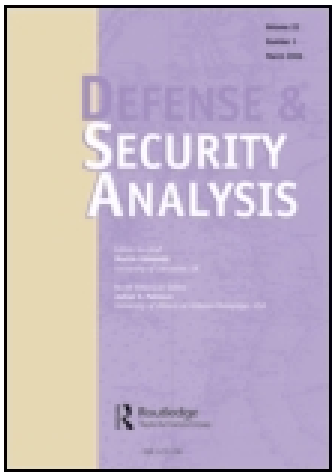

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US Army Transformation: Where is the Future?

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INTRODUCTION

The US Army planned and prepared for decades for high intensity combat with the Warsaw Pact, and established strong, heavy forces with outstanding firepower, armor protection, and tactical mobility. In the post-Cold War era, however, threats are no longer as clearly defined. Though well equipped and trained, the US Army now often finds itself unsuitable for, and somehow irrelevant to, post-Cold War conflicts because its backbone, heavy armored forces, cannot get to the right spot, in numbers, on time.

The best-known example is the first Gulf War. When Iraqi troops invaded Kuwait in August 1990, it took an additional six weeks after the US vanguard units had arrived to deploy enough heavy forces to the theater.[1] What the US Army now needs is strategic mobility. A decade later, in Kosovo, the US Army again found itself incapable of deploying rapidly to the theater. From this background, the US Army has struggled for its identity in this new environment. In October 1999, immediately after the Kosovo campaign, the US Army announced a huge, long-term plan known as "Army Transformation", which would utilize new information technology to fully transform the US Army into a light, agile, deployable, lethal, survivable force that would fit into the post-Cold War world and future conflicts.[2] Can the Transformation be successful, and, if not, how might it be redirected? These are the main questions addressed by this article.

This case study demonstrates the crucial relationships between political resolve, tactical doctrine and force development. It argues that the US Army Transformation is headed in the wrong direction. If the US Army continues on this path, it will fail. Thus, this article offers two prescriptions to redirect the course of the US Army Transformation. After the introduction, the second section gives a brief overview of the Army

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Transformation; the third and fourth sections concern two major sets of problems of the Transformation: weight and information technology. Given these problems, the final section provides two prescriptions: first, along with loosening the physical constraints on future fighting vehicles, the best solution is to reject the notion of rapid deployment in a reactive expedition and, second, to station forces pre-emptively in those regions crucial to the US.

A BRIEFING ON THE US ARMY TRANSFORMATION

The father of the US Army Transformation is former Army Chief of Staff, General Eric K. Shinseki. Subsequently, the Secretary of Defense, Donald H. Rumsfeld, endorsed Shinseki's Transformation promise.[3] On 12 October 1999, when General Shinseki was Army Chief of Staff, he announced, during a major speech:

> To adjust the condition of the Army to better meet the requirements of the next century, we articulate this vision: "Soldiers on point for the Nation transforming this, the most respected Army in the world, into a strategically responsive force that is dominant across the full spectrum of operations." With that overarching goal to frame us, the Army will undergo a major transformation . . .[4]

This was the origin of the US Army Transformation. In the same speech, General Shinseki also announced what the US Army should accomplish:

> We will enable our divisions to dominate across the full spectrum of operations by providing them the agility and the versatility to transition rapidly from one point on that spectrum to another with least loss of momentum. To do so we must develop a vibrant capability for reach back communications and intelligence so that we can begin to aggressively reduce the size of our deployed support footprints – both combat support and combat service support . . . It is our intent that units deploy essentially with their fighters and their critical support needs . . . We will look for future systems which can be strategically deployed by C-17, but also be able to fit a C-130-like profile for tactical intra-theater lift.[5]

These statements reveal the basic idea behind Transformation. In order to cope with the uncertain threats around the world, the US Army needed strategic mobility, defined as transport by airlift. The force would move from theater to theater using large strategic transporters, and transship to smaller tactical transporters to move within the theater. As a result, all future systems should fit into the C-130 Hercules transport aircraft,[6] the mainstay of the US Air Force tactical transporter fleet. Reducing the weight and size of equipment is not difficult. The US Army already has two airborne light divisions, but "light" is almost equal to "weak" in the Army's terminology. The real challenge is to reduce the weight and size of equipment without any loss of lethality or survivability.

The key to this goal is information technology. The US Army will employ superior information technology to take the battle initiative, attack the enemy's entire force

formation over the whole depth of a battle space using stand-off weapons, and engage the enemy before they can reach American positions.[7] The US Army is scheduled to have the first "transformed" brigade around 2010 and complete the Transformation of the entire US Army by 2030.[8] The transformed Army will also break down divisions into smaller, modularized brigades.[9] The current ten divisions will be divided into between 43 and 48 brigades.[10]

The US Army is developing two major new weapon systems to fulfill this Transformation aspiration. The first system, an interim solution, resulted in the development and procurement of the Stryker series of fighting vehicles.[11] These are already under way. The US Army selected the Stryker light armored vehicle to form an interim brigade in 2002, renamed the "Stryker Brigade". The second system, known as "Future Combat Systems" (FCS),[12] is the key to the Army's Transformation and the future US Army. This huge FCS development package essentially comprises many different manned and unmanned, ground and air systems that are linked by an advanced information network into a larger system.[13] In the near- and mid-term, some of the US current heavy forces will be updated and remain in service for a considerable number of years.[14] In the long term (after 2030), FCS will replace all the current heavy forces.

The centerpiece of FCS is the network system comprising: the "Warfighter Information Network Tactical" (WIN-T) for larger equipment; and the "Soldier-Level Integrated Communications Environment" (SLICE) for soldiers using smaller equipment and smart munitions.[15] FCS will develop three categories of other equipment: the Manned Ground Vehicle (MGV); the Unmanned Ground Vehicle (UGV); and the Unmanned Air Vehicle (UAV).[16] The MGV, similar to the Stryker family, is a series of different vehicles designed to conduct different missions but with a common design and sharing many parts. There will be eight MGV variants.[17] UGVs are three different kinds of robots.[18] The UAVs include five categories of unmanned small airplanes.[19] According to the latest plan,[20] the first full FCS-equipped brigade will be established in 2014 and capable of combat operations in 2016.[21]

WEIGHT THAT MATTERS

This section considers the first problem, that of weight. There are two dimensions to the weight problem: individually, the future vehicle is too heavy to fit in the C-130 Hercules; and collectively, the entire transformed unit is too heavy to move by airlift.

