



Future Combat Systems: Taking the Current Force into the Future

Technologies that are changing the way we fight wars in order to keep the peace, [including] the Army's Future Combat Systems . . . will give every Soldier precise tactical information in the heat of battle.

President George W. Bush*

Background

Future Combat Systems (FCS) represents the Army's primary initiative to reduce or eliminate capability gaps in the Future Force assessed against the estimated capabilities of future enemy threats. The FCS program is the centerpiece of DOTMLPF (doctrine, organization, training, materiel, leader development, personnel and facilities) solutions for the Future Force. It is tied directly to achieving concepts and capabilities to meet the needs of the future Joint Force.

FCS will consist of a family of advanced, networked air- and ground-based maneuver, maneuver support and sustainment systems. It employs a revolutionary, integrated architecture to help meet the future Joint and Army commanders' requirements. These capabilities include networked communications, networked operations, sensors, battle command systems, training platforms, and both manned and unmanned reconnaissance and surveillance capabilities. These will enable improved situational understanding and operations at a level of synchronization heretofore unachievable.

FCS-equipped Unit of Action (UA) Within a Balanced Force

The Future Force will be a mixed force of heavy, light, Stryker and FCS. The FCS-equipped brigade encompasses more than a new set of capabilities; this organization reflects a fundamentally transformed method of combat. The core of the FCS maneuver UA comprises the 18 manned and unmanned platforms centered on the Soldier and integrated by a network.

The Future Combat Systems-equipped UA is not just a unique brigade combat team built around a family of systems. Rather, it is the cornerstone of future Army Modular Force capabilities, providing the Joint Force with dominant landpower capability that is decisive in any operation, against any level of threat, in any environment. The FCS-equipped brigade balances the capabilities for strategic responsiveness and battlespace dominance.

The FCS-equipped UA can be tailored with additional capabilities for specific missions during

*Remarks at signing ceremony for the Fiscal Year 2005 Defense Appropriations Bill, 5 August 2004

*We have a concept of development
where we evolve from the Current Force to the Future Force
in a continuous, seamless manner
and we . . . start to network the Current Force.*

Dr. Francis J. Harvey, Secretary of the Army,
in testimony before the House Armed Services
Committee re the Fiscal Year 2006 Army Budget

a campaign. It allows command and control of up to six combined-arms battalions by one commander. It is able to employ a range of supporting capabilities to perform a variety of missions such as reinforcing fires, engineering operations, military police tasks, air and missile defense, psychological operations and civil affairs.

The FCS-equipped UA is designed to ensure a campaign-quality Army. Although it has the responsiveness and deployability to achieve rapid Army deployment goals, it is designed with the durability, endurance and stamina to fight battles and engagements for the duration of a campaign. Given its inherent tactical mobility, it can land at points removed from its objectives and out of range of enemy defenses, then move by land to complete its mission. This capability applies not only to entry operations but also to theater operations throughout the campaign.

Spiral Acquisition Strategy

The Army is accelerating Future Combat Systems by putting FCS technologies into the current Army Modular Force. This will reduce operational risk by improving the Current Force's survivability, its intelligence, surveillance and reconnaissance and its joint interdependence. As emerging FCS capabilities enhance the Current Force, the Current Force's operational experience informs the FCS program, mitigating future challenges and risk. FCS technologies will migrate into the Current Force through a series of four spirals or "spin-offs."

The first FCS capabilities, consisting of prototypes fielded to an evaluation brigade combat

team, come into the force in Fiscal Year 2008. Following successful evaluation, production and fielding of the first increment (spiral 1) to Current Force units will commence in 2010. This process will be repeated for each successive spiral. By 2014, the Army force structure will include one UA equipped with all 18+1 FCS core systems and additional Modular BCTs with selected FCS capabilities. (See graphic on page 10.)

