NDIA TWV Conference

TWV Transformation Efforts

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Evolution of Light Tactical Vehicles

Input to JLTV timeline

Market Research (EMIP & PSD)

Science & Technology programs
  - Army and ONR S&T
  - FTTS ACTD Overview
  - MSV and UV Vehicle Capabilities and Lessons Learned
  - ONR S&T Support to JLTV
  - CTV Technology Demonstrator

Who’s Who in JLTV Program Planning

Current JLTV Acquisition Schedule

Summary
Light Tactical Vehicle Evolution: Jeep to JLTV

<table>
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<tr>
<th>Year Range</th>
<th>Model</th>
<th>Technology Improvements</th>
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<tr>
<td>1959-1984</td>
<td>M151</td>
<td>Redesigned for the Military. Featuring a longer wheelbase, softer ride, more powerful engine, manual transmission, and four wheel independent suspension</td>
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<td>1993-?</td>
<td>M1114/M1151</td>
<td>Expanded Capacity Vehicles (1993-present) 5,100 lb. payload (M1113, M1151/1152, incl. crew) Heavy Up-Armored HMMWV (M1114 UAH)</td>
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<tr>
<td>2010-Future</td>
<td>JLTV FOV</td>
<td>Integrated Survivability (Armor), Integrated C4ISR (space, weight, power) Net Payload Capacity with Armor Improved Mobility with and without Armor</td>
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Today’s Light Vehicle is More Complex - Modernization Cycles Accelerating
Differences between HMMWV & JLTV Programs

- Governance Army Only
  - MDA is PEO CS&CSS
  - Mandatory reports fewer
  - Initiatives
    - Add on Armor
    - Safety

- Governance Joint Services
  - User Community
    - AMCB
    - TRADOC/MCCDC
    - GOSC
    - Joint Staff
  - DAB/OIPT Members
  - Secretary of the Army
  - Secretary of the Navy
  - HQMC/CG MCSC

- MDA is DAE
- Mandatory reports greater
- Initiatives
  - Concept Decision
  - Time Defined Acquisition
  - Fuel Reduction
  - Companion trailers designed to integrate with FOV
Joint Light Tactical Vehicle (JLTV) FOV Inputs

BLUF: Efforts will enable us to be smarter requirements and specification writers
EMIP and PSD Demonstrations
Open to Industry

Market Education – not Source Selection

- EMIP held demonstrations for 145 technology ideas during 2006
- YUMA, AZ Jan 06 and Three Quarterly Demos at Warren
- Process continuously demonstrates mature component technologies (lower risk)
- Useful to JLTV CDD and CPD as well as Current Fleet Technology Insertion
- Next EMIP Technology Application Idea deadline 16 Feb 07 for April Demos
- Technology Priorities
  - Improved Safety
  - Improved Survivability
  - Improved Reliability, Maintainability, and Supportability
  - Distribution and Mission Enhancements

- PSD reviewed 32 systems during Aug 06 in Dec 07 reviewed the FTTS UVs and MSV with companion trailers
- Final report due Feb 07 to TWV BOD
- Demos invaluable in providing insights into potential performance which will support requirements development
  - Eg: GVW approaching 19,000 lb appears essential to meet LTAS protection and payload requirements
  - Eg: Power to weight ratio of 30HP/Ton appears essential to meet or exceed objective speed/acceleration requirement
  - Eg: GVW breakpoint for soft soil mobility appears to be in the 16,000-17,000 lbs range
  - Eg: Transportability by Helo and C-130 are further challenging constraints

EMIP review
EMIP click blue box for collage

PSD Overview (click box for movie)

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FTTS ACTD funded two contractors to develop Utility Vehicle Demonstrators
- Specifications based on FCS requirements
- Currently leveraging ACTD to support JLTV program
  - FTTS ACTD has and is transitioning information (Phase 1 M&S) to JLTV Requirements process and will continue with existing scope
  - FTTS ACTD Phase 2 will demonstrate JLTV Utility Vehicle “like” Mission Role Variant from two Tier 1 suppliers in an Operational Environment (Ft. Lewis)

ONR S&T complements ACTD outputs by funding five additional vendors M&S to assess JLTV specific requirements contained in draft CDDs (30 Nov 06)

ONR will demonstrate a JLTV Combat Tactical Vehicle Variant

**Combined Army/USMC S&T will have provided 11 vendor’s detailed M&S and 4 clean sheet of paper demonstrators prior to JLTV MS B - reducing program risk and helping shaping Future TWV requirements**
Survivability & Force Protection
- Monocoque cab
- Modular armor kit
- Front, rear and side cameras
- NBC system
- Collision avoidance
- 2 person cab

