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# From "Whack-a-Mole" to Three-Dimensional Chess: Leveraging Airpower to Defeat the Improvised Explosive Device

by

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# Contents

**Acknowledgements**

During my formative years as an RC-135 co-pilot, I had the great fortune of working with Mark Stratton, a navigator with approximately four more years of service, in the standardization and evaluation section of the 45th Reconnaissance Squadron. Through his informal mentorship and excellent example, I became a more professional aviator and officer. I lost touch with Mark after his transfer to the DC area, and heard nothing of him until an email from a personal friend in June 2009 announced that he had been killed in an IED attack while in command of a Provincial Reconstruction Team in northeast Afghanistan. In solemn tribute and as a thank-you for his role in my career and positive influence on my life—a thank-you I hadn't taken the time to communicate to Mark before his untimely end--I dedicate this work to his memory.

## Abstract

Beyond their battlefield effects, improvised explosive devices (IEDs) are weapons of "strategic influence" which directly affect the US-led coalition's strategic center of gravity--its collective will to continue to continue the conflict. This asymmetric capability mitigates the overwhelming mismatch between insurgent and coalition forces and casts victory in Overseas Contingency Operations (OCO) into serious doubt, which begs the question: Given airpower is its primary asymmetric advantage in the OCO environment, how can the US leverage it most effectively to counter the comprehensive IED threat?

Accordingly, this essay seeks to provide an answer with a counter-IED (C-IED) operational design and innovative airpower roles and missions—re-aligned ISR, extensively integrated information operations (IO) and precision attack, and engagement with the population--to defeat the comprehensive IED threat within the broader aims of OCO. The entire IED threat is examined to provide a foundation for the new operational design. Subsequently, a re-focused C-IED end state and COGs are nominated and further broken down into critical vulnerabilities and lines of operation. Corresponding roles and missions for airpower are then examined in depth and condensed into a recommended way ahead to win the C-IED fight at last.

**Introduction**

Over eight years into its Overseas Contingency Operations (OCO; formerly known as the

Global War on Terror) in Afghanistan and Iraq, the United States finds itself uncertain of

victory. Its military is mired in a struggle to effectively adapt its supreme capabilities to counter-

insurgency (COIN) and win the "Long War" within a shrinking timetable. At the center of this

dilemma lies the fundamental question of how to properly employ its airpower—originally

designed for strategic attack of complex systems--against de-centralized insurgent cells wielding

improvised explosive devices (IEDs). Accordingly, this essay seeks to provide an answer with a

counter-IED (C-IED) operational design and innovative airpower roles and missions—re-aligned

ISR, extensively integrated information operations (IO) and precision attack, and engagement

with the population--to defeat the comprehensive IED threat within the broader aims of OCO.

By conventional measures, the OCO battlespace is a cliché mismatch. On one side, the

US military, augmented by its coalition partners, stands as undisputedly the most technologically

exquisite force ever fielded, overwhelmingly supported by a citizenry that expects speedy

advancement of its causes with minimal casualties due to its airpower advantage. Opposing this

ultra-modern Goliath is a decentralized band of insurgents which pursues its strategy through

much lower-technology means. Chief among them is the IED, a broad category of custom-made

munitions that provide "an ideal asymmetric weapon"[1] to effectively inflict casualties at low

costs, especially relative their enemies' ultra-technological capabilities.[2]

Despite this apparent disparity, insurgent tactics have proven greatly effective--IEDs are

the most lethal threat to US troops, accounting for about half of all American casualties in Iraq[3]

and more than 80 percent of US and NATO casualties in Afghanistan.[4] Beyond tactical

successes, insurgents have become quite adept at exploiting IED engagements for propaganda

purposes, directly striking the will of the American people to continue the Long War[5] and casting doubt on the US forces' ability to secure the indigenous population. Clearly, the insurgent IED campaign poses a major obstacle toward US and coalition success in the region, which begs the question: Given airpower is its primary asymmetric advantage in the OCO environment, how can the US-led coalition leverage it most effectively to counter the comprehensive IED threat?

**Story that Illustrates the Problem**

On Memorial Day, 2009, US Air Force Lt Col Mark E. Stratton commanded the Panjshir Provincial Reconstruction Team (PRT) in northeast Afghanistan,[6] a tangible extension of the US's full commitment to win the people's "hearts and minds" and offer a viable future apart from the insurgency. While leading a convoy near Bagram Airfield, a roadside IED detonated near Lt Col Stratton's vehicle, killing him and two other members of his team.[7] While the insurgency effectively decapitated the area's major pro-US, pro-Afghan government agency, the engagement also scored a successful blow to American strategy and the support of its people.

Beyond Panjshir, Lt Col Stratton's untimely end was reported to the US citizenry through various tiers of media, as localized as his hometown newspaper in Foley, Alabama. Instead of emphasizing the nobility of the US cause and Lt Col Stratton's crucial role, its article linked testimonials to his admirable individual character with his stepgrandfather's assertion that "this whole thing seems so unnecessary, the waste."[8] Insurgent propagandists themselves could not have better questioned the human cost of a distant war, generating an incredibly disproportionate effect from the destruction of a single vehicle with an ostensibly "improvised" weapon.

