

PM FCS (BCT) Platform Overview - Combat Vehicles Conference

21 OCT 2008

Future Combat Systems (BCT) Overview

Manned Ground Vehicle Overview

COL Bryan McVeigh, Project Manager

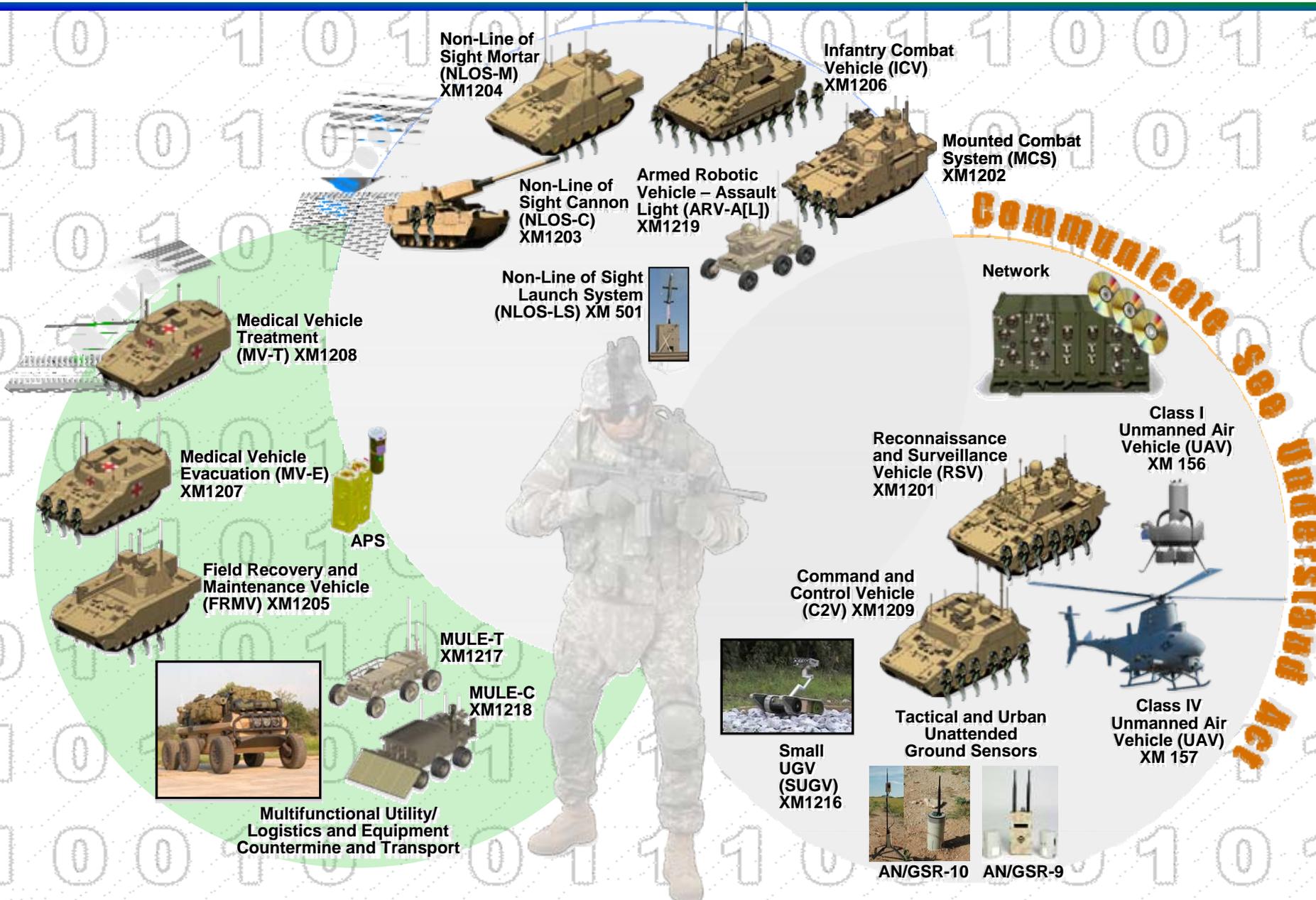
Mounted Combat System Tank, Combat, Full Tracked: Medium

LTC Robert Hannah, Product Manager

Unmanned Air Vehicles Overview

LTC Winfield Keller, Product Manager

Future Combat Systems



Recent Program Accomplishments

- Delivered 1st Non-Line of Sight Cannon Prototype (NLOS-C P1) vehicle for testing, successful first round firing
- Completed Spin Out 1 Tactical Field Test (TFT), Field Demonstration, Test and Evaluation (FDT&E), and Preliminary Limited User Test (P-LUT)
- Delivered first set of “accelerated” Small Unmanned Ground Vehicle (SUGV) and Class 1 Block 0 units
- System of Systems Common Operating Environment (SoSCOE) 2.0 Deliveries/Testing
- Completed Autonomous Navigation System (ANS) and Multi-function Utility/Logistics and Equipment (MULE) Vehicle Preliminary Design Reviews
- Completed Joint Expeditionary Force Experiment (JEFX-08)
- Non-Line of Sight Launch System (NLOS-LS) Control Test Vehicle (CTV) 2 Successful Flight
- Airborne Standoff Minefield Detection System (ASTAMIDS) Captive Flight Test
- First end-to-end Active Protection System (APS) Test