The weight bottleneck

The US Army imposed a physical weight limit on its newly-developed vehicles. They would be limited to the capacity of a C-130 and the vehicle should be able to roll off the aircraft, ready to fight.[22] The Stryker should weigh less than 38,000 lbs, and the FCS manned vehicles, which are far more advanced and capable than Stryker, should still not exceed 40,000 lbs.[23] Both Stryker and FCS have experienced trouble with this weight requirement.

The first step of Transformation, the first Stryker Brigade, is now on duty in Iraq. Although the Strykers are effective on the ground,[24] they are nevertheless overweight.

The US Army needs to remove some crew members and certain items to make the Stryker Hercules-transportable.[25] Currently, a Hercules carrying a Stryker cannot fly very far, maybe as little as 60 miles in some conditions.[26] Another problem is protection. The Stryker can withstand heavy machine-gun bullets, but if the insurgents have rocket-propelled grenades (RPGs) it is vulnerable. Against RPG attacks the US Army has had to give the Stryker additional armor.[27] This armor is both heavy (8,000 lbs) and bulky, making the Stryker, with its add-on armor, too wide to get on the Hercules. The armor has to be removed before loading, transported separately, and then reassembled after unloading. A complicated and time-consuming process. The Stryker is therefore not ready to fight on arrival and the US Army has had no choice but to give up the initial Hercules-transportable requirement.

Whilst the Stryker fails to meet the weight requirements, the FCS has even more serious weight problems. The Stryker is only an interim, off-the-shelf solution, but the FCS is the bedrock of a transformed future US Army. The FCS must be at least as capable as current heavy forces. Some systems in the FCS under development have experienced extreme difficulty fitting into the Hercules. For example, a combat-ready "Mounted Combat System" (tank) might be as heavy as 48,510 lbs to satisfy the required fighting power. If the armor, ammunition, fuel and crew are removed to enable the tank to fit into a Hercules, four to six hours are needed for reinstallation.[28] Although the US Army previously insisted that being Hercules transportable is "non negotiable",[29] it finally relented in late 2005. Now being Hercules-transportable is no longer required; instead, the FCS should moved by C-17s, and each C-17 should carry three vehicles.[30]

Airlift capacity

Collectively, the weight problem is even worse. A Stryker brigade has about 350 Strykers,[31] around 700 other vehicles, and 3,614 troops. Together they weigh around 13,000 tons.[32] An FCS-equipped brigade is similar, with approximately 971 vehicles and 2,847 personnel; it should weigh about 11,700 tons.[33] Even if the US Army can achieve its weight limitations and retain its lethality and survivability with ultra-advanced technology, which is unlikely, a transformed brigade is still too heavy for rapid airlift.

Originally, the US Army wanted to move its troops inside a theater using Hercules aircraft, but only a limited number of Hercules are available. Furthermore, Hercules fleets are located in different theaters. Any given theater may only have about 100 Hercules' and routine missions are already a heavy workload for the aging fleet.[34] More importantly, there is a serious contradiction between the concepts of intra-theater airlift and rapid reaction. The basic reason driving the Transformation is the new post-Cold War environment, where the potential threat is thought to be "unclear". How, then, can any transporter fleet be positioned to move the troops in a theater that is still unclear? If the transporter fleet is pre-deployed and waiting for the troops, why cannot the troops also be pre-deployed?

The shortage in the strategic airlift fleet is even more fundamental. Taking all related factors into consideration, the RAND Corporation conducted an airlift study and concluded that a 9,000 kms mission, such as the deployment of a Stryker brigade from

Fort Lewis in the US to Skopje in the Balkans, needed 46 hours to fly one mission and a total of 270 C-17 sorties was required. Deploying a Stryker brigade in this scenario would take seven to eight days and need 38 percent of the strategic airlift fleet in 2005 or a projected 33 percent by 2009. If a Stryker brigade were to arrive within four days – the US Army's goal[35] – it would need either 105 percent of the current strategic airlift fleet or 80 percent of a future strategic airlift fleet when the current purchase plan is completed in 2008.[36]

At the same time, airports would also have to work at an unusually high efficiency level. As the RAND study suggested, it is "unrealistic, given the total deployment demands of a joint force."[37] The US Air Force might increase numbers in the airlift fleet but it could hardly fill the existing airlift gap.[38] Increasing the airlift fleet significantly is necessary but unlikely because of budget constraints.[39] In the foreseeable future, the US Air Force will almost certainly allocate most of its resources to its main tasks such as air-to-air combat or air-to-ground attack.[40] The inescapable conclusion is that a transformed brigade will still be too heavy.

Most damagingly, the basic concept of Transformation, that of a rapid reactive expedition, is not only infeasible but also meaningless. The first Gulf War is an excellent example. When Saddam Hussein ordered the Iraqi Army to invade Kuwait, it occupied the country almost immediately. Kuwait is about 10,000 kms away from the US; it would take more than 23 hours for the first sorties of transports to arrive. In other words, before the first US soldier could touch Kuwait's soil, Kuwait would already have been occupied. Even if the Iraqi Army took four days to occupy Kuwait, and the US could deploy a brigade in four days, a brigade of troops would likely have been over-run by an Iraqi armored force equipped with more than 4,000 tanks.

INTELLIGENCE OR MUSCLE?

