PROGRAM MANAGER
FUTURE COMBAT SYSTEMS
FCS
One Team-The Army/Defense/Industry
UNIT OF ACTION

FCS 18+1+1 White Paper

15 October 2004

WHITE PAPER

1. **Purpose:** To provide an overview of the Future Combat Systems (FCS) program

2. **Facts:**

a. Future Combat Systems (FCS) is a joint (across all the military services) networked (connected via advanced communications) system of systems (one large system made up of 18 individual systems, the network, and most importantly, the Soldier). Future Combat Systems are connected via an advanced network architecture that will enable levels of joint connectivity, situational awareness and understanding, and synchronized operations heretofore unachievable. FCS will operate as a System of Systems (SoS) that will network existing systems, systems already under development, and systems to be developed to meet the requirements of the Army's Future Force Unit of Action (UA).

b. Future Combat Systems includes 18+1+1 systems consisting of unattended ground sensors (UGS); two unattended munitions, the Non-Line of Sight – Launch System (NLOS-LS) and Intelligent Munitions System (IMS); four classes of unmanned aerial vehicles (UAVs) organic to platoon, company, battalion and Unit of Action (UA) echelons; three classes of unmanned ground vehicles, the Armed Robotic Vehicle (ARV), Small Unmanned Ground Vehicle (SUGV), and Multifunctional Utility/Logistics and Equipment Vehicle (MULE); and the eight manned ground vehicles (18 individual systems); plus the network (18+1); plus the Soldier (18+1+1).

c. FCS is the core building block of the Army's Future Force. The FCS-equipped Unit of Action (UA) will consist of three FCS-equipped Combined Arms Battalions (CABs), a Non-Line-of-Sight (NLOS) Cannon Battalion, a Reconnaissance Surveillance and Target Acquisition (RSTA) Squadron, a Forward Support Battalion (FSB), a Brigade Intelligence and Communications Company (BICC), and a Headquarters Company. The FCS-equipped UAs will be the Army's future tactical warfighting echelon; a dominant ground combat force that complements the dominant Joint team. Although optimized for offensive operations, the FCS-equipped Unit of Action (UA) will have the ability to execute a full spectrum of operations. FCS will improve the strategic deployability and operational maneuver capability of ground combat formations without sacrificing lethality or survivability.

d. FCS will use evolutionary acquisition to develop, field, and upgrade FCS throughout its lifecycle. On 22 July 2004, Army officials announced plans to accelerate the delivery of selected Future Combat Systems to the Current Force. The plan expands the scope of the program's System Development and Demonstration (SDD) phase by adding four discrete "spirals" of capabilities at two year increments for the Current Forces. Spiral 1 will begin fielding in Fiscal Year (FY) 2008 and consist of prototypes fielded to the Evaluation Brigade Combat Team (BCT) for their use and evaluation. Following successful evaluation, production and fielding of Spiral 1 will commence to Current Force units in 2010. This process will be repeated for each successive spiral. By 2014, the Army force structure will include one Unit of Action (UA) equipped with all 18 + 1 FCS core systems and additional Modular Units of Action with embedded FCS capability. This is the centerpiece of this adjustment: providing the Current Force with FCS capability sooner rather than later.

e. FCS is now in the System Development and Demonstration (SDD) phase. The FCS acquisition program was approved by the Defense Acquisition Board (DAB) in May 03. FCS requirements and Key Performance Parameters (KPPs) were revalidated by the Army Requirements Oversight Council (AROC) 30 June 2004. Presentation for Joint Requirements Oversight Council (JROC) review and

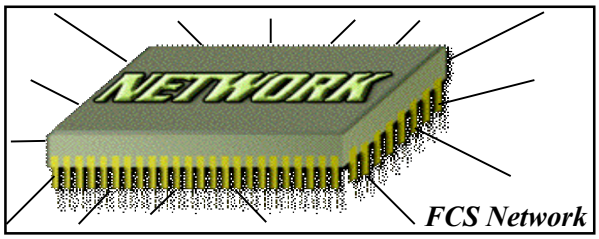
approval is scheduled for 14 October 2004. A DAB Review is scheduled for 18 November 2004. FCS has been designated a Joint Services program with an Army and Marine Joint Program Office (JPO) being established.

3. **Points of Contact:** COL Robert Beckinger, TRADOC System Manager (TSM) FCS, (502) 524-3321, and Mr. Bill White, PM Unit of Action (UA) Operations Director, (586) 574-8631.

For additional information about the FCS program via the Web, refer to the January-February 2004 FCS-theme issue of the Army Acquisition, Logistics, and Technology (AL&T) magazine which can be downloaded from http://asc.army.mil/pubs/alt/default.cfm (use the "Browse Back Issues" menu to select the January-February 2004 issue).

OVERVIEW OF THE 18+1+1 FCS SYSTEMS

1. The Future Combat Systems Network



The Army's Future Combat Systems (FCS) network allows the FCS Family-of-Systems (FoS) to operate as a cohesive system-of-systems where the whole of its capabilities is greater than the sum of its parts. As the key to the Army's transformation, the network, and its logistics and Embedded Training (ET) systems, enable the Future Force to employ revolutionary operational and organizational concepts. The network enables Soldiers to perceive, comprehend, shape, and dominate the future battlefield at unprecedented levels as defined by the FCS Operational Requirements Document (ORD).

