

The Future of Counterinsurgency Modeling:
Decision Aids for United States Army Commanders

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Chapter 1: Introduction

1.1 Motivation

After more than a decade of fighting in Afghanistan and Iraq, terror groups and enemies of the United States remain at large. The United States Army has refined its doctrine to resemble a fighting force that has been entrenched in protracted war. Through its development of Unified Land Operations (ULO) defined in Army Doctrine Publication (ADP) 3-0 and Army Doctrine Reference Publication (ADRP) 3-0, the Army has also taken steps within its doctrine to ensure readiness for a conventional conflict that may require the synchronization of assets across multiple spectrums of operations. The future is often unpredictable, which makes the readiness of an army, and the constant refinement of its doctrine, all the more important. While doctrine shapes decisions made on the battlefield, the random variability inherent to any conflict suggests a need for additional aids to assist commanders in making sound decisions.

History has shown many examples of conventional and unconventional warfare. In some cases, conventional wars have degraded into unconventional wars that prolonged for many years.

Many books have been written that describe and analyze the nature of different unconventional wars and insurgencies that have taken place throughout history. While no two insurgencies are the same, analyzing these past conflicts can result in the realization of many similarities. The Army's current counterinsurgency (COIN) doctrine, Field Manual (FM) 3-24, attempts to capture these similarities in Chapters 4 and 5 (U.S. Dept. of the Army and U.S. Marine Corps. 2014).

At the center of all conflicts is a population with a sentiment that may be either for, against, or neutral toward the actions of competing organizations. Different segments of the population may

display various levels of active or passive support or resistance toward a competing organization. David Kilcullen, a senior advisor to General David Petraeus in 2007 and 2008, described how the people remain at the center of counterinsurgency efforts in a 2006 journal article.

...the operational art of counter-insurgency remains fundamentally concerned with displacing enemy influence from social networks, supplanting insurgent support within the population, and maneuvering to marginalize the enemy and deny them a popular base. Thus, at the operations level counter-insurgency remains a competition among several sides, each seeking to mobilize the population in its cause. The people remain the prize. (Kilcullen 2006)

Social dynamics may vary from culture to culture and multiple cultures may coexist within the same population, which makes competing organizations' struggle for support all the more challenging. The doctrine of the United States Army, as represented in FM 3-24, defines that in many cases the strategic center of gravity is political. (U.S. Dept. of the Army and U.S. Marine Corps. 2014). Naturally, the political support stems from the local population's perception of their government, the counterinsurgent, and the insurgent. This makes understanding cultures and sub-cultures across different regions and populations critical for military commanders.

A RAND Corporation study in 2008 stated that the ultimate goal in COIN is the population's "allegiance to the legitimate government." (Pirnie and O'Connell 2008) The counterinsurgent seeks to connect the host nation government to the population while eliminating segments of anti-government insurgents and sentiment to the point that the host nation can adequately secure its populace. As described in its doctrine, the approach to a counterinsurgency by the United States Army rests on the framework described by the shape-clear-hold-build-transition methodology (U.S. Dept. of the Army and U.S. Marine Corps. 2014). As the manual describes,

this approach does not represent a linear framework but a framework that is constantly changing between phases depending upon the operating environment and the host nation's capability in specific areas.

The COIN manual appears to be designed as a one-size-fits-all framework for countering insurgencies across the world. Whether this holds true is certainly up for debate; however, the framework does provide a practical approach given the many lessons learned throughout history of not only our conflicts, but the conflicts of other nations as well. This framework provides a baseline for modeling the way in which the United States Army will conduct future operations against an insurgency in any given region.

In the past, the Army has been accused of preparing for the last war instead of the next war. Because the United States has been involved with counterinsurgency campaigns throughout the past decade does not necessarily mean that a counterinsurgency will be the next campaign. However, given the many instabilities in the world today, conditions exist in many regions for insurgencies to develop. Eliot Cohen, a professor at Johns Hopkins University's School of Advanced International Studies, and his colleagues claim that "America's extraordinary conventional military power makes it likely that many of our future opponents will choose irregular means, including terrorism and insurgency, to achieve their political objectives and prevent us from achieving ours" (Cohen, et al. 2006). While the United States' involvement in future insurgency conflicts remains a decision for the civilian leadership of the country, the Army must always be prepared. Thus, the counterinsurgency doctrine of the United States Army is essential to the way in which the Army prepares for the next conflict – whether it is at an advisory capacity or directly engaged with an irregular and unconventional enemy.

As the Army looks ahead to their next war, it will use its doctrine to train for a wide array of possible conflicts involving counterinsurgency. This gives way to the motivation for this paper. The Army has used simulation games in various ways to assist in decision making and to train their leaders. They have also used simulation as an organizational learning tool to further their understanding of the way in which future wars must be conducted. This paper is aimed at providing a framework to base future work upon in order to provide a relevant decision aid to assist United States Army Commanders when planning for and conducting operations within an insurgency conflict.

1.2 Insurgencies

To facilitate further discussion in the future of modeling counterinsurgency operations, we must first understand an insurgent and recognize the inherent fact that no two insurgencies are the same. A counterinsurgency technique in one area may not yield the same result in another. Kilcullen describes several key differences between ‘classical’ and ‘modern’ insurgencies in his article called “Counter-insurgency Redux”. He asserts that in past insurgencies, insurgents had a unified goal whereas today’s insurgencies often *lack* a unified goal (Kilcullen 2006). Kilcullen proceeds to provide several historical examples of such conflicts highlighting the decentralization and objective-free nature of modern insurgencies. Despite these differences, however, some similarities between ‘classical’ and ‘modern’ insurgencies remain and the Army has attempted to tie those similarities together within its doctrine.

An insurgency has three prerequisites defined in paragraph 4-10 of FM 3-24 (United States Army COIN field manual): opportunity, motive, and means. As the manual describes, opportunity may exist when a host nation government does not have control over or support of parts of its population. If a population does not support their government and the government

cannot quell hostilities, then the opportunity for an insurgency exists. The motive for an insurgency refers to “real or perceived grievances that insurgents use to mobilize a population in support of an insurgency” (U.S. Dept. of the Army and U.S. Marine Corps. 2014). Established or emerging leaders can create a compelling narrative linking grievances to a political agenda to mobilize the population in an effort against the host nation government. The means to support an insurgency may span black markets and existing social networks to finance and resource the cause. Multiple avenues exist for the resourcing of an insurgency and the identification of such resourcing by a counterinsurgent has considerable value.

The United States Army COIN manual defines several different tactical and operational approaches used by insurgents. The first approach is an urban approach in which insurgents leverage attacks against key symbols and infrastructure in an attempt to ignite a government response that is an overreaction against the population (U.S. Dept. of the Army and U.S. Marine Corps. 2014). Another approach is a military approach. This approach depends upon successful insurgent engagements against the government in order to inspire the population to join the insurgency. The next approach is the protracted approach. This type of approach attempts to draw out the conflict for as long as possible while continuing to build up resources and support while wearing down the counterinsurgent. The final approach is a subversive approach in which the insurgent attempts to subvert the government from within through the use of a political wing of the insurgency.

The COIN doctrine also defines eight different dynamics that are common to most insurgencies (U.S. Dept. of the Army and U.S. Marine Corps. 2014). These dynamics are: leadership, ideology, objectives, environment and geography, external support, internal support, phasing and timing, and organizational and operational patterns. These dynamics are explained in detail

within FM 3-24; they illustrate the intricacies of an insurgent movement and highlight both tangible and intangible elements of what is needed for an insurgency to gain momentum and achieve success. These dynamics represent some of the challenges in gaining a comprehensive understanding of an insurgency and hence the obstacles for military commanders and staffs to overcome when planning and conducting operations.

