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UNMANNED AERIAL VEHICLE USE IN ARMY BRIGADE COMBAT TEAMS: INCREASING EFFECTIVENESS ACROSS THE SPECTRUM OF CONFLICT

by

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One of the major strengths of the U.S. Army conventional force, and its doctrinal methods, is the ability to conduct operational and tactical maneuver out of contact with an enemy force. This allows the U.S. to decide the time, place, and conditions of contact. Under this system national, strategic, and operational intelligence systems generate, analyze, and disseminate intelligence to maneuver units.

When major conventional operations conclude, or in operations where they never take place, conventional forces transition to Stability Operations and Support Operations (SASO). Conducting SASO operations generally requires extensive interaction with, and conducting operations among, a local populace. The necessary physical interaction with a local populace causes two significant problems for conventional forces: traditional intelligence assets (national, strategic, operational) are largely irrelevant to the operations U.S. forces conduct, and interacting with a local population whenever outside of a FOB affects the actions of the population. In military operations other than conventional combat, intelligence must be generated from the lowest possible tactical level, something conventional forces are not organized or equipped to do. Proliferating Shadow Tactical Unmanned Aerial Vehicle (TUAV) Platoons throughout Army Brigade Combat Team's (BCTs) subordinate battalions will enable commanders to gather the tactical intelligence necessary for success.

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ABSTRACT

One of the major strengths of the U.S. Army conventional force, and its doctrinal methods, is the ability to conduct operational and tactical maneuver out of contact with an enemy force. This allows the U.S. to decide the time, place, and conditions of contact. Under this system national, strategic, and operational intelligence systems generate, analyze, and disseminate intelligence to maneuver units.

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TABLE OF CONTENTS

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LIST OF FIGURES

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I. INTRODUCTION

A. BACKGROUND

Despite the technological advances the military has experienced since the Vietnam War, soldiers, sailors, airmen and marines today are facing similar challenges in Iraq and Afghanistan to those that troops faced almost 40 years ago. Operations Enduring and Iraqi Freedom have served to direct our armed forces' attention to conducting counter-insurgency operations, something that conventional forces have not faced on a large scale since Vietnam. One byproduct of this transition away from training for and executing standard conventional operations to training for and fighting active insurgencies is the Army and Marine Corps Counterinsurgency Manual (FM 3-24, FMFM 3-24 (Draft Version)).

> This manual is designed to fill a doctrinal gap. It has been 20 years since the U.S. Army published a manual devoted to counterinsurgency operations, and 25 since the Marine Corps published its last such manual. With our Soldiers and Marines fighting insurgents in both Afghanistan and Iraq, it is thus essential that we give them a manual that provides principles and guidelines for counterinsurgency operations.[1]

FM 3-24, while still in draft from, recognizes fundamental counterinsurgency principles. In an insurgency combat power alone will not insure victory. While a conflict may pit insurgent against counterinsurgent forces over a variety of issues, when stripped bare of all political, social, and cultural contexts, the conflict is ultimately over who, the insurgent or the counterinsurgent, can control the local population. The population is critically important to both the insurgent and counterinsurgent mainly because it can provide a decided advantage to the force that can control it: for the insurgent, the population provides resources, in the form of people, guns, and money, as well as allowing the insurgent forces to conceal themselves within the population; for the counterinsurgent, the population provides intelligence on the insurgent force, enabling the counterinsurgent to target the insurgent. As Sir Robert Thompson states in "Defeating Communist Insurgency: The Lessons of Malaya and Vietnam," "[t]he population is not

[1] LTG David H. Petraeus and LTG James N. Mattis, Foreword to *Counterinsurgency (Final Draft), FM 3-24 and FMFM 3-24* (Departments of the Army and Navy: Washington, D.C., June 2006).

only providing the guerilla with his food and intelligence, but giving him perfect cover and concealment. Dressed as a peasant, the guerilla, except when he is carrying arms, is indistinguishable from the rest of the people. In fact, he can be both a peasant by day and a guerilla by night."[2]

An insurgent force embedded in a local population may give the insurgent the advantage in controlling the population's behavior. The population may not be actively supporting the insurgent due to their ideological belief in the insurgent cause, but rather may simply be intimidated by the insurgent into passively supporting, and not reporting to the counterinsurgent, the insurgent's activity. Despite the reasons behind the population's support of the insurgent, active or passive due to sympathy or intimidation, this situation presents a significant challenge for the counterinsurgent – gathering intelligence on insurgents that are integrated into a non-cooperative population, or conducting reconnaissance and surveillance operations within an urban population. The challenge of attempting to interact with a local population that is supportive of an insurgent cause is illustrated in Figure 1. This figure shows a counterinsurgent patrol approaching an insurgent controlled village and how the local populace passes information on the patrol's actions to insurgents, enabling the insurgent to avoid the counterinsurgent patrol.

[2] Robert Thompson, *Defeating Communist Insurgency: The Lessons of Malaya and Vietnam* (Frederick A. Praeger Inc.: New York, 1966), 32-33.

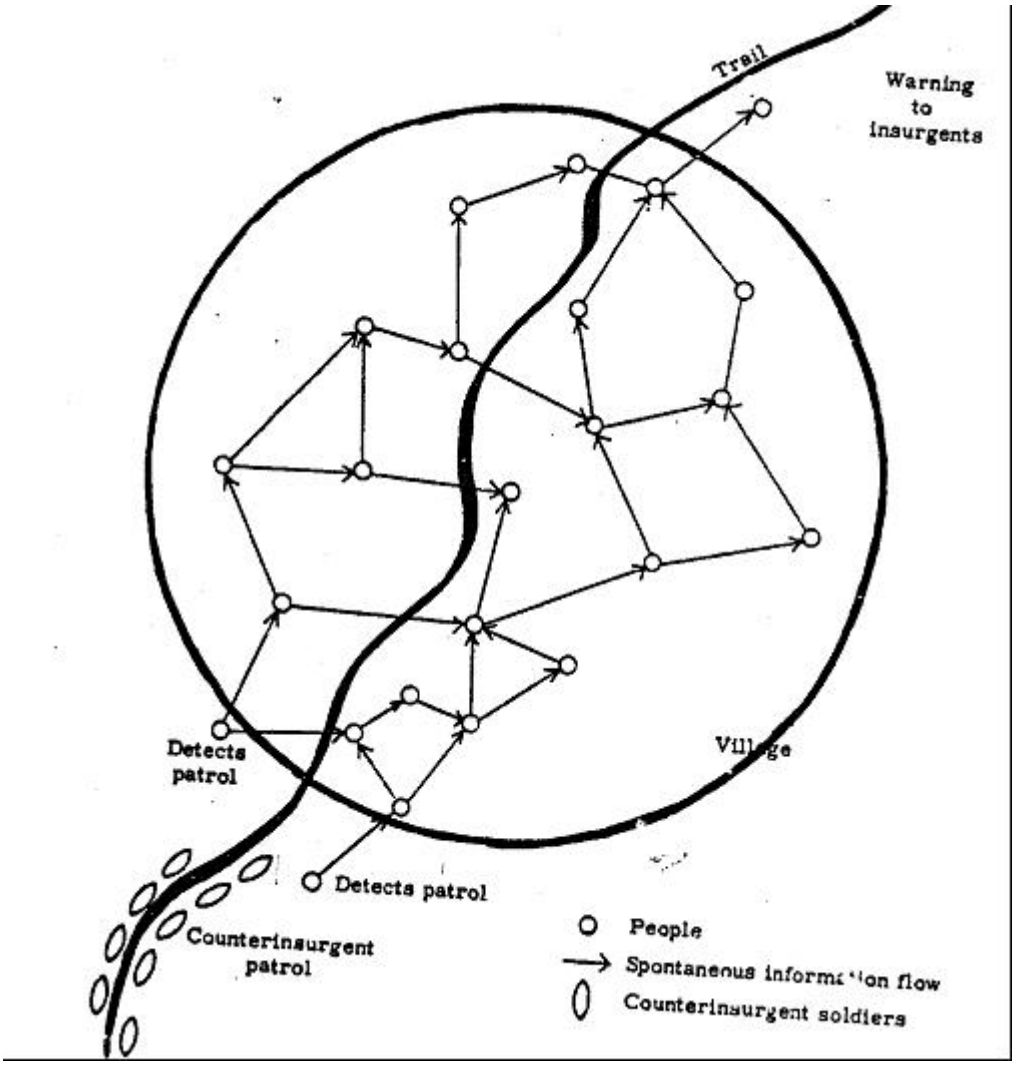

Figure 1. Information Flow to Insurgents[3]

Further hindering the counterinsurgent is that conventional forces are not organized or equipped to gather intelligence from a civilian population. They lack sufficient interpreter, Civil Affairs, and Human Intelligence (HUMINT) assets to penetrate the population and extract intelligence.[4] Special Operations Forces (SOF), specifically Army Special Forces (SF), are best suited to combat an active insurgency because they are organized with organic linguists, HUMINT assets, and are small and self-sufficient enough to live among the local population. Living among a local

[3] M.D. Havron, J.A. Whittenburg, and A.T. Rambo, *U.S. Army Handbook of Counterinsurgency Guidelines for Area Commanders – An Analysis of Criteria* (American University: Washington D.C., January 1966), 212.

[4] The current organizational structures of the U.S. Army's Brigade Combat Teams (Heavy, Light, and Stryker) will be discussed in detail in subsequent chapters.

population is a critical capability that can lead to earning the trust of the people, and over time, gain the population's support against the insurgent forces.

While the Army's recent attention to using conventional forces to combat insurgent forces and interact with local civilian populations is a seemingly new issue, U.S. conventional forces have been dealing with this problem with varying degrees of success for decades. Aspects of the Vietnam War, peacekeeping operations in Somalia, and the current Iraq and Afghanistan conflicts highlight the nature of this problem and that despite extensive experience, conventional forces continue to have difficulty gathering intelligence on belligerent groups that embed themselves in a local population.

B. THE VIETNAM WAR

The Vietnam War was a complex conflict that cannot be summarized in a few pages due to the length of the conflict, the widely disparate terrain encountered in different parts of the country, and the variety of forces engaged on both sides. Despite this, several generalizations about the conflict are accurate – U.S. military forces consisted of, but were not limited to, naval ships and aircraft, a vast array of air force aircraft, and conventional and special operations forces, while the North Vietnamese generally had limited naval and air forces, and three types of ground forces: regular North Vietnamese Army (NVA) forces, Viet Cong (VC) guerilla fighters, and the Viet Cong Infrastructure (VCI), which was a 'shadow government' established among South Vietnamese villages and hamlets with the goal of assuming power once the North Vietnamese won the conflict with the south. In addition to being a politically organizing force, the VCI "…recruit[ed] soldiers, the political cadres collected taxes, usually in the form of agricultural produce, and moved goods around the country using a sophisticated logistical network. They gathered information on the enemy from the peasants and organized surveillance along the edges of the hamlets. They took land from the wealthy to give to the poor in exchange for the population's support, and helped poor peasants farm their land. Some of their duties were less pleasant, including the execution of government leaders and supporters."[5]

[5] Mark Moyer, "The War Against the Viet Cong Shadow Government," in *The Real Lessons of the Vietnam War: Reflections Twenty-Five Years After the Fall of Saigon*, eds. John Norton Moore and Robert F. Turner (Carolina Academic Press: Durham, North Carolina, 2002), 152.