Network Centricity
- Integrated communications suite
- Integrated computer system

Sustainability
- 30 kW exportable AC power
- Enhanced on-board diagnostics
- Lube for life (bushings & bearings)

Transportability
- 96"W x 102"H x 406"L
- C-17 transportable
- 49,000 lbs. Curb weight
- 75,000 lbs. Gross vehicle weight

Mobility
- Parallel hybrid electric propulsion
- Air suspension height control (ASHC) and load monitoring system (LMS)
- Central tire inflation system (CTIS) / run-flat
- Anti-lock braking system (ABS)

Payload
- 13 Tons - Residual payload w/B kit

Distribution
- Multi-functional LHS & MHE crane hook lift and a forklift
- 6,100 lbs at 23 feet MHE
- 13,200 lbs at 24’ 3” LHS

Operational Range
- 300 miles

- C9 8.4L engine (335 kW @ 2200 rpm)
- 4 NiMH batteries 8.5 amp hrs, 336 Volts
- Integrated starter/generator (ISG) 120kW peak, 100 kW continuous
- 7 speed hydrokinetic automatic transmission

Commonality with MSV
- Axles, suspension, wheels, tires, brakes, ABS, Central Tire Inflation System (CTIS), 24 Volt CAN/Bus System

Distribution
- Receives flat racks and ISO containers from Truck Load Handling System (LHS)
- Move loads and trailer without truck

Mobility
- 3 axle with semi-autonomous operation
- Steering on Axle #1 and #3
- Turning radius (Autonomous): 20 ft-8 in
- Max speed 1.89 MPH
- Vertical Obstacle 24 in Step
- Gradient (Autonomous) – 30%
- Air Bag Independent Wishbone Suspension with ride height control
- 230 mm Jounce, 200mm Rebound
- Central tire inflation system (CTIS)

Deployability
- Self-Powered offload C-130 and operational watercraft Joint Requirement

Operational Range
- Range 65 miles
- Power Diesel Engine (73 HP)
- Hydrostatic Drive Train
- Tethered Coupled / Wireless Uncoupled Control
International Military Group – FTTS Demonstrator

Utility Vehicle (UV) & Trailer

**Survivability & Force Protection**
- Monocoque cab
- Modular Armor Kit
- 2 person cab

**Network Centricity**
- Integrated communications suite
- Integrated computer system

**Sustainability**
- Limited on-board diagnostics
- 75kW integrated, exportable AC power

**Transportability**
- 92” w x 83” h x 221” l
- CH-47 and C-130 Transportable
- Demonstrator curbweight = 18,600 lbs
- Reducible weight = 16,400 lbs

**Mobility**
- Parallel Hybrid electric propulsion
- Torsion bar suspension, passive shocks
- Designed for adjustable ride height control
- Central Tire Inflation Systems (CTIS)
- Rear axle steer
- Anti-Lock Braking System (ABS)

**Payload**
- 3400 lb payload with integral armor
- On-board crane with 800 lb lift @ 8’

**Operational Range**
- Over 555 mile range

**UV Companion Trailer**

**Commonality with UV**
- Common tires, suspension, brakes with truck

**Payload**
- 5500 lb payload
Lockheed Martin – Owego – FTTS Demonstrator

**Utility Vehicle (UV) & Trailer**

**Survivability & Force Protection**
- Monocoque cab
- Modular Armor Kit
- Machine Gun Ringmount
- 2 crew + 1 jump seat

**Network Centricity**
- Integrated communications suite
- Integrated computer system

**Sustainability**
- Limited on-board diagnostics
- 8kW integrated exportable AC power

**Transportability**
- 95" w x 90" h x 229" l
- CH-47 & C-130 Transportable
- Demonstrator curbweight = 21,600 lb
- Reducible curbweight = 19,705 lb

**Mobility**
- Parallel Hybrid electric propulsion
- SLA suspension with Air Spring, passive shocks
- Adjustable Ride height control (4 position)
- Central Tire Inflation (CTIS)
- Anti-Lock Braking System (ABS)

**Payload**
- 3300 lb payload with A-kit armor
- On-board crane with 1000 lb lift @ 5'

**Operational Range**
- 528 mile range

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**UV Companion Trailer**

**Commonality with UV**
- Common tires, suspension, brakes with truck

**Payload**
- 6100 lb payload
Lessons Learned from the ACTD

That industry presently has products which potentially can meet *many* of our present and future requirements….. *but not all, trades will be required*

Integration of advanced technologies on *new* systems is possible…. *but seldom without a significant effort and risk*

Must be realistic in our requirements….. *understand there is going to be limited dollars available*
ONR S&T Support to JLTV