**Significance of the Problem**

This engagement, though only one of the nearly 1,000 that occur in Afghanistan monthly,[9] exemplifies the full scope of the IED threat. Beyond the immediate impact of the

physical destruction and loss of life, there is the higher-order effect of generating headlines and statistics unfavorable to maintaining popular support of the war.  In response, the US has committed massive resources to specifically counter the IED—not the overall insurgent strategy or organization, but the weapons themselves--to better protect its troops, with limited success.

As only a resource-plentiful superpower could, the US increased its bureaucratic largesse in search of an answer.  Originally formed as the Army IED Task Force in 2003 in response to enemy actions in Iraq, the Department of Defense (DoD) founded the Joint Improvised Explosive Device Defeat Organization (JIEDDO) as a permanent entity in February 2006.[10] JIEDDO is charged with focusing DoD efforts to "defeat improvised explosive devices as weapons of *strategic influence* (emphasis added)."[11]

Despite the acknowledgement of a more significant context of the IED's impact to OCO, JIEDDO and DoD have spent billions of dollars on a range of technical solutions that narrowly focus on device detection and protection.[12]  Though clearly a valid task, overemphasis on force protection has hampered US pursuit of strategic objectives.  Urgent innovations have carried the unintended consequence of defining victory in simple terms of soldiers' survival instead of defeating the insurgency.  When questioned about the desired US end state, an Explosive Ordinance Disposal specialist responded, "winning to me is going home, really, after our deployment's done,"[13] suggesting the US response has unintentionally divorced winning individual IED engagements at the tactical level from any meaningful strategic context.

To correct this, the US must fully comprehend the IED as a "tactical weapon with strategic influence,"[14] a concept JIEDDO's mission statement acknowledges yet seems to have ignored in practice.  "Strategic influence" encapsulates insurgents' ability to use IEDs to directly erode what Savre calls "American will"[15] to continue the Long War, exemplified in small

measure by the chronicle of Lt Col Stratton's death. This effect is the most significant

consequence of IED warfare and reflects the enemy's strategy. Realizing that it cannot defeat

US and/or coalition forces conventionally, the insurgency instead seeks to persuade their civilian

leaders to withdraw from the battlefield by influencing their democratic populations at large.

General Peter Pace, former Chairman of the Joint Chiefs of Staff, essentially validated this

approach for insurgent planners early on. Describing the battle between open societies and

terrorist networks, he confirmed that "the United States and partner nations remain highly

vulnerable to terrorist violence designed to undermine the international antiterrorist coalition and

to cause some members to seek to 'opt out' of the struggle."[16]

In addition to self-identifying its weakness, the dramatic US response to IED warfare

telegraphed how to exploit it. At the outset, IEDs were more a weapon of necessity than choice.

IEDs were primarily crafted from surplus Iraqi munitions and provided the fledgling insurgency

a degree of survivability through remote detonation.[17] The massive scale of the US response to

early IED attacks "openly advertised the success of our enemy and portrayed a perception of

failure to the American people,"[18] which mapped the link between insurgent means and ends.

This connection hatched the insurgents' current anti-US line of operation: Integrate IED attacks

and negative propaganda aimed directly at the American public[19] to force US military

withdrawal, achieving victory by forfeit.

Therein resides the real significance of the IED campaign. Though it is a small-scale

tactical weapon with relatively little destructive power, the IED provides the insurgents a

tremendous asymmetric means to directly generate effects at the strategic level. Worse, their

apparent success, given the massive US and coalition response, proves they understand precisely

how to leverage this advantage. Conversely, US and coalition fixation on protecting their forces

from individual devices has obstructed prosecution of meaningful strategic objectives. As a result, victory in OCO stands very much in doubt.

**Solution to the problem**

However, all is not lost. The US-led coalition holds in reserve an asymmetric advantage of its own: airpower. While aircraft are employed en masse in both theaters, their relegation to close support of a defensive-minded, engagement-by-engagement C-IED operation should not be confused with authentic "airpower." Instead, this "whack-a-mole" (after the simplistic arcade game of never-ending brute force) scheme squanders airpower's unique capabilities to directly generate higher-order effects beyond the immediate battle area. Accordingly, it is time to adopt a more "air-minded" approach—"three-dimensional chess," perhaps—that emphasizes defeat of the broad IED operation at the strategic and operational levels over mitigating the tactical level effects of individual devices.

Hence, this essay proposes three innovated airpower roles and missions: (1) re-aligned ISR, (2) extensively integrated IO and kinetic operations, and (3) engagement with the population. This scheme will effectively leverage the US's asymmetric advantage and defeat the comprehensive IED threat within the broader aims of OCO. First, the full scope of the IED threat including technology, tactics, IO exploitation methods, and network structure, will be studied in detail. With the IED problem adequately framed, a corresponding operational design will be developed to counter the comprehensive IED threat's strategic and operational centers of gravity and exploit their related critical vulnerabilities, culminating in lines of operation oriented to a re-defined IED end state. Finally, corresponding "air-minded" innovations to existing air operations will be examined in depth and condensed into a recommended way ahead for applying airpower to the C-IED fight.