While the CIA's Phoenix program targeted the VCI, it was the mission of the U.S. conventional forces to combat the NVA and VC guerillas throughout South Vietnam. Though there were significant differences between the leadership and strategies of Generals Westmoreland and Abrams, regular forces conducted patrols throughout the jungles and villages of Vietnam in order to find, fix, and finish the combat forces arrayed against them. "To defeat this diverse force, American and South Vietnamese leaders identified three purely military missions: "search and destroy" (engaging conventional or mobile enemy units); "clear and hold" (engaging enemy territorial companies and guerillas); and "securing" (providing military security on a continuing basis so that the other pacification tasks could be carried out).[6] The primary challenges that these forces faced were that the thickly vegetated jungles provided significant concealment and allowed NVA and VC forces to elude U.S. force, resulting in "[a]bout eighty-eight percent of the contacts were initiated by the enemy. In other words, they attacked when they were ready,"[7] and the necessity of searching for guerillas within local villages and hamlets indicated that "[t]he guerillas are now operating within the population, and this is the period where he can apply Mao Tse-tung's dictum that the guerilla must be to the population as little fishes in water. The population is not only providing the guerilla with his food and intelligence, but giving him perfect cover and concealment."[8] Whether attempting to engage conventional and guerilla forces in the jungle or attempting to distinguish guerillas from local populations, U.S. conventional forces faced the difficult task of gaining sufficient intelligence to accurately target the enemy forces.

C. UNITED STATES FORCES IN SOMALIA

United States and United Nations forces operations in the nation of Somalia, as part of Unified Task Force (UNITAF) and later the United Nations Operations in Somalia (UNOSOM II), provide another example of the challenges that conventional forces face operating in an urban environment against a force that integrates with an indigenous

6 Jeffrey Clarke, " On Strategy and the Vietnam War," in *Assessing the Vietnam War: A Collection from the Journal of the U.S. Army War College*, eds. Lloyd J. Matthews and Dale E. Brown (Pergamon – Brassey's International Defense Publishers: Washington, 1987), 68.

7 Robert E. Morris, "Why We Lost the War in Vietnam: An Analysis," in *The Real Lessons of the Vietnam War: Reflections Twenty-Five Years After the Fall of Saigon*, eds. John Norton Moore and Robert F. Turner (Carolina Academic Press: Durham, North Carolina, 2002), 392.

8 Sir Robert Thompson, *Defeating Communist Insurgency: The Lessons of Malaya and Vietnam* (Frederick A. Praeger, Inc., New York, 1966), 32-33.

population. While a majority of the military operations that garnered extensive media attention related to the special operations forces (SOF) actions against Aideed and his clan militias, there were large conventional force contributions to the mission, primarily in humanitarian relief efforts and the Quick Reaction Force (QRF). The tactic of creating roadblocks from which to ambush UN forces and restrict their movement within Mogadishu led to the adoption of "increase[ing] the level of helicopter overwatch as part of 'eyes over Mogadishu.' Carried out primarily under the cover of darkness, this operation consisted of route reconnaissance and aerial photography for the dual purpose of protecting UN and U.S. troops and monitoring Somali militias' activities."[9] Responding to this aerial overwatch of Mogadishu, militias began relocating roadblocks and ambush locations to confuse UN and US forces as to their correct locations. The increased use of helicopters for aerial reconnaissance was recognition of an intelligence gap that could not be filled by other collection assets and that in order to be effective, the intelligence had to be as current and accurate as possible.

An additional challenge that forces in Somalia faced was simply navigating through the city – "land navigation was extremely difficult, especially due to the inadequacy of available maps that gave only a crude approximation of the layout of blocks and buildings."[10] Combined with the ever-changing militia roadblocks and ambush sites, U.S. and UN forces had extreme difficulty moving anywhere in the city without accurate and up to date intelligence. In addition to the frequent ambush and mortar attacks against US and coalition forces, Somali militias began to attack QRF and TF Ranger aircraft with RPG-7s and SA-7 surface-to-air missiles, and successfully shot down their first helicopter on 25 September 1993. This led to a change in aerial tactics and led to increased reliance on ground forces to prevent additional aircraft losses.[11]

A concrete example of the confusion and danger this lack of intelligence causes occurred during the October 1993 Battle of Mogadishu, the TF Ranger and SOF raid to

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[9] Robert F. Baumann, Lawrence A. Yates, and Versalle F. Washington, *My Clan Against the World – US and Coalition Forces in Somalia 1992-1994* (Combat Studies Institute Press, Fort Leavenworth, Kansas, 2003), 114-115.

[10] Ibid.,, 124.

[11] United States Forces, *Somalia After Action Report and Historical Overview – The United States Army in Somalia*, 1992-1994 (Center of Military History, Washington, D.C., 2003), 134-135.

capture Mohamed Farah Aideed. After the initial success of the raid on Aideed's compound, and the capture of 24 of his aides and militiamen, Somali forces successfully attacked a US UH-60 helicopter. This drastically changed the TF Ranger mission from a raid to a Combat Search and Rescue (CSAR) mission, and eventually necessitated the commitment of the QRF, consisting of US Rangers, US QRF, Pakistani, and Malaysian forces to rescue trapped US forces within Mogadishu.[12] Complicating the mission of the QRF forces to reach the TF Ranger forces were the inaccurate maps, changing roadblock locations, and frequent ambushes by Somali militias. This caused delays in the rescue convoy reaching the trapped Rangers and SOF personnel and hampered their ability to return to the UN compound. All convoys attempting to move to the Ranger locations faced "[s]warming crowds, burning tires and other obstacles, and above all, ambushes at seemingly every turn,"[13] as well as not knowing the precise locations of the various Ranger and downed helicopter positions around the Aideed compound. Ultimately, ground forces communicated with overhead helicopters to guide them to the Ranger positions, as well as using trial and error along various routes to reach the Rangers and then return to the UN compound.[14] A lack of accurate maps and an ever changing tactical ground situation in an urban environment necessitates conventional forces having a method of gathering real-time, accurate intelligence in order to maneuver forces with minimal interference from any opposing force.

D. OPERATION IRAQI FREEDOM

Conventional forces in Iraq also face similar problems distinguishing insurgents, criminals, and militia members from the local population, and this is exacerbated by the larger population centers that US forces operate in. From April 2003 to February 2004 the 2d Squadron, 2d Armored Cavalry Regiment (2/2), a HMMWV based reconnaissance organization, had responsibility for the Sadr City area of northeast Baghdad, an approximately 75 city block slum populated by over two million Shia Iraqis. The primary challenges facing 2/2 were Former Regime Elements (FRE), mainly Saddam

[12] United States Forces, *Somalia After Action Report and Historical Overview – The United States Army in Somalia*, 1992-1994, Center of Military History, Washington, D.C., 2003. 139.

[13] Robert F. Baumann, Lawrence A. Yates, and Versalle F. Washington, *My Clan Against the World – US and Coalition Forces in Somalia 1992-1994*, Combat Studies Institute Press, Fort Leavenworth, Kansas, 2003. 145.

[14] Ibid., 145-158.

Fedayeen fighters, a criminal weapons black market, and the first machinations of Al-Sadr's Mahdi Army. These criminals and militia members lived in the neighborhoods where they operated, and were very successful at intimidating the population to not cooperating with the coalition forces.

A majority of the Shia in Sadr City saw the Fedayeen fighters as tools of the Ba'athist regime and were readily willing to inform on their locations to 2/2. As a result of subsequent coalition operations, the Fedayeen fighters were killed, captured, or fled to other parts of Iraq. The criminal and militia elements were more difficult to locate and conduct operations against because of the support that they received from the population. With little support from the population, 2/2 attempted numerous raids and patrols against the areas where the weapons market operated. These raids usually obtained a few weapons, but never identified the personnel operating the market because the criminals utilized an early warning system of flares, drums, and whistles any time a coalition patrol approached the market, giving the weapons dealers time to move a majority of their weapons and leave the immediate area. The weapons market was located close to the geographic center of the city, and due to heavy personnel and vehicle traffic, coalition forces' freedom of maneuver, both mounted and dismounted, was severely restricted.

Coalition forces encountered similar problems identifying the members of the Mahdi militia as they were establishing roadblock, checkpoints, and attempting to take control of Iraqi government buildings. Dressed as civilians, the militia members were able to blend into the civilian population as coalition forces approached and resume their activities once patrols were no longer in the area. Coalition forces were also not able to successfully emplace observation posts (OPs) in any area of the city without being observed. The Sadr City area of Baghdad is predominantly residential, and all coalition force movements inside the city were observed by the local population, and likely reported to the militia and criminal elements. 2/2 did not possess a capability to gather intelligence, conduct reconnaissance or surveillance without interacting with the population and influencing the environment they were collecting on.[15]

[15] The author was an anti-tank company commander with 2d Squadron, 2d Armored Cavalry Regiment in the Sadr City area of Baghdad from April to October 2003, and the descriptions of events in that area are from his personal experiences.

E. ARMY TRANSFORMATION

In contrast to SOF, conventional forces are designed, organized, trained, and equipped to conduct combat operations against other conventional forces. Conventional forces are manpower, equipment, and logistics intensive, and do not possess the capability to embed themselves within a civilian population for an extended period of time without refit and resupply. This lack of capability adversely impacts the conventional forces' ability to reverse the advantage insurgents possess in co-opting the support of the population. Further hampering the conventional force in combating an insurgency is the current use of large Forward Operating Bases (FOBs). The conventional force that reside within these FOBs generally depart them only to conduct combat patrols and operations, intelligence gathering, and conduct logistic resupply operations, thus limiting their ability to actively interact with, get to know, and understand the nuances of the local population and gather intelligence on the insurgent.

