Toward a Protected Future Force

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A significant challenge facing planners of America's future ground forces is the question of how to think about survivability. With a great deal of emphasis placed on strategic mobility—both in speed of deployment and in logistical efficiency—the manned ground vehicles of the US Army's Future Combat Systems (FCS) will be considerably lighter than the tanks and infantry fighting vehicles currently fielded in Army units. This poses a problem: without the ability to wield the armor protection of the Abrams main battle tank, FCS vehicles[1] will have more inherent vulnerability to enemy direct-fire weapons than the vehicles that they will eventually replace. This problem is not just tactical and operational in nature; it has strategic implications, and if it is not addressed effectively, the ability of the Army to meet its required aims will be put at risk.

The US Army plans to introduce its next-generation ground force quickly, starting with an experimental battalion by the end of the decade and a full brigade—called a Unit of Action—in 2014.[2] The Future Force, formerly called the Objective Force, is anticipated to be a highly mobile, light armored force with previously unheard-of intelligence-surveillance-reconnaissance (ISR) capabilities, emphasizing maneuver and stand-off precision firepower to eliminate enemy forces from long range. The Army's plan does allow for a conventional armored "counterattack" corps based on existing tanks and fighting vehicles through at least 2030, but the centerpiece of the Army will be the FCS-equipped Units of Action.

The FCS Family of Vehicles—Survivability without Protection?

The survivability of the Future Force depends on two factors: the technological measures taken to protect the force and the methods of employ-

ment of the Units of Action. According to the Army's "Concepts for the Objective Force" white paper:

> The agility of our formations combined with the common operating picture is critical to maximize survivability. Ground and air platforms will leverage the best combination of low observable, reduced electronic signature, ballistic protection, long-range acquisition, early discrete targeting, shoot first every time, and target destruction every time we pull the trigger. Objective Force survivability will be linked to its inherently offensive orientation, as well as its speed and lethality.[3]

The inherent protection of the 16- to 20-ton FCS manned ground vehicle will be relatively low, primarily the result of its light weight. Future Combat Systems vehicles will be equipped with a variety of technical countermeasures intended to enhance their survivability in the event of contact with the enemy, but the underlying basis for their ability to survive on the battlefield is their ability to locate the enemy in all terrain types and then kill or outmaneuver the enemy without being effectively engaged.

The extent to which armor will play a role in FCS survivability was outlined in a presentation given at the 23d Army Science Conference in December 2002.[4] The presentation outlines the Army's vision of a holistic approach to survivability: it intends to employ methods of preventing American vehicles from being effectively engaged through a combination of technical defenses and creative employment of forces. For example, to avoid detection, the Army will maneuver its forces out of contact with the enemy, it will employ vehicles with reduced signatures, and it will attempt to blind the enemy through targeting its command and control and ISR assets. Similar methods will be employed at each of the other levels of engagement—once detected, methods will be used to prevent Army vehicles from being acquired, and then hit, and then penetrated, and then destroyed. This is typically given in a diagram with concentric circles, the outermost being "Detected" and the innermost being "Killed."

This is a fundamentally useful way of approaching the problem of survivability; however, the solution that is currently being pursued is heavily skewed toward the outer circles—preventing Army units from being detected and acquired. This is not yet a comprehensive plan for survivability; it is an eggshell, and when the outermost circles are compromised, the proposed Fu-

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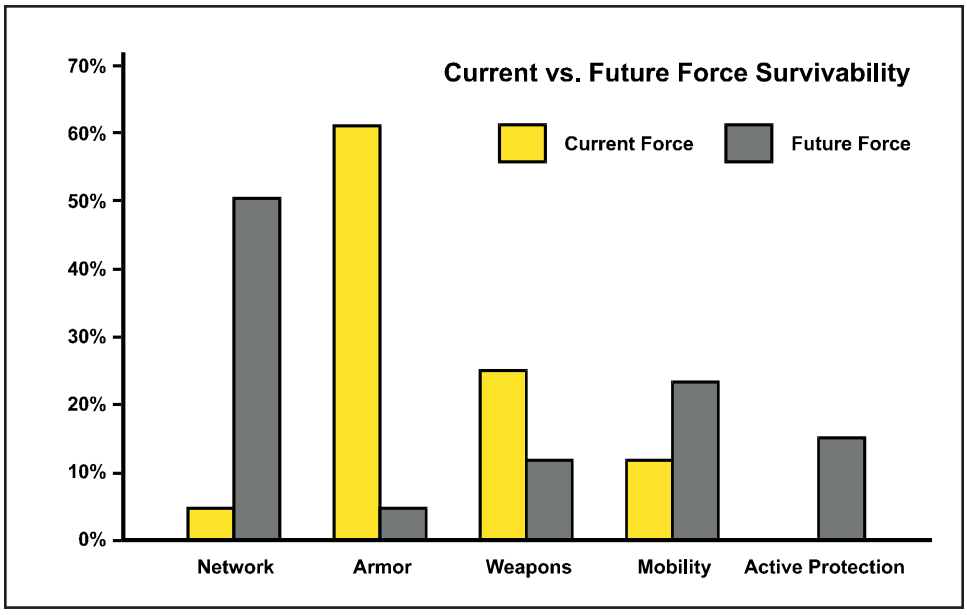