**Understanding the Comprehensive IED Threat**

The key to re-designing C-IED operations is to fully understand the comprehensive threat. First and foremost, the term "improvised" is misleading, connoting haphazard construction and employment. In fact, IEDs more closely represent custom-built weapons for each specific engagement's tactical and strategic aims, which contrast the conventional paradigm of mass-produced general-purpose stockpiles. Employment could also be characterized as "innovative" rather than "improvised;" though modern IED warfare is rooted in Saddam Hussein's Iraqi Intelligence Service,[20] insurgents have steadily improved tactics and technology over the course of OCO to more effectively achieve strategic objectives.

**Technology**

In practice, only the bomb-makers' imagination and skill level limit the construction methods of IEDs.[21] At the outset of hostilities, IEDs made heavy use of re-purposed weapons-grade materials, such as scavenged mines or artillery shells. As munitions became scarce, bomb-makers increasingly turned toward organic, hydrogen peroxide-based explosives.[22] Beyond finding new materials, bomb-makers have developed sophisticated means of amplifying their effects through massing multiple devices. Chief among them is "daisy-chaining," or the linkage of several devices to a single detonator.[23] Similarly, "coupling" links devices together to delay detonation of the first so as to defeat countermeasure equipment and specifically target mine-clearing vehicles.[24] "Boosting" also reduces the probability of detection by stacking mines atop one another, with the topmost mine being constructed of non-metallic materials.[25]

Aside from increasing blast yields, a marked trend toward precision has greatly enhanced the lethality of IEDs. The most prolific destruction comes from the shaped charge variant, designed to narrowly focus its blast and penetrate armor.[26] This concept has culminated in the

explosively formed penetrator (EFP), which adds a conical piece of metal at one end of the blast

cylinder.[27] Upon detonation, the device's blast expels the conical metal as a freshly-molten

projectile which enters the target vehicle through the breach created by the base shaped charge.[28]

On a smaller scale, precision is achieved though the magnetic IED. Also known as

"sticky bombs,"[29] they are directly attached to un-armored vehicles. This allows much smaller

amounts of non-military grade explosive to be employed, increasing their ease of manufacture

and ability to escape detection.[30] As a US military spokesperson noted in 2008, magnetic IEDs

afford the attacker survivability and reduce collateral damage, allowing insurgents to more easily

hide among the population.[31] In short, insurgents have meticulously developed the IED into their

equivalent of coalition stand-off range, precision-guided weapons.

**Tactics**

Contrary to ad hoc improvisation, IED engagements have characteristic tactics of

emplacement and detonation. During the crucial emplacement phase, the insurgent is most

vulnerable to detection. Three essential emplacement tasks—site preparation, device placement,

and arming—are typically accomplished in order.[32] This staged process is often spread over a

period of several days[33] to minimize contact time at the target.[34] As time permits, additional

camouflage may be added to enhance the IED's ambush potential.[35]

Once the device is in place, insurgents have several means of detonation at their disposal.

The most basic is the command wire, which physically links the device to a remotely operated

switch. "Remote" is typically limited to line-of-sight, as the bomber must manually initiate

detonation. As wires proved to be somewhat prone to detection, insurgents adapted radio-

frequency (RF) devices such as cell phones and garage door openers[36] for the task. In response,

coalition forces developed jammers to prevent RF command signals from reaching the IED.[37]

Consequently, insurgents innovated further in the form of passive infrared devices embedded in devices themselves,[38] alleviating the need for manual detonation. Other trigger mechanisms incorporate pressure pads and timers[39] to increase insurgent survivability and IED concealment.

**Exploitation**

Beyond the readily apparent tactical impact of physical destruction, insurgents design IED engagements to create content for their far-reaching IO campaign. As a lecturer at Air Command and Staff College (ACSC) asserted, the individual targets have little military value on their own[40]—destroying vehicles piecemeal will not defeat the US-led coalition's forces. An attack's true significance, therefore, lies in its exploitation for propaganda.

The ACSC lecturer noted the characteristic professional quality of several examples of insurgent IED films. Highly skilled production traits demonstrate the videos' importance and suggest the kinetic operation is structured to support the information operation[41]—filming and exploiting the engagement is more significant than the IED blast itself. Insurgents disseminate video to both local and worldwide audiences to gain acceptance of their cause and discredit their enemies. Unwittingly, the Western media indirectly assists insurgent IO through its routine reports and lamentation of IED casualties, exemplified by Lt Col Stratton. Therefore, the net effect of the IO campaign is twofold: It simultaneously presents a compelling case for the "hearts of minds" of locals and erodes the critical American will to continue the conflict.

**Network**

Despite the consistent message, insurgent IED operations are typically decentralized, dispersing both IED manufacture and employment into autonomous cells as much as possible to maximize operational security.[42] A typical IED cell consists of six to eight members, headed by a financier responsible for securing resources and interacting with other regional groups.[43]

Additionally, cells generally have one skilled bomb-maker with at least one apprentice. Another specialized member acts as the primary "emplacer," with the remaining "unskilled" laborers performing as lookouts, triggermen, scouts, or cameramen during attacks.[44]

Though de-centralized in execution, the IED cell is not completely independent of critical support functions. First, the very existence of each cell hinges upon the presence of a financier willing to organize and provide necessary resources. Similarly, the combat power of IED cells depends on a shallow pool of pseudo-professionals. McFate notes the increase in sophistication and lethality of the IED over the course of the conflict "indicates that their design and construction has become a specialized function within the insurgency"[45] and "suggests there are relatively few expert bomb-makers."[46] Similarly, the trademark high production quality of insurgent video supports a hypothesis that a specialized cadre within the insurgency is dedicated to propaganda exploitation.[47] While IED cells may be widely dispersed, their power is clearly derived from a very narrow cross-section of skilled individuals who depend on at least somewhat centralized planning, training, and supply.