Future Capabilities into the Current Force

The Army's plan to adjust the FCS program is based on the fact that a nation at war must provide for its operational forces the best possible capabilities. Additionally, the program adjustment reflects that the Army, as a learning institution, has heeded the counsel of several independent review panels, including the Welch panels, Government Accountability Office (GAO) and Congressional Budget Office (CBO) studies, and the Institute for Defense Analyses. FCS remains at the heart of the Army's strategy to adjudicate risk using the Current-to-Future-Force construct. Under this construct, the future Army Modular Force informs development of the current Modular Force. **This is the centerpiece of the adjustment: providing the Current Force with FCS capabilities sooner rather than later.**

Modular forces solve immediate Army shortfalls and urgent force capability gaps. The Army has used the FCS-equipped UA operational and organizational plan as the starting point to create a modular, brigade-based Army. Through its Modular Force efforts, the Army is rapidly moving its Current Force toward the characteristics envisioned for the FCS-equipped UA;

this will enable the Army to transition into FCS-equipped units and FCS-enabled methods of operation. Furthermore, the modular design improves the Current Force's versatility, agility, information superiority and full-spectrum capabilities that are paramount to the FCS-equipped UA.

These two major initiatives are not competing; rather, they are truly complementary, both striving toward achieving the operational requirements for landpower. Using primarily organizational change to achieve operational needs, modular forces enable leader development and feedback for Future Force developments. The FCS-equipped UA will capitalize on the Modular Force initiative and go further in achieving land force operational needs by effecting change through new materiel. It is through this new materiel and Modular Force design that the operational concepts and tactics, techniques and procedures (TTPs) envisioned for the Future Force will become a reality.

Organizational and Equipment Overview

FCS is a family of systems designed around a common network with advanced, networked air- and ground-based systems including manned combat vehicles, unmanned air and ground vehicles, unattended sensors and unattended munitions—all with embedded and networked battle command that operates as a system of systems, with all platforms capable of tactical airlift. Future Combat Systems is connected via an advanced network architecture that will enable levels of joint connectivity, situational awareness and understanding, and synchronized operations heretofore unachievable.

Core equipment systems. FCS includes 18+1+1 core systems comprising:

- **Eight manned ground vehicles.** FCS has eight manned vehicles designed to perform the tasks required in the maneuver and maneuver support functions of the UA:
 - **Mounted Combat System (MCS):** Provides direct and beyond-line-of-sight offensive firepower in its primary role of providing direct support. MCS is capable of rapid-rate precision fires to destroy multiple targets at standoff ranges.
 - **Infantry Carrier Vehicle (ICV):** Comprises four versions—company commander, platoon leader, rifle squad and weapons squad—each with turret-mounted fire support weapons. Both the rifle and weapons squad variants will transport nine Soldiers.
 - **Non-Line-of-Sight Cannon (NLOS-C):** Provides networked, extended-range targeting and precision attack fires on point and area targets. The primary role of NLOS-C is in support of FCS combat-arms battalions and subordinate units.
 - **Non-Line-of-Sight Mortar (NLOS-M):** Provides close support fires for tactical maneuver. A dismounted 81mm capability is retained by the FCS mortar platoons.
 - **Reconnaissance and Surveillance Vehicle (RSV):** With its advanced sensor suite, will detect, locate, track, classify and automatically identify targets at long standoff ranges, under all climatic conditions, day or night. RSV equipping includes unattended ground sensors, a small unmanned ground vehicle with various payloads, and two unmanned aerial vehicles.
 - **Command and Control Vehicle (C2V):** Provides the hub for battlefield command and control by incorporating systems for information management of the integrated FCS network of communications. The C2V has data and sensor capabilities and tools enabling the synchronizing of information, coordinating of action and increasing situational understanding and the distribution of a common operating picture.
 - **Medical Vehicle-Treatment (MV-T) and Medical Vehicle-Evacuation (MV-E):**

- Provide advanced trauma management and advanced trauma life support.
- **FCS Recovery and Maintenance Vehicle (FRMV):** Provides the recovery and maintenance system to sustain and generate combat power.
 - **One family of Unattended Ground Sensors (UGS).** The FCS Unattended Ground Sensors program consists of tactical and urban sensors:
 - **Tactical-UGS (T-UGS),** which includes Intelligence, Surveillance and Reconnaissance (ISR)-UGS and Chemical, Biological, Radiological and Nuclear (CBRN)-UGS;
 - **Urban-UGS (U-UGS),** also known as Urban Military Operations in Urban Terrain (MOUT) Advanced Sensor System.
 - **Two Unattended Munitions.** FCS has two unattended munitions programs:
 - **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. The Precision Attack Missiles (PAMs) are being designed to defeat heavy armored targets. PAM is a modular, multimission, guided missile with two trajectories—a direct-fire or fast-attack trajectory and a boost-glide trajectory.
 - **Intelligent Munitions System (IMS):** Provides, unattended, both offensive battlespace shaping and defensive force protection capabilities for the Future Force. 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.
 - **Four Unmanned Aerial Vehicles (UAVs).** There are four classes of unmanned aerial vehicles (UAVs) organic to platoon, company, battalion and brigade echelons.