A critical aspect to any insurgency is the population. As defined in FM 3-24, “one of the primary goals of a local insurgency is population control” (U.S. Dept. of the Army and U.S. Marine Corps. 2014). In the July-August 2005 issue of the *Military Review*, John A. Lynn, Professor of History at the University of Illinois, wrote that “an insurgency’s existence implies a base of popular support that actively aids or at least tolerates the insurgents” (Lynn 2005). An insurgent must have a base of support from the populace in order to be successful. The population is just as important to the insurgent as it is to the counterinsurgent and thus remains the focal point of the conflict. A *New York Times* article in 2012 described how local villagers in Laghman Province of Afghanistan rose up against the Taliban to drive them out of their villages (Rubin and Matthew 2012). This story illustrates the necessity of gaining popular support for the insurgent and it highlights the fact that the most critical component to the conflict is indeed the local population.

1.3 The Population

The local population remains at the heart of any insurgency. The *New York Times* article that discussed how the people rose against the Taliban also ended with a quote from Juma Khan, a local village leader. He said, “We don’t want anyone here, just leave us the way we are and let us fight for our people ourselves...” (Rubin and Matthew 2012). He highlights that some populations may simply be against everybody because they are outsiders. They just want to be

left alone. However, some populations may desire security, better amenities, or access to resources. Understanding what the needs are of a set of people can influence the way in which the counterinsurgent, or insurgent, approaches that segment of the population.

If competing organizations are fighting over the support of the population, then for an organization to be successful in the conflict requires a complete understanding of the population and the dynamics of the culture in which they live. Chapter 3 of the Army's COIN manual reinforces the importance of understanding the culture of the Operating Environment. The Army's COIN manual states:

To be successful in interacting with the local population... military members must do more than learn a few basic facts... they must understand the way their actions can change the situation for the local population (both positively and negatively) and the resulting perceptions of the population towards those actions. (U.S. Dept. of the Army and U.S. Marine Corps. 2014)

In a March-April 2005 article in the *Military Review*, Montgomery McFate, who was a fellow at the Office of Naval Research, called upon the anthropology community to contribute to the counterinsurgency effort in Iraq by asking the question, "If anthropologists remain disengaged, who will provide the relevant subject matter expertise?" (McFate 2005) She further asserts that "successful counterinsurgency depends on attaining a holistic, total understanding of local culture." (McFate 2005)

Many intricacies exist within a culture. One characteristic that the Army's COIN manual highlights is that culture is not static, it is constantly changing and therefore the cultural situation must continuously be assessed (U.S. Dept. of the Army and U.S. Marine Corps. 2014). Such an

understanding is critical to the way in which cultures must be viewed at all levels of war. Because a local population may have a belief about something one day does not necessarily mean that it will have that same belief the next. Due to the struggle between an insurgent and a counterinsurgent, daily life for local people will change drastically and such changes must be realized for the counterinsurgent to have success.

The population and the culture is the root of what must be understood within a counterinsurgency campaign. It is critical to the success of the insurgent and it is critical to the success of the counterinsurgent. As Kilcullen put it, the people are the prize.

1.4 The Problem

As many Army leaders know, conducting operations against an unconventional enemy is a difficult task. A 2006 article in the Military Review outlines many of the problems associated with conducting a campaign against an insurgency. In the article, titled “Principles, Imperatives, and Paradoxes of Counterinsurgency”, Cohen, et al. describes several paradoxes that at first glance seem counterintuitive:

The more you protect your force, the less secure you are... The more force you use, the less effective you are... Sometimes doing nothing is the best reaction... The best weapons for counterinsurgency do not fire bullets... [The host nation] doing something poorly is sometimes better than us doing it well... If a tactic works this week, it will not work next week; if it works in this province, it will not work in the next... Tactical success guarantees nothing... (Cohen, et al. 2006)

These paradoxes are representative of the many problems Army commanders face during their decision making process and highlight the complexities of fighting against an insurgency.

Commanders at all echelons must deal with the complexities of the operating environment and must do so with many restrictions imposed upon them; from the rules of engagement to various resource constraints, commanders must overcome a wide array of challenges while ensuring they meet their higher headquarters' intent and nesting their operations within the overall strategy of the campaign. While commanders have many decision aids to facilitate making the best decisions given a certain level of risk versus reward, the problem of attaining a comprehensive understanding of how a set of actions might influence the operating environment of a volatile area continues to remain a key problem affecting commanders at multiple echelons.

When Battalion and Brigade level operations and intelligence sections war-game an operation, they often look at cause and effect relationships between actions and counteractions. Namely, they play out the operations and consider the consequences of those operations. Considering the first order effects of an operation may often be trivial, but considering the second and third order effects along with the unintended consequences of a set of actions may often be difficult to dissect. Thus, the staff sections and the commanders are faced with a considerable amount of "unknowns" prior to conducting counterinsurgency operations. They can make reasonable assumptions based on intelligence reporting about the enemy, they can speculate about the reaction of the population, and they can estimate the overall impact an operation has upon the operating environment, but often times the operation will not unfold the way it was intended. Intelligence may not always provide an accurate estimate of the enemy and the sentiment of the population may easily be misunderstood. In any case, an operation by the counterinsurgent may be viewed as a random variable with a given distribution as part of an overall system aimed at achieving a particular end state.

The overall problem then can be summed up into one question: can we develop a counterinsurgency decision aid for Army tactical commanders to assist in making decisions about when and where a particular set of operations should be conducted? What we strive to achieve is a model that depends on a set of parameters about the insurgent, counterinsurgent, host nation, and population that provides an accurate assessment of the uncertainty of operations in a given operating environment as well as an accurate picture of the effects of the operations in the struggle for popular support.

The following chapters of this paper provide a foundation for understanding this problem and give forth some of the dynamics that should be incorporated into the solution.

Chapter 2: Levels of Warfare

2.1 Tactical Level

The tactical level of warfare can be described as the actual combat component to achieve operational level objectives. Described in the United States Military's Operations Joint Publication, "tactics is the employment and ordered arrangement of forces in relation to each other" (U.S. Joint Chiefs of Staff 2011). The focus of tactics is the planning and execution of engagements, which includes various lethal and non-lethal activities. For example, the tactical level of war would include an infantry company conducting a raid targeting an insurgent weapons cache or an infantry platoon conducting training for host nation security forces.

As described in the construct of the Brigade Combat Team (BCT) below, the BCT is the army's largest tactical unit; however, "Levels of command, size of units, types of equipment, or types of forces or components are not associated with a particular level of war" (Department of the Army 2012). With this in mind, the decisions commanders make are considered strategic, operational, or tactical "based on their effect or contribution to achieving strategic, operational, or tactical objectives" (Department of the Army 2012). To this extent, the decisions made at the BCT are typically categorized into the tactical level of war.

The tactical level then, is the level at which commanders decide where and when one or more engagements take place. These decisions within COIN are most often found within the BCT. Commanders subordinate to the BCT Commander will often make these decisions as well, so long as they fall in line with the operational level objectives.

2.2 Operational Level

The operational level of warfare links tactics to strategy. The focus at this level is the “design, planning, and execution of operations using *operational art*... to design strategies, campaigns, and major operations and organize and employ military forces” (U.S. Joint Chiefs of Staff 2011) Depending upon the kind of conflict, this level of war is likely found at the Corps or Division level.

The utilization of the term *operation* may present a confusing military definition. While defined within the doctrinal concepts of this paper, we should note that the term *operation* does not necessarily refer to the operational level. The operational level of war is typically designated for major operations.

An example of major operations within the context of counterinsurgency may involve transferring a province to allow the host nation full control of operations (Dubik 2012). These decisions point toward the overall strategic objectives and the tactical implication of an operational level decision are fairly clear. In this example, at the tactical level the BCT must orchestrate its missions to support a transition to the host nation by integrating with other assets that the operational level has set forth. The purpose of the operational level is to provide the necessary link from strategy to tactics.

2.3 Strategic Level

The strategy for a counterinsurgency campaign links the operational and tactical objectives to political policy. The United States retains a myriad of capabilities to combat insurgencies; however, political policy will shape the strategy following a dialogue that must take place between political leaders and commanders. The capabilities that the United States has in

conducting operations are vast and political and military leaders must understand the costs and risks associated with deploying those capabilities. United States strategy is “defined by how it combines these capabilities (the ways), resources them (the means), and its willingness to accept risk in attaining its policy goals” (U.S. Dept. of the Army and U.S. Marine Corps. 2014). The COIN field manual also states that “once U.S. policymakers have determined the goals (the ends) of the U.S., the military evaluates operational approaches to conduct counterinsurgency efforts depending on the ends, ways, means, and acceptable risk” (U.S. Dept. of the Army and U.S. Marine Corps. 2014).