The FCS network consists of four overarching building blocks: System-of-Systems Common Operating Environment (SOSCOE); Battle Command (BC) software; communications and computers (CC); and intelligence, reconnaissance and surveillance (ISR) systems. The four building blocks synergistically interact enabling the Future Force to see first, understand first, act first and finish decisively.

System-of-Systems Common Operating Environment (SOSCOE)

Central to FCS network implementation is the System-of-Systems Common Operating Environment (SOSCOE), which supports multiple mission-critical applications independently and simultaneously. It is configurable so that any specific instantiation can incorporate only the components that are needed for that instantiation. SOSCOE enables straightforward integration of separate software packages, independent of their location, connectivity mechanism and the technology used to develop them.

System-of-Systems Common Operating Environment (SOSCOE) architecture uses commercial off-the-shelf hardware and a Joint Tactical Architecture–Army compliant operating environment to produce a nonproprietary, standards-based component architecture for real-time, near-real-time, and non-real-time applications. System-of-Systems Common Operating Environment (SOSCOE) also contains administrative applications that provide capabilities including login service, startup, logoff, erase, memory zeroize, alert/emergency restart and monitoring/control. The System-of-Systems Common Operating Environment (SOSCOE) framework allows for integration of critical interoperability services that translate Army, Joint, and coalition formats to native, internal FCS message formats using a common format translation service. Because all interoperability services use these common translation services, new external formats will have minimal impact on the FCS software baseline. The FCS software is supported by application-specific interoperability services that act as proxy agents for each Joint and Army system. Battle Command (BC) can access these interoperability services through application program interfaces that provide isolation between the domain applications, thereby facilitating ease of software modifications and upgrades.

Battle Command (BC) Software

Battle Command (BC) mission applications include: mission planning and preparation, situation understanding, BC and mission execution and warfighter-machine interface (WMI). These four software packages' combined capabilities enable full interaction among the FCS-equipped Units of Action (UAs). Battle Command (BC) capabilities will be common to, and tightly integrated into, all

FCS, and will share a common framework to achieve the long-desired goal of an integrated and interoperable system with no hardware, software or information stovepipes.

The Mission Planning and Preparation package consists of 16 services embedded within System-of-Systems Common Operating Environment (SOSCOE). They support the development of deliberate, anticipatory and rapid-response plans; the ability to perform plan assessments and evaluations; terrain analysis; mission rehearsals; and after-action reviews for the Unit of Action (UA). As an example of the capabilities provided by this package, consider the FCS-networked fires key performance parameter (KPP). This package's predictive planning capabilities pre-approve airspace for weapons/munitions to target pairings so that when the decision to engage a target is made, the available weapons/munitions are already understood.

The 10 Situation Understanding package's services allow warfighters to better comprehend the battlespace and gain information superiority. The package includes map information and situational awareness (SA) database maintenance, which performs fusion as follows:

• Situation refinement that fuses spatial and temporal relationships among objects, grouping objects and abstract interpretation of the patterns in the order of battle.
• Threat refinement that combines activity with capability of enemy forces, infers enemy intentions and performs threat assessment.
• Process refinement that monitors the fusion process itself, assesses the accuracy of the fusion process and regulates the acquisition of data to achieve optimal results.

The Battle Command (BC) and Mission Execution package contains planning and decision aids that assist the commander in making quick, informed and accurate decisions to best prosecute the battle. These services are fully independent of mode — training, rehearsal or operational — and are intended to support manual to autonomous operations.

The warfighter-machine interface (WMI) package provides the capabilities to present Soldier information and receive Soldier information. WMI provides a common user interface across multiple platforms supporting the common crew station and "personal digital assistant" display system. It considers parameters such as echelon, type of system being used, and the warfighter's role to tailor information presentation.

Communications and Computers (CC) Systems

The FCS Family-of-Systems (FoS) are connected to the command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) network by a multilayered Communications and Computers (CC) network with unprecedented range, capacity and dependability. The Communications and Computers (CC) network provides secure, reliable access to information sources over extended distances and complex terrain. The network will support advanced functionalities such as integrated network management, information assurance and information dissemination management to ensure dissemination of critical information among sensors, processors and warfighters both within, and external to the FCS-equipped organization.

The Communications and Computers (CC) network does not rely on a large and separate infrastructure because it is primarily embedded in the mobile platforms and moves with the combat formations. This enables the command, control, communications, computers, intelligence, surveillance, and

reconnaissance (C4ISR) network to provide superior Battle Command (BC) on the move to achieve offensive-oriented, high-tempo operations.

The FCS communication network is comprised of several homogenous communication systems such as Joint Tactical Radio System (JTRS) Clusters 1 and 5 with Wideband Network Waveform (WNW) and Soldier Radio Waveform (SRW), Network Data Link and Warfighter Information Network–Tactical (WIN-T). FCS leverages all available resources to provide a robust, survivable, scalable and reliable heterogeneous communications network that seamlessly integrates ground, nearground, airborne and space-borne assets for constant connectivity and layered redundancy.

