



TACOM

Life Cycle Management Command



Fielding the New Sustainment Concepts DoD Maintenance Symposium

28 October 2008

Agenda



- Building Health Management for Ground Systems
- Vehicle Health Management System
- Condition Based Reliability Analysis (CoBRA)
- Making the Business Case
- Benefit to the Army/Warfighter
- Path Forward
- Systems Engineering
- Summary

Building Health Management



Paper Logbook

Today's Health Management

IETM Diagnostic Troubleshooting

1 MSD/3 Mechanics

STE/ICE



Platform Information:

Digital BCT, Electronic Technical Manuals, Built In Test / Fault Isolation Test, Vehicle Diagnostic Management System

Digital Platforms:

Digital Architecture, Data Collectors

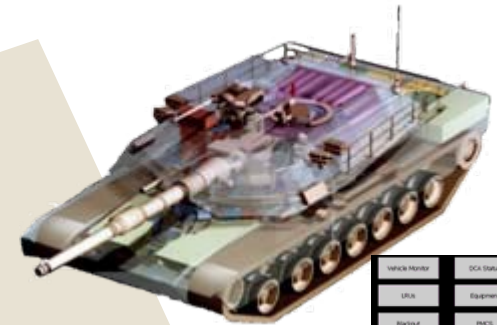
Conditional Based Maintenance:
Fact Based, Trend Analysis

VHMS:

ED, Self Reporting, Self Monitoring

Prognostics:
Predictive Maintenance

Desired Endstate



Vehicle Model	CCA Status
M1A1	Equipment
Blackout	PHC
Various	Back

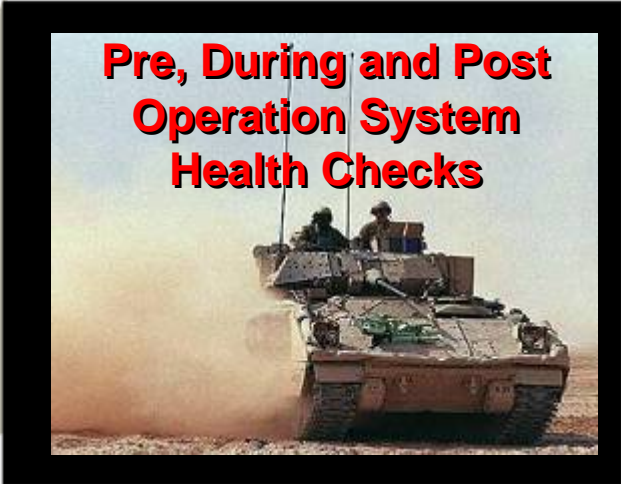


Commonality Opportunities - Technologies, Products, & Components

Vehicle Health Management System



Wireless Data



IETM



PM HBCT Test & Evaluation of Condition Based Maintenance (CBM+) Condition Based Reliability Analysis (CoBRA)

- Functional data from electronic control modules
- Platform sensors and Data
- Automatic data collection, storage and transmission (transparent to the unit)
- Unique item tracking to key components
- Maintenance and Logistics analytical tools and reports
- Correlate Maintenance actions with data collected
- Risk reduction with Fort Knox Fielding
- Establishes the foundation for the LCMC CBM+ Capability

Vehicle Configurations

Ongoing at Ft Knox



Vehicle Configurations

1CAV 3 BDE



CoBRA – *Test & Evaluation*



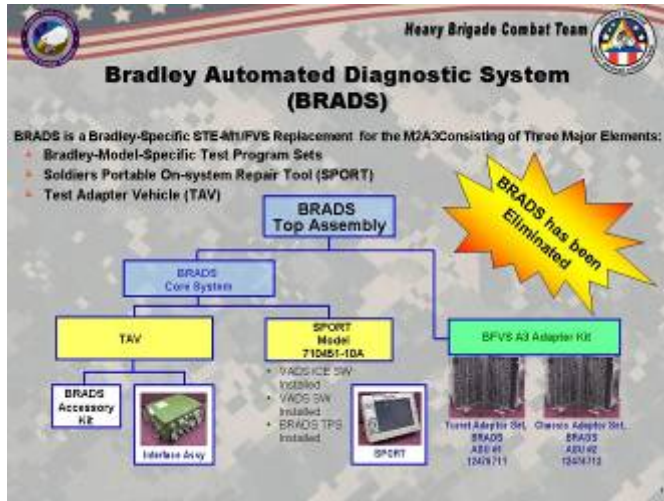
- Collecting Sensor Data
 - Vehicle Data Repository (VDR)
 - Enterprise Service Bus/Systems Open Architecture
- Aberdeen Proving Ground Tested & Approved



