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The Brigade Combat Team (BCT): A Revolution in Organizational Structure

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Abstract

This paper explores the U.S. Army's force reorganization around the Brigade Combat Team (BCT), which began in 2002. The BCT shifted how various army units interacted by changing the echelon at which different types of units report to a single commander, essentially creating self-sufficient units of about 2,500 soldiers instead of the previous self-sufficient units of about 15,000 soldiers. This paper utilizes existing organizational theories and research to better understand the implications for such a dramatic change in organizational structure. It contextualizes the army's reorganization by applying the Rational Actor, Political, and Bureaucratic Models outlined in *Essence of Decision* by Graham Allison and Philip Zelikow. These models help explain why the army found the restructuring necessary.

In changing the organizational structure of the U.S. Army, some processes that existed prior to the BCT became less effective and arguably outdated, such as the army's decision-making process and personnel management system. At the same time, the army instituted a new communications system which was designed to better integrate disparate units, but was also stymied by the outdated decision-making processes. After understanding these factors, this paper asserts that various new technologies have failed to meet their full potential within the BCT due to ongoing implications related to not satisfactorily adjusting decision-making, communications systems, and personnel management based on the BCT reorganization. These technologies include unmanned aerial vehicles, integrated communications networks, and a particular armored vehicle (known as the Mine Resistant Ambush Protected Vehicle). This paper has implications for non-military organizations which have undergone or are examining the effects of structural reorganization.

The Brigade Combat Team (BCT): A Revolution in Organizational Structure

1. Introduction

The post-9/11 U.S. Army has undergone a nearly transparent but seismically important shift in how it is organized and how various combat and support capabilities are integrated together. This type of far-reaching organizational change illustrates the importance of structure and hierarchy in impacting organizational culture, framing how new technology is leveraged, dictating how personnel are managed, and dramatically changing its capabilities. This type of disruptive innovation can serve as a case study for both civilian organizations and government agencies alike.

Starting in 2002, the U.S. Army began a complete reorganization into the Brigade Combat Team (BCT) concept, which toppled army doctrine[1] that dated back to World War II. The very means by which the U.S. Army fought wars and organized its soldiers changed. Analyzing previous research on military innovation, decision-making, communications, and personnel management helps contextualize why this dramatic reorganization of troops occurred, and it provides a better understanding into the organizational effects of altering hierarchies. These hierarchical changes can alter how decisions are made, how people communicate, how personnel are managed and promoted, and how new technologies or ideas bring innovation.

Prior to 2002, the U.S. Army was organized around the "division," which had approximately 15,000 soldiers. The division had all of the combat and support capabilities to be self-sufficient: infantry, artillery, reconnaissance, medical, military intelligence, and logistics. However, post-9/11 U.S. Army leaders found that the division was not as adept at fighting

[1] Army doctrine are the established principles and rules on how the army operates and fights, including tactics, techniques, and procedures (Spencer, 2018).

unconventional conflicts as it was as fighting conventional wars against adversaries like the Soviet Union. The U.S. Army's division sheer number of personnel and equipment required a massive logistics footprint, which made it slow to deploy, ill-designed for stability operations,[2] and difficult to tailor for specific missions. Their solution was to create the Brigade Combat Team (BCT), which consisted of about 2,500 soldiers and had all the same capabilities of the former divisions, albeit less of each capability due to the reduced number of personnel.

This reorganization of personnel and resources to focus around on echelon lower (i.e. decentralization of authority) had massive and unforeseen effects. The army's planning model, which was a top-down and time-intensive process from the Cold War era, became obsolete. The modern communications systems designed to enable the BCT failed to modernize this planning process, resulting in inefficient processes and the near-constant risk of information overload. The army's career management remained largely unchanged, leading to challenges with aligning army leaders' careers to necessary competencies and the risk of overextending spans of control. At a time of great technological innovation (such as integrated communications systems, unmanned aerial vehicles, and new armored vehicles), these aforementioned problems based on the implementation of the BCT made it more challenging for the army to incorporate new technologies into the BCT as "architectural innovations."[3]

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[2] Stability operations is the overarching term that describes military operations that enable the establishment or reestablishment of a national government, provide security against organized criminal or insurgent groups, provide essential government services, provides emergency response, and/or humanitarian relief. Stability operations includes such varied missions as counter-narcotics, counter-insurgency, peacekeeping, and natural disaster response (Maxwell, 2009).

[3] Architectural innovation describes when new or existing technology changes not only how a task is completed, but supplants the previous task and thereby changes what tasks are completed (Scott, Kaahaaina, & Stock, 2019). An example of this would be that when shortwave radios initially replaced telegraphs or couriers in transmitting the same information; however, when

Thesis:

The BCT represents a disruptive innovation, because it changed how units within the army are integrated and function together, delegating responsibilities to an echelon below previously accepted levels. This innovation changed how the U.S. Army operated, stressed systems that pre-dated the reorganization, catalyzed innovations post-reorganization, and changed the army's organizational culture. This case study illustrates that the structure and the way units and sub-units within an organization interact has incredible influence over organizational outcomes as a whole. If a hierarchy within an organization is altered, old processes and management techniques may also require adjustments.

2. A New Conflict: The Post-9/11 Problem

Introduction. From World War II until 2002, the U.S. Army's "unit of action" (i.e. the self-contained echelon at which different combat capabilities are integrated) was the division, which was comprised of approximately 15,000 soldiers and led by a major general. However, the early 2000s was awash with both activity and change for the U.S. Army. The United States military's interventions in the decades preceding 2002 (including the 2001 invasion of Afghanistan) illustrated the shortcomings of the U.S. Army division (Kugler, 2008). The U.S. Army division was slow to deploy to fast-developing conflicts, too cumbersome for non-conventional conflicts, and ill-suited for the missions they were being assigned. Designed for conventional world wars, the division risked becoming an artifact of a bygone era.

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radios were used to call for artillery support during a battle, this represented an architectural innovation, because the radio was used to complete an entirely new task.

Military Interventions. In 2002, the Belfer Center for Science and International Studies (part of the Harvard Kennedy School) held a two-day conference on transforming the United States military (Deutch & White, 2003). The workshop gathered both current and former Department of Defense (DoD) officials, military officers (such as War College students), and senior military commanders (Deutch & White, 2003). The conference was framed within the 2001 Quadrennial Defense Review, which outlined six defense goals: to defend the U.S. homeland, to deny enemy sanctuaries, to project and sustain military forces across the world, to conduct effective operations in space, to conduct effective information operations, and to leverage technology to develop the "common operating picture) (Deutch & White, 2003).

The conference was also convened at a unique vantage point in American military history. After the fall of the Soviet Union and Cold War hegemony, the United States military had conducted a number of foreign interventions. Notably, each intervention characterized the United States as projecting military forces beyond their normal areas of operation (known as an "expeditionary force") against significantly inferior militaries while enjoying absolute air superiority: Iraq, Somalia, Haiti, Bosnia, Kosovo, and Afghanistan (Deutch & White, 2003). Although all tactical victories, each intervention had its own frustrating nuances that required the U.S. Army to specially task-organize its units instead of use its actual "unit of action," the division.

Both the Grenada and Panama invasions of the 1980s necessitated light infantry units which were inserted by helicopter or by parachute. Neither military operation required the total soldiers or the logistical footprint of an entire division (approximately 15,000 soldiers) (Kugler, 2008). Bosnia and Operation Desert Storm both illustrated that the U.S. Army also required significant time to deploy its troops overseas in sufficient strength. The challenge of deploying

U.S. forces was evidenced in the five-month build-up for Operation Desert Storm (Kugler, 2008). In the 1999 military intervention against Serbia, Milosevic's army was defeated without even the introduction of ground forces (Johnson, Peters, Kitchens, Martin, & Fischbach, 2012).

Humanitarian or "stability operations"[4] in Kosovo and Somalia required a mission-specific assignment of troops and equipment, again breaking-up the traditional division "unit of action" paradigm (Kugler, 2008). Operations in Afghanistan required light infantry, but the army's "heavy" armored divisions were irrelevant to the conflict. Meanwhile, any war with a conventional military emphasized armored tank divisions and mechanized infantry (Kugler, 2008). In sum, the U.S. Army's division force structure of 2002 was too slow to deploy to fast-developing conflicts and ill-suited for the missions once they arrived. Although boasting a successful record in almost all overseas conflicts since the 1980s, the Belfer conference recognized that each of these "small wars" required a force that could be customized for specific missions, reduce logistics requirements, and able to be deployed faster than the standard U.S. Army division (Deutch & White, 2003).

