



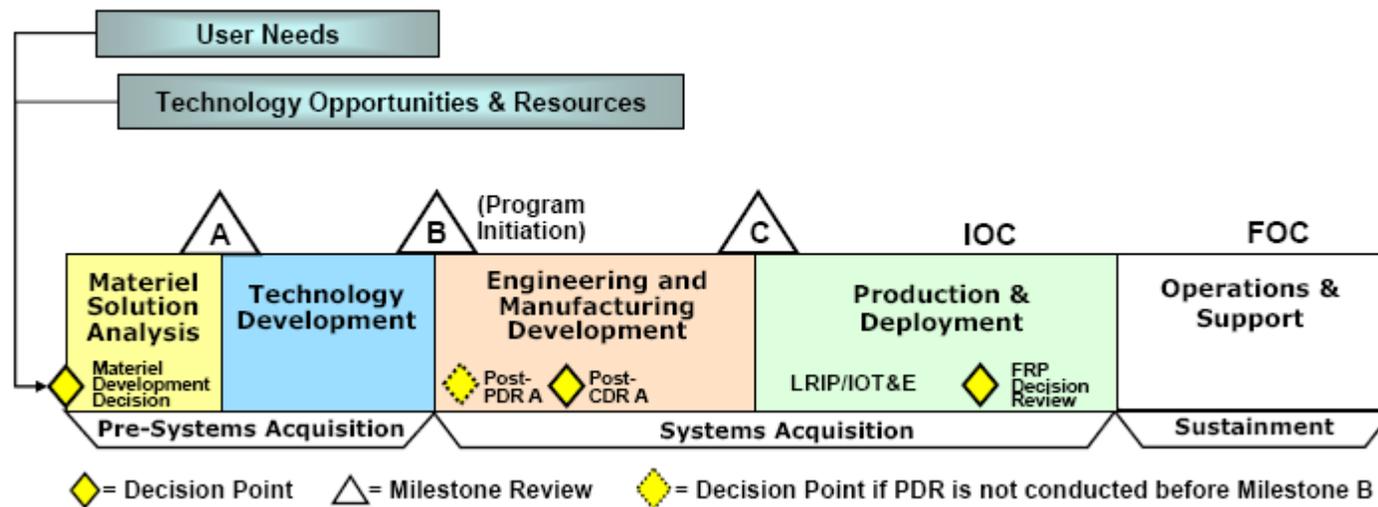
HSI in Light Tactical Vehicles: Opportunities, Challenges and Path Forward



Paul Munya, ARL-HRED
Cindy Whitehead, NSWCDD
Chelsey Lever, NSWCDD

Agenda

- ▶ Comparisons with other vehicle programs
- ▶ Background
- ▶ HSI Through Milestone B
- ▶ HSI Beyond Milestone B



Comparisons with other wheeled vehicle programs

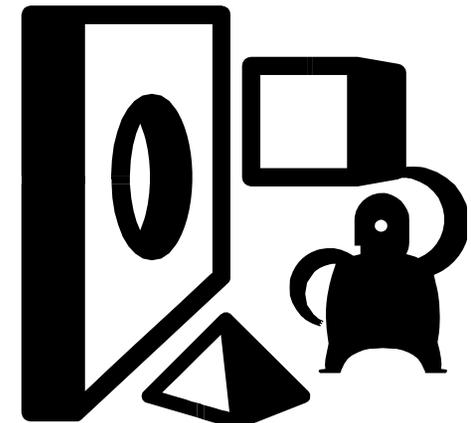
- ▶ HMMWV reset
 - Integration of HSI done by ECP in response to urgent needs
 - Impacts on cost and performance
 - No programmatic approach to HSI issue tracking and mitigation tracking
- ▶ MRAP
 - Urgent needs program
 - HSI issues fixed via ECP
 - Issues with seats, flooring, emergency egress, aisle sizing, gunner restraint system, blast restraints



