during MOT&E.

4. Optimize the sensitivity of the reagent kits to provide for identification of threats at levels closer to infectious levels.
5. Investigate possible operational implications of the agents and matrices that resulted in a larger number of false positives.
6. Add process and inhibition controls to the JBAIDS Block I system to reduce the incidence of false negative and false positive reporting by JBAIDS laboratories.

Operational Suitability

To improve operational suitability:

1. Perform a study to determine if there is a more cost effective solution than the current JBAIDS reagent kits.
2. Provide additional shelf-life testing to characterize the longevity of the JBAIDS consumables and upgrade the refrigerator capacity to include space for reagent kits to be maintained at proper temperature for the deployed location.
3. Investigate bio-safety level containment and make appropriate changes to Tactics, Techniques, and Procedures and Doctrine to provide for increased protection of military operators.
4. Bring the JBAIDS laptop into compliance with existing DoD directives.
5. Complete additional electromagnetic interference testing to resolve the potential impact on operations.
6. Improve training by including a checklist for each protocol to make sure all steps were completed. Guidance should be provided on what to do when presented with environmental or clinical samples for which they were not trained or when presented with smaller sample volumes than those indicated in the protocols.
7. Ensure the JBAIDS Concept of Operations and military doctrine address the impact of results reported from JBAIDS laboratories on consequence management as a result of presumptive, confirmatory, and definitive identification.

MH-60R Multi-Mission Helicopter

The MH 60R Multi-Mission Helicopter, as tested, is operationally effective, operationally suitable, and survivable. The operational and live fire testing were adequate.

Test and analyses indicate that:
- The MH 60R test article successfully accomplished primary and secondary missions, constrained only by heavy workloads imposed on the aircrew sensor operator during primary missions, particularly in areas with dense target and radio frequency (RF) signal environments.
- The MH 60R is a damage-tolerant aircraft that can withstand multiple small-arms projectile hits, continue to fly, and often complete its mission with damage.

Program Overview

The MH 60R is the replacement for the current Navy SH-60B and SH-60F aircraft. It is designed and built to execute its primary missions of Under Sea Warfare (USW) and Anti-Surface Warfare (SUW) from large and small deck Navy combatant ships. Secondary missions include search and rescue (SAR), vertical replenishment (VERTREP), Naval surface fire support (NSFS), medical evacuation (MEDEVAC), very high frequency/ultra high frequency (VHF/UHF) communications relay (COMREL), logistics support, and personnel transport.

To fulfill its primary missions, the aircraft is equipped with:
- A digital cockpit and data processing system common with the MH 60S Fleet combat support helicopter.
- A newly developed APS-147 Multi-Mode Radar.
- A newly developed electronic support measures system.
- An integrated self defense system.
- A new acoustic processor supporting the airborne low frequency dipping sonar and sonobuoy signal processing requirements.
- A new forward-looking infrared system with laser designator.
- A legacy weapons suite consisting of door-mounted machine guns, Hellfire missiles, and torpedoes.

Operational Effectiveness

The MH 60R is operationally effective. It completed all primary and secondary missions in a realistic operational environment. The aircraft met or exceeded all threshold performance requirements. In most cases, the aircraft, avionics, and mission systems demonstrated enhanced capabilities to detect and prosecute missions against the most challenging targets-of-interest, as compared to legacy aircraft. However, with the increase in number, capabilities, and complexity of mission sensors without concomitant increase in the three-person flight crew size, there comes a noticeable increase in operator workload and training requirements.

Operational Suitability

The MH 60R is operationally suitable. It met all but one reliability, maintainability, availability, and reconfiguration metrics. The aircraft built-in test capability exhibited a false alarm rate of 28.8 percent, which was above the less than 20 percent threshold operational requirement. Eight of the 15 false alarms were attributable to the new APS 147 Multi-Mode Radar. It will be necessary to improve the software to reduce the false alarm rate within acceptable limits.