The U.S. Army has recently started an extensive program to transform its conventional forces into modular Brigade Combat Teams (BCTs) so that "Soldiers, leaders, and units [will] be extremely capable in counterinsurgency operations without sacrificing their ability to prevail in conventional combat."[16] These BCTs are a capabilities-based bridge between the late 1990s and early 2000s force, or 'Legacy Force,' which were intended to counter the Cold War Soviet threat in Europe, and the Army's Future Force. The organization changes are intended to improve their capabilities across the spectrum of conflict – from peacekeeping to high-intensity combat operations. "Three standard BCT designs make up the maneuver power of the modular Army: heavy brigade combat teams (HBCTs), infantry brigade combat teams (IBCTs), and Stryker brigade combat teams (SBCTs). These BCTs have improved command and control capabilities and organic combined arms capabilities, including battalion-sized maneuver, fires, reconnaissance, and logistic subunits."[17] Other units in the Army's transformation program are Maneuver Enhancement (ME), Battlefield Surveillance

[16] Army Comprehensive Guide to Modularity, Version 1.0, Headquarters, U.S. Army Training and Doctrine Command, Task Force Modularity (Fort Monroe, Virginia, 08 October 2004), vii.

[17] Ibid., 6-1.

Brigades (BSB), Aviation (AB), Fires (FB), and Sustainment Brigades, though these organizations are not the focus of this thesis.

These reorganized combat brigades have several new systems to increase their ability to operate in conventional and unconventional environments, specifically Unmanned Aerial Vehicles (UAVs). As currently structured, each BCT has an organic Tactical UAV platoon (TUAV), consisting of three Shadow UAVs, which is intended to be an observation and intelligence gathering platform for the Brigade Commander. In addition to these deliberate organization changes, conventional Army units currently operating in Iraq are using the smaller Raven-B and other UAVs at the company and platoon level to improve their ability to view the battlefield around them. The current use of UAVs within BCTs is growing, but not organizing UAVs at the battalion level misses an opportunity to further increase the ISR capabilities of the BCTs.

When conducting conventional combat operations BCTs are able to draw intelligence and relevant information from a variety of higher level sources to understand the operational and tactical situation. These sources include satellite imagery, U-2 aircraft imagery, strategic UAVs like the Global Hawk and Predator, and Joint Surveillance and Target Attack Radar System (JSTARS), and other national and strategic systems. The intelligence gathered by these systems is analyzed and, and in conjunction with higher level operational plans, is disseminated through multiple levels of command before it reaches and can be acted on at the tactical level. In a conventional conflict this intelligence gathering and distribution system ensures that tactical operations are synchronized with higher level operations, and accomplishes the strategic, operational, and tactical plans necessary for success. In Stability Operations and Support Operations (SASO) battalions often have to operate in and amongst civilian populations, and therefore have a need to be able to gather and develop bottom-up tactical level intelligence that is immediately useful to tactical units. In these instances, the top down intelligence dissemination useful in conventional operations is not responsive to tactical commanders, who cannot task these assets to specific areas because they do not control their employment. To enable tactical commanders to operate effectively in SASO environments they need a dedicated ISR capability at the tactical level, specifically

UAVs. Fielding UAVs to maneuver battalions in BCTs will enable all maneuver units to have an organic ISR capability, enhancing the ability of conventional forces to conduct operations across the spectrum of conflict.

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II. BRIGADE COMBAT TEAMS

A. ARMY TRANSFORMATION OVERVIEW

This chapter will detail the organizational changes throughout Army formations, focusing on the changes at the brigade and below level. The most important aspect of the changes at brigade level are the additional Intelligence, Surveillance, and Reconnaissance (ISR) assets in the Brigade Combat Teams (BCTs) that will increase their ability to gather the bottom-up intelligence necessary for success in Stability Operations and Support Operations (SASO), though the current changes occur predominantly at the brigade level. Organizing the ISR assets at the brigade increases the commander's ability to gather actionable tactical intelligence, but by not including any additional assets at the battalion level, does not fully exploit the capabilities of the ISR assets.

The Army's current Campaign Plan is designed to increase the Army's capabilities across a wide range of missions and develop a joint and expeditionary Army with campaign capabilities[18] by relieving stress on families and soldiers, improving the capabilities of Army forces, redesigning conventional force units, and redefining the Army's culture by focusing on the soldier and increasing joint capabilities. A critical component of the Campaign Plan is Army Transformation, which will "sustain and enhance the capabilities of current forces while building future force capabilities to meet the requirements of tomorrow's Joint Force."[19] The Army's transformation program is part of a wider Department of Defense transformation plan and will ensure that the Army is capable of integrating its forces into the future joint operational environment. The end-state of Army Transformation is the Objective Force, brigade sized Units of Action equipped with Future Combat Systems. The Objective Force, scheduled to begin fielding in 2014, will incorporate organizational and doctrinal changes to enable Army units to see the enemy first, understand the environment first, act first, and decisively finish the enemy. Until the Objective Force is ready for fielding and employment, the Army is

[18] Army Campaign Plan Powerpoint Presentation, available from http://www.army.mil/thewayahead/acppresentations/4_1.html; accessed 03 October 2006.

[19] Foreword, 2004 Army Transformation Roadmap, Office of the Deputy Chief of Staff, U.S. Army Operations, Army Transformation Office, 31 August 2004.

focusing on transforming the current, or Legacy Force, into the Interim Force, a brigade based modular force. The goal of the transformation to the Interim Force is to enable conventional forces to maintain their tactical superiority in high intensity combat operations while improving their ability to successfully conduct other missions across the spectrum of conflict.

The building blocks of Army Transformation are Units of Action (UA), brigade sized units that are self-contained, capable of independent operations, and have capabilities that are traditionally only associated with divisions. The primary maneuver UAs fall into three categories: Heavy Brigade Combat Team (HBCT), Infantry Brigade Combat Team (IBCT), and Stryker Brigade Combat Team (SBCT). Other Army units will organize into Maneuver Enhancement Brigades (ME), Battlefield Surveillance Brigades (RSTA), Aviation Brigades (AV), Fires Brigades (Fires), and Sustainment Brigades (SUST). As part of Army Transformation traditional division and corps structures will also radically change. Replacing them will be Units of Employment x and y (UEx, UEy), two and three-star level tailorable headquarters capable of integrating into joint environments and controlling several subordinate UAs.

B. UEy AND UEx HEADQUARTERS

In future conflicts, one UEy, a three-star headquarters, will serve the Regional Combatant Commanders as "the Army Service Component Command (ASCC). As the ASCC the UEy is responsible for the administrative control (ADCON or Title X support) of all Army forces in the AOR. The ASCC also integrates Army forces into the execution of theater engagement plans, and provides Army support to other services as directed by the regional combatant commander."[20] While responsible for allocating Army forces throughout a theater of operation, the UEy will also control operational protection, information superiority, and theater support commands that will support the operations of joint and Army operations throughout the theater in accordance with the theater regional combatant commander's priorities. Figure 2 shows a potential organization for a notional UEy.

[20] White Paper, Unit of Employment (UE) Operations, Version 2.2, Revised Initial Draft, 05 December 2003, 40.

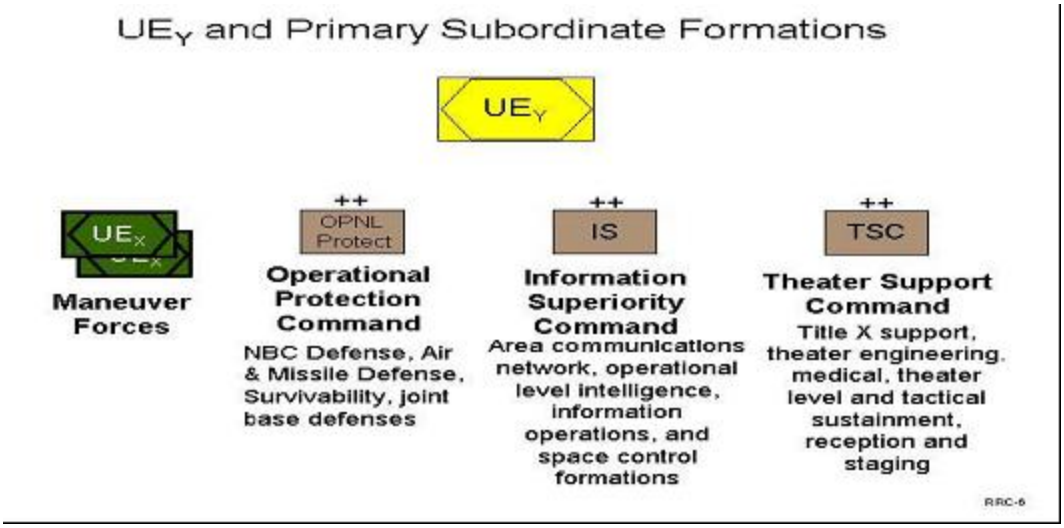

Figure 2. Potential UEy Structure[21]

The UEy will be more flexible than the traditional corps headquarters in that it will be tailorable, scalable, capable of integrating into a joint theater headquarters, and will be able to select its subordinate units based on mission requirements, not just select entire divisional units based on existing habitual relationships. It its role as a force provider to the RCC, the UEy will be able to select specific UAs based on their capabilities and assign them to subordinate UEx headquarters, as well as allocate other theater level Army units to the RCC.

The primary tactical subordinate unit of the UEy is the UEx, a two-star headquarters that is the primary tactical controlling headquarters of Units of Action. "It is designed as a modular, command and control headquarters for the offensive, defensive, and stability operations incident to major land operations….Each UEx is unique not only for a particular campaign, but for different phases of a campaign."[22] Figure 3 shows two possible UEx organizations, based on two disparate missions. In each example the UEx is the controlling tactical headquarters for several UAs, as assigned by the UEy, in order to meet the tactical requirements as determined by the RCC.

[21] White Paper, Unit of Employment (UE) Operations, Version 2.2, Revised Initial Draft, 05 December 2003, 41.