Each of these UAVs is designed to provide Reconnaissance, Surveillance, and Target Acquisition (RSTA) from the dismounted Soldier to each organizational level up to brigade echelon. Each class has extended ranges and durations based on the element it is designed to support.
 - **Three classes of Unmanned Ground Vehicles (UGVs).** The three classes of unmanned ground vehicles are the Armed Robotic Vehicle (ARV), the Small Unmanned Ground Vehicle (SUGV) and the Multi-functional Utility/Logistics and Equipment (MULE) Vehicle :
 - The **ARV** comes in two variants: the Assault variant and the Reconnaissance, Surveillance and Target Acquisition (RSTA) variant.
 - The **SUGV** is a small, lightweight, man-portable UGV capable of conducting military operations in urban terrain tunnels, sewers and caves.
 - The **MULE Vehicle** is a 2.5-ton UGV that will provide logistics support to dismounted operations. Three common chassis variants are planned: transport, countermine and armed robotic vehicle-assault-light (ARV-A-L).
 - **The network and the Soldier (+I, +I).** The Army's FCS network allows the FCS Family of Systems (FoS) to operate as a cohesive system-of-systems in which the whole of its capabilities is greater than the sum of its parts. As the key to the Army's transformation, the network, including its logistics and Embedded Training (ET) systems, enables 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.

All Soldiers in the UA are part of the Soldier-as-a-System overarching requirements, 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. The FCS Soldier, regardless of Military Occupational Specialty (MOS), will be enabled to perform Army common tasks and functions more efficiently and effectively.

FCS Unit of Action Structure

The FCS-equipped UA design is a modular organization that is tailorable based on the operational considerations of mission, enemy, terrain, troops, time available and civil considerations, (METT-TC), and it is capable of receiving Unit of Employment, Joint Force and Special Operations augmentation. Commanders have the ability to task organize on the move and can operate successfully in open rolling, urban and other complex terrain (mountains, dense forest and jungle).

The FCS-equipped UA can be tailored with additional capabilities for specific missions during a campaign. It allows command and control of up to six combined-arms battalions by one commander. It is also able to employ a range of supporting capabilities to perform a variety of missions such as reinforcing fires, engineering operations, military police tasks, air and missile defense, psychological operations and civil affairs. Special Operations elements can add language capability as well as civilian interface and psychological operations abilities. This modular design facilitates greater flexibility for the commander and minimizes its deployment footprint.

The FCS-equipped UA is a network-enabled force. Its vast sensor array will dramatically improve a commander's situational awareness. Sensor-shooter relationships begin with the Soldier and exist throughout the formation, allowing the FCS-equipped UA to accurately direct internally

generated effects or those generated from supporting units and joint assets. This ability to cooperatively engage targets with tactical-, operational- and strategic-level assets will be accomplished in seconds rather than minutes. The FCS-equipped UA presupposes platform superiority and emphasizes teaming of teams to achieve combat power synergy.

The FCS-equipped UA will be optimized to develop the situation out of contact (before forces are joined), throwing the enemy off balance by destroying his high-payoff systems before he can maneuver to a position of advantage. The FCS-equipped UA sets the conditions and isolates enemy formations to enable it to close with and destroy the enemy at a time and place of its choosing. Though optimized to develop the situation out of contact, it will be capable of finishing engagements decisively. FCS will be capable of providing the needed protection to ensure survivability. Also, FCS will enable the Army to rapidly adapt and field improved survivability systems in response to emerging threats.

The FCS-equipped UA, a combined-arms force built to be interdependent with joint forces, can work directly for a joint task force. A key construct of this design is the ability to develop sensor-to-shooter linkages across service lines. The FCS-equipped UA, designed with an operational architecture that allows it to access joint assets, is built to leverage the best capabilities of other services vice building redundant capabilities into the FCS-equipped UA. (See graphic on page 11.)

Headquarters Company. The UA HQ provides C2, information management and communications to enable the UA command group to plan and execute missions. It also provides administrative and logistical staff support to the headquarters section and any attached units.