Equally concerning, just weeks before the Belfer conference, the American military ran an ambitious three-week wargame that incorporated both 17,000 real-world soldiers at actual training sites and a tabletop exercise involving top Pentagon planners (Borger, 2002). Titled the Millennium Challenge, the wargame simulated an invasion of Iraq—but in the exercise, Saddam Hussein initially won (Borger, 2002). In the first iteration of the exercise, the retired Marine playing the part of Saddam Hussein, Lieutenant General Paul Van Ripper, sunk most of the American fleet in the Persian Gulf, including its aircraft carriers (Borger, 2002). Van Riper utilized swarming techniques to overwhelm the fleet,[5] fired cruise missiles to sink the aircraft

[4] See definition for stability operations on page 4.

carriers, leveraged analog communications to outwit American military intelligence, and called into question the efficacy of amphibious operations (along with the American strategy for projecting expeditionary forces overseas as a whole) (Borger, 2002).

Looking ahead at potential future conflicts, the final conference report also assumed: "U.S. conventional military capable is sufficiently dominant to provide high confidence that the United States would prevail over any state in a conventional military conflict for the foreseeable future" (Deutch & White, 2003, pp. 3). The report struck an optimistic chord that Russia would continue progress towards a Western-style democracy and cooperation with the United States (Deutch & White, 2003). It surmised that China was not a threat and would be unable project military force regionally for decades to come (Deutch & White, 2003). In short, the conference framed the threat environment for the United States military as being peerless, and it envisioned the U.S. Army being largely utilized as an expeditionary force in smaller regional conflicts around the world.

Summary. Taken together in 2002, one could reasonably surmise that the old ways of waging war would not work in the twenty-first century. The U.S. Army division—it could be argued—was too slow to get where it was needed, too difficult to sustain logistically once it got there, too big for small wars, and too outdated for big wars. A change was essential if not inevitable.

3. Background: Combined Arms, the Post-9/11 Problem, and the Brigade Combat Team

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[5] "Swarming" in respect to military terminology refers to the use of low-cost weapons to overwhelm an enemy (Hsu, 2016). During the Millennium Challenge wargame, small manned boats were utilized by the enemy to overwhelm automated U.S. Navy defensive weapons; however, swarming technology also includes low-cost drones that can "swarm" an adversary Borger, 2002

Combined Arms

Introduction. Since the dawn of organized warfare, armies have grappled with the challenge of both developing disparate combat capabilities (e.g. infantry, archers, cavalry, etc.) and synchronizing the actions of those different capabilities in battle. Combined Arms describes the concept that militaries integrate different combat capabilities to complement each other and be more successful than any single capability could be alone (House, 2001). Combined Arms has existed since the zenith of organized warfare. In the ancient world, Combined Arms reflected the concept that archers could fire arrows at the enemy while infantry closed ranks to fight hand-to-hand, and cavalry protected flanks or exploited enemy weak spots.

Better mapping and communications technologies have allowed Combined Arms to decentralize over the past 200 years. During the American Civil War, different combat capabilities (infantry, artillery, and cavalry) were integrated together in units of approximately 25,000 soldiers, but today these disparate capabilities are integrated together in units of approximately 2,500 soldiers. Incorporating the different types of combat units at lower levels, soldiers at combat's "frontlines" are able to more efficiently and effectively work together.

Combined Arms in the Ancient World. The concept of Combined Arms is as old as the history of warfare itself. When Alexander the Great of Macedonia formed his army along the Pinarus River (across from the King Darius of Persia) at the Battle of Issus in 333 BCE, he lined his cavalry on his left flank, spear-equipped infantry in the middle, and his best troops on the right flank (Wasson, 2011). Each combat element received their orders from Alexander before the battle, and then Alexander personally led the attack on the right flank. Once the battle began, any further coordination between elements was nearly impossible. Alexander broke through the

enemy lines, flanked the Persians, and caused a full-scale retreat (Wasson, 2011). This battle exemplifies ancient Combined Arms.

The different combat units were integrated at the highest level—the army itself under Alexander. Since Alexander led the attack from the front, he could not communicate across his front after the battle began. His communications limitations necessitated centralization and Combined Arms at the head of his army; orders were given at the outset of battle to his three combat elements and then each was entrusted to carry out those specific orders. This represents Combined Arms in its simplistic sense.

Finding the "Golden Mean." Research studies have found that somewhere between the senior executives and first line leaders—at the level where various units with different functions are incorporated together (such as an office or factory)—an intermediate manager holds disproportionate influence on the overall success of the organization (Tannebaum & Georgopoulos, 1957). For the U.S. Army, this echelon of disproportionate power and influence over mission success is at the level where combat units are integrated (known as Combined Arms). This is the level where infantry units, artillery units, tank units, and logistics units all report to the same commander. This echelon exercises disproportionate autonomy, makes disproportionately critical decisions, receives disproportionate resources, and is disproportionately important to the overall success of the army's mission.

Indeed, a study of organizational behavior measured the "amount of control" and "degree of influence" among several industrial plants (Tannebaum & Georgopoulos, 1957). The study queried plant personnel from entry-level employees to senior executives to determine the degree that they exercise control (the term "control" being defined as social influence and power) on others compared to the extent in which they are being controlled by others (Tannebaum &

Georgopoulos, 1957). The study found that intermediate managers (station and individual plant managers) exercised the greatest amount of control and influence (Tannebaum & Georgopoulos, 1957).

This tension between centralization and decentralization is inherent in organizations, to include military, business, and nonprofit alike (Cummings, 1995). Often the forces of centralization and decentralization result in organizational "pendulum swings" towards either effect, based on environmental factors (Cummings, 1995, p. 103). For militaries, the sophistication of weapons, communications technology, and the "organizational essence"[6] act as forces towards centralization/decentralization and Combined Arms as a whole.

The significance of Combined Arms can be compared to a grocery store. Imagine a national grocery store chain. If all of the inventory decisions were managed at the national headquarters, stores would not accommodate for local tastes or trends. However, if inventory was solely managed at each individual store, the grocery chain as a whole would likely lose efficiency in its inventory control system. Similarly, if marketing was completely centralized, stores could not advertise managers' specials in a weekly circular. However, if each store ran its own entirely independent marketing program, the grocery chain might struggle to develop national-level advertising campaigns that speak to all of its potential consumers.

Similarly, Combined Arms is a function of communications, collaboration, and integration, where different technologies and bureaucracies can each help determine the optimal hierarchy. For the U.S. Army, the infantry (rifleman) soldier is the foundational element of the combat unit, however, they require support. Like the grocery store, it is a function of efficiency and effectiveness. Should every 100 soldiers be assigned an artillery cannon or every 1,000

[6] Organizational essence describes the prevailing view of the personnel from within an organization of what their mission is and how they should accomplish it (Yamada, 2014).

soldiers? Should there be one tank for every 100 dismounted soldiers or every 1,000? Should meals be prepared out of small portable kitchens near where soldiers are located or should meals be prepared in centralized locations and then transported to the soldiers? These questions speak to the crux of the Combined Arms predicament that senior military leaders face.

Armies have often shifted the echelon in which disparate combat capabilities are combined. This decision to shift the "unit of action"[7] is largely based on two opposing forces. First, militaries centralize (or combine arms at higher echelons) in order to better synchronize activities and "mass fires." [8] Second, militaries recognize that information becomes distorted and communications timelines increase the further away from the frontlines of battle (both geographically and in respect to hierarchies). Organizations seek to find a balance between centralization and decentralization, known as "the golden mean," where decisions are made and resources/personnel are allocated at the perfect level (Cummings, 1995, p. 107). In many respects, Combined Arms is a study of the military trying to find "the golden mean."

[7] "Unit of Action" describes the echelon in the army at which different combat capabilities are combined with each other and the logistics/support elements, enabling the echelon to function independently and be self-sufficient in combat (House, 1984). For example, the U.S. Army's "unit of action" was the division from World War II until 2002. It included infantry, artillery, reconnaissance, and logistics.

[8] "Massing fires" refers to consolidating weapons and focusing on specific targets to maximize the effect on those specific targets (Johnson & Halverson, 2020). For example, while firing 100 guns at 100 targets promises to eliminate some targets, firing 100 guns at one target promises to eliminate that specific target.