[22] Ibid., 46

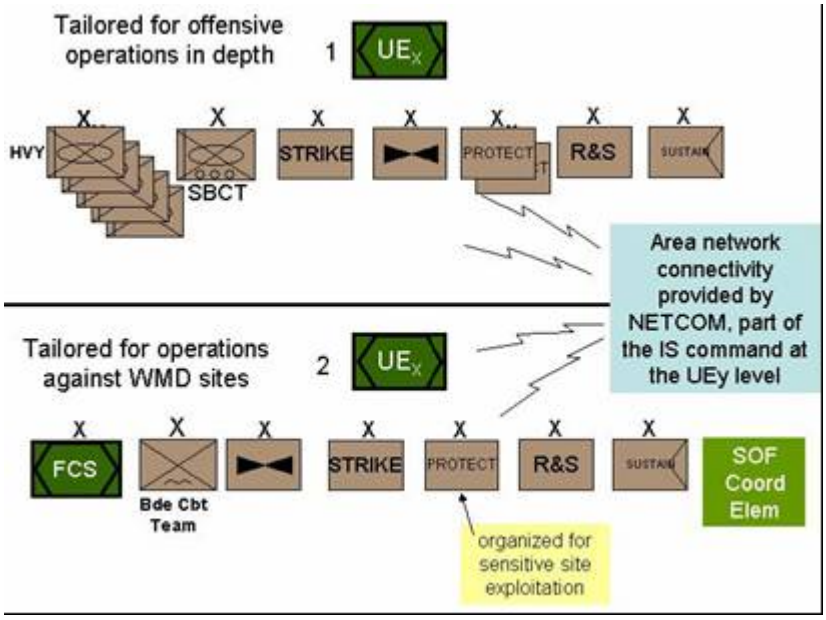

Figure 3. Examples of UEx Organization[23]

C. BRIGADE COMBAT TEAMS

The Army transformation goal is to reconfigure the existing 33 active component and 34 National Guard brigades and create 10 additional brigades (one in each of the active divisions) and five Stryker brigades, resulting in an end strength of 82 combat brigades. The brigades will serve as modular building blocks of the Interim Force by allowing combatant commanders to select individual brigades, based on their capabilities and mission requirements, instead of relying solely on the relatively inflexible nature of existing divisions that have a limited capability to tailor forces to specific mission needs. For example, a Legacy Force armored division consisted of three armor brigades each composed of a combination of three armor or mechanized infantry battalions, an engineer battalion, a field artillery battalion, and a logistical support battalion, as well as several supporting brigades. In selecting an armored division for an operation a combatant commander would receive the division with its three similarly configured combat brigades, as well as all of the supporting artillery, aviation, engineer, and support assets in the division. With the Interim Force, the combatant commander has the flexibility to request individual brigades with vastly different capabilities. As Figure 3 shows, the

[23] White Paper, Unit of Employment (UE) Operations, Version 2.2, Revised Initial Draft, 05 December 2003, 47.

RCC can structure Army forces to meet the mission requirements, ranging from several heavy brigades and a Stryker brigade to a mix of heavy, light, and Stryker brigades, with a mix of supporting brigades.

D. THE HEAVY BRIGADE COMBAT TEAM

"The HBCT is a balanced combat organization built around a brigade special troops battalion (BSTB), two combined arms maneuver battalions, a fires battalion, a reconnaissance squadron, and a brigade support battalion (BSB),"[24] and is capable of operating across the spectrum of conflict from high-intensity combat operations to a variety of stability operations. Figure 4 shows the organizational structure of the HBCT.

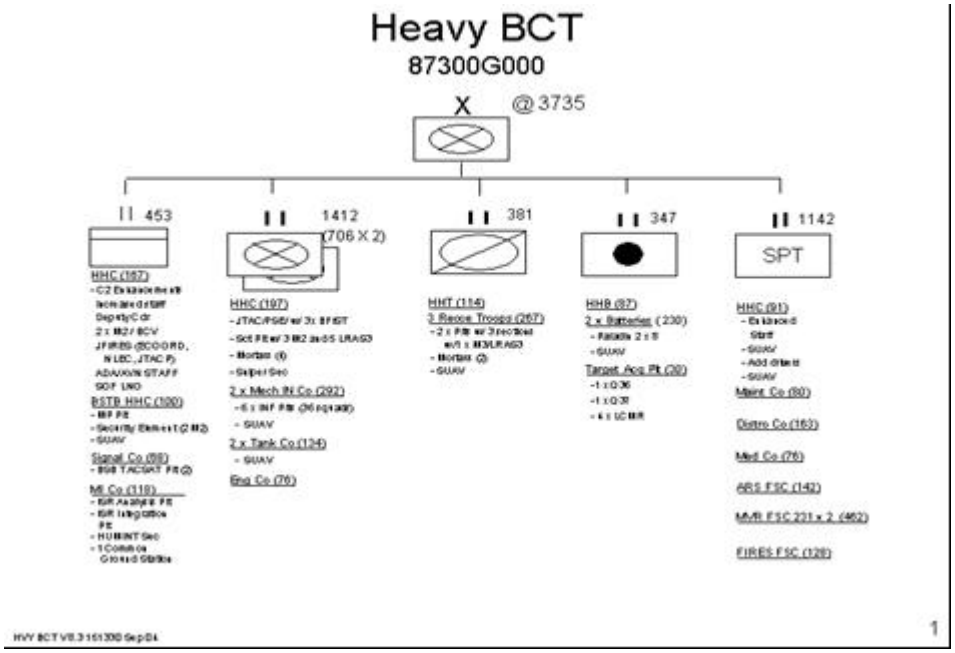

Figure 4. Heavy Brigade Combat Team Organization[25]

Following paragraphs will look at each of the brigade's subordinate battalions to identify changes from Legacy Force brigades.

[24] Heavy Brigade Combat Team (Ch 8), Army Comprehensive Guide to Modularity, Vol 1, Version 1.0, Headquarters, US Army Training and Doctrine Command, Task Force Modularity, Fort Monroe, Virginia, October 2004, 8-1.

[25] Ibid.

The addition of the Brigade Special Troops Battalion (BSTB) is the first major change in a UA brigade and it serves as the controlling headquarters for several other units added to the brigade. The units added to the BSTB are a Military Police (MP) platoon for security tasks, a Nuclear, Biological, and Chemical (NBC) platoon, an Area Network (Signal) company, and a Military Intelligence (MI) company with an Analysis and Integration (A&I) platoon, a Ground Collection platoon (Signals Intelligence (SIGINT) and Human Intelligence (HUMINT)), and a Tactical Unmanned Aerial Vehicle (TUAV) platoon. Under the Legacy Force structure these combat support units are divisional assets that are attached to a division's subordinate brigades based on mission requirements. Permanently assigning these assets to a brigade combat team greatly increases the flexibility of the brigade by reducing its reliance on external units and enables it to better integrate combat multipliers into combat operations.

The second major change to the HBCT is in the organization of the subordinate maneuver battalions. Legacy Force heavy brigades had either two armor battalions and one infantry battalion, or two infantry battalions and one armor battalion each with three subordinate companies (infantry battalions with three infantry companies, armor battalions with three armor companies), and a Brigade Reconnaissance Troop (BRT), a HMMWV based asset that was the brigade commander's primary reconnaissance asset. The UA force structure has two balanced maneuver battalions with two infantry and two armor companies each, and an armed reconnaissance squadron that is capable of conducting traditional cavalry missions of zone, route, and area reconnaissance. Each maneuver battalion also has an engineer company, a brigade asset under the Legacy Force structure, and the maneuver companies have organic Small Unmanned Aerial Vehicles (SUAV).[26] This change gives the BCTs an organically combined arms capability, and they do not need to rely as heavily on the brigade to provide additional assets. Figure 5 shows the maneuver battalion organization.

[26] The SUAV system is the Raven-B UAV, a short duration (80 minutes), limited range, and low altitude system that is designed to give squads and platoons real-time intelligence in a focused area. Chapter III will discuss UAV systems in greater detail.

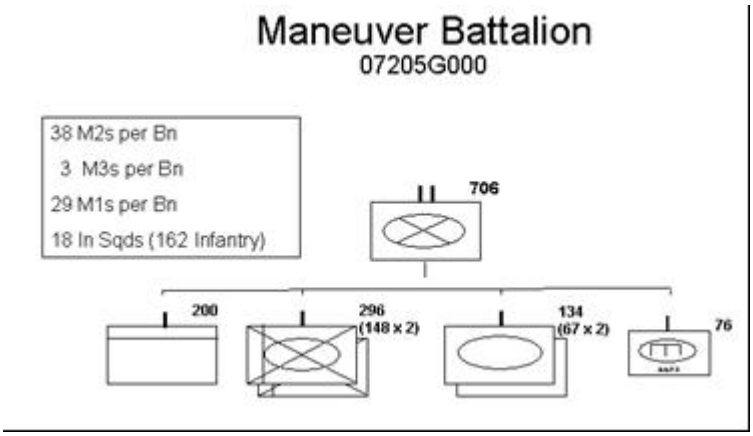

Figure 5. HBCT Maneuver Battalion Organization[27]

The armed reconnaissance battalion is the third maneuver unit in the HBCT and its existence is recognition of the need to improve the ISR capability of the brigade. The armed recon squadron consists of three cavalry troops, each with two scout platoons, a heavy mortar section, a Combat Observation and Lasing Team (COLT), as well as SUAVs at the troop level. While the squadron has replaced the third maneuver battalion and lacks the combat power of a maneuver battalion, it increases the brigade's ability to gather intelligence and gives the commander the ability to fight for information, a traditional cavalry role. Figure 6 shows the armed reconnaissance squadron's organization.

[27] Heavy Brigade Combat Team (Ch 8), Army Comprehensive Guide to Modularity, Vol 1, Version 1.0, Headquarters, US Army Training and Doctrine Command, Task Force Modularity, Fort Monroe, Virginia, October 2004, 8-4.

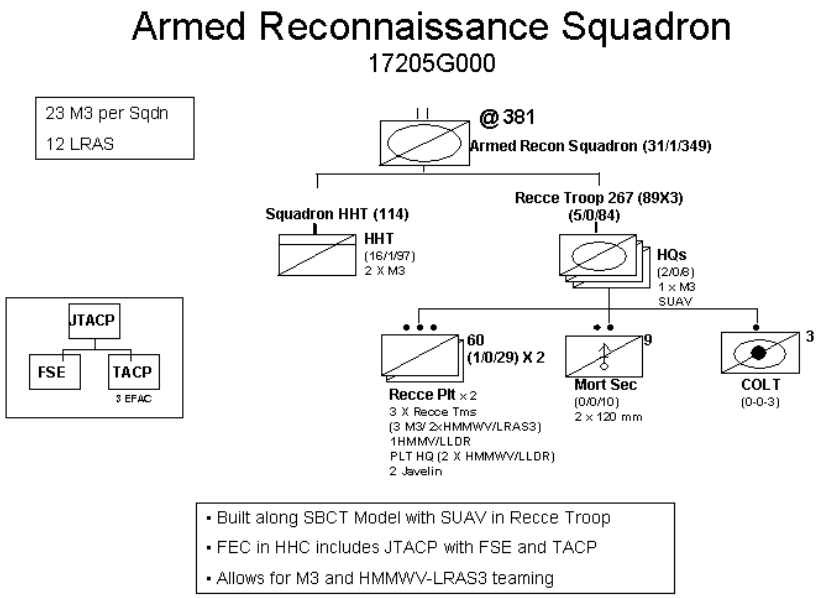

Figure 6. HBCT Armed Reconnaissance Squadron Organization[28]

The final significant change to the HBCT organization is in the Brigade Support Battalion. As in the Legacy Force, the BSB provides maintenance, logistic, transportation, and medical support to all units in the brigade, but unlike the legacy brigade the HBCT BSB pushes Forward Support Companies (FSCs) to the maneuver, armed reconnaissance, and fires battalions. The legacy force BSB had an extensive maintenance capability, but in order to utilize it battalions evacuated their vehicles to the Brigade Support Area (BSA), a large logistics site in the brigade's rear area. The HBCT reduces the need to evacuate vehicles to the BSA by attaching the FSCs, with significant maintenance capability, to the brigade's five battalions.

