Backgrounder

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Future Combat Systems: A Congressional Guide to Army Modernization

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As the annual budget process continues on Capitol Hill, Congress has again reduced funding for Future Combat Systems (FCS)—the U.S. Army's primary modernization program—by about $200 million in the fiscal year (FY) 2008 defense appropriations bill. While this cut is in addition to about $825 million over the past three years, Congress's provision of nearly full funding is welcome. However, with an additional $3.4 billion in cuts scheduled over the next five years, any further reductions could drive the proverbial final nail into the program's coffin.[1]

To critics of FCS, this seems only prudent. After all, they argue, the program's costs have ballooned, it is based on unproven technologies, and the entire concept was "always a pipe dream."[2] They suggest that the Army should instead invest FCS resources in repairing and resetting equipment worn down or destroyed in Iraq and Afghanistan. However, these arguments ignore the fact that Future Combat Systems is the first comprehensive upgrade in decades and that, at only 3.7 percent of the Army's total budget, the program will not bankrupt the Army. Furthermore, the Army urgently needs to reset and modernize simultaneously.

Soldiers are already using FCS-like technologies on the battlefield, including chemical and biological detectors, robots to ferret out improvised explosive devices (IEDs), lighter and more robust vehicle armor, and network sensors that allow soldiers to track friendly units. More FCS technologies are scheduled to "spin out" next year, further enhancing current

Talking Points

- Having gone to war in Iraq in 2003 with equipment based on 30-year-old technologies that has deteriorated even more in harsh operating environments, the Army needs to field its "future force" now.
- The Future Combat Systems program is designed to alleviate operational and equipment shortfalls and raise the common denominator for units that do not receive FCS manned vehicles by inserting these capabilities across the force beyond FCS brigades.
- FCS brigade combat teams will be rapidly deployable, self-sufficient units that perform a wider array of missions with little or no augmentation. FCS could also save billions of dollars in maintenance, fuel, and personnel costs while reducing the number of troops in harm's way.
- Congress should continue robust oversight of the FCS program while fully funding Army modernization and FCS this year and into the future to achieve program stability.

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capabilities. Given that the Army went to war in Iraq in 2003 with an equipment shortfall of over $50 billion and equipment that was based on 30-year-old technologies and has deteriorated even more in harsh operating environments, the Army needs to field its "future force" now.[3]

The Challenge

Many skeptics question the need for the sweeping modernization program, pointing out that the Army is already the planet's dominant ground force and that manpower and equipment are overstretched, resulting in operational shortfalls. Rather than throw money at new programs, they argue that the Army should instead buy more of what it knows already works.

While these arguments have some merit—the Army went into Afghanistan and Iraq underfunded and underequipped—they ignore the emerging threat environment, which is markedly different from the Cold War environment that shaped today's force. The Army's warfighting capabilities were created to counter conventional threats from various imperialist, fascist, and communist states throughout the 20th century.[4] In the first Gulf War, the Army demonstrated its unrivaled ability to conduct large-scale conventional operations.

America's post–Cold War enemies have sought to offset the Army's firepower advantage based on two strategic understandings. First, "casualties are America's vital center of gravity," so killing American personnel is no longer a means to victory, but an end. Second, America's enemies know that they cannot match U.S. soldiers head-to-head, so they avoid direct engagement believing that if they prolong the conflict long enough, America will tire of it first. Consequently, their "strategic end game [is] not to win but to avoid losing."[5]

Army leaders have dubbed this new environment the era of "persistent conflict." Since 2001, the United States has fought successive waves of non-state groups that operate asymmetrically as dispersed networks rather than as traditional military forces. A number of different causes motivate these enemies, including Islamic fundamentalism, globalization, competition for energy, demographic trends, nuclear proliferation, and the exploitation of failed states. Even if the conflicts in Iraq and Afghanistan ended today, Secretary of Defense Robert Gates believes, "We can expect that asymmetric warfare will remain the mainstay of the contemporary battlefield for sometime."[6]

Israel's experience with Hezbollah is an ominous harbinger of the future. It shows the growing sophistication of the asymmetric threat to the West. Indeed, the Hezbollah insurgency was, by all accounts, much more complex than the Iraqi insurgency, with greater strategic planning and tactical forethought. Hezbollah shows the limits of traditional, conventional arms and the growing importance of network-enabled warfare such as the capabilities of the U.S. Army's Future Combat Systems. A large part of what the Israelis lacked was the ability to rapidly gain and share a greater understanding of the enemy, his capabilities, and his decision-making process. If the Israelis could have shared this information and understanding in real time throughout their force, they could have adapted to Hezbollah attacks before they even occurred.