ONR is conducting studies, analyses and technology development efforts in the areas of concepts, survivability, and mobility

- **Technology evaluations and trade studies**
  - Awarded Contract to Nevada Automotive Test Center (NATC)
  - Validation of JLTV CDD and performance specification

- **Fabricate a Gap 1 technology demonstrator**
  - Nevada Automotive Test Center
  - Build, test, and evaluate a Combat Tactical Vehicle demonstrator platform

- **Concept studies/mockup construction**
  - Awarded contracts to AM General, General Dynamics, BAE, Cadillac Gage, Oshkosh
  - Generate concepts for FOV:
    - Near term concept (for MS B)
    - Far term concept (MS C and beyond)
    - Future technology investment areas
  - Deliverables aligned with key acquisition events
ONR (NATC) – Technology Demonstrator
Combat Tactical Vehicle (CTV)

**Survivability & Force Protection**
- 6 Marine/Soldier cab
- Monocoque Aluminum-based V-Shaped Lower Hull with Integrated Armor/Structure
- Modular Armor Kit
- Blast-Mitigating Seats
- Air Conditioning w/ Modular NBC
- Automatic Fire Suppression
- Accepts Multiple Weapons Stations

**Network Centricity**
- Integrated communications suite

**Sustainability**
- Limited on-board diagnostics
- 10Kw on the Move & 30Kw Stationary Integrated, exportable AC power

**Transportability**
- 96” w x 220” l  Operational Ht = ~ 86 inches & Reducible Ht = 76.4 inches
- CH53/CH47 EAT & C130 Transportable
- MPS & Amphibious shipping
- Demonstrator curb weight = 15,600 lbs

**Mobility**
- 322 Hp Detroit Diesel 926
- 6-Speed Twin Disc Transmission with Integral Transfer Case
- SLA Independent w/ 3-Position Ride Height Adjustment & 24” Wheel Travel
- Central Tire Inflation Systems (CTIS)
- Anti-Lock Braking System (ABS) w/ Integrated Stability Control

**Payload**
- 6000 lb payload with integral armor

**Operational Range**
- 400 miles
ONR/RDECOM are conducting studies, analyses and technology development efforts in the areas of concepting, survivability, and mobility

**Mobility Initiatives:**

- Advanced suspension development
  - Awarded contract to L-3 Communications
- Mature Magneto-Rheological (M-R) fluid technology
- Transportability studies
  - Address critical ship and aircraft interface
- Fuel efficiency improvement initiatives
  - Define military duty cycles and conduct hybrid electric vehicle (HEV) studies
  - Conduct modeling and simulation to quantify vehicle energy usage
  - Pursue innovative powerplant and vehicle accessory energy reduction technologies

**Survivability Initiatives:**

- Requirements Analysis (Threats out to 2017), Technology Assessments (Industry & Govt.), Modeling & Simulation (Mine Protection, Operational Effectiveness), Technology Development/Maturation (Armor spin outs, non-Armor technologies)
- Integrated Survivability: Modular, Reconfigurable, System Engineering Design Approach
Who’s Who in JLTV Program Planning

Science and Technology
TARDEC/ONR
- Technology development for large database of information to support requirements development

Requirements Development
CASCOM/ MCCDC
- CDD development and staffing for approval

Materiel Development
PEO CS&CSS/MARCORSYSCOM
- Milestone documentation development and approval for MS B

Program Governance
OSD/ARMY/NAVY
- Program Certification and Milestone Decisions
### Science & Technology

**ONR & TARDEC**
- Demonstrations
- Studies & Assessments
  - FTTS ACTD M&S (Phase 1)
  - FTTS ACTD Demonstrators (Phase 2)
  - JLTV Req’s Study & Demonstrator
  - JLTV Concept Design BAAs

### JLTV Requirements

**MCCDC & TRADOC**
- Joint Initial Capabilities Document (JICD)
- Evaluation of Alternatives (EoA)
- Capability Development Document (CDD)

### JLTV Acquisition

**MARCORSYSCOM & PEO CS&CSS**
- Establish JPO
- Acquisition Program Documentation
- Draft RFP Prep/Comments/Revision
- Final RFP/ Source Selection
- Award SDD Contract(s)
- SDD

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**JLTV Acquisition Schedule**

As of 1 Feb 07 - NDIA

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<th>FY06</th>
<th>FY07</th>
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Summary

Entering Program at the MS B NOV 07

Draft RFP late Feb/early Mar 07; Final RFP May 07 – check FedBizOps

JLTV is an opportunity for Industry… this is where you spend your IR&D

RFP info will also be posted at the JLTV website

http://contracting.tacom.army.mil/ssn/jltv.htm

JLTV@tacom.army.mil