E. THE INFANTRY BRIGADE COMBAT TEAM

The IBCT is the second type of brigade combat team that reorganize during the Army's transformation process and will standardize infantry brigade force composition across the force. In the Legacy Force there are several different types of infantry units, all with different organizations: airborne, air assault, mountain, and standard infantry. By standardizing infantry brigades a RCC will have a greater pool of units to choose from

[28] Heavy Brigade Combat Team (Ch 8), Army Comprehensive Guide to Modularity, Vol 1, Version 1.0, Headquarters, US Army Training and Doctrine Command, Task Force Modularity, Fort Monroe, Virginia, October 2004, 8-3.

for an operation instead of being limited by brigades that cannot meet the mission requirements. Figure 7 shows the IBCT task organization.

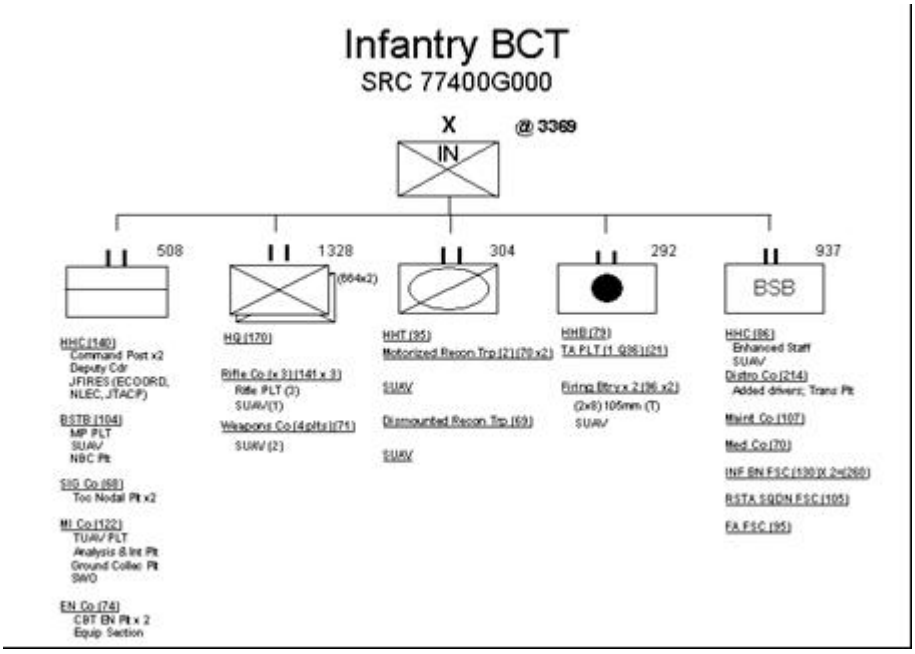

Figure 7. Infantry Brigade Combat Team Organization[29]

Like the HBCT, the IBCT consists of a BSTB, two maneuver battalions, a reconnaissance squadron, a fires battalion, and a BSB. The IBCT BSTB also consist of an MP platoon, an NBC platoon, an Area Network company, and MI company with a TUAV platoon, and an engineer company. The addition of the engineers in the BSTB is a change from the HBCT organization that has engineer platoons in the maneuver battalions.

Each of the maneuver battalions have three rifle companies, each with three rifle platoons, and a weapons company with four HMMWV-based Anti-tank (AT) and heavy machine gun platoons. Each of the four companies in the battalions are equipped with the SUAV system, as in the HBCT. A significant change to the armed reconnaissance squadron from the HBCT is instead of three mounted troops, there are two mounted and

[29] Infantry Brigade Combat Team (Ch 9), Army Comprehensive Guide to Modularity, Vol 1, Version 1.0, Headquarters, US Army Training and Doctrine Command, Task Force Modularity, Fort Monroe, Virginia, October 2004, 9-1.

one dismounted reconnaissance troops, giving the brigade an increased reconnaissance capability over the Legacy Force infantry brigade. The firing battalion in the IBCT is similar to that of the HBCT, with two firing batteries and a target acquisition platoon, though the artillery pieces are 105mm towed systems, as opposed to self-propelled 155mm systems. The IBCT's BSB also provides logistic, maintenance, transportation, and medical support to the IBCT, as well as providing FSCs to the maneuver and recon battalions.

F. THE STRYKER BRIGADE COMBAT TEAM

The Stryker Brigade Combat Team (SBCT), the Army's newest combat formation, is designed provide the Army with a rapidly deployable and highly mobile capability. Heavy brigades, while highly lethal and mobile in open terrain are not rapidly deployable and have extensive logistical sustainment requirements. Light brigades, in contrast, are very mobile in close terrain and have limited firepower. The SBCT represents a force that is mobile in open and closed terrain, is more survivable than light units, and has firepower capabilities that fall between heavy and light units. "The Stryker brigade combat team (SBCT) is designed to be a full spectrum, early entry combat force. It has utility in all operational environments against all projected future threats. It possesses significant utility for divisions and corps engaged in a major theater war; however, the SBCT is optimized to meet the challenges of smaller-scale contingencies."[30]

The SBCT is organized around the M1126 Infantry Carrier Vehicle, more commonly referred to as the Stryker, which comes in ten versions all derived from the same base chassis: M1126 – Infantry Carrier, M1127 – Reconnaissance , M1128 – Mobile Gun System, M1129 – Mortar Carrier, M1130 – Commander's Vehicle, M1131 – Fire Support, M1132 - Engineer, M1133 - Medical, M1134 – Anti-tank Guided Missile (ATGM), M1135 – NBC Reconnaissance.[31] The SBCT is organized with three motorized infantry battalions, a cavalry (RSTA) squadron, an artillery battalion, a brigade

[30] Preface to FM 3-21.31 The Stryker Brigade Team, Headquarters (Department of the Army: Washington D.C., March 2003), xi.

[31] Stryker Armored Vehicle, 10 February 2006; available from http://www.globalsecurity.org/military/systems/ground/iav.htm; Internet; accessed 12 October 2006.

support battalion, an anti-tank company, an engineer company, a signal company, and a military intelligence company. Figure 10 shows the SBCT task organization.

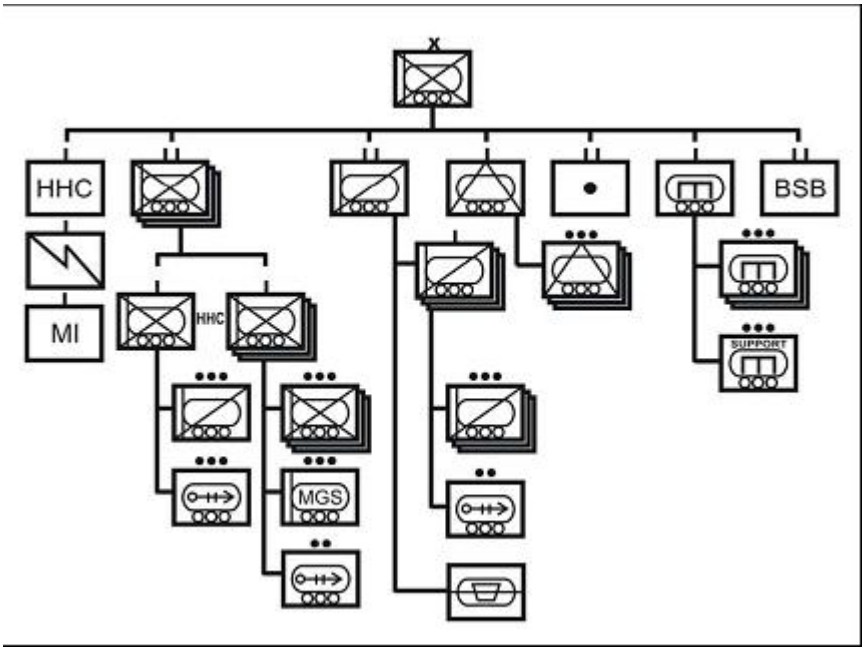

Figure 8. Stryker Brigade Combat Team Organization[32]

Another unique aspect of the SBCT, specifically within the infantry battalions, is four platoon in each company – three infantry and one mobile gun system platoons. The addition of the MGS platoons give individual companies the ability to fight as combined arms teams, incorporating dismounted infantry, infantry carrier vehicles, MGS vehicles, mortars, and snipers into operations. As with the HBCT and IBCTs, there is a TUAV platoon, though it is assigned to the RSTA squadron, and SUAVs at the company level throughout the brigade.

As this discussion of the BCT organizational changes from the Legacy to the Interim Force shows, the majority of the additional ISR capabilities are located at the brigade headquarters level of the brigades. By focusing ISR assets at brigade level, the brigade commanders is able to focus assets on his ISR collection plan, but this also limits

[32] Overview of the Stryker Brigade Combat Team (Ch 1), FM 3-21.31 The Stryker Brigade Team, Headquarters, Department of the Army, Washington D.C., March 2003, 1-13.

the ability of subordinate tactical commanders to conduct ISR operations below brigade level as there are no dedicated ISR assets in the maneuver battalions.

The following chapter will describe the specific ISR systems in the BCTs and their effectiveness in varying types of terrain and environments, showing that while there are several ISR systems in the BCTs few of them are effective in urban environments and among civilian populations.

III. BRIGADE COMBAT TEAM ISR ASSETS

A. ISR OVERVIEW

This chapter will describe the characteristics and capabilities of the Intelligence, Surveillance, and Reconnaissance (ISR) assets of the Interim Force Brigade Combat Teams (BCT). In conjunction with the previous chapter, the description of the organizational changes of the BCTs from the Legacy to the Interim Force, will highlight gaps in the ability of the BCTs to conduct ISR. Specifically, the lack of ISR assets at the battalion level limits the brigades' ability to gather intelligence at the lowest tactical level, which is necessary for success in Stability Operations and Support Operations (SASO). Describing the BCT ISR assets in detail will show that a majority of the systems are most effective in conventional conflicts or in areas away from urban areas, which limit the effectiveness of most of the BCT's assets.

The transformation of the U.S. Army from the Legacy to the Interim Force is not simply a redesign of units' organizational structures, but instead an organizational redesign focusing on increasing the capability of the units to conduct operations across the spectrum of conflict. One of the most important increases in capability within the BCTs is in their ISR[33] abilities. Though the three BCT organization types have different structures and capabilities, they all use similar, or identical in some cases, systems and thus have similar capabilities

The first asset that all the BCTs have in common is scouts, soldiers specially trained to gather information on the terrain and intelligence on an enemy force. Scouts can be used either in a surveillance role or to conduct reconnaissance. Within a Heavy BCT (HBCT) there are three reconnaissance troops in the Armed Reconnaissance squadron, each with two scout platoons, and one scout platoon in each of the two combined arms battalions. The HBCT scout platform is the M3 Cavalry Fighting

[33] FM 3-21.31, The Stryker Brigade Combat Team, defines ISR as follows: Intelligence is the product resulting from the collection, processing, integration, analysis, evaluation, and interpretation of available information concerning foreign countries or areas and information and knowledge about an adversary obtained through observation, investigation, analysis, or understanding.; Surveillance involves continuously observing an area to collect information. Wide-area and focused surveillance provide valuable information.; Reconnaissance assets collect information and can validate current intelligence or predictions. Reconnaissance units, unlike other units, are designed to collect information.

