

THE PROMISE OF PRECISION

BY

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USAWC STRATEGY RESEARCH PROJECT

THE PROMISE OF PRECISION

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ABSTRACT

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THE PROMISE OF PRECISION

Although he might be intimidated by the firepower and technology of his opponent for a while, recent experience seems to indicate that initial uncertainty turns first to familiarity and then often to contempt when the insurgent discovers that napalm is not the atomic bomb, and shells, no matter how destructive, can do little harm when dropped in the wrong place.¹

—MG Robert H. Scales, Jr., USA (Ret)
Firepower in Limited War

Americans are famously enamored by gadgets, machines, and the latest technology; their military is no different. For generations, the United States military has relied on technology and machines to reduce the need for men, and on firepower to lessen the number of friendly casualties. This replacement of metal for lives has usually proven a fair exchange. Unfortunately, as the power of technology and the precision of weapons has grown, so too have the unrealistic expectations. The United States tends to overestimate the benefits derived from using military power; the belief that technology and precision weapons promise easy, speedy and bloodless wars reinforces that tendency and has proven alarmingly seductive and hard to resist.

The latest incarnation of this over-confidence in technology is the now discredited “transformation” of the military led by Secretary of Defense Donald Rumsfeld. Secretary Rumsfeld sought a smaller, more agile, more responsive, and even more high technology reliant military. This network-centric rather than platform-centric force would rely less heavily on large formations using traditional weapons and more heavily on “stealth, precision weaponry and information technology.”² The United States would transition from an “industrial age” to an “information age” military.³ As an added bonus, technology would allow the United States to do more with less -- less money, less

equipment, less personnel and less bloodshed. Unfortunately, a force with the very traits desired by the proponents of transformation, a force that achieved a remarkably swift and relatively clear-cut victory over the Iraqi military in 2004, quickly proved less than capable of managing that country in the wake of the fighting, and in defeating the resulting insurgency. This near disaster in Iraq has made even the term “transformation” unpopular and has once again shattered the promise that any form of technology, including precision weapons, is a universal remedy for the difficulties of war --- at least for now.⁴

That transformation oversold the supremacy of technology and the capabilities of precision weapons now seems to be well understood. “Balanced forces,” “counter-insurgency,” “boots-on-the-ground” and other manpower intensive policies and terms are now fashionable. In fact, recently both the Army and the Marine Corps have dramatically increased both their numbers of personnel and traditional weapons platforms such as armored vehicles.⁵ Nonetheless, the military continues to struggle with the role of technology, trying to balance the mistakes and accomplishments of recent years without overreacting or overcorrecting -- all while technology advances at the brisk pace common during wartime. Technology, firepower and precision weapons remain at the heart of how the American military fights, and will play an even more important role in the future. Still, precision weapons, like strategic airpower and nuclear weapons before them, are not now, nor will they ever be, the only answer. No matter the power of technology or the precision of weapons, humanity, as ever, will prove resilient in the face of his enemy’s reported dominance. This paper contends that recent history reconfirms the need for a balanced military, consisting of different

services and arms, capable of operating in all levels of war and scaling its actions to the threat at hand; a military force that considers precision weapons as one of its many options. This paper will also recommend changes necessary to more effectively use precision weapons. Since, despite the professed American dedication to technology, the military still has not taken all the steps necessary to exploit fully the capabilities of precision weapons.⁶

The Progress of Precision

Throughout history, most bullets, artillery rounds and bombs missed their targets. During the daylight bombing of Germany in World War II, hundreds of American B-17 bombers, dropping thousands of bombs, were required to guarantee a single hit on a 300-meter long target.⁷ However, in the past several decades, the orders of magnitude improvements in the accuracy and dependability of precision weapons -- and in the capabilities of surveillance and targeting networks that identify targets, deliver targeting data, obtain permission to fire, and control weapons over great distances -- cannot be exaggerated.⁸ In a number of recent conflicts, precision weapons have consistently demonstrated the ability to hit a precisely known target. Precision weapons are routinely accurate to within less than fifteen meters of a target; whether fired by howitzers from 20 kilometers, dropped by aircraft from 15,000 feet, or launched by ships from hundreds of kilometers.⁹ American forces can “increasingly see most of what the enemy’s forces are doing, to hit most of what they see, and to damage most of what they hit.”¹⁰ Though the world is no longer impressed by nightly news film of a missile flying through a window, this ability can dramatically influence a potential target. In an interview conducted after Operation Iraqi Freedom, while discussing air attacks on one of his battalions, an Iraqi division commander stated, “The level of precision of those