**The Comprehensive Threat**

To review, the IED is anything but "improvised"—IEDs have evolved into the insurgent equivalent of coalition precision weaponry. The relative insignificance of individual IED targets proves their true impact lies in their exploitation for propaganda and the associated effects on local and US will. While employed via decentralized cells, limited numbers of specialized members form the IED network's core. To defeat the IED threat, the US must channel this thorough understanding into a corresponding operation designed to exploit its vulnerabilities.

**Designing a More Effective Counter-IED Operation**

*In this type of war you cannot—you must not—measure the effectiveness of the effort by the number of bridges destroyed, buildings damaged, vehicles burned, or any of the other standards that have been used for regular warfare. The task is to destroy the effectiveness of the insurgent's efforts and his ability to use the population for his own ends.–General Curtis E. LeMay[48]*

Re-designing operations to effectively counter the IED begins with ingraining the critical idea that the true nature of the problem goes far beyond defeating individual devices. As JIEDDO Vice Director Dr. Robert L. Keesee admitted in 2008, attempting to eliminate the IED threat one bomb at a time "in some ways [is] as difficult as solving the problem of bullets."[49] Despite several JIEDDO initiatives aimed at individual devices, Keesee recognized the crux of the IED problem lies in "rendering [its] strategic influence null"[50] and confining its effect to the tactical level. To do this, a National Academy of Sciences study recommended a corresponding shift in focus onto "disrupting the entire IED threat chain."[51]

As Savre proposed, an effective C-IED campaign compels forces to "minimize [their] tactical and operational overreaction to the device"[52] and counter-intuitively requires "less emphasis on the IED at every level and more emphasis on defeating the enemy."[53] Beyond the individual device, the enemy IED network comprises key members of federated cells including financiers, bomb-makers, emplacers, and propagandists as previously described. Defeating the enemy also requires a basic understanding of counterinsurgency (COIN) principles to frame the C-IED fight within a meaningful context.

**COIN: The Broader Context**

C-IED operations should be considered a subset of COIN. Therefore, its objectives must align closely with COIN principles, especially the fundamental imperative to provide security for the local population as the first step toward a successful outcome. As Crane notes, "the ability to

achieve security serves as a foundation of government legitimacy."[54]  Perceived legitimacy gives

credibility to US and coalition actions, which builds further support from the populace at the

expense of competing insurgent messages enabled by their masterful use of IEDs.  In short,

legitimacy of host nation (HN) and US actions is the precursor for victory in COIN.[55]

The cumulative effect of establishing legitimacy through security is the isolation of

insurgents from their potential sources of support.  Alienation is a far more viable alternative to

attempting to kill or capture every single insurgent[56] or, applied specifically to IED warfare,

disabling every single fielded device.  Crane suggests that "to achieve long-term success, skillful

counterinsurgents must eliminate the source of an insurgency's recuperative power,"[57] which is

the recruitment of new insurgents.  To counter, COIN forces must exploit IO opportunities to

win what amounts to a public debate over which side can better provide for the local population.

In short, C-IED and COIN missions must consider the IO impact of each potential action and

strive to build legitimacy as the best way to win over the populace and isolate the insurgents.

**Re-defining the C-IED End State and Objectives**

Regrettably, current C-IED operations neglect basic COIN principles in favor of

considering the IED threat in a vacuum.  Focus on the device itself and over-emphasis on force

protection and individuals' survival suggest that the US is pursuing a narrow C-IED goal,

arguably defined as "eliminate IED detonations."  Despite its vast technological resources, this

task has proven to be unfeasible, if not impossible.  Considering the apparent failure of this

current approach and the IED's strategic effects within the framework of COIN, C-IED

operations should be re-designed toward a more comprehensive end state: Enemy is unable to

effectively exploit IED engagements for IO gains.  Corresponding objectives, or the clearly

defined, decisive, attainable goals toward which every military operation should be directed,[58]

would include neutralization of enemy IO capabilities and IED cell functions, disruption of the network's centralized support functions, and denial of insurgent access to weapons materials.

**Analysis: Centers of Gravity and Critical Factors**

With this new end state and related objectives established, the next step is to identify and analyze relevant centers of gravity (COGs). Clausewitz famously defined COGs as "the hub of all power and movement, on which everything depends,"[59] or sources of enemy strength in simplified Joint Publication 5-0 parlance.[60] Kem condenses the concept further, asserting COGs are not merely sources of strength, "they **are** the strength (emphasis in original)."[61] Intelligent operational design must consistently direct efforts against COGs to reach a desired end state. Using Kem's model, COGs exist at both the strategic and operational levels of war, and are converted into actions on decisive points at the tactical level.[62] Kem likens this tiered arrangement to three-dimensional chess,[63] emphasizing the need for linkage between all three levels to achieve victory.