The strategic objectives in a counterinsurgency campaign may vary depending upon the nature of the insurgency. On December 1, 2009 President Obama presented his Afghanistan strategy in an address, which was “to disrupt, dismantle, and defeat al-Qa’ida and prevent its capacity to threaten America and our allies in the future” (Obama n.d.) He then stated that to accomplish this, the United States would pursue three objectives: “denying al-Qa’ida a safe haven, reversing the Taliban’s momentum, and strengthening the capacity of Afghanistan’s security forces and government...” (Obama n.d.). President Obama laid out his political objectives to shape the strategy for conducting the counterinsurgency campaign in Afghanistan. Military leaders then had to develop their plans for shaping their strategic objectives in order to meet the President’s objectives. At this point in the Afghanistan war, the United States surged their forces across Afghanistan and ramped up training efforts to further train and develop the Afghan security forces; thus, the President’s policy was enacted into an overall strategy for the campaign.

The strategic objectives are often overarching goals that define the end state of the campaign. The strategy may provide insight into how that end state is achieved, but the tactical operations conducted at lower echelons of the Army must correspond to reaching the strategic end state.

Chapter 3: Background

3.1 Doctrinal Concepts

Critical for researchers to understand are the doctrinal terms and concepts used by the United States Army. Language can often mislead those who do not understand the definitions of words or phrases commonly used within the military. This section serves as a reference for the terminology used in this report that may not be common amongst researchers. The following terms can also be found in the United States Army COIN manual (U.S. Dept. of the Army and U.S. Marine Corps. 2014) and the United States Army Offense and Defense publication (Department of the Army 2012).

Area of Operations: An operational area defined by the joint force commander for land and maritime forces that should be large enough to accomplish their missions and protect their forces.

Battle: A battle consists of a set of related engagements that lasts longer and involves larger forces than an engagement.

Center of Gravity: The source of power that provides moral or physical strength, freedom of action, or will to act.

Clear: A tactical mission task that requires the commander to remove all enemy forces and eliminate organized resistance within an assigned area.

Counterinsurgency: Comprehensive civilian and military efforts designed to simultaneously defeat and contain insurgency and address its root causes.

Engagement: A tactical conflict, usually between opposing, lower echelon maneuver forces.

End State: The set of required conditions that defines achievement of the commander's objectives.

Insurgency: The organized use of subversion and violence to seize, nullify, or challenge political control of a region. Insurgency can also refer to the group itself.

Intelligence: The product resulting from the collection, processing, integration, evaluation, analysis, and interpretation of available information concerning foreign nations, hostile or potentially hostile forces or elements, or areas of actual or potential operations.

Irregular warfare: A violent struggle among state and non-state actors for legitimacy and influence over the relevant population(s).

Operation: A military action or the carrying out of a strategic, tactical, service, training, or administrative military mission.

Operational Approach: A description of the broad actions the force must take to transform current conditions into those desired at end state.

Operational Environment: A composite of the conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of the commander.

Rules of Engagement: Directives issued by competent military authority that delineate the circumstances and limitations under which United States forces will initiate and/or continue combat engagement with other forces encountered.

3.2 Centers of Gravity

Understanding the center of gravity is an essential element for determining the kinds of operations that must be conducted during a counterinsurgency. The Army's COIN manual

describes a center of gravity as “the source of power that provides moral or physical strength, freedom of action, or will to act” (U.S. Dept. of the Army and U.S. Marine Corps. 2014).

Centers of gravity are dynamic, changing over time and location; they may also differ between the tactical, operational and strategic levels of war.

A key component to the military planning process is the identification of the enemy’s center of gravity. In this section, we explore several centers of gravity that are often identified. This is not a comprehensive look at all centers of gravity, but it provides the foundation for a key component to any counterinsurgency modeling effort. The center of gravity must be incorporated into a model for that model to present a valid representation of the operating environment.

The Joint Intelligence Preparation of the Operating Environment publication provides several examples of centers of gravity, though not necessarily intended for counterinsurgency. At the strategic level, a center of gravity “could be a military force, an alliance, political or military leaders, a set of critical capabilities or functions, or national will” (U.S. Joint Chiefs of Staff 2009). At the operational level, a center of gravity is often “associated with the adversary’s military capabilities... but could include other capabilities in the operational environment” (U.S. Joint Chiefs of Staff 2009). Centers of gravity are always linked to the objective of an organization and must be continually protected and/or fought for by the competing organizations.

In counterinsurgency, the center of gravity may be difficult to identify. The Army’s COIN manual states that in “many cases, political support is the strategic center of gravity for the U.S.” (U.S. Dept. of the Army and U.S. Marine Corps. 2014) The United States depends on the political support of the host nation in order to have legitimacy in the conduct of operations during a counterinsurgency. Status of forces agreements illustrate how the United States works

closely with a host nation government in order to establish boundaries for the interaction between the military and the host nation. The insurgent and the host nation, however, may have many different centers of gravity. For example, external support may be critical for an insurgent organization and should a counterinsurgent identify that as a center of gravity and then target it accordingly, an insurgent organization may quickly deteriorate.

Some scholars argue that the population is the center of gravity for most insurgencies. In a *Small Wars and Insurgencies* journal article, Nori Katagiri writes that “civilian support is considered to be the key to win COIN because populations offer supplies, intelligence, sanctuary, training grounds, and recruitment on which the insurgent and counterinsurgent alike depend” (Katagiri 2011). However, Katagiri cautions against framing the population as the single most important aspect to effective COIN. He asserts that by practicing a “winning of the hearts and minds” strategy, a dilemma ensues where “victory would be impossible without a third party’s help, but the strategy requires compromise that may undermine policy” (Katagiri 2011). The essence of the article implies that to hold the population as the single most important center of gravity may not necessarily yield the desirable end state of the overall strategy set forth in a COIN campaign.

When considering centers of gravity, we must understand that there exist essential elements of an operating environment which make each competing organization capable of conducting operations. That essential element is not necessarily the population, yet the population certainly remains a key characteristic of the operating environment that the competing organizations are struggling to obtain support from. Analysis of centers of gravity provides commanders with the information necessary to strike at key targets in order to extinguish their capability. Thus, the better the centers of gravity are understood, the better a commander can utilize resources to combat an insurgency.

3.3 Army Structure

To model the effect of operations for an effective decision aid, we must understand the hierarchy of the Army organization as well as several characteristics about the way in which the Army functions. Who makes the decisions and who helps shape those decisions is crucial to identifying ways in which a modeling effort can be effective. This section serves to provide a basic description of the Army command hierarchy.

The United States Army has many kinds of units. For the purposes of this paper, we will focus on the Brigade Combat Team (BCT). The BCT is the “largest fixed tactical [unit] in the Army” and their “chief tactical responsibility is synchronizing the plans and actions of their subordinate units to accomplish assigned tasks for division headquarters” (Department of the Army 2012). Field Manual 3-90.6 provides the detailed functions and characteristics of a BCT. Figure 2.1, below, shows the line and block chart of a typical Infantry Brigade Combat Team construct (Department of the Army 2010).