Executing to Support Army Modernization Strategy

Manned Ground Vehicle Overview

COL Bryan McVeigh
Project Manager, FCS (BCT), Manned Ground Vehicles

21 OCT 2008

Manned Ground Vehicle (MGV) Family

C2V
XM1209



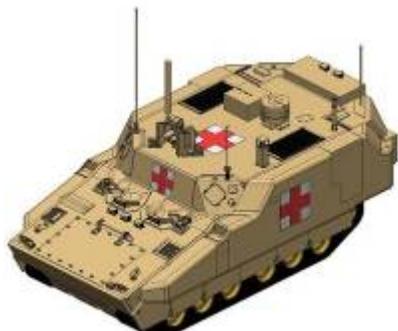
RSV
XM1201



MCS
XM1202



NLOS-C
XM1203



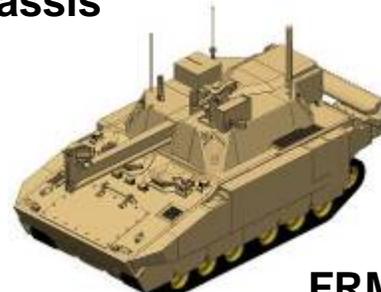
MV(E/T)
XM1207/1208



**Common
Chassis**



ICV
XM1206



FRMV
XM1205



NLOS-M
XM1204

Manned Ground Vehicles Since the Last Conference

1st QTR 08

2nd QTR 08

3rd QTR 08

4th QTR 08

Oct 07 – Dec 07

RSV Mock-Up Evaluation



MGV Track Testing at YPG - Nov 2007

First Direct and Indirect Vision System Evaluation – Dec 2007



Jan 08 – Mar 08

Non-Line of Sight Mortar Firing Platform Completes Breech Cycle Testing – Jan 2008