attacks put real fear into the soldiers of the rest of the division. The Americans were able to induce fear throughout the army by using precision air power.”¹¹ Additionally, the commander of the Al-Nida Armored Division, considered the best equipped division in the Iraqi Army, declared that the damage caused by, and the fear of, precision airpower essentially dissolved his Division; 12,000 of his 13,000 men were killed, or more likely, deserted.¹² Iraq learned that in high-intensity wars between industrial-age militaries, the side without standoff precision weapons becomes merely a list of targets.

While precision weapons became more accurate, they, and the aircraft that often carry them, became better able to operate in poor weather. The targeting systems and control processes also improved, becoming quicker, more flexible and more able to support a moving ground force. As a result, the capacity to divert a munition or an aircraft on to an emerging target progressed dramatically. In Operation Desert Storm, only 20% of aircraft sorties received initial or updated targeting data after takeoff. By Operation Iraqi Freedom, 90% of sorties received additional target information, or new targets, after takeoff.¹³ In addition, while the accuracy of precision munitions was increasing, their average cost was decreasing. The most commonly used precision weapon during Operation Enduring Freedom was the Joint Direct Attack Munition (JDAM), a guidance kit that converts a conventional bomb into a precision bomb. A relative bargain at \$18,000 per kit, JDAMs were far cheaper than the \$1 million Tomahawk cruise missile, which was the most commonly used precision weapon in Iraq ten years before.¹⁴ Not surprisingly, the American military has grown more reliant on precision weapons. According to a Government Accounting Office report, aircraft are

using an ever-increasing percentage of precise munitions: 8% in Operation Desert Storm, 30% in Allied Force, 60% in Enduring Freedom and 68% in Iraqi Freedom.¹⁵

A Balanced Force

In the wake of the transformation controversy, and the recognition that small, technology-based military forces are not necessarily the solution for all wars, “balance” has become the new catchphrase. Financially, the United States cannot afford multiple military forces, each designed to fight one specific kind of war. Nor can it gamble on only one kind of force, designed to fight only one kind of war. The United States must build and maintain a military that can operate at all levels of war against all types of enemies -- a force designed to change in response to the task assigned. Likewise, the requirements for firepower, precise or not, depends upon the type of war, the terrain and the nature of the enemy. A military that relies on a relatively few weapon systems firing a relatively few types and number of munitions, no matter how precise, will not meet that goal. Despite the many advances in, and success of, precision weapons, during recent combat operations, alone they were simply not enough.

Promises Unfulfilled

Many saw the remarkable American victory against the Taliban government of Afghanistan during 2001-2002 as proof of the power of a transformed military. Specifically, that a small number of Special Forces soldiers using air-delivered, precision weapons in support of a local, allied military can win a war -- the United States can have an outsized impact with few forces on the ground. A closer examination of the conflict exposes a more complicated lesson. At the outset, the accuracy and destructive power of the Americans astonished the Taliban and caused significant casualties. However, the Taliban learned quickly and hurriedly employed techniques

traditionally used against an enemy with strong fire support, namely: camouflage, concealment, dispersion, deception, fortification and the use of primitive communications techniques that are difficult to intercept. As the fighting continued, the American Special Forces found it increasingly difficult to identify Taliban targets. Even when found and struck, well-prepared Taliban positions often withstood repeated strikes by air-delivered precision weapons. In the end, Afghan soldiers and American infantry defeated determined Taliban with the traditional combined arms techniques of fires to suppress targets followed by close-quarters fighting.¹⁶