The operational availability metric was examined to ascertain the administrative and logistics delay times for receipt of spare/repair parts from the normal Navy Logistics Supply System during the test period. The average delay time was high at 20.93 hours. An average delay time of 10.34 hours would correspond to the commonly accepted operational availability metric value of 75 percent.

Survivability

The MH 60R, is survivable against projected threats. In its baseline configuration missions, it is more survivable than previous H-60 models. To reduce susceptibility, an integrated self defense countermeasures suite was added to the MH 60R. Flight tests demonstrated that the suite meets its effectiveness requirements. The MH 60R also benefits from the presence of self defense capable machine guns and a new radar with target imaging and threat recognition capability. The Joint Army-Navy UH/MH 60 LFT&E program conducted extensive live fire vulnerability testing over the life of the H-60 series

aircraft. This testing, combined with extensive combat usage data, established that with few exceptions, the H-60 aircraft family is robust and ballistically tolerant.

Recommendations

The Navy should:

1. Correct the software deficiencies that limit efficient mission accomplishment. This should include corrections to address false alarms associated with the APS-147 radar.
2. Correct operator-system interface deficiencies identified during operational evaluation (OPEVAL) and incorporate them in the next available Airborne Operating Program software release. This could entail changes in operator training.
3. Conduct a Follow-on Operational Test and Evaluation (FOT&E) to verify correction of software and system deficiencies, which cause the higher level of the sensor operator workload experienced during primary warfare missions.
4. Improve crew and system survivability by:
   - Inerting fuel tank ullage to prevent explosions from incendiary hits.
   - Reducing the potential for gearbox chip detector screen blockage resulting from ballistic hits to the main transmission assembly.
   - Correcting, as practical, the design deficiencies identified in the survivability evaluation in Section V.

Surface Electronic Warfare Improvement Program (SEWIP) – Block 1A

This report is on the Block 1A Surface Electronic Warfare Improvement Program (SEWIP) upgrade. The ultimate goal of SEWIP is to upgrade the defense of Navy ships from electronic warfare attack and from attack by anti-ship missiles. The SEWIP upgrades components of a larger system, the AN/SLQ-32 Electronic Warfare (EW) System. It is the AN/SLQ-32 that collects signals from emitters, analyzes them, and displays the trajectory and emitter identification to the operator for further processing and possible tactical action. The SEWIP is an evolutionary development program providing block upgrades to the AN/SLQ-32 system with the SEWIP Block 1A being the first. The Block 1A upgrade examined in this report focuses only on the replacement of the AN/SLQ-32's digital signal processor, presorter, and the operator's control and display console. These components are 1977-vintage, have been out of production for years, and have become obsolete and unsupportable.

By itself, the SEWIP Block 1A upgrade does not make the AN/SLQ-32 operationally effective or suitable. On the other hand, it enhances the ability to protect Navy ships by improving situational awareness and engagement support in addition to laying a good foundation for future upgrades. An evaluation of the full AN/SLQ-32 EW System will be conducted in conjunction with the operational evaluation (OPEVAL) of a future SEWIP block upgrade that includes improvements to the antenna/receiver systems. Resolution of the SEWIP Block 1A test limitations prior to that future block upgrade OPEVAL is required before DOT&E can fully evaluate the AN/SLQ-32's operational effectiveness and suitability.

The SEWIP Block 1A's enhancement of the AN/SLQ-32's performance and the use of logistically supportable equipment provides a solid basis for future SEWIP Block upgrades. In that context, further procurement of the SEWIP Block 1A upgrade is warranted.

ANNEX - BLRIP EXECUTIVE SUMMARIES

Small Diameter Bomb Increment One (SDB)

The Small Diameter Bomb Increment One (SDB) is operationally effective, and it is operationally suitable with some limitations.

System Overview

SDB weapons system consists of the GBU-39/B 250-pound class air-launched glide bomb and the BRU-61/A carriage assembly. SDB is the first Air Force Miniature Munition weapon system and is designed to increase the number of weapons carried per aircraft for employment in offensive counter-air, strategic attack, interdiction, and close air support missions. Combatant commanders use SDB to attack fixed or relocatable targets that remain stationary throughout the weapon time of flight in all weather conditions. The initial SDB-capable aircraft is the F-15E, and follow-on aircraft include the F-22A, F-35, F-16, B-1, B-2, B-52, and MQ-9.