Figure 1: Current vs. Future Force Survivability.

ture Force is on considerably weaker ground than modern conventional armored forces, to say nothing of armored forces two decades from now. Figure 1 depicts the different contributing characteristics of survivability, comparing the Future Force with the current armored force.[5]

Even keeping in mind claims that FCS survivability will be higher overall than that of the current force, the reliance upon the network and mobility factors make up some 70 percent of the Future Force's comprehensive survivability. Decreased direct firepower and armor protection are high prices to pay, particularly when a more protected and more heavily armed force could employ the same network and active protection systems. The high reliance upon mobility and enhanced communications and reconnaissance is not a balanced solution to this problem, and it offers uncomfortably little redundancy; American forces should be able to continue the mission in the event that the communications or information available to them is compromised.

Several recent experiences demonstrate the difficulty of relying upon advantages in communications technology and agility in place of robust protection. Irregular forces in Somalia, Chechnya, Afghanistan, Iraq, and elsewhere have employed ad hoc networks that have allowed them to communicate effectively. In Operation Iraqi Freedom in particular, both irregular and regular enemy forces developed measures that enabled them to respond with varying degrees of effectiveness even though their regular command and control systems were presumably subject to extensive attacks. In Karbala, as in Mogadishu nearly ten years before, Iraqi units responded to American heli-

copters through the use of a cell-phone-based early warning network and prearranged signals. The result this time was one Apache Longbow helicopter downed and crew captured, 29 other helicopters (all but one of the attacking force) no longer mission capable, and an entire attack helicopter regiment out of action for a month.[6]

Cell-based organizations and terrorist elements require little to no command and control to function on the battlefield. In future wars, competent adversaries will be wise to America's attempts to cripple enemy communications while relying on an extensive communications network of its own to function on the battlefield. Opponents who confront this problem will develop means both of frustrating American reconnaissance and surveillance techniques and of conducting operations with decentralized elements that can operate with degraded communications.

Even in the absence of attempts to actively target American reconnaissance and communications capabilities, FCS-equipped units will still face two major challenges: achieving a high degree of situational awareness in all terrain and circumstances, and making that information available throughout the chain of command down to the lowest tactical levels. Again, recent experiences show how difficult this is even against militarily weak adversaries. In Kosovo, locating Serbian units hiding in the forests proved very challenging; few Serb units were seriously harmed by NATO air attacks. In Afghanistan, Taliban and al Qaeda fighters were able to hide among rocky hillsides and bring heavy fire on US helicopters that thought they were approaching safe landing zones.[7] In Operation Iraqi Freedom situational awareness at the brigade level and below was apparently very poor. That was certainly the case with the 11th Attack Helicopter Regiment's failed deep attack on the night of 23 March 2003.[8]

The systems designed to protect FCS vehicles on the battlefield will play an important role in their survivability, particularly when US troops close with those of the enemy. In addition to basic ballistic protection, a variety of countermeasures have been suggested, including hard and soft active defenses, electromagnetic and other types of advanced armors, and increased use of remotely operated air and ground vehicles on the battlefield. Information on these systems is scarce, and it should be noted that no description of how this problem will be fully addressed has been made public for discussion across the Army. This is a troubling development in itself, given that the first battalion of FCS is to be fielded only a few years from now.

The ballistic protection of the basic FCS manned ground vehicle will be inadequate for close combat against a serious opponent. Because all the technologies for FCS are not expected to be mature by the time of the first fielding, the first iteration will be introduced as FCS Block I. The armor re-

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ported for FCS Block I will protect the vehicle from 14.5mm projectiles and fragments from 155mm artillery airbursts; later versions are claimed to also include armor protection against up to 30mm armor-piercing rounds.[9] Clearly the Army is and should remain tight-lipped about the exact level of integral protection in its future vehicles. However, while advanced composite materials may yet prove surprisingly effective, they will not provide the Army with a 20-ton vehicle that has enough ballistic protection to withstand hits even from weapons designed to kill 1980s-era armored personnel carriers, much less main battle tanks.

