DEPUTY UNDER SECRETARY OF DEFENSE FOR
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3500 DEFENSE PENTAGON
WASHINGTON, DC 20301-3500

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MEMORANDUM FOR UNDER SECRETARIES OF THE MILITARY DEPARTMENTS

SUBJECT: Life Cycle Sustainment Outcome Metrics

In July 2006, the Joint Requirements Oversight Council (JROC) established a mandatory warfighter Materiel Readiness/Sustainment Key Performance Parameter (KPP) (Materiel Availability) and identified Material Reliability and Ownership Cost as related Key System Attributes (KSAs) for new acquisitions. Specific definitions of these metrics, as they will appear in the revised Chairman of the Joint Chiefs of Staff Manual (CJCSM) 3170.01C, scheduled for issuance in 1Qtr CY2007, are contained in Attachment 1. Working with your acquisition and logistics offices we have established these KPP/KSA definitions along with a Mean Down Time definition, also provided in the Attachment. Goals for these four materiel readiness outcomes should be established early in the concept decision process, refined throughout the design development process, and then carried through as program baseline goals until system retirement. Status towards these goals should be reported at Program Reviews (DAB, DAES, MRUs, etc).

Additionally, we have at least 14 Life Cycle Sustainment (LCS) "Enablers" (Attachment 2) that tend to be key leverage considerations throughout a program's life cycle. These enablers are important technical and management processes that, when appropriately addressed, positively impact the Materiel Readiness LCS Outcomes. We encourage continuing emphasis on these LCS enablers throughout the weapon system life cycle.

Reporting and use of these outcomes and enablers should begin as soon as practical for all ACAT 1 Acquisition Programs, as well as all major legacy programs currently included in the Defense Readiness Reporting System (DRRS). I request your individual Service Management Information Systems offices work directly with the Defense Acquisition Management Information Retrieval (DAMIR) office to ensure access to this data, with minimal additional workload for the programs. The next revision to DoDI 5000.2 and the Defense Acquisition Guidebook will incorporate the four Materiel Readiness outcome goals and LCS enablers and detailed process for the collection and reporting of these sustainment data items.

The principal point of contact for administration of these Life Cycle Sustainment Metrics is Mr. David V. Pauling, Assistant Deputy Under Secretary of Defense (Materiel Readiness and Maintenance Policy), (703) 697-7980, david.pauling@osd.mil.

Jack Bell

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Attachments:
As stated

Cc:
Army Acquisition Executive
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LIFE CYCLE SUSTAINMENT OUTCOME METRICS

1 MATERIEL AVAILABILITY (Key Performance Parameter (KPP))

Materiel Availability is a measure of the percentage of the total inventory of a system operationally capable (ready for tasking) of performing an assigned mission at a given time, based on materiel condition. This can be expressed mathematically as (the number of operational end items divided by the total population). Materiel Availability also indicates the percentage of time that a system is operationally capable of performing an assigned mission, and can be expressed as (uptime divided by (uptime plus downtime)). Determining the optimum value for Materiel Availability requires a comprehensive analysis of the system and its planned use, including the planned operating environment, operating tempo, reliability alternatives, maintenance approaches, and supply chain solutions. Materiel Availability is primarily determined by system downtime, both planned and unplanned, requiring the early examination and determination of critical factors such as the total number of end items to be fielded and the major categories and drivers of system downtime. The Materiel Availability KPP must address the total population of end items planned for operational use, including those temporarily in a non-operational status once placed into service (such as for depot-level maintenance). The total life cycle timeframe, from placement into operational service through the planned end of service life, must be included.

Materiel Availability (MA) is a number between 0 and 100 that provides the average percentage of time that the entire population of systems is materially capable for operational* use during a specified period.

$$\text{Materiel Availability} = \frac{\text{Number of End Items Operational*}}{\text{Total Population of End Items}}$$

Materiel Availability measures the percentage of the entire population that is operational.

* Operational means in a materiel condition such that the end item is capable of performing an identified mission.