Every FCS vehicle in the Unit of Action (UA) will be equipped with a 4- or 8-channel Joint Tactical Radio System (JTRS) Cluster 1. Soldiers and other weight and power-constrained platforms will be equipped with a 1- or 2-channel Joint Tactical Radio System (JTRS) Cluster 5. In addition to the Wideband Network Waveform (WNW) and Soldier Radio Waveform (SRW) communications backbone, the software programmable Joint Tactical Radio System (JTRS) will support other waveforms to ensure current force Joint, Interagency and Multinational (JIM) interoperability. The WIN-T will provide additional communications capability within the Unit of Action (UA), as well as reach to echelons above — intra- and inter-Unit of Action (UA), and UA to Unit of Employment (UE) —and range extension.

The FCS Network Management System manages the entire Unit of Action (UA) network including radios with different waveforms, platform routers, and local area networks (LANs), information assurance elements, and hosts. It provides a full spectrum of management capabilities required during all mission phases, including pre-mission planning, rapid network configuration upon deployment in the area of operations, monitoring the network during mission execution and dynamic adaptation of network policies in response to network performance and failure conditions.

FCS will employ an integrated computer system to host the System-of-Systems Common Operating Environment (SOSCOE), ensure common processing, support networking and employ consistent data storage/retrieval across all FCS platforms and applications. The integrated computer system consists of processors, storage media, dynamic memory, input/output devices, local area networks (LANs) and operating systems. A suite of seven computing system types have been identified to meet the various FCS platform-specific requirements for security, processing capability, computational capacity, throughput, memory, size, weight and power.

Intelligence, Reconnaissance and Surveillance (ISR)

A distributed and networked array of multispectral intelligence, reconnaissance and surveillance (ISR) sensors provides FCS with the ability to “see first.” Intelligence, Reconnaissance and Surveillance (ISR) assets within the Unit of Action (UA) — as well as those external to the Unit of Action (UA) and at higher echelons — will provide timely and accurate situational awareness (SA), enhance survivability by avoiding enemy fires, enable precision networked fires, and maintain contact throughout engagement. FCS will process real-time ISR data, outputs from survivability systems, situational awareness (SA) data and target identification information to update the common operating picture (COP) containing information on friendly forces, battlespace objects (BSOs), BSO groupings and their associated intent, threat potential and vulnerabilities. The real-time distribution and dissemination of information and data are reliant on robust, reliable, and high-capacity network data links.

To provide warfighters with actionable information, the data from the various distributed intelligence, reconnaissance and surveillance (ISR) and other sensor assets are subject to complex data processing, filtering, correlation, aided target recognition and fusion. The Sensor Data Management (SDM) software organizes all the sensor data — including detection reports — and tracks information as received from the sensor packages. Data are then processed and fused to synthesize information about the object, situation, threat and ongoing intelligence, reconnaissance and surveillance (ISR) processes. In addition to receiving data from FCS organic sensors, Sensor Data Management (SDM) has the capability to receive sensor data from nonorganic sources including, current forces and Joint, Interagency, and Multinational (JIM). Sensor Data Management (SDM) will perform sensor data format conversions to output the data in FCS standard data formats.

Networked Logistics Systems

The key to the success of the FCS is the Networked Logistics Systems integrated through the Family-of-Systems (FOS) to achieve the logistics goals of reducing the logistics footprint, enhancing deployability, increasing operational availability, and reducing total ownership costs. These critical program goals are included in the two logistics Key Performance Parameters (KPP), KPP 4 (Transportability/Deployability) and KPP 5 (Sustainability/Reliability). Inherent to meeting these KPPs is the integration of logistics in the command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) network primarily through the Platform-Soldier Mission Readiness System (PSMRS) and the Logistics Decision Support System (LDSS). These systems provide unprecedented logistics information and decision tools to the commanders and logisticians by enabling the distribution system to deliver the right stuff to the right place at the right time. The networked logistics is further enabled by the demand reduction technologies designed into the System of Systems. Increased Reliability Availability Maintainability – Test (RAM-T) goals and implementing a Performance Based Logistics (PBL) support concept through extensive up front systems engineering efforts will result in increased Operational Availability and significant decreases in both parts and maintenance personnel while generating increased combat power for the Soldiers.

Embedded Training

The FCS network facilitates the Soldier's ability to train anywhere, any time. Technology has matured to a level that supports these requirements. Embedded Training (ET) will be developed as an integral part of the FCS manned platform and command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) architectures.

The Embedded Live-Virtual-Constructive (L-V-C) Training is the cornerstone of the networked Embedded Training (ET) and will satisfy the Key Performance Parameter (KPP#6) which states "The FCS Family of Systems (FoS) must have an embedded individual and collective training capability that supports live, virtual, and constructive training environments." Embedded Training (ET) must be designed-in at the start of the program to ensure it is developed in conjunction with the other FCS System of Systems (SoS) components. To do otherwise would lead to needless duplication of software development, potential negative training as a result of inevitable baseline divergence (as training tries to keep pace with operational software functionality) and additional space/weight/power claims for training. To fulfill the Operational and Organizational (O&O) concepts, the System of Systems (SoS) must be capable of supporting operations, mission rehearsal and training of separate audiences (soldiers, units, leader/staff teams) simultaneously.