In fact, faced with similar problems in Iraq—the lack of situational awareness of how and when the

1. Association of the United States Army, "A Transformed and Modernized Army: A National Imperative," *Torchbearer National Security Report*, April 2007, at *www.ausa.org/PDFdocs/TBSecRpt/TB_FCS_3Apr07.pdf* (October 10, 2007).
2. Michael O'Hanlon in John M. Donnelly, "Dream Army's Rude Awakening," *Congressional Quarterly*, July 29, 2006, p. 2.
3. Robert M. Gates, U.S. Secretary of Defense, remarks delivered before the Association of the United States Army, Washington, D.C., October 10, 2007, at *www.defenselink.mil/speeches/speech.aspx?speechid=1181* (October 24, 2006).
4. The White House, *The National Security Strategy of the United States of America*, September 2002, p. 1, at *www.whitehouse.gov/nsc/nss.pdf* (November 20, 2007).
5. Major General Robert H. Scales Jr. (Ret.) and Frank Kendall, "The Future Combat Systems (FCS): Its Origins and Concept of Employment, unpublished paper, p. 2.
6. U.S. Department of Defense, *Quadrennial Defense Review Report*, February 6, 2006, at *www.defenselink.mil/qdr* (November 20, 2007).

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enemy will attack—soldiers and Marines have demonstrated that the best way to counter these tactics is often with common sense and combined arms. A combined arms force balances armor's lethality and mobility with concentrated infantry to control complex terrain. Heavy armor leads the charge to "soak up" concealed IEDs and ambushes while infantry follows behind to clear the area. Major General Terry L. Tucker, former commander of the Armor Center at Fort Knox, described the successful use of a heterogeneous force in the battle of Fallujah: "It was Abrams tanks and Bradley Fighting Vehicles that spearheaded our attack into Fallujah, while dismounted tankers, scouts, artillerymen, and infantrymen followed and subsequently cleared buildings."[7] Overwhelming evidence suggests that these tactics significantly reduce casualties.[8]

Army leaders have drawn several significant conclusions from these types of conflicts.

First, they demonstrate that the greatest challenge for land forces is not irregular, traditional, catastrophic, or disruptive conflicts, but rather the potential combination of all four types of conflicts simultaneously. Consequently, the Army must become more expeditionary, able to "conduct prompt, sustained combat and stability operations" and able to respond to all types of contingencies ranging from high-intensity conflict to sustainment operations to counterinsurgency and counterterrorism.[9]

Second, "finding the enemy and then rapidly acting on that information" is vital to success on the battlefield.[10] The Army will likely conduct operations on the enemy's turf, where the enemy not only knows the battlefield better, but also has had ample time to prepare a layered defense. As in the battle of Fallujah, ground forces typically rely on heavy armor to lead the advance to spring traps because they know little of what lies in the streets and buildings in front of them. This knowledge gap exists largely because Army vehicles have a single line-of-sight targeting capability. A soldier in a tank typically cannot view the battlefield from an unmanned aerial vehicle (UAV) overhead or even from the adjacent fighting vehicle. Employing technologies that enable soldiers to quickly detect friendly and enemy personnel and vehicles and pass that information along is as critical to tactical success as is firepower.

To meet these challenges, the 2004 National Military Strategy and 2006 Quadrennial Defense Review tasked the Army with becoming more "agile" (rapidly deployable, highly mobile, self-sustained, and full-spectrum capable) and "fully networked" (information-based and integrated across the Army and joint forces) while maintaining its conventional dominance. Consequently, the Army is seeking smaller, more self-sufficient units armed with new vehicle platforms that can operate cutting-edge communications and sensors and independently conduct combined arms operations. This is a significant but necessary undertaking, and it requires the Army to transform itself structurally, doctrinally, and technologically.