Another problem concerns information technology, the major means the US Army uses to reduce weight while retaining the combat power. Traditionally, troop survivability relied on armor, but armor is heavy and inevitably becomes the nightmare of rapid deployment. As a result the US Army is now using a more comprehensive notion of survivability, one that includes other qualities,[41] especially information technology. Networks allow better interoperability between separated systems. Each smaller and lighter system is less capable, but collectively they can be as capable as heavier systems. The essence of information advantage lies in the notion of "Network-Centric Warfare".[42] Various, multiple, dedicated sensors with different functions characterize Network-Centric Warfare.[43] Each sensor only surveys part of the battlefield and the enemy activities and provides incomplete information, but when this is then merged into a single "common battlespace knowledge" through the network, it collectively yields the information advantage for the entire force.[44]

Information advantage would enable the FCS to seize the initiative, engage the enemy first, avoid potential dangers, and minimize the need for close combat.[45] In spite of its light armor, the entire FCS is thought to be as survivable as the current heavy tank because of the network. Although Network-Centric Warfare is an attractive idea, the Army's Transformation depends too heavily on the information network due

to the extreme weight constraint set on the vehicles. Specifically, the overall survivability of a traditional tank, such as the current M-1 Abrams, is provided mostly (60 percent) by armor, and only five percent by network. By contrast, the overall survivability of FCS is provided only five percent by armor, and mostly (50 percent) by network.[46] Thus, the availability and the application of the Network-Centric Warfare becomes a problem.[47]

A pig in a poke?

Because of its heavy dependence on the network, the US Army requires high levels of information advantage: "90 percent of all tanks, armored fighting vehicles, and artillery positions known and updated every 10–30 minutes"; "70 percent of enemy infantry positions known and updated every 5–10 minutes"; "90 percent of blue force infantry positions known and 95 percent of noncombatants identified"; and "potential combatants also identified."[48] These specifications are very demanding. Although information technology has made considerable progress in commercial products, military applications are a different story. Furthermore, any future network system must pass extensive trials to prove its robustness and reliability under potential jamming and disruption from the enemy,[49] making its development even more challenging. The US Army awarded the contracts for FCS network systems in 2004 as a part of its overall next-generation communication and radio equipment.[50] Developments are currently behind schedule and the Army has been forced to reconsider the contracts.[51]

This article acknowledges that the FCS network systems will eventually be completed, but the critical question here is whether or not they will be ready on time. As mentioned above, because of its heavy dependence on the network, the first combat-capable FCS brigade would only be ready around 2016, a quarter of a century after the end of the Cold War. The Transformation will finally be complete around 2030, a quarter century from today. If one could hardly foresee the world of 2000 in 1975, how can we imagine the world 25 years from now? Even if the post-Cold War environment will not change for another 25 years, the Transformation is still too slow to satisfy the current missions. The US Army will have to accept an unsuitable configuration for a long period. Then, the world changed again after the terrorist attacks of 11 September 2001; the post-Cold War era is already history, and we are now in the post-9/11 era.

A fish out of water?

Because of its heavy dependence on the network, the Transformed US Army must also work under all circumstances. There are at least two situations in which the utility and application of Network-Centric Warfare are in question: asymmetric warfare and close combat. Like other high technology systems, Network-Centric Warfare is most suitable in a simple environment,[52] i.e., symmetric conflicts such as armored mechanized warfare in open field. Large numbers of tanks and vehicles emit plentiful electronic, thermal, and acoustic signals, and flat ground provides only very limited cover, all making the targets easier to find and track. In asymmetric conflicts, like guerrilla warfare in forest or urban areas, the targets are soldiers or even hostile civilians, and picking up and identifying the true enemy is very hard. If the sensor grid fails to detect

the enemy, the whole concept of surviving by avoiding danger breaks down.[53] To make things worse, in some asymmetric situations such as police missions, the forces must be visible to constitute a persistent presence. They simply cannot avoid being seen, since being seen is an essential feature of their mission.[54] The only way to protect troops in these situations remains armor.[55] Though asymmetric warfare is an increasing challenge for the US Army,[56] ironically, network-centric FCS is best suited for conventional symmetric warfare.[57]

Furthermore, even if the enemy is a symmetric mechanized force, the utility of Network-Centric Warfare is greatly reduced in close combat. Network-Centric Warfare depends on the information advantage to attack first; close combat negates this because an enemy at close quarters can return fire immediately. Close combat will be common for the future US Army, because a potential enemy would not dare to expose itself and try to force the US Army to engage in close combat. As shown in the Kosovo campaign, the enemy could remain on the defensive, move their troops only occasionally, and keep those forces dispersed to avoid detection.[58] This would force the US Army to search for them and in so doing, get to close quarters.

Theoretically, faced with close combat in offensive operations, the US Army could wait for reinforcing heavy forces because the FCS is usually a vanguard to secure footholds in such places as airports or ports.[59] This argument, however, is only partially accurate. Even in these ideal missions, intense close combat would still be unavoidable. Defending a foothold means that initial FCS units would have to operate in a relatively confined location. This seriously constrains its freedom of maneuver. In these situations, if the enemy also has quantitative advantages, FCS may find itself unable to evade unless it retreats from the foothold.

PRESCRIPTIONS

The US Army faces a difficult dilemma given these weight and information technology problems. It is trying to transform and demonstrate its usefulness, and prevent itself from being marginalized in the US armed services. However, if the US Army proceeds with its Transformation plan, it could fail and waste billions of dollars.[60] How can the US Army resolve its Transformation dilemma? Assuming the above analysis of its problems is correct, two prescriptions are offered. The first is technological and tactical: relax the weight constraint. The second is strategic and fundamental: the US Army should give up the notion of rapid deployment in reactive expedition operations. Rather, heavy forces should be pre-emptively stationed in crucial regions.