Relating COGs to decisive points requires examination of three critical factors of each COG: its critical capabilities (CCs), critical requirements (CRs), and critical vulnerabilities (CVs). CCs are the crucial enablers that allow a COG to function,[64] or the primary abilities that make a COG a COG.[65] CCs hinge upon CRs, which are "the conditions, resources, and means that are essential for a COG to achieve its CC"[66] and be fully operational. CVs comprise the deficient components of CRs that provide an adversary an opportunity to attack and cause a COG to fail to reach its CCs.[67]

Hence, this construct provides the methodology to determine which enemy components should be acted upon to reach the desired end state. Tactical actions against CVs disrupt CRs, which preclude achievement of CCs, rendering COGs ineffective; defeat of all COGs

characterizes accomplishment of objectives which produce the desired end state. Accordingly, C-IED operations should be re-defined in terms of strategic and operational level COGs that match the proposed IED end state and their critical factors.

### Strategic COG: Appeal of the Insurgent Message

Given the emphasis on IO exploitation of IED engagements and US reaction to IED-induced casualties, the insurgents' strategic COG is clearly the "appeal" of their message; that is, the persuasion of both HN and worldwide audiences to accept--not necessarily agree with—their views. The message hinges on two CCs: Communicate with audiences around the globe and show compelling content that promotes insurgent superiority over COIN forces.

Four CRs enable these CCs. Insurgent propagandists must have access to global information systems, the technical ability to produce messages, and a dependable supply of content from the IED network. Additionally, the relative "convincing" value of the message at least partially depends on a complicit or indifferent US and coalition IO response. Analyzing these CCs, two CVs emerge: Counter-messages from sources perceived to be legitimate can effectively oppose insurgent propaganda and, more importantly, convincing content depends on a small pool of suppliers and producers, or the "skilled laborers" of the IED network.

### Operational COG: Comprehensive IED Network

Logically, the comprehensive IED network encompassing manufacture, employment, and propaganda dissemination forms the insurgents' operational COG. The IED network derives its strength from four CCs. Insurgents must manufacture weapons, identify target areas for IED attacks, emplace and detonate devices, and produce relevant IO content.

Related CRs include access to weapons materials, the presence of US, coalition, and/or host nation targets, undetected emplacement, and video production equipment. Also, IED cell

manning, both "skilled" and "unskilled," forms a CR. While skilled labor is in much shorter supply and is plausibly more important than its unskilled counterpart, long-term success hinges on cultivating new recruits which initially serve in unskilled roles. Finally, the device must detonate at the time and place of the insurgents' choosing with the camera rolling in order to generate a useful effect.

From further analysis of these CRs, three CVs emerge. As mentioned above, skilled labor is scarce and difficult to replace. Likewise, the supply of unskilled personnel is vulnerable in two ways: They must first be convinced to join the fight, and their survivability—or ability to progress into more critical roles—depends on their concealment from COIN forces. Lastly, the delicate choreography of IED engagements to yield propaganda can be disrupted.

**Implementation: Lines of Operation**

With CVs exposed, the last step in the operational design process is to organize them into lines of operation (LOOs). Since positional reference to the enemy has little to no bearing on IED warfare, the C-IED fight relies upon logical LOOs, or careful arrangements of related decisive points (DPs) that, when acted upon, will cumulatively affect COGs.[68] Typically, CVs translate directly into DPs; therefore, this proposed design merges logically-related CVs from the preceding critical factor analysis into two related logical C-IED LOOs.

The first, Counter insurgent IO, comprises CVs related to the exploitation of IED attacks for propaganda. The primary decisive point is to enter into the currently one-sided IO "debate," including broadcasting counter-messages to mitigate the impact of IED video around the world and persuade the local population to reject insurgent claims in favor of aligning themselves with the US-led coalition. This IO campaign will also address the source of IED combatants,

disrupting the flow of new unskilled recruits.  Countering insurgent IO also involves kinetic operations to eliminate film-makers and neutralize or destroy film production centers.

The second LOO, Neutralize the IED network's combat power, aims to counter the warfighting capability of IED cells.  Its primary focus is to target the limited supply of financiers, bomb-makers, and emplacers, as well as to deny cells access to explosive materials.  Targeting unskilled laborers falls into this LOO as well, but should be considered a lower priority than their skilled counterparts.  Denial of concealment and the related disruption of IED engagements' careful timing also form DPs along this LOO.

**Shifting to Operational Art**

With LOOs established, the challenge turns to operational art, or matching US and coalition means to these ways.  Considering the operational design principle of leverage presented in Joint Publication 5-0, planners must seek to exploit relative advantages across physical and informational domains.[69]  The insurgents have mastered this principle--IED attacks, coupled with the ability to hide among the populace and disseminate propaganda, represent asymmetric capabilities properly oriented toward the strategic goals of undermining the coalition locally and eroding American will.  To counter, the US-led coalition must re-consider how to leverage its own asymmetric airpower "trump cards"--ISR, electronic warfare, information operations, and precision attack[70] capabilities--to exploit the insurgents' critical vulnerabilities, affect their COGs, and defeat the comprehensive IED threat.

## Roles and Missions for Airpower in C-IED Operations

Though current efforts to defeat the IED have made ever-increasing use of aircraft, particularly in ISR applications, they should not be confused with airpower. Remedying this discrepancy requires a renewed sense of "air-mindedness" to overcome the COIN predilection for employing air forces almost exclusively in roles that emulate close air support (CAS). Applying the C-IED operational design, three innovative roles and missions for airpower are appropriate: (1) considerably refined ISR capabilities, tasks, and processes, (2) dramatically expanded IO efforts across all three airpower domains integrated with precision attack, and (3) force multiplicative efforts to engage airmen more closely with the population.