Heavy Metal

Regrettably, the Army did not adequately prepare for this new threat environment after the Cold War. Faced with massive top-line budget cuts (20 percent in FY 1992 and 15 percent in FY 1993 alone) and subsequent contraction from 18 active-duty divisions to 10 divisions in the 1990s, the Army chose to maintain its heavy equipment at the expense of modernization.[11] While these platforms have unmatched ability to conduct direct conventional operations, they are not designed to operate as a rapidly deployable, self-sufficient force capable of performing a variety of operations.

Ironically, Army leaders phased out the Sheridan, the service's only light tank capable of rapid deploy-

7. *Ibid.*
8. John Gordon and Bruce R. Pirnie, "'Everybody Wanted Tanks': Heavy Forces in Operation Iraqi Freedom," *Joint Force Quarterly*, Issue 39 (October 2005), at *www.dtic.mil/doctrine/jel/jfq_pubs/1539.pdf* (November 1, 2007).
9. U.S. Army, "2007 Posture Statement," February 14, 2007, at *www.army.mil/aps/07/execSummary.html* (October 22, 2007).
10. *Ibid.*
11. U.S. Department of Defense, Office of the Under Secretary of Defense (Comptroller), *National Defense Budget Estimates for FY 2008*, March 2007, at *www.defenselink.mil/comptroller/defbudget/fy2008/fy2008_greenbook.pdf* (December 3, 2007).

ment, and canceled its replacement, the Armored Gun System. Budget constraints halted research and development of other advanced armor vehicles, including the Future Scout and Cavalry System, the replacement for the HMWWV (Humvee) and the Bradley. As a result, the Army essentially missed an entire generation of modernization.

The consequences of the defense drawdown and "procurement holiday" during the 1990s first became apparent in Kosovo, when the Army struggled to deploy quickly from Germany, and later when Turkey denied use of its territory for the 2003 invasion of Iraq. Instead of deploying an entire heavy infantry division of 15,000 soldiers and 1,500 armored vehicles, the Army managed to airlift only 2,000 airborne soldiers reinforced by less than two dozen armored personnel carriers, Bradleys, and Abrams tanks.[12] The lack of rapidly deployable light armored vehicles severely limited options.

Meanwhile, major combat operations in Iraq and Afghanistan are wearing down the Army's fleet of heavy vehicles. The Army estimates that the operational tempo of Abrams and Bradleys in Iraq and Afghanistan has increased fivefold and sixfold, respectively. Coupled with harsh environmental conditions, each year of deployment equals about five years of normal wear and tear.[13] In a recent report, the Government Accountability Office (GAO) noted that "the continued high use of equipment to support current operations and…maintenance issues resulting from advancing ages" has reduced readiness and ballooned maintenance costs.[14]

Resetting legacy equipment will cost $13.6 billion in FY 2008 alone. This situation is untenable.

The Future Combat Systems Program

The FCS program is designed to fill the operational and equipment shortfalls through a sweeping modernization of the Army into a "more agile, adaptive, responsive, and deployable" force.[15] The Army is reorganizing its force structure from the World War II–era 10,000–20,000-man divisions into more flexible modular brigades of 3,500–4,500 soldiers. These brigades are designed to be more rapidly deployable, self-sufficient units that can perform a wider array of missions with little or no augmentation. These units have already demonstrated their effectiveness by sustaining a high level of engagement in Iraq. Moreover, the brigades are designed to rotate in and out of theater while retaining unit cohesion, largely eliminating the need for division commanders to oversee long-term force management.

Future Combat Systems is the materiel backbone of a larger modular organization effort. FCS is a significant undertaking, composed of over 300 different technologies, 600 different contracts, and 14 systems and platforms. Although the Army describes the program as a "systems of systems," it is aptly described as creating "updated modular brigade[s] built around a light-to-medium weight armored vehicle, known as the manned ground vehicle, and supported by computer networks, sensors, and robots."[16]

Many are surprised to learn that Army combat vehicles have little point-to-point or shared targeting capability. Current sensors have relatively slow response times and lack "persistent stare," survivability, and networking capabilities. FCS is designed to close these operational gaps. FCS sensors and robots will bolster battlefield intelligence-gathering capabilities through surveillance and reconnaissance, while the integrated network will provide a unified picture not only to every individual within a unit, but across the entire force whether soldier, ground vehicle, helicopter, or unmanned aerial vehicle.[17] Through these systems, the Army is seek-