Lessons Learned from other wheeled vehicle programs

▶ HMMWV & MRAP

- Design challenges at onset
 - Evolutionary development to cope with rapid changes
 - Soldier machine interface problems
 - Poorly understood HSI requirements
 - Designs are not scalable for new technologies
 - Sequential rather than concurrent engineering
 - Mismatch of user manpower and skill profiles with system design solutions



Lessons Learned from other wheeled vehicle programs

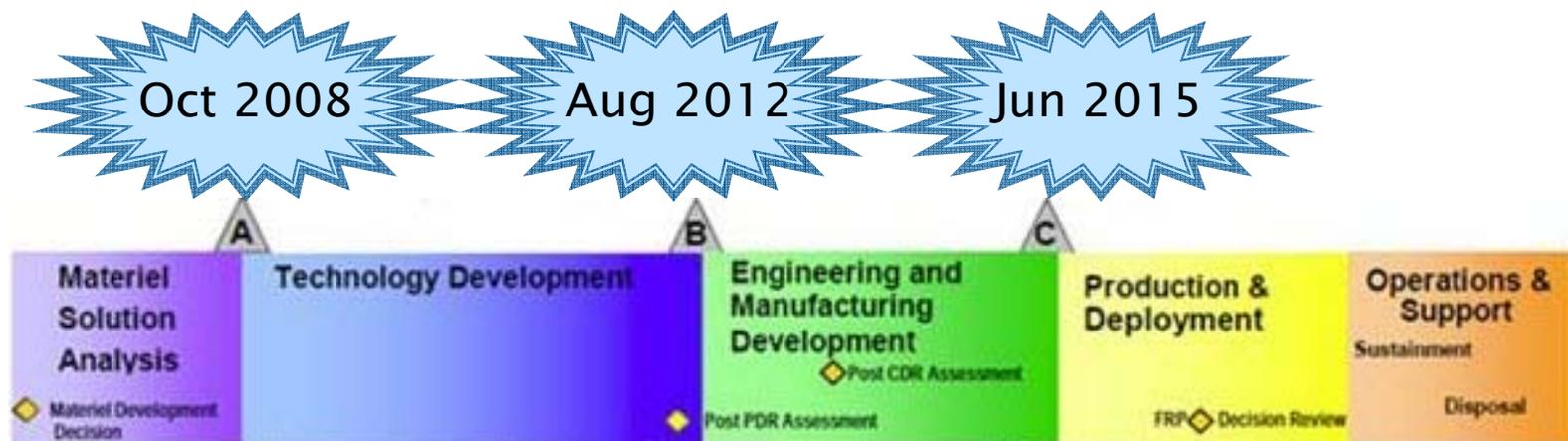
▶ HMMWV & MRAP

- Programmatic challenges at onset
 - Marginalization of the HSI risk
 - Limited HSI resources in the Program Office
 - Lack of program approved MANPRINT/HSI plans during acquisition



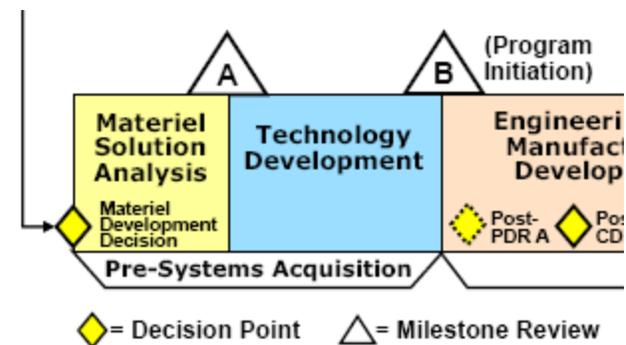
Joint Light Tactical Vehicle

- ▶ US Army and US Marine Corps
- ▶ New start acquisition
- ▶ Competitive prototyping