SDB uses a combination of Global Positioning System (GPS) and internal inertial navigation system guidance to achieve kills across a broad range of target sets through the combination of precise accuracy and warhead effects. It is supported by the Accuracy Support Infrastructure (ASI) system, a ground-based, theater-deployable differential GPS system, designed to increase SDB accuracy. ASI collects GPS satellite positioning error data and broadcasts target location data corrections to the SDB through the F-15E data link prior to weapon release.

Test Adequacy

The operational testing of SDB adequately supported an evaluation of the system's operational effectiveness and operational suitability.

Air Force Operational Test Command conducted the SDB initial operational test (IOT) from November 2005 through July 2006. Operational test aircrews and maintainers planned, flew, and maintained missions. Test phases and events included mission planning exercises, ASI deployment and operations, logistics activities and demonstrations, and flight test missions carrying and delivering both live and inert SDBs. Air Force Operational Test Command conducted testing using production-representative weapons and carriage assemblies. IOT evaluated 51 SDBs in operationally representative free flight test missions to include testing in a GPS jamming environment.

Operational Effectiveness

SDB is operationally effective and lethal when the optimum fuzing mode is correctly selected. Weapon guidance accuracy combined with appropriate fuze selection will achieve kills across the full spectrum of user-defined target sets. SDB proved lethal against the targets engaged in IOT, and is likely to be lethal against the required targets that were not attacked in testing. SDB demonstrated effective employment and target engagement using both preflight mission planning and airborne targeting using the F-15E onboard sensors to designate and engage targets.

The weapon was not able to perforate all hardened targets with a single SDB, likely requiring two weapons against the same aim point in order to achieve the user's required level of damage for these targets. SDB lethality against relocatable soft surface targets and lightly armored ground combat systems proved heavily dependent upon the fuzing option selected (height of burst or impact) based on actual target location error.

Although limitations in the currently fielded weapons planning software do not support a definitive assessment of the user's requirement of 17 weapons to kill 14 targets, SDB can be expected to perform near its required capability and kill 14 targets with 18 weapons. Additional limitations in the SDB effectiveness modeling resident in this software also lead to inappropriate fuzing solutions for some targets with small target location error.

The ASI system provided incremental guidance accuracy improvements, but did not enhance nor detract from overall effectiveness or lethality.

SDB effectiveness in the presence of GPS jamming is presented in the Classified Annex to this report.

Operational Suitability

SDB is operationally suitable with some limitations. SDB met user needs for maintainability and reliability with one exception: the BRU-61/A carriage assembly did not meet the user's mean time between failure requirements during IOT. Additionally, the currently fielded SDB mission planning software leads the aircrew to a fuzing option selection that will not achieve the user's required target damage criteria in some target scenarios. Finally, the ASI system required continuous

monitoring and troubleshooting to maintain availability to support SDB missions. This was deemed not to be significant as ASI did not enhance nor detract from effectiveness or lethality observed in IOT.

Recommendations

SDB is an effective system and is suitable for combat operations with some limitations. To address these limitations, the Air Force should:

1. Improve BRU-61/A bomb rack reliability to meet the user-defined mean time between failure requirements.
2. Improve weapons planning software SDB effectiveness modeling. Improvements are necessary to accurately plan for effective SDB employment using both height of burst and impact fuzing. Follow-on live warhead flight testing against relocatable targets (particularly lightly armored ground combat systems) is required to validate the accuracy of software improvements and provide a more robust set of empirical data to better characterize the range of SDB capabilities and limitations.
3. Reconsider the value added in fielding the ASI system given that it did not fully support the user's concept of employment and did not contribute to nor detract from SDB effectiveness.
4. Take measures to ensure that all SDB weapons procured retain the minimum capabilities in a GPS jamming environment as discussed in the Classified Annex to this report.

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