XM1201, Reconnaissance and Surveillance Vehicle (RSV) Test Rig – March 2008



Apr 08 – Jun 08

MGV-P3 Power Pack Testing - April 2008

Non-Line of Sight Mortar Firing Platform Completes Phase II Testing – May 2008



Non-Line of Sight Cannon Integration – May 2008

NLOS-C Delivery – Jun 08



July 08 – Oct 08

Active Protection System Design Verification Test



Medical Vehicle Mock-up Pit Stop Evaluations

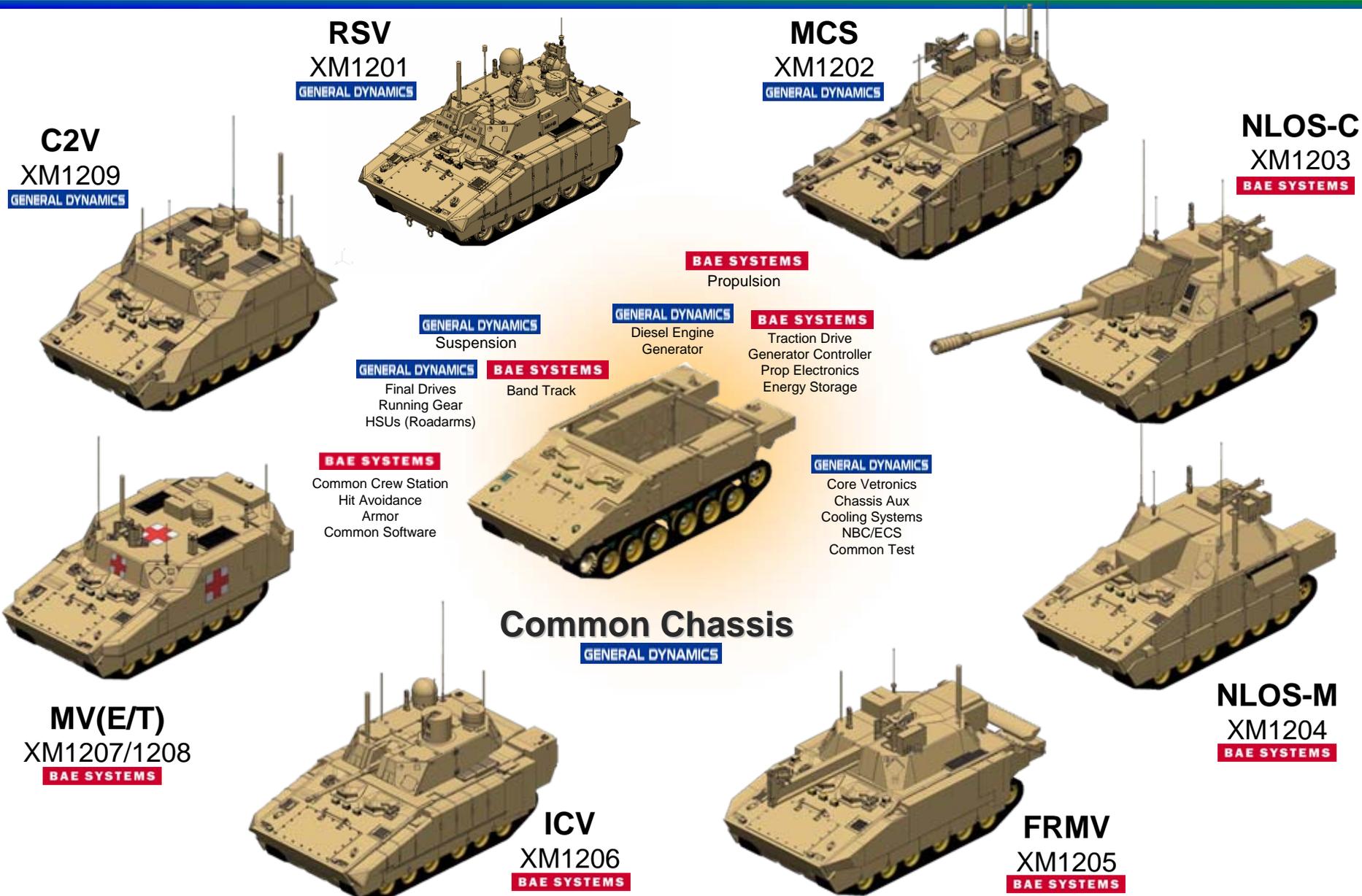
NLOS-C Prototype 3 Driving

NLOS-C Prototype 1 Firing



Manned Ground Vehicle (MGV) Fleet

Joint development between both of the FCS One Team Partners



XM1202 Mounted Combat System Tank, Combat, Full Tracked: Medium

LTC Bob Hannah, PdM MCS
21 October 2008

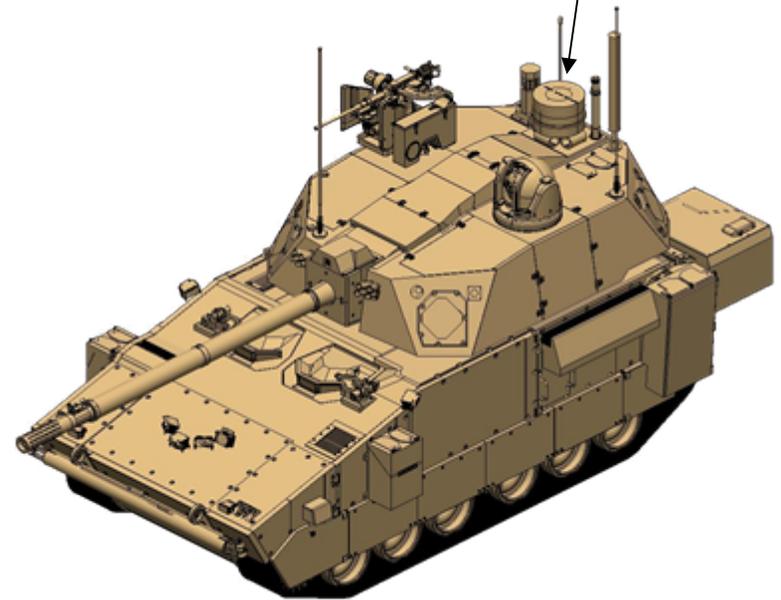
XM1202 Mounted Combat System (MCS)

Key Capabilities

- Provides highly lethal, mobile Line-Of-Sight (LOS) and Beyond-Line-Of-Sight (BLOS) capabilities
- Increased rate of fire through auto-loader and the automated ammunition handling system reduces crew fatigue
- Lightweight XM360 120mm cannon with 27 ready rounds
- Fires all current 120mm rounds and Mid-Range Munition (MRM)
- Light/ heavy caliber secondary armament with integrated fire control

Status

- Ammo Handling System/ Primary Weapon Assembly/ Turret Structure/ armament sub-systems were integrated into Firing Platform at the Armament Subsystem Development Laboratory in Shelby, MI
- Began testing the Firing Platform at TARDEC in Aug 08; testing the Firing Platform on live-fire range at Aberdeen Proving Ground beginning 1st Qtr FY09.
- Gun tube Proof testing / Cannon Interim Safety Firing Test #1 completed at Aberdeen Proving Ground. 500-round Safety Firing Test #2 began in 4th Qtr FY08. More than 1650 rounds fired in XM360 development to date.



Firing Platform Integration



XM360 Test at APG, MD

XM 1202 Mounted Combat System

1st QTR 08

2nd QTR 08

3rd QTR 08

4th QTR 08

Oct 07 – Dec 07



Ammo Handling System, Primary Weapon Assy, Turret Structure deliveries completed in December 2007

Jan 08 – Mar 08

Ammo Handling System, Primary Weapon Assy, Turret Structure were integrated into the Firing Platform at the Armament Subsystem Development Lab in Shelby, MI from Jan-Jun 2008



Apr 08 – Jun 08

Gun tube Proof Testing/ Cannon Interim Safety Test # 1 completed at Aberdeen Proving Ground in June 2008



Demonstrated Firing Platform functionality for the Army Chief of Staff on 18 June 08

July 08 – Oct 08

MCS Firing Platform Testing on the Turret Motion Base Simulator at TARDEC: Jul – Nov 08



Class I & IV

Unmanned Air Vehicles

1st QTR 08

2nd QTR 08

3rd QTR 08

4th QTR 08

Oct 07 – Dec 07

Airframe static load testing



E3 Testing



Jan 08 – Mar 08

Experiment 2.1



Rotor Hub Fatigue Test with the US Navy



Class IV Phase I Assembly of A4 & A5



Apr 08 – Jun 08

ASTAMIDS Initial Flight Test (IFT) and Contractor Flight Test (CFT)