12. Sydney J. Freedberg, Jr., "Future Tanks Could Surprise Critics," *The National Journal*, September 16, 2006, at *www.govexec.com/dailyfed/092006nj1.htm* (November 20, 2007).
13. Association of the United States Army, "Resetting the Force: An Equipment Challenge," *Torchbearer National Security Report*, October 2005, at *www.ausa.org/pdfdocs/TB_Resetting.pdf* (November 20, 2007).
14. U.S. Government Accountability Office, *DOD Needs to Identify and Address Gaps and Potential Risks in Program Strategies and Funding Priorities for Selected Equipment*, GAO–06–141, October 2006, at *www.gao.gov/highlights/d06141high.pdf* (November 20, 2007).
15. Association of the United States Army, "A Transformed and Modernized Army."
16. Freedberg, "Future Tanks Could Surprise Critics."

ing a rapid fusion of information at the speed-of-computer versus the old speed-of-human.

The eight variants of the medium-weight manned ground vehicle (MGV) will possess firepower and survivability characteristics similar to their heavier Abrams and Bradley counterparts, but they will consume 30 percent less fuel. Integrating these technologies will enable each FCS brigade to operate on the battlefield with unprecedented communications and coordination, more firepower, and more speed for up to three times longer than current combat units. Army doctrine has established the objective that an FCS brigade combat team will be capable of 72 hours of sustained combat. Moreover, FCS brigades will have "more teeth and less tail." Robots that enhance capabilities, vehicles that require fewer soldiers to operate, and less downtime for maintenance and resupply mean that each brigade will need significantly fewer support personnel. As a result, each FCS brigade will have up to 500 fewer soldiers but the same number of infantry as a current infantry brigade and twice the number of infantry as a heavy brigade.

Additionally, the Army will insert FCS capabilities throughout the force beyond FCS brigades. Active protection systems, robots, unmanned aerial systems, and sensors will raise the baseline for Army units that do not receive FCS manned vehicles. Soldiers throughout the force will be able to pass digital images back and forth, access information directly from the UAVs and helicopters overhead, and identify the enemy as "red" targets visible to all soldiers on the network. Some Army leaders describe their approach as "some get all and all get some." In short, FCS is intended to drive modernization of all Army forces to prepare for a complex future of multiple, simultaneous threats.

The program's goal is to engage the enemy beyond their line of sight. While this may not always be operationally or tactically feasible, improved situational awareness and rapid communication will often allow soldiers to operate from a distance and maintain better vehicle protection. Lieutenant General Stephen Speakes describes the FCS concept as the "ability to reach out, identify with much greater clarity where the enemy is, what the enemy is doing and attempt to intercept him or destroy him far before it becomes a steel-on-steel engagement."[18]

Recapitalizing and Resetting Old Vehicles

Army modernization efforts are not limited to FCS procurement. Additional and ongoing modernization programs include improving intelligence, surveillance, and reconnaissance capabilities; increasing precision effects; and replacing or recapitalizing staple vehicles (e.g., trucks) that are being used at four to five times above normal rates in Iraq and Afghanistan. Critics argue that recapitalizing and resetting old vehicles with FCS technology would be more timely and cost-effective than developing an entirely new class of vehicles, but this option has two principal obstacles: power and armor.

Power. The next generation of ground vehicles must be able to connect and communicate with each other through sensors. The diesel engines in current vehicles produce only a fraction of the electrical power needed to run the full FCS network software. FCS manned ground vehicles will have hybrid electric engines that generate enough power to operate FCS technologies and export power as needed, effectively turning them into mobile battlefield generators. As a result, more than two-thirds of the network sensors in an FCS brigade will be deployed on manned ground vehicles.[19] However, aging vehicles will still be able to use the FCS network. Abrams and Bradleys are being equipped with auxiliary power units to power new computers, sensors, and radios, but size and space prevent full use of FCS technologies.

The Army has already installed a stripped-down FCS-like network in some combat vehicles, which improves on the Army's Blue Force Tracker (BFT).