Brigade Intelligence and Communications Company (BICC). The BICC plans, coordinates and directs organic and external signal assets to support the UA in achieving seamless

communications architectures, an assured information management construct and a reliable network gateway to external resources. The BICC enables proactive decisions by the commander by providing timely, relevant and accurate early warning and predictive intelligence based on information from organic sensors and external sources. It establishes, maintains and controls both the communication and knowledge grid structures, enabling the effective utilization of the Battle Command System in support of the UA commander.

Three FCS-equipped Combined-Arms Battalions (CABs). Each battalion is capable of closing with the enemy by means of combined-arms fire and maneuver and tactical assault to destroy the enemy, repel his assaults and/or seize terrain.

Reconnaissance, Surveillance and Target Acquisition (RSTA) Squadron. The RSTA squadron reconnoiters to find or fix threats and to build and share the common operational picture tailored to the air-ground team as it relates to task or purpose, allowing the commander to focus combat power at the decisive point and at the right time. It also conducts security operations to provide early warning, reaction time, maneuver space and protection to air-ground movement and maneuver.

Non-Line-of-Sight (NLOS) Battalion. The battalion provides destructive, suppressive, protective and special-purpose fires and effects to enable the UA to conduct decisive operations. It is organized and equipped to acquire targets and deliver fires and effects at extended ranges in all terrain types and environments to deny enemy forces sanctuary; provide precision point and area effects from dispersed locations; and rapidly shift striking power across the area of operations.

Forward Support Battalion (FSB). The battalion distributes supply classes for food, extra materials, fuel and lubricants, construction materials, ammunition and explosives, medical, repair parts and water. It performs field maintenance and recovery and provides health service support for force health protection to the UA and its attached units. It carries the sustainment stocks that exceed

the organic carrying capability of the UA's maneuver and maneuver support. It plans and coordinates for the UA sustainment requirements.

Analytical Underpinnings

An extensive body of analysis over the past decade (Louisiana Maneuvers Exercises, Army After Next studies, wargaming and analysis, and Force XXI digitization experiments) underpins FCS development and continues to this day. The collective effort that has produced compelling evidence to support senior-leader decisionmaking is remarkable for its degrees of complexity, innovation, rapidness and integration of Army, Department of Defense (DoD) and industry analysis resources. Recent efforts can be divided into four distinct analyses:

- **Defense Advanced Research Projects Agency (DARPA)/TRADOC Analysis Command (TRAC)/Four Industry Teams Analysis (January 2000–October 2001).** In January 2000, the FCS Army Analysis Integrated Product Team (AIPT), sponsored by the FCS Program Manager (PM) of DARPA, initiated a unique analysis that was largely a collaboration of Army analytic organizations and the four industry teams contracted by DARPA to perform FCS concept exploration and design. From April 2000 to October 2001, industry and Army analysts worked side-by-side to evaluate emerging concepts for FCS. This effort helped shape the concepts of the Army and the FCS Lead System Integrator (LSI), and was foundational for the Analysis of Alternatives (AoA) conducted during FCS Concept and Technology Development (CTD).
- **FCS Milestone B Analysis of Alternatives (January 2000–May 2003).** As the foundational pillar of this body of analysis, the Army conducted an FCS AoA to inform a May 2003 Milestone B (MS B) decision for the FCS program to enter System Development and Demonstration (SDD). The most complex AoA ever undertaken by the Army and perhaps

by DoD, it supported DoD, joint and Army senior leaders' decisions for implementing and adjusting the FCS program. Done concurrently with development of the FCS Unit of Action Operation and Organization (O&O) concept and the FCS Operational Requirements Document (ORD), and system definition of the FCS family of systems, the AoA analyzed seven alternatives across nine joint operational and tactical warfighting scenarios, employing 50 different models and simulations.

The AoA study team comprised a diverse membership from across the Army, Federally Funded Research and Development Centers (FFRDCs) and industry, further distinguished by its inclusion of the LSI. Most important, the team was highly qualified, innovative and fully committed to the AoA. The team war-gamed or simulated more than 10,000 scenario hours for record, giving special attention to the modeling and analysis of communications architectures, networked sensors and fires, and operations within a joint force. The AoA found FCS to be the preferred alternative based on costs and effectiveness. At the tactical and operational levels, the brigade combat team equipped with the FCS increment 1:

- leveraged and enabled more effective joint operations;
 - were able to affect a larger area of operations (AO);
 - accomplished the missions faster;
 - killed the threat earlier and at longer ranges;
 - survived as well as or better than units alternatively equipped;
 - deployed faster (except for light forces) and built combat power more quickly; and
 - demanded less sustainment with a smaller logistics footprint.
- **FCS Key Performance Parameter (KPP) Analysis (June 2003 – May 2004).** The KPP

analysis was designed to inform and underpin the KPP metrics established in the FCS ORD. Its principal findings supported the 24 May 2004 Army Requirements Oversight Council (AROC). The analysis began in June 2003 following the May 2003 FCS MS B decision and relied upon proven methods used in the FCS AoA while also incorporating new techniques developed for the unique requirements of the KPP analysis. It focused on determining if the threshold values for Networked Battle Command, Networked Lethality, Transportability, Sustainability/Reliability, Training and Survivability enable the FCS-equipped UA to be effective during the conduct of combat operations.

The KPP analysis supported the ORD-established KPP threshold values for the FCS System of Systems (SoS) and found:

- Values set for KPPs enabled the FCS-equipped UA to successfully conduct the operations described in the UA O&O plan.
- When the UA conducted operations with the FCS SoS operating at their threshold values for network dependability, operational availability, networked lethality and survivability, the UA retained enough combat power to conduct follow-on operations, albeit with some risks.
- The network enabled the commander's situational awareness, the UA's ability to leverage networked lethality and to engage the threat at extended ranges and out of contact. When severely degraded, the network contributed to more frequent, unexpected close fights; as a result, UA survivability suffered as well.
- The network enabled the organic lethal capabilities of the FCS SoS to be dominant killers of threat, and also enabled the lethal capabilities of the Unit of Employment and joint forces to be significant contributors as well.

- The UA achieved mission success with the FCS SoS performing at the Sustainability/Reliability KPP threshold values. However, the UA's ability to accomplish an immediate follow-on mission was at risk due to a buildup of maintenance workload and combat losses of sustainment assets.
- The Survivability KPP threshold enabled significant protection of the FCS SoS and UA survivability but did not make the FCS platforms invulnerable to threat actions. The UA was able to conduct follow-on operations; however, there was risk posed by losses of ICVs and non-FCS SoS sustainment assets resulting from threat targeting priorities and close-in engagements.
- Bad weather reduced networked lethality, but it also improved Blue (friendly) Force survivability. Bad weather more negatively impacted the threat, allowing the FCS-equipped UA to retain a relative combat advantage.
- **FCS Analysis of Alternatives Update (May 2004–October 2004).** The AoA Update analysis built upon the innovative methodologies proven in the AoA and KPP Analysis. More than 2,000 total scenario hours were wargamed or simulated for record, and 10,000 more were devoted to preparation and analysis support. A diverse and highly qualified study team from across the Army, supported by FFRDCs and industry and led by the FCS Lead System Integrator, performed the update.

It was further distinguished by its inclusion of the FCS LSI. The update focused on further improving the treatment of the communications network and its effect on force outcomes, to include the addition of network attack, as well as improving the treatment of the sustainment concept and capabilities and their impact on the FCS force. The study team also addressed the impact of a major change to the FCS-equipped UA aviation structure and assessed the conduct of operations in jungle terrain.

Program Oversight

The FCS program has both the advantage and challenge of continuous program oversight from four levels—Congress, Office of the Secretary of Defense (OSD), Joint Staff and Army. Congress is kept informed by quarterly updates, and GAO has a person on site in St. Louis to oversee the program. GAO has completed four audits with no findings that required corrective action and currently has four audits underway that include overview of communications, the Lead System Integrator concept, a “quick look” review, and a review related to Milestone B update documentation.

OSD oversight is also comprehensive and continuous. The Institute for Defense Analyses has conducted several studies including the panel studies and an FCS management review. In fact, FCS restructuring in the Fiscal Year 2006–11 Program Objective Memorandum (POM) was a direct result of their independent reviews and an effort on the part of the Army to make the FCS program more affordable and executable. Ongoing oversight comes from the Cost Analysis Improvement Group, the Defense Acquisition Board, the Overarching Integrated Process Team and the Joint Staff through the Joint Capability Integration and Development System (JCIDS) process.

Army oversight is even more comprehensive; in addition to normal oversight, it includes quarterly four-star reviews by Army Training and Doctrine Command (TRADOC); a board of directors that includes senior Army staff and Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA/ALT), TRADOC and Project Manager personnel.