A careful look at Operation Iraqi Freedom also confirms the need for a coordinated combination of precise, conventional, air-delivered and ground-delivered munitions. Air-delivered precision weapons were used almost exclusively, and to great success, during the opening phase of the war. Once American forces directly engaged Iraqi forces however, precision munitions became only one of many weapons required. In the confusion of combat, American forces often did not have the precise intelligence essential to use precision weapons. Even if the intelligence was attainable, American forces did not necessarily have the time to gather and analyze the intelligence and methodically strike each target. Bad weather, poor visibility due to fog or smoke, lack of or wrong intelligence, actions of the enemy to hide his forces and the need for quick action all contributed to the use of traditional, massed volleys of mortar, cannon and rocket fire.¹⁷ In many instances, massed fires, despite the associated collateral damage, was the best choice. In eight days of battle in and around An Nasiriyah, 1st Battalion, 10th Marines fired 2,100 artillery rounds; 98% of which were either conventional high explosive or cluster rounds. In one instance, a windstorm prevented

the use of any other weapon system, including ground-based anti-tank missiles, so conventional artillery fire destroyed an entrenched tank.¹⁸ At Al Kifl, 1st Battalion, 41st Field Artillery and 1st Battalion, 10th Field Artillery “fired countless close fire missions as 1st Brigade repelled wave after wave of enemy foot soldiers.”¹⁹ Precision weapons alone proved unable to respond quickly enough in a dynamic and chaotic environment full of multiple and especially moving targets. Despite the power of technology, sometimes physical proximity, and the resulting greater coordination and control over that asset, ensured the use of mortars, artillery or helicopters. Precision weapons were also not effective at suppressing large numbers of un-located enemy. It was often impossible to identify, locate and target the huge number of targets available; the answer was the combination of direct fire, massed artillery and mortar fire, and the large-scale drops of conventional bombs from aircraft. Outside Baghdad on 6-7 April 2003, elements of the 3rd Brigade of the 3rd Infantry Division were hit by artillery and mortar fire, and attacked by an Iraqi combined-arms force of tanks, armored personnel carriers and dismounted infantry. In a 12-hour long fight, the Brigade stopped the attack with direct fire from 25mm cannons and 120mm tank guns, indirect fire from 120mm mortars and 155mm artillery and A-10 aircraft conducting low, strafing passes. Returning to a technique of earlier wars, artillery and mortars fired a 30-minute “final protective fire” to form a protective wall of metal between a beleaguered American unit and an attacking company-sized Iraqi force.²⁰ At As Sawawah, artillery from the 82^d Airborne Division fired 20-minutes of high explosive and smoke-producing projectiles to both suppress enemy fire and to obscure enemy observation while American forces crossed a 250-meter long bridge.²¹ Regularly lost in the love affair with precision

weapons is the value of suppressive fires in concert with maneuver forces and of mass, non-precise fires.

In Iraq, fighting in urban areas also proved incredibly complicated, requiring every type of direct, indirect, precise and conventional fire available. During the November 2004 recapture of Fallujah, finding a determined enemy in solidly built urban terrain was grueling and time consuming. While an imbedded journalist with a Marine infantry company in Fallujah, Dexter Filkins writes of a sniper who fired at Marines from a large, well constructed three-story building. Marines responded with rifle and machinegun fire, then grenades and artillery; the sniper continued to fire. Aircraft dropped a 2,000-pound and a 500-pound bomb into the building; the sniper continued to fire. Finally, an M-1 tank fired ten 120mm cannon rounds. Much to the shock and chagrin of the watching Marines, the enemy sniper snuck out the back of the building and road away on a bicycle.²² In Iraq, precision weapons proved less valuable than expected exactly where needed most -- against insurgents and in urban terrain. Insurgents were adept at hiding among civilians and were therefore very difficult to identify and to strike without causing civilian casualties. The many buildings in urban environments were essentially readymade fortifications, providing insurgents a multitude of protected positions to fight from and concealed routes to move along.