17. Lieutenant General Michael Vane, "Future Combat Systems," presentation at Future Combat Systems One Team Breakfast, October 8, 2007.
18. "Lt. Gen. Stephen Speakes; U.S. Army Deputy Chief of Staff for Programs (G8)," *Defense News*, September 3, 2007, p. 38.
19. Association of the United States Army, "A Transformed and Modernized Army."

In 2003, the Army equipped units heading into Iraq with BFT, enabling soldiers to track friendly "blue" units on screen. According to Captain Sam Donnelly, a battalion command staff officer during the invasion, before BTF, the "primary means of command-and-control was an FM radio, a map, and thumbtacks." By the end of the campaign, "the only real contact we had with [other units] was through [network] text messaging."[20] The FCS applications move beyond text messages and blue icons for friendly vehicles by providing a more complete view of friendly and enemy units.

While many of the Army's platforms may be recapitalized, they still will not be able to accept all of the FCS sensors and communications equipment. An FCS brigade combat team will offer soldiers the ability to move information quickly—whether by image, text, or voice—on and off the battlefield and to share target pictures in real time if needed. In addition, command and control MGVs will establish a full battle command on the move. This will make units more mobile and survivable and reduce the number of soldiers needed for command and control—a significant change from the current "tent farms" of brigade headquarters.

Armor. Reports from Iraq suggest that armor is still critical on the battlefield, especially in combined arms operations. Heavy armor led the charge toward Baghdad in 2003, and heavy tanks and infantry fighting vehicles have been vital to combating the insurgency. In asymmetric conflict and counterinsurgency operations, "armor denies the insurgent what he most desires: a vulnerable target that can be easily attacked at low risk."[21]

Yet Iraq has also demonstrated the limits of armor. Insurgents have used increasingly sophisticated IEDs and rocket-propelled grenades (RPGs) to destroy armored vehicles. With a large bomb, enough time to plan, and plenty of luck, insurgents can destroy any modern combat vehicle, including tanks, armored personnel carriers, amphibious assault vehicles, and even the Mine Resistant Ambush Protected vehicles and Buffalo Mine Protected Clearance vehicles.

The Army has responded by equipping many vehicles with "B-kits" to increase their armor. However, the unified hulls used by the Abrams and Bradley have already been retrofitted with additional armor. At 70 tons and 34 tons, respectively, they are reaching their weight limits, and adding even more armor would begin to sacrifice mobility, transportability, and reliability.

The Army believes that technological advances over the past 30 years will enable the FCS family of manned ground vehicles to weigh 27 tons but have the same survivability as the older, heavier vehicles. Specifically, MGV armor and protection systems will ideally provide "all-around protection against mines, rocket-propelled grenades favored by guerillas, and quick-firing cannon shells as large as 30 millimeters, the standard caliber of guns on Russian-made infantry carriers."[22] In fact, with the exception of the front of the Abrams, the MGVs are equal to or more survivable than anything in the Army inventory. Moreover, MGVs are designed to shed their "skins just like a snake,"[23] allowing their armor to be upgraded as new technology is fielded.

The Future Combat Systems is not intended or designed solely to replace heavy brigade combat teams. Although the Army will mothball some heavy tanks, "FCS brigades will serve *alongside* heavy-armored units."[24] In fact, the Army plans to maintain some heavy units until at least 2030 to ensure that the nation has a heavy alternative that is more suited to direct fire fights with heavily armored opponents. The 15 FCS brigades will conduct combined arms operations and employ dual-use equipment for various types of conflict. In this sense, they are better equipped for the "fluid wars of the future that will have no clear front line."[25] In

20. Freedberg, "Future Tanks Could Surprise Critics."
21. Daniel Gouré, "Rolling Thunder," *Armed Forces Journal*, May 1, 2005, p. 24.
22. Freedberg, "Future Tanks Could Surprise Critics."
23. "Lt. Gen. Stephen Speakes."
24. Freedberg, "Future Tanks Could Surprise Critics" (emphasis added).
25. *Ibid.*

addition, non-FCS combat brigades will use many FCS technologies. The program budget currently provides enough funds for four equipment "spin-outs" to the current force over several years.