Joint MANPRINT/HSI Working Group

- ▶ MANPRINT/HSI Working Group (WG)
 - Purpose
 - HSI objectives and metrics
 - Membership & Charter
 - Organization
 - Chartered under SE IPT
 - Managed by the SIPT



HSI Through TD Phase

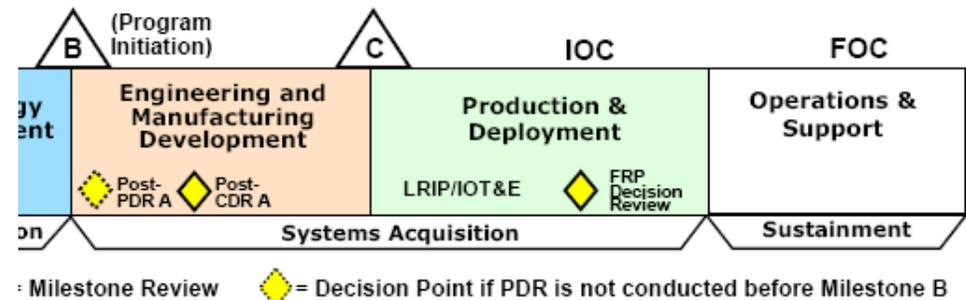
- ▶ HSI-specific products
 - System MANPRINT/HSI Management Plan (SMMP)
 - HSI Issues Log
 - Risk process/Risk Recon
 - MIL-STD-1472 Gap Analysis
- ▶ PD Requirements
 - Specific, objective, testable requirements
 - Cross-walked with CDD
- ▶ RFP/SOW
 - Contractor required activities and schedule
 - CDRLs
- ▶ ILA
- ▶ Milestone B documents
- ▶ Test and Evaluation
 - Ride & Drive
 - Limited User Test



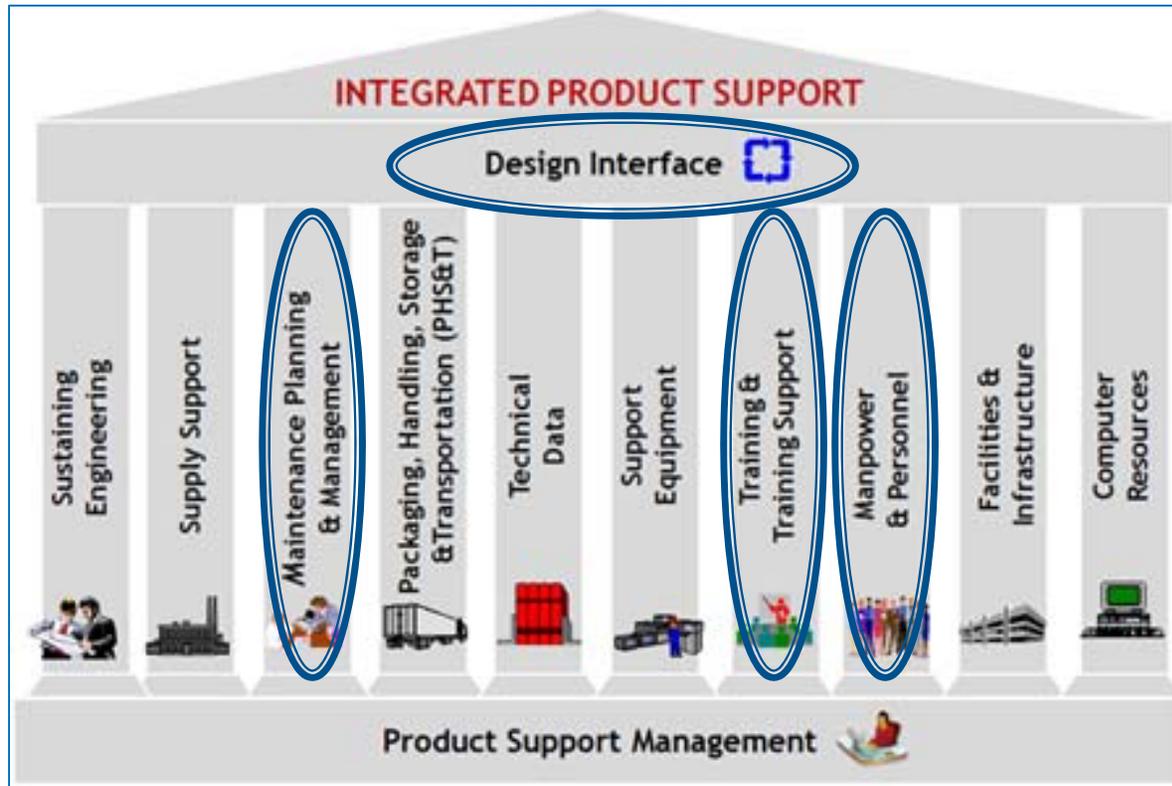
JLTV Technology Development Phase
Vehicles Displayed