Despite the claims of proponents of precision weapons and of air power acting alone, a closer examination of NATO's 1999 Operation Allied Force against the Federal Republic of Yugoslavia also shows perhaps not a Pyrrhic victory, but definitely a troubled one.²³ The 78-day air campaign ultimately either caused or contributed to the Serb withdrawal from its erstwhile province of Kosovo, depending upon one's

perspective.²⁴ However, this victory does demonstrate many of the pitfalls of over-reliance on precision weapons and airpower. Serbia's clever and patient use of its 1960s-era air defense system was surprisingly effective at exploiting NATO's fear of casualties. This fear forced NATO aircraft to change their preferred tactics and to fight from much higher altitudes.²⁵ This fact is even more alarming in that much more capable air defense systems are available on the international arms market. While NATO aircraft fought a high-technology war from 15,000 feet, Serbia consciously responded with paramilitary and irregular forces hiding among the population and operating absent technology.²⁶ NATO's unwise announcement that it would not introduce ground forces allowed the Serbs to choose to operate in ways difficult to counter from the air; with small groups of widely dispersed troops using small arms and light vehicles, hiding in the difficult terrain common in the Balkans. Serb forces successfully used dispersion, deception and camouflage, along with the emplacement of previously destroyed equipment, to fool aircraft. A dummy bridge made of plastic sheets was reported "destroyed" in a number of air strikes.²⁷ Most importantly however, while NATO bombed, Serbian forces dramatically increased the scale of the ethnic cleansing of Kosovar Albanians from Kosovo -- the prevention of which was one of NATO's key goals of the conflict. Because from 15,000 feet aircraft could not differentiate irregular military forces from civilians, Serbian forces in Kosovo could not be struck effectively until the Kosovo Liberation Army forced them to operate in the open.²⁸ Often it takes units on the ground to compel an enemy to deploy his forces in a way that makes those forces vulnerable to precision weapons. Despite recent improvements in the ability of aircraft to fly in all types of weather, adverse weather also

greatly hampered air operations. Though the weather experienced was not outside the norm expected in the region, on 39 of the 78 days of the air campaign, at least one-half of all planned sorties were canceled. On only 24 of the 78 days could aircraft fly unhindered.²⁹ Weather, along with the fear of anti-aircraft weapons and the great distances from support bases to targets, all contributed to the fact that it took a surprisingly large percentage of NATO's aircraft to sustain what was a lackluster bombing pace against a third-rate opponent.

Airstrikes and missiles were very successful at destroying fixed sites like bridges, factories and power facilities. However, strikes on "key nodes" and "vulnerability points" did not easily debilitate Serbia's agricultural-based economy.³⁰ Strikes against mobile targets were also less successful. The optimistic assessments of damages to Serbian ground forces publicized during the conflict were revised a number of times, and always downward, after the fighting. Multiple and conflicting reports were eventually published, but even the most optimistic report does not claim, nor could it prove, significant reductions to Serbian military strength.³¹ That it took longer than expected for Serbia to submit to a measured and relatively modest air campaign should not be a surprise. The capacity of modern nation-states, from Britain, Japan and Germany in World War II, and later North Korea, North Vietnam and even Iraq, to withstand massive amounts of bombing is well understood. To expect precision weapons to accomplish what massive firepower often cannot, namely to break a nation's will to resist, is wishful thinking. It is hard to underestimate a dedicated enemy's ability to sustain and to suffer; it is easier to do both against precision attack.