- Stakeholder Collaboration
 - Academia
 - DA G4/LIA
 - LOGSA
 - AMCOM LCMC
 - FCS
 - CASCOM
 - CECOM LCMC
 - AMRDEC
 - TARDEC
 - ARDEC
 - AMSAA
 - OEMs



Making the Business Case for Ground Systems



M2A3

- Embedded Software Replaces Bradley STE-M1/FVS

M1A1

- Embedded software tests all operational functions that can be verified without operator interaction or external input/manipulation

Key Tests	Carry-on Equip		Reduction	
	CBM+	CBM+	Minutes	%
1040	68	9	59	87%
1103	63	16	47	75%
1240	68	7	61	90%
1300	68	10	58	85%
1438	66	8	58	88%
1800	210	90	120	57%
Self Test	43	7	36	84%

Most Tests will be reduced a further 30% by the end of the year

Stryker

- Physical Tear Down Analysis of Component
- Used Available Data and Reliability Centered Maintenance (RCM) Techniques
- Developed Spindle Diagnostic Algorithm and Tool
- Deployed Worldwide; 40 Minutes per Vehicle

Benefit to the Army/Warfighter



Linking the Warfighter & Logician

CFLCC Command Center



Tactical



Vehicle Monitor	DCA Status
LRUs	Equipment
Blackout	PMCS
Versions	Back



Course of Action

Allows the user to **project supply consumption** for a given COA by event or across time. This feature assists in training, planning, and execution.

“Can I logistically support the fight?”

Combat Power

Gives the commander the latest **available status** of critical weapon systems, fuel, ammunition, and personnel.

“What can I put into the fight and when?”

Health Management

Health Management provides systems the latest available **Real Time** platform health status of fuel, ammunition, diagnostics and personnel.

“What is my Operational Availability?”

Fleet Management

Uses information that will achieve **Prognostics/Conditioned Based Maintenance**, will lower OS Costs, provide for trend analysis

“What is the status of my Fleet?”



Path Forward



From This...

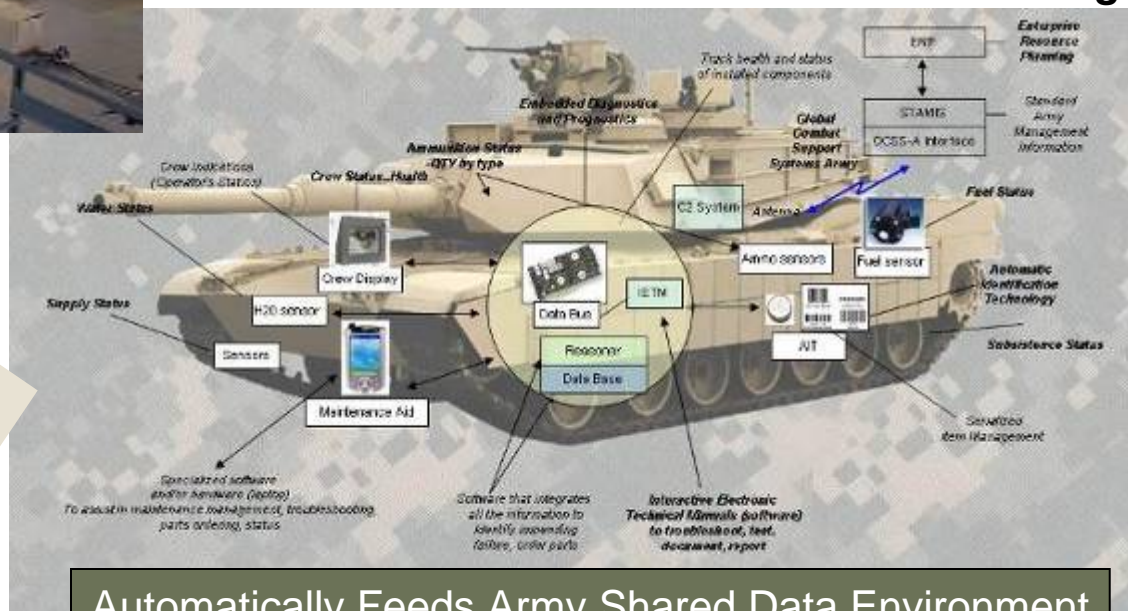
To This...