In addition, Secretary of the Army Francis J. Harvey and Army Chief of Staff General Peter J. Schoomaker recently announced that they will conduct in-depth reviews of the program at least three times a year. Secretary Harvey, in close consultation with General Schoomaker, will also serve as the Army approval authority for all major changes to the program.

FCS Contract Restructure

On 6 April 2005, Secretary Harvey announced a restructuring of the business aspects of the Future Combat Systems program. The changes are comprehensive and include contractual, programmatic and managerial improvements.

The improvements formally link the FCS program to the Army Modular Force Initiative through a Future Combat Force Strategy that establishes a framework for the continuous progression of the current Modular Force into the future. The Future Combat Force Strategy provides for the spiraling of FCS-based technologies into the current Modular Force, integration of current combat lessons in areas of doctrine, organization, equipment and other key elements and into the force, and eventual incorporation of advanced manned combat platforms developed in the FCS program.

Secretary Harvey directed that the current FCS Other Transaction Agreement (OTA) with the Lead System Integrator change from an OTA to a Federal Acquisition Regulation-based contract.

Conclusion

Future Combat Systems (FCS) is key to achieving a strategically responsive, precision maneuver force that is dominant across the range of military operations as outlined for the Army's Future Force concept.

The FCS-equipped Unit of Action will operate as a system of systems and will provide the needed protection to ensure survivability. Current designs for FCS provide a suite of protection capabilities greater than those of current manned ground systems.

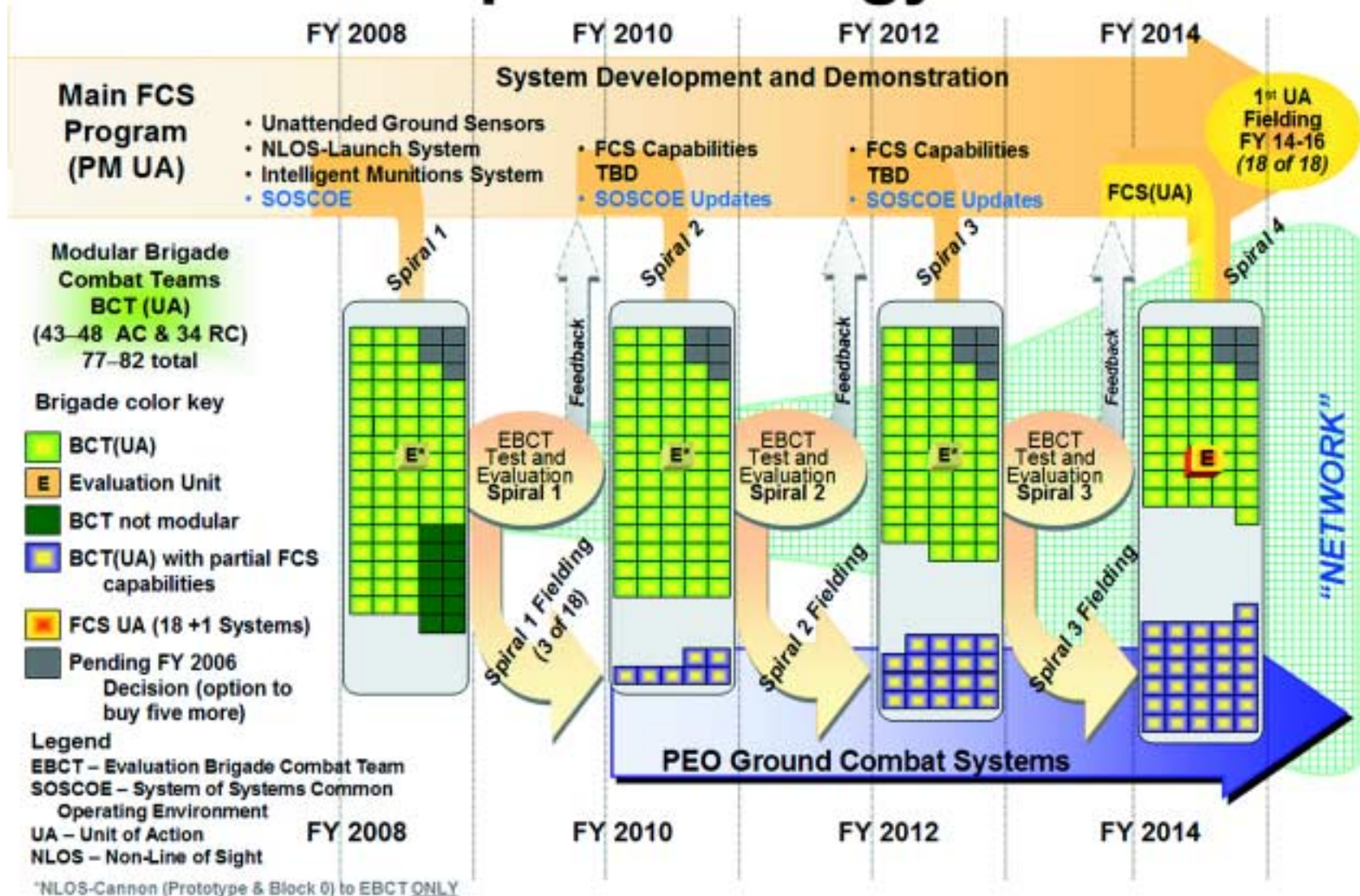
The Army is employing better business practices by transforming its business, resourcing and acquisition process for FCS. Restructuring the management of the FCS program will increase its emphasis on jointly fighting the Global War on Terrorism. Contract changes provide greater control, safeguards and incentives for contractor performance.