Vehicle, a variant of the M2 Bradley Fighting Vehicle. Light BCTs have three reconnaissance troops in the reconnaissance squadron, two mounted and one dismounted, and one dismounted scout platoon within each of the three infantry battalions. The mounted troops within the reconnaissance squadron are equipped with different High Mobility Multipurpose Wheeled Vehicle (HMMWV) variants. The Stryker BCTs Reconnaissance, Surveillance, Targeting, and Acquisition (RSTA) squadron has three three-platoon Stryker equipped reconnaissance troops and a surveillance troop, and each of the three infantry battalions has one Stryker mounted scout platoon.

B. SCOUTS

The individual scouts, all working as part of a cohesive ISR effort, are the best sensor on the battlefield, with specific systems simply enhancing their ability to gather intelligence on enemy forces. Scouts are effective in conventional operations in finding the enemy, determining the enemy's composition, and determining the enemy's weaknesses that maneuver units can exploit to their advantage. Scout formations encounter the same difficulty as other conventional forces when operating in an urban environment. They are unable to conduct their ISR operations unseen – a critical component of their capability, and are therefore subject to counter-reconnaissance efforts. Scouts encounter same difficulty in distinguishing enemy personnel from the civilian population. Finally, the closed nature of urban terrain negates a scout's stand-off observation capabilities and forces him to attain close physical proximity to what he is observing or gathering intelligence on.

C. LRAS3, ITAS, IBAS

Common to the three Interim Force BCT organizations are the Long Range Advanced Scout Surveillance System (LRAS3) and Improved Target Acquisition System (ITAS) / Tube-launched, Optically-tracked, Wire-guided missile (TOW) for HMMWV based units or Improved Bradley Target Acquisition System (IBAS) / TOW for M2 and M3 equipped units. LRAS3 is a "long-range multi-sensor system for the U.S. Army scout, providing the real-time ability to detect, recognize, identify and geo-locate distant targets."[34] The LRAS3's primary components are a second-generation Forward Looking

[34] Long-Range Advanced Scout Surveillance System – LRAS3, Raytheon Product Data Sheet, 2006; available from http://www.raytheon.com/products/stellent/groups/public/documents/content/cms04_017581.pdf; Internet; accessed 27 October 2006.

Infra-Red (FLIR) night sight, a global positioning interferometer, a laser range finder, and a daylight TV recording system. This system allows the scout to acquire, identify, track, and determine an exact location for anything on the battlefield in excess of 10 kilometers, and some systems are capable of laser designating targets for aircraft and artillery fires. The primary advantage this system gives the scout is the ability to survey the battlefield and identify enemy targets, while remaining out of direct fire range. The LRAS3 is a line of sight (LOS) system and cannot see personnel or vehicles that are concealed behind terrain, and its extended range capability can be severely restricted by urban terrain.

Figure 9. M1114 with a pedestal mounted LRAS3[35]

The ITAS / TOW and IBAS / TOW are day / night sight systems for the HMMWV and M3 mounted TOW system. The ITAS and IBAS are both second-generation FLIR sights like the LRAS3 and also have laser range finders, but have a shorter surveillance range than the LRAS3. Both systems allow the TOW gunner to observe well beyond the TOW's maximum range of 4.5 km, though both are also LOS systems and subject to the same degradation due to terrain and urban environments as the LRAS3.

[35] Long-Range Advanced Scout Surveillance System – LRAS3, Raytheon Product Data Sheet, 2006; available from http://www.raytheon.com/products/stellent/groups/public/documents/content/cms04_017581.pdf; Internet; accessed 27 October 2006.

D. BAIS, REMBASS-II

BCT scouts are also equipped with the Battlefield Anti-Intrusion System (BAIS) / AN/PRS-9 and the Remotely Monitored Battlefield Surveillance System – II (REMBASS-II). These systems respectively detect seismic, acoustic and seismic, acoustic, magnetic, and infrared signatures. They are remote systems that can detect vibration, sound and other environmental changes out to 350 meters, and serve to enhance defensive positions and force protection measures.[36] BAIS and REMBASS-II systems will have a reduced effectiveness in urban terrain due to the large amount of personnel and vehicle traffic associated with towns and cities.

E. MILITARY INTELLIGENCE COMPANY ISR ASSETS

The next significant ISR capabilities that the BCTs possess are organized within the Military Intelligence (MI) company. The MI companies (one per BCT) consist of the following platoons :an Analysis and Integration (A&I) Platoon, a Ground Collection Platoon, and a Tactical Unmanned Aerial Vehicle (TUAV) Platoon. The A&I platoon consists of a Situation and Target Development squad, an ISR Requirements squad, and a Common Ground Station squad. The Ground Collection Platoon's assets are a Prophet Control squad who are dedicated to operating a Prophet AN/MLQ-40 (V)3 Multi-Sensor SIGINT System, a Measures and Signals Intelligence (MASINT) squad that operates Ground Surveillance Radar (GSR) and REMBASS-II systems, and three Human Intelligence (HUMINT) sections. The TUAV platoon consists of four Shadow-200 UAVs, a launch and recovery section, and a system control section.

The primary system that the A&I platoon uses is the AN/TSQ-179 Joint Surveillance Target Attack Radar System (JSTARS) Common Ground Station (JCGS). The JCGS is does not fulfill an ISR collection function, but instead "provides support to Army field commanders by simultaneously receiving, processing, displaying, manipulating, storing, retrieving, and disseminating information to intelligence, fire support and command and control elements from Brigade to Echelons Above Corps

[36] BAIS / AN/PRS-9 – Battlefield Anti-Intrusion System, L-3 Communications Systems – East Website, 10 March 2004; available from http://www.l-3com.com/cs-east/pdf/bais.pdf; Internet; accessed 02 November 2006, and REMBASS-II / AN/GSR-8 (v) – Remotely Monitored Battlefield Sensor System – II, L-3 Communications Systems –East Website, 10 March 2004; available from http://www.l-3com.com/cs-east/pdf/rembassii.pdf; Internet; accessed 02 November 2006.

(EAC)."[37] The CGS allows the BCT to receive information from JTARS E-8A aircraft (Moving Target Indicators, Fixed Target Indicator, Synthetic Aperture Radar), AH-64 Apaches MTI, UAV data and imagery, and other strategic and national-level assets, then analyze the information, and send it a variety of other command and control, intelligence, and artillery systems.

The Ground Collection Platoon's primary systems are the AN/MLQ-40 (V)3 Prophet, AN/PPS-5D Ground Surveillance Radar, and three four-man HUMINT Teams. The Prophet system is a signals intelligence and electronic warfare platform with the primary mission to "electronically map radio frequency (RF) emitters on the battlefield from 20 MHz (High Frequency/HF) to 2000 MHz (Super High Frequency/SHF)."[38] The Prophet system can provide a Line of Bearing (LOB) to an enemy emitter, and with multiple systems can triangulate an emitter's location. Prophet is also capable of conducting Electronic Attack (EA) against a variety of emitters, effectively jamming their ability to transmit, and intercept tactical voice communications. The Prophet is a LOS system and is subject to degradation due to terrain and urban areas. An enemy force operating in urban areas will still be subject to having their electronic signals collected by the Prophet, but can use low-power and short range systems to limit the Prophet's effectiveness.

[37] AN/TSQ-179 Joint STARS Common Ground Station (CGS), FAS Intelligence Resource Program Website, 26 January 2000; available from http://www.fas.org/irp/program/process/jstars-gsm.htm; Internet; accessed 02 November 2006.

[38] AN/MLQ-40 Prophet, Global Security.org Website, 26 April 2005; available from www.globalsecurity.org/intell/systems/prophet.htm; Internet; accessed 01 November 2006.

Figure 10. AN/MLQ-40 Prophet System[39]

Within the BCTs there are multiple AN/PPS-5D Ground Surveillance Radars, both in the MI company and the Armed Reconnaissance Squadron (HBCT and IBCT) / RSTA Squadron (Stryker BCT). The GSR is a man-portable system that can detect, identify, determine a location for, and track personnel targets out to 10 km and vehicle targets out to 20km. Like other LOS systems, the GSR is susceptible to terrain masking and has limited effectiveness in urban terrain and is best suited for open terrain in conventional conflicts to detect enemy personnel and vehicles, as it cannot distinguish between friend or foe.

Figure 11. AN/PPS-5D Ground Surveillance Radar[40]

[39] L3 Communications, Titan Group Website; available at http://www.titan.com/products-services/abstract.html?docID=382; Internet; accessed 16 November 2006.

The final components of the Ground Collection Platoon are the three HUMINT teams. Each are composed of three HUMINT collectors and one Counter-intelligence (CI) agent.[41] The three teams (four in the Stryker BCT) can be used to focus on the brigade collection plan to answer the brigade commander's Priority Intelligence Requirements (PIR), or be task organized to the maneuver battalions and integrated into their respective collection plans. These soldiers are trained to conduct the following HUMINT collection and reconnaissance missions: civil-military operations support, civil disturbance support, local operational data collection, debriefing and interrogation, elicit information from the population, interrogate EPWs and detainees, document exploitation, and source screening.[42] This capability vastly improves the BCTs ability to conduct reconnaissance operations in an urban environment, though the BCT's effectiveness will be directly affected by the number of linguists / interpreters that are available to the BCT: a lack of language capability in a non-English speaking country will make the HUMINT collector and CI agent's unique capabilities largely irrelevant. Scouts traditionally observe and report on 'what' is happening on the battlefield, and the addition of the HUMINT teams further expands a commander's view of the battlefield environment by attempting to answer 'why' a particular event is occurring.

F. UNMANNED AERIAL VEHICLES

The final major addition to the BCTs capability is the incorporation of Unmanned Aerial Vehicles (UAVs) into the BCT organization. There are two types of UAVs in the BCTs, the RQ-11B Raven-B and the RQ-7B Shadow-200. The Army's goal in the Future Force is to utilize four classes of UAVs at the brigade and below, from 1 hour duration vehicles used by individual soldiers to 18-24 hour duration vehicles at the brigade level. Class I UAVs will be Vertical Take Off and Landing (VTOL), weigh approximately 15 pounds, operate effectively in urban and heavily wooded terrain, have a

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[40] Product Manager, Robotics and Unmanned Sensors website; available from https://peoiewswebinfo.monmouth.army.mil/portal_sites/IEWS_Public/rus/pps5d.htm; Internet; accessed 16 November 2006.