Finally, the continued technological sophistication of the US military has had some incongruous and unintended consequences. The mere existence of a large, powerful, high-intensity war focused -- and expensive -- American military deters potential enemies from developing a like force. However, by broadcasting its dependence on technology and precision weapons, the United States and other high-technology dependant forces, are driving current and budding enemies towards devising ways to defeat those systems, to develop their own precision systems, and to operate "asymmetrically." The world has already seen the consequences of technological advances in anti-armor, anti-ship and anti-air weapons. In Lebanon in 2006, the Israeli Defense Force (IDF) was profoundly shaken by Hezbollah's hybrid use of prepared defenses, guerrilla tactics, unmanned aerial vehicles, guided missiles and short-ranged conventional missiles. The Israeli Navy, unaware that Hezbollah had obtained anti-ship missiles, was surprised when such a missile hit and damaged an Israeli naval vessel.³² Guided anti-tank missiles struck fifty Israeli tanks, 21 of which had their armored hulls penetrated.³³ After years of meticulous preparation, Hezbollah's defensive positions along the Israeli-Lebanese border were unpredictably elaborate, well fortified, dispersed and concealed. Unexpectedly, Hezbollah fighters actually stood and fought from these positions, which the IDF found very difficult to locate even after being fired upon from them. Most engagements began when concealed Hezbollah fighters fired on surprised Israeli soldiers. Finally, despite an extensive air campaign, the Israeli Air Force simply could not locate and destroy Hezbollah's many short-range missiles: thousands of which rained down on Northern Israel throughout the war, with 220 being launched on the war's final day.³⁴

Therefore, despite their ever-increasing usefulness, and despite their centrality to American military operations, precision weapons still have their weaknesses. Precision weapons are designed after all to strike fixed and stationary targets, and only once those targets are precisely located.³⁵ In war however, precise knowledge is often hard to come by. Precision munitions, and the targeting system that control them, continue to struggle with targets that appear suddenly, that are moving, that are time-sensitive or fleeting or are fortified, well-concealed or deeply buried.³⁶ The best Intelligence, Surveillance and Reconnaissance (ISR) platforms still cannot see through thick foliage or in urban terrain. The enemy also has a vote. Precise weapons are unmatched at dismantling systems that are “structurally complex,” like integrated air defense systems or electrical power grids. They are however, less successful against systems that are “interactively complex,” that can respond and react in infinite ways, like economies and leadership structures.³⁷ Repeatedly, humanity has shown a remarkable ability to offset or diminish a foe’s advantage; history has many examples of successful counters to once dominant weapons. It is also very difficult to predict how different countries adapt or respond to new technologies like precision weapons. A wily opponent, as the IDF has seen in Hezbollah, can exploit aspects of high-technology warfare like UAVs and precision weapons, without having to invest in the research to develop these weapons or in building complete targeting systems. These specifically selected technologies can be combined with traditional insurgent tactics and the exploitation of the media. Future enemies are simply unlikely to maneuver large numbers of mechanized forces in open terrain far away from populated areas. It is now well understood that precise, standoff weapons will tear these forces apart. The United States cannot count on its next foe to

be as foolish as Iraq -- to fight to the American military's strengths, twice -- but should expect that means will be devised to counter many of its strengths.³⁸ Finally, in wars where each side perceives a vital national interest, rarely will precise actions alone have the physical and physiological impact necessary to truly defeat an enemy. Often only firepower, and lots of it, can break the will of an opponent and only men on the ground can truly exploit that broken will. It is difficult to turn military success into a lasting political change with standoff precision weapons.

As seen above, recent military operations seem to re-enforce the traditional values of joint forces and combined arms, not of the primacy of one system, service or arm. The United States must therefore simultaneously maintain a large and sophisticated military, continue to be the forerunner in military technology, develop means to counter that same technology, and finally, to operate in asymmetrical environments. This prodigious feat will require a complete range of capacities: from highly sophisticated systems and personnel to well-trained, foot-mobile infantry and everything in between. The United States must maintain a military capable of using judicious and precise weapons, or mass and destructive fires, in all types and levels of war. At the same time, the military must have the mentality that fires, precise or not, are not the only solution to a problem. The world must be convinced that America can be precise and focused, or overwhelmingly destructive; indeed the capability and willingness to destroy an enemy lends credibility to the use of precision weapons. Precision weapons are a vital part of this system, but cannot be relied upon to the exclusion of the rest. The fundamental concern now should be improving the military's ability to use precise weapons and to increase the types of circumstances where

precision weapons can be employed. The clearest way to identify weaknesses in the use of precision weapons is through the “decide, detect, deliver, and assess” targeting methodology used by the United States Army and Marine Corps.³⁹ This methodology helps to synchronize maneuver forces, intelligence gathering and fire support. Looking at the last decade of conflict through this methodology, it is clear that the United States military is first-rate at “decide” and “deliver.” It is in “detect” and “assess” where the shortfalls are found.

