



DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY OF THE ARMY
ACQUISITION LOGISTICS AND TECHNOLOGY
103 ARMY PENTAGON
WASHINGTON DC 20310-0103

SAAL-ZL

JUN 26 2011

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Improving the Reliability of U.S. Army Materiel Systems

1. Reference memorandum, SAAL-ZL, 6 December 2007, subject: Reliability of U.S. Army Materiel Systems.
2. Based on historical data, approximately four out of five U.S. Army systems fail to achieve their reliability requirements, resulting in significant penalties associated with system availability, life cycle costs, and schedule delays. The referenced policy established measures to improve the reliability of all programs with a Joint Potential Designator of Joint Requirements Oversight Council "Interest" and Information Technology systems that include hardware development. In order to mitigate reliability shortfalls for Army materiel systems, this policy extends the coverage to include all Acquisition Category (ACAT) I and for ACAT II programs where the sponsor has determined reliability to be an attribute of operational importance. The two main reliability improvement mechanisms addressed by this policy are an early Engineering and Manufacturing Development (EMD) reliability test threshold and an early engineering-based reliability program review. The enclosure provided along with this memorandum includes additional guidance regarding the implementation of this policy.
3. Effective immediately, the early EMD reliability threshold shall be established before entrance into Milestone B and incorporated into solicitations for the EMD effort.
 - a. The process for establishing and reporting the early EMD reliability threshold, mechanism for detecting and reporting threshold breaches, and guidance for early engineering-based reliability program review is enclosed.
 - b. Program Managers (PMs) of all ACAT I systems and for ACAT II systems where the sponsor has determined reliability to be an attribute of operational importance shall place reliability growth planning curves in the Systems Engineering Plan (SEP), Test and Evaluation Master Plan (TEMP), and EMD contracts and ensure that U.S. Army systems are resourced to accomplish this requirement. PMs shall focus on best Design for Reliability (DfR) activities during system design. A DfR program shall be articulated in the SEP and executed prior to Milestone B to ensure the program achieves its initial reliability targets during early system-level prototype testing. It is imperative that a very large portion of failure modes are eliminated prior to Milestone B. There should only be a few remaining significant failure modes post-Milestone B that are difficult to identify until the system is operated by Soldiers under realistic conditions.

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4. This policy shall apply to ACAT I and ACAT II programs specified above containing reliability attributes and that are pre-Milestone B or that have increments that are pre-Milestone B. This policy does not apply to Information Technology systems that include no hardware procurement or development. This policy supports Department of Defense Instruction 5000.02 guidance to formulate a viable reliability, availability, and maintainability (RAM) strategy that includes a reliability growth plan as an integral part of design and development. The RAM strategy shall be documented in the program's SEP and Life Cycle Sustainment Plan, and be assessed during technical reviews, test and evaluation, and Program Support Reviews.
5. This policy rescinds Department of Army Memorandum, Reliability of U.S. Army Materiel Systems, SAAL-ZL, 6 December 2007.
6. The point of contact is Mr. Stephen Hayes, commercial (703) 617-0227, DSN 767-0227, or e-mail: steve.hayes1@us.army.mil.



Heidi Shyu

Acting Assistant Secretary of the Army
(Acquisition, Logistics and Technology)

Encl

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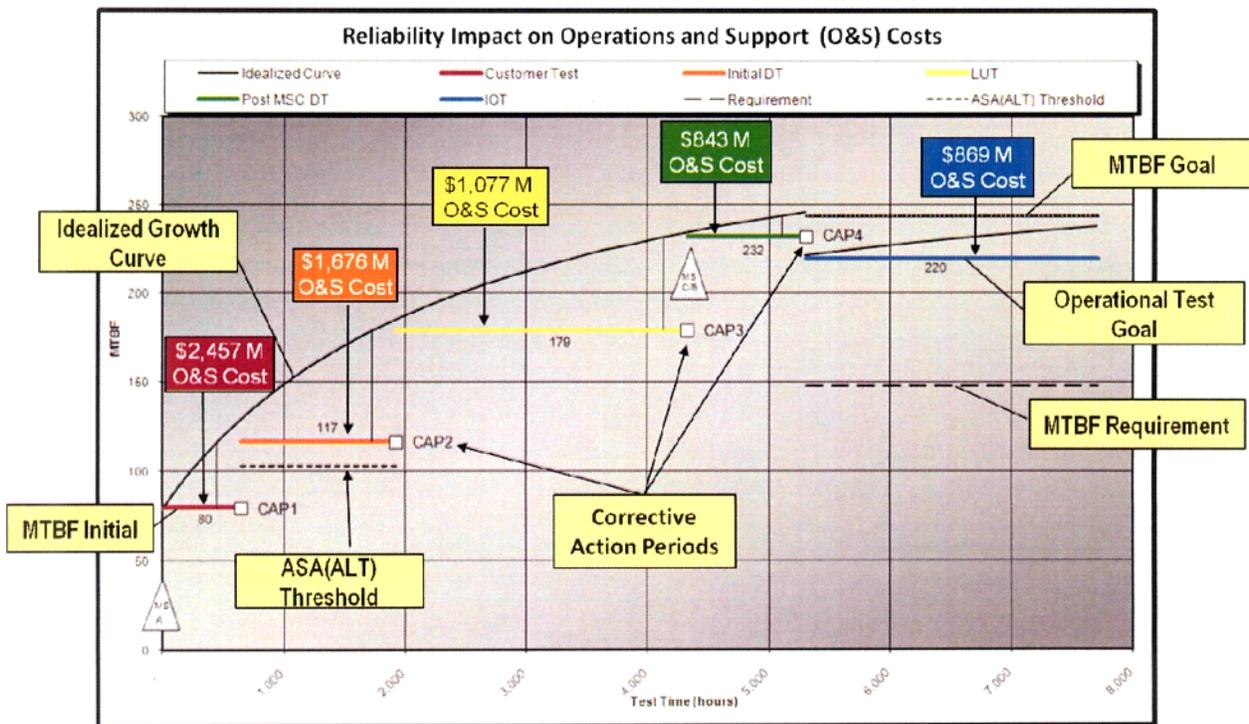
Test Threshold and Reliability Engineering Review Processes