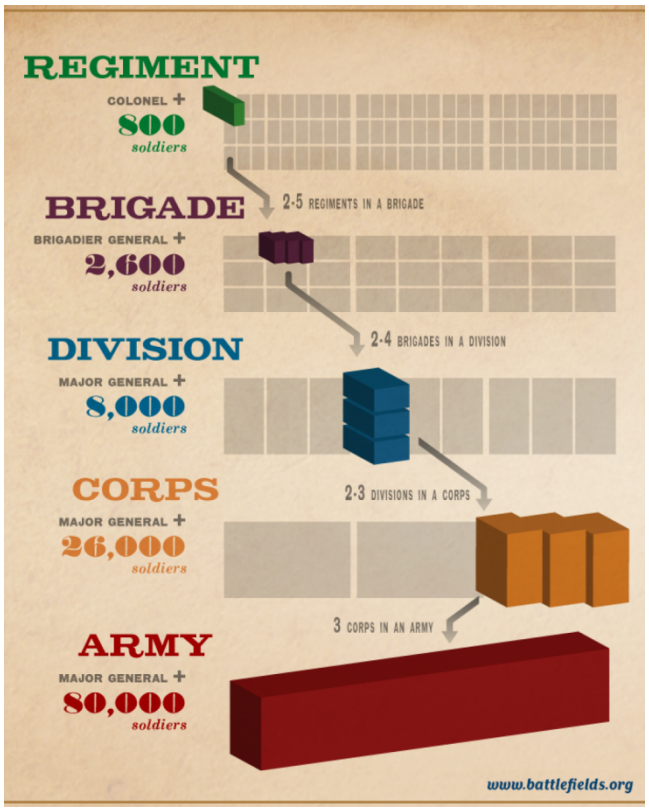

Figure 1. Civil War Unit Strengths. Reprinted from "American Battlefield Trust." (Civil War Army Organization, 2019).

Combined Arms in the American Civil War. The pendulum of centralization and decentralization swung back and forth during the Civil War. In addition to infantry and cavalry, both Union and Confederate armies employed cannon artillery. Indeed, much of modern-day principles for employing artillery were in place by 1861 (Wilson, 1991). Cannons were utilized to soften enemy positions prior to attack, disrupt enemy operations, destroy enemy obstacles or fortified positions, prevent the enemy from massing formations for an attack, and for covering a retreat (Wilson, 1991). However, both sides struggled with how to integrate artillery with cavalry and infantry in order to best allow for coordination during battle.

Both Union and Confederate commanders experimented with assigning artillery at every echelon from brigade (consisting of about 2,500 soldiers) to the head of the army itself (consisting of tens of thousands of soldiers depending on the theater of operations) (Wilson, 1991). After early setbacks in the war, the Union army settled on assigning batteries (each consisting of about six cannons) to brigades, which were commanded by a brigadier general (Wilson, 1991). After the Union lost the Battle of Chancellorsville, their artillery was reorganized into larger units that reported directly to corps (consisting of about 25,000 soldiers and typically led by a major general) (Wilson, 1991). The subsequent Union victory at the Battle of Gettysburg illustrated that the importance for artillery to be massed and well-coordinated with infantry in order to be effective (Wilson, 1991). Due to communications limitations, artillery was found to be best coordinated at the division or corps level (Wilson, 1991). Communications technology could not allow commanders of brigades or below to effectively manage artillery.

Combined Arms in the World Wars. World War I brought innumerable technologies, tactics, and innovations to the battlefields of Europe. However, division was still the "unit of action," meaning that the various types of soldiers and capabilities (infantry, artillery, engineer, tank) were incorporated at that echelon (House, 1984). For example, the standard British infantry division included 18,000 soldiers, 76 artillery pieces, 24 machineguns, a unit of scouts, a unit of engineers, supporting logistics personnel/equipment, and a headquarters (House, 1984).

Combined arms took another step forward with the Battle of Cambrai when over 400 British tanks spearheaded an attack with the support of artillery, airplanes, and infantry (House, 1984). Although the battle itself proved nominally inconsequential to the war, it represents a greater recognition of the importance of integrating various capabilities on the battlefield (House, 1984).

In World War II, armies still struggled with the best way to organize tanks, infantry, and other combat capabilities together. Initially, the U.S. Army formed armored divisions with a bifurcated headquarters system with one headquarters for infantry and one headquarters for tanks; an arguably antithetical concept for the premise of combined arms (House, 1984). In 1943, the bifurcated headquarters concept was changed to copy the German battle group concept, maintaining the two subordinate headquarters within each division but allowing the battalions of motorized infantry and tanks to be task-organized for specific missions at the battalion level, meaning that a brigade-level headquarters (commanded by a colonel) would typically have both tanks and motorized infantry under their command (House, 1984).

Summary. Combined arms shifted from the corps-level of the Civil War (consisting of about 25,000 soldiers) to the division level in the early twentieth century. As new weapons were introduced, such as tanks and airplanes in World War I, the technologies were incorporated into the existing combined arms paradigm. The division (consisting of about 15,000 soldiers) continued to be the U.S. Army's "unit of action" from World War I until the twenty-first century. For most of that time, communications and imprecise mapping challenged the effectiveness of combined arms at echelons below the division level. However, the American military response to 9/11 and the Global War on Terror proved to be the catalyst to upset nearly a century of division-level Combined Arms and change the U.S. Army's primary "unit of action."

Organizational Theories Applied to Combined Arms

Introduction. Combined Arms in modern militaries reflect a conflict between Classical Organization Theory[9] and the Neoclassical Organization Theory.[10] On one hand, militaries rely

[9] Classical Organizational Theory utilizes scientific method and a systems-based approach to organizing people to complete specific tasks within a larger project or mission (Walonick, 1993). For example, automotive assembly lines represent the pinnacle of Classical Organization Theory.

on command and control; after all it is the source of the term "military discipline." On the other hand, wars are chaotic, and it is difficult for leaders to visualize the battle unfolding in order to effectively make and subsequently communicate decisions; hence the term "fog of war." These two truths are at odds.

First, militaries depend on rigid hierarchies for control, efficiency, and synchronizing activities. Military maneuvers are drilled and rehearsed in an attempt to achieve perfection. This type of templated activity can lead to centralization and the Taylorism of the Classical Organizational Theory, where each unit exists to perform a specific function and each unit is comprised of soldiers with individual skill specialties (McCrystal, 2015). The hundreds of specialized jobs in the modern U.S. Army also necessitate strong command and control. Infantry must be synchronized with not only tanks and artillery, but also with pilots, mechanics, communications personnel, and engineers (to name a few specialties)—besides the other units operating to their left and right. If any single responsibility is not performed correctly or in sync with the other personnel, the entire operation risks failure.

Second, although tasks can be standardized in practice, military conflict itself is not. When discussing the 2003 American invasion of Iraq, Lieutenant Colonel Lehr is quoted: "Planning is a point of departure. It is all about flexibility" (Lacey, 2003). This uncertainty can be described using Chaos Theory. Chaos Theory seeks to understand seemingly random or unpredictable events by analyzing the complex and non-linear systems behind them. This mathematical field of study can be applied to social sciences (including sociology and management) (Crossman, 2019). Indeed, after applying Chaos Theory to the study of American

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[10] Neoclassical Organizational Theory recognizes the informal human interactions and behaviors in addition to the formal rules of Classical Organizational Theory, thereby emphasizing the importance of individual thoughts and motivations within an organization (Bhardawaj, 2019)

military conflicts of the twentieth century and (utilizing such data as aircraft losses in the Vietnam War and casualties in the Western European offensive of World War II), a research project at the Air Command and Staff College determined: "Specifically, warfare must be dynamic, nonlinear, fractal, and at least partly deterministic" (Tagarev, et al., 1994, p. 76). For example, a case study of urban combat found that casualty rate varied from 10-50 casualties per 1,000 troops per day; however, offensive house-to-house fighting resulted in casualties up to 50 soldiers per 1,000 troops each day while defensive operations resulted in casualty rates as low as 10 soldiers per 1,000 troops each day (Leitch, Champion, & Navein, 1997). This casualty rate can then help military leaders plan effective evacuation plans, assign sufficient medical personnel to the combat units, and ensure sufficient combat strength for sustained operations. In the case of such non-standard tasks, decentralized authority and creativity can become strengths, while centralized decision-making can hinder success (Perrow, 2014).

Classical Organizational Theory. General Stanley McCrystal attributed the modern American military's command and control hierarchy to the rise of industrialization in the early twentieth century and the concurrent development of Classical Organization Theory, which was pioneered by Frederick Taylor (McCrystal, 2015). Taylor applied the Scientific Management Theory to industrial management (also known as "Taylorism") which relied on four main principles: to find the best (most efficient, effective, etc.) way to complete a task, to match workers to complete each task, to effectively supervise workers with feedback, and that managers must plan and control operations (Walonick, 1993). Taylorism was widely applied to production processes, leading the segmentation of labor (McCrystal, 2015). Instead of a single crew of workers building a single car, Taylorism encouraged the assembly line, where each employee worked on a single step of production. In Classical Organization Theory, it was

incumbent on managers to have clear lines of authority and control (Walonick, 1993). Tasks must be delineated and workers must be specialized to meet tasks in the best way possible (Walonick, 1993).