2 MATERIEL RELIABILITY (Key System Attribute (KSA))

Materiel Reliability is a measure of the probability that the system will perform without failure over a specific interval. Reliability must be sufficient to support the warfighting capability needed. Materiel Reliability is generally expressed in terms of a mean time between failure(s) (MTBF), and once operational can be measured by dividing actual operating hours by the number of failures experienced during a specific interval. Reliability may initially be expressed as a desired failure-free interval which can be converted to MTBF for use as a KSA. (e.g. 95% probability of completing a 12 hour mission, free from mission-degrading failure; 90% probability of completing 5 sorties without failure, etc.) Specific criteria for defining operating hours and failure criteria must be provided together with the KSA. Single-shot systems and systems for which other units of measure are appropriate must provide supporting analysis and rationale.

Materiel Reliability = Mean Time Between Failure

$$\text{Materiel Reliability} = \frac{\text{Total Operating Hours}}{\text{Total Number of Failures}}$$

3 OWNERSHIP COST (Key System Attribute (KSA))

Ownership Cost provides balance to the Sustainment solution by ensuring that the Operations and Support (O&S) costs associated with materiel readiness are considered in making decisions. For consistency and to capitalize on existing efforts in this area, the Cost Analysis Improvement Group's O&S Cost Estimating Structure will be used in support of this KSA. Only the following cost elements are required: 2.0 Unit Operations (2.1.1 (only) Energy (fuel, petroleum, oil, lubricants, electricity)); 3.0 Maintenance (All); 4.0 Sustaining Support (All except 4.1, System Specific Training); 5.0 Continuing System Improvements (All). Fuel costs will be based on the fully burdened cost of fuel. Costs are to be included regardless of funding source. The KSA value should cover the planned lifecycle timeframe, consistent with the timeframe used in the Materiel Availability KPP. Sources of reference data, cost models, parametric cost estimating relationships and other estimating techniques or tools must be identified in supporting analysis. Programs must plan for maintaining the traceability of costs incurred to estimates and must plan for testing and

evaluation. The planned approach to monitoring, collecting, and validating operating and support cost data to supporting the KSA must be provided.

Ownership Cost = O&S costs* associated with Materiel Readiness

* Using the CAIG O&S Cost Estimating Structure Selected cost elements:
  - 2.0 Unit Operations (2.1.1 (only) Energy (Fuel, POL, Electricity))
  - 3.0 Maintenance (All)
  - 4.0 Sustaining Support (All except 4.1, System Specific Training)
  - 5.0 Continuing System Improvements (All)

4 MEAN DOWN TIME

Mean Downtime (MDT) is the average Total Downtime required to restore an asset to its full operational capabilities. MDT includes the time from reporting of an asset being down to the asset being given back to operations / production to operate. MDT includes administrative time of reporting, logistics and materials procurement and lock-out/tag-out of equipment, etc. for repair or preventive maintenance.

$$\text{Mean Down Time (MDT)} = \frac{\text{Total Down Time for All Failures}}{\text{Total Number of Failures}}$$

LIFE CYCLE SUSTAINMENT ENABLERS

Defense Acquisition University (DAU) References and Information Links

1. **PERFORMANCE BASED LOGISTICS (PBL)**

   - DAU Acquisition Community Connection (ACC) PBL Site https://acc.dau.mil/CommunityBrowser.aspx?id=18074

   - DAU Acquisition Community Connection (ACC) PBL Toolkit https://acc.dau.mil/CommunityBrowser.aspx?id=22482

   - DAU Acquisition Community Connection (ACC) Sustainment Site https://acc.dau.mil/CommunityBrowser.aspx?id=18073

2. **CORROSION PREVENTION**

   - DAU Acquisition Community Connection (ACC) Corrosion Prevention & Control Site https://acc.dau.mil/CommunityBrowser.aspx?id=32446

3. **ITEM UNIQUE IDENTIFICATION (IUID)/SERIALIZED ITEM MANAGEMENT (SIM)**

   - DAU Acquisition Community Connection (ACC) Item Unique Identification (IDID) Special Interest Area (SIA) https://acc.dau.mil/uid

4. **TECHNICAL DATA/IETM**

   - DAU Acquisition Community Connection (ACC) Interactive Electronic Technical Manuals (IETM) Site https://acc.dau.mil/CommunityBrowser.aspx?id=22427