[41] In the RSTA Squadron of the Stryker BCT there is one HUMINT collector per six-man squad, further increasing the ability to collect HUMINT at the lowest tactical level possible.

[42] MAJ Brad C. Dostal and CPT Christine McCormick, "Preempting the Enemy – HUMINT's Role in Multidimensional Reconnaissance within the IBCT;" available from http://www.globalsecurity.org/military/library/report/call/call_01-18_ch4.htm; Internet; accessed 30 October 2006.

flight duration of one hour, and provide reconnaissance and surveillance information to the lowest tactical level. Class II UAVs will also be VTOL aircraft, have up to a two hour endurance, and provide the company commander with day, night, and adverse weather reconnaissance and surveillance capability, as well as the ability to integrate with other air and non-line of sight (NLOS) systems. Class III UAVs will be a maneuver battalion asset and provide the same capabilities as the CL I and II systems, as well as serving as a communications relay, mine detection, and meteorological survey platform. Class IV systems will be long-duration, persistent surveillance (18-24 hours) assets that provide the brigade commander with all the capabilities of CL I-III systems, in addition to electronic surveillance and the ability to cross-cue other brigade sensor systems.[43]

The Shadow-200 TUAV platoon, a Class III UAV system, is a complete system composed of four Shadow-200 UAVs, two Ground Control Stations (GCS), two Ground Data Terminals (GDT), a Portable Ground Control Station (PGCS), a Portable Ground Data Terminal (PGDT), 4 air vehicles, a Ground Data Terminal, a portable Ground Control Station, and four Remote Video Terminals. The system also includes six HMMWVs with trailers to transport the system's equipment, and 22 personnel to operate and maintain the system.[44]

Figure 12. RQ-7 Shadow[45]

[43] Future Combat System (FCS) Fact Files, U.S. Army Website, 03 November 2006; available at http://www.army.mil/fcs/index.html; Internet; accessed 08 November 2006.

[44] Tactical Unmanned Aerial Vehicle (TUAV) Concept of Operations (CONOPs), 22 March 2000; available from www.fas.org/irp/programs/collect/docs/TUAV-CONOPS.htm; Internet; accessed 31 August 2006.

[45] RQ-7 Shadow; available from http://en.wikipedia.org/wiki/RQ-7_Shadow; Internet; accessed 17 November 2006.

Both the IBCT and HBCT have one TUAV platoon in the MI Company, while the SBCT has one TUAV platoon in the surveillance troop of the armed reconnaissance squadron. The TUAV platoon, and the Shadow-200, is the "ground maneuver commander's primary day/night, Reconnaissance, Surveillance, and Target Acquisition (RSTA) system"[46] and can assist his efforts to increase his situational awareness of enemy forces, provide a target acquisition capability, conduct a battle damage assessment, and enhance the commander's understanding of the battlefield environment. The mission of the TUAV platoon "is to provide a real-time, responsive day and night imagery surveillance and reconnaissance capability to support SA [situational awareness], TA [target acquisition], and BDA [battle damage assessment] to brigade and below units."[47] The Shadow aircraft and its sensor payload are both capable of conducting preprogrammed or operator-controlled operations.

The most important characteristics of the Shadow-200 are its operating altitude, flight duration, payload, and the range that it can operate away from its control station. The Shadow's maximum operating altitude is approximately 15,000 feet AGL, though it is most often operated lower than 10,000 feet. This relatively high altitude capability allows the Shadow to conduct surveillance without presenting an audio signal to targets on the ground, preventing targets from knowing that they are being observed.[48] The Shadow's flight duration is approximately five hours, giving it the ability to loiter over a target area, provide persistent surveillance capability to the brigade commander. A payload capacity of 60 lbs. allows the Shadow to carry a variety of sensors. Currently, the Shadow's payloads consist of Electro-optical / Infrared video sensors, laser designators, and a Radar Frequency Interferometer (RFI) that can determine grid locations for ground targets. The variety of payloads that the Shadow can carry give the BCTs the ability to observe a location, find an enemy target, determine the target's location, and designate the target for attack by other systems – artillery, rotary, and fixed

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[46] Tactical Unmanned Aerial Vehicle (TUAV) Concept of Operations (CONOPs), 22 March 2000; available from www.fas.org/irp/programs/collect/docs/TUAV-CONOPS.htm; Internet; accessed 31 August 2006.

[47] FMI 3-04.155, Army Unmanned Aircraft System Operations, (Headquarters, Department of the Army: Washington, D.C.), April 2006, 1-9.

[48] CW3 Steve Schisler, Raven/SUAV TRADOC Systems Manager – Unmanned Aerial Vehicle Systems, "RE: Thesis," Email to author, 15 November 2006.

wing aircraft. Finally, the Shadow is capable of operating up to 50km away from a GCS, as long as the GCS and aircraft can maintain a LOS connection. This gives the brigade the capability to conduct reconnaissance and surveillance well away from ground operations, allowing U.S. forces to remain out of contact with enemy forces.

The RQ-11 Raven-B, a CL II UAV, is fielded to Army units as a system consisting of three Raven aircraft, three different payload sensors (1xElectro-optical and 2xInfrared), a remote video terminal (RVT), and the unit's ground control unit (GCU).[49] It is a man-portable system providing near real-time (NRT) day and night surveillance to platoons and companies.[50]

Figure 13. RQ-11 Raven

Within the HBCT and IBCT there are a total of 15 three-aircraft Raven-B systems: three per reconnaissance squadron, four per maneuver battalion, two per artillery battalion, one in each support battalion, and one system in the special troops battalion. The SBCT also has 15 Raven systems, with one in the brigade Headquarters and Headquarters Company (HHC), three systems per infantry battalion, four systems in the RSTA squadron, and one in the artillery battalion.[51]

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[49] Army Unmanned Aircraft Systems, FMI 3.04-155 Army Unmanned Aircraft Systems Operations, (Headquarters, Department of the Army: Washington, D.C.), April 2006, pages 2-10 to 2-13.

[50] A Naval Postgraduate School thesis titled "The Raven Small Unmanned Aerial Vehicle (SUAV), Investigating Potential Dichotomies Between Doctrine and Practice," written by MAJ Glenn Jenkins and MAJ William Snodgrass, Jr. (30 June 2005), provides a detailed analysis of the doctrinal and actual uses of the Raven UAV, and describes the acquisition processes used to field the system.

[51] Steve Schisler, CW3, Raven/SUAV TSM-UAVS, "Modular Forces – Draft Working Papers" Powerpoint Presentation, November 2006, Email to author, 15 November 2006.

The characteristics of the Raven-B that make it an effective ISR platform are its battery powered motor, small size, and payload capability. The Raven has a battery powered motor and propeller, giving it a 60-90 minute flight duration and low observable audio signature. This enables the Raven to operate at altitudes up to 1000 feet and have a low probability of detection. The Raven is also a small aircraft with a wingspan of 4.5 feet, further contributing to its ability to remain undetected. The Raven has three interchangeable payloads – one electro-optical, one side looking infrared, and one forward looking infrared – that allow it operate day or night.[52]

To date, the manufacturer of the Shadow-200, AAI Corporation, has delivered 51 systems to the Army, and these systems have flown over 28,000 missions with over 110,000 flight hours, in support of Operations Iraqi and Enduring Freedom (OIF / OEF).[53] Similarly, the Raven has flown over 15,000 missions totally over 18,000 flight hours in support of OIF and OEF.[54] With the extensive use of UAVs in combat, Army force are beginning to develop Tactics, Techniques, and Procedures (TTPs) and doctrine for their use. FMI 3-04.115, Army Unmanned Aircraft System Operation, provides doctrinal guidance on UAV employment, but focuses exclusively on UAV support to conventional operations.

G. UAV EMPLOYMENT

In Iraq and Afghanistan, soldiers are using the Shadow and Raven for a wide range of mission from traditional reconnaissance missions to supervising Iraqi National Guard mission performance. Specifically, the Shadow and Raven systems are in use conducting reconnaissance prior to and during cordon and search and raid operations, conducting area reconnaissance, route reconnaissance, convoy escort and security missions, IED emplacement detection, observing Iraqi forces checkpoints and patrols,

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[52] Army Unmanned Aircraft Systems, FMI 3.04-155 Army Unmanned Aircraft Systems Operations, (Headquarters, Department of the Army: Washington, D.C.), April 2006, page 2-11.

[53] "AAI Corporation Receives Unmanned Systems Contract," Spacewar Website, 17 October 2006; available from http://www.spacewar.com/reports/AAI_Corporation_Receives_Unmanned_Systems_Contracts_999.html; Internet; accessed 16 November 2006.

[54] "AeroVironments Raven Achieves Production Operational Milestones," Spacewar Website, 16 March 2006; available from http://www.spacewar.com/reports/AeroVironments_Raven_Achieves_Production_Operational_Milestones.html; Internet; accessed 16 November 2006.

counter-mortar operations, initial targeting of enemy forces, and Forward Operating Base (FOB) security missions.[55] Both systems are demonstrating the effectiveness of UAVs at the tactical level, in missions ranging from combat operations to stability and support operations. UAVs are also proving to be the only BCT systems that can effectively conduct ISR operations in densely populated urban environments, allowing the BCT to collect information that it otherwise would not be able to collect.

The Shadow and Raven systems, while both in use within the Interim Force BCTs, were not both originally part of the Army's transformation plan. The TUAV Shadow platoon has been a part of the process from the origins of the transformation process and has proceeded through the new Joint Capabilities Integration and Development Process, the Department of Defense's (DOD's) latest acquisition process. Conversely, the Raven's integration into the transformation process is based on an Operational Needs Statement from commanders who wanted an "over-the-hill, around-the-corner capability."[56] The requirements for a system that could provide the needed capabilities originated in 2001 during Operation Enduring Freedom, and it was fielded through a Rapid Equipping Force beginning in 2003.[57]

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[55] CW3 Steve Schisler, Raven/SUAV TRADOC Systems Manager – Unmanned Aerial Vehicle Systems, "Shadow 200 TUAV Baghdad TTPs and Issues" and "Raven Vignettes, 17 APR 05," "RE: Thesis," Email to author, 15 November 2006.

[56] Charles Weirauch, "Playing the UAV Hand," MS&T – The International Defence Training Journal, February 2006, 40.

[57] The Army's Rapid Equipping Force is a means to assess emerging requirements of combatant commanders and to suggest solutions that can be implemented rapidly. Beyond that need, solutions must be evaluated for their possible contribution to the future force.