The tactical prescription: heavy individually, light collectively

The first prescription is to relax the weight constraint. Rapid airlift may be necessary, but how the Transformation currently addresses this requirement is wrong. The US Army wants to lighten individual vehicles and, consequently, lighten the entire force, however, these two considerations are totally different. Lightening the individual vehicle does not mean lightening the entire force; on the contrary, it may make the entire force heavier. A well-known example can be taken from World War II when the US Army needed five medium tanks to match one German heavy tank. One heavy tank

weighed only 56 tons, but five 30-ton medium tanks weigh 150 tons,[61] not to mention the heavier logistic burden to support them.

This is also true for the Transformed force. Tight weight constraints on individual vehicles undermine the combat power of FCS so the US Army has to use quantity to compensate. This results in a heavier weight for the entire force and needs more logistic support, making the force strategically less mobile. The essence of FCS is information technology; less capable light systems linked up by the network are more capable than unlinked heavier systems, but there is no reason why the newly developed FCS network system cannot link up with heavier systems. Other things being equal, the heavier each vehicle is, the more combat power it has. If the network system can be installed on 40,000 lb vehicles, it should not be difficult to install it on larger, heavier vehicles. Network systems can further strengthen the combat power of heavy vehicles and so fewer are needed to generate the same combat effectiveness. Heavy vehicle-equipped forces in fact would have a lighter total weight and be more strategically mobile.

With regard to tactical issues, heavy vehicles can only be airlifted by either the C-17 or C-5 aircraft, but the US Army may need to transport vehicles to landing strips where the larger aircraft can only operate with difficulty. Though this is true for C-5, C-17 is just designed to be capable of landing on unimproved runways and has proved itself in Afghanistan and Iraq.[62] Even if there are airfields in which only the Hercules can land, the aircraft could still carry engineers to construct a better runway for the C-17. The air-drop system can also enable the C-17 or C-5 to deliver equipment without landing. In addition, the average age of a US Hercules fleet is about 32 years,[63] and new aircraft will soon be needed. Newer and larger aircraft like the C-17 are to be preferred to the smaller, 40-plus-year-old-designed Hercules.[64] In sum, it makes no sense that the Hercules must move everything in the Transformed Army.

Another consideration is terrain. The heavier the vehicle, the more difficulty it will encounter operating in mountains, swamps and forests. This is definitely true but does not obviate the need for the heavier vehicle. There is no reason to give up the next generation heavy vehicle just to operate in areas where they are limited by terrain. The US Army needs both heavy and light combat vehicles to operate in different environments; in the past it had both simultaneously. The next generation of vehicles need not reject either one or the other option.

Heavier vehicles can still share many technologies and parts with lighter vehicles. Dividing the manned combat vehicles in the FCS into heavy and light categories is feasible. A similar British project, the "Future Rapid Effect System" (FRES), included both heavy and light categories.[65] Relaxing weight constraints and creating a heavy variant category will reduce the technological challenge,[66] enable the FCS to enter service earlier, and better deal with asymmetric warfare and close combat. From this point of view, the US Army's decision in late 2005 to abandon the Hercules as a parameter is not discouraging; rather, it is a welcome development. The US Army now wants three vehicles in one C-17, but this does not relax the weight constraint enough. Since the C-17 can accommodate up to 76 tons of payload, its cargo limit could be the new ceiling of the heavy variant. This idea begins to meet both the tactical and the technological challenges imposed by the weight issue.

The strategic prescription: why not pre-emptive stationing?

The second solution is pre-emptive stationing. Pre-emptive stationing of forces does not imply or require pre-emptive use. Rather, it is the equivalent of US military deployments to Europe during the Cold War. Rapid reactive expeditions are neither feasible nor necessary. The basic assumption of the US Army's Transformation, that a world without the Soviet Union requires rapid reaction, is a myth. The concept of a rapid reactive expedition is a product of the early 1990s, when the sudden end of the Cold War perplexed the US and prompted a strategic reassessment. What was never clarified in the post-Cold War era was not the threat, but US interests. There may be threats everywhere, but they do not necessarily threaten US national interests. If the US clarifies its vital national interest for the Army, there will be less trouble correcting the course of the US Army's Transformation.

Where and what are US vital national interests? The major interests are in those "wealth-generating areas" and the places that "possess critically important raw materials." These places are the source of national power and have a huge impact on the balance of power. Fortunately, such places are rare. John J. Mearsheimer, for instance, lists only three areas: Western Europe, Northeast Asia and the Persian Gulf.[67] We might add one other, the Caspian Region, which also has oil. Since the regions critical to US interests are few in number, pre-emptive stationing in these places is that much easier. To make things easier still, there are even fewer areas where major US interests are threatened by tangible rivals with large armies.

With the end of the Cold War, Western Europe and Northeast Asia are no longer threatened by the Soviet Union. China may be a potential threat, but the US has retained its bases in South Korea and Japan. Furthermore, China is also separated from other East Asian states by mountains and seas. At home the US does not need ground forces to prevent invasion. The major enemies of the US, the so-called "Axis of Evil" or "Rogue States", are also rare, and are located in the Middle East (Iran) and Northeast Asia (North Korea). The US Army can transfer its forces from Europe to either the Persian Gulf or the Caspian Region. In other words, although the Cold War is over, the basic logic of military preparation remains the same; what should change is only the location of any pre-emptive stationing.

The US will have secondary national interests such as natural disaster relief, peacekeeping, aid, or genocide prevention. These are usually not as crucial or urgent and require no instant intervention.

Disaster relief may require an instant response, but this also has minimum force requirements and can easily be accomplished with current light forces and existing airlift capacity. The other issues are subject to open debate, first letting the public and the government fully discuss the issue and then deciding whether or not the US should intervene and to what extent.[68] The first units may be deployed by airlift, but a feasible, much slower tempo, should be sufficient. Since these missions may persist for some time, follow-on heavier units can simply be transported by sea.