Success of the Stryker

The success of Stryker brigades in Iraq has highlighted the potential utility of FCS. Developed in part as an FCS precursor, the Stryker family of eight-wheeled vehicles was fielded to achieve armored units that are faster and more agile than heavy brigades and have more firepower and protection than light infantry units. Although critics initially questioned the move away from heavy armor, Strykers have since become the vehicle of choice for many soldiers in Iraq. Uniquely suited to counter the hit-and-run insurgent attacks, Stryker brigades can transport more troops faster than other units can. A Stryker unit commander in Iraq recently stated:

> A company of 10 infantry carrier Strykers can put 120 dismounted infantry soldiers on the ground in less than an hour anywhere in Baghdad—using only 20 vehicle crewmen. It would take 40 armored Humvees and 80 vehicle crewmen to transport as many infantrymen.[26]

Strykers also have unparalleled situational awareness because they are equipped with built-in intelligence, surveillance, and state-of-the-art communications systems. In addition, their armor has held up remarkably well in combat. Only a handful of RPGs have penetrated Strykers, and the IEDs that "sometimes damage or destroy our Strykers," according to the same unit commander, "are large or sophisticated enough to defeat any vehicle—[Abrams] tanks included."[27] The Stryker's capabilities will continue to grow as it is retrofitted with updated technology. For example, the vehicle is scheduled to receive the Army's first active protection system.

Despite these virtues, however, the Stryker brigade is still not the Army's answer to the multi-threat environment. Strykers are carriers, not fighting vehicles. They lack the ability to operate across the entire spectrum of conflict, including high-intensity direct fire fights. An FCS brigade could not only counter both high-level and low-level threats, but also build on Stryker unit capabilities to accomplish its missions more quickly. For example, an FCS brigade will be able to move in one-third less time than a current Stryker brigade would need. In addition, an FCS force will integrate lessons learned from Stryker capabilities—such as strategic employment, less maintenance, and increased speed—with modern technologies that increase lethality and survivability and reduce sustainment costs through smaller and more rapid field repairs.

Investing in Today's Force

A common criticism of Future Combat Systems is that program costs have spiraled upward, exemplifying the runaway Pentagon procurement process. Yet, in constant 2003 dollars, the program's cost has remained relatively steady. In 2004, the price increased from $96 billion to $160 billion because the Army expanded the program's size, scope, and timeline based on recommendations from the GAO and others. The changes included fielding FCS technologies as they are developed rather than waiting a decade or more for the complete set of technologies.

Granted, many cost challenges to the FCS program are self-imposed by the Army, particularly by the Army's systemic unwillingness to budget realistically through sound up-front cost estimates. Nor is Congress always a reliable partner. Too often, Congress does not do enough to hold the services accountable, for example, by granting change or reprogramming requests after an obviously low bid was accepted by a service. In addition, Congress should recognize the fiscal, technological, and business case benefits of an integrated FCS program versus hundreds of disparate programs. Building a non-integrated program from scratch is more expensive, especially if integration is required later.

Major FCS program adjustments were driven primarily by the GAO risk assessments—specifi-

26. Colonel Steve Townsend, "Stryker Success," letter to the editor, *The Washington Times*, June 18, 2007, at *www3.washingtontimes.com/op-ed/20070617-080235-9230r.htm* (November 5, 2007).

27. *Ibid.*

cally, that the program did not allow for enough experimentation to reduce risks in technological integration. The Army added technology maturation and reliability improvements and experimentation, which increased costs and extended the overall plan by about four years. It also changed the acquisition strategy and broke the program down into more manageable phases.

While these significant changes increased program costs by adding more systems to field across the force, the goal remains to reduce FCS development-to-field time by up to 30 percent. To achieve this within resource constraints, Army leaders have "canceled more than 100 programs to free resources for FCS."[28] Currently, FCS accounts for only 3.7 percent of the Army's budget and is the only Army program in the Pentagon's top 15 weapons acquisition programs.[29] It is nonetheless a significant share of the Army's discretionary funding.

Finally, FCS could save billions of dollars in maintenance, fuel, and personnel costs over the lifetime of units while reducing the number of troops in harm's way.