The Taylorist directive-style hierarchy is often assumed necessary by military theorists (Davidson, 2011). The modern U.S. Army requires hundreds of specialized career fields, known as Military Occupational Specialty (MOS). Each job must work in sync, leading to oligarchization, a term for the centralization of power within an organization over time (Zald & Ash, 1966). As organizations age, grow, and/or bureaucratize, oligarchization often occurs (Zald & Ash, 1966). "Oligarchization" describes the concentration of power within a small minority of people within an organization, often through the addition of formal bureaucratic process and procedures designed to control actions or decisions of others (Zald & Ash, 1966).

Indeed, the crux of Combined Arms is not only the recognition of oligarchization, but the decision of where the oligarchization occurs within the hierarchy: "the golden mean." Wherever the various specialized units—infantry, artillery, tanks, logistics, etc.—are integrated, that echelon and those particular leaders hold an inordinate power and have inordinate responsibility in dispensing the tasks of their organization (Zald & Ash, 1966). The U.S. Army's "unit of action" (the unit where the different types of combat capabilities are integrated and the unit is self-contained in having everything it needs to conduct war) holds the profound responsibility (House, 1984).

Decentralization. Centralization and decentralization are two opposing forces within the military; centralization to make command and control more efficient, and yet the opposing force of decentralization which pushes leaders to delegate decision-making and encourage subordinates to take initiative. If the U.S. Army completed routine tasks in one centralized

location—a giant factory or warehouse—tasks could be standardized and management could be rigidly oligarchized (Perrow, 2014). Alternately, non-routine tasks are often better performed through creativity and flexible processes (Perrow, 2014). The U.S. Army's challenge is that at virtually every level, a task can simultaneously be routine and unique; e.g. assaulting an enemy in the desert or assaulting an enemy atop a mountain, ambushing an armored vehicle or ambushing several enemy soldiers walking along a trail, etc. The U.S. Army as an institution demands both the ability to perform a task to perfection (such as firing an artillery round across miles of battlefield to impact within several meters of its target) and the ability to improvise at a moment's notice (determining what type of artillery round to fire depending on the desired effect).

Combined Arms is similar to jazz music. Although jazz is known for its improvisation, a musician must master the ability to play all of the chords before being able to improvise. Similarly, an army must be technically competent before being able to seize the initiative and exploit an enemy vulnerability.

Essence of Decision: To Reorganize the U.S. Army

Introduction. The U.S. Army division (as an organizational structure) "failed" in critical ways during military interventions from the 1980s through 2002 (even in conflicts deemed to have successful outcomes), thereby catalyzing a need for change. Janine Davidson applied Organization Theory to military innovation in *Lifting the Fog of Peace*: "For organizational theorists, militaries resist innovation as a result of structural systems, norms, and standard operating procedures that together focus behavior toward particular outcomes" (Davidson, 2010). As a naturally conservative organization that resists change, organizational change comes in response to three distinct catalysts: external pressure (congress, president, and public opinion),

opportunity to grow or survive, and failure (battlefield or training scenarios) (Davidson, 2010). This approach is based on Graham Allison and Philip Zelikow's book, *Essence of Decision*, which outlines three decision-making models: Rational Actor model, Organizational Model, and Political Model (Chumer & Turoff, 2006).

Applying the Rational Actor Model, the U.S. Army had faced a series of stumbles since the Cold War, necessitating that the slow, ungainly, and logistically substantial "unit of action" division be reorganized or replaced. Under the Organizational Model, the U.S. Army faced external pressures to change, because intelligence analysis, military budgets, and operations (as dictated by the Executive Branch of U.S. government) all necessitated an army that was more expeditionary. Lastly, the Political Model recognizes that the U.S. service branches compete for resources/funding and power/influence, which is awarded based on its relevance to the operations at hand. The Navy and Marine Corps were better postured and organized for the war in Afghanistan and future interventions, meaning that unless the army changed, it would be at a disadvantage in the perpetual contest for funding in Congress and influence with the Executive Branch.

Change from Failure (Rational Actor Model). The Rational Actor Model approaches organizational change and decision from the perspective of a "rational" analysis of various courses of action that result in the most logical decision (Chumer & Turoff, 2006). It assumes that organizational decisions are based on a rational assessment of the information; however, it does not directly consider dynamic situations (with limited information), internal bureaucracy/politics, or the "human element" (Chumer & Turoff, 2006, p. 16).

Applying the Rational Actor Model to the watershed of events that led to the entire reorganization of the U.S. Army—the 2001 Quadrennial Defense Review, the 2002 Belfer

Conference, and the Millennium Challenge (wargame)—the prevailing analysis of that day (circa 2002) supported the assessment that the U.S. Army's combat units' organization needed to change. Under this paradigm, the U.S. Army division (as it existed in 2002) was not suited for future expeditionary operations. The military actions of post-9/11 and the previous twenty years of military interventions indicated that the U.S. Army division was too cumbersome in logistical footprint, too slow in deploying, and too rigid to respond to the spectrum of military actions around the world. In essence, the U.S. Army was facing the hint of failures in its previous otherwise successful interventions of the 1980s and 1990s. From a Rational Actor Model perspective, the U.S. Army needed to redesign its "unit of action" and restructure how it deployed and fought wars.

External Pressure (Organizational Model). The Organizational Model assumes that organizations will continue to do what has historically worked until their behavior no longer works (Chumer & Turoff, 2006). This perspective acknowledges the complex bureaucracy and well-developed organizational culture within large groups of people like the U.S. Army (Davidson, 2010). When external pressures are applied to the military—defense budgets from congress, missions or threat assessments from the executive branch, or public opinion against protracted conflicts that could result in significant American casualties—all those variables represent factors that the military must consider in its decision-making (Davidson, 2010). These pressures can result in "bounded rationality"[11] whereas certain otherwise viable alternatives are rejected by decision-makers (Chumer & Turoff, 2006, p. 6). Lastly, the Organizational Model may lead to the mental framework called "threat rigidity," meaning that an organization's

[11] The concept of "bounded rationality" describes the limitations placed on decision-makers that prevent them from arriving at their most optimal solution, which can include time constraints, limits on available information, mental biases, to name several variables (Eatwell, Milgate, & Newman, 1990).

response to a crisis or threat is less adaptable due to its preconceived notions of its organizational essence (Chumer & Turoff, 2006). Although organizations might be adept at completing the tasks that they believe are critical, it may also lead to an inflexibility to recognize when the tasks themselves must change.

Under the Organizational Model, the U.S. Army (circa 2002) faced significant external pressure to change, with the pressure coming from with the United States government. The Belfer Conference emphasized the need for an expeditionary military that responded to a wide spectrum of operations, from disaster response to counter-insurgency (Kugler, 2008). At the same time, the Millennium Challenge questioned the American strategy for conventional war. As the war in Afghanistan intensified and the Department of Defense budgets increasingly prioritized existing contingency missions over preparedness for hypothetical conventional wars, previous defense projects unrelated to counter-insurgency were cancelled (Kugler, 2008). From executive branch to public opinion, the threat from the Soviet Army (and similar armies) was viewed as outmoded while the threat from terrorists/insurgents was immediate and actualized.

Opportunity to Grow/Survive (Political Model). The Political Model for decision-making accepts that even within governments or organizations which hold the same goals, leaders within the various sections can have divergent interests and act as independent "stakeholders" (Chumer & Turoff, 2006). Individuals might be motivated by the loss of personal power or prestige, or they could be motivated by the loss of their own organization's power or influence (Chumer & Turoff, 2006). Within the Department of Defense, the service branches (Army, Navy, Air Force, and Marine Corps) compete for shares of the overall budget and the power/influence that comes with taking the lead role in various military operations.

In the persistent contest between service branches for funding and influence, the U.S. Army risked lagging behind the other branches in a post-9/11 world that prioritized expeditionary forces and de-emphasized the threat of conventional war with near-peer adversaries, such as China or Russia. Precision munitions (smart bombs, GPS-guided missiles, etc.) were dramatically increasing the effectiveness of both the Navy and Air Force (Kugler, 2008). The Air Force's stealth bomber aircraft could take-off from a base in the United States, bomb a target in the Middle East, and return to the continental United States without ever landing (Kugler, 2008). Similarly, the Navy transformed itself from a battleship-based fleet pre-World War II to an aircraft carrier-based fleet starting in World War II, eventually enabling carrier-based jets to target any location within 300 miles of coastline. The Marine Corps had a legacy that included expeditionary combat units which could quickly deploy. The Marine Expeditionary Unit (MEU) (approximately 2,000 Marines, which includes combat, logistics, and aviation units) has existed since the 1960s (Marine, 2018). The 26th MEU deployed to Afghanistan in 2001 as one of the first conventional ground combat units (Marine, 2018).