The US may have difficulty forming a consensus on what constitutes "major" or "secondary" interests, thus inhibiting pre-emptive stationing. However, a lack of consensus equally handicaps rapid reaction. If the US fails to reach a consensus, a rapid

reactive expedition will be impossible to initiate, or a response will be meaningless because it is already too late. In other words, it is not the lack of strategic mobility but the lack of decision clarity or of political will that are the major reasons for either a delay or for no response, as in 1993 over Rwanda.[69] The only decision that was made immediately regarding major US interests was in respect of Iraq's invasion of Kuwait. Pre-emptively stationed forces are still the only way to protect these interests. Such a stationing decision would allow the US Army to manage its force structure much more economically and realistically.

Pre-emptive positioning creates diplomatic and political issues for the host state and these issues can only be addressed by political resolve. As mentioned above, the world's security environment changed after 11 September 2001 and US perceptions also changed. Why should not the US Army's Transformation adapt accordingly? Since that terrorist attack, the US realized the advantages and opportunities provided by pre-emption,[70] and began to exercise its will more assertively. Pre-emptive stationing is active; it has the advantage of taking the initiative and, to a large degree, eliminates the problems associated with reactive expeditions. Pre-emption became the doctrine[71] of President George W. Bush;[72] the logic behind this concept was expressed in his first 2004 presidential debate: "[W]e saw a threat and we realized that after September the eleventh, we must take threats seriously before they fully materialize." He continued: "We have to be right 100 percent of the time, and the enemy only has to be right once – to hurt us." Not surprisingly, his opinion was: "[T]he best way to protect this homeland is to stay on the offense."[73]

While the US was heavily divided during the 2004 presidential campaign and has engaged in intensive debates on how to behave in the post-11 September world,[74] this has not been the case where pre-emption is concerned. As John Kerry put it during the first 2004 presidential debate: "No President, through all of American history, has ever ceded – and nor would I – the right to pre-empt in any way necessary to protect the United States of America. But if and when you do it . . . you've got to do in a way that passes the test, that passes the global test, where your countrymen, your people understand fully why you're doing what you're doing and you can prove to the world that you did it for legitimate reasons."[75] In other words, the debate is not on the concept of pre-emption *per se*, but on a pre-emptive "strike". This is different from pre-emptive "stationing". Today the US has secured footholds in the Middle East and Caspian regions: Kuwait, Iraq, and Afghanistan, plus base rights in several Central Asian countries.[76] The US Army can be pre-positioned there to protect major US interests.

The on-going global war on terror may be an exception to this rule because the locations of terrorist groups are uncertain. They can be anywhere in the world, especially in remote areas, but this argument does not change the logic. Terrorist groups are small entities involving only a few armed people and do not concentrate into a large presence. Terrorist groups do not resist or defend positions but usually melt away when under attack. The question is how to spot them, rather than how to strike them. Furthermore, the US Army units needed to strike terrorist groups are usually small special operations forces or, at most, a brigade sized light infantry. Airlift of these troops is no problem.[77] Terrorist groups hiding in "failed states" cannot be destroyed by temporal strikes but only pursued from place to place.[78] What are needed to eliminate terrorist

sanctuaries are sufficient troops to invade and the whole capability around the mission of "nation building". Firm political resolution with a long-term effort is the key to this success in which case rapid reactive expeditions are irrelevant and unnecessary.

CONCLUSION

This article argues that the US Army Transformation is heading in the wrong direction. If the US Army continues along this Transformation path, it will fail. There are two fundamental problems. First is weight. Limiting future vehicles by the capacity of a C-130 Hercules transport aircraft is technically impossible and limiting size to three vehicles on a C-17 is still too restrictive. Even if the US Army achieves the weight limitation and retains its lethality and survivability with ultra advanced technology, the transformed forces are still too heavy for rapid airlift. The second problem is information technology, the key to the Transformation. Transformation depends too heavily on information technology, which may not be ready as scheduled, and, as scheduled at present, is also slow to meet the current missions. Furthermore, it is nearly impossible to rely on information technology in close combat and asymmetric warfare.

This article offers two prescriptions: first, reduce the overall weight collectively not individually. Relax the weight constrains on some of the combat vehicles and use the C-17's cargo capability as the new weight ceiling. Second, reject the notion of rapid deployment in a reactive expedition; instead, station pre-emptively in those regions crucial to US national interests as was done during the Cold War. Rapid reactive expeditions regarding major US national interests are not feasible and are unnecessary.

What is unclear in the post-Cold War era is not the threat but an unrealized national interest. Major US interests, however, are clear; they all lie in those regions where there is huge wealth and strategically critical raw materials. In the foreseeable future, only two regions are of real major importance to the US that are threatened by evident rivals: the Persian Gulf and the Caspian Region. In other words, the uncertainty of conflicts lies in their timing, not their location. The only feasible way to protect US interests in these crucial regions is to station appropriate forces pre-emptively. The US will also have secondary interests in other places, but they are not as crucial or urgent and do not require instant intervention. 11 September provided an incentive for the US to actively define its interests. As it is still a decade before the first combat capable FCS brigade is ready to enter service (around 2016), it is highly possible that the Army's Transformation can be re-directed.

NOTES

1. Kim Burger, "The End of the Road?", *Jane's Defence Weekly*, 12 September 2001, pp. 66–81.
2. Ezio Bonsignore, "The 2001 US Army Modernisation Plan", *Military Technology*, Vol. 25 No. 10, 2001, pp. 10–25.
3. See: Donald H. Rumsfeld, "Transforming the Military", *Foreign Affairs*, Vol. 81 No. 3, 2002, pp. 20–32.
4. The full text of the address is available at http://www.amc.army.mil/logcap/docs/csavision-statement.pdf.
5. *Ibid.*

