



ASA(ALT) OFFICE OF THE CHIEF SYSTEMS ENGINEER

RELIABILITY, AVAILABILITY, MAINTAINABILITY (RAM) INITIATIVE

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THE CHALLENGE

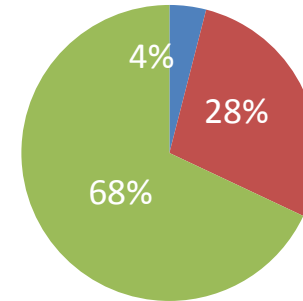
Operational and Sustainment (O&S) costs dominate total system costs; close to 65% on average across all DoD acquisitions

One of the major issues across DoD acquisitions is System Reliability

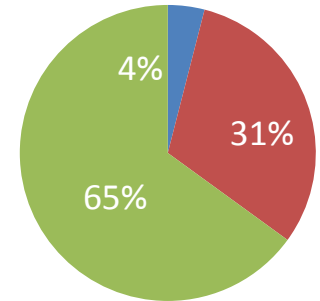
POOR RELIABILITY:

- leads to **higher sustainment costs** for replacement spares, unscheduled maintenance, repair parts, facilities, staff, etc.
- puts additional burden to the user and **hinders warfighter effectiveness** and can essentially render weapons useless.

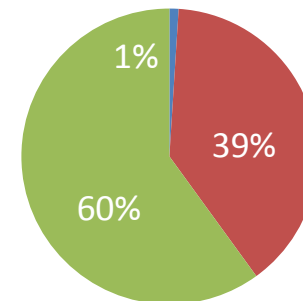
Ground Combat Systems



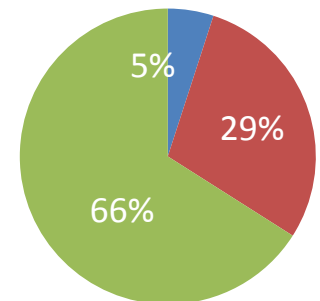
Rotary Wing Aircraft



Surface Ships



Fighter Aircraft



RDTE Procurement O&S

DOD needs systems that are effective when needed; not just effective when available





ARMY & OSD LEADING THE WAY



Over the past decade, DoD and Army has taken significant steps to improve system Reliability

2007				2008				2009				2010				CY 2011			
1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
McQuerey	JCIDS	Reliability Improvement	Working Army Group Acquisition Policy (Bolton memo)	USD(AT&L) RAM (Young)	DODI 5000.02	WSARA	Gilmore DOT&E Initiatives	DOT&E State of Reliability Memo	USD (AT&L) DTM 11-003										



08 DEC 2007

MEMORANDUM FOR THE DISTRIBUTION

SUBJECT: Reliability of U.S. Army Materiel Systems

Emerging data shows that a significant number of U.S. Army systems are failing to demonstrate established reliability requirements during operational testing or during their life cycle...

Effective immediately, a DOD reliability test threshold will be established for all programs with a Joint Program Designator of Joint Requirements Oversight Council...

This new policy will be incorporated in the next revision of Army Regulation 70-1, Army Acquisition Policy, and Army Regulation 70-3, Test and Evaluation Policy.

The point of contact is Mr. Steven Hall, room 644-7446.

Steven Hall, room 644-7446

80113337

Enclosures



MEMORANDUM FOR DISTRIBUTION

SUBJECT: Continued to Improve Reliability across Administrative Transition

The Assistant Secretary of Defense (ASD) reports on the progress of the program to improve system reliability...

In order to ensure the Army's Acquisition Executive is participating in a Reliability Improvement Working Group...

Thank you for your interest in improving system reliability...

4-2-2008

SECRETARY OF THE ARMY



MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENT

SUBJECT: Reliability, Availability, and Maintainability Policy

In recent years, there has been an increasing trend within the Department of Defense to address the program reliability during developmental testing...

The Defense Science Board Task Force on Developmental Test and Evaluation recommended that RAM, including a robust reliability program...

Therefore, the Secretaries of the Military Department and the Directors of the Defense Agencies are directed to establish a reliability improvement acquisition policy...

4-2-2008

SECRETARY OF THE ARMY



MEMORANDUM FOR UNDER SECRETARY OF DEFENSE

SUBJECT: Army Reliability, Availability, and Maintainability (RAM) Improvement Initiatives

The U.S. Army concurs with your July 21, 2008 memorandum indicating that RAM has not been sufficiently emphasized during weapon system development...

We are also working in parallel with the Department of Defense (DoD) Reliability Improvement Working Group...

Program Manager charters have been modified to include a RAM focus.

Acquisition Program Baselines will include an increased RAM scope and hold Program Executive Officers and Program Managers accountable.

Army Systems Acquisition Review Councils and other reviews will be modified to focus on RAM as part of their process.

Reliability reports and points of contact are now part of my staff located in the newly established Systems Engineering Directorate.

Future capabilities documents and acquisition contracts will include emphasis on RAM.

RAM training provided to our acquisition and logistics workforce will be increased in scope and frequency.

We will sponsor RAM workshops and conferences, which will include providing the latest information on RAM improvement initiatives to our Program Managers.



THE UNDER SECRETARY OF DEFENSE

3610 DEFENSE PENTAGON

WASHINGTON, DC 20315-5001

March 21, 2011

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS

SUBJECT: Directive-Type Memorandum (DTM) 11-003 - Reliability Analysis, Planning, Tracking, and Reporting

References: (a) DoD Directive 514.01, "Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)), December 9, 2005

(b) DoD Instruction 5000.02, "Operation of the Defense Acquisition System," December 8, 2008

(c) Department of Defense Reliability, Availability, Maintainability, and Cost Estimate Report Manual, June 1, 2009

(d) DoD 5910.1-M, "DAD Procedures for Management of Information Requirements," June 30, 1998

Enclosure

In accordance with the authority in Reference (b), this DTM, consistent with the direction of the Under Secretary of Defense for Acquisition, Technology, and Logistics to immediately enhance reliability in the acquisition process...