FCS vehicles are to be fielded with the Integrated Army Active Protection System (IAAPS), a device designed to offer both "hard" active defense by physically intercepting incoming projectiles and "soft" active defense through the use of electronic countermeasures. This is an important part of the survivability system for these vehicles, but it has its limitations. First, an active protection system will be primarily effective against shaped-charge warheads, at least in the near term; a system that effectively intercepts incoming hypervelocity kinetic energy rounds is a challenge requiring considerably more demanding specifications than the existing prototypes that have successfully defeated shaped-charge projectiles. Second, such a system will require an amount of stand-off range to properly detect and engage incoming rounds. This will vary based on the velocity of the incoming round and a variety of other factors, but it will leave a zone near the vehicle where its defenses are limited. Given that ambushes in Iraq have commonly been at ranges well under 50 meters,[10] this is a real concern.

Additionally, depending on the type of system chosen for the FCS's active defenses, there may be other technical issues that severely limit their effectiveness in certain environments. Any active defense system that physically intercepts incoming rounds will pose a risk to friendly dismounted infantry as well as local civilians. Defensive devices like the Full Spectrum Active Protection Close-in Shield (FCLAS) employ an explosive charge to defeat threats; during peace operations, restrictive rules of engagement could greatly complicate force protection. That said, this is clearly an important

technology. As of 2002, active defenses under testing had effectively engaged antitank guided missiles and rockets (despite requiring a 50-100 meter stand-off range) with designers anticipating a 90-percent hit probability by 2006.[11] Impressive as that is, for an active defense system to be a true replacement for armor plate it will need to be even more capable than this; a ten-percent failure rate in the face of massed enemy fires would still result in high US casualties against a skilled and determined opponent.

Defenses based on electronic countermeasures will be increasingly prevalent on future battlefields, but they are effective only against a narrow range of threats. Since the more advanced enemy targeting systems may be subject to jamming or spoofing, this capability should be aggressively pursued, but just as with a "hard" active protection system, even a fairly high degree of effectiveness may still result in prohibitive risk against an opponent able to employ a large number or the right kinds of weapons against American forces. Naturally, electronic countermeasures will offer no effective protection against unguided threats like rocket-propelled grenades. Electronic countermeasures should be present on all future US Army combat vehicles, regardless of inherent protection, because of the advantages they will offer against certain classes of threats, primarily antitank guided missiles.

Another promising technology being researched for use on future light armored vehicles is electromagnetic armor. At the cost of only a few additional tons of weight, this armor essentially creates an electrical field within layered plates that deforms shaped-charge warheads that impact the vehicle. The primary limitation of this technology is that it is effective mainly against shaped-charge warheads and would provide little protection against kinetic-energy rounds. Additionally, electromagnetic armor is not expected for introduction until FCS Block II; it will not be included in the first FCS-equipped Units of Action.[12] This is one of the most important technologies that will be introduced to enhance the protection of the FCS family of vehicles, however, and it will contribute significantly to the battlefield survivability of all Army vehicles that receive it.

Again, much that is planned for the protection of the Future Combat Systems family of vehicles is not publicly available: planners do not want potential enemies to know these capabilities, and in some cases they do not yet know to what extent certain technologies will be sufficiently mature to be integrated into the final system. The level of technological risk being accepted by the designers of this force is considerable, and no one can predict yet what the final system will look like once completed. The important point is that even if every part of the Future Force's comprehensive system of survivability functions as advertised, the amount of protection available may still not prove adequate. Even the advocates of the currently planned Future Force de-

scribe a force that must rely on stealth, agility, and superior situational awareness to succeed in combat. The reasons that inherent protection is both necessary and desirable are outlined below.

Why Protection Matters

Because light vehicles lack the thick composite armor of modern main battle tanks, their ability to survive in battle will be based on evasive maneuver and proactive stand-off fires, combined with limited physical defenses and careful selection of engagements. Even so, circumstances will arise that will require vehicles with higher inherent protection, and when that protection is not required, it may still be highly desirable.