6. The maximum payload of a C-130 is between 44,000–45,000 lbs. However, the weight capacity of transports varies depending upon the range: the longer the range the less the weight. Taking mission flexibility into consideration, the proper payload of a C-130 should between 29,000–32,000 lbs. See Roxana Tiron, "Brigades Not Likely to Deploy in 96 Hours", *National Defense*, Vol. 86 No. 583, 2002, p. 42; Andrew F. Krepinevich Jr., "The Army and Land Warfare: Transforming the Legions", *Joint Force Quarterly*, Vol. 32, 2002, p. 77. All the transport aircraft can be refueled in-flight, extending their range. Range is also complicated by many other factors like wind, runway condition, weather, etc. This complicates the statistical analysis, but does not change the logic of the following arguments. Tanker numbers are also limited and require pre-positioning. Hence, this article simply uses the weight requirements listed by the US Army.
7. Ian Roxborough, "From Revolution to Transformation: The State of the Field", *Joint Force Quarterly*, Vol. 32, pp. 68–75.
8. The Army Transformation's scheme is available at https://www.ausa.org/PDFdocs/Hooah_Guide_web.pdf.
9. The original name of these brigades is "Unit of Action" (UAs), but the US Army dropped the "UA" usage in September 2005. See Joshua Kucera, "US Army Division Regrouped into Four Brigades", *Jane's Defence Weekly*, 9 June 2004, p. 10; Joshua Kucera, "US Army Details New Combat Structure", *Jane's Defence Weekly*, 15 December 2004, p. 7; Scott R Gourly, "US Army Reaches for Further FCS Milestones", *Jane's International Defence Review*, Vol. 39 No. 1, 2006, p. 11.
10. United States Army 2004 Transformation Roadmap: 3-1~3-5, available at http://www.oft.osd.mil/library/library_files/document_386_ATR_2004_Final.pdf.
11. Stryker family has ten variants: Infantry Carrier Vehicle (ICV), Mobile Gun System (MGS), Anti-tank Guided Missile Launcher Vehicle, Commander's Vehicle, Medical Evacuation Vehicle (MEV), Mortar Carrier (MC), Engineer Squad Vehicle (ESV), Fire Support Vehicle (FSV), Reconnaissance Vehicle (RV), and Nuclear-Biological-Chemical Reconnaissance Vehicle (NBC RV).
12. Charles A. Cartwright and Dennis A. Muilenburg, "Future Combat Systems – an Overview", http://www.army.mil/fcs/articles/index.html; Sandra I. Erwin, "Twenty-Ton Combat Vehicle Slated for 2012", *National Defense*, Vol. 85 No. 562, 2000, pp. 33–35.
13. The FCS is sometimes also known as a "System of Systems". About the network in the FCS, see: Kim Burger, "The Global Battlefield", *Jane's Defence Weekly*, 27 August 2003, pp. 24–27; Kim Burger, "US Army to Refocus Modernization", *Jane's Defence Weekly*, 1 October 2003, p. 8.
14. Mark Hewish, "Technology Transformation for Armored Warfare, Part I", *Jane's International Defence Review*, Vol. 36 No. 4, 2003, pp. 33–47. For example, the US Army will keep the heavy M-1 Abrams tank for at least 25 more years. See Roxana Tiron, "Army Future Force: Abrams Tank Still Far From Retirement", *National Defense*, Vol. 89 No. 611, 2004, pp. 40–42.
15. Rupert Pengelley, "Future Tactical Comms: Redefining the Box", *Jane's International Defence Review*, Vol. 36 No. 5, 2003, pp. 29–39. Mark Hewish, "Technology Transformation for Armored Warfare, Part II", *Jane's International Defence Review*, Vol. 36 No. 5, 2003, pp. 50–57.
16. Kim Burger, "The Big Picture: US Army Future Combat Systems", *Jane's Defence Weekly*, 13 June 2001, pp. 19–27; Kim Burger, "Boeing/SAIC Announce First Opportunities in FCS Programme", *Jane's Defence Weekly*, 17 April 2002, p. 8.
17. They are: Mounted Combat System (MCS), Non-Line-of-Sight Cannon (NLOS-C), Non-Line-of-Sight Mortar (NLOS-M), Infantry Carrier Vehicle (ICV), Command & Control Vehicle (C2V), Recon/Surveillance Vehicle (RSV), Medical Vehicle (MV), and FCS Recovery & Maintenance Vehicle (FRMV). See Andrew Koch, "GD, United Defense Split Combat Systems Work", *Jane's Defence Weekly*, 24 December 2003, p. 7.
18. They are: Armed Robotic Vehicle (ARV) which is about six tons; Multifunction

Utility/Logistics Equipment Vehicle (MULE) which is one to two tons; and Soldier UGV (SUGV) which is some tens of kg, and can be carried by a soldier. See Mark Hewish, "GI Robot", *Jane's International Defense Review*, Vol. 34 No. 1, 2001, pp. 34–40; Mark Hewish, "Technology Transformation for Armored Warfare, Part I", *op. cit.*, pp. 33-47. Christopher F. Foss, "Lockheed Unit Lifts Lid on MULE Platform", *Jane's Defence Weekly*, 10 December 2003, pp. 31–32; Christopher F. Foss, "FCS Armed Robotic Vehicles Detailed", *Jane's Defence Weekly*, 24 November 2004, p. 31.