Sensor Based

Self Monitoring

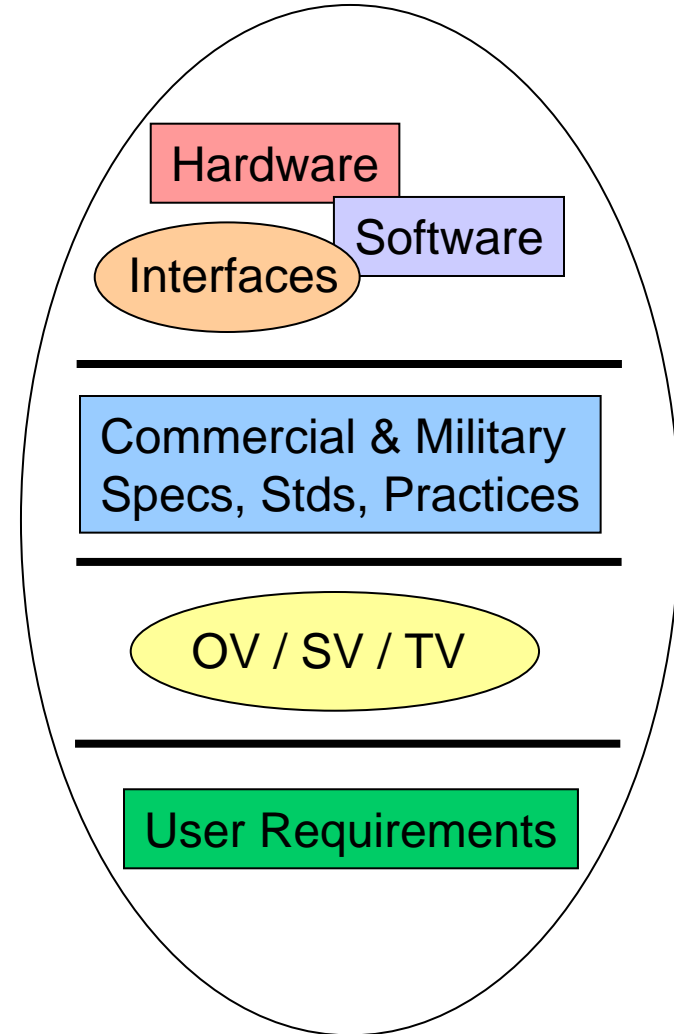
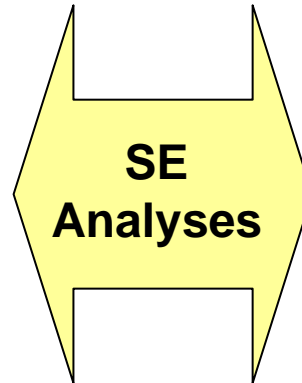
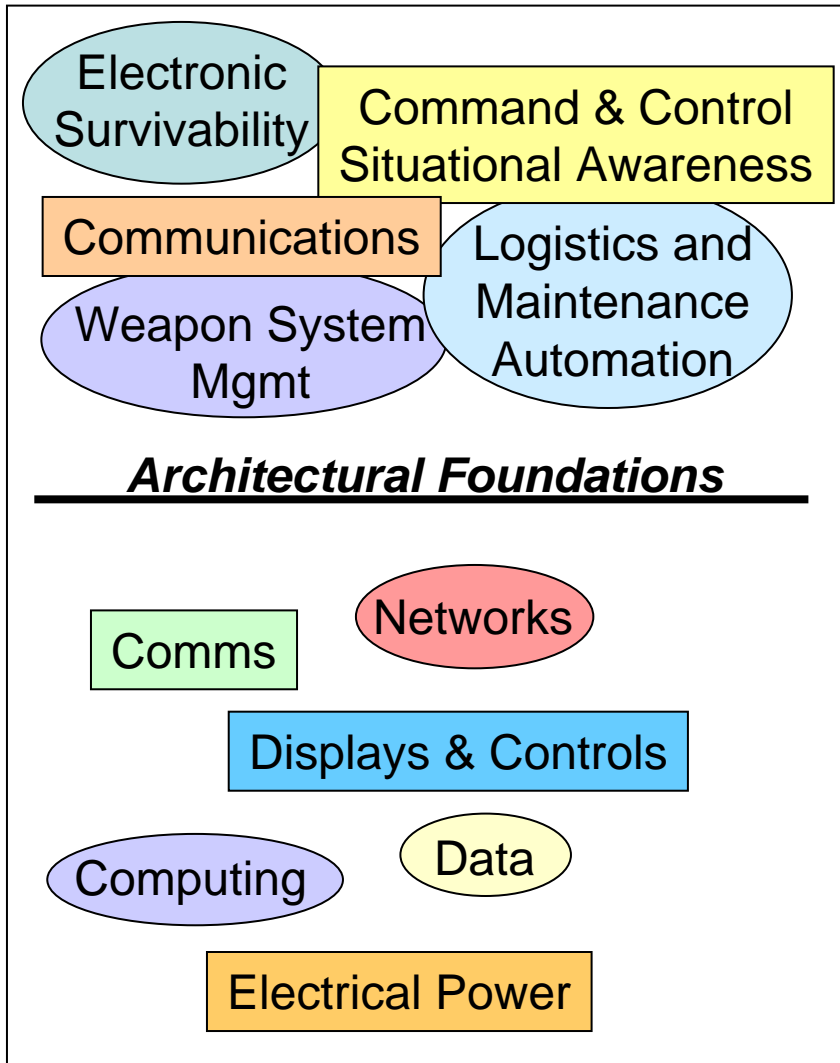
Self Reporting