The FCS is now formally linked to the Army Modular Force Initiative to fulfill the Army Future Combat Force Strategy.

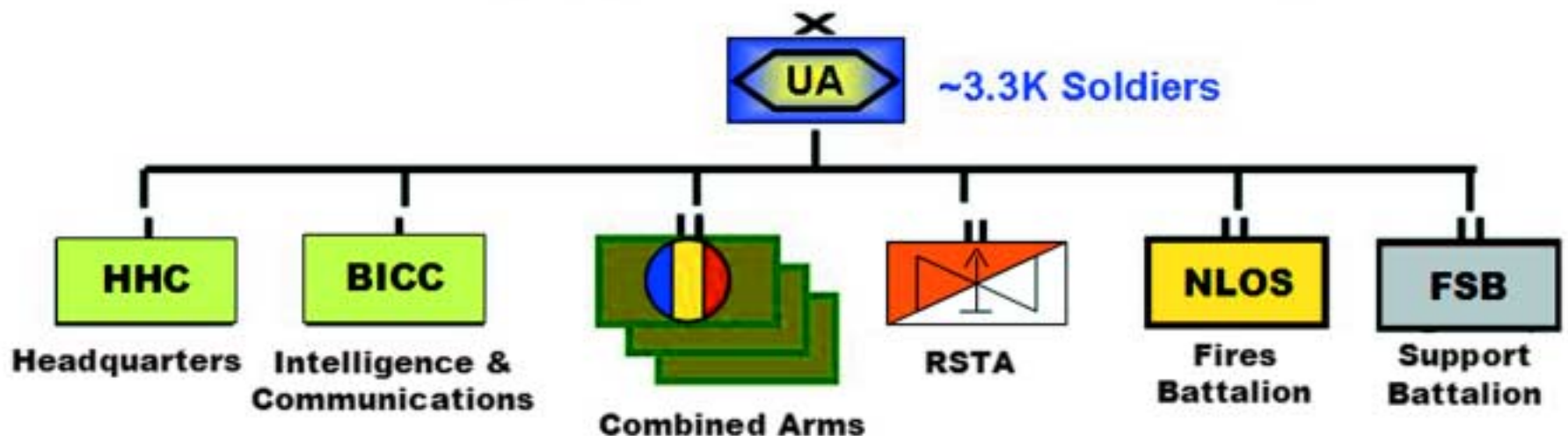
***We are committed to the Future Combat Systems,
but this is a journey. It is not a destination.***

General Peter J. Schoomaker, Army Chief of Staff,
in testimony before the House Armed Services
Committee re the Fiscal Year 2006 Army Budget

Future Combat Systems (FCS) Spiral Strategy



Future Combat Systems (FCS)-Equipped Unit of Action (UA) Design



- Threshold 2014 (dated 2 August 2004) with changes dated 6 December 2004
- Aggregate threshold increase from 2,976 personnel to 3,184 to 3,285

HHC=Headquarters, Headquarters Company
 BICC=Brigade Intelligence & Communications Company
 RSTA=Reconnaissance, Surveillance, Target Acquisition
 NLOS=Non-Line-of-Sight
 FSB=Forward Support Battalion



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