19. They are: Class I, Organic Air Vehicle (OAV) for a platoon; Class II, OAV for a company; Class III, Small Unmanned Air Vehicle (SUAV) for a battalion; Class IVa: Tactical Unmanned Air Vehicle (TUAV) for a Brigade; Class IVb: Extended-Range/Multi-Purpose (ER/MP) UAV, the largest UAV in the FCS. See Joshua Kucera, "US Identifies Future Combat Systems Range of UAVs", *Jane's Defence Weekly*, 23 June 2004, p. 10. Joshua Kucera, "Armed UAV Goes Forward after FCS-Related Delay", *Jane's Defence Weekly*, 8 September 2004, p. 7.
20. Because the entire FCS project has been restructured several times, the descriptions above are the latest version and somewhat different from the original proposal.
21. Joshua Kucera, "FCS Ground Vehicles Delayed", *Jane's Defence Weekly*, 28 July 2004, p. 5.
22. Sandra I Erwin, "Future Combat Systems Technologies Not Keeping Pace with Expectations", *National Defense*, Vol. 89 No. 611, 2004, pp. 45–46; The US Army's explanation for this weight issue is "We don't anticipate C-130s going into a hot drop zone to get these vehicles off, and so what you have is a vehicle that's capable of coming off, 'doing minimal reconfiguration' and being totally combat-ready." Sandra I Erwin, "Army Confident about Move to Wheeled Combat Vehicle", *National Defense*, Vol. 86 No. 574, 2001, pp. 22–23.
23. Kim Burger, "Delivery Date for US Army IAVs", *Jane's Defence Weekly*, 27 February 2002, p. 8.
24. Joshua Kucera, "US Army Standardises Stryker Brigades", *Jane's Defence Weekly*, 26 May 2004, p. 10.
25. Roxana Tiron, "Stryker Not Up to Speed in Some Areas, Soldiers Claim", *National Defense*, Vol. 87 No. 587, 2002, p. 18.
26. Kim Burger, "Value of US Army Stryker Brigades in Question", *Jane's Defence Weekly*, 16 October 2002, p. 8.
27. Kim Burger, "Strykers Receive Interim Armour Kits", *Jane's Defence Weekly*, 10 September 2003, p. 10; "Stryker Uparmored for Service in Iraq", *Jane's International Defence Review*, Vol. 37 No. 1, 2004, p. 33.
28. Joshua Kucera, "FCS Planners Opt for Heavier Vehicles", *Jane's Defence Weekly*, 29 June 2005, p. 4.
29. Joshua Kucera, "Weighty Problem for FCS Project", *Jane's Defence Weekly*, 23 February 2005, p. 5.
30. Sandra I. Erwin, "For Army's Future Combat Vehicles, Flying by C-130 No Longer Required", *National Defense*, Vol. 90 No. 624, 2005, pp. 18–19.
31. Scott Gourley, "Driving Force", *Jane's Defence Weekly*, 5 February 2003, pp. 20–23.
32. Ezio Bonsignore, "Armour Deployment Common Sense, Anyone?", *Military Technology*, Vol. 27 No. 11, 2003, pp. 62–66.
33. Mark Hewish, "Technology Transformation for Armored Warfare, Part I", *op. cit.*, p. 38.
34. John A. Tirpak, "The Airlift Gap", *Air Force Magazine*, Vol. 87 No. 10, 2004, pp. 34–39.
35. Roxana Tiron, "Brigades Not Likely to Deploy in 96 Hours", *op. cit.*, p. 42.
36. Damian Kemp, "Lifters and Shifters", *Jane's Defence Weekly*, 15 June 2005, pp. 57–65.
37. Eric Peltz, John M. Halliday, Aimee Bower, *Speed and Power: Toward an Expeditionary Army*, Santa Monica: RAND, 2003, pp. 28–33.
38. John A. Tirpak, *The Airlift Gap*, *op. cit.*, p. 36.
39. US Air Force originally wanted 42 more C-17s, but dropped that idea in February 2006. The US Air Force now may only buy seven more C-17s to keep the production line at work; plus the four C-17s ordered by Australia in December 2005, these could only extend the pro-

duction for 16 months. See Michael Sirak, "C-17 Evolves as Airlifter", *Jane's Defence Weekly*, 28 July 2004, p. 30; Joshua Kucera, "Major US Programmes Are to Remain Intact", *Jane's Defence Weekly*, 15 February 2006, p. 9; Stephen Trimble, "C-17 Production Lift May Extend by 16 Months", *Jane's Defence Weekly*, 26 April 2006, p. 8.

40. Ezio Bonsignore, "Armour Deployment Common Sense, Anyone?", *op. cit.*, p. 64.
41. Sandra I. Erwin, "Army's Future Combat System Shakes up Procurement Culture", *National Defense*, Vol. 87 No. 590, 2003, pp. 24–27; Marsh Gelbart and Ezio Bonsignore, "Squaring the Light AFV Survivability Circle", *Military Technology*, Vol. 28 No. 2, 2004, pp. 52–60; William K. Suttie, "Integrated Survivability for Land Platforms", *Military Technology*, Vol. 27 No. 11, 2003, pp. 57–60.
42. Arthur K. Cebrowski, "Network-Centric Warfare", *Military Technology*, Vol. 27 No. 5, 2003, pp. 16–21.
43. Marion H. Van Fosson, "The Future Combat Systems", *Military Technology*, Vol. 25 No. 10, 2001, pp. 29–30.
44. Martin C. Libicki, *Illuminating Tomorrow's War*, Washington DC: Institute for National Strategic Studies, 1999, p. 32.
45. International Institute for Strategic Studies, *Strategic Survey 2002/03*, Oxford: Oxford University Press, 2003, pp. 20–21.
46. Mark Hewish, *Technology Transformation for Armored Warfare*, Part I, *op. cit.*, p. 46.
47. Kim Burger, "US to Address Cost Worries on 'System of System'", *Jane's Defence Weekly*, 19 February 2003, p. 6.
48. Joseph N. Mait and Jon G. Grossman, "Relevancy and Risk: The US Army and Future Combat Systems", *Defense Horizons*, Vol. 13, 2002, p. 4.
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51. "US Army Revises Acquisition Process for WIN-T Programme", *Jane's International Defence Review*, Vol. 37 No. 11, 2004, p. 10; Joshua Kucera, "Boeing and US Army to Renegotiate FCS Deal", *Jane's Defence Weekly*, 13 April 2005, p. 7; Joshua Kucera, "US Army Warns Boeing on JTRS", *Jane's Defence Weekly*, 4 May 2005, p. 6.
52. Martin van Creveld, *Technology and War*, New York: The Free Press, 2002, pp. 272–273.
53. Joshua Kucera, "Iraq Conflict Raises Doubts on FCS Survivability", *Jane's Defence Weekly*, 19 May 2004, p. 8; Ezio Bonsignore, "How 'Transformational' is US Army Transformation?", *Military Technology*, Vol. 27 No. 10, 2003, pp. 67–72.
54. "British Army Decides to Keep Its Heavy Armour for Extra Decade", *Jane's International Defence Review*, Vol. 38 No. 5, 2005, p. 6.
55. Scott R. Gourley, "Forces Recognise the Importance of Expanding Protection Measures", *Jane's International Defence Review*, Vol. 38 No. 5, 2005, pp. 26–32.
56. Robert M. Cassidy, "Renaissance of the Attack Helicopter in the Close Fight", *Military Review*, Vol. 83 No. 4, 2003, pp. 42–44.
57. Joshua Kucera, "Future Tense", *Jane's Defence Weekly*, 28 September 2005, pp. 30–33.
58. Barry R. Posen, "The War for Kosovo", *International Security*, Vol. 24 No. 4, 2000, p. 64.
59. Kim Burger, *The End of the Road?*, op. cit., p. 78; Marvin Leibstone, "Defence Strategy Enhancements and the FCS Model", *Military Technology*, Vol. 27 No. 7, 2003, pp. 73–78.
60. Andrew Koch, "End of the Line for US Tanks?", *Jane's Defence Weekly*, 7 August 2002, p. 9.
61. This comparison refers to the US M-4 Sherman medium tank and the German Tiger heavy tank. See Eric Lefèvre, *Panzers in Normandy Then and Now*, London: Battle of Britain Prints International, 1993, pp. 161–183; George Forty, *German Tanks of World War II "in action"*, New York: Blandford Press, 1988, pp. 118–141. Michael Green, *Tiger Tanks*, Osceola: Motorbooks International, 1995.
62. Bill Sweetman, *Airlifter Turnaround: How the C-17 Came Good both in Production and in Action*, pp. 61–64.