Class I 5hp Heavy Fuel Engine risk reduction test



July 08 – Oct 08

Class IV Transportability Test

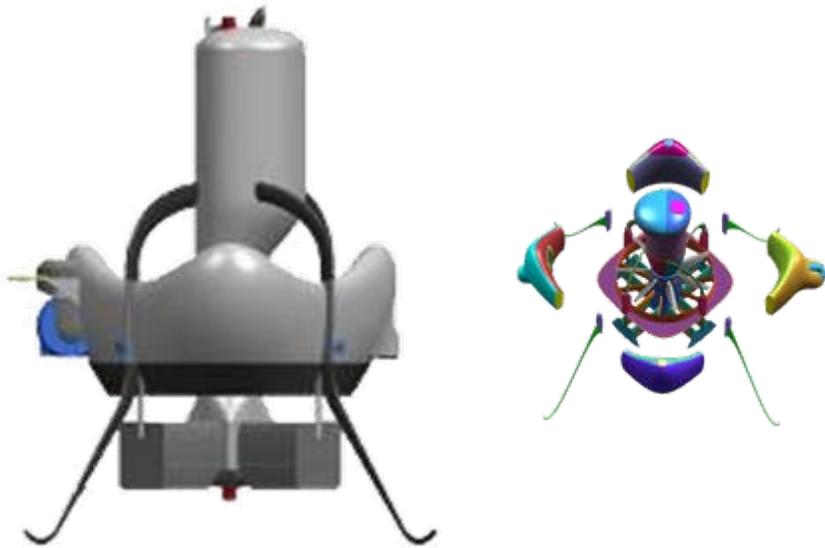


25th ID deployment of gMAV



P-LUT





Missions

- RSTA
- Laser Designation

Description

- Manpackable/Air Droppable
- Hover & Stare Capability
- EO/IR/LD/LRF Sensor
- Heavy Fuel Engine
- Deployable within Five Minutes





Airborne Surveillance,
Target Acquisition and
Minefield Detection
System (ASTAMIDS)

SAR/GMTI

Missions

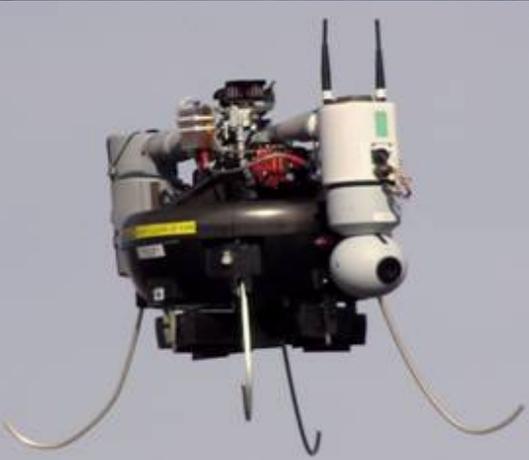
- RSTA
- Laser Designation
- Wide Area Surveillance
- Wideband Communications Relay
- Standoff CBRN
- Met Data for NLOS
- Manned/Unmanned teaming

Description

- Brigade Combat Team organic Reconnaissance, Surveillance, and Target Acquisition (RSTA) capability
- Transportable by Ground, Rail, Sling, C-130
- Autonomously take off and land at unprepared and unimproved landing zones
- Autonomous flight and navigation



Current Efforts



OIF Support

- 36 gMAV air vehicles fielded
- 40+ Trained operators
- Transitioned to PM UAS
- Supporting additional training, fielding, development and procurement

AETF Activities

- 20+ Trained operators
- P-LUT
 - Gimbaled sensor
 - JTRS/SRW integration
 - Lessons Learned
 - TTP
- LUT
 - Engine Control Unit
 - Electric Starter
 - Centralized Controller excursion



Unmanned Aerial Vehicles (UAV)