HSI Through EMD Phase

- ▶ Update
 - System MANPRINT/HSI Management Plan (SMMP)
 - HSI Issues Log
 - Risk process/Risk Recon
 - Milestone C Documents
 - ILA
- ▶ Maintainability Audit
 - A process, not a single event
- ▶ Test and Evaluation
 - Shakedown testing
 - Limited User Test
- ▶ RFP/SOW for LRIP
 - PD requirements
 - Contractor activities and schedule
 - CDRLs



Logistics



AFFORDABILITY

CONTROLLING
COST GROWTH

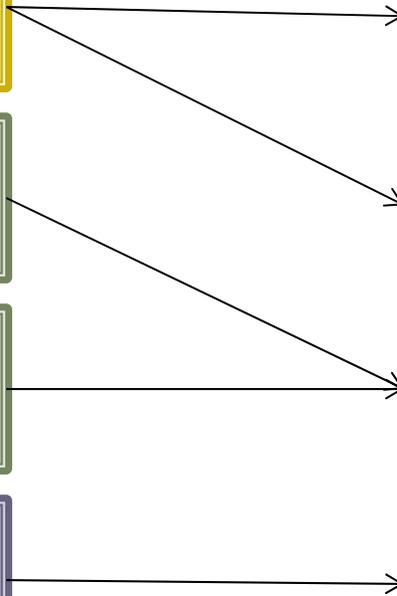
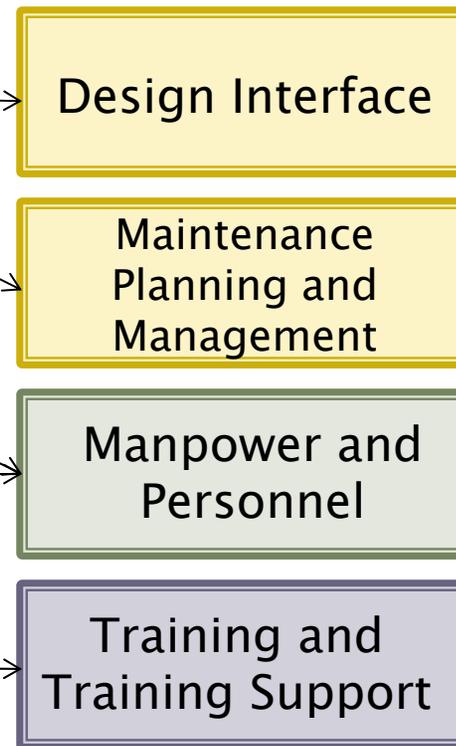
INDUSTRY
INNOVATION

HSI and Logistics

HSI Domains



IPS Elements



HFE Efforts

- ▶ Maintainability Audit (MA)
 - Using FSRs and TIRs
 - MTTR
 - Level of effort
 - Accessibility
- ▶ Logistics Demonstration (LD)
 - Using Warfighters and surveys
 - Tech manuals