   - DAU Acquisition Community Connection (ACC) Data Management (DM) Community of Practice (COP) https://acc.dau.mil/dm

Attachment (2)

5. CONDITION BASED MAINTENANCE (CBM+)

- DAU Acquisition Community Connection (ACC) Condition Based Maintenance (CBM+) Site https://acc.dau.mil/CommunityBrowser.aspx?id=32444

A. PROGNOSTICS & DIAGNOSTICS

- DAU Acquisition Community Connection (ACC) Prognostics and Health Management (PHM) and Advanced Diagnostics Site https://acc.dau.mil/CommunityBrowser.aspx?id=128766

B. RELIABILITY CENTERED MAINTENANCE

- DAU Acquisition Community Connection (ACC) Reliability Centered Maintenance (RCM) Site https://acc.dau.mil/CommunityBrowser.aspx?id=111386

6. CONTINUOUS PROCESS IMPROVEMENT (CPI)

- DAU Acquisition Community Connection (ACC) Continuous Process Improvement (CPI) Site https://acc.dau.mil/CommunityBrowser.aspx?id=22426

7. TITLE 10 REQUIREMENTS/ 50/50, Partnering

50/50

- DAU Acquisition Community Connection (ACC) Depot Level Maintenance (Title Ten Requirements and 50/50) Site https://acc.dau.mil/CommunityBrowser.aspx?id=32452

Partnering

- DAU Acquisition Community Connection (ACC) Public-Private Partnerships (PPP) Site https://acc.dau.mil/CommunityBrowser.aspx?id=22413

8. DEPOT MAINTENANCE PLAN

- DAU Acquisition Community Connection (ACC) Depot Level Maintenance Site https://acc.dau.mil/CommunityBrowser.aspx?id=32452

9. DIMINISHING MANUFACTURING SOURCES AND MATERIAL SHORTAGES (DMSMS)/OBSOLESCENCE PLAN

- DAU Acquisition Community Connection (ACC) Diminishing Manufacturing Sources and Material Shortages (DMSMS) Site https://acc.dau.mil/CommunityBrowser.aspx?id=32245

- DAU Acquisition Community Connection (ACC) Aging Systems Site https://acc.dau.mil/CommunityBrowser.aspx?id=22415

- DAU Acquisition Community Connection (ACC) Obsolescence Management Site https://acc.dau.mil/CommunityBrowser.aspx?id=32247

- DAU Acquisition Community Connection (ACC) Continuous Modernization Site https://acc.dau.mil/CommunityBrowser.aspx?id=32248

- DAU Acquisition Community Connection (ACC) Technology Insertion Site https://acc.dau.mil/CommunityBrowser.aspx?id=32703

- DAU Acquisition Community Connection (ACC) Lead Free Electronics/Solder Site https://acc.dau.mil/CommunityBrowser.aspx?id=32257

10. TRAINING

- DAU Acquisition Community Connection (ACC) Training and Training Support Site at https://acc.dau.mil/CommunityBrowser.aspx?id=32726

11. INTEGRATED SUPPLY CHAIN MANAGEMENT (SCM)

- DAU Acquisition Community Connection (ACC) Supply Chain Management (SCM) Site https://acc.dau.mil/CommunityBrowser.aspx?id=22412

12. RADIO FREQUENCY IDENTIFICATION (RFID)

- DAU Acquisition Community Connection (ACC) Radio Frequency Identification (RFID) Site https://acc.dau.mil/CommunityBrowser.aspx?id=22423

13. PREDICTIVE MODELING

- DAU Acquisition Community Connection (ACC) Systems Engineering Modeling and Simulation (M&S) Site https://acc.dau.mil/CommunityBrowser.aspx?id=19343

14. LONG TERM PERFORMANCE BASED AGREEMENTS (PBA)

- DAU Acquisition Community Connection (ACC) Performance Based Agreements (PBA) Site https://acc.dau.mil/CommunityBrowser.aspx?id=46649

- DAU Acquisition Community Connection (ACC) PBL Toolkit Performance Based Agreements (PBA) Site https://acc.dau.mil/CommunityBrowser.aspx?id=32525