Class I

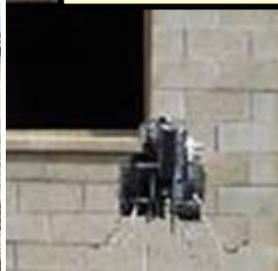


Class I Engine prototype

Class I Block 0 with soldier



Class I Block 0 in Flight



Class I Block 0 with Gimbaled sensor



Experiment 1.1



Army A7 undergoing shipping inspection process at SAC

A2 Engine Run at Moss Point, MS 7 Aug 07



Army / Navy Fire Scouts at Moss Point, MS



N1 being flown at AUVSI Demo at Webster Field, MD

Class IV



Army A5 on Display @ Marine Corp Day, Quantico, VA



Army A2 being loaded on C130 at Trent Lott International Airport, MS

Questions

Backup

Future Combat Systems Since the Last Conference

1st QTR 08

2nd QTR 08

3rd QTR 08

4th QTR 08

Oct 07 – Dec 07

**Unattended
Ground Sensors &
MULE**



Jan 08 – Mar 08

B-Kit in M1151A1



Apr 08 – Jun 08

C2V Demonstrator



**Captive Flight Test #12
– May 2008**



NLOS – LS Test



July 08 – Oct 08

**SUGV Video Imagery
Sent to B-Kitted
HMMWV During Spin
Out P-LUT**



Spin Out P-LUT at AETF



MGV System Overview

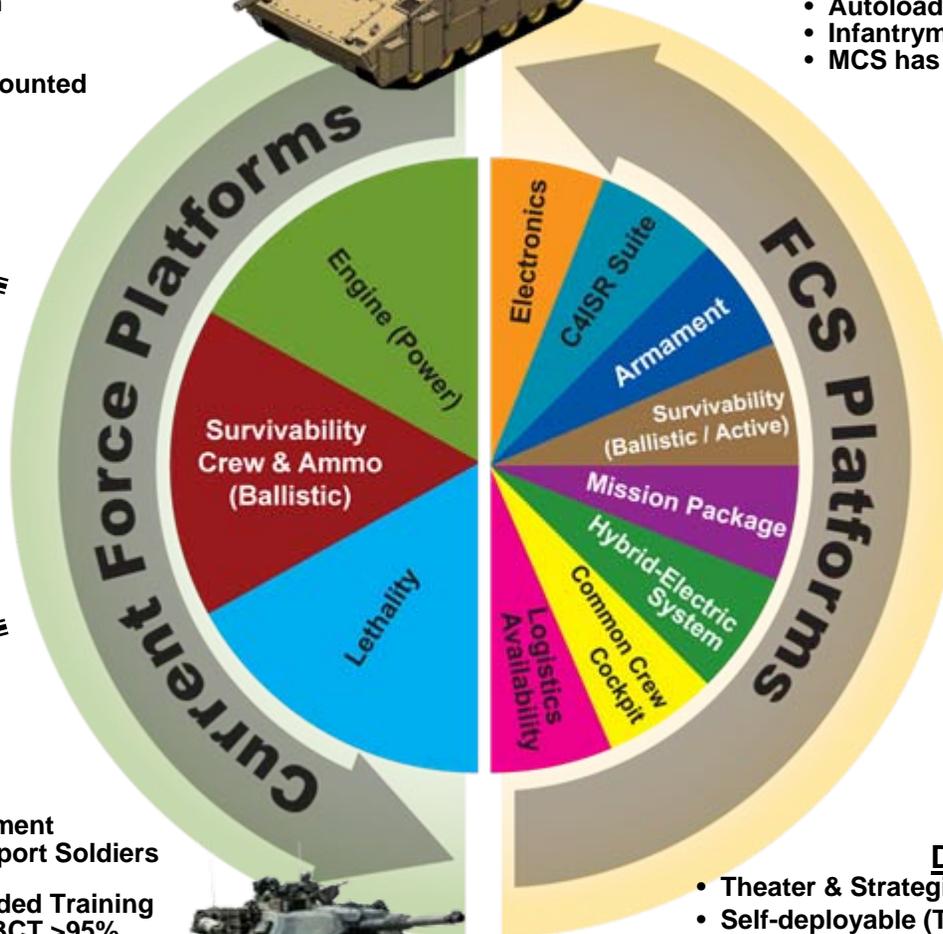


Force Protection/Survivability

- Upgradeable Armor
- Active Protection System
- Hit Avoidance Suite
- Mine Kit
- Crew Seating – Ceiling Mounted

Lethality

- Automated Rate of Fire & Precision
- Autoloader = Less Soldiers (MCS, NLOS-C/M)
- Infantrymen: HBCT 324 vs FCS BCT 702
- MCS has 2km LOS & 12 km BLOS Capability



Supportability

- Reduced Sustainment Burden
 - Fuel: 33% reduction
 - Spares: 62% reduction
 - 30 Min. Time To Repair
- 80% of maintenance tasks performed by crew

Commonality

- Common MGV Chassis
- 75% of MGV parts are common to all platforms
- 10 common tools per platform
- 20 total common tools
- Common SW throughout BCT

Affordability

- Reduced Manpower and Sustainment
- Cost less to Maintain: HBCT Support Soldiers 1186 vs FCS BCT 411
- Costs less to train due to Embedded Training
- Vehicle Ao: HBCT >90% vs FCS BCT >95%
- Power and Energy to Grow