Target Location

The main hurdle to the more effective use of precision weapons at all three levels of war is finding targets with enough precision to strike them. To realize their full benefits, precision weapons require intelligence that is far superior and much more precise than for any other type of military operation. Because of their proximity to a target, most ground forces can evaluate, operate on and exploit less accurate intelligence. Conventional air munitions can be dropped, or massed artillery fired at, an area where an enemy is expected to be. This is not so for precision weapons -- for both technical reasons and because of the consequences of errors. Precision weapons tend to be both smaller in number and in explosive power than conventional weapons, and therefore need to strike extremely close to a target to have an effect. As important are the unintended consequences of not striking precisely. Meaning, what happens when a precise munition misses a target, hits the wrong target or causes non-combatant casualties? The now well-known capabilities of precision weapons have created an expectation that only combatants will be killed. During Operation Allied Force, an American B-2 bomber mistakenly struck the Chinese Embassy in Belgrade with five JDAMs, killing seven Chinese diplomats. China interpreted it as an intentional act.⁴⁰

Because of the hype over precision weapons, how could it be otherwise? Saddam Hussein learned from this and other incidents. During the early days of Operation Iraqi Freedom, Saddam hid from American aircraft not in bunkers deep underground, but in buildings near foreign embassies and other sensitive areas, knowing the American hesitation to strike near those sites.⁴¹ As seen in Serbia, and again recently in Afghanistan and Pakistan, the backlash to mistakes or alleged mistakes, skillfully exploited through the media by the enemy, has literally reduced the occasions where even precision weapons are used.⁴² In Afghanistan in recent years, the weapons that have caused most collateral damage and therefore the most repercussions have been precise weapons.

Despite this need to locate targets precisely, the American military does not invest adequately in the equipment, in the processes and in the people to do so. For cultural and budgetary reasons, the military services focus on large, expensive, “capstone” weapon systems. The services tend to find enough money for aircraft, tanks and ships, to the neglect of intelligence, target analysis, sensors and the targeting network. The prime example of this trend is in unmanned aerial vehicles (UAV). After resisting for decades, experiences in Iraq and Afghanistan have finally forced the services to recognize the incredible value and versatility of UAVs. However, despite the huge increases in the number of UAVs, the money spent on traditional systems, especially manned aircraft, dwarfs that spent on UAVs. Between 1999 and 2009, yearly UAV spending increased from \$500 million to \$3.5 billion. However, in 2008 alone, \$56 billion was spent on manned aircraft research and acquisition.⁴³ Equipment is also short at the tactical level, where despite the advances in technology, very few front-line

military personnel have the tools necessary, such as laser range finders, to locate targets precisely. The current target location systems are simply too large, too expensive and are fielded in too small of numbers. Satellites have proven remarkable, and are used to great success at “deep targets” and at the strategic level. However, in Iraq in 2003, due to bureaucracy, prioritization of resources, and a fast moving operation, data from satellites and other national-level assets rarely made it down to the tactical level.⁴⁴ According to a 1st Marine Division “Lessons Learned” report, the Division “found the enemy by running into them, much as forces have done since the beginning of warfare.”⁴⁵ As late as 2010, an infantry battalion leaving Afghanistan stated “Target location was just about the hardest thing for the Marine on the ground to do...”⁴⁶ Unfortunately, more equipment, be it UAVs or other ISR, will not solve the problem. Data from existing ISR platforms already overwhelm the military because of the dramatic increase in the information available and the shortage of both intelligence personnel and analysis systems.⁴⁷ This weakness in detecting targets is even more worrisome because precise knowledge of a future enemy, knowledge that can be used quickly to dramatic results, is not developed in a short time. To get the most of precision weapons, the United States must always know, requiring almost constant observation of potential foes. Unfortunately, that very same overwhelmed system, and those very same overwhelmed personnel, must conduct this endless observation.