The U.S. Army of 2002 faced the imperative to change or become irrelevant. The missions of post-9/11 American military actions appeared best suited for the other service branches. In the early months of Operation Enduring Freedom (Afghanistan), the U.S. Army struggled to deploy conventional forces to the area of operations, finally able to deploy several brigades in December 2001 (Kugler, 2008). These brigades were not designed to operate independently and thereby required the Air Force, Navy, and Marines to support them with a variety of capabilities, such as artillery, aircraft, and armored vehicles (Kugler, 2008). It was apparent by 2002 that the U.S. Army risked being de-prioritized for resources and combat

missions if it did not transform itself into a force that could better support the contemporary conflicts.

Summary. The strategic vision of the U.S. Army in 2002 not only altered what wars the army would prepare for but also questioned *how* these conflicts would be fought. Under all three decision-making models (Rational Actor, Organizational, and Political) the U.S. Army was at the crossroads for change:

> "Previously U.S. military doctrine had focused heavily on mechanical attrition processes in order to defeat enemy forces. Army doctrine, in turn, had focused mainly on massing large forces with formidable firepower in order to launch concentrated strikes against enemy troop formations…By contrast, defense transformation switched focus away from attrition, and concentrated instead on a wide set of battlefield effects through dominant maneuvers and precision engagements aimed at unraveling the enemy's cohesion, thereby fracturing its capacity to operate effectively…A doctrine of dispersed, non-contiguous force operations meant not only that Army forces would be deployed across much larger distances, but also that maneuver brigades would need to develop the capacity to operate independently, at locations well-removed from their parent divisions and corps (Kugler, 2008, p. 10).

4. A New Army for a New War: The Brigade Combat Team (BCT)

Introduction

Based on the three decision-making models, the U.S. Army had one viable alternative to their existing paradigm of having a combined arms division: a Combined Arms "unit of action" at the brigade level. If combined arms at the division level (approximately 15,000 soldiers) was

too cumbersome, Combined Arms at the brigade level (approximately 3-4,000 soldiers and one echelon below division) would logically be superior.

Combined Arms at the brigade level was not without precedent, even with the U.S. military. The Marine Expeditionary Units (MEU) had existed since the 1960s, and they employed a similar combination (approximately 2,200 Marines) of infantry, armor, and logistics/support units (Marine, 2018). Between World War I and World War II, the British Army experimented with a tank-centric brigade that included artillery and infantry, but faced a variety of challenges that included widespread skepticism, military leaders' nepotism towards one particular type of combat unit, and budget constraints (House, 1984). During World War II, American divisions task-organized brigades for specific operations with a combination of infantry and armor (House, 1984). The French Army established "tank-infantry" battalions in the 1960s, though they struggled with the mechanics of how to command and control such units and also struggled with a steep learning curve for junior officers who were thereby forced to master the intricacies of both tank and infantry tactics (House, 1984). Indeed, the Soviet Union established combined arms battalions (approximately 1,000 soldiers) in the 1980s, which included a combination of tanks, infantry, engineer, artillery, and support/logistics capabilities (Mault, 1988). In 2002, the "pendulum swing" of centralization/decentralization had decidedly swung towards decentralization based the environmental and organizational considerations of the day (Cummings, 1995, p. 103).

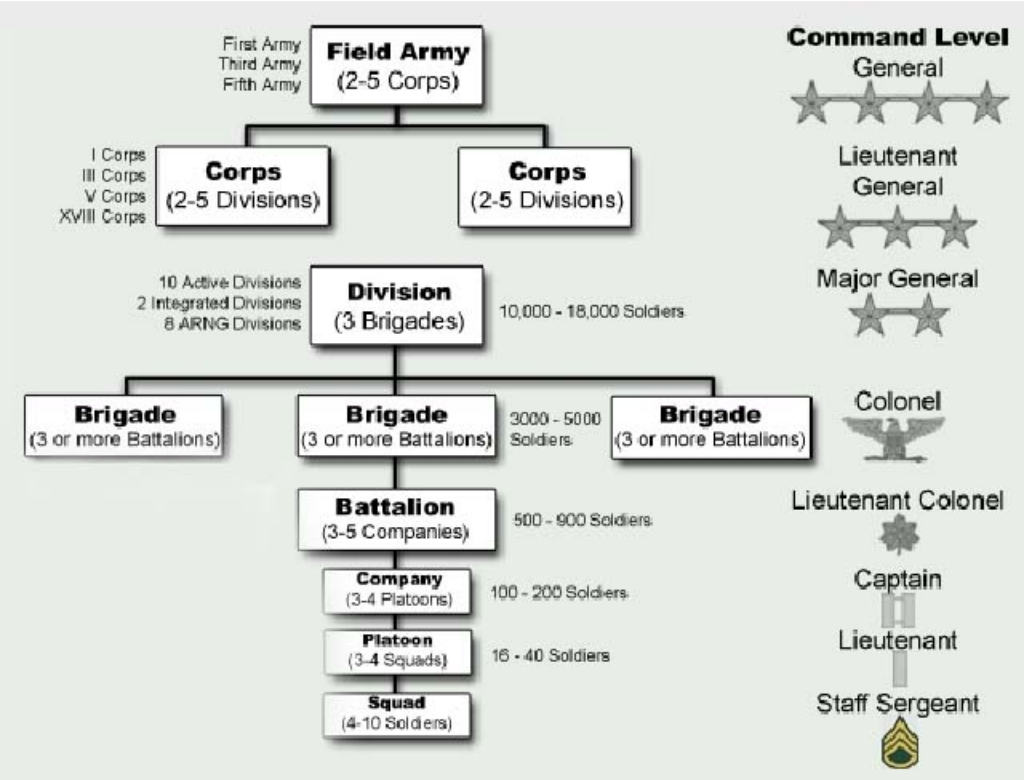

Figure 2. Modern Echelons in the U.S. Army. Reprinted from https://olive-drab.com. (U.S. Army Organization, 2012).

Key Point: When the U.S. Army shifted combined arms to the brigade level, it necessitated also shifting support/logistics capabilities to that same level. The BCT is thereby exponentially more capable, self-reliant, and lethal that the "legacy" (previous) combat brigades of the U.S. Army prior to 2003. The BCT also created seismic changes in the U.S. Army's organizational culture and thereby affected how decisions are made, how soldiers communicate, how new technology is incorporated into the existing paradigm, and how leaders careers evolve.

What Exactly is the BCT?

The U.S. Army created the concept of a Brigade Combat Team (BCT), which began implementation beginning in 2003 (Kugler, 2003). The BCT (approximately 3-4,000 soldiers)

was designed to be self-contained; able to fight independently and have all the combat, support, and logistics capabilities required to conduct sustained military operations (BCT, 2010). This necessitated that capabilities at the division level be shifted to the echelon below (the brigade), such as artillery, engineers, and military intelligence (Kugler, 2003). The BCT was intended to provide greater flexibility, decrease the logistical footprint, improve the army's ability to conduct expeditionary missions, leverage C4I and precision fires to increase lethality, and meet the contemporary threats (Kugler, 2003).

The BCT was originally comprised of two "maneuver" (combat) battalions, compared to the three maneuver battalions under the previous design (Kugler, 2003). However, this decrease in direct combat manpower would be compensated with an internal reconnaissance squadron, artillery batteries, and logistics units (Kugler, 2003).

The U.S. Army also transitioned to three distinct types of BCTs, as opposed to the preceding paradigm of seventeen distinct brigade types under the previous system (Johnson et al., 2012). The three types of BCTs are: Infantry Brigade Combat Team (IBCT), Stryker Brigade Combat Team (SBCT), and the Heavy (armored/tank) Brigade Combat Team (HBCT) (BCT, 2010). The IBCT are the army's "light" ground forces; able to transported on the battlefield by parachute, helicopter, vehicle, or by foot (CRS Report, 2019). The HBCT has tanks and armored personnel carriers; an ideal unit for combat in the plains of Europe or deserts of the Middle East against a conventional military. The SBCT is based around the Stryker, a wheeled and armored vehicle designed to transport soldiers to the battle (Kugler, 2003). These three distinctive BCTs reflect the strategic considerations that were contemporary to their conceptualization.

Infantry Brigade Combat Team (IBCT). The IBCT is designed to operate across a variety of missions: provide area security (i.e. occupy and control land, populations, and

resources), offensive/defensive operations in severely restricted terrain (i.e. fight in mountains or dense forests), and infiltrate/seize objectives in the enemy's rear (e.g. parachute behind enemy lines to secure an airfield) (Johnson et al., 2012). IBCTs can operate in restricted terrain, because they are not assigned heavy combat vehicles (tanks, armored personnel carriers, etc.) (Johnson et al., 2012). This allows military leaders greater flexibility in transporting IBCTs and thereby decreases the time required to deploy them. The IBCTs are further divided into three sub-types: light infantry (primarily foot-mobile, though can be transported by other methods), airborne (specially trained and equipped for parachuting into combat), and air assault (specially trained and equipped for using helicopters to be transported into combat) (Johnson et al., 2012).