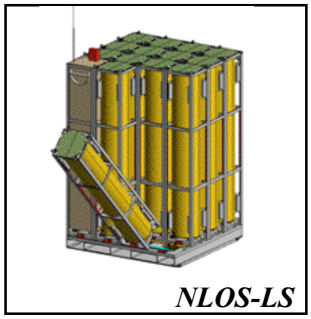
2. Unattended Ground Sensors (UGS)


UGS

The FCS Unattended Ground Sensors (UGS) program is divided into two major subgroups of sensing systems: Tactical-UGS (T-UGS), which includes Intelligence, Surveillance and Reconnaissance (ISR)-UGS and Chemical, Biological, Radiological and Nuclear (CBRN)-UGS; and Urban-UGS (U-UGS), also known as Urban Military Operations in Urban Terrain (MOUT) Advanced Sensor System. The intelligence, reconnaissance and surveillance (ISR)-UGS will be modular and composed of tailorable sensor groups using multiple ground-sensing technologies. An Unattended Ground Sensors (UGS) field will include low-cost, expendable and multimode sensors for target detection, location and classification; and an imaging capability for target identification. A sensor field will also include a gateway node to provide sensor fusion and long-haul communications capability for transmitting target or other information to a remote operator, or the common operating picture through the FCS Unit of Action (UA) Network. The Unattended Ground Sensors (UGS) can be used to perform mission tasks such as perimeter defense, surveillance, target acquisition and situational awareness (SA), including Chemical, Biological, Radiological and Nuclear (CBRN) early warning.

Urban-Unattended Ground Sensors (U-UGS) will provide a leave-behind, network-enabled reporting system for situational awareness (SA) and force protection in an urban setting, as well as residual protection for cleared areas of Urban Military Operations in Urban Terrain (MOUT) environments. They can be hand-employed by Soldiers or robotic vehicles either inside or outside buildings and structures.

3. Non Line of Sight – Launch System (NLOS-LS)


NLOS-LS

The Non-Line-of-Sight – Launch System (NLOS-LS) consists of a family of missiles and a highly deployable, platform-independent Container Launch Unit (C/LU) with self-contained tactical fire control electronics and software for remote and unmanned operations. Each Container Launch Unit (C/LU) will consist of a computer and communications system and 15 missiles [Precision Attack Missiles (PAM) and Loitering Attack Missiles (LAM)].

Precision Attack Missiles (PAM) is a modular, multimission, guided missile with two trajectories — a direct-fire or fast-attack trajectory, and a boost-glide trajectory. The missile will receive target information prior to launch, and can receive and respond to target location updates during flight. The Precision Attack Missiles (PAM) will support laser-designated, laser-anointed and autonomous operation modes and will be capable of transmitting near-real-time information in the form of target imagery prior to impact. Precision Attack Missiles (PAM) is being designed to defeat heavy armored targets.

Loitering Attack Missiles (LAM) will provide imagery for area search, surveillance, targeting and battle damage assessment (BDA), and could serve as an airborne radio transmission platform for other system missiles, as well identifying high-payoff targets for missile attack. Loitering Attack Missiles (LAM) will be capable of flying to extended ranges with significant loiter time at its maximum range. Mission data can be preprogrammed or changed in flight, and imagery information can be provided to

multiple common ground systems. Current target requirements for Loitering Attack Missiles (LAM) are for high-fleeting, high-value targets.

4. Intelligent Munitions System


Intelligent Munitions System

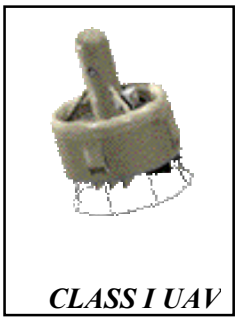
The Intelligent Munitions System (IMS) is an unattended munitions system providing both offensive battlespace shaping and defensive force protection capabilities for the Future Force. The Intelligent Munitions System (IMS) is a system of lethal and nonlethal munitions integrated with robust command and control features, communications devices, sensors and seekers that make it an integral part of the Future Combat Systems network's core systems.

Intelligent Munitions System (IMS) provides unmanned terrain dominance, economy of force and risk mitigation for the warfighting commander. Typical missions include:

- Isolating enemy forces, objectives, and areas of decisive operations.
- Creating lucrative targets, and engaging them or cueing other fires.
- Filling gaps in the noncontiguous battlespace.
- Controlling noncombatant movement with its nonlethal capabilities.

With its reduced footprint, Intelligent Munitions System (IMS) can be delivered by various means, and once on the ground, locate itself, organize all of its components and report its location to the Battle Command Mission Execution (BCME). It will be under positive control of the BCME, one of the FCS command and control applications. The munition field can be armed, turned off to allow friendly passage, then rearmed to resume its mission. This on-off-on capability allows it to be recoverable, further reducing its logistics footprint. Intelligent Munitions System (IMS) will not become a residual hazard; it will self-destruct on command or at a preset time interval. It will also be tamper resistant.