Design Interface

2.0 Design Interface	Milestones		
ASSESSMENT CRITERIA	B	C	FRP
2.1 Parts and Materials Selection			
2.1.1 Design guidelines for the contractor are provided that optimize supportability and maintainability of the system. The degree of adherence to the design guidelines for supportability and maintainability should be assessed at PDR and CDR (ref DoDI 5000.02).	F	U	U
2.1.4 A parts standardization program has been implemented. Standard parts and equipment are those currently in the DoD inventory or produced in accordance with nationally recognized industry, international, federal, or military specifications and standards (ref 10 U.S.C. Section 2451, DoD 5000.02).	IP	F	U
2.2 Testability and Diagnostics			
2.2.2 Detailed BIT and testability analysis is completed by CDR, and BIT effectiveness is validated with tests.		F	



Maintenance Planning and Management

5.0 Maintenance Planning and Management	Milestones		
ASSESSMENT CRITERIA	B	C	FRP
5.1 Maintenance Concept, Design & Analysis			
5.1.1 Accessibility, Human Factors Engineering (HFE), diagnostics, repair and sparing concepts for all maintenance levels are established (ref. DoDD 4151.18, MIL-HBK-470A).	F	U	U
5.1.2 Requirements for manpower factors that impact system design utilization rates (e.g., maintenance ratios) are identified.	F	U	U
5.2 Maintenance Planning and Plan			
5.2.8 Maintenance planning documentation identifies: <ul style="list-style-type: none"> • Tools and test equipment by task function and maintenance level • Category codes (e.g., SMR codes, etc.) • Manufacturer's part numbers, cage codes, nomenclatures, descriptions, estimated prices, and recommended S&TE quantities, including logistics (e.g., technical data, spares, test equipment) for S&TE 	I	IP	F



MPT Efforts

- ▶ MPT IPT
- ▶ Manpower Estimate Report
- ▶ MPT Plan of Action and Milestones (POA&M)
- ▶ MA and LD
 - Levels of maintenance
 - Tech manuals to training



Manpower and Personnel

10.0 Manpower and Personnel			
ASSESSMENT CRITERIA	B	C	FRP
10.1 Human Systems Integration (HSI)			
10.1.2 Broad cognitive, physical, and sensory requirements for the operators, maintainers, and support personnel that contribute/constrain to total system performance have been analyzed.	IP	F	U
10.1.3 An HSI plan has been developed, executed, and maintained, and has been coordinated with subsystem HSI plans and the overall SEP.	IP	F	U
10.2 Manpower and Personnel			
10.2.1 A Manpower Estimate (ME) for the operation and maintenance of the program has been developed for all programs (Manpower Estimate Report for ACAT I programs) (ref DoDI 5000.02).	F	U	U
10.2.3 Maintenance and calibration task times, maintenance and calibration skill levels, and number of maintenance and support provider personnel required have been derived from task and “workload” analyses.	IP	F	U



Training and Training Support

9.0 Training and Training Support			
ASSESSMENT CRITERIA	B	C	FRP
9.1 Training Analysis and Planning			
9.1.1 A Training Planning Process Methodology and Front End Analysis is conducted.	IP	F	U
9.2 Training Materials			
9.2.1 Technical publications are developed prior to the development of training materials.	I	IP	F
9.3 Training Product and Support			
9.3.1 Training devices and simulators to support operator, maintainer, or calibration training are identified if needed.	IP	F	U



HSI/MANPRINT challenges

- ▶ Program HSI/MANPRINT challenges
- ▶ Mitigation plans
- ▶ Opportunities to influence design



Impact of HSI

- ▶ Better EMD requirements
- ▶ Overcome problems with legacy platforms
- ▶ Support to operator and maintainer
- ▶ Increased visibility with program office
- ▶ Improved relationships with other services, HSI domain SMEs, and IPT reps
- ▶ Cost savings over lifecycle