### Status Quo: "CAS-like" ISR

Far more than conventional warfare, COIN and C-IED depend on intelligence. To that end, the US has deployed its maximum number of dedicated ISR assets, offering limited quantities of Signals Intelligence (SIGINT), Materials and Signatures Intelligence (MASINT), Image Intelligence (IMINT) and Ground Moving Target Indication (GMTI) capabilities. IED warfare has also driven the emergence of "non-traditional ISR (NTISR),"[71] or the conscription of fighter and bomber aircraft into ISR roles in order to mitigate shortfalls in collection capacity.

Absent other "-INT" capabilities, NTISR aircraft's chief function is full-motion video (FMV) surveillance through re-purposed targeting pods, an innovation of traditional IMINT. These assets augment an ever-increasing supply of unmanned aerial vehicles (UAVs) with equipment specifically designed for the task. As FMV platforms have demonstrated proficiency to monitor insurgent activities including IED emplacement, the joint force's demands for FMV have become "insatiable"[72]--so much so that the Secretary of Defense commissioned "Project Liberty" in 2008 to rapidly construct and field specially-designed manned FMV assets.[73] In

short, FMV has become the marquee technology of US and coalition attempts to detect IEDs and enhance force protection.

**The Case for "Air-Mindedness"**

Unfortunately, exaltation of FMV has essentially devolved ISR into "S"—CAS in the guise of ISR, effectively divorcing FMV data from development of meaningful intelligence. FMV idolatry places far too much value on near-term information at the expense of building and exploiting the "big picture" of the IED network. Current "ISR" demonstrates that while extensive air efforts have been directed against the IED, they have not been properly leveraged to counter the comprehensive strategic effects of IED warfare. Instead, operations have been built on the hopes of catching the enemy in the act of emplacing individual devices;[74] this resource-consuming, low-payoff approach epitomizes "whack-a-mole" and falls far short of leveraging authentic airpower to achieve "three-dimensional chess"-type ends.

Accordingly, these asymmetric assets must be re-molded into a truly "air-minded" operation which de-emphasizes the "close fight" in favor of opportunities to generate higher-order effects[75] further from the IED engagement site. As Dunlap notes, air-minded employment "is analogous (on a much larger and effective scale) to the effect insurgents try to impose on US and other friendly forces through the use of IEDs."[76] RAND echoes this sentiment, asserting the unique advantages of airpower are "essential for countering the inherent advantages of the insurgent."[77] Though COIN is almost dogmatically thought of as ground-centric conflict, Airmen must look beyond CAS and CAS-emulating "S" to truly counter the comprehensive threat instead of opposing IED engagements one-by-one.

**The Alternative: "Air-Minded" ISR**

This rather scathing indictment of FMV-centric ISR is not meant to imply that FMV has

no place in an air-minded C-IED operation.  Without question, properly-oriented FMV can deny

the concealment on which IED emplacers depend.  However, planners must acknowledge that

FMV sensors, especially when attached NTISR aircraft, have significant limitations in field of

view (FOV) and loiter time.  Mitigation and enhanced effectiveness necessitates sufficient

"cross-cue" integration with ISR capabilities.  Further, operators must understand that the real

value of their imagery lies not in the location of individual devices and emplacers—though

critical for protecting the force and disrupting the IED engagement cycle—but in tracing them

back to the their origins.  Presumably, this will lead to sources of insurgent strength, fixing the

location of IED cells and/or facilities housing centralized functions.  In short, focus needs to shift

from quickly engaging the IED site to cultivating intelligence about the IED network.

Though FMV-based IMINT has become a signature capability, lesser-known sensors

must be better integrated—not just added--into C-IED ISR efforts.  MASINT platforms can be

oriented toward detecting common IED explosive materials.  Ideally, this capability should be

directed toward finding IED cell and bomb-making locations, cross-cued and integrated with

other ISR assets.  SIGINT platforms can intercept communications between financiers and

higher-level actors, as well as intercept and locate insurgent propaganda broadcasts.  Widely

acknowledged as crucial to COIN, technical ISR means are greatly enhanced with human

intelligence (HUMINT)-derived cues.  Thus, the US and coalition must emphasize building a

robust HUMINT network to complement, if not enable, an air-minded approach that fuses

multiple "soda straws" of data into actionable intelligence to direct action against CVs and

neutralize COGs. Such an approach also compels expansion of processing, exploitation, and dissemination (PED) capacity, particularly in FMV, for detailed exploitation beyond real-time.

Apart from improved cross-cues, data fusion, and increased PED, adjustments to Combined Air and Space Operations Center (CAOC) processes are also in order to integrate and focus airborne capabilities. First, the tasking of ISR assets—especially FMV—has increasingly resembled the CAS request process, which relies heavily on requests from ground units instead of central CAOC direction. This has the effect, as a former Multi-National Corps-Iraq (MNC-I) commander noted, of turning the current intelligence effort into a "bottom-up process,"[78] with approximately 80-85% of tasks originating at the brigade or battalion level.[79] While close coordination with ground forces clearly improves satisfaction of their individual needs, overreliance on tactical-level unit input detrimentally skews overall ISR toward the "close fight."