1. Establishing a Reliability Growth Planning Curve: Reliability growth planning is quantified and reflected through a reliability growth planning curve using the Planning Model based on Projection Methodology (PM2).

a. Where warranted by unique system characteristics, the Army Test and Evaluation Command (ATEC), in consultation with the PM, may specify an alternative reliability growth planning method.

b. At a minimum, reliability growth planning should consider the initial and goal reliability targets, test phases, corrective action periods, and reliability thresholds (interim goals to be achieved following corrective action periods). It should also include realistic management metrics, such as Management Strategy and Fix Effectiveness Factor.

c. The operation and support costs must be assessed during the development of the reliability growth planning curve and must accompany all planned levels of reliability achievement (see figure below for a notional example).



Notional Reliability Growth Planning Curve with O&S Costs Annotated at each Achieved Level of System Reliability throughout

d. The reliability growth planning curve shall be included in the SEP, TEMP, and the EMD contract.

e. Sample Design for Reliability (DfR) and reliability growth planning curve contract language will be made available at the Army Center for Reliability Growth website (<http://www.amsaa.army.mil/ReliabilityTechnology/CRG.html>) and will be updated periodically.

2. Early EMD Reliability Test Threshold: Army Regulation 73-1, "Test and Evaluation Policy" requires materiel developers to establish and chair a T&E Working-level Integrated Product Team (WIPT) and prescribes the T&E WIPT membership. PMs will establish a Reliability, Availability, Maintainability (RAM) Subgroup to the T&E WIPT chaired by the PM's designated representative. The RAM Subgroup will include appropriate stakeholder members to include, but not limited to, the user and T&E communities. The RAM Subgroup will develop an EMD reliability threshold for the system.

a. The threshold will be established early enough to be incorporated in the EMD contract.

b. When the RAM Subgroup is unable to establish a threshold, the default value for the threshold value(s) will be 70% of the reliability threshold requirement(s) specified in the Capability Development Document (CDD).

c. The threshold must be demonstrated with a minimum of 50% statistical confidence, calculated using standard confidence level procedures. For unique single-shot programs where sufficient test assets are not available to gain a statistically significant sample size, ATEC and the PM may jointly agree that the 50% statistical confidence requirement can be waived.

d. The threshold shall be approved as part of the TEMP and recorded in the Acquisition Program Baseline at Milestone B.

3. Test and Evaluation Planning: The Test and Evaluation Strategy (TES) and TEMP will include T&E planning for evaluation of the reliability threshold.

a. The TES and TEMP will include the program reliability growth planning curve.

b. The program will be expected to meet or exceed the reliability threshold value at the end of the first full-up, integrated, system-level Developmental Test (DT) event in EMD.

c. The T&E WIPT's RAM Subgroup will define what constitutes this DT event. Earlier DT events may also be needed in order to surface failure modes that are difficult to identify with reliability modeling and simulation.

d. Where appropriate, modeling and simulation activities will be leveraged in all T&E phases to inform the overall reliability assessment.

4. Threshold Assessment: ATEC will conduct an analysis/evaluation of the DT event used to demonstrate the reliability threshold value. If a threshold breach occurs during the DT event used to demonstrate the reliability threshold value, an in-process review led by ATEC will convene to address the following:

a. PM's planning and implementation of Corrective Actions (CA), the projected reliability as the CAs are implemented, and the programmatic impacts.

b. ATEC assessment of the PM's CA plan, the system's limitations/capabilities given the current level of reliability maturity, the projected reliability, and the risk of the program not getting back "on track."

c. ATEC, with support from the PM and the Army Materiel Systems Analysis Activity (AMSAA), will estimate ownership costs impacts of the current and projected reliabilities.

d. The U.S. Army Training and Doctrine Command will assess the utility of the system given its current and projected reliabilities.

5. Early Engineering-based Reliability Program Review: In advance of the threshold DT event, ATEC, with support from AMSAA, will periodically review the materiel developer's reliability documentation, along with available test data, to determine if the system is on a path to achieving the reliability threshold. ATEC will report the findings to the system RAM Subgroup of the T&E WIPT. Such reviews can be timed with key program office events.

a. For programs with a high risk assessment based on the AMSAA Reliability Scorecard, the Commanding General of ATEC will provide the ASA(ALT), thru the Army T&E Executive, a recommendation regarding reliability improvement activities. Coordination through the PM to the Program Executive Officer will occur in advance of the threshold breach report to ASA(ALT).

b. The AMSAA Reliability Scorecard can be obtained by sending a request to amsaa.reltools@us.army.mil.

6. Leveraging Technology Development and Demonstration Activities: The key to successfully demonstrating reliability requirements during EMD is the identification and assessment of the reliability performance of prototypes during technology development and demonstration activities. It is crucial that appropriate reliability-focused pre-Milestone B activities set programs up for success.