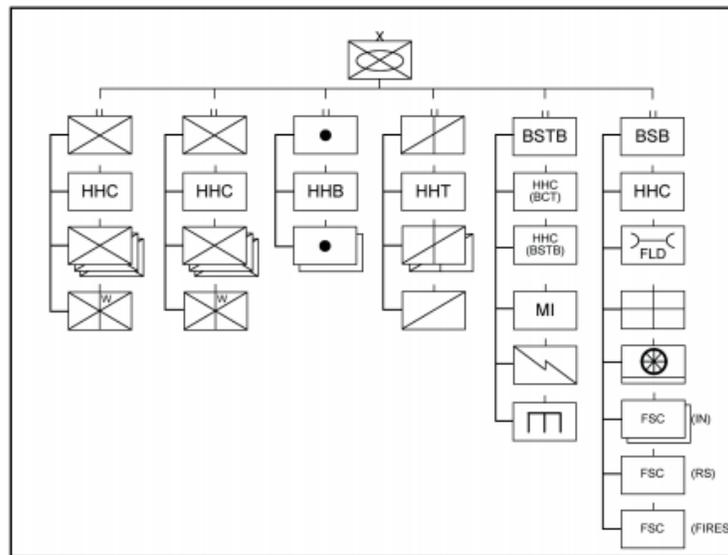


Figure 2.1: Infantry Brigade Combat Team

When deployed in support of various operations, a BCT will often task organize, which means different units within the BCT may be assigned under another command or units not organic to the BCT may be assigned under the BCT.

A BCT is led by a United States Army Colonel (O-6 paygrade) and is referred to as the Brigade Commander. The Brigade Commander has a robust staff section that supports personnel, intelligence, operations, logistics, communications, civil affairs, and other various activities that support the commander as well as the subordinate units. The Brigade Commander deploys forces to support both strategic and operational objectives. As such, the Brigade staff is charged with understanding the strategy of the campaign and the operational objectives that are nested within the strategy. The Brigade Commander is the ultimate decision maker for the BCT and is responsible for deploying the subordinate units in accordance with the capabilities designed to meet the overall objectives.

A Battalion is the next lower unit within the construct of the BCT and led by the Battalion Commander. The Battalion Commander is responsible for the deployment of the Battalion's subordinate Companies. The Battalion retains a similar staff to the BCT, but with smaller staff elements. The staff supports the Battalion Commander's decision making when deploying the subordinate Companies to fight an operation. The Battalion receives the operations orders from the BCT and formulates their own operations orders to distribute to the subordinate Company elements. The Battalion is primarily concerned with the tactical objectives set forth by the Brigade.

The Company is the next lower unit that is nested within the Battalion and led by a Company Commander. The Company Commander does not have a staff similar to that of the Battalion and the Brigade Commander. The Company Commander has a senior non-commissioned officer

with the rank of First Sergeant that is responsible for assisting the Company Commander on a variety of issues to include planning for tactical operations. Many Companies are also equipped with a Company Intelligence Support Team (CoIST). The CoIST is anywhere from one to four soldiers that interact with the Battalion Intelligence Section to support the Company Commander in decision making and tracking intelligence within the Company area of operations.

The platoon is the next lower unit that is nested within the Company. The platoon is led by a Platoon Leader. This is the lowest organization that is led by a commissioned officer. The platoon is the execution element for tactical tasks. At times, a Company level operation will include multiple platoons each conducting operations in support of the same objectives.

When considering how a BCT is deployed in COIN, we can consider Afghanistan as an example. A BCT was typically responsible for several provinces. Then, depending on the nature of the insurgency in each province, each Battalion was distributed across the area of operations. In one province, there may have been two Battalions while in another province there may have been only one Battalion. The Companies in each Battalion were then responsible for several districts within the assigned area of operations of the Battalion. Platoons, then, would conduct operations within those districts at the discretion of the Company Commander based on the orders given to the Company Commander and the Company Commander's own initiative.

One aspect to the way in which the Army deploys a BCT in support of COIN is that the United States Army does not fight the insurgents alone. The host nation security forces play an integral role in the fight. The United States Army, along with other branches of the military, are involved with training the host nation forces and support the host nation forces during operations. In Afghanistan, the Army went through several different phases in growing the Afghan National Security Forces. At one point, Embedded Training Teams (ETT), comprised of personnel from

various branches of the military, were sent to assist in training and conduct operations with the Afghans while the BCT conducted the bulk of the operations targeting insurgents. Then, a shift to Combined Action occurred which was aimed at partnership between the BCT and the Afghans. In this phase, the Army conducted operations alongside the Afghans. Following Combined Action, Security Forces Advisory and Assist Teams (SFAAT) were sent to advise the Afghans while the BCT acted only in a supporting role in many areas, allowing the Afghans to take the lead on planning and conducting operations against the insurgents. Thus, the partnership between the United States Army and the host nation is a critical component to conducting counterinsurgency operations, especially when an enemy has no time horizon for winning the conflict.

3.4 The Framework for Countering Insurgency

The Army's COIN manual provides the framework flexibility so that operations may be adjusted as the cultural and insurgent situations change. Through its "shape-clear-hold-build-transition" model, the Army acknowledges that while a unit may be part of the clear phase in one area, it may also be part of the hold phase in another. (U.S. Dept. of the Army and U.S. Marine Corps. 2014) The dynamic nature of counterinsurgency means that the counterinsurgent must adapt to the changing conditions and adjust its concept of operations as those conditions change.

Within the general framework of "shape-clear-hold-build-transition", each phase provides a guideline for the distribution of offensive, defensive, and stability operations. For example, in the clear phase, offensive operations represent the majority of the operations while defensive and stability operations represent a smaller fraction. Figure 2.2 shows a composite view of the framework and illustrates the way in which the framework is applied throughout COIN operations in a specific region (U.S. Dept. of the Army and U.S. Marine Corps. 2014).

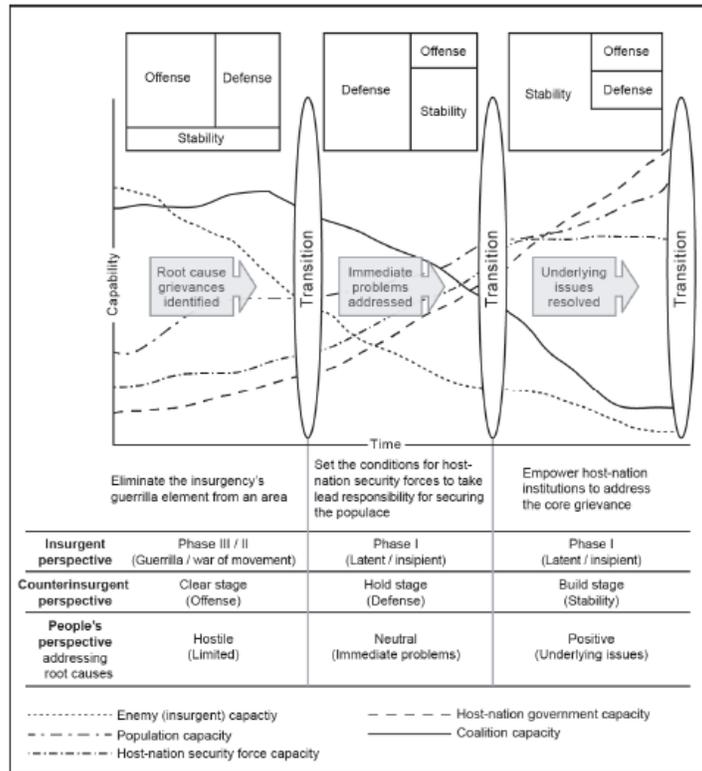


Figure 2.2: “Shape-Clear-Hold-Build-Transition” Framework

Shape Phase

The shape phase involves the preparation of conducting operations within a specific area.

Throughout this preparation, United States ground forces involve many other partners in shaping the operating environment. Intelligence entities are leveraged to learn as much about the area as possible. Disruption operations may be conducted in order to “force the insurgency to alter its course of action” (U.S. Dept. of the Army and U.S. Marine Corps. 2014). Reconnaissance operations may be critical to filling in intelligence gaps prior to the commitment of forces to specific areas as well. The shape phase is critical to the overall framework as it sets the stage for the following clearing operations that involve the kinetic use of force.

Clear Phase

During the clear phase, offensive operations represent the majority of the counterinsurgents efforts. Offensive operations for the counterinsurgent are generally operations that involve counterinsurgent forces targeting insurgent forces through raids, ambushes, movement to contact, and the seizing of key terrain. Such operations are very kinetic and revolve around a counterinsurgent-insurgent interaction. During offensive operations, attrition may occur within insurgent and counterinsurgent personnel and supplies, and collateral damage may cause a shift in local national sentiment. Similarly, offensive operations for insurgent forces, which can be represented by ambushes, indirect and direct fire engagements also result in counterinsurgent-insurgent interactions. These too carry a certain risk of collateral damage that could influence the population.