Also, the sheer volume of requests leads to "peanut butter spreading"[80] ISR assets to equitably, albeit very thinly, distribute coverage. Unfortunately, this effectively deprives the ISR enterprise its essential ability to dwell on a problem as long as it takes to understand it.[81] To be more air-minded toward defeating the IED network and succeed in COIN overall, ISR capabilities should not be divvyed on the basis of satisfying vast federated inputs of "where" and "how much," but instead prioritized on the basis of what is important to affecting COGs and reaching the end state. Thus, more top-down guidance from higher headquarters in the form of commander's critical information requirements (CCIRs) is appropriate.

While current platforms and sensors provide tremendous asymmetric capabilities, emergent technologies could better equip the joint force to detect and prosecute the IED network's higher-level actors and functions. Wide-area airborne surveillance (WAAS) greatly expands FOV beyond current FMV. Long-duration aircraft better provide the requisite

persistence for meaningful change detection and denial of concealment than fighter-derived

NTISR. Integrated with robust PED, a long-duration WAAS platform would enable forensic

analysis, or the ability to back-track from an event to its source.[82] Beyond IMINT, current or

near-future sensors to detect hidden explosives, monitor activities inside of buildings, and

identify and track personnel[83] would enhance ISR efforts as well.

**Integrated Information Operations**

Acknowledgement that the enemy is waging a carefully constructed IO campaign

compels the US-led coalition to counter with one of its own. Thus, applying airpower to the C-

IED fight requires looking beyond ISR-supported kinetic roles to information operations across

all three airpower domains: air, space, and cyberspace. If employed correctly, IO can discredit

the insurgency and reinforce the legitimacy of the HN's government and COIN forces alike,[84]

providing two related effects. First, the coalition would realize enhanced effectiveness in

providing security to the population while bolstering HN government legitimacy and would

consequently gain greater freedom of action for its ISR and kinetic operations. Second, this

effort would deny insurgents similar freedom, which largely stems from "a permissive

environment often enabled by the ruling establishment's lack of credibility, legitimacy, and

support from its own 'governed' population."[85] The net result is a US and collation capability to

at least mitigate, if not usurp, the insurgents' current asymmetric IO advantage.

When conducting IO, the US must be particularly leery of its image in the theater; as

Savre notes, "any media with an American face is considered illegitimate from the outset."[86] To

effectively compete with local networks and insurgent propaganda, the US and coalition must

garner the assistance of host-nation and/or regional media to help get the intended message

across to a useful target audience.[87] This may require embedding locals into coalition IO centers.

Beyond securing popular support, cyberspace applications of IO could utilize technological means to influence, corrupt, or usurp insurgent command and control systems, unconventional as they may be. Applied to IED warfare, this would seek to sever the links between key members of IED cells and their external support and/or trace these sources to expose their identities and location for further intelligence development or kinetic action.

Instead of adhering to the conventional paradigm that IO augments kinetic actions, the US should consider adopting the opposite when framing its C-IED operations: Use kinetic action to support IO, which is essentially the IED network's methodology. Within operational security constraints, the US could build an IO plan and integrate IO elements into kinetic actions to capture compelling visual content like the insurgents do. This approach would enter the US into what de Caro terms SOFTWAR, or "the hostile use of global television to shape another nation's will by changing its vision of reality,"[88] which the insurgents presently wage unopposed.

While IO is not an exclusive role of airpower, airpower-based IO has historically proven effective in COIN. For example, the Royal Air Force carried out a large-scale IO campaign in Malaya, dropping leaflets and using aerial broadcasts to "convince the local population of the legitimacy of the government while discrediting the enemy."[89] Related efforts to target insurgents by name—enabled by an enviable HUMINT network—amplified success. Indeed, 70% of surrendering guerillas cited "sky shouters" as a significant factor in their decision to discontinue the conflict.[90] Innovation of this basic approach with modern technology could yield similar results in denying IED cells crucial popular support and its entry-level labor force.

**Airpower among the Population**

As the broader COIN effort and the C-IED fight rely on separating insurgents from the population and integrating COIN forces into the community, airmen must do as much as possible

to mitigate their inherent separation from the masses. This is not as daunting a task as it first appears, though it requires another paradigm shift. In conventional applications, combat aircraft rely on low observability for protection and maximum lethality. In COIN, the opposite generates a desirable effect: Aircraft can be used as a visible means of support and protection for the local population and as a deterrent to insurgent action.

Therefore, COIN and C-IED airpower should be as high-profile as practicable; as Peck asserts, "the mere visible or audible presence of airpower can demonstrate commitment to a population and support to a government as well as shape the behavior of insurgents by reducing their freedom of movement and denying them sanctuaries."[91] While great efforts have been made to reduce visibility and enhance kinetic strikes on insurgents through preserving surprise, allowing aircraft into view prior to the "finish" phase would perhaps sufficiently dissuade their action in the first place and preclude the need for kinetic operations. Applied to IED warfare, visible airpower could induce hurried, haphazard action in the emplacement phase, making both the device and insurgent more vulnerable to detection. Non-lethal or lethal, all efforts should reflect MNC-I's realization that "this population responds to airpower."[92]

ISR effectiveness would also benefit greatly from an effort to reduce separation. In general, airpower's ability to quickly traverse vast expanses quickly is an asset. However, a key factor in COIN-related ISR is change detection, or observing deviations from normal patterns of behavior and area-specific characteristics. While this is pursued through technical means such as GMTI, IMINT, and MASINT, individual aircrew familiarity with an area would provide an additive HUMINT-like capability at the operator's rudimentary PED level. As Army Field Manual 3-24 points out, the COIN environment is by no means homogeneous--"what works one

day in one place for the counter-insurgent does not necessarily work at a later date against the same enemy."[93] Therefore, familiarity gained by covering the same area routinely is crucial.