Common Chassis. Manned ground vehicles share a common chassis, saving the Army money in development and maintenance. Developing and procuring the eight MGV types cost an estimated $6 billion, roughly the total cost of developing and procuring three current-force vehicles: the Abrams, Bradley, and Multiple Launch Rocket System. Developing the eight types individually would increase costs by as much as $12 billion and take one-third longer.[30]

In addition, the maintenance for manned ground vehicles is intended to save time and money while allowing for improvements after vehicles are built. For example, MGVs will share roughly 70 percent of the same parts and require only about 20 tools to maintain—a concept initially inspired by designers working in NASCAR. The manned ground vehicle design will enable crews to perform substantially more maintenance (up to 80 percent) than is performed by crews of current combat vehicles and will require less than half as many mechanics to maintain.

Less Fuel. The hybrid electric engine in FCS vehicles will consume up to 30 percent less fuel than current vehicles consume. This is a cost reduction multiplier across the battlefield. According to Captain Ray Bolar, an Army tank officer and veteran of two tours in Iraq, "Every eight hours, you're going to burn 300 gallons, whether [the Abrams is] moving or not." During the invasion of Iraq, unarmored fuel trucks made "30,000 supply runs, averaging 800 miles apiece."[31] Fewer supply convoys would not only cut costs and reduce overall manpower, but also reduce casualties in what are widely acknowledged as some of the most vulnerable U.S. forces in Iraq.

Less Manpower. Manpower costs are by far the Army's largest expense, accounting for 36 percent of the Army's 2008 budget. In addition to needing fewer mechanics and truck drivers, FCS brigades will require 500 fewer soldiers than today's heavy brigades because of other FCS efficiencies.[32] FCS Brigade Combat Teams will include three combined arms battalions; the Non-Line-of-Sight Cannon battalion; the reconnaissance, surveillance, and target acquisition squadron; the forward support battalion; the brigade intelligence communications company; and the headquarters company.

Revised Doctrine, Training, and Organization. FCS Program Manager Major General Charles Cartwright observes that the days of vehicle crew drills are over. In the past, operational units practiced so that they would operate smoothly in battle. Soldiers would drill as a team loading, firing, and resupplying. With FCS, these tasks will be completed by the system. Machines will do manual labor tasks while the soldiers focus on cognitive activities. Soldiers will need this time on the battlefield because more

28. Association of the United States Army, "A Transformed and Modernized Army."
29. Lieutenant General David F. Melcher, "The Heritage Foundation: U.S. Army Budget Overview," Association of the United States Army Annual Meeting, Washington, D.C., October 9, 2007, p. 8.
30. *Ibid.*
31. Freedberg, "Future Tanks Could Surprise Critics."
32. Association of the United States Army, "A Transformed and Modernized Army."

information on friendly locations, enemy situations, and threat evolutions will be available. Unmanned systems (robots and UAVs) will do some of the dangerous and dirty jobs that soldiers do today. Army training standards and doctrine are being updated to educate soldiers to leverage unmanned systems, absorb more information more quickly, apply that knowledge usefully, operate the system, and respond accordingly.

The Future Is Now

Although the Army will not equip the first FCS brigade combat team until 2015, FCS forerunners are already playing important roles on the battlefield. Since 2003, small unmanned ground vehicles (SUGV) such as the Pacbot have discovered over 1,000 IEDs in Iraq. The Army has recently outfitted the 25th Infantry Division with micro air vehicles—precursors to the FCS Class I UAV—to perform reconnaissance at the platoon level.[33] In addition, the latest armor upgrade kits for light vehicles, such as the Humvee, are based on FCS armor technology.

Yet, despite their utility, these technologies were developed without the overall network integration that FCS will provide. Over the next decade, FCS technologies will spin out as the Army procures and equips the systems for soldiers in the field. The first spin-out is scheduled to begin in FY 2008 and will include an early part of the network operating system; joint tactical radio system; ground sensors; and the computer-integrated-system B-kits for Abrams, Bradleys, and Humvees. In FY 2008, the B-kits will enable soldiers in these vehicles to obtain data directly from UAVs. FCS will also provide the first MGV prototype, the non-line-of-sight launch system. Two additional spin-outs are scheduled to begin in FY 2010 (active protection system, vehicle sensors, SUGV, and Class 1 UAV) and FY 2012 (FCS Battle Command, Mule, and Class IV UAV) before the first FCS combat brigade arrives in 2015.