5. Class I Unmanned Aerial Vehicle (UAV)


CLASS I UAV

The Class I Unmanned Aerial Vehicle (UAV) provides the dismounted soldier Reconnaissance, Surveillance, and Target Acquisition (RSTA). Weighing less than 15 pounds, the air vehicle operates in complex urban and jungle terrains with a vertical take-off and landing capability. It is interoperable with selected ground and air platforms and controlled by dismounted soldiers. The Class I uses autonomous flight and navigation, but it will interact with the network and Soldier to dynamically update routes and target information. It provides dedicated reconnaissance support and early warning to the smallest echelons of the Unit of Action (UA) in environments not suited to larger assets. It will also perform limited communications relay in restricted terrain, a tremendous deficit in current operations.

The system (which includes two air vehicles, a control unit, and parts) is back-packable, weighs 40 pounds, and can remain in flight for up to 60 minutes.

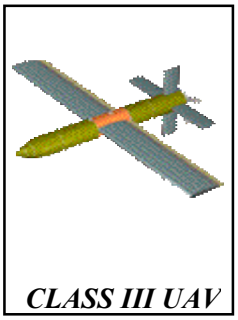
6. Class II Unmanned Aerial Vehicle (UAV)

CLASS II UAV

The Class II Unmanned Aerial Vehicle (UAV) has twice the endurance and a wider range of capabilities than the Class I. It is a multifunctional aerial system possessing the Vertical Take-Off and Landing capability. It supports the Infantry and Mounted Combat System Company Commanders with reconnaissance, security/early warning, target acquisition and designation. The Class II Unmanned Aerial Vehicle (UAV) will be a vehicle-mounted system that provides Line-of-Sight (LOS) enhanced dedicated imagery. The distinguishing capability of this UAV is target designation in day, night, and adverse weather. This provides the Company Commander the ability to shape the battle space by employing a combination of Line-of-Sight (LOS), Beyond-Line-of-Sight (BLOS), and Non-Line-of-Sight (NLOS) fires. It can team with selected ground and air platforms, and provides limited communications relay.

The Class II Unmanned Aerial Vehicle (UAV) can be carried by two Soldiers, has a 16 km radius of action, and can remain aloft for two hours.

7. Class III Unmanned Aerial Vehicle (UAV)



CLASS III UAV

The Class III Unmanned Aerial Vehicle (UAV) is a multifunction aerial system that has the range and endurance to support battalion level RSTA within the Unit of Action's (UA) battle space. The Class III must maximize endurance and payload while minimizing maintenance, fuel, and transportation requirements. It provides the capabilities of the Class I and Class II, but also provides communications relay, mine detection, Chemical, Biological, Radiological and Nuclear (CBRN) detection, and meteorological survey. It allows the Non-Line-of-Sight (NLOS) battalion to deliver precision fires within the UA area of interest. The Class III must be able to take-off and land without a dedicated air field.

The Class III Unmanned Aerial Vehicle (UAV) has a six hour endurance and a 40 km radius of action.

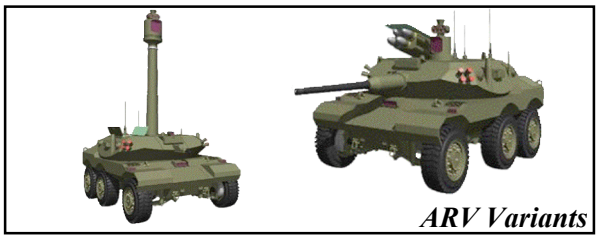
8. Class IV Unmanned Aerial Vehicle (UAV)

CLASS IV UAV

The Class IV Unmanned Aerial Vehicle (UAV) has a range and endurance appropriate for the brigade mission. It supports the Unit of Action (UA) Commander with communications relay, long endurance persistent stare, and wide area surveillance over a 75 km radius. Unique missions include dedicated manned and unmanned teaming (MUM) with manned aviation; Emitter Mapping; Wide Band Communications Relay across 150-175 km; and standoff Chemical Biological Radiological, Nuclear, and Energy (CBRNE) detection with on-board processing. Additionally, it has the payload to enhance the RSTA capability by cross-cueing multiple sensors. It operates at survivable altitudes at standoff range at day and night and during adverse weather. Like the Class III, the Class IV must be able to take-off and land without a dedicated air field.

The Class IV Unmanned Aerial Vehicle (UAV) System (which includes four air vehicles) has an objective endurance of 18-24 hours and a 75 km radius of action.

9. Armed Robotic Vehicle (ARV)



ARV Variants

The Armed Robotic Vehicle (ARV) comes in two variants: the Assault variant and the Reconnaissance, Surveillance and Target Acquisition (RSTA) variant. The two variants share a common chassis. The Assault variant will remotely provide reconnaissance capability; deploy sensors, direct-fire weapons, and special munitions into buildings, bunkers, and other urban features; locate or by-pass threat obstacles in buildings, bunkers, and tunnels, and other urban features; assess battle damage; acts as a communications relay; supports the mounted and dismounted forces in the assault with direct fire and anti-tank (AT) weapons; and occupy key terrain and provide over-watching fires.