The IBCT is comprised of the following units:

- (2) Infantry Battalions serve as the primary combat force for the BCT. Each infantry battalion is comprised of three infantry companies. Their capabilities include heavy machineguns, mortars, anti-tank weapons, scouts, and snipers (BCT, 2010).
- (1) Reconnaissance Squadron conducts reconnaissance and surveillance to gather information about the terrain and enemy by primarily observation. It includes mortars, armored wheeled vehicles, and snipers (BCT, 2010).
- (1) Fires Battalion provides artillery support and counter-fire (i.e. shoots at stuff that shoots at the BCT). The fires battalion includes 16 towed 105-mm howitzer cannons and radar systems to support the counter-fire mission (BCT, 2010).
- (1) Brigade Support Battalion is designed to provide all internal logistics needs for up to 72 hours of combat. Its capabilities include medical, transportation,

vehicle and equipment maintenance, kitchen/feeding operations, and quartermaster/supply (BCT, 2010).

- (1) Brigade Special Troops Battalion provides a unique set of capabilities that were previously managed at the division level:
    - Military intelligence (which provides ability to collect and analyze data/information about the environment and enemy),
    - Engineers (which may build obstacles to impede enemy movements, can destroy enemy obstacles to allow the BCT to move, and can construct defensive or fighting positions for the BCT), and
    - Signal (responsible for ensuring C4I systems are operational) (BCT, 2010).

The IBCT faces several challenges. It was designed at a time and within a context that minimized the threat of conventional warfare, so the IBCT would be challenged against a modern, conventional army. Modern Anti-Access Area Denial (A2AD) technology (such as radar, air defense systems, mines, and "swarming" of low-cost drones) undermine—if not eliminate—the IBCT's ability to be inserted behind the enemy lines of a modern foe (Johnson et al., 2012). Since the IBCT was designed with this mission in mind, it lacks the heavy armored vehicles and heavy firepower to "maneuver and survive in close combat against hardened enemy fortifications, light armored vehicles, and dismounted personnel" Johnson et al., 2012, pp. 4). Under the same token of mobility being the priority for IBCTs, it lacks the abilities of "gap crossing" (i.e. traversing a river), "general engineering" (i.e. construction of buildings), and long-range or "mobile protected firepower" (i.e. ability for the IBCT's artillery to match enemy artillery range or be protected against enemy infantry) (BCT, 2010; Johnson et al., 2012). In

summary, the IBCT is superbly designed for the counter-insurgencies of Iraq/Afghanistan or the expeditionary conflicts of Bosnia/Kosovo; however, IBCTs are marginalized against modern-day nation-state adversaries, because they lack sufficient armored vehicles or firepower to defeat a conventional enemy (CRS Report, 2019).

Heavy Brigade Combat Team (HBCT). The HBCTs are armor-based: the Abrams main battle tank, the Paladin self-propelled (and armored) howitzer cannon, and Bradley (armored) infantry fighting vehicle (BCT, 2010). The HBCT is designed with the conventional war in mind against a modern, well-equipped adversary. Offensive in design, HBCTs seize terrain and destroy enemy forces (BCT, 2010).

Figure 3. Photo of the Paladin self-propelled howitzer. Reprinted from https://www.military.com/. (Paladin, 2019).

The HBCT is comprised of the following units:

- (2) Combined Arms Battalions serve as the primary combat force for the HBCT. Each combined arms battalion is comprised of two tank companies and two

infantry companies so that the Abrams tank and the Bradley Fighting Vehicle are integrated in combat. It also includes mortars, scouts, snipers, and a counter-mine team to clear landmines (BCT, 2010).

- (1) Reconnaissance Squadron conducts reconnaissance and surveillance to gather information about the terrain and enemy by primarily observation (BCT, 2010).
- (1) Fires Battalion provides artillery support and counter-fire support. It includes 16 Paladin self-propelled howitzer cannons, meaning that the fires battalion is rapidly mobile and the Paladin vehicle/cannons are armored for protection (BCT, 2010).
- (1) Brigade Support Battalion is designed to provide all internal logistics needs for up to 72 hours of combat. Its capabilities include medical, transportation, vehicle and equipment maintenance, kitchen/feeding operations, and quartermaster/supply (BCT, 2010).
- (1) Brigade Special Troops Battalion provides a unique set of capabilities that were previously managed at the division level:
    - Military intelligence (which provides ability to collect and analyze data/information about the environment and enemy),
    - Engineers (which may build obstacles to impede enemy movements, can destroy enemy obstacles to allow the BCT to move, and can construct defensive or fighting positions for the BCT),
    - Signal (responsible for ensuring C4I systems are operational), and
    - Military Police (provide security and traffic control) (BCT, 2010).

The HBCT's greatest drawback is its armor. As the name "heavy" indicates, HBCTs are fully mechanized and therefore require the greatest logistical support of any BCT formation (Sprang, 2013). HBCTs operate best in open or minimally restrictive terrain, as opposed to terrain like swamps, mountains, forests, or urban areas (Sprang, 2013). HBCTs also cost approximately four times as much as an IBCT in terms of equipment procurement, and it costs about double an IBCT to transport within the domestic United States (Sprang, 2013). Transporting HBCTs overseas requires strategic sealift since some equipment is too heavy to be airlifted (Sprang, 2013). One analysis indicated that in ideal conditions, it would cost approximately six times more to redeploy an HBCT to the Middle East than an IBCT (Sprang, 2013). All of the additional heavy equipment in an HBCT requires nearly double the support personnel than an IBCT. 18% of HBCT personnel are non-combat compared to 12% in IBCTs (Johnson et al., 2012). Since the 2003 U.S. invasion of Iraq, the army has not required HBCTs to perform their mission. Instead, HBCTs—when deployed—have been customized with different equipment sets to support the counter-insurgency conflict in Afghanistan (Sprang, 2013).

Figure 4. Photo of a Stryker Infantry Carrier Vehicle. Reprinted from https://www.armyrecognition.com (Frahan, 2020).

Stryker Brigade Combat Team (SBCT). If the IBCT was too light and lacked the ability to destroy conventional or fortified enemy forces and the HBCT was too heavy (both physically to deploy and in respect to logistics support), the SBCT was designed as a compromise between the two other BCTs. The SBCT is based around the Stryker, an eight-wheeled fighting vehicle with armor for protection and a 105mm main cannon. The Stryker offers greater mobility, firepower, and protection than the dismounted infantry soldiers of IBCTs, and it is lighter, able to traverse more restricted terrain, and has less logistics requirements than the HBCT (BCT, 2010).

Each Stryker vehicle holds a squad (9) of soldiers and transports them to the battle. The soldiers disembark before assaulting the enemy and the Stryker provides support by fire (i.e. the Stryker engages the enemy with its various armaments while the dismounted soldiers maneuver against the enemy position) (BCT, 2010). By providing support by fire, the intent is to prevent the enemy from engaging the dismounted troops (BCT, 2010). The SBCT's mobility and protection allow it to maneuver against enemy positions; to flank, break through enemy lines, and/or quickly exploit a break in enemy lines (BCT, 2010).

The SBCT is comprised of the following units:

- (3) Stryker Infantry Battalions serve as the primary combat force for the SBCT. Each battalion has three infantry companies, all of which are equipped with the Stryker vehicle to allow for self-transport. Each battalion includes mortars, scouts, and snipers, (BCT, 2010).
- (1) Reconnaissance Squadron conducts reconnaissance and surveillance to gather information about the terrain and enemy by primarily. Unlike other reconnaissance squadrons in other types of BCTs, SBCT reconnaissance

squadrons include additional military intelligence assets (such as interrogators, unmanned aerial vehicles, and radio intercept equipment) (BCT, 2010).

- (1) Fires Battalion provides artillery support and counter-fire support. It includes 18 towed howitzer cannons (BCT, 2010).
- (1) Brigade Support Battalion is designed to provide all internal logistics needs for up to 72 hours of combat. Its capabilities include medical, transportation, vehicle and equipment maintenance, kitchen/feeding operations, and quartermaster/supply. Additionally, it manages the SBCT's anti-tank, engineer, signal (communications), and military intelligence companies (approximately 100-200 soldiers each) (BCT, 2010).

The SBCT's strength is that it is logistically lighter than an HBCT but has greater firepower and protection (armor) than an IBCT. On the same token, it can operate across a wide spectrum of combat scenarios: patrol the streets of Iraq to ensure political/security stability, engage in conventional battles with other armies, and conduct counter-insurgency operations against organized groups.