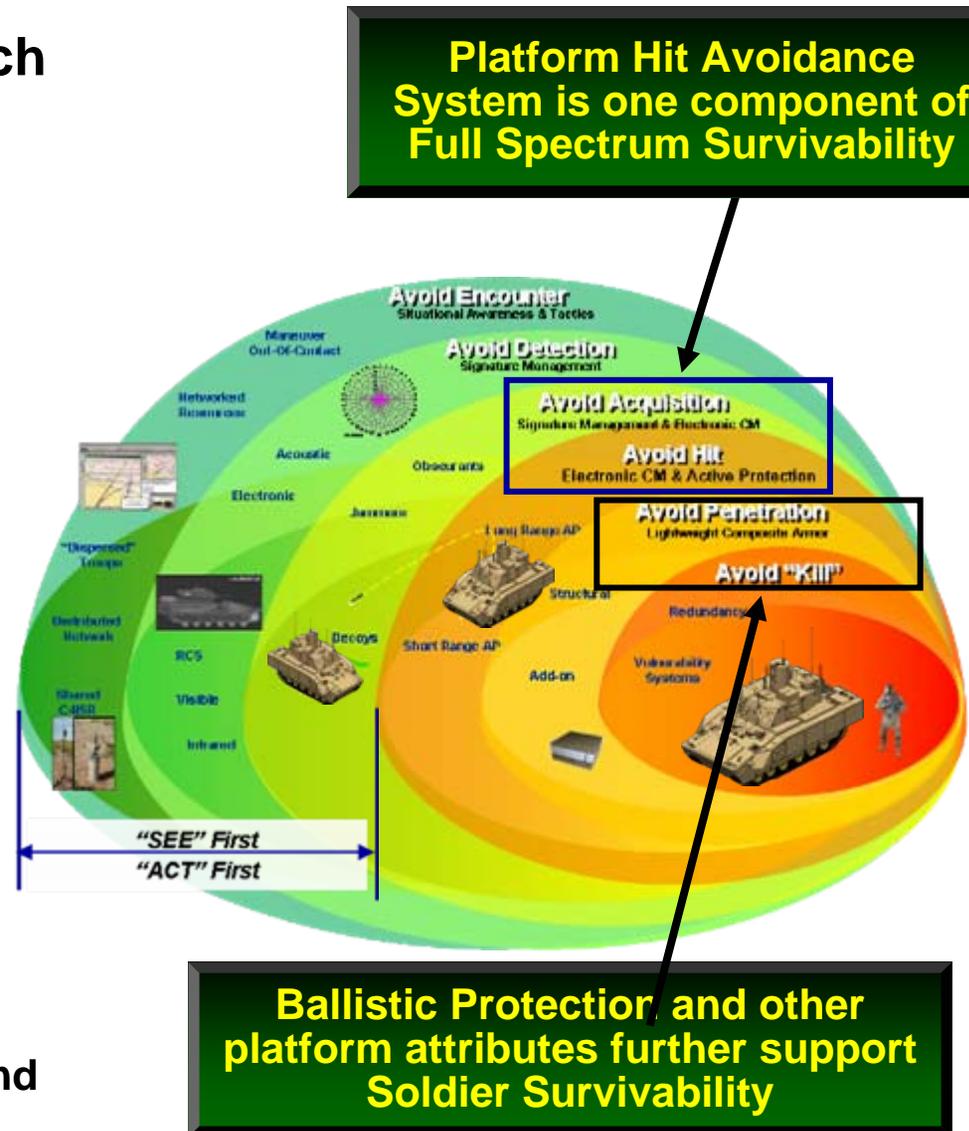
Deployability

- Theater & Strategic Deployable: C-5 / C-17
- Self-deployable (Tactical Road March w/o HETTS)
- Mobility Advantage: Bridges/Unimproved Roads
- Able to use greatest variety of Rail Services



FCS Survivability – A Holistic Approach

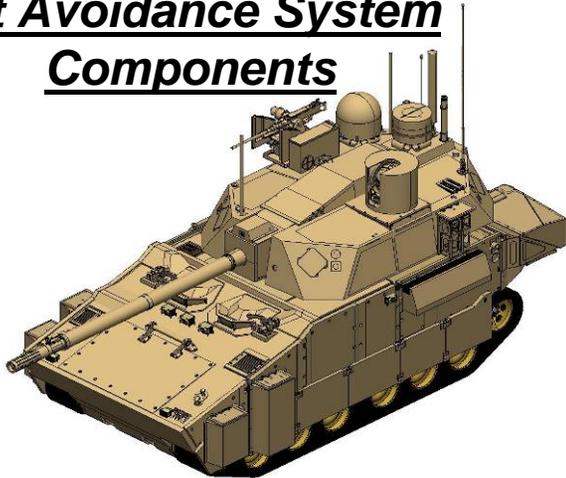
- “Onion Skin” methodology which leverages layers to protect the Soldier and equipment
- Leverage Power of System of Systems
 - Avoiding kill
 - Including reducing impulse to Mounted Soldiers
 - Avoiding penetration
 - Including standoff and ballistic protection
 - Avoiding acquisition and hit with countermeasures
 - Including decoys
 - Avoiding encounter with situational awareness and tactics
 - Including detection using Multifunctional Utility/Logistics and Equipment Vehicle - Countermine (MULE-CM)



MGV On-board Survivability Suite

Hit Avoidance System Components

Active



Multi-Function Counter Measure (MFCM)

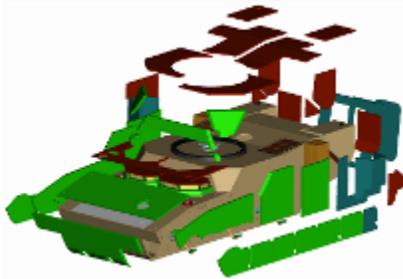
Passive Threat Warning Sensor (4X)

MFRF Radar Antenna (4X)

Laser Threat Warning Sensor (4X)

Active Protection System (APS)
 Long Range Counter Measure
 Short Range Counter Measure

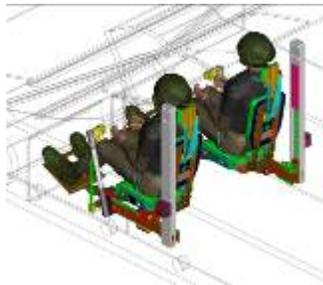
Passive



Base "B" Armor

- Armor upgradability designed into each MGV via A+B approach
- Bx/Ux path forward provides periodic armor updates every ~3 years
- Modular AT Mine kit