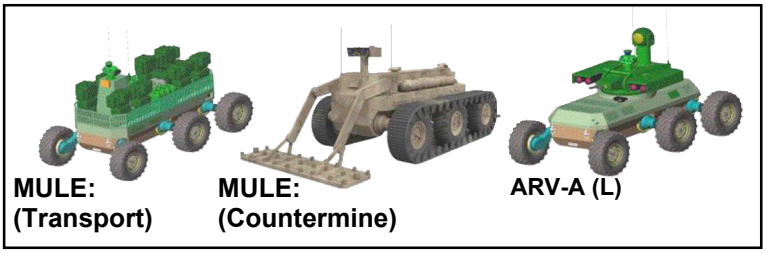
The Reconnaissance, Surveillance and Target Acquisition (RSTA) version will remotely provide reconnaissance capability in Urban Military Operations in Urban Terrain (MOUT) and other battlespace; deploy sensors, direct-fire weapons, and special munitions into buildings, bunkers, and other urban features; locate or by-pass threat obstacles in buildings, bunkers, tunnels, and other urban features; acts as a communications relay; and assess battle damage assessment (BDA).

10. Small Unmanned Ground Vehicle (SUGV)

SUGV

The Small Unmanned Ground Vehicle (SUGV) is a small, lightweight, manportable UGV capable of conducting military operations in urban terrain tunnels, sewers, and caves. The Small Unmanned Ground Vehicle (SUGV) is an aid in enabling the performance of manpower intensive or high-risk functions (i.e. urban Intelligence, Surveillance, and Reconnaissance (ISR) missions, chemical/Toxic Industrial Chemicals (TIC)/Toxic Industrial Materials (TIM), reconnaissance, etc.) without exposing Soldiers directly to the hazard. The Small Unmanned Ground Vehicle's (SUGV) modular design allows multiple payloads to be integrated in a plug-and-play fashion. Weighing less than 30 pounds, it is capable of carrying up to six pounds of payload weight.

11. Multifunctional Utility/Logistics and Equipment (MULE) Vehicle



MULE Variants

The Multifunctional Utility/Logistics and Equipment (MULE) Vehicle is a 2.5-ton Unmanned Ground Vehicle (UGV) that will support dismounted operations. It consists of four major components:

• Mobility platform or common chassis.
• Autonomous Navigation System (ANS). The ANS is the mission payload package that will be integrated on both the Multifunctional Utility/Logistics and Equipment (MULE) Vehicle and Armed Robotic Vehicles (ARVs) to provide a robotic semiautonomous capability, and also on the family of Manned Ground Vehicles (MGVs) to provide a leader-follower capability.
• Operator Control Unit (OCU).
• Three Mission equipment packages/variants.

The Multifunctional Utility/Logistics and Equipment (MULE) Vehicle is sling-loadable under military rotorcraft. The Multifunctional Utility/Logistics and Equipment (MULE) Vehicle has three variants sharing a common chassis: transport, countermine and the Armed Robotic Vehicle (ARV)-Assault-Light (ARV-A-L). The transport Multifunctional Utility/Logistics and Equipment (MULE) Vehicle will carry 1,900-2,400 pounds of equipment and rucksacks for dismounted infantry squads with the mobility needed to follow squads in complex terrain. The countermine Multifunctional Utility/Logistics and Equipment (MULE) Vehicle will provide the capability to detect, mark and neutralize anti-tank mines by integrating a mine detection mission equipment package from the Ground Standoff Mine Detection System (GSTAMIDS) FCS program. The Armed Robotic Vehicle (ARV)-Assault-Light (ARV-A-L) Multifunctional Utility/Logistics and Equipment (MULE) Vehicle is a mobility platform with an integrated weapons and reconnaissance, surveillance and target acquisition (RSTA) package to support the dismounted infantry's efforts to locate and destroy enemy platforms and positions. The Multifunctional Utility/Logistics and Equipment (MULE) Vehicle platform's centerpiece is superior mobility built around an articulated suspension system to negotiate obstacles and gaps that a dismounted squad might encounter.

12. Mounted Combat System (MCS)

MCS

The Mounted Combat System (MCS) provides direct and Beyond-Line-of-Sight (BLOS) offensive firepower capability allowing UAs to close with and destroy enemy forces in support of the operations plan. The Mounted Combat System (MCS) delivers precision fires at a rapid rate to destroy multiple targets at standoff ranges quickly and complements the fires of other systems in the Unit of Action (UA). It is highly mobile and maneuvers out of contact to positions of advantage. It is capable of providing direct support to the dismounted infantry in an assault, defeating bunkers, and breaching walls during the tactical assault. The Mounted Combat System (MCS) also provides Beyond-Line-of-Sight (BLOS) fires through the integrated sensor network. Beyond Line-of-Sight (BLOS) fires from a Mounted Combat System (MCS) provide in-depth destruction of point targets up to 8 kilometers away from the target. This capability significantly increases the options available to the Unit of Action (UA) commander for the destruction of point targets through the integrated fires network enhancing SoS

lethality. The Mounted Combat System (MCS) will consist of the common Manned Ground Vehicle (MGV) chassis and an autoloading line of sight and Beyond-Line-of-Sight (BLOS) capabilities.