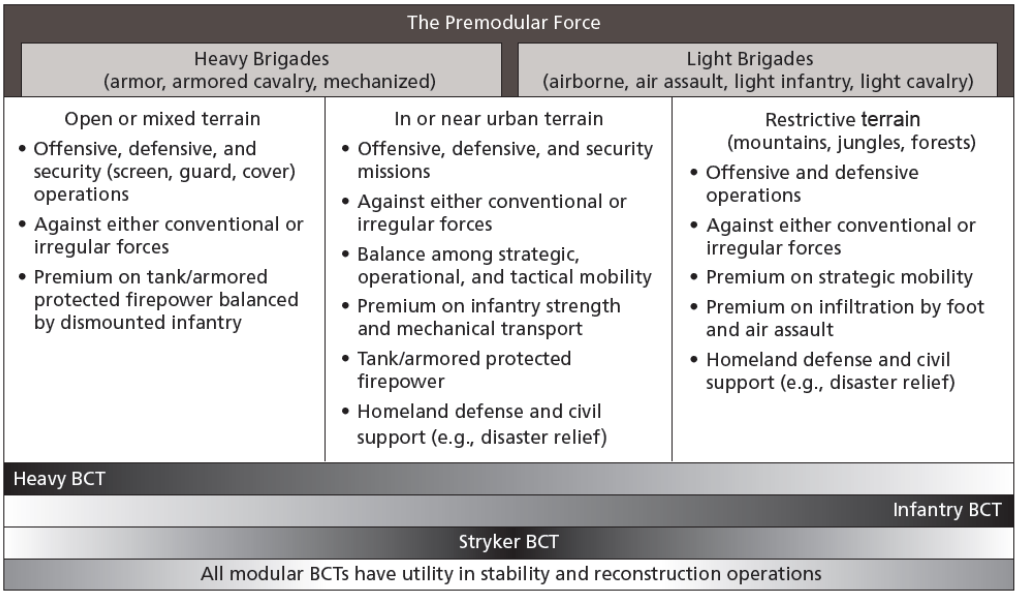

Figure 5. Comparative Capabilities of BCTs. Reprinted from "A Review of the Army's Modular Force Structure." (Johnson et al., 2012).

Summary

The HBCT reflected the need for the army to be prepared to face a traditional modern army, such as China, Russia, or North Korea (Kugler, 2003). The IBCT reflected a desire for a mobile unit that was sufficiently flexible in mission and sufficiently light on logistical requirements (Kugler, 2003). The IBCT can be parachuted behind the front lines in a conventional war, provide security in counter-insurgency operations (such as Afghanistan), or be a quick response force around the globe (such as Somalia and Bosnia in the 1990s) (CRS Report, 2019). Lastly, the SBCT reflected a hybrid of the IBCT and HBCT. The Stryker vehicle's light armor and armament allowed it to be more nimble and maneuverable than HBCTs, but SBCTs also provided greater armor and firepower than the IBCT (Kugler, 2003). Conceptually, the Stryker could drive infantry soldiers to the battle, then allow the soldiers to dismount to assault the enemy while providing supporting fire from its vehicle-mounted cannon and machineguns

(Kugler, 2003). Military planners envisioned similar scenarios to Bosnia and Somalia when they designed the SBCT; low-intensity conflicts against a significantly weaker adversary where some type of armored vehicle was necessary for transporting infantry but the Abrams tank and Bradley Fighting Vehicle were cumbersome or unnecessary (Kugler, 2003). Examining the likely conflicts of early post-9/11, the three-BCT model reflects the dynamic tapestry of threats that were identified by U.S. military planners.

5. Planning and Decision-Making in the BCT

Introduction

Managing a large and complex organization such as a BCT requires exceptional planning and specific processes to guide leaders through decision-making. The U.S. Army has a process for planning, coordinating, and conducting operations, known as the Military Decision Making Process (MDMP). MDMP pre-dates the BCT and has its origins in Cold War strategy (Burwell, 2001). Based on these origins, MDMP is designed for conventional armies meeting in climatic battles that decide the fate of nations (Burwell, 2001). In the BCT-based reorganization of the U.S. Army, MDMP became obsolete.

Background

Before understanding MDMP, it is critical to understand how an army headquarters functions. Although every army unit has a single commander (the person who is alone responsible for everything that the unit does or fails to do), he/she has a myriad of staff personnel who assist with the day-to-day operations of the unit. Essentially, the commander serves in a role similar to a CEO while the staff serves as his/her corporate office. The staff personnel are divided among functional areas, known as sections. Each section is headed by a single officer

who reports to the commander. While staffs can vary in number of personnel, the functions remain the same and typically fall under the following positions:

Executive Officer. The Executive Officer assists the commander with managing the rest of the staff sections and synchronizing their efforts as a whole.

The Adjutant (also known as S-1). The Adjutant is responsible for personnel management, administrative actions (pay, promotions, awards, etc.), legal actions on behalf of the commander, and generally serves in a role similar to a human resources manager.

Intelligence Officer (also known as S-2). The Intelligence Officer is responsible for collecting, analyzing, and communicating information about the enemy and environment. He/she is also responsible for security programs, such as ensuring documents are properly protected, sensitive items (weapons, ammunition, high-dollar equipment) is properly secured, and that soldiers are trained on relevant espionage and/or terrorist threats.

Operations Officer (also known as S-3). The Operations Officer plans for future operations, tracks current operations/activities, and has overall responsibility for training subordinate units/personnel.

Logistics Officer (also known as S-4). The Logistics Officer ensures that there are sufficient equipment and supplies to enable the unit's operations. This also includes feeding soldiers, maintenance on vehicles and equipment, and transportation.

Signal Officer (also known as S-6). The Signal Officer is responsible for ensuring that the units have adequate communications capabilities. This includes radios for the battlefield, laptops for the staff personnel, and networks to connect everyone. This section is equivalent to an Information Technology office for a business.

Special Staff. The staff also includes personnel with the label of "special staff." This typically includes an attorney (to provide legal guidance and assist with disciplinary actions), a chaplain (to minister to soldiers and assist with morale-building), medical personnel (both combat casualty care and preventative/routine medical care), public affairs (to communicate with the public), and budget/contract officer (to manage fiscal resources).

The Mechanics of MDMP

MDMP is a detailed and explicit process with seven distinct steps:

1) Receipt of Mission. In the first step, a staff receives initial guidance from the commander to begin the planning process. *"Invade Western Europe in 1944"*

2) Mission Analysis. Next, the staff begins analyzing information in respect to the commander's guidance. For the Battle of D-Day the staff sections might assess—

The Adjutant: *"We need 150,000 soldiers for a ground invasion."*

The Intelligence Officer: *"Enemy positions are too well-defended around port cities to successfully complete an amphibious invasion of France."*

The Operations Officer: *"We must disrupt enemy supply lines in order to successfully complete an amphibious invasion in Normandy France."*

The Logistics Officer: *"We must immediately establish a port or forward resupply point to shuttle supplies to shore and evacuate casualties back to England."*

3) Course of Action (COA) Development. In this step, the staff sections analyze all of the information in the previous phase to develop possible COAs. *"We can parachute soldiers behind enemy lines and conduct an amphibious attack at Normandy, France."*

4) COA Analysis/Wargame. In this step, the staff attempts to "wargame" the COAs. This COA can be a simple tabletop exercise where participants talk through the phases of their plans,

or this can be large-scale exercise like the Millennium Challenge. *"If we invade France at Calais, we could secure a deep water port, but if we invade France at Normandy, we might sustain lower casualties."*

5) COA Comparison. In this step, the staff ultimately selects a plan that they would like to conduct. *"We will invade France via Normandy."*

6) COA Approval. Although the staff at this juncture has selected their first-choice for a plan, they must present their analysis and recommendations to their commander for final approval.

7) Issue Guidance or Orders. Once the commander approves the plan, the staff drafts a formal "operations order" that assigns specific tasks to specific subordinate units. Tasks are synchronized and key information is disseminated.

