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Air Force Materiel Command

War-Winning Capabilities ... On Time, On Cost



Unclassified Informational Brief

Multi-Echelon Modeling for Improved Supply Chain Performance

Selected Essential Item Stock for Availability Method (SESAME) to "right-size" DoD inventory

HQ AFMC/A8S Mrs. Deb Hileman/Mr. Greg Gehret 11 Jun 07 DSN 787-4535

Integrity ~ Service ~ Excellence





- Why DOD needs multi-echelon modeling
- Background on Air Force Inventory Efficiency
- What is Multi-echelon modeling
- Multi-Service Effort to Implement Multi-Echelon Modeling using SESAME
- Status of SESAME, Multi-Echelon Model, Pilot at Ogden Air Logistics Center
- Summary



- Enterprise view of supply chain optimizes inventory levels system-wide
 - The right level of the right part at the right location
 - Money, Money, Money...
- 1. Silver, Pike, Peterson, "Inventory Management and Production Planning and Scheduling"
- 2. CACIs (working with MCA's SPO) website: "Readiness-based Sparing Benefits"



Multi-Echelon Models What do they do?





Historical perspective:

- Where we were: Pre COLT, very little mass AF/DLA collaboration
- Where we are: With COLT (single echelon), AF and DLA data collectively yields better performance for the same Cost
- Where we need to be: Multi-echelon models will further improve performance bringing it closer to the mathematically optimal solution



Why Multi-Echelon Models What do they look like?





Background on Air Force Inventory Efficiency (AFIE) Pilot

• AFIE, response to PBD 422, focused on bullet 2:

"Directs Army, Navy, Air Force, and DLA to plan to eliminate retail operations..."

- AFIE pilot began at OC-ALC Jun 03; ≈ 3K NIINs
- AFIE pilot began at OO-ALC Aug 04; ≈ 2.5K NIINs
- AFIE had two goals:
 - Reduce AF "duplicative" stock (save inventory \$)
 - Maintain warfighter support (no degradation to support)



Background (cont'd)

How is support for Consumable Items measured?



Customer Wait Time

- CWT relates how long maintainance has to wait for part
 - Affects scheduling and resource allocation at the ALCs
 - Affects timing of LRUs/SRUs repair for ALCs and bases
 - Affects PDM line (shop flow) at the ALCs
 - Affects MICAP Hours at the bases



Background (cont'd) Current AFIE Level Setting Process





Background (cont'd) Where We Are ... AFIE – Support







Background Summary:

- AFIE may have reduced inventory; however, at a substantial degradation to warfighter support
- AFIE current business rules are not RBS
- AF/DLA working to inject RBS into AFIE
- This pilot offers a unique opportunity for DoD to 'lean forward' on BRAC recommendations





Create a joint AF/DLA process that would link DLA inventory investments with AF support



Adding RBS to AFIE meets the full intention of PBD 422





- RBS model will set a better mix (breadth and depth) of "consumable" levels
 - Lack of part means waiting DLA procurement Lead Time
- Near immediate impact to maintenance:
 - LRUs/SRUs repaired in timely fashion



Reduced LRU repair time = increased Ao



How can we "fix" AFIE (cont'd)

CWT on Consumable Items Affects Many Weapon Systems

- State HATERIEL COLUMN
- EBOs on Line Replaceable Units (LRUs) are the basis for calculating Aircraft Availability (Ao)
- The relationship between Ao and EBOs:

EBOs/Number of Aircraft ≈ -In(Ao) CWT is related to EBOs: ECWT (in days) = EBOs/Daily Demand Rate





Inventory Systems...future supply chain what would SESAME do?



<u>*Level₁, *Level₂, and Level₃: determined by SESAME (via marginal analysis trade-offs)</u>

**EOQ₁, EOQ₂, and EOQ₃: determined by SESAME ROP₁, ROP₂, and ROP₃: determined by SESAME

Simultaneously determines the right levels at the right locations to achieve the targeted ECWT at the least DoD cost

 \ast another option in SESAME is to use Expected Fill Rate in lieu of Level

** EOQ1 can be either an input to SESAME or computed by SESAME (as Wilson EOQ)







SESAME is a Multi-Echelon, Multi-Indenture Inventory Model that determines the Optimal Range and Depth of Spares and Repair parts at all locations in order to meet either a Weapon System/End Item Budget Constraint or Operational Performance Target





CWT

for

Pilot



SESAME Objective Function



Find Least Cost set of spares by location, which achieves backorder/CWT target

Tradeoff, over all items at all locations, Backorder/CWT Reduction at User Echelon for increased stock cost



Data needed for SESAME Pilot general flow diagram







Using SESAME on Ogden's AFIE items





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97 additional DoDAACs

AF Maintenance



Multi-Service Effort to Implement Multi-Echelon Modeling



- DLA recognized a gap in the Wholesale tool-set for Retail management and stood up a multi-service IPT to investigate implementing Multi-Echelon Modeling
- The Multi-Service IPT supports a plan to fill the gap in the DLA tool-set by using an existing Service (Army) model while DLA works the long-term Inventory Policy Optimization (IPO) implementation in BSM
- The use of a proven RBS tool, Selected Essential Item Stock for Availability Method (SESAME) was accepted by the IPT
- The IPT recommended use of SESAME to determine AF/DLA levels for OO-ALC AFIE items (2530 Items)



- Analysis completion expected end of Jun 07
- Implementation Alternatives/Issues
 Determination
- Brief AF and DLA to obtain implementation approval with discussions on metrics
 - Already have GO support for the initiative
 - Tools exist within BSM to change levels settings
- Further expansion across USAF remains TBD





- Timeline for DLA to have multi-echelon modeling capability still unknown
 - Limited Service budgets won't allow us to wait
- In the interim use SESAME
 - Proven multi-echelon Army model
 - No new development, can use "off-the-shelf"
- Potential to generate BRAC savings
- Implementing near-term is "Do-able" based on out pilot results

Improve warfighter support without increasing costs