The Unit of Action's emphasis on precision stand-off fires and its high maneuverability and extensive communications and reconnaissance capabilities are likely to make it a peerless combat force in open country warfare, should an enemy be foolish enough to engage it in such unfavorable circumstances. However, in a variety of other situations it will be risky to commit forces based around lightly armored vehicles. Limited visibility environments may prove to be a problem, although the effects of obscurants, fog, heavy rain, and sandstorms will diminish over time as better means of reconnaissance and surveillance are developed. Degraded reconnaissance means degraded survivability for a force that depends on seeing its enemies first and engaging at arm's length.

Although the requirements of warfare in limited visibility and the limitations of active protection systems are part of the case suggesting the need for well-protected vehicles, it will be the missions that the Army will be required to accomplish that will demand effective protection the most. The US military's experiences in Afghanistan and Iraq have demonstrated the effectiveness of America's air power when applied in synergy with ground forces. America's ability to destroy enemy forces in open country is a powerfully disabling force that will present a daunting challenge to any future opponent. When combined with the plausible threat of ground attack, this creates an unsolvable dilemma for the enemy commander: either his forces mass to fight an attacking ground force, making them most vulnerable to air attacks, or they disperse to avoid being slaughtered from the air, making them vulnerable to defeat in detail on the ground.

It will therefore increasingly be the case that future enemy forces will inhabit close terrain and populated areas where the tremendous US advantage in stand-off precision firepower cannot be as effectively employed. The defining purpose of US ground forces will be to conduct close combat—eliminating enemy forces among noncombatants and valuable infrastructure. This trend will only be reinforced by the gradual increase in urbanization around the

world. By 2007 more than half the world's population will live in cities; by 2030 the number will have passed the 60 percent mark.[13]

In such circumstances, the attacking elements will be required to expose themselves to enemy direct fire to engage them without undue collateral damage. Iraqi Fedayeen often fought in populated areas in plain clothes, moving unarmed among civilians from weapon cache to weapon cache to conduct ambushes or otherwise engage American troops. With a light armored force based around precision fires, eliminating enemies that fight in this way is even more difficult; if force protection requirements force US Army units to reduce enemy units hiding among civilians with massed stand-off firepower, civilian casualties may be frighteningly high to the point of being politically unacceptable. And if even a small number of RPG-equipped infantry supported by concealed antitank guns and artillery dug into buildings can cause considerable damage, what alternative would the FCS-equipped force have?

Any restrictive set of rules of engagement (ROE) could cause severe problems in such circumstances. Even with permissive ROE, the collateral damage resulting from this sort of warfare could impose political costs of its own. Given enemy attempts to disguise their own forces as civilians, or even to simply conduct ambushes, it may not be the case that Army units will be able to fire even when the enemy first comes into line of sight or other observation. Similarly, no amount of speed, agility, or communications can change geographic realities; the Iraqis knew American forces had to take Baghdad to topple Saddam's regime. When political, strategic, or operational demands force Army units to close with the enemy, a lightly protected force will be at a serious disadvantage.

Not only will enhanced protection be necessary in certain unavoidable conditions, but it will continue to be highly desirable even when it is not absolutely needed. Having excellent protection gives a commander options he would not otherwise have with forces possessing merely adequate inherent protection. Well-protected forces can accept greater risks during mission planning and execution, and their ability to physically intervene and shape the battlefield by their actions and presence can be vital. Forces that lack such protection also can benefit from the support of these units; since the friction of war can never be eliminated, it will be useful for highly mobile, network-centric light forces to have backup as a hedge against battlefield surprises. A mixed heavy-light mechanized force would frustrate enemy plans to defend against a single type of force. Moreover, a heavier force optimized for close combat would be a potent means of insurance for a future commander, with which he could extract lighter forces from undesirable situations should the need arise.

Examples of the kind of options that the commander has had when in control of protected forces abound throughout the history of combined-arms

warfare, and the recent experience in Operation Iraqi Freedom provides some of the most striking cases. When Task Force 1-64 of 2d Brigade, 3d Infantry Division raided up Highway 8 into Baghdad on 5 April 2003, they did so with no information on enemy strength or positions.[14] The success of TF 1-64's raid on 5 April led to the larger attack on 7 April, when 2d Brigade moved into Baghdad for good, contributing to the swift collapse of the regime. In both attacks the superior training and coordination of the American forces allowed them to get the most out of their advantages in firepower and protection, despite being vastly outnumbered and having limited intelligence on enemy forces occupying difficult terrain. With more lightly protected forces that rely on excellent situational awareness, a lack of adequate reconnaissance will instill caution in attacking troops; delays due to shaken confidence in the intelligence picture could be a major problem.