IV. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

As the largest component of the Army, conventional forces are regularly called to participate in conflicts that are not conventional in nature. These forces need to be able to conduct operations across the spectrum of conflict, from high intensity conflict to peacekeeping operations and all operations in between. Critical to the success of conventional forces in any conflict is their ability to conduct Intelligence gathering, Surveillance, and Reconnaissance (ISR) to first see the battlefield environment and then conduct operations that influence that environment. In conventional conflicts there are significant national and strategic assets that collect, analyze, process, and disseminate intelligence to forces for use in the field. These assets are ill suited to gathering the real-time intelligence that conventional forces need to be successful in unconventional conflicts, specifically counterinsurgency and urban operations. In the Army's transformation from the Legacy Force to the Interim Force, and eventually the Future Force, there are significant additions to the modular Brigade Combat Teams (BCTs) that specifically address the BCTs' ISR capability, both organizationally and through the addition of specific ISR systems.

Organizationally, the Heavy BCTs have changed from having three combat arms battalions to having two combined arms battalions and an armed reconnaissance squadron, the Light BCTs maintained their three infantry battalions and added a reconnaissance squadron, and the Stryker BCTs, a completely new Army organization, are organized around three infantry battalions and a cavalry squadron. The transformation plan also adds a military intelligence company to each BCT, and incorporates the Raven-B UAV to the maneuver companies in the combined arms and infantry battalions, giving them an increased ISR capability at the lowest tactical level. In Legacy Force brigades the only dedicated ISR assets were a brigade reconnaissance troop and three scout platoons, one in each of the maneuver battalions. Converting a maneuver battalion into a reconnaissance squadron and adding a military intelligence company in the BCTs reflects the need for increased capability at the brigade level to generate tactical level intelligence and conduct more robust surveillance and

reconnaissance missions. The addition of reconnaissance squadrons in the BCTs gives the BCTs hundreds of additional scouts. Despite the additional reconnaissance capabilities of the BCTs, both at the brigade and company level, there is an ISR gap within the combined arms battalions that the organizational redesign did not address. The HBCT combined arms battalions, LBCT infantry battalions, and SBCT infantry battalions do not have a battalion-level dedicated, improved ISR capability over the Legacy Force battalions.

To augment the organizational changes in the BCTs, the Army is adding new, and increasing the numbers of existing, ISR systems within the BCTs. The addition of Ground Surveillance Radar (GSR), Long Range Acquisition Scout Surveillance System (LRAS3), Improved Target Acquisition System (ITAS) and Improved Bradley Acquisition System (IBAS), Remote Battlefield Surveillance System (REMBASS-II), Common Ground Station (CGS), Prophet Signals Intelligence (SIGINT) system, and the Shadow-200 and Raven-B Unmanned Aerial Vehicles (UAVs) augment the BCT organizational changes and enhance their ISR capabilities. These systems are predominantly organized within the MI company and the reconnaissance squadrons, and do not significantly enhance the combined arms and infantry battalion's ISR capabilities. A majority of these systems are limited in that they are Line of Sight (LOS) systems and are significantly degraded by rolling and wooded terrain, as well as urban environments.

Organizing the BCTs in this manner provides several advantages over Legacy Force units. First, regional commanders can tailor the forces that they need to accomplish their missions. With commanders able to select individual brigades instead of entire divisions, the brigades would lose their access to traditional divisional assets like Military Police (MP), Chemical, and Military Intelligence (MI). As such, the BCTs contain small elements of these units, increasing their flexibility and ability to operate independent of divisional support and augmentation. The Interim Force BCTs also all contain organic reconnaissance units, allowing them to conduct the conventional intelligence, reconnaissance, and surveillance missions normally conducted by divisions. The BCTs also retain the combat power of the Legacy Force units, ensuring their ability

to maintain dominance over conventional enemies. Organizing the BCTs as they are in the Interim Force improves their ability to operate independently while retaining their conventional combat power.

"In urban operations, the one commodity a close-combat soldier or Marine demands most is knowledge of the enemy waiting around the street corner in ambush."[58] The Shadow and Raven UAVs are the only systems in the BCT organization that can effectively provide this level of intelligence in a variety of environments, in a variety of conflict types.

B. RECOMMENDATIONS

To capitalize on the effectiveness of the Shadow and Raven UAVs, and the unprecedented ability they give commanders to see aspects of the battlefield that were previously unavailable to them, the author recommends incorporating the Shadow Tactical Unmanned Aerial Vehicle (TUAV) platoon into each maneuver and reconnaissance battalion and squadron in the BCTs. As BCTs are currently using the Raven-B at the company level, the author will make no recommendations regarding their implementation or operation. By adding TUAV platoons to each of the maneuver units in the BCTs, the brigade will have ISR capabilities at all organizational levels – brigade, battalion, company, and platoon. Providing ISR capabilities throughout the depth of the BCT organizations ensures that "[a]ll operations [can] be shaped by carefully considered actionable intelligence gathered and analyzed at the lowest possible levels and disseminated and distributed throughout the force."[59]

Battalion is the lowest recommended implementation for the TUAV platoon because battalions have sufficient staffs to integrate UAVs into a comprehensive ISR plan, and monitor and control their use during operations. Company level units do not possess a staff beyond the commander, executive officer, first sergeant, and a few soldiers, and therefore have a limited capability to plan and supervise complex combined arms missions. Companies are instead primarily the executors of, and key components of, combined arms missions that are planned at brigade and battalion level. Incorporating

[58] MG (ret.) Robert H. Scales, "Urban Warfare: A Soldier's View," *Military Review*, January – February 2006, 11.

[59] Eliot Cohen and others, eds., "Principles, Imperatives, and Paradoxes of Counterinsurgency," *Military Review*, March-April 2006, 50.

TUAV platoons at the company level will make a company commander's job unnecessarily complex, and force him to focus more on the planning and controlling the employment of UAVs and less on the actions of his subordinate combat platoons.

Battalions, conversely, have significant dedicated staffs whose sole purpose is to plan and supervise the execution of combined arms operations. By adding TUAV platoons to maneuver battalions the TUAV platoon leader and warrant officer will become members of the battalion staffs, and be able to provide their expertise and experience in integrating UAVs into battalion operations. This will enable the battalion to exploit the capabilities of the TUAV platoon while allowing company commanders to focus on employing their platoons.

As currently organized, maneuver battalions in the BCTs have no improved ISR capability over the Legacy Force battalions, limiting their ability to conduct ISR missions in counterinsurgency and urban environments. As discussed in Chapter I, success in counterinsurgency operations, specifically when insurgents embed themselves into a civilian population, requires a capability to observe the population and gather intelligence on the insurgents without influencing their behaviors. Chapter III shows that UAVs are the only ISR asset in the BCTs that provide an observation capability without directly influencing the behavior of the target. Having a single TUAV platoon in each brigade limits the ability of BCTs to conduct persistent ISR operations in more than one location at a time. Current and past operations in Iraq and Afghanistan have had brigades responsible for large areas of operation (AO), often encompassing significant urban areas. Within these AOs, subordinate battalions will each be responsible for contiguous sectors, resulting in brigade AOs that encompass several battalion AOs. One TUAV platoon per BCT forces the brigade commander to prioritize where to employ the surveillance capabilities of the Shadow-200, where one TUAV platoon per battalion would allow a BCT's subordinate battalions to conduct simultaneous UAV surveillance missions.

C. DOTMLPF CONSIDERATIONS

The following section will address the Doctrine, Organization, Training, Material, Leadership and Education, and Personnel and Facilities (DOTMLPF) considerations for incorporating the Shadow TUAV platoon into maneuver battalions with the Interim Force BCTs.

1. Doctrine

To effectively incorporate UAVs into battalions there needs to be a sound doctrinal template for employing them across the spectrum of conflict. The current Field Manual that covers UAV operations, FMI (Interim) 3-04.115, does not adequately address all operations in which UAVs can be utilized. FMI 3-04.155, Chapter 5 – Unmanned Aircraft System Employment, covers reconnaissance and surveillance, security operations, unmanned aircraft system targeting, manned-unmanned team operations, and personnel recovery missions, but does not address UAV operations in urban areas or how UAVs can affect the variety of missions encompassed by Stability Operations and Support Operations.[60] The use of Raven and Shadow UAVs in Operations Iraqi and Enduring Freedom are providing a wealth of tactics, techniques, and procedures (TTPs) in the area of UAV capabilities and employment. These TTPs should be transformed into doctrinal templates prior to the fielding of the Future Force, which will be use unmanned systems much more intensively than the Legacy or Interim Forces.

2. Organization

The Army's BCTs have set personnel limits with specific allocations for number of personnel assigned, and whether or not a position is filled directly affects the Army's personnel replacement system. The personnel system is also a zero sum game – once personnel limits are set, adding a position requires removing a position from elsewhere in the organization. To add a TUAV platoon to a battalion requires removing 22 positions from another part of the battalion. Additional studies should determine what areas of the battalion organization can sustain losses of personnel to enable adding the 22 TUAV platoon personnel.

[60] FM 3-07, Stability Operations and Support Operations, list the various SASO missions as Foreign Internal Defense, Peace Operations (Peacekeeping and Peace Enforcement), Stability Operations (Security Assistance, Humanitarian and Civic Assistance, Support to Insurgency, Support to Counterdrug Operations, Combating Terrorism, Noncombatant Evacuation Operations, Arms Control, Show of Force), and Support Operations (Domestic Support Operations, Foreign Humanitarian Assistance).

3. Training

To accommodate the additional personnel requirements of 22 trained personnel per combined arms and infantry battalion, the Military Intelligence School at Fort Huachuca, AZ, will have to expand it ability to train additional UAV operators. This will require an expansion of all aspects of UAV operator training, including Basic Training, the Non-commissioned Officer Education System (NCOES), and the Officer Basic Course (OBC).

4. Material

To procure the additional TUAV platoons the Army will have to alter its budget projections, and allocate an approximately $10 million per platoon.[61] By adding at least two TUAV platoons to each BCT that has one platoon, the budgeting necessary to purchase the additional platoons will at least triple the previous budget allocations for the system. Additional UAV platoons in all BCT maneuver battalions will also require a long term investment to account for additional operators and their training, as well as maintenance and replacement costs for the UAV systems throughout their lifecycle.

5. Leadership and Education

Simply adding a new system to an organization does not ensure that the system will increase the effectiveness of the organization. Trained personnel, specifically those in leadership positions that will be planning the system's use and controlling its implementation, are essential. To ensure that the Army's leaders know how to incorporate UAVs into their operations, the Armor and Infantry Schools should integrate UAV capabilities and employment training into all non-commissioned officer and officer education systems.

6. Personnel and Facilities

To support the additional aircraft in the BCTs it will be necessary to expand the support personnel and facilities at stateside Army posts. This includes, but is not limited to, hanger and maintenance facilities at Army airfields, additional training areas that support UAV employment, and contractor support facilities.

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[61] Matthew Swibel, "Learning to Fly," Forbes.com Website, 30 October 2006; available from http://www.forbes.com/free_forbes/2006/1030/184.html; Internet; accessed 13 November 2006.

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