As the Army COIN manual describes, the purpose of the clear phase is to remove enemy forces and organized resistance from a particular area (U.S. Dept. of the Army and U.S. Marine Corps. 2014). While the removal of enemy forces is the aim of the clear phase, the Army recognizes that underground resistance and auxiliary forces may not be completely removed before transitioning into the hold phase. Thus, a commander must have certain criteria that defines success in the clear phase before transitioning into the hold phase. This criteria more than likely involves a certain threshold of kinetic activity within the area of operations or an estimate of the insurgents remaining within the area. In other words, a significant decline in counterinsurgent-insurgent interactions should be observed prior to transitioning into the hold phase.

Hold Phase

The hold phase is when a significant decrease in offensive operations occurs. The counterinsurgents aim is to secure a population so that the host nation can continue to develop in order to eventually secure the population itself. The hold phase lasts as long as it takes to “develop the capability of the host-nation security forces [and] reduce the enemy strength in the area to the point that the host-nation security forces can take lead responsibility for security” (U.S. Dept. of the Army and U.S. Marine Corps. 2014).

As Figure 2.2 illustrates, defensive operations comprise the bulk of the effort for the counterinsurgent with stability tasks representing a significant amount as well. Offensive operations in this phase are minimal yet are important in continually disrupting and targeting the underground resistance and auxiliary forces. Defensive tasks during the hold include “counter cache operations, area denial, combined security at fixed sites, block infiltration routes, countermobility, and securing the population” (U.S. Dept. of the Army and U.S. Marine Corps. 2014). Stability tasks include “manning, equipping, and training host-nation security forces, establishing local governance functions, and establishing culturally appropriate rule of law systems within the host nation’s plan” (U.S. Dept. of the Army and U.S. Marine Corps. 2014). As these varying tasks suggest, many types of interactions within the operating environment take place. Interactions between counterinsurgent and insurgent are apparent as well as interactions between counterinsurgent and local national, insurgent and local national, and local national and local national.

The hold phase may take a long time to complete depending upon the many variables within the operating environment. Should robust infrastructure exist in a particular area, the stability tasks in that area may not take nearly as long as an area where there exists a severe lack of

infrastructure. Similar to the transition from the clear phase, a commander must decide on when to transition from the hold phase and enter into the build phase. Once again, a certain threshold must exist that defines this decision. This could be how well the host nation security forces perform in training and when deployed to the field. According to the Army's COIN manual, this transition happens when the host nation security forces are capable of taking lead responsibility of security operations (U.S. Dept. of the Army and U.S. Marine Corps. 2014).

Build Phase

The build phase sees a rise in stability operations. The Army's COIN manual states that the build phase "comprises carrying out programs designed to remove the conditions that allow the insurgency to exist..." (U.S. Dept. of the Army and U.S. Marine Corps. 2014). The stability tasks that take place are "advising and assisting the host-nation security forces, developing professional development programs (including professional education) for host-nation security and government individuals, facilitating host-nation governance activities, support to local and national demilitarization, demobilization, and reintegration programs, and development of host-nation rule of law and conflict resolution mechanisms" (U.S. Dept. of the Army and U.S. Marine Corps. 2014). Despite the large amount of stability tasks, offensive and defensive operations in support of the host-nation continue. Such operations include precision strikes, tactical overwatch and quick reaction force operations in support of the host nation and a continued protection of the population in coordination with the host nation security forces.

In the build phase, interactions between all organizations continue to occur; however, the host nation security forces should be making the most interactions with the local national population as well as the insurgents. The United States presence begins to decrease within this phase, particularly as the shift towards the transition phase begins.

Transition Phase

The transition phase marks the complete turnover of a particular function to the host nation. This phase should not be confused with a complete withdrawal of the United States military. In fact, often times a United States presence is necessary even after every function has been transitioned. This may be for the purposes of “[training] host-nation security forces or institutions, [providing] enablers, or [beginning] security cooperation tasks at the request of the host-nation government” (U.S. Dept. of the Army and U.S. Marine Corps. 2014).

The end state of the “shape-clear-hold-build-transition” framework is “to create the conditions necessary for the host nation to counter an insurgency independently” (U.S. Dept. of the Army and U.S. Marine Corps. 2014). An insurgency may go on for many years and may be draining on resources and national will. As such, the United States recognizes that it cannot afford to spend many years combating an insurgency; it needs to create the conditions for training and equipping the host nation in order to combat the insurgency itself with limited support from United States assets.

Chapter 4: Related Work

4.1 Modeling Insurgency

Simulation games have been developed that allow military commanders and staffs to train in counterinsurgency operations. The Institute for Creative Technology at the University of Southern California developed an urban simulation game that incorporates a simulated population that seeks to maximize expected reward as a Markov Decision Problem while exhibiting bounded rationality (Mcalinden, et al. 2009). The purpose of the simulation is to provide a “practice environment for counterinsurgency operations...” (Mcalinden, et al. 2009). A simulation of this kind is helpful for commanders and staffs to train in counterinsurgency operations, but it does not represent an effective decision aid to tactical planning during a counterinsurgency conflict. This simulation can assist commanders in preparing to deploy to an urban environment; however, a model for tactical planning for a wide variety of counterinsurgency environments must not be dependent upon the players of a game, but dependent upon parameters that can be manipulated to represent the doctrinal phase-by-phase counterinsurgent operations, the population dynamics, and the insurgent approach.

R.G. Coyle, in “A System Description of Counter Insurgency Warfare”, developed a diagrammatic model to simulate the influences and array of variables affecting a counterinsurgency conflict (Coyle 1985). The purpose of Coyle’s article was to “demonstrate a compromise between mental and mathematical models by applying techniques of system description to produce a diagrammatic model... of the admittedly complicated influences at work in counter-insurgency warfare” (Coyle 1985). This model demonstrates the complexities of causes that can influence insurgent and counterinsurgent support and serves as a method for

understanding strategic decisions. Coyle's model possesses a series of "feedback" loops which he claims "allows one to suggest policy guidelines" to influence the way in which resources are deployed to either favor the insurgent or the counterinsurgent (Coyle 1985). This model gives forth a method to consider strategic decisions during campaign development, but seems to lack a construct that supports the way in which people within a population interact with each other, which must be a basis for a model relevant to a tactical commander.

In another approach to the diagrammatic system for modeling counterinsurgency, Edward Anderson developed a method that resembles a similar construct as Coyle (Anderson Jr. 2011). Anderson, however, explored the effect of lethal and non-lethal operations and calibrated his model using data from the Anglo-Irish conflict of 1919-1921. He also explored other questions such as troop withdrawal and timing of lethal and non-lethal combat efforts. While the model represents a sophisticated approach to help shape a counterinsurgency campaign strategy, it does seem to lack the local national interactions that are essential to modeling perceptions of people.

A United States Army Major, Benjamin Hung, and his colleagues provided insight into modeling a local population along with respective competing influencers in his work titled "Optimization-Based Influencing of Village Social Networks in Counterinsurgency"; he presented two models and several experiments to show an effective way to assign a counterinsurgent to villages through non-lethal targeting (Hung, Kowitz and Ozdaglar 2011). In this work, Hung presents the problem of "deciding on whom U.S. forces should engage through outreach, negotiations, meetings, and other interactions in order to ultimately win the support of the population in their area of operations" (Hung, Kowitz and Ozdaglar 2013). The model provides a basis for considering non-lethal actions, but does not incorporate the lethal operations that are conducted

in tandem with the non-lethal operations in accordance with the Army's framework defined in FM 3-24.

