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An Alternative Future Force: Building a Better Army

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Recent operations in Iraq highlight the need for the Army's leadership to rethink major aspects of its transformation strategy. While the three-week period of combat operations that toppled the regime illuminates one set of implications, the continued and contested postwar operations illuminate another. Furthermore, the insights emerging from Iraq are not isolated, but part of a growing body of operational knowledge gleaned from post-Cold War operations in Bosnia, Rwanda, Somalia, Haiti, Kosovo, and Afghanistan. In the light of this decade of hard-won experience, it seems that the Army's transformation concept rests on a set of major assumptions which should be questioned. This article examines some of those assumptions and suggests an alternative pathway for preparing US ground forces to meet the challenges of the next several decades.

The Objective Force

The intent of the Army's Transformation Plan is to transform the Army into a generally homogenous force—the Objective Force, now termed the Future Force—equipped with advanced technology medium-weight combat vehicles (less than 20 tons) that will allow it to have battlefield effectiveness similar to today's heavy forces. In this sense, homogeneity implies that multiple types of divisions and brigades of the current Army (heavy, light, airborne, air assault) will merge into one uniform type—although apparently the

Army is still considering the possibility that the 82d Airborne and 101st Airborne (Air Assault) divisions may remain unique organizations.

In October 1999, General Eric Shinseki, then the Army Chief of Staff, articulated a vision whose laudable goal was to make the Army more strategically relevant. Since that time, an Army Transformation Plan has evolved centered around the creation of a new generation of fighting vehicles based on a common platform, the Future Combat Systems (FCS), and a new organization where brigades, divisions, and corps are replaced by Units of Action (UA) and Units of Employment (UE). General Shinseki also laid out an ambitious schedule under which the FCS "system of systems," with its proposed array of manned and unmanned combat vehicles and associated situational awareness technologies, would be developed by the early years of the next decade.

The first operational UA, roughly equivalent in size to a current brigade, would appear around 2012, followed by approximately two maneuver brigades converted to the Objective Force design each year thereafter. Current Army plans assume that the combat elements of the Army National Guard also would be transformed by 2030. The principal design constraint on the Future Combat Systems is weight. The requirement that the FCS weigh between 16 and 18 tons has two origins. First is the goal of creating an Army that is strategically more responsive than today's heavy forces but more capable than today's rapidly deployable light forces. Second, the Army wants to give the Objective Force the capability to conduct "air mechanized" maneuver via tactical airlift, initially by the C-130 and in the future by a follow-on system that is either a very short take-off and landing, fixed-wing aircraft or a heavy-lift rotary-wing aircraft, the Air Maneuver Transport (AMT).[1] To realize this operational air-mechanized maneuver capability, potentially deep in an enemy's rear areas, the Future Combat Systems can weigh no more than 16 to 18 tons.[2]

The Army is resorting to an array of approaches to squeeze weight out of the force structure. Instead of relying on heavy armor for protection,

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the Army is postulating a combination of high-technology protective measures and situational awareness to protect the FCS combat vehicles. Second, it is slimming down the supporting logistical structure by exploiting hybrid engine technology so that the FCS family will demand far less logistical support for large-scale military campaigns at both transoceanic (strategic) and regional (operational) distances.

This radically improved strategic and operational agility is to satisfy the strategic planning rationale that ground forces must respond rapidly to fast-breaking threats of aggression anywhere in the world. Indeed, the Army has established some demanding deployment goals for the Objective Force—a brigade (UA) "anywhere in the world" in 96 hours, followed by the rest of the division (UE) by 120 hours. Satisfying these goals requires the UA and UE structures to be very streamlined to reduce their overall weight. Consequently, these ambitious deployment goals are having a profound effect on the design and operational concepts of the entire future Army.[3]

The Army believes that a force consisting of combined-arms UAs that are virtually identical in composition will have improved strategic responsiveness and operational agility.[4] Consequently, each Unit of Action will have a mixture of infantry and direct and indirect fire sub-units, plus various support elements to allow for operations across the full range of military operations—from peacekeeping and peace enforcement in military operations other than war (MOOTW) to high-intensity combat in a major combat operation (MCO). With this transformation, the Army leadership believes that the total Army will become as strategically responsive as either the Air Force or the Navy and Marine Corps while retaining the Army's staying power.

Key assumptions for the Objective Force include the following:

- Substantial land forces will be deployed and employed very early in crisis situations.
- Rapid strategic and operational (in theater) deployability is a key design requirement for the entire Army. A corollary to this assumption is that the future Army should be able to deploy by air, specifically in C-130 class aircraft.
- Technology enhancements, in particular situational awareness, can make a force armed with medium vehicles at least as effective—and as survivable—as today's heavy forces.
- High levels of real-time operational and tactical situational awareness will be attainable in all terrain types.
- A homogeneous force can be designed in a way that is appropriate for missions that span the entire range of military operations from humanitarian assistance, through stability and support, up to major combat operations.

In the pages that follow we will question most of these assumptions. Ultimately, we recommend major changes to the key components of the Objective Force. Still, we appreciate the technological and doctrinal options the current Army Transformation Plan has forced to the surface since it was conceived in October 1999. By no means do we want to throw those out. Rather, we seek ways in which they can be integrated into the Army's evolving force structure to give the service strategic relevance and greater flexibility, at less risk, than the continued pursuit of the Objective Force in its current configuration.

The Changing Global Threat—
The Objective Force Operational Environment

Operation Iraqi Freedom and its aftermath are especially illuminating in that they represent the type of war the Objective Force is designed to wage—one against a large army using conventional weapons. Of particular importance in the recent war with Iraq is the fact that the United States and the coalition had the strategic initiative. The United States dictated if, when, and where military operations would take place—with one important exception that will be mentioned below. Even though it took months to deploy forces into the region to be ready for offensive operations, that was not a particular problem, since the timing of operations was based on our schedule, not the enemy's. The Iraqis had months of essentially unambiguous strategic warning that we were coming, but they were incapable of preparing an adequate response. If additional time had been required to deploy more forces, we could have taken that time. Again, the Iraqis had no military means to significantly interfere with, much less stop, our deployment.

The one exception to the United States having the strategic initiative was in the area of international relations. It took the Administration months to build up the degree of international support that we finally managed to obtain, such as it was. Several key nations, most notably Saudi Arabia and Turkey, refused to permit offensive operations from their soil. This strategic reality—months to build political (especially international) willingness to fight, together with lingering access problems—undermines the notion that in the future a large portion of the US military has to be designed for very rapid crisis response and deployment.

On the high end of the combat spectrum, the Army and its sister services may not find an opponent similar to Iraq in the foreseeable future. Only three plausible MCO-type opponents come readily to mind: China, Iran, and North Korea. China is a special case, with much more military power than any other plausible opponent; US decisionmakers would be extremely wary about trading blows with China, especially with American ground forces.

"To remain relevant to our nation's security, the Army needs to consciously adapt to the new strategic, technological, and budgetary realities of the early 21st century."

Furthermore, both China and North Korea are already armed with nuclear weapons, and Iran may soon have a small nuclear arsenal.

The possession of nuclear weapons by these nations fundamentally changes the stakes involved in any potential conflict. Nuclear weapons also significantly reduce the likelihood that the United States would be inclined to accept the risks associated with the deployment of sizable numbers of ground forces within range of such a threat. All of the services need to come to grips with the realities of fighting in a nuclear environment. Given the emergence of future MCO-class military opponents that are armed with nuclear weapons, a major issue is whether the key sensors and communications systems associated with the next generation of reconnaissance-strike and battlefield situational awareness systems will have to be made resistant to wide-area electromagnetic effects generated by high-altitude nuclear weapon use.[5]

Nevertheless, one potentially important lesson learned from Operation Iraqi Freedom is that existing US military forces are more than adequate for major combat operations in a non-nuclear environment against forces with second-tier technology and questionable quality. This insight is important for several reasons. First, the Army is focusing its transformation plan on building a capability for rapid deployment of ground forces to conduct major combat operations against conventional, ground-centric opponents—now a low-probability event. Second, if it does have to rapidly deploy to fight an Iraq-like major combat operation, it is unlikely that the entire Army will need to be able to deploy with the rapidity envisioned for the Objective Force. Third, the homogeneous Objective Force, optimized for major combat operations, is not appropriate for the vast majority of lesser operations the Army will likely be called upon to execute in the coming decade or more. These more probable operations will be at the mid-to-low end of the conflict spectrum, analogous to post-Cold War operations in Somalia, Rwanda, Kosovo, Bosnia, and the occupation phases of Afghanistan and Iraq that are a part of the global war on terrorism.

Other potential missions below the level of major combat operations also could include counterinsurgency and internal defense and development operations in support of friendly but weak governments in places like Indonesia, the Philippines, and various locations in Central or South America. All of these missions have the potential of lasting for years. In addition to MCO-capable forces, the Army will need forces appropriate for the lower end of the spectrum of operations—for example, special operations forces or other units designed for more traditional forms of strategically agile forcible entry.

On the Need for Strategic Agility

All of this calls into question the assumption that large land forces will be required to deploy quickly to an MCO and fight soon after arrival. The buildup before the Iraq war was consistent with the US government's attempt to coerce the regime of Saddam Hussein into accepting weapons inspections by the UN. Furthermore, future large-scale contingencies by the United States are more likely to be motivated by the desire to conduct preemptive military operations as part of a counterproliferation operation to disarm a rogue regime arming itself with chemical, biological, radiological, or nuclear weapons, rather than reacting to a sudden act of regional aggression (the type of contingency that dominated planning in the Cold War and 1990s). This change in focus suggests that the United States may well have the strategic and operational initiative when it comes to a future major combat operation.

The clearest exception to this trend is a possible preemptive military attack launched by North Korea in response to a US-organized campaign of economic coercion to compel Pyongyang to give up its attempt to acquire a nuclear arsenal. Even in this case, the United States would likely have some time to lean forward with a variety of air, sea, and ground forces in Northeast Asia before the initiation of any campaign of economic coercion—which would require the sustained support of China, South Korea, and Japan, as well as the significant military power of South Korea.

This is not to say that a rapid deployment capability is not desirable. It is. But designing the entire Army for air deployment—by an airlift fleet that will be severely taxed by competing requirements in any major contingency—is unnecessary. Instead, greater emphasis should be given to various pre-positioning options in potential theaters of operation and increased exploitation of new high-speed sealift technologies.

On "Air Mechanization"

The central rationale for the 16- to 18-ton Future Combat Systems is the requirement for the FCS to be lifted by C-130 tactical aircraft over operational distances. Beyond the C-130, some in the Army hope for the eventual

purchase of a large number of tilt-wing or tilt-rotor aircraft that would be owned and operated by the Army. Such an aircraft would give the Army the ability to conduct deep vertical envelopment operations as well as some degree of strategic deployability. For several reasons, the rationale of the air mechanization concept, which has already heavily influenced the design of the Objective Force, requires careful analysis.

The concept of air mechanization calls for Units of Action to conduct air-envelopment operations deep in hostile territory, using some combination of C-130 or follow-on aircraft such as the Air Maneuver Transport. However, the low-altitude air defense threat, even in relatively poor countries, is becoming much more severe. This raises the risk of such operations. Most worrisome is the widespread proliferation of surface-to-air missiles that can be transported by light trucks or even carried by individual soldiers; high rate-of-fire, electro-optically guided, anti-aircraft artillery; and infantry-borne automatic weapons and rocket-propelled grenades (RPGs). These low-altitude, unsophisticated, and cheap air defense systems have become so worrisome to the US Air Force and Navy that both have concluded that current and future air strike and ground support operations should be conducted at altitudes above 10,000 feet.

The concept of air mechanization assumes that the low-altitude threat can be countered or suppressed long enough to conduct large air-envelopment operations. History suggests that this might be difficult. During Operations Lam Som 719 (the last major air assault operation by the Army during the Vietnam War in 1971), Army aviation lost some 400 helicopters damaged and 100 destroyed in four weeks to a relatively unsophisticated air defense.[6] More recently, in Kosovo NATO had great difficulty in locating and suppressing the low-altitude threat. Most of the Apache helicopters that supported Operation Anaconda in Afghanistan were disabled by intense ground fire in a matter of minutes. In Iraq, militia-type units put up such intense ground fire that an entire regiment of some 29 Longbow Apaches had to withdraw (one had crashed on take-off), with one shot down and 28 heavily damaged.

A common thread running though all these operations is that the weapons employed were not sophisticated air-defense systems, yet they were devastatingly effective against aircraft operating at low altitudes. Given the fact that for over a decade the Air Force and Navy have moved away from low-altitude operations, it is highly unlikely that either of those services will be willing to devote considerable resources to countering the low-altitude threat, since they now simply fly well above it.

In the aftermath of the combat experience of the 11th Aviation Regiment in Iraq, the high-level Army reluctance to use Task Force Hawk's Apache attack helicopters in an aerial offensive operation during the 1999

war with Serbia appears vindicated.[7] More recently, during Operation Iraqi Freedom, neither the Army nor Marines conducted a helicopter assault operation into hostile territory. It appears that only special operations forces used helicopter insertions to conduct small raids against well-planned targets.

Given that reluctance to employ even small numbers of attack helicopters in deep attacks against opponents like the Iraqis and Serbs, the idea that the Army would be willing to send large numbers of cargo-type aircraft deep into enemy airspace for vertical envelopment operations seems highly implausible. Therefore, the Army should rethink the emerging "air mechanization" ideas in light of recent combat experience.

On FCS Survivability

Once delivered by air or sea, the Future Combat Systems family of light armored vehicles will have to rely primarily on vastly improved battlefield situational awareness (even in complex terrain) to avoid being destroyed by direct-fire weapons. In open terrain, current technology and combat experience in Iraq strongly suggest that the lighter FCS family may prevail over opponents equipped with more traditional and heavier armored fighting vehicles. However, what Operation Iraqi Freedom further demonstrated is that when we find an enemy force (especially an armored opponent) in open terrain, the preferred US means of engaging them will be low-risk, precision attack from the air. The chances that the US Army will be heavily engaged on open terrain by a large enemy armored force that has not been pummeled by air attack is remote indeed.

On the other hand, Operation Iraqi Freedom has illuminated the usefulness of heavy armor coupled with mechanized or motorized, but dismountable, infantry in suburban and urban terrain. This, by the way, is precisely the experience of Israeli forces during their recent years of urban operations—they use heavily armored tanks in a leading role in urban settings.

This is not to suggest that medium-weight forces, such as those equipped with Stryker, will not be able to conduct offensive operations in complex terrain. It does, however, suggest that the lighter Stryker and later FCS-type vehicles will have to rely heavily on unmanned ground and aerial scouts as well as dismounted infantry for protection from close-range engagements by hidden direct-fire weapons, most specifically RPG-type weapons.

As a supplement to infantry, the Future Combat Systems developers hope that several advanced unmanned aerial and ground reconnaissance systems can be developed by the end of the decade. Current plans call for several hundred of these vehicles to provide future Units of Action with battlefield surveillance. A number of technological hurdles have to be cleared before these vehicles can enter the force in significant numbers. Some advances in

sensors, propulsion, software, and other components may require at least another decade of development before a mature and militarily useful family of combat robots can be deployed.

The larger issue for FCS survivability is the current assumption that very high levels of situational awareness can be achieved in all terrain types.[8] Current and planned sensors will almost certainly be able to locate enemy forces in open terrain, but, as mentioned above, enemy forces in open terrain will almost certainly fall victim to US air attack. Increasingly the Army and Marines will find themselves used in more challenging complex terrain (suburbs, cities, forests, and jungles) where the ability of air power to find and engage enemy forces will probably be restricted by technological limitations. Therefore, lightly armored FCS units will require high levels of situational awareness in precisely those terrain types where achieving that goal will be the most difficult. If FCS-armed units cannot achieve what by today's standards are extremely high levels of situational awareness, they will be at considerable risk.

On Homogenization

The recent combat experience in Iraq suggests that the Army needed a broad spectrum of ground combat units to conduct that major combat operation. During Operation Iraqi Freedom the Army deployed the full range of special operation forces, light infantry (Ranger, airborne, air assault), mechanized infantry, armor, and cavalry forces (light and armored). If there was a deficiency in the Army force posture, it was the lack of air-transportable, medium-weight brigades—i.e., Stryker brigades—to be used during the early phases of Operation Iraqi Freedom in northern Iraq. When Turkey denied the entry of the 4th Infantry Division (Mechanized), the Army was compelled to use a light brigade, the 173d Airborne, reinforced by a small number of M-1 Abrams tanks, as a regional stabilization force. The unit parachuted from C-17s in a benign environment, with Kurdish allies controlling the drop zone. C-17s air-landed the company-sized force of tanks. Noteworthy was the lack of organic mobility and firepower of the airborne brigade, unlike a Stryker brigade equipped with the Mobile Gun System.[9] Fortunately, the local Iraqi garrisons in northern Iraq did not put up much of a fight.

Local commanders mixed and matched light infantry supplied by the 101st Airborne Division and a brigade of the 82d Airborne Division with armor supplied by the 3d Infantry Division (Mechanized). In other cases, the initiative was seized on the ground during the opening moves into downtown Baghdad with the armor and mechanized infantry "thunder runs." In parallel with the Army's air and ground blitzkrieg along the left flank of the Euphrates River, the Marines used a similar mix of armor, mechanized

infantry (in AAV-7 armored amphibious tractors), and infantry in trucks on the right flank along the Tigris River.[10] Later, during the occupation of Baghdad and the other main cities of Iraq, it became apparent that the combat elements needed considerable reinforcement by combat support units, especially military police with their unique skills and training, to facilitate stability operations.[11]

If the past decade is any guide, the US Army will spend most of its time in the next decade or more on stability operations. This calls into question the need for the expensive and very high-tech FCS combat vehicles for all maneuver brigades. One could well question the efficiency of using the envisioned Objective Force units in operations at the lower end of the spectrum. For example, if the Army had been completely transformed in the early 1990s, would it have made sense to have Army forces patrol Bosnia for years in FCS vehicles? Or should part of the force be equipped to perform lower-intensity operations with equipment appropriate to the operational environment?

Similarly, in the coming years the Army could find itself engaged in counterinsurgency-type operations in areas such as Indonesia, the Philippines, sub-Saharan Africa, or Colombia. In those mostly jungle-covered areas, any vehicles, including the Future Combat Systems, could be more of an encumbrance than a help. Thus, it does not appear that the high cost of converting brigades to FCS units ($4 to $5 billion each) is warranted when the vehicles and organizations may not be appropriate for many of the missions or terrain the Army will likely find itself faced with in the future.

The larger point is that Operation Iraqi Freedom appears to show that (1) the land force will be increasingly focused on combat in complex terrain, since US air power is omnipotent in the open; (2) a mix of ground force units is needed, including heavy armor; and (3) the US Army has to be prepared to operate in any number of terrain types. All of these factors argue against homogenization of the force.[12]

One of the earliest and firmest design requirements of the Future Combat Systems was the requirement that the FCS be compatible with the C-130, the oldest and smallest of the Air Force's cargo planes. Indeed, it can be argued that the homogenized Objective Force Army is being designed to an unnecessary airlift constraint. This limitation has, in turn, forced the FCS system designers, and the organizational designers of the Units of Action, to push technology to the limit to achieve heavy-force-like effectiveness in units armed with 16- to 18-ton fighting vehicles. No other factor so increases the risk of the FCS program as the constraining effect of the C-130 limitation.[13]

Again, as noted above, given the size of the airlift fleet, and the competition for aircraft by all elements of the joint force when a crisis occurs, it is

highly unlikely that the Army would be able to air-deploy more than one or two brigade-sized elements in the first two to three weeks of a crisis. If the crisis is taking place anywhere in the world's littoral regions, ships loaded with far more tonnage than airlift is capable of moving will start to arrive by the end of the third week (and in far less time if the equipment is prepositioned aboard cargo ships somewhere in the threatened region), even if the deployment is from Galveston, Texas, to Pakistan. From the time the first ships start to arrive, the tonnage they deliver will dwarf what the airlift fleet is capable of moving. Additionally, ships generally are indifferent to the weight of individual combat systems. Seventy-ton main battle tanks are no problem for most military cargo ships. Thus, given the realities of the air-sea deployment equation, the idea of constraining the entire future combat vehicle fleet to airlift (particularly the C-130) seems unnecessary.

On Costs

One of the most daunting challenges for the Future Combat Systems concept is investment costs. Currently, the cost of equipping a single Stryker Brigade with contemporary, essentially off-the-shelf, medium-weight armored fighting vehicles is running at approximately $2.5 billion. Present estimates suggest that the cost of fully equipping a brigade-equivalent Unit of Action with FCS vehicles and supporting equipment will be approximately $4 to $5 billion.[14] Even if this estimate can be somewhat reduced, it is likely that the Army's capital investment account will allow only one Unit of Action a year to be converted. This is especially true if the planned purchase of the Comanche helicopter takes place in parallel with the acquisition of the FCS. Assuming that the active Army remains at nine or ten divisions, it will take until beyond 2030 to fully convert the active Army to the FCS configuration. Including the National Guard in the plan to rearm with FCS would add tens of billions of dollars and decades to the program.

These costs do not include the estimates associated with the development and fielding of a C-130 follow-on by the Air Force or an Air Maneuver Transport by the Army during the next decade. Estimates suggest that either program, a central element in realizing the air mechanization concept, will cost at least $10 to $15 billion in research and development over a decade. After development by roughly 2015, full-scale production of the Air Maneuver Transport would not start until roughly 2020 (low-rate initial production for major aircraft programs is typically four to six years long, during which very few aircraft are produced; only after that does full-rate production start) at a fly-away cost of at least $110 million per aircraft. Compare that to roughly $180 million for the current C-17 heavy airlifter, which has much greater range, double the speed, and four times the payload of the notional Air

Maneuver Transport. The current cost estimate for the much smaller V-22 tilt rotor is around $70 million per aircraft, which indicates the potential cost of building large tilt-rotor aircraft. Furthermore, the fact that it has taken some 20 years to get the V-22 to the current point in its troubled development should also sound a cautionary note for the Army about any potential Air Maneuver Transport program.

For the Army to purchase enough Air Maneuver Transports to move just one Unit of Action would be a daunting proposition for the service. Assuming a Unit of Action will weigh roughly 10,000 tons (roughly a one-third reduction compared with a Stryker brigade), and if the Air Maneuver Transport can lift 20 tons intra-theater, a minimum of 500 such aircraft would be needed in operational units if the Army wanted the ability to lift just one of its roughly 30 Units of Action using organic lift. But 500 operational aircraft would require a purchase of 600 to 650 aircraft when the needs of the training base and spares are included.

At a production cost of at least $110 million each (and the Air Maneuver Transport could cost more, if the history of cost growth in major aircraft programs is any guide), plus R&D and new infrastructure costs (the Army has no infrastructure capable of handling a large number of C-130 class aircraft), the Air Maneuver Transport program could easily cost over $100 billion—for one brigade of organic lift for light armored vehicles. And this cost estimate does not include a very substantial investment in a variety of aerial vehicles and countermeasures that would be required to protect the Air Maneuver Transport during a deep and contested vertical envelopment operation.

Finally, the high unit cost of at least $110 million per aircraft means that the capability would be fielded very slowly. The Army simply could not afford to build many aircraft each year at those prices (the C-17 costs approximately $180 million per aircraft, and the highest annual production total is 15 aircraft). It would take literally decades to build enough Air Maneuver Transports to move just one Unit of Action.[15]

What of the possibilities that the Air Force could build a super short take off and landing (SSTOL) follow-on to the C-130 anytime soon? The odds are not good. Given the USAF's need to modernize its aerial tanker fleet, its continuing purchase of C-17s, tactical fighter modernization (including both the F-22 Raptor and the F-35 Joint Strike Fighter), and a host of other investment priorities, it seems unlikely that the Air Force will heavily invest in a C-130 follow-on any time in the next decade. The modernized C-130J will remain in production through this decade, and as long as it does, the Air Force will probably not devote resources to a follow-on theater transport based on the Army's needs.[16]

An Alternative Approach

What, then, should the Army do? To remain relevant to our nation's security, the Army needs to consciously adapt to the new strategic, technological, and budgetary realities of the early 21st century. It is likely that the Army's budget and end-strength will not increase by any significant amount during the rest of this decade. Therefore, the recommendations below are influenced by those assumptions. The alternative Army would have the following major features.

A Diversified Structure

The Army should retain a diversified force structure. The fact that the Army will have to operate across the spectrum of operations and in many different terrain types is in itself sufficient justification for this approach. The Army should plan for a future of roughly nine divisions with an approximately equal mix of light (including the airborne and air assault elements), medium (Stryker-armed), and heavy forces. Several armored cavalry regiments (brigade equivalents) could be kept as independent units. One might be designed as an experimental unit to test new joint concepts of operation, systems, and technologies that emerge from the FCS program.[17]

Most of the Army's missions in the next decade or more will likely be at the mid-to-lower end of the conflict spectrum. Those are precisely the kinds of operations where combat support and combat service support units are better suited than combat forces. Rather than continuing to dip into the reserve component for support forces for even small operations, the active Army should rebalance its force structure portfolio in order to be better prepared to conduct the missions that will dominate in the coming years. As a hedge against the unlikely possibility that major combat operations could be beyond the means of the active force, the Army should look to the National Guard to provide additional combat and combat support units.

As for how the future Army should be structured, it seems that a reexamination of the brigade, division, and corps structure is in order, but without the wholesale change associated with the Objective Force's Units of Action and Units of Employment. The Army may be able to achieve some economies by taking a hard look at the roles that are being performed by each of its echelons from battalion through corps. Various concepts have been suggested to streamline the several command echelons. Even if the Army elects to retain all of the current echelons, there may be the opportunity to reduce the functions (and the number of sub-units) of various echelons.

For example, in the early 1990s the Army examined the concept of "skip echelon" logistics support, where the battalions and divisions would retain their command function but lose most of their normal support units, fo-

cusing instead on battle management. Meanwhile, those support functions would migrate to brigade and corps levels.

The point is that there are various organizational alternatives available to the Army that could (1) result in some manpower economies, (2) reduce the total number of support units that the Army would have to deploy to a crisis, thus enhancing strategic agility, (3) be less dramatic than the UA and UE concepts currently under examination, and (4) be more conducive to the retention of a light, medium, and heavy force mix as opposed to the virtually all-medium Objective Force.

In light of the increased importance of military operations other than war, as well as the growing importance of special operations forces, it is probably necessary to free some Army end-strength to provide for a larger number of units in the active component conducive to those missions. Assuming that active component end-strength cannot be increased, the Army should be prepared to disband one of its ten divisions and convert the personnel and resources into key combat service and combat service support units, such as military police, civil affairs, medical, transportation, and engineering units. Further, some of that freed manpower could provide a modest increase in the Army's special operations forces.

On the Future Combat Systems

The Future Combat Systems should be redirected to become a program designed not to produce a family of universal fighting vehicles for the entire Army, but as a technology-enabling program to inject new capabilities into a modernizing family of light, medium, and heavy combat systems and other dimensions of combat power. For example, one of the key FCS technologies is a hybrid diesel/turbine electric drive. Hybrid propulsion promises significant improvements in operational fuel economy, yielding powerful low-speed torque with direct-wheel drive, providing a source of electric power for a wide range of sensors and next-generation armaments. Important technology enablers such as high-performance direct/indirect fire weapons and passive/active armor could be deployed in a "spiral" process. Other opportunities include the development of a family of unmanned ground and air reconnaissance and combat vehicles coupled with increasingly networked high-bandwidth communications.[18]

For the next decade, the Army could focus on applying these technologies to modernize its light and medium elements while upgrading the combat potential of the rest of the Army. Six to nine light brigades should be retained, but they need some form of light combat vehicle for protected mobility, as well as other survivability and lethality enhancements. While the Army's light forces would retain rather specialized missions (forced entry, support of strike missions

employing special operations forces, operations in restricted terrain, peace enforcement), they would be enhanced by absorbing many of the new systems that the Future Combat Systems R&D should produce. A new family of light combat vehicles in the two- to seven-ton class, using as many FCS spin-off technologies as possible, could be optimized for transportation by the C-130 and medium/heavy helicopter fleets of both the Army and Marine Corps.

The emerging medium brigades, currently transitioning to Stryker vehicles, could receive and exploit the new technologies associated with the revised FCS program. Around 2010, a new generation of Strykers with hybrid propulsion and upgraded armor could begin production. Over time, earlier-model Strykers could be used to modernize National Guard units that have a peace-enforcement or homeland defense mission. A key change would be to end the C-130 transportability requirement for medium-weight armored vehicles.

The weight limit for medium forces would be allowed to increase somewhat beyond the Stryker's 19 tons so long as at least two or three combat vehicles could be carried by a C-17 over intra-theater distances. Not to be forgotten, the re-engined C-5 may be used to move medium-weight forces over both strategic and operational distances. This might lead to medium-weight units being supplemented with a somewhat heavier family of track-laying vehicles that may be derived from the Bradley modernization program.[19]

As for the heavy forces, the M-1 tank and M-2/3 Bradley infantry and cavalry vehicles do not need urgent modernization in this decade. The roughly nine heavy brigades that would be included in the active component of the future Army would be able to benefit from some of the early FCS technology spin-offs. For example, the Bradley family might be modernized with all-electric drive, band-track technology, and FCS-derived medium-caliber weapons as a replacement for the current turret. Alternatively, it may prove cheaper to develop a brand new medium-weight chassis. The chassis of the modernized Bradley or new family could become the basis for a family of combat vehicles that either supplement the Stryker-equipped units or constitute a new-generation infantry combat vehicle and main battle tank. Alternatively, the M-1 could be modernized with a new engine and transmission. All combat vehicle families would benefit from other FCS-derived technologies, such as active protection systems and better situational awareness at the small-unit level. Main battle tank class vehicles will gain many benefits from the various hybrid propulsion concepts. Further out in the next decade, a redesign of the M-1 turret is possible with an automatic loader that will allow a new main gun/direct-fire weapon, a three-man crew, and lower weight.

As noted, although the Army would want to retain heavy elements well into the future, there would eventually be a need to rearm the heavy forces with a follow-on vehicle. This could be a heavier version of the mod-

ernized Bradley chassis in the 30- to 45-ton weight class. Given the expected useful life of the M-1 and M-2, deployment of such a vehicle could probably wait until roughly 2020 or even later. The extent to which the Army would want to invest in upgrades to the M-1 and M-2 fleet would influence the date when follow-on medium/heavy vehicles should be introduced.

On Strategic Mobility

In the future, light and some medium-weight forces could be moved transoceanic or theater distances by C-5s and C-17s, with limited help from the C-130 fleet.[20] As is the case today, the bulk of the Army would be moved by sea, taking advantage as well of prepositioned equipment sets placed in key locations around the globe. There is now a major innovation in theater-range (approximately 2,000 nautical miles) high-speed sealift. The Army and Marine Corps are testing several such vessels. One was used as a mother ship for special operations forces during Operation Iraqi Freedom. These vessels will allow Army medium forces to be prepositioned on ships that have a cruise speed of some 40 knots. With shallow drafts, these vessels will have many more off-loading options than larger, single-hulled vessels.[21]

With these prepositioning ships based in various bastions (hubs) such as Diego Garcia, Guam, and possibly Darwin, Australia, and Ascension Island, the Army, in conjunction with the Navy and Marines, could deploy brigade-sized units in a matter of days to potential combat zones. Both the Army and Marines should explore a possible joint program if an operationally robust vessel can be developed by the end of the decade. Furthermore, the Army could co-invest with the Marine Corps in a new generation of very large pre-positioning ships that would allow the Army to deploy heavy forces to reinforce light and medium forces delivered either by air or by high-speed sealift.

The reality is that today and for decades to come, if there is a major crisis requiring the deployment of multiple brigades, the overwhelming majority of the Army's equipment and supplies will deploy be sea, not air. There are simply too many constraints on airlift—such as the overall size of the airlift fleet, the reality of limited-capacity second- and third-world airports, and the inevitable intense competition for airlift among all the elements of the joint force—for the Army to assume that many of its forces will move by air. This reality highlights the fact that there is no need to constrain the entire future combat vehicle fleet to the requirement to be moved by air.

On Vertical Envelopment

The Army should maintain a vertical assault capability for forcible entry operations. However, the extremely expensive and operationally risky "air mechanization" concepts should be abandoned. The airborne and air as-

sault forces should be modernized along similar lines. First, as mentioned above, the airborne units should be provided with a new generation of light (two- to seven-ton) fighting vehicles that can be delivered by guided parafoil. These vehicles might be held at the division level and provide one or more brigades with enhanced mobility and firepower. The use of guided parafoils from higher altitudes would reduce the need for the Air Force to risk low-altitude penetrations by its transport planes. New concepts for the aerial delivery of combat vehicles with personnel using parafoils are possible.[22]

As for the 101st Airborne Division, the transformation will be more dramatic. The 101st could become a light division in a configuration similar to the modernized 82d Airborne Division. Both could be classified as airborne divisions. Both would have a Stryker Mobile Gun System battalion that could air-land to provide additional firepower when needed. Once in theater, both divisions could exploit Army aviation assets plus Navy and Air Force fighter support for aerial firepower, thus reducing the amount of organic fire support systems they would have to deploy, especially during early entry operations.[23]

Army transport aviation assets could be withdrawn from the division and kept at the corps echelon. Where appropriate, lift and attack helicopter brigades could provide either the 101st or 82d with an aerial maneuver and fires capability. Depending upon contingency plans, combat aviation brigades could reinforce division task forces that would likely be operating with a mix of light, medium, and heavy ground combat brigades.

In light of the risk of deep, low-altitude aerial combat operations, it makes sense to focus Army aviation's modernization program on upgrades to the Blackhawk, including the S-92 variant or the EH-101, a replacement for the Chinook such as a modernized Sea Stallion with a possible 20-ton payload "sky crane" variant, and an Apache modernized beyond the current Longbow variant. The former would provide combat and combat service support lift missions. The latter would provide mobile close air support to the maneuvering ground forces. Even though these aviation assets would not be used in large-scale, deep-attack missions, all would require a major investment in low-altitude, surface-to-air missile countermeasures.[24]

Finally, the rationale for procuring the Comanche has faded. Its role as a deep-penetration aerial reconnaissance vehicle can largely be accomplished by the wide range of unmanned aerial vehicles (UAVs) and unmanned combat aerial vehicles (UCAVs) already operational or under development.

The Genuine Air/Ground Revolution

Operation Iraqi Freedom highlighted most dramatically the major advances the US military has realized in the past decade in reconnaissance-strike operations and the effective provision of close air support to maneuvering

ground units. The Army's two and a half divisions on the left flank and the Marine Expeditionary Force on right flank had, by the standards of Army doctrine, far less than the normal complement of corps-level artillery support. In fact, the US expeditionary force went into Iraq light on artillery compared to Desert Storm in 1991, when considerable amounts of corps artillery were deployed.[25]

The Army should encourage the recent shift in Air Force thinking that now focuses on enemy field forces as a key strategic center of gravity. The use of ground-based and naval air power to provide battlefield air interdiction (direct air support) and close air support appears to have crossed a historical watershed in Afghanistan and Iraq. The Army should welcome the opportunity to reduce the requirements for organic cannon and rocket artillery, especially at the corps level. This is a clear opportunity for the Army to show its commitment to joint operations.

In the future Army, maneuver brigades will have a new generation of mortars to provide organic fire support. Cannon and rocket artillery will be found at the division level. Most of the current corps artillery could be moved into the reserve forces to be mobilized only during protracted major combat operations. Similar to the Marine Corps, the Army should rely much more on fixed-wing combat aviation to provide indirect fire support. A great advantage to this change is that the Army can largely eliminate the logistical burden of deploying corps-level artillery with all its associated needs for ammunition and fuel. In essence, precision indirect fires will increasingly be delivered by manned and unmanned combat air vehicles. This is a significant aspect of the transformation of the air-ground team, and it can be made much more complete and robust by the end of the decade.[26]

Even with these advances in air-ground indirect fire cooperation, it will be appropriate to exploit new precision-munitions technologies that emerge out of the revised FCS program. These could include a new family of either wheeled or track-laying vehicles for the M-777 155mm howitzer, 120mm breech-loading mortars, and various rocket launcher concepts.

On Combat Service Support

The attacks on the Army's supply lines during Operation Iraqi Freedom highlight the need for creating support units that think and train like combat units. Future ground logistics may be menaced by a number of ground threats. This suggests that the next generation of hybrid-powered logistics vehicles have more robust survivability features and personnel who are more heavily armed and better trained for self-defense.[27]

One of the attractive features of guided parafoil and parachute technology is that multi-ton payloads, including ammunition, food, and fuel, can be delivered from C-130s and C-17s operating at altitudes above the low-altitude

air defense threat. Also, there will be a very important role for medium- and heavy-lift helicopters to provide responsive, in-theater logistical support to units that are maneuvering at depth through contested terrain.[28]

The Alternative Army as Old Army?

Critics of the alternative Army we suggest are likely to say that the concept is simply pouring new wine in old bottles. There is some measure of truth to that. On the other hand, we believe the inherent complexity of ground combat requires that the Army, as the premier ground combat institution, modernize with technological and fiscal prudence. Fortunately, the Army Transformation Plan has begun a technology investment process from which the Army's senior leaders can selectively choose to support a more measured modernization.

The problem with the conceptual logic of the Objective Force, with its Future Combat Systems, is the belief that changes in the strategic threat demand a high-risk, rapid, and total transformation of the Army. Consequently, the Objective Force—or Future Force—represents enormous technical risk for the Army, given the requirement to achieve at least the same level of combat effectiveness as today's heavy forces with a future Army virtually entirely armed with 16- to 18-ton combat vehicles. At the end of the Vietnam War the eviscerated US Army emerged with a suite of combat equipment that was roughly a generation behind the main opponent, the Soviet Union. There was a need to quickly catch up. This led to the so-called "Big Five" (plus other) weapons that were intended to give the US Army a battlefield edge against a peer-level opponent. Even in those strategically grave circumstances, the Army did not seek major, high-risk "leap aheads" to regain an advantage. Today, however, the pursuit of the Objective Force is taking great risks at a time when the United States enjoys unparalleled superiority over any plausible conventional opponent.

Today's US military is, and will remain for many years, utterly dominant against conventional opponents. What the US Army needs to do is realistically assess the strategic situation, the likely future missions the Army will be called upon to perform (and the terrain in which they will be undertaken), and the changing balance in different operational contexts between US air and land forces. This assessment must be the analytical basis for future Army concepts. Consequently, fundamental adjustments to current transformation plans should be made to provide a vision that will give the Army the capabilities it will need to address the national security challenges the United States will face in the future. Only then will the Army meet the relevance concerns it believes are at the heart of its need to transform. The time to get started is now.

NOTES

As with all *Parameters* articles, the views expressed are the authors' own and do not necessarily represent those of their employer or any government agency. This article was adapted and expanded from an earlier version that appeared in *Armed Forces Journal*, October 2003.

1. Previously known as the Future Transport Rotorcraft (FTR) or Joint Transport Rotorcraft (JTR).

2. US Army Training and Doctrine Command, "The US Army Objective Force, Operational and Organizational Plan for Maneuver Unit of Action," July 2002, p. 15.

3. US Army Objective Force Task Force, "The Objective Force 2015 White Paper," final draft, 8 December 2002, p. 32.

4. Lieutenant General John Riggs, Director, Objective Force Task Force, briefing, "Transforming the Army to the Objective Force," January 2002, pp. 32-33.

5. Stephen Larrabee et al., *The Changing Global Security Environment: New Opportunities and Challenges* (Santa Monica, Calif.: RAND, June 2003), pp. 202-04. See Peter A. Wilson, "Asymmetric Threats," in *Strategic Assessment 1998 Engaging Power for Peace*, ed. Hans Binnendijk (Washington: National Defense Univ. Press, 1998), pp. 171-72, for the argument that the US investment in command, control, communications, and intelligence (C3I) systems could be militarily compromised by the deft use of nuclear weapons to cause widespread material damage but not mass human casualties.

6. See Peter A. Wilson, "Operation LAM 719—Prelude to the 1972 Spring Offensive," Appendix B in his *Defense of Hue and Quangtri City: The 1972 NVN Invasion of MR-1* (Alexandria, Va.: Center for Naval Analyses, May 1974), pp. B-1 to B-10. For comments on the 11th Aviation Regiment's disastrous Operation Iraqi Freedom experience, see Barry R. McCaffrey, "Joint Firepower Wins Wars—Apache Helicopters Are Getting a Bad Rap," *Armed Forces Journal*, October 2003, pp. 8-10.

7. Bruce Nardulli et al., *Disjointed War* (Santa Monica, Calif.: RAND, 2002), p. 94.

8. See Larry D. Welch et al., *Report of the Independent Assessment Panel for the Future Combat System* (Alexandria, Va.: Institute for Defense Analyses, 2003). Slide 6 highlights the vital importance of the "interdependence" of FCS units on external means to operate as a high-performance system of systems. Further, this assessment noted that software development of this system of systems is judged to be the greatest cost and schedule risk to the program.

9. Recent deployment exercises inside the United States demonstrate that three Stryker armored fighting vehicles can be carried by a C-17 over operational distances, approximately 1,500 nautical miles, similar to the distance between Italy and northern Iraq.

10. See Bing West and Ray L. Smith, *The March Up: Taking Baghdad with the 1st Marine Division* (New York: Bantam Books, 2003), for an account of the 1st Marine Division's offensive.

11. The need for specialized units trained for stability operations was highlighted by the widespread looting and vandalism that occurred immediately after the defeat of any organized Iraqi military resistance. By the late summer of 2003, approximately 130,000 US Army soldiers appear to be tied down in Iraq for protracted occupation duty where there remain a sustained insurgency, especially in the Sunni Arab regions of the country. See Michael R. Gordon, "Carrying the Weight," *The New York Times*, 17 September 2003, for a description of the Army's unit rotation plan for the Iraqi occupation force through 2004. A major institutional challenge will be to design an effective unit and personnel rotation policy that does not do serious long-term damage to the viability of the all-volunteer force. A similar challenge looms for the National Guard. See Seth Stern, "Iraq Effect Shakes National Guard," *Christian Science Monitor*, 18 September 2003.

12. Congressional Research Service, *Iraq War: Defense Program Implications for Congress* (Washington: Congressional Research Service, June 2003), pp. 18-21.

13. The Army has gone down this road before of restricting the size and weight of its armored fighting vehicles in the name of tactical and operational mobility requirements. See David E. Johnson, *Fast Tanks and Heavy Bombers: Innovation in the U.S. Army, 1917-1945* (Ithaca, N.Y.: Cornell Univ. Press, 1998), for a description of the effects of tactical bridging and strategic deployment requirements on the design of late-1930s US Army armored fighting vehicles. The result was the M-4 Sherman battle tank which by 1943 was clearly outclassed by German medium and heavy tanks, the Panther and Tiger families of main battle tanks.

14. "Amid Technology Questions, Mounting Bills, Some FCS Pieces Delayed," *Inside the Army*, 31 March 2003.

15. At this time any cost estimate for the Air Maneuver Transport has to be tentative, since there is no formal program. The authors discussed possible costs with members of the Army Science Board (ASB) as well as senior engineers from a variety of aerospace firms. The $110 million unit cost derived from the ASB study of future Army vertical envelopment options could be much larger. Some estimates by non-ASB sources suggest that the Air Maneuver Transport may cost more than $200 million per aircraft. For additional insight on the AMT's potential development challenge, see Jon Grossman et al., *Vertical Envelopment and the Future Transport Rotorcraft—Operational Considerations for the Objective Force* (Santa Monica, Calif.: RAND, MR-1713-A, 2003).

16. For a description of the USAF's troubled B-767 lease program, see William Matthews, "Tanker Lease Program: Air Force 'Done Deal' Gets Undone," *Armed Forces Journal*, October 2003, pp. 12-14.

17. It is noteworthy that the British army has decided to develop a medium-weight force to complement its light and heavy forces. See Giles Ebbutt, "UK Goes in Search of Heavy Effect with Medium Weight," *International Defense Review*, September 2003, pp. 45-51.

18. See Mark Hewish, "Technology Transformation for Armored Warfare," *International Defense Review*, April 2003, pp. 33-47, for a summary of the new technologies associated with the unmanned and manned fighting vehicles that are a part of the FCS.

19. Relaxing the weight constraint of the FCS family of armored fighting vehicles would allow the development of a medium-weight fighting vehicle that could handle the off-axis recoil of a 120mm cannon vice the less-capable 105mm cannon found on the mobile gun system. See Welch et al. Slides 60 and 62 highlight the technological risk of putting a 120mm cannon on a 16-ton armored fighting vehicle compared to one weighing 20 tons or more. The British army has come to a similar conclusion, accepting that its direct-fire version of its Future Rapid Effects System of medium-weight vehicles may need to weigh up to 25 tons, and will rely only on its future fleet of A400M and C-17 airlifters and not its C-130 fleet. See Rupert Pengelley, "Future Rapid Effects System Leads to British Forces' Transformation," *International Defense Review*, September 2003, pp. 52-57. Further, this article describes a new "electric armor" concept that should provide medium-weight vehicles—including Stryker—a high level of protection against rocket-propelled grenades, a major threat to all light- and medium-weight fighting vehicles.

20. A strong case can be made to preposition a number of the Stryker medium-weight brigades in positions along the Eurasian periphery. From these logistical hubs, a portion of the C-17 fleet could be used to move a brigade-sized force intra-theater rather than transoceanic distances.

21. See Alan Vick et al., *The Stryker Brigade Combat Team, Rethinking Strategic Responsiveness and Assessing Deployment Options* (Santa Monica, Calif.: RAND, 2002) for the argument that the Army should give much greater emphasis to prepositioning, sea-basing, and high-speed sealift options instead of a continued commitment to the proposition that multi-brigade Army units should rely on airlift for transoceanic deployment. For a description of the new generation of fast sealift options, see Richard Scott, "Advanced Hullforms Break the Conventional Mould," *Jane's Navy International*, April 2003, pp. 10-17.

22. For an overview of precision-guided parafoil technology, see Edward Doucette, "US Army Precision, Extended Glide Airdrop System (PEGASYS) Program," summer 2003 briefing presented to QuarterMaster School, PM Sustainment System, Natick Soldier Center, Natick, Mass. Over the last few years, NASA has successfully test-flown guided parafoils some 25 times with payloads ranging from nine to 12 tons as part of a now-canceled X-38 International Space Station lifeboat with a guided, soft-landing capability. Ted Strong Inc. has repeatedly used a combination of drogue chute and piloted parafoils to launch manned all-terrain vehicles (ATVs) from cargo aircraft flying at 20,000 feet, landing within a circular error probable (CEP) of a few tens of meters.

23. As specialized forcible entry units, the two new-model airborne divisions might have only mortars with advanced munitions and no artillery as part of the table of organization and equipment (TO&E) to reduce their assault and sustainment airlift requirements. Taking advantage of shorter operational lift distances as a prepositioned Stryker brigade, one or more airborne brigades might be moved to a distant theater of operations during the buildup phase of a crisis to be in position to conduct a forcible-entry air assault.

24. Helicopters were used extensively by both the Army and Marines during Operation Iraqi Freedom to provide ground maneuver units with urgent resupply and casualty evacuation. None were shot down by Iraqi stay-behind forces that were not equipped with man-portable air defense systems. Future operations involving rapid ground maneuver over a considerable geographic distance against a better-organized and better-equipped opponent may not be so fortunate.

25. No corps-level field artillery brigades were deployed with the Operation Iraqi Freedom divisions. This is in stark contrast with the large number of active and reserve field artillery brigades deployed during Operation Desert Storm. For Army deployments at the beginning of Operation Iraqi Freedom, see Jonathan Tarter, "United States Army Deployments to the Persian Gulf (Part V)," USNI Periscope Special Reports, http://www.periscope.ucg.com/special-2003031717.shtml. As an example of the extensive use of corps-level artillery support used during the opening phase of Operation Desert Storm, see Robert H. Scales, *Certain Victory: The U.S. Army in the Gulf War* (Washington: Brassey's, 1994), p. 227.

26. For a description of the powerful and beneficial effects that air support had on the Marine offensive in Operation Iraqi Freedom, see West and Smith, pp. 183-85.

27. The armored cab designed for the HIMAR multiple rocket launcher is one early upgrade option for the large fleet of medium logistics vehicles. One attractive feature for hybrid-powered vehicles without a complex and vulnerable multi-axle/transmission system is that the hull can be designed to be more resistant to mine damage, a significant threat in most stability or counterinsurgency operations.

28. During Operation Iraqi Freedom the 1st Marine Division used C-130 transports to provide maneuver elements with fuel support from field-expedient airstrips to allow the division to conduct offensive operations in a lightened logistics configuration or "LOG LITE." See West and Smith, pp. 78-79.