Soldier



Vehicle Structure and Crew Seats

- Designed to mitigate impulses to Soldier

Short Range Countermeasure will Defeat



Bomblet

RPG

Long Range / MFCM Countermeasures will Defeat



ATGM

Tank HE/ HEAT

Tank KE

BLOS Top Attack

Armor & Mine Kit will protect Against



Auto-Cannon



Heavy Machine Gun



Mines



HE Frag

MGV Common Chassis



Status

- **Maturing common chassis design in advance of MGV PDR**
- **Various components in test now including hybrid electric propulsion, composite armor, active protection system, and bandtrack & hydro-pneumatic suspension**
- **P1 NLOS-C chassis assembly complete**
- **P3-P6 NLOS-C chassis integration & assembly ongoing**

MGV ICV & RSV

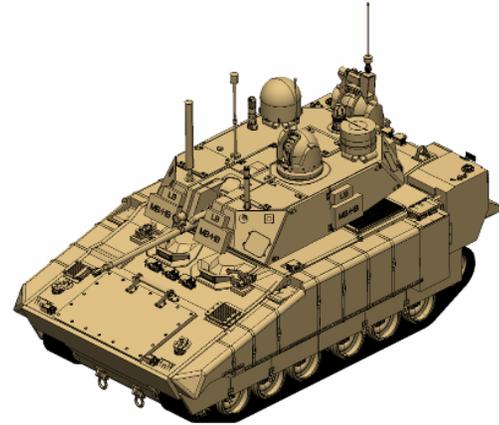
Infantry Combat Vehicle (ICV)



Status

- Conducted ICV mock-up ingress/egress demonstrations
- Awarded system subcontracts for:
 - M240 remote operating kit
 - 30mm ammunition handling system
 - Mk44 30mm gun
- Conducted critical design reviews for the gun turret drive system, multi-media slipring, off-slipring processing system and ammunition

Reconnaissance & Surveillance Vehicle (RSV)



Status

- Continuing to mature RSV design to PDR
- Maturing SIGINT integration approach
- Executing RSV Rooftop Deconfliction Test
 - Turreted Rooftop Test Rig construction completed
 - Physical placement and electro-magnetic interference assessment in process
 - Test began July 2008

MGV C2V & MCS

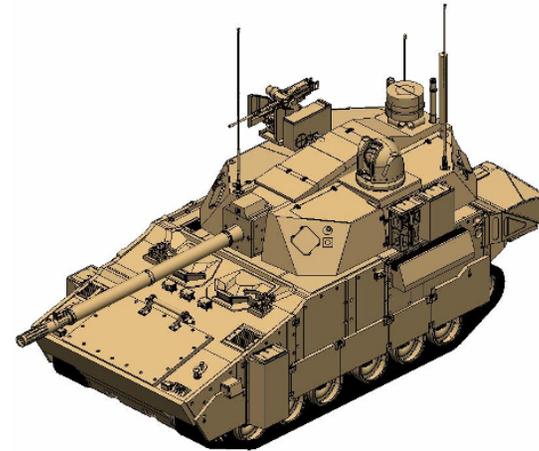
Command & Control Vehicle (C2V)



Status

- Continuing to mature C2V design to PDR
- Maturing SIGINT integration approach
- Preparing for Rooftop Deconfliction Test phase 2
 - Architecture update, E3 and Test model update
 - Test to begin March 2009

Mounted Combat System (MCS)

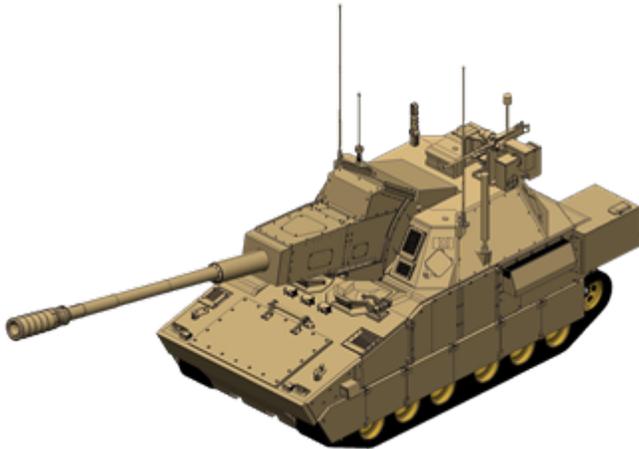


Status

- Ammo Handling System/ Primary Weapon Assembly/ Turret Structure/ armament sub-systems were integrated into Firing Platform at the Armament Subsystem Development Laboratory in Shelby, MI
- Began testing the Firing Platform at TARDEC in Aug 08; testing the Firing Platform on live-fire range at Aberdeen Proving Ground beginning Nov 08.
- Gun tube Proof testing / Cannon Interim Safety Firing Test #1 completed at Aberdeen Proving Ground. 500-round Safety Firing Test #2 began in Jul 08. More than 1400 rounds fired in XM360 development to date.