Self Validating



Automatically Feeds Army Shared Data Environment

Systems Engineering Trade Space



Goals to a Common Solution

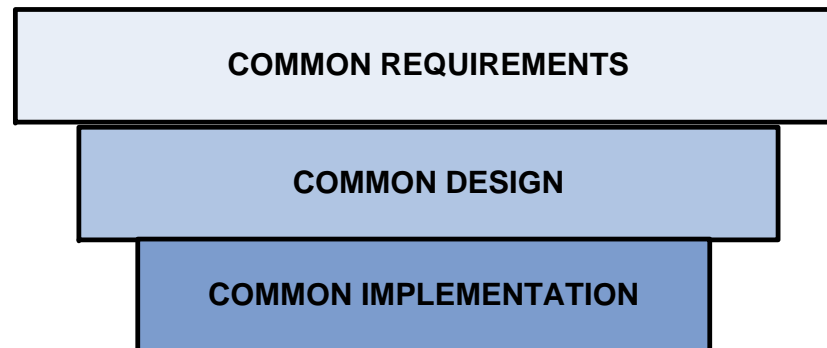


- **Improve Situational Understanding of System Status**
- **Increase Mission Readiness Through Proactive Vehicle Health Management**
- **Reduce Overall Sustainment Costs**
- **Maximize Future Combat Technology Integration Capability**
- **Commonality Across Commodity Platforms**
- **Interoperability with C2 and Support Systems**
- **Minimal SWAP footprint**
- **Measurable and verifiable improvements**
- **Best Technical Solutions!**

Building Commonality



- Three Levels of Commonality
 - Common Requirements
 - Drive common functionality, common look and feel
 - Common Design
 - Common Architectural Design Supports Common Implementation
 - Common Screen Designs Support Common Look and Feel
 - Common Implementation
 - Same Applications Across Systems



Development Approach



- Top-Down Common Architecture development with consideration of existing system designs
- Opportunities for diagnostic and prognostic improvements are analyzed from “bottom-up”
- Common Development Performed in Parallel with Platform Specific Development
 - Common efforts are performed only once and usually lead final platform architecture
- Incremental Design, Implementation, and Test

Summary



TACOM LCMC is:

- Implementing CBM+ using Systems Engineering processes
- Participating in defining Army CBM IT and communications and Common Logistics Operating Environment (CLOE) requirements
- Going to do what makes sense for ground systems

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