Furthering the exploration of influencing networks, Jason Tsai, of the University of Southern California, developed a model using a game theoretic approach given an active population with two competing organizations (J. Tsai, T. H. Nguyen, et al. 2014). Game theoretic approaches have been popular in the analysis of security domains (Jain, et al. 2010); Tsai extended the uses of game theory to the case of competing influences. In his approach, a defender attempts to mitigate the influence by the attacker within a counterinsurgency domain where the population also spreads the influence of either competing organization (Tsai, Nguyen and Tambe 2012). This approach provides insight into a game-theoretic approach necessary to model how ideas can spread through a population, but once again fails to consider the effects of other interactions on the battlefield, namely the kinetic fight between the insurgent and the counterinsurgent.

The above work can help form a foundation for which a model to represent the players and the interaction between the players within an actual operating environment can be constructed. The techniques defined by the authors above must be incorporated within an algorithm in order to emulate each phase of the counterinsurgency framework. While each competing organization attempts to maximize the number of supporting population nodes, they also attempt to minimize each other's ability to influence the population. For the counterinsurgent, this may be accomplished by eliminating insurgent nodes, displacing insurgent nodes, or reducing the resources necessary for insurgent nodes to operate. For the insurgent, minimizing the counterinsurgent's ability may be accomplished by attacking the counterinsurgent in order to disrupt their operations and drain national will. In any case, the models developed retain the non-lethal targeting aspect, but they can be bolstered by adding the element of lethal effects,

which also plays a role in public perception and the overall success or failure of a population-centric COIN campaign.

4.2 Other Contagion Modeling Domains

Other domains for modeling the effect of influencing a population are quite vast and certainly relevant to the COIN domain. Marketing a product, campaigning for political office, or understanding how to treat a virus epidemic are all domains that deal with population influencing.

In the case of viral marketing, Daniel Golovin and Andreas Krause present several concepts in their “Adaptive Submodularity” article in the Journal of Artificial Intelligence Research.

Golovin and Krause consider a basic knowledge about a social network structure in order to determine an initial set of people to market toward in order to spur maximum demand for a product (Golovin and Krause 2011). The basic idea is that they select an individual to offer a product promotion to and then make some observations about how the demand spreads for the product. Their work includes the concept of making decisions with limited information about the social network.

In work being done at Teamcore at the University of Southern California, Partially Observable Markov Decision Processes (POMDP) are leveraged in modeling decision making under uncertainty within the domain of the spread of the Human Immunodeficiency Virus amongst homeless youth (Yadav, et al. 2015). In his work, Amulya Yadav considers networks that are unknown amongst homeless youth and presents a method for determining the nodes of the network that will result in a maximization of spreading best practices for preventing the spread of HIV.

In both of the works above, the authors explored the concept of having knowledge gaps that revolve around a population set. Their goal is to select the nodes that maximize a desired effect centered on influencing as much as the population as possible. The modeling in these domains, while starkly different from the counterinsurgency domain, provides key concepts to furthering the development of a model for counterinsurgency.

Chapter 5: Decision Aid Considerations

5.1 Constraints

The commanders who are making the decisions about when and where to conduct their operations to achieve the operational objectives should be the focus for a decision aid. The strategic and operational levels will set the political policy into action, but the commanders who are “on the ground” are forced to make the decisions that will directly affect the outcome of their area of operations.

Many constraints exist when considering a model for counterinsurgency. For an effective decision aid, our aim should be to create a usable tool that can give a commander a general understanding of how a set of operations are going to unfold. While many intelligence capabilities exist to make effective predictions about enemy networks, population networks, and other critical aspects to a model, we must acknowledge that the Army operates in a resource constrained environment. The Army will not know the complete layout of a population network. They may be able to discern who key local leaders are and they may be able to use the anthropology community to determine certain aspects of the population and culture, but often times intelligence resources are committed to the kinetic fight. After all, the kinetic fight is when most American Soldiers are killed in action. Therefore, the Army commits a large amount of intelligence resources to counter improvised explosive devices, target high value individuals within an insurgent network, protect our forward operating bases and outposts, and destroy enemy logistic caches. Non-lethal targeting efforts seem to take the backseat at the Battalion and Brigade level when leveraging intelligence assets, yet a great deal of arguments exist that suggest this should not necessarily be the case during COIN.

When considering a model, knowledge of the local population network will be minimal. The Army will have some insight into population dynamics, but to consider the entire population as a network with each individual representing a node may not be feasible. Despite a great deal of resources committed to developing the insurgent network, this will also be difficult to fully develop. Key leaders of the insurgency will be identified and many other nodes as well, but having a *complete* insurgent network outlined is not feasible.

5.2 Feasible Inputs

The inputs to a model must represent the reality of the information commanders and staffs will have at their disposal. Knowing the complete population network, for example, is a piece of information that commanders and staffs will not have. Similarly, they will not know the extent of the insurgent network. They will be able to create an estimate based on many different pieces of intelligence from a variety of intelligence sources and platforms, but the extent of the network will be unknown.

Critical to a model is a basic knowledge of the population. Despite not knowing the exact population network (i.e. who is connected to who), the commander's staff should be able to utilize different resources to gain an understanding of the culture. This is a key component that the United States Army must understand, and such a component should be represented in a model that attempts to capture a counterinsurgency conflict. The staff can create a general understanding of cultural influencers and hierarchies. For example, perhaps a village in a rural area is informally ruled by a group of elders. Those elders then carry a large amount of influence in that the villagers will support the decisions of the elders. This cultural structure makes the elders a critical component in any influencing campaign and is necessary to gain support during a counterinsurgency. Contrarily, suppose a culture is similar to that of different pockets in the

United States. Here, freedom and autonomy are valued heavily which often results in a lack of structured cultural hierarchy.

The cultural input should reflect percentages of the labor force occupations as well as other characteristics about the culture and the ways in which people have daily interactions. It should also reflect the way in which these interactions occur. In the examples above, if the village elders support the host nation government then the rest of the village is likely to follow.

However, in the second example of the United States, if the oldest and wisest person in a community is influenced one way, then the rest of the community may not necessarily be inclined to follow. A cultural input may take various forms and will require further analysis beyond the scope of this paper in order to determine how that input may be represented.

Another critical input to the model must be a terrain input. Terrain impacts the way in which people live. From roadway systems, to rivers, valleys, and mountains, people are subject to the conditions of their terrain. For example, people who live in a village that has several crossroads leading to several remote villages in the back of a valley are likely to have more of a market place where people living in adjacent villages interact. This input can easily be obtained by a commander's intelligence staff through map reconnaissance and other anthropologic avenues. A terrain input is critical to achieving usable results from the model, as seen in the outputs section of this report.

A commander's staff will know pieces of information about the insurgency. They will be able to estimate the insurgencies different centers of gravity, size, capabilities, and disposition. They will be able to gain a general knowledge of who does what within the insurgent network over time. Intelligence sections will maintain a high value target list along with how the insurgents are connected to each. Such a connection chart will have many gaps, but as time increases, they

will gain a more comprehensive understanding of how the insurgents operate. As stated within the constraints, having a complete construct of the insurgent network is not feasible, but having a solid understanding is feasible and therefore must be considered for an input into an accurate model.

A commander's staff will also know some information about the host nation. In particular, they will be able to assess the strength and capabilities of the host nation security forces. They will be able to make estimates on how quickly the host nation will be able to grow their security forces and how long it will take to train them. Several variables are associated with this. For example, if a country previously had security organizations that were relatively well trained, then growing this kind of force may not take as long as a country that may not have had a well-trained or well-equipped security force.

Figure 5.1, while not comprehensive, shows the basic inputs that are necessary and feasible for a COIN model. For the United States Army input, the troop level should represent the troops on hand while the phase thresholds represent when the unit will transition into subsequent phases. This input may be represented by the capability/size of the host nation security forces or by the number of insurgents remaining in an area, or by a combination of the two.