Tasking sorties to shuttle between areas to quickly image targets and scheduling flyers with no consideration of building area expertise not only separates airpower from the local population, but ground forces as well. This byproduct precludes development of rapport between soldiers and airmen, which hampers the close coordination required for COIN operations,[94] which in turn impacts overall joint force effectiveness. Additionally, passing mission-specific contextual guidance to crews could ease both coordination and area familiarity issues.[95] Thus, careful adjustments to ATO development practices and unit-level aircrew scheduling and intelligence briefings have great potential to improve airpower performance in the IED fight within the broader scope of COIN.

**The Way Ahead**

In the end, properly applying airpower to COIN and C-IED operations is certainly within reach. The primary barrier is the joint force's fascination with the "close fight" and ISR's sometimes detrimental ability to watch it unfold. While CAS-like ISR applications have an important role in the overall OCO campaign, the entire intelligence apparatus has over-emphasized them, essentially forgetting to relate vaunted "S" back to actionable "I."

Returning to airpower's roots with an "air-minded" approach will remedy the problem. Though re-purposed ISR efforts may not maintain their immediate visibility and utility to ground units, they will actually have greater effect in defeating the enemy. "Air-minded" COIN and C-IED operations hinge on ISR's ability to fix targets related to DPs and CVs for mutually supporting IO and precision attack and also enjoy multiplicative effects when structured to integrate aircraft and airmen into the local population as much as practicable.

## Recommendations and Conclusions

Above all, intelligently applying airpower to C-IED operations requires a solid understanding of the IED's critical role as a weapon of strategic influence. Planners must place the immediately tangible battlefield effects of IED engagements into the broader context of the comprehensive IED threat and COIN. Considering the full scope of IED warfare, the US and coalition should abandon its device-oriented "whack a mole" approach in favor of "three dimensional chess," leveraging asymmetric capabilities to solve the complete IED problem.

Implementation—especially when applied to airpower—requires "air-minded" solutions that look beyond the "close fight" to seeking opportunities to affect enemy COGs and bring about the desired end state. Accordingly, the US and coalition should adopt the operational design proposed in Chapter 3, re-purposing the C-IED fight to prevent the enemy from exploiting IED employment for IO gains by targeting two COGs: appeal of the insurgent message and the comprehensive IED network. Two related LOOs, Counter insurgent IO efforts and Neutralize the IED network's combat power, provide the roadmap to victory.

Airpower should continue to play a vital role in C-IED efforts and must be re-oriented along these LOOs. In the short term, ISR should continue with current capabilities applied through adjusted tasking methods. Recognizing IEDs as a theater-level problem, airborne ISR applied to C-IED tasks should take theater-level direction through an appropriately vetted list of CCIRs instead of "peanut butter spreading" assets to meet narrowly-focused unit level requests. While these tasks are important, they should no longer be misinterpreted as effective ISR; rather, they could be more accurately be considered a non-kinetic form of CAS, potentially freeing up more PED capacity for higher-order data.

Longer term innovations would also enhance airpower's effectiveness against the IED. While technological solutions should not be over-glamorized, development of advanced sensors and long-duration platforms would provide the persistence and depth of information that NTISR assets simply cannot match—their limited capabilities compel concentration on the strategically irrelevant "close fight."  Platforms under development, such as UAVs with durations measured in days and/or lighter-than-air craft carrying advanced WAAS and MASINT sensors, would alleviate this pitfall, provided often-overlooked PED capacity is expanded to match.

Innovation extends beyond platforms to new means of employment.  IO across all three airpower domains requires a complete overhaul to counter the well-crafted insurgent propaganda campaign.  The US and coalition should explore principles of de Caro's SOFTWAR and new partnerships with HN media.  Also, air operations should be integrated with the local community as much as possible, whether through a visual reminder of support and deterrence or matching units and crews to specific geographic areas to build familiarity.  In sum, these innovations solidify HN and US/Coalition legitimacy, providing the foundational freedom of action for all C-IED and COIN activities.

Clearly, the IED is anything but "improvised;" it provides an asymmetric, custom-built means of precision engagement to directly affect US COGs and achieve insurgent strategic aims. To date, the US has over-emphasized defeating individual devices and largely ignored IEDs' strategic influence.  Leveraging the US and coalition's asymmetric airpower advantage to neutralize insurgent IO and defeat the IED network begins with truly "air-minded" ISR enabled by improved CAOC processes and emergent systems and ends with precision kinetic action beyond the "close fight" aligned with friendly IO themes to directly affect insurgent COGs and deny their strategic influence—"strategic attack" re-defined for COIN.

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