To ensure that these technologies are ready to deploy, the Army has established the Evaluation Task Force at Fort Bliss, Texas, to test and evaluate systems and to refine the doctrine, training, and organization of FCS brigades. The soldiers are experimenting with the technologies scheduled for the first spin-out and are scheduled to test the Abrams and Bradley B-kits early next year. After several exercises, one non-commissioned officer said, "I became a big believer. All they need to do is get it out to the soldier and start training on it."[34]

What Congress and the Army Should Do

No one is expecting Congress to write blank checks to the Army for its massive and ambitious modernization programs, but Congress should seek to answer several useful questions as the Army moves forward with the Future Combat Systems:

- How do Army modernization programs meet Reserve Component requirements?
- What is the Army modernization plan for non-maneuver brigades (e.g., fire support; mobility; aviation; and intelligence, surveillance, and reconnaissance)?
- Does FCS strike the right balance between modernization and recapitalization?
- Do the modernization plans account equally for strategic and tactical mobility?
- Do FCS brigade combat teams possess both maneuverable and survivable capabilities?
- Is the FCS brigade suitable to fighting and winning a wide range of mission sets?
- If not the integrated procurement approach for brigade combat teams, what acquisition strategy would Congress prefer?

Congress and the Army should ensure implementation of comprehensive Army modernization and the FCS program in a responsible manner. Specifically:

- Congress should continue its support for Future Combat Systems and restore the funding that was cut from FCS in the 2008 defense appropriations bill. Schedule disruptions have caused some of the turbulence in the FCS program, which only

33. Rob Coppinger, "Improved Micro-UAV Faces September Tests," *Flight International*, July 3, 2006, at *www.flightglobal.com/articles/2006/03/07/205323/improved-micro-uav-faces-september-tests.html* (November 29, 2007).

34. Association of the United States Army, "A Transformed and Modernized Army."

increased costs, risks, and skepticism. Congress can help by not consistently reducing funding for the program, particularly those elements integrated with schedule demands.

- In exchange, Congress should continue to exercise robust oversight of FCS. This should include demanding Technology Readiness Level assessments, another review of the FCS critical technology list, manufacturing readiness reports, and synchronization of non-FCS programs that are crucial to FCS success. Knowledge-based measures recommended by the GAO should guide FCS oversight leading up to a major milestone review in 2008. With GAO staff already embedded full-time in the Army's FCS program office, Congress should have access to all levels of the program staff and all relevant information to continue this review.
- The Army should review the recent Defense Science Board report that suggests that the Army should alter the future airlift concept for FCS vehicles. Of particular concern is the Army's lengthy development timeline.[35] Congress should monitor the Army's evaluation of alternative concepts and their viability and cost projections.
- If necessary, Congress should give the Army FCS program manager more time to achieve program goals and objectives. Congress should commend the Army for developing a spin-out approach through the development of reward criteria for additional spin-out–equipped units that are fielded successfully.
- The Army should clearly delineate the modernization requirements and resource plans for the Army Reserve and Army National Guard. The Reserve Component needs a modernization program to meet its unique needs.
- Congress should press the Army for its modernization strategy for active-duty units that are not slated for FCS, such as the non-maneuver active brigades.
- The Army should develop transparent metrics for Congress to measure modernization objectives. Congress should review the results of the Evaluation Task Force's evaluations of FCS technologies.
- Congress should accelerate the development of the Class I UAV and SUGV. Their precursors, the micro air vehicle and Pacbot, have already demonstrated their utility. Fully developed systems would give an immediate boost to soldiers on the battlefield.

Conclusion

The Army modernization paradigm should become a "current to future" force instead of today's approach, described by some as a "current versus future" force. Procuring the Future Combat Systems should not be a zero-sum game of buying either today's systems or tomorrow's, but not both. Congress should continue robust oversight of the FCS program while fully funding Army modernization and Future Combat Systems this year and into the future to achieve program stability.

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35. U.S. Department of Defense, Defense Science Board, "Future Need for VTOL/STOL Aircraft," July 2007, at *www.acq.osd.mil/dsb/reports/2007-07-Future_Need_for_VTOL_STOL_Aircraft.pdf* (November 30, 2007).