13. Infantry Carrier Vehicle (ICV)


ICV

The Infantry Carrier Vehicle (ICV) consists of four platform versions: a Company Commander; a Platoon Leader; a Rifle Squad; and a Weapons Squad. All four platform versions appear to be identical from the exterior to prevent targeting of a specific Infantry Carrier Vehicle (ICV) variant type (e.g., Platoon Leader). The Infantry Platoon includes an Infantry Carrier Vehicle (ICV) Platoon Leader variant; three Infantry Carrier Vehicle (ICV) Rifle Squad variants; and an Infantry Carrier Vehicle (ICV) Weapons Squad variant. The Infantry Carrier Vehicle (ICV) Rifle Squad variant and Infantry Carrier Vehicle (ICV) Weapons Squad variant each deliver 9-person infantry squads to a location from which they will conduct a close assault. The Infantry Carrier Vehicle (ICV) will effectively employ weapon systems and rapidly maneuver during blackout, day and night operations, inclement weather, and limited visibility periods. The Infantry Carrier Vehicle (ICV) will deliver the dismounted force to the close battle and support the squad by providing self-defense and supporting fires. The Infantry Carrier Vehicle (ICV) carries the majority of equipment freeing the individual Soldier to focus on mission. The squad will have access to Army and Joint fire delivery systems from external sources to provide extended range, networked responsive precision or volume fires on demand in support of tactical maneuvers. The Infantry Carrier Vehicle (ICV) can move, shoot, communicate, detect threats, and protect crew and critical components under most land-surface environments. Data transfer with other components of the Unit of Action (UA) permits constant update of the common operational picture and rapid identification of targets.

14. Non-Line-of-Sight Cannon (NLOS-C)


NLOS-C

The Non-Line-of-Sight Cannon (NLOS-C) provides unprecedented responsiveness and lethality to the Unit of Action (UA) commander. The Non-Line-of-Sight Cannon (NLOS-C) provides networked, extended-range targeting, and precision attack of point and area targets in support of the Unit of Action (UA) with a suite of munitions that include special purpose capabilities. The Non-Line-of-Sight Cannon (NLOS-C) provides sustained fires for close support and destructive fires for tactical standoff engagement. The system's primary purpose is to provide responsive fires in support of the FCS Combined Arms Battalions (CABs), and their subordinate units in concert with line-of-sight, Beyond-Line-of-Sight (BLOS), Non-Line-of-Sight (NLOS), external and Joint capabilities. The system provides flexible support through its ability to change effects round-by-round and mission-by-mission. These capabilities, combined with rapid response to calls for fire and rate of fire, provide a variety of effects on demand.

The cannon will be able to move rapidly, stop quickly, and deliver lethal first round effects on target in record time. The Non-Line-of-Sight (NLOS) Cannon will have a multiple round-simultaneous impact (MRSI) capability. The multiple round-simultaneous impact (MRSI) capability, coupled with the Non-Line-of-Sight Cannon's (NLOS-C) superior sustained rate of fire, will provide record effects on target from a smaller number of systems. The cannon, like all Manned Ground Vehicle (MGV) variants, can rapidly rearm and refuel, and its system weight makes it uniquely deployable. Fully automated handling, loading, and firing will be another centerpiece of the Non-Line-of-Sight Cannon (NLOS-C).

The Non-Line-of-Sight Cannon (NLOS-C) balances deployability and sustainability with responsiveness, lethality, survivability, agility, and versatility.

15. Non-Line-of-Sight Mortar (NLOS-M)


NLOS-M

The Non-Line-of-Sight Mortar (NLOS-M) provides unparalleled responsiveness and lethality to the Unit of Action (UA) commander. The mortar provides fires in close support of tactical maneuvers that include destructive fires and special purpose fires. While working as part of an Non-Line-of-Sight Mortar (NLOS-M) battery, the Non-Line-of-Sight mortar-firing Precision Guided Mortar Munitions will deliver lethal fires to destroy high payoff and most dangerous targets, and provide area suppression in support of Unit of Action (UA) companies and platoons. The mortar and platoon are highly flexible and agile in establishing sensor-shooter linkages. It provides highly responsive, reliable, timely, accurate, and sustained rates of fire and rates of kill with 24/7 availability in all weather and terrain conditions at extended ranges. The Non-Line-of-Sight Mortar (NLOS-M) system provides precision-guided fires to destroy, protective fires to suppress and obscure the enemy and illumination fires all in close support of Unit of Action (UA) Combined Arms Battalions (CABs) maneuver units. The platoon provides responsiveness with fires on-demand to engage complex and simultaneous target sets. The command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) network enables the FCS Non-Line-of-Sight Mortar (NLOS-M) fire control system to conduct semi- to autonomous computation of technical fire direction, automatic gun lay, preparation of the ammunition for firing and mortar round firing. Vastly improved handling, loading and firing systems will be another centerpiece of Non-Line-of-Sight Mortar (NLOS-M). The mortar platoon will retain a dismounted 81mm mortar capability for complex terrain.