Assessing the Damage

For any recent conflict, the military can easily produce vast amounts of detailed data on aircraft sorties, types and numbers of munitions, on miles traveled and missiles fired, but it cannot give the same level of detail on targets hit and damage done. As mentioned above, there is still considerable controversy over the “battle damage

assessment (BDA)” from Operation Allied Force! Reports from Operation Iraqi Freedom, much like earlier reports from Operations Desert Storm and Enduring Freedom, state that the BDA process simply could not keep up with the pace of operations.⁴⁸ The sheer quantity of activity led to the “effective collapse of the effort to provide timely battle damage assessment.”⁴⁹ Technological advances have allowed many more targets to be struck and much more quickly. However, there has been no equal improvement in the capacity to analyze and assess the results of those strikes. Like the precise intelligence necessary to strike with precision weapons, precise intelligence is necessary to evaluate the consequences of those strikes. As in target location, the cause of this problem is the lack of investment in personnel and resources. Despite some recent improvements, the military services still do not have an occupational specialty for BDA, a standardized system to collect and maintain data, or common definitions or procedures. Nor have commanders routinely committed the ISR assets and intelligence personnel necessary to conduct proper BDA during the actual fighting. In Afghanistan, the Taliban routinely claim high numbers of non-combatant casualties after air and artillery strikes. By the time the United States can conduct BDA, and complete an investigation, the enemy’s accusations have done their damage. Simply, to more fully exploit precision weapons, the military must dedicate more resources to both finding targets and to assessing strikes, and if necessary, less resources on the means to conduct those strikes.

Conclusion

Precision weapons do not fulfill the promise of the ultimate weapon, of a weapon that will guarantee easy, bloodless and decisive victory. This promise will never be met. Dominant weapons have always eventually been weakened, marginalized and beaten.

Technology too can and will be defeated. While precision weapons and technology can reduce the friction, chaos and the killing in war, these will never be eliminated -- especially when ground forces are operating close to the enemy. Some things, like human nature, are just outside the reach of technology. The United States must continue to take full advantage of its technological lead, but not build a military that can only fight the kind of war it wants to fight. The United States must also be careful not to over-sell its ability to be precise. Humans make mistakes, technology malfunctions, and "precise" has different definitions to different people -- especially if a member of your family was just killed. The United States must consciously choose a mixture of precise and conventional munitions, weapons systems and delivery types to be equally effective in counterinsurgency and high-intensity wars. Finally, the United States must keep in mind that as ever more precision capabilities are developed, a tenacious enemy will develop ever more ways to avoid being defeated by them.

Endnotes

¹ Robert H. Scales, Jr., *Firepower in Limited War*, revised ed. (Novato, CA: Presidio Press, 1997), 289-90.

² President George W. Bush quoted in United States Department of Defense, *Transformation Planning Guidance*, (Washington D.C: United States Department of Defense, April 2003), 3.

³ United States Department of Defense, *Transformation Planning Guidance*, 9.

⁴ For a few of the many articles on "transformation" see James Kitfield, "The Counter-Revolution in Military Affairs: Iraq Has Transformed the Army in Ways that Donald Rumsfeld Never Envisioned," *National Journal* (December 4, 2009): Max Boot, "The Struggle to Transform the Military," *Foreign Affairs* 84, no. 2 (Mar/Apr 2005): 103-104 and Robert D. Kaplan, "What Rumsfeld Got Right; How Donald Rumsfeld Remade the U.S. Military for a More Uncertain World," *Atlantic Magazine* (July/August 2008): 64-74.

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