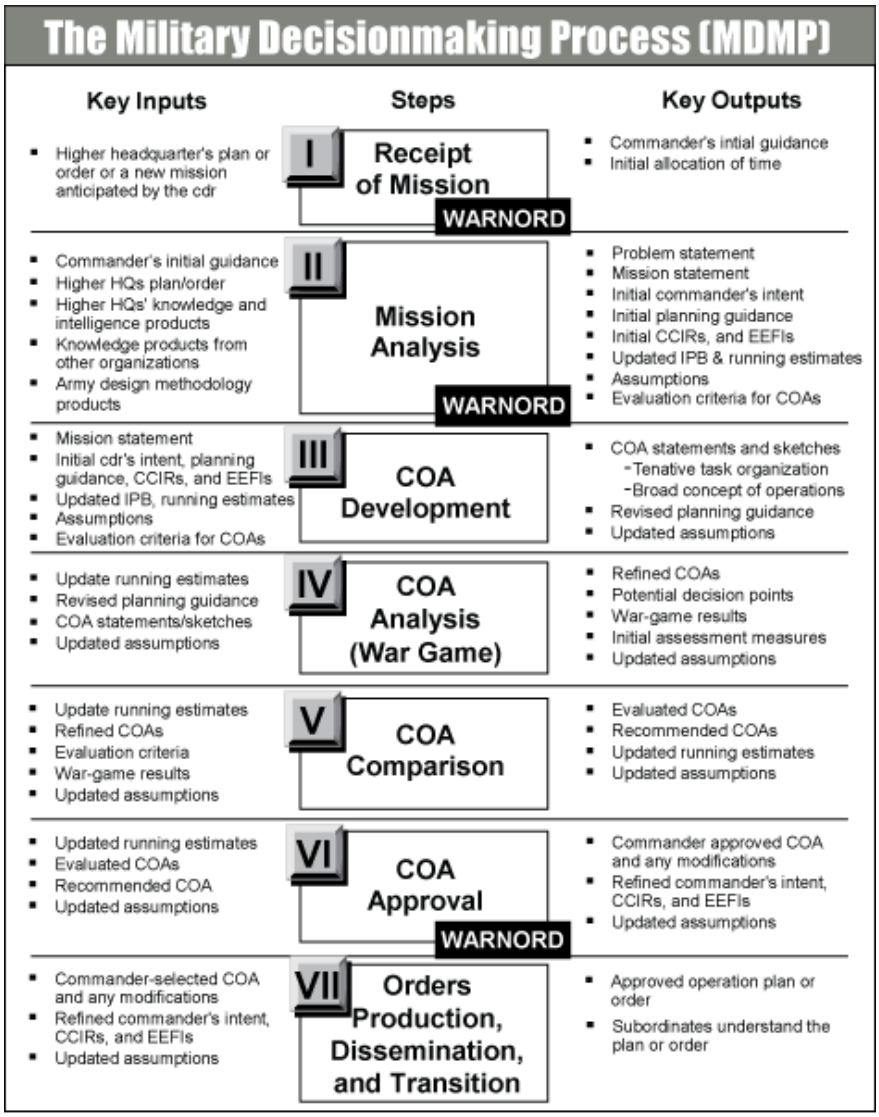

Figure 6: The MDMP Steps. Reprinted from https://www.thelightningpress.com. (Wade, 2017).

History of MDMP

The history of MDMP illuminates why it exists in its current form of a highly bureaucratized planning process. Its origin dates to the 1980s during the Cold War. Contemporary military scholars of that time likely saw the historical arc of decisive conventional battles. Historically, military leaders had the ability to deliberately plan campaigns, align their resources to their armies, and finally meet the enemy in climatic battles that had the ability to

decide entire wars. After such battles, both sides often had the ability to reassess the situation before committing to further battle. Warfare favored good plans.

The American Civil War can be segmented into a series of campaigns based on grand strategy: the General Meade's Peninsula Campaign to capture Richmond, General Lee's Confederate's Maryland Campaign to threaten Washington D.C., General Sherman's March to the Sea to wage total war on the Confederacy, and General Grant's Wilderness Campaign to carry-out a war of attrition. In World War I, leaders could spend months planning campaigns or even specific battles. British and French military leaders began planning for launching the Battle of the Somme over six months before it began (Brosnan et al, 2020). World War II saw similarly well-planned campaigns: the German invasions of Poland, Czechoslovakia, and ultimately France; allied amphibious invasions in North Africa, Italy, France; and the American island-hopping campaign of the Pacific Theater. In all of the circumstances, success warranted deliberate and time-consuming planning. Looking at threats from the Soviet Union during the Cold War, American planners divined enemy attack plans across Eastern Europe, calculated routes and their respective speeds of advance, and then developed corresponding counter-attacks.

> "In the 1980s the United States Army's conceptualization of the battlefield was analogous in many ways to a chessboard. Good guys began on one side of the board, each unit represented by a piece on the chessboard… In the front of the formation were the scouts; behind the scouts were the maneuver units, each with its own movement and firepower capability. The bad guys were on the other side of the board" (Burwell, 2001).

The rise of precision weapons and fast-developing expeditionary-style military interventions caused some U.S. Army leaders to question the efficacy of MDMP in the 1990s (Burwell, 2001). No longer was conventional warfare analogous to one chess piece moving

against another. Instead of a chessboard campaign like the World Wars, the army was facing increasingly complex conflicts that required a more three-dimensional approach to operations, including such considerations as diplomatic, political, and economic (Burwell, 2001). The U.S. intervention in the Somali Civil War could not be described on a chessboard, let alone cleanly drawn upon a map. War became more nuanced when victory became defined by limited political or humanitarian goals and bounded by such oblique rules as United Nations mandates or internationally recognized rules for use of force.

In 1993, the U.S. Army's Center for Army Lessons Learned (CALL) found that MDMP in its contemporary form was: "slow, laborious, and of marginal value in a fast-moving tactical situation" (Wampler et al., 1998, p. 2). The byproduct was that army leaders were developing their personal planning and decision-making processes, often resulting in significant shortcomings when tested in realistic training scenarios (Wampler et al., 1998). The army attempted to rectify these shortcomings, changing the MDMP process three times in four years (Wampler et al., 1998). U.S. Army scrutiny against MDMP has since likely only increased.

MDMP has been criticized for being overly complicated (it has seven steps with some steps having up to eighteen sub-steps) (Cojocar, 2011). It has been accused of overwhelming staff personnel with data and requiring too many time-consuming procedures for the dynamic, time-constrained environment of combat (Frambes, 2005). The U.S. Army determined that MDMP required significant training before a staff could effectively utilize the procedures due to its complexity, necessitating both formal individual training (so that an officer understood their role in the process and routine staff exercises (so entire staffs could work together in completing the processes) (Wampler, Centric, & Salter, 1998). Even when units received what was deemed

to be requisite training, many staffs still struggled to follow the detailed procedures (Wampler et al., 1998).

Instead of the complex set of procedures outlined through MDMP, some military scholars argued for alternative, simpler methodologies that could provide more of a framework for planning that could be better scaled based on the "bounded rationalities," such as time constraints (Cojocar, 2011). In constantly evolving situations—such as during conventional battles or in counter-insurgency—MDMP can become a burden; due to the constant flood of new information and the time-consuming nature of MDMP, a staff cannot help but have outdated steps in the process while focusing on another step (Cojocar, 2011). One alternative is Design Methodology, which seeks to identify the current situation, the desired end state, and then understand the problems facing the organization in order to achieve the end state (Cojocar, 2011). This approach allows the amount of staff procedures to be dictated by the mission and time available to plan.

Dr. Milan Vego argued that MDMP is overly complicated in his article, *The Bureaucratization of the U.S. Military Decisionmaking Process* (Vego, 2018). MDMP treats information gathering, analysis, planning, and revisions as all part of the decision-making process. Dr. Vego warned that this cumbersome process makes the planners "prisoners of the format" instead of allowing them to be flexible or creative in solving problems (Vego, 2018, p. 35). U.S. Army staffs are divided into functional areas (operations, intelligence, personnel, logistics, and communications), and each staff section already is expected to maintain an "estimate" that provides relevant information about external and internal factors. Dr. Vego wrote that the format-bound checklist of tasks and procedures within MDMP leads to centralization and inflexibility in planning and decision-making (Vego, 2018).

OODA Loop

Colonel John Boyd devised a decision-making process that is the antithesis of MDMP: simple, flexible, and scalable to the task at hand. This process, known as the OODA Loop, illustrates the greatest shortcoming of MDMP for the BCT-based U.S. Army—its inability to compensate for an enemy that is responding tactically just as quickly as our own military planners. MDMP suits deliberate and initial planning for operations, such as D-Day, the 1991 Persian Gulf War, and the 2003 invasion of Iraq. However, BCTs are also expected to conduct abbreviated MDMP planning in combat; when computers are stowed-away and soldiers are living out of vehicles or on the ground. When armies engage in direct combat, MDMP cannot keep up with the influx of information and the need for rapid decisions with incomplete plans (Wampler et al., 1998). In essence, decision-making during continuous combat operations creates a bounded rationality that is incompatible with MDMP. For example, as time becomes more constrained, MDMP becomes less effective (Wampler et al., 1998). General James Mattis described in his memoir, *Call Sign Chaos*, that tactical success on the battlefield meant making decisions and carrying out those decisions faster than the enemy can (Mattis, 2019). MDMP is an encumbrance to that philosophy.