A common argument made against modern heavy armor is that tomorrow's advanced antitank weapons will defeat even the best-protected vehicles. But the purpose of armor has never been to maintain complete invulnerability against all possible threats. Rather, armor allows protected maneuver and should reduce a vehicle's vulnerability to the most common threats available to the enemy. The level of protection on Army combat vehicles will determine what weapons are effective against them, and it is better to be vulnerable to few than to many. The more potential threats are reduced, the less reliance on advanced sensors and communications is necessary.

At the strategic level of war, there are additional considerations that could prove problematic. A Future Force relying primarily on sensors, communications, and maneuver for battlefield survivability neglects more than just the advantage of protection on the battlefield. The utility of that force to strategic leaders is also affected, and it changes how potential adversaries may respond to the use or threat of use of force by America's leadership.

In developing a network-centric force and concentrating on reconnaissance, surveillance, target acquisition, and employing precision fires, the Army is focusing on the creation of capabilities that are being similarly developed in the air and missile arms of the other three services. Redundancy in warfare is an asset, not a liability, and the Army absolutely should improve on its currently limited precision indirect-fire capabilities. However, an overemphasis on this capability at the expense of the Army's ability to perform close combat missions—which air power will never be able to accomplish—would be a mistake. Again, because US air- and ground-based precision fires will be able to so effectively eliminate targets in open country, the need will be for Army units that can engage enemy forces directly. Future Army missions will continue to require the Army to close with and destroy the enemy at line of sight and closer ranges; as a result, trading off

protection in favor of mobility and firepower weakens the Army's utility in a joint environment.

The Future Force's offensive orientation also may have an adverse effect on the flexibility of US national and military strategy. Basing an Army around a force that is designed to preempt the enemy at the tactical and operational levels of war is hazardous because it limits the options available to American strategic leaders and offers incentives to adversaries to behave in an offensive manner once wars appear likely. It will not always be a matter of deploying from the homeland and launching into the attack; in the event of a crisis it may be worth more to be able to quickly deploy American units to the theater before the start of combat to visibly demonstrate an American commitment to an ally's security. The Army's ability to serve as an effective deterrent is enhanced if it can reasonably be expected to survive an enemy's preemptive blows, and if its ability to accomplish its mission is not compromised fatally by enemy attacks against its communications infrastructure.

Finally, the Army's role in supporting the United States' military credibility may suffer if too much attention is paid to rapid deployment and not enough attention is paid to winning once troops arrive on the battlefield. The most important part of military credibility is that the response be effective, not that it be swift. Whether that response comes quickly is irrelevant if it is insufficient (and when a response is known to be ineffective it probably will not be sent at all). The ability to deploy forces halfway around the world on a moment's notice is useless if they are incapable of decisively defeating the enemy when they get there. If in the name of rapid deployment the Army creates a force that decisionmakers perceive as too vulnerable to use in action, they will have made it *less* likely that decisionmakers will elect to use the Army, despite its increased deployability.

Creating a Protected Future Force

Retired Major General Robert Scales has written:

> What died on the battlefields of Iraq was the vision held by many of a homogenized army—one in which units would largely resemble one another. Instead, the Army of the future will require a large kit bag of capabilities that it can deploy and fit together, sometimes in the middle of battle, to meet the many exigencies of this new era in warfare.[15]

The emerging Revolution in Military Affairs offers potent opportunities across the full range of ground combat, and not merely for stand-off engagements over open or relatively open terrain. A networked and precision-weapon-armed force with a high degree of protection and organic direct firepower optimized for close combat in urban and complex terrain would be the

"A mixed heavy-light mechanized force would frustrate enemy plans to defend against a single type of force."

ideal knockout punch for the future joint force. Instead of avoiding it, the Army should be designing a force specifically with close combat in mind, because this will be among the Army's most vital warfighting missions.

With the fielding of the Stryker Brigade Combat Teams, the US Army has filled an important gap in the capability of its ground forces. While the purpose of these units is to serve as an interim force that allows the Army to develop new doctrine and take advantage of the technological advances that are to enable its next-generation ground force, it is also worth noting that this force is of use to the United States right now. The Stryker units are strategically mobile and have a flexible organization that integrates combined arms at lower levels of command than do most of the units that existed before them. As a whole, the Army's current force is more balanced than at any time in recent memory, with light, medium (Stryker), and heavy forces all available to war planners, each with their own strengths and weaknesses.

Despite their utility as a more readily deployable mounted force, however, the Stryker units are a problematic model for the Future Force. In terms of protection they have all the weaknesses and few of the advantages of the projected FCS-equipped force. Without the advanced sensors and communications network of the Unit of Action, and without even FCS's active defenses, Stryker-equipped forces would require substantial reinforcement to function in combat against even moderately equipped and motivated enemies.[16] But used in concert with the light and heavy forces already in the US Army, the Stryker brigade offers potent capabilities that improve the entire Army's effectiveness. Rather than attempting to develop the future ground force as an exclusively FCS-equipped force, the Army should opt to sustain its balanced capabilities, seeking to create transformed light/specialty, medium (FCS), and heavy forces. All of these force options have special functions, and all could be radically improved through the addition of the communication and sensor capabilities planned for the Future Force.

The Army's current armored force has served the nation well, and the M1 Abrams and M2/M3 Bradley will continue to serve in one fashion or another for decades. However, there are several reasons why the current

heavy force may prove inadequate to future warfighting demands, and why the Army should begin a push toward a replacement set of systems. Some of the limitations of the current armored force are well known and are in fact driving Army Transformation; modern armored vehicles are both large and heavy, and they require extensive logistical support as well. This makes them difficult to deploy and supply over strategic distances, and the size and weight issues again cause problems once in theater, particularly in areas with poorly developed infrastructure. The narrow streets in the urban areas of many third world countries are a real problem; future combat environments may well look more like the claustrophobic alleys of Grozny than the relatively spacious highways through Baghdad.

Given the battlefield successes of the Abrams main battle tank, every anti-armor weapon manufacturer on the planet has an incentive to market weapons that find the chinks in the Abrams' armor. American tanks reported as many as 18 non-penetrating hits from Iraqi rocket-propelled grenades after intense combat in Baghdad; a handful sustained enough damage to be abandoned, despite the relative inadequacy of Iraqi arms and training. Iraqi forces were mostly equipped with rocket launchers and warheads designed decades ago; if 1990s-era infantry antitank weapons are prevalent on the battlefield of 2020 and beyond, the Abrams and especially the Bradley will be substantially more vulnerable. Russian manufacturers of antitank weapons already sell modern tandem-shaped-charge warheads that can be fired from the widely available RPG-7 launcher. In 2020 the M1 Abrams will be 40 years old; upgrades may extend its effectiveness for a few years, but they will not solve the problem of deploying the vehicle quickly and will provide limited protection from threats designed specifically in response to this champion of two wars in Iraq.

Because neither the current armored force nor the FCS Unit of Action will be fully adequate to meet the Army's requirements, the Army needs to seriously examine two major changes to its transformation agenda to accommodate the demands of future close combat. First, the Army should consider improving the protection levels of those FCS manned vehicles most likely to be employed in direct-fire ground combat: the infantry carrier and the mounted combat system. Second, the Army should develop a timeline for transforming the current heavy force into a future ground combat force that combines optimal firepower and protection with the proposed advantages of the Future Force, including its organization and advanced communications and sensors network.

All ground combat vehicles must balance firepower, protection, mobility, and sustainability, but the requirements of each depend on their role; by 2025 the Army should strive to be able to deploy vehicles with survivability

well beyond that of the Abrams main battle tank, to say nothing of the proposed FCS vehicles. While the time may come when sub-20-ton vehicles can have an adequate level of protection for future battlefield uses, this is not likely to be the case anytime soon. Future vehicles must have fully spherical protection against the widest possible variety of threats to be able to win decisively in complex terrain. Additionally, in contrast to the relationship between the extremely well-armored Abrams and the considerably lighter Bradley, future infantry carrier vehicles may require protection approaching that of future main battle tanks or their equivalents. Close combat will place high demands on any force, and the Army's ability to not merely succeed but excel in this kind of fighting must be preserved.

Improving the protection of the FCS ground combat vehicles may require pushing back the Unit of Action's timeline—therefore reducing the amount of technological risk being taken in order to make 20-ton vehicles survivable on the battlefield—or it may (and probably will) require increasing the vehicles' combat weight, which would mean relaxing the requirement that FCS vehicles be able to be transported on C-130 cargo planes. This would have relatively little impact on their strategic mobility, as the C-17 and C-5 will continue to be the primary means of strategic airlift and both are well equipped to handle a vehicle of increased weight. The C-130 requirement was based not on the need for strategic mobility, but on the ability to transport FCS vehicles within a theater of operations. While this is desirable, it does not justify the costs of going to such a restrictive size and weight. It is a better option to make at least some FCS vehicles require C-17 transport than it is to risk deploying them with inadequate armor protection. An FCS Mounted Combat System redesigned without the restrictive 20-ton weight limit and combining all the advanced technology and improvements set for the baseline FCS with an improved level of armor protection would add substantial backbone to the entire Unit of Action.

As an alternative or in addition to improving the armor protection of FCS manned combat vehicles, the Army should develop a next-generation armored force to replace the current heavy force. This force would be the Army's knockout punch, combining the best possible mix of firepower, protection, and tactical mobility. It would benefit from the extensive research and development being conducted for Future Combat Systems as well, as a transformed armored force would be most effective if it employed all of the FCS vehicles' protective measures, communications and sensors systems, and improvements in other areas such as sustainability. These vehicles should be designed with urban combat and close coordination with infantry dismounts as a top priority.[17] Every attempt should be made to alleviate the weight and size problems of existing armored vehicles that make deploy-

"The Army should develop a next-generation armored force to replace the current heavy force."

ability and sustainability such a challenge, but the priority for this force would be the ability to provide maximum overmatch in close combat in complex terrain against the most seasoned and well-equipped opponents. Naturally, a force designed to succeed in the worst possible circumstances would have utility throughout the full range of lower-intensity combat engagements as well. If this approach were to be adopted, the Block II FCS could be built to a 30- to 40-ton weight goal, with the intention of making those vehicles the basis of the future heavy force.

Balance between strategic mobility and combat power is key. In terms of deployability, not all of the Army's forces need to be light enough to be deployed by air in the event of a crisis, and not all of the force needs to be heavy enough to defeat all possible enemies in any terrain or mission. There is a practical limit to the extent which Army units can be quickly deployed from the homeland via air: this constraint is a function of the number of air transport craft available, the competition with other services for the use of those airplanes, and the number and location of suitable air bases where the forces to be deployed need to go.[18] It is therefore going to continue to be the case that significant amounts of materiel will need to be either present at the beginning of a conflict or transported to the theater via surface transport. In terms of combat capabilities, having a transformed light-medium-heavy mix offers crucial advantages as well. The inverse relationship between mass and deployability should not necessarily be viewed as a dilemma; by pursuing both, the Army would gain the advantages of both. The real dilemma should fall to America's enemies, who would face the much more difficult task of finding ways to defeat both a swift-moving, highly-mobile, FCS-based force and a close-combat-optimized armored force. Even a relatively small advanced heavy force reinforcing a larger, lighter force could have effects well out of proportion to its size as a result.

These changes would complement those necessary and desirable changes that are already planned for the Future Force. Enabled with superior intelligence and surveillance assets, the future commander would be best able to pinpoint those weapon systems that can destroy his most well-protected

vehicles and engage them as priorities, rather than being forced to attrit or avoid an opponent whose entire force potentially possesses weapons dangerous to the Army's vehicles. Advanced surveillance and reconnaissance can tell the commander where best to employ forces in close assault for maximum physical or psychological effect. The choices available to a commander who has even a core of highly protected "hard" maneuver units will prove more useful than the choices available to a commander with a force of lightly armored vehicles at risk from virtually all of an enemy's force. The United States should strive to create a protected future force whose eyes see all, or nearly all, weapons powerful enough to destroy them, and whose armor is thick enough to provide near invulnerability to those enemies they can't see.

Conclusion

There is much to praise in the Army's attempts to transform itself for the future. In past years it has demonstrated its willingness to adapt to a radically new and difficult security environment and to embrace new technologies and thinking that may provide revolutionary increases in the Army's ability to threaten and use force in support of the nation's strategic aims. However, the Army's efforts to transform itself must be tempered by an understanding of those aspects which have brought it stunning successes in the past. In a welcome first step in this direction, Army Chief of Staff General Peter Schoomaker has indicated that technological improvements resulting from the FCS program will be spun off into existing forces as they become available.[19] This will extend the utility of the Army's current generation of fighting vehicles, but unless Army Transformation is adjusted to provide for enhanced protection, the Army may no longer have an effective means of providing protected maneuver to units in contact with the enemy once the Abrams is phased out of active service. Also, as noted in Lieutenant General John Riggs' introduction to the "Objective Force in 2015" White Paper, Army Transformation is still a work in progress. Army planners realize that the battlefield survivability of the FCS manned vehicles is a point of significant concern. And in recent comments, Director of Force Transformation Arthur Cebrowski indicated that the services were reexamining their approaches to transformation, with an eye toward balancing fires, maneuver, protection, logistics, sensing, and command, rather than an "exclusive focus" on fires.[20]

The Army's next-generation force as currently envisioned may prove inadequate to the demands of future combat in complex terrain. As explained in documents on the Future Force, it is expected to fight primarily at stand-off ranges, using mobility, superior situational awareness, and precision weapons to place the enemy at a disadvantage. While technological solutions potentially available to the FCS will enhance the protection of the

lightly armored vehicles that are intended to make up the Future Force, it is simply not the case that they will enjoy levels of ballistic protection similar to those of the current force. The designers of the Future Force acknowledge this when they write of the necessity for developing the situation out of contact and engaging the enemy at beyond line-of-sight ranges.

Protection will continue to be necessary to enable the Army to accomplish its missions both in times of war and of peace, and it will continue to be highly desirable in many situations where it is not absolutely necessary for mission accomplishment. The advantages of a more strategically deployable force will be wasted if such a force is incapable of accomplishing its missions at an appropriate cost.

NOTES

1. Future Combat Systems actually refers to a family of systems that includes unmanned aerial and ground vehicles. For brevity's sake, in this article "FCS vehicles" refers to FCS manned ground vehicles unless otherwise noted.

2. Joshua Kucera, "FCS Ground Vehicles Delayed," *Jane's Defence Weekly*, 28 July 2004, p. 5.

3. US Army, Objective Force Task Force, "Concepts for the Objective Force," p. 14, http://www.army.mil/features/WhitePaper/ObjectiveForceWhitePaper.pdf.

4. Major General William L. Bond, "FCS Survivability" presentation, Army Science Conference, 4 December 2002, p. 7.

5. Ibid., p. 15.

6. Rick Atkinson, *In the Company of Soldiers* (New York: Henry Holt and Company, 2004), p. 153.

7. For a considerably more detailed analysis of target acquisition in Afghanistan, see Stephen Biddle, *Afghanistan and the Future of Warfare: Implications for Army and Defense Policy* (Carlisle, Pa.: US Army War College, Strategic Studies Institute, November 2002), pp. 26-33.

8. Thanks to John Gordon for his comments on this area; see also his article, coauthored with Peter A. Wilson and David E. Johnson, "An Alternative Future Force: Building a Better Army," *Parameters*, 33 (Winter 2003-04), 19-39.

9. See Sandra I. Erwin, "Army's Future Combat System Shakes Up Procurement Culture," *National Defense*, January 2003, http://www.nationaldefensemagazine.org/article.cfm?Id=1008.

10. Interview with First Lieutenant Skip Boston, 588th Engineer Battalion, 2d Brigade Combat Team, 4th Infantry Division.

11. US Army Training and Doctrine Command, "Unit of Action Maneuver Battle Lab: How Do We Get There?" p 17.

12. Erwin, "Army's Future Combat System Shakes Up Procurement Culture."

13. United Nations, *World Urbanization Prospects: The 2001 Revision*, http://www.un.org/esa/population/publications/wup2001/WUP2001report.htm.

14. David Zucchino, *Thunder Run: The Armored Strike to Capture Baghdad* (New York: Atlantic Monthly Press, 2004), p. 12.

15. Major General Robert H. Scales, USA Ret., Statement before the US House of Representatives, Armed Services Committee, 21 October 2003.

16. US Army, *Stryker Brigade Combat Team*, Field Manual 3-21.31, ch. 1.

17. For a look at the desirable characteristics of armored vehicles for use in urban combat, see R. M. Ogorkiewicz, "Combat Vehicles Take On Urban Warfare," *Jane's International Defense Review*, June 2004, pp. 66-69.

18. John Gordon and David Orletsky write that given these constraints, "Only relatively small units—a battalion task force—can deploy extremely rapidly." See their chapter, "Moving Rapidly to the Fight," in *The U.S. Army and the New National Security Strategy*, ed. Lynn E. Davis and Jeremy Shapiro (Santa Monica, Calif.: RAND, 2003).

19. Sandra I. Erwin, "Army Seeks Short-Term Payoff from Future Combat Systems," *National Defense*, December 2003. See also Megan Scully, "Balancing Act: Will U.S. Army's Future Combat Systems Take On a New Shape?" *Defense News*, 12 April 2004, p. 12.

20. Vince Crawley and Gopal Ratnam, "U.S. Transformation Chief Says Iraq Combat Accelerates Efforts," *DefenseNews*, 19 January 2004.