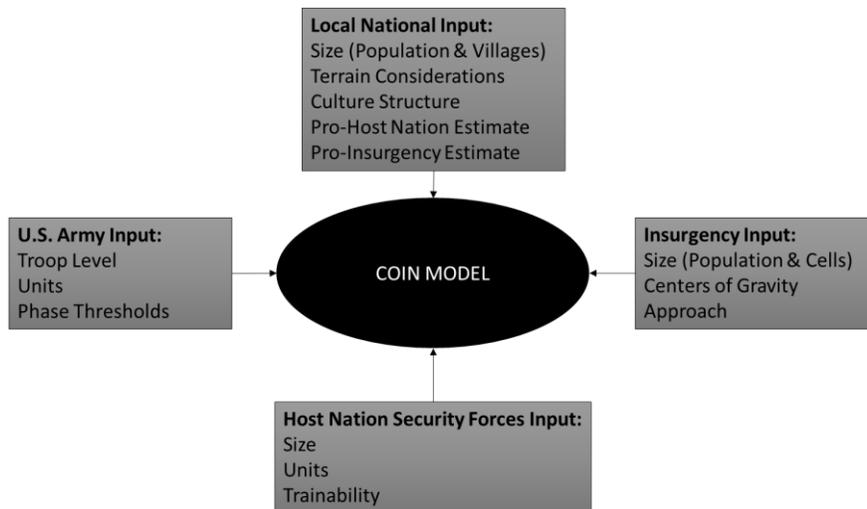


Figure 5.1: COIN Model Inputs

The inputs denoted in Figure 5.1 are basic. As a model is developed, some of the algorithms may require other inputs not listed. If the input is feasible, then it should be made as an input requirement; however, if the input is infeasible, then a probabilistic assumption should be made and the output should reflect the assumption necessary for the model.

5.3 Feasible Outputs

The goal of a model for counterinsurgency must be to produce a usable tool for tactical commanders to use when making decisions. The output of a model must give the commander insight into a chosen course of action. The tactical level within COIN is likely to be the level that may utilize a COIN model decision aid more effectively than at the operational or strategic level.

An output that could provide useful insight at the tactical level should use the framework of how the United States Army conducts COIN operations. The “shape-clear-hold-build-transition” framework lends itself to a model that can be based on the respective phases. In particular, the

clear, hold, and build phases are where the bulk of human interactions within the operating environment take place. In these phases, the following interactions occur: counterinsurgent-insurgent, counterinsurgent-host nation, counterinsurgent-local national, insurgent-host nation, insurgent-local national, host nation-local national and local national-local national.

The objective of a model should be to minimize the time between phases thereby minimizing the total time of the conflict. Due to resource constraints and the longevity of counterinsurgencies, a counterinsurgent force does not want to have its military engaged with the enemy any longer than necessary. Thus, a tactical ground unit should want to achieve success as quickly as possible. A key output for a decision aid is the distribution of offensive, defensive, and stability operations per phase as well as the time required to meet the specified thresholds. Figure 5.2 illustrates such an output.

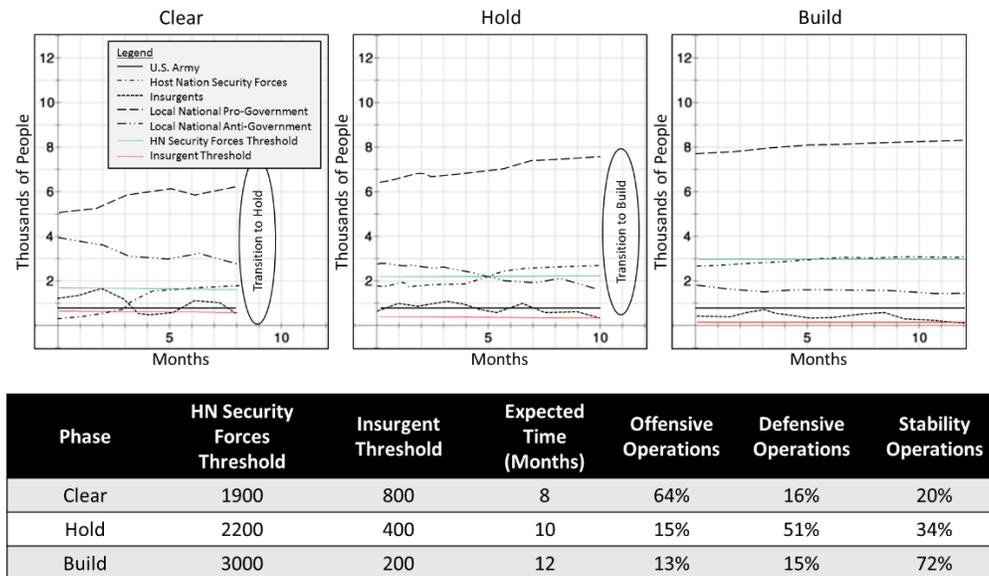


Figure 5.2: Example Model Output

Figure 5.2 shows several different pieces of information that can allow a commander and staff to plan for future operations. In this example, the shift in phases is a result of the host nation

security forces meeting a specific threshold and the estimated insurgents meeting a certain threshold. Once both thresholds are met, then the commander is able to transition into the next phase.

The optimum operational distributions should remain at the offensive, defensive, and stability operations level. In other words, to breakdown the operations into specific types of offensive, defensive, or stability operations – such as movement to contact or raid – would provide too much specificity to the commander that may not necessarily meet the needs of reality. At the level shown in Figure 5.2, the commander can use the distribution from the model in order to validate the level of operations during each phase of the conflict.

When considering the thresholds that the model should seek to optimize, one may wonder why no threshold is set for the local nationals who are either for or against the government. The rationale behind this is that the thresholds must be something that can be either accurately measured or discerned by the counterinsurgent. As stated earlier in this paper, intelligence resources, as well as units on the ground, may have a difficult time accurately measuring the population. While the population sentiment remains a vital role in countering an insurgency, it is not a feasible measurement for Army units. Knowing the strength of the host nation security forces and an estimate of the insurgency are two feasible measurements that an Army unit can measure through their intelligence resources and troops on the ground.

Figure 5.3, below, illustrates the variables that a model should seek. Using the example output from Figure 5.2, the figure below shows the end state thresholds set for each phase. It also shows the conditions that must be imposed upon each phase. A model should allow the user to manipulate these conditions; however, the conditions currently shown in Figure 5.3 represent a doctrinal approximation from the Army's COIN manual. This variable illustration resembles

that of a linear or non-linear program, but some additional elements to the model must be included as described in subsequent paragraphs.

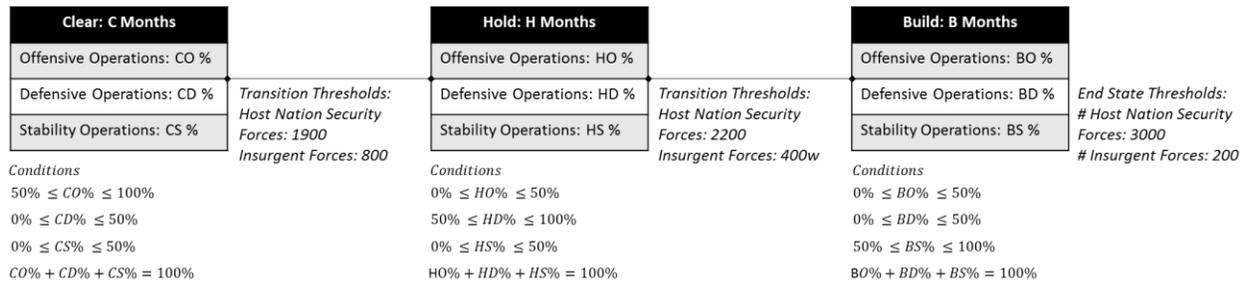


Figure 5.3: Variable Illustration

A model that is able to provide the above output should also provide an additional output to support the tactical commander. One of the primary decisions a tactical commander makes is deciding where to conduct operations. From a non-lethal perspective, this includes deciding which villages or towns to operate in and where interactions with local national people could maximize positive support. An output to a model must give the commander insight into where operations should take place.

Figure 5.2 illustrates how to minimize a COIN conflict given current Army doctrine; an additional objective of a model must be to specify where the operations should be conducted. Specifically, the model should assist in selecting which kinds of people and which types of villages to influence through their non-lethal campaign. The input of cultural structure and terrain considerations should allow the model to find these pieces of information.

Consider the illustration in Figure 5.4. The nodes of the network represent the United States Army, Host Nation Security Forces, Insurgents, and Local Nationals while the edges represent their interactions. This small example illustrates the players involved and the interactions they may have at one instant of a COIN conflict.