Amplify procedures in Reference (b) and is designed to improve reliability analysis, planning, tracking, and reporting



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SOLDIERS AS THE DECISIVE EDGE



EXAMPLES OF RELIABILITY ISSUES



- During TD Phase, OMS/MP was changed to a much harsher mission profile than what was in the P-Spec for the TD Phase and the change was after vendors had their CDR.
- High reliability requirements coupled with a high statistical confidence requires significant Operational Test Miles.
- Language specific to Reliability Growth Models and use of M&S and test data (Fault tree analysis, Finite Element Analysis) to feed prediction models and FMECA was not in the TD phase RFP.
- Insufficient RAM team structure in the program office. In some cases, one RAM engineer supporting multiple programs and in some cases no official RAM engineer leading the reliability program.
- Test-fix-test mentality; not enough emphasis on Design for Reliability (DfR).





EXAMPLES OF RELIABILITY ISSUES



- The identified “Critical functions” do not correctly correlate to the JROC approved CPD KPPs, KSAs or Other System Attributes. The result is a many to many relationship that is difficult to test as currently described versus JROC approved and what was contracted as system performance requirements.
- Common definition of Fully operational and Essential Critical Failures between T&E Community, User Community and Materiel Developer.
- Clear definition of Essential Mission Critical Failure and Software Problem Reports.
- Hard time defining Software Defect Containment Contract Language in the Contract/SOW.





RELIABILITY IMPROVEMENT WORKING GROUP (RIWG)



- ASA(ALT) OCSE has re-established Reliability Improvement Working Group (RIWG) – Aug 2012
- RIWG comprises of members from ASA (ALT) and reliability leads from TRADOC, AEC, AMSAA, PEOs, and RDECs
- Focus of RIWG is to
 - perform detail assessment of RAM efforts through out the acquisition life cycle for the programs that are having reliability issues
 - collect lesson learned
 - unearth systemic root causes for the reliability issues
 - recommend solutions to the leadership that can curb these rising issues





RELIABILITY IMPROVEMENT WORKING GROUP (RIWG)



- Current RIWG Focus in on Five Systemic Army Program Reliability Causal Factors
 1. Requirements and Operational Usage Definition;
 2. Accurate Cost/Risk Assessments;
 3. Accurate TRL Assessments;
 4. Failure Definition/Scoring Criteria (FD/SC); and
 5. Design for Reliability





PROPOSED RECOMMENDATIONS FOR RELIABILITY IMPROVEMENT



1. Early thorough Assessment of Reliability Requirements:

- After the MDD, there needs to be thorough review of the definition of OMS/MP, Draft CDD, and AoA. Center of Reliability (CRG) growth can provide support, RIWG can coordinate the handshake.
- Reliability needs to be part of the TRL assessments and a key focus area in AoA and for emerging S&T programs.
- Post MS A, review of Reliability KSA and FD/SC.

Need to make sure we are not signing up for unrealistic requirements





PROPOSED RECOMMENDATIONS FOR RELIABILITY IMPROVEMENT



2. Use Reliability Growth Planning Curve to plan and 'track' reliability issues:

- Program Office to establish a Reliability Growth Planning Curve (RGPC)
 - Incorporated in SEP and updated in TEMP
 - O&S costs overlaid on the RGPC
 - Update the RGPC after test events to effectively track reliability
- Establish Early EMD Reliability full-up system-level Developmental Test Threshold, documented in the TEMP.
- Collect developmental test data to provide early indication of reliability problems.

This was part of “Improving the Reliability of US Army Materiel Systems” memo signed by Ms. Shyu (June 2011)





PROPOSED RECOMMENDATIONS FOR RELIABILITY IMPROVEMENT



3. Use of Reliability Score Cards as part of Program System Reviews:

- Structured engineering and analytical approach to identify weak performers early in program development, but can also be applied throughout life-cycle of system
- General version along with software specific version
 - Each scorecard divided into multiple categories
 - Each category contains several elements with associated rating criteria

AMSAA-AEC Center of Reliability Growth (CRG) can provide training and also perform an independent assessment





PROPOSED RECOMMENDATIONS FOR RELIABILITY IMPROVEMENT



4. Use of Reliability Contract Language:

- Derived Reliability Contractual Language to be used during solicitation and contract execution in the TD phase and further updated in the EMD phase
- Current language focuses on Milestone (MS) B contracts and employs one-time use Data Item Descriptions (DID)
- Good examples: Language used for Joint Effects Targeting System (JETS) & Lightweight Counter Mortar Radar (LCMR) Programs





OTHER CONSIDERATIONS



- **Commander's Critical Information Requirements (CCIR)** - Need for accurate and **early** warnings to HQDA so support can be appropriately provided (if needed).
- Systems are getting vastly complex. Need to look at how to make the systems easier to train and training more efficient. Reduce the number of Failure modes caused by training.
- Leadership engagement is critical.
- Organizations such as various RDECs and AMSAA-AEC CRG are there to provide support in the arena of Reliability Improvement. RIWG can coordinate the handshake.





LONG RANGE



- From lessons learned, need to bin/categorize programs and develop **tailored** Reliability Programs to better help Program Offices execute them.
 - Program offices with software or IT intensive programs have hard time following traditional hardware/vehicle Reliability Program.
- Pulling together the Operational Use data such Conditioned Based Maintenance; “On-time” and “Downtime”; use of Spare Parts for the systems and utilizing it to better define the OMS/MP.





CONTACT INFO



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