MGV NLOS-C & NLOS-M

Non-Line Of Sight – Cannon (NLOS-C)



Status

- Firing platform at YPG fired over 2800 rounds
- Prototype #1 – Rolled out at Army Birthday
- Prototype #1 start Firing testing Sep 08
- Prototype #3 start Mobility testing Oct 08
- Prototype #4-6 Mission Module and Chassis assembly and integration ongoing

Non-Line Of Sight – Mortar (NLOS-M)

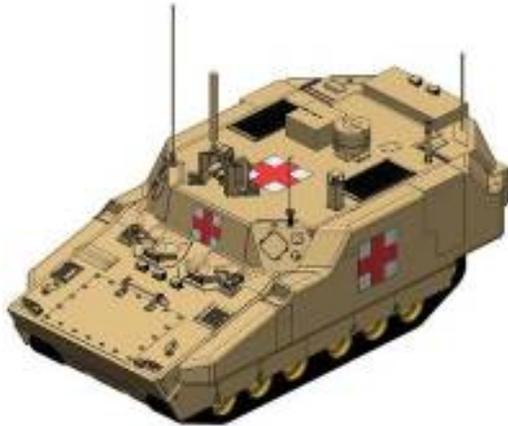


Status

- NLOS-M Firing Platform has fired 1178 rounds
- Ultra-light weight tube delivered and tested during Phase II at Camp Ripley
- Upgraded and Tested In-bore Air Retention System and Automated Mortar Cleaning System at Camp Ripley Apr-May 08
- Mortar Ammunition Handling System in process of being assembled

MGV MV-E/T & FRMV

Medical Vehicle – Evacuation (MV-E) Medical Vehicle – Treatment (MV-T)



Status

- Executed MV-E PitStop Engineering Evaluation validating the design of the litter lift handling system, placement of medical equipment and medic workstation
- Incorporated PitStop evaluation findings to improve LLHS design, placement of medical equipment and medic workstation design
- Conducted data entry assessment using the Rapid Automated Medical Processing System
- Executed MV-T Mock Up Demonstration and Evaluation
- Conducted assessment on MV-T medical equipment set stowage, MV-T treatment table and MV-T shelters

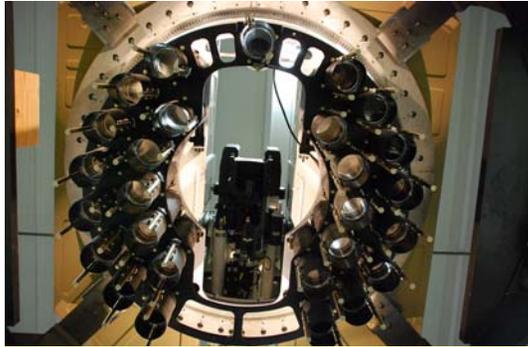
Field Recovery & Maintenance Vehicle (FRMV)



Status

- Increased design-to capacities for the recovery equipment and maintenance lift to support all FCS manned and unmanned ground vehicles
- Completed recovery winch and crane boom actuator Preliminary Design Reviews
- Maintained Light Weight Tactical Crane and Towing Component Maturation Plans per baseline plans

XM1202 MCS Recent Accomplishments



Ammunition Handling System

- Ammo Handling System/ Primary Weapon Assembly/ Turret Structure/ armament sub-systems were integrated into Firing Platform at the Armament Subsystem Development Laboratory (ASDL) in Shelby, MI from 2nd – 3rd Qtr FY08.
- Demonstrated Firing Platform functionality to the Army Chief of Staff on 18 Jun.
- Gun tube Proof testing / Cannon Interim Safety Firing Test #1 completed at Aberdeen Proving Ground in 3rd Qtr FY08.
- Firing Platform began testing on the Turret Motion Base Simulator in 4th Qtr FY08.
- More than 1650 rounds fired in XM360 development to date.



Firing Platform Integration



XM360 Test at APG, MD



GEN Casey at the ASDL in Shelby



Firing Platform on TMBS at TARDEC

Class I FY 09 and 10 Way Ahead

FY 09

- Conduct Class I PDR - 1st Qtr FY09
- Procure Engines and Airframes for Early Developmental Assets
- Conduct EO/IR/LD/LRF Payload CDR – 3rd Qtr FY09
- Conduct Class I 1st Risk Reduction Flight – 4th Qtr FY09



Class I Engine prototype

FY 10

- Conduct Class I CDR – 2nd Qtr FY10
- Procure Remaining Engines and Airframes for Early Development Assets
- Risk reduction flight on Early Developments Assets – 4th Qtr FY10



EDA Risk Reduction flight

Class IV FY 09 and FY 10 Way Ahead

FY 09

- Conduct Class IV UAVS Preliminary Design Review (PDR) 1st Qtr FY 09
- Complete Phase 1 of air vehicle assembly at Moss Point, MS for Air Vehicles A6-A8
- Support ASTAMIDS EO/IR/LD/CM payload CDR 3rd Qtr FY 09
- Conduct Cooperative Rotor Hub Fatigue Testing to begin 1st QTR FY 09
- Support ASTAMIDS Contractor Flight Testing at YPG 1st QTR FY 09

FY 10

- Conduct Class IV UAVS Critical Design Review (CDR) 1st Qtr FY 10
- Begin Phase 2 of air vehicle assembly (includes installation of FCS unique equipment) at Moss Point, MS for air vehicles A1-A4
- Conduct integration and test at Northrop Grumman/FCS Class IV UAV System Integration Lab (SIL):
 - JTRS HMS SFF-J and WIN-T radios
 - ASTAMIDS and SAR/GMTI payloads
 - Type IV ICS brass board



Moss Point, MS
Assembly Facility