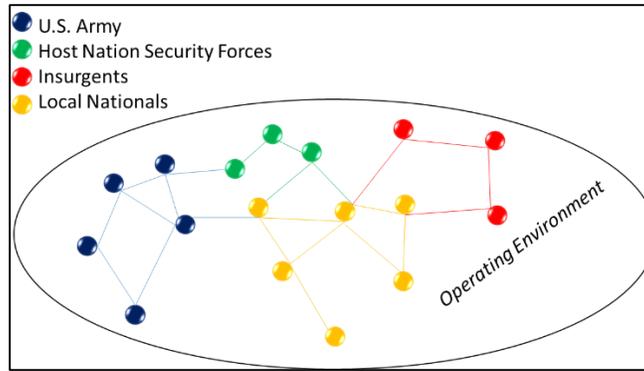


Figure 5.4: Example Network in Operating Environment

Due to the limited input for the local national population, the output cannot be to specify which village to conduct operations, but it should provide characteristics about the types of villages.

The model should identify characteristics about the nodes that were used to minimize the time of conflict. An example of this output is shown in Figure 5.5.

Level 1 Nodes	Level 2 Nodes	Level 3 Nodes
Terrain Considerations	Terrain Considerations	Terrain Considerations
>5 Crossroads Primary Roadway River Confluence Valley Base	2-4 Crossroads Lakeside	<2 Crossroads Mountain
Population Considerations	Population Considerations	Population Considerations
Head of household Village elder	Shopkeepers Religious Leaders	Farm workers Family members

Figure 5.5: Example Node Output

Figure 5.5 demonstrates an intuitive notion of node selection; however, a real scenario may yield different results. The aim of this output is to derive characteristics about the nodes that maximize influence, which ultimately results in minimizing the time of the conflict. Level 1 Nodes should be those nodes that carry the most weight in spreading influence while Level 2 and Level 3 remain important, but to a lesser degree. This output should pull out characteristics from

the terrain and cultural inputs. Thus, a higher fidelity of the inputs should be sought in order to produce higher fidelity in the node selection criteria.

The overall output to a decision aid should use the doctrinal framework that the Army has established for countering future insurgencies. The goal of the output must be to produce usable information that can assist the commander in making decisions. The output can help commanders establish realistic timelines and shape their operations in order to develop a winning strategy to achieve the overarching end state of COIN, which is to transition regions back to the host nation.

5.4 Model Approach Considerations

Many possible approaches exist when attempting to model counterinsurgency. A likely approach may be the use of game theoretic principles mixed with concepts from social networks. Using game theoretic and network terminology, multiple agents may exist within a disconnected or connected network where the agents are represented by nodes in the network. Edges between the nodes of the network could represent the interactions between agents and could be associated with a probabilistic payoff. For example, if a United States Army force interacts with an insurgent force in an offensive operation, an edge would exist between that force and the insurgent force with a payoff of some distribution representative of an offensive operation calibrated within the overall metrics of the model.

Developing the distributions of the payoffs may require real data that is not the easiest kind of data to obtain. Due to classification restrictions of the United States military and the overall task of collecting the kind of data necessary to develop realistic payoff distributions presents tremendous obstacles in the pursuit of an accurate model. To overcome this obstacle,

assumptions about the parameters may be made to develop the model, but the distribution parameters should be relatively easy to manipulate in order to better calibrate a model once data can be obtained.

The rationale for needing to have distributions for the payoffs lies in the uncertainty of war. Simply because the United States conducts an operation with certain intentions does not necessarily mean that those intentions are met. For example, when conducting an air strike on a group of insurgents, collateral damage may result in innocent civilian fatalities. This collateral damage may then result in turning a pro-host nation government civilian into a supporter of the insurgency. Even when conducting non-lethal stability operations, the United States Army may inadvertently cause distress among the population. One story that is commonly told amongst the United States Army involves an Army unit that built a water well for an Afghanistan village. The thought that the people would appreciate having running water in their village seemed logical; however, the people did not appreciate the project. The reason behind their dissatisfaction with the project was that the women of the village enjoyed retrieving the water from another source – this was their time to be together as women and away from the men. Once the well was built, this time was no longer necessary and the women caused problems amongst the men because of it. Whether this story is a true story or just a fable circling around the Army, it serves as an illustration of unintended consequences and furthers the point that randomness is certain when conducting COIN operations.

When considering a social network with a game theoretic approach, the payoffs must also be associated with the consequences of interactions. Attrition or displacement may occur between competing organizations and the turning of local nationals as a supporter of a competing

organization may happen multiple times. The cultural structure input should provide the baseline for how the influencing mechanism works, which then evolves into the output shown above.

Despite being unable to adequately measure the sentiment of a population, a model that retains an inner working of the population's interactions is vital to how well the host nation security forces perform and how the insurgency numbers may increase or decrease. The more support an insurgency has in a specific area, the easier it is to recruit and grow in numbers. Similarly, the less support the host nation has in a specific area, the more difficult it is to grow their numbers. While the model may not optimize the population sentiment thresholds per operational phase, the population clearly represents a critical component to the model that must be represented within the inner workings of the model.

The work completed by the authors described in the related work chapter of this paper provides a solid foundation for the development of a decision aid model. The inner workings of the models developed for social network influencing and the spread of contagion should be considered when developing a model for counterinsurgency. Such approaches to population influence are critical to the further development within this domain. Game theory and social network analysis should be able to provide the foundations for the algorithms necessary to achieve an accurate portrayal of counterinsurgency.

Chapter 6: Conclusions

War is one of the many consequences of human behavior. Human behavior may often be difficult to predict yet alone model. Successful counterinsurgency is dependent upon human interactions and the consequences of those interactions. Modeling a counterinsurgency campaign to provide insight into the appropriate level of forces and operations, therefore, presents a challenging task. As we continue to explore whether the feasibility of modeling current United States Army COIN doctrine in order to develop a relevant decision aid for Army commanders, we must also continue to refine the algorithms and game theoretic approaches to contagion and cultural interactions.

The military has continually refined the ways in which it measures success in counterinsurgency. In Vietnam, counting the bodies of the enemy was a way that commanders thought they could measure the success of the campaign. This, however, proved to be ineffective as the nature of the conflict was further understood. As many scholars have inferred, the population remains a key component to success within COIN. While the population may not necessarily be the center of gravity, it remains at the core of a counterinsurgency and the prize that competing organizations hope to attain.

Modeling a counterinsurgency to accurately portray relevant data can benefit a tactical commander and staff so that they can continue to refine plans and operate within the framework of doctrine. A model can also help establish reasonable goals for the Army unit conducting operations so as not to overreach their capabilities, but utilize resources in effective ways to achieve the desired end state. Furthermore, the identification of characteristics for node selection can have significant impacts on how tactical commanders conduct their non-lethal targeting

operations. The objective of maximizing influence through key nodes within the population network must be inherent to a model that minimizes a COIN conflict using the doctrinal framework. Thus, the two outputs described in this paper should be achievable through one comprehensive model.

The concepts described in this paper for developing a usable decision aid may present some computational difficulty in optimization due to the probabilistic nature of the problem and the many nodes that represent the networks of agents within the domain. Additionally, further development of a cultural input may be required. Such an element presents a critical piece to a model so that it can serve multiple operating environments. The cultural input will have a significant impact on the interactions and the spread of influence within the model.

The core of the model must revolve around the interactions within the operating environment. How these interactions happen will drive the performance of the model. The probabilistic nature describing the uncertainty and unintended consequences of operations must be represented within the model. These probabilities may impose a requirement to run the model multiple times, but such a requirement will only further the ability for commanders and staffs to make better decisions when considering their operations.

War has never been “black and white”; it is a messy business where the United States cannot afford anything other than victory. A model that describes counterinsurgency will undoubtedly be messy and probabilistic at best. Such a model, however, has the potential to reduce the lives lost by providing the tactical commander with an ability to make the best decisions possible to reduce the time of involvement. Further development of these concepts may have considerable impacts.

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