16. Reconnaissance and Surveillance Vehicle (RSV)


RSV

Reconnaissance and Surveillance Vehicles (RSVs) feature a suite of advanced sensors to detect, locate, track, classify and automatically identify targets from increased standoff ranges under all climatic conditions, day or night. Included in this suite are a mast-mounted, long-range electro-optic infrared sensor, an emitter mapping sensor for radio frequency (RF) intercept and direction finding, remote chemical detection, and a multifunction RF sensor. Reconnaissance and Surveillance Vehicles (RSVs) also feature the onboard capability to conduct automatic target detection, aided target recognition and level one sensor fusion. To further enhance the scout's capabilities, Reconnaissance and Surveillance Vehicles (RSVs) are also equipped with unattended ground sensors (UGS), a Small Unmanned Ground Vehicle (SUGV) with various payloads and two unmanned aerial vehicles (UAVs).

17. Command and Control Vehicle (C2V)


C2V

The Command and Control Vehicle (C2V) is part of the family of manned ground vehicles and is the hub of battlefield command and control. The Command and Control Vehicle (C2V) platform provides for information management of the integrated network of communications and sensor capability within the Unit of Action (UA) and provides the tools for commanders to synchronize their knowledge of combat power with the

human dimension of leadership. It is located within the headquarters sections at each echelon of the Unit of Action (UA) down to the company level, and with the integrated command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) suite of equipment, it provides commanders command and control on the move.

Command and Control Vehicles (C2Vs) contain all the interfaces required to enable the commander to leverage the power of the C4ISR network and provides the means for leaders at all levels to achieve information superiority and situational understanding and to establish, maintain and distribute a common operating picture fused from the friendly, enemy, civilian, weather and terrain situations while on the move. The crew uses its integrated C4ISR suite (communication, computers and sensor systems) to receive, analyze and transmit tactical information via voice, video and data inside and outside the Unit of Action (UA). The Command and Control Vehicle (C2V) can also employ unmanned systems, such as unmanned aerial vehicles to enhance situational awareness throughout the Unit of Action (UA).

18. Medical Vehicle – Treatment (MV-T) and Evacuation (MV-E)

MV-E/MV-T

The Medical Vehicle is designed to provide advanced trauma life support within 1 hour to critically injured Soldiers. The Medical Vehicle serves as the primary medical system within the Unit of Action (UA) and will have two mission modules: Evacuation and Treatment. The time-sensitive nature of treating critically injured soldiers requires an immediately responsive force health protection system with an expedient field evacuation system. The FCS Medical Vehicle-Evacuation (MV-E) vehicle allows trauma specialists, maneuvering with combat forces, to be closer to the casualty's point-of-injury and is used for casualty evacuation. The Medical Vehicle -Treatment (MV-T) vehicle enhances the ability to provide Advanced Trauma Management (ATM)/Advanced Trauma Life Support (ATLS) treatments and procedures forward for more rapid casualty interventions and clearance of the battlespace. Both FCS Medical Vehicle mission modules will be capable of conducting medical procedures and treatments using installed networked telemedicine interfaces, Medical Communications for Combat Casualty Care and the Theater Medical Information Program (TMIP).

19. FCS Recovery and Maintenance Vehicle (FRMV)

FRMV

The Recovery and Maintenance Vehicle (FRMV) is the recovery and maintenance system for employment within both the Unit of Action (UA) and Unit of Employment (UE) and contributes to sustaining and generating combat power to the Future Force structure. Each Unit of Action (UA) will have a small number of 2-3 man Combat Repair Teams within the organic Forward Support Battalion (FSB) to perform field maintenance requirements beyond the capabilities of the crew chief/crew, more in-depth Battle Damage Assessment Repair (BDAR), and limited recovery operations. The Recovery and Maintenance Vehicle (FRMV) is designed to hold a crew of three with additional space for three additional recovered crew. The Recovery and Maintenance Vehicle (FRMV) has a Close Combat Support Weapon (CCSW) and Mk-19mm grenade launcher.

20. The Soldier


The Soldier

All Soldiers in the Unit of Action (UA) are part of the Soldier as a System (SaaS) overarching requirement encompassing everything the Soldier wears, carries, and consumes to include unit radios, crew served weapons, and unit specific equipment in the execution of tasks and duties. All Soldiers systems will be treated as an integrated System of Systems (SoS). The FCS Soldier, as defined by Soldier as a System (SaaS), meets the need to improve the current capability of all Soldiers, regardless of Military Occupational Specialty (MOS), to perform Army Common Tasks and functions more efficiently and effectively. Soldier as a System (SaaS) establishes a baseline for core Soldier requirements, and establishes the foundation for specific or mission unique Warrior Programs (Land, Mounted, and Air). It will present a fully integrated Soldier that provides a balance of tasks, and mission equipment in support of the Soldier Team, FCS, and the Future Force.