63. Tamar A. Mehuron (ed.), "USAF Almanac", *Air Force Magazine*, Vol. 88 No. 5, 2005, pp. 42–81.
64. Damian Kemp, "Lifter and Shifters", *Jane's Defence Weekly*, 15 June 2005, p. 62.
65. One C-17 will carry two heavy-version or three light-version FRES vehicles. It means each heavy variant will be 38 tons and light variant will be 25 tons. In March 2006, the British further divided the FRES into three categories: 20–25 tons, 25–30 tons, and 30–40 tons. See James Murphy, "UK MoD Alters FRES Parameters", *Jane's Defence Weekly*, 15 June 2005, p. 6. In fact, FRES and FCS might share many technologies. See James Murphy, "Boeing Looks to Move in on FRES Work", *Jane's Defence Weekly*, 15 June 2005, p. 32; Christopher F. Foss, "UK Firms up AFV Strategy", *Jane's Defence Weekly*, 22 March 2006, p. 6.
66. For example, prior to the current FCS program, the US Army was envisaging a next-generation tank known as Future Main Battle Tank (FMBT), which weighs 55 tons. See Dr Asher H. Sharoni and Lawrence D. Bacon, "The Future Combat System (FCS)", *Armor*, Vol. 106 No. 4, 1997, pp. 7–13.
67. John J. Mearsheimer, *The Tragedy of Great Power Politics*, New York: WW Norton and Company, 2001, pp. 144–145.
68. Alexander Nacht, "US Foreign Policy Strategies", *The Washington Quarterly*, Vol. 18 No. 3, 1995, pp. 195–210.
69. See Micah Zenko, "Saving Lives with Speed: Using Rapidly Deployable Forces for Genocide Prevention", *Defense & Security Analysis*, Vol. 20 No. 1, 2004, pp. 5–6.
70. There is annoyance in the International Relations literature regarding the public confusion between "prevention" and "pre-emption." Prevention is for longer-term threats, and pre-emption is for shorter-term, immediate threats. See Stephen Van Evera, *Cause of War: Power and the Roots of Conflict*, Ithaca and London: Cornell University Press, 1999, pp. 35–38, 73–75. This article chooses to keep with the terminology and meaning used by the Bush Administration. President Bush states: "If we wait for threats to fully materialize, we will have waited too long . . . our security will require all Americans to be forward-looking and resolute, to be ready for pre-emptive action when necessary to defend our liberty and to defend our lives." This notion of "pre-emption" is in fact "prevention" in academic usage. See "Remarks by the President at 2002 Graduation Exercise of the United States Military Academy, West Point", available at http://www.whitehouse.gov/news/releases/2002/06/20020601-3.html.
71. George W. Bush, "The National Security Strategy of the United States of America", 2004, available at http://www.whitehouse.gov/nsc/nss.pdf.
72. Donald C. F. Daniel, Peter Dombrowski, Rodger A. Payne, "The Bush Doctrine Is Dead; Long Live the Bush Doctrine?", *Orbis*, Vol. 49 No. 2, 2005, pp. 199–212.
73. "Remarks by President Bush and Senator Kerry in First 2004 Presidential Debate", available at http://www.whitehouse.gov/news/releases/2004/10/20041001.html.
74. One side argues that the US is free to use its hegemonic power, see Charles Krauthammer, "The Unipolar Moment Revisited", *The National Interest*, No. 70, 2002/2003, pp, 5–17; the other side argues that the US hegemonic unilateralism will backfire and produce more enemies, see G. John Ikenberry, "America's Imperial Ambition", *Foreign Affairs*, Vol. 81 No. 5, 2002, pp. 44–61.
75. "Remarks by President Bush and Senator Kerry in First 2004 Presidential Debate", *op. cit.*
76. Recently, the US also gained access to Azerbaijan. See Joshua Kucera, "US Helps Forces, Gains Foothold in Caspian Region", *Jane's Defence Weekly*, 25 May 2005, p. 12.
77. Alan Vick, David Orletsky, Bruce Pirnie, Seth Jones, *The Stryker Brigade Combat Team: Rethinking Strategic Responsiveness and Assessing Deployment Options*, Santa Monica: RAND, 2002, pp. 83–86, 115.
78. Chester A. Crocker, "Engaging Failing States", *Foreign Affairs*, Vol. 82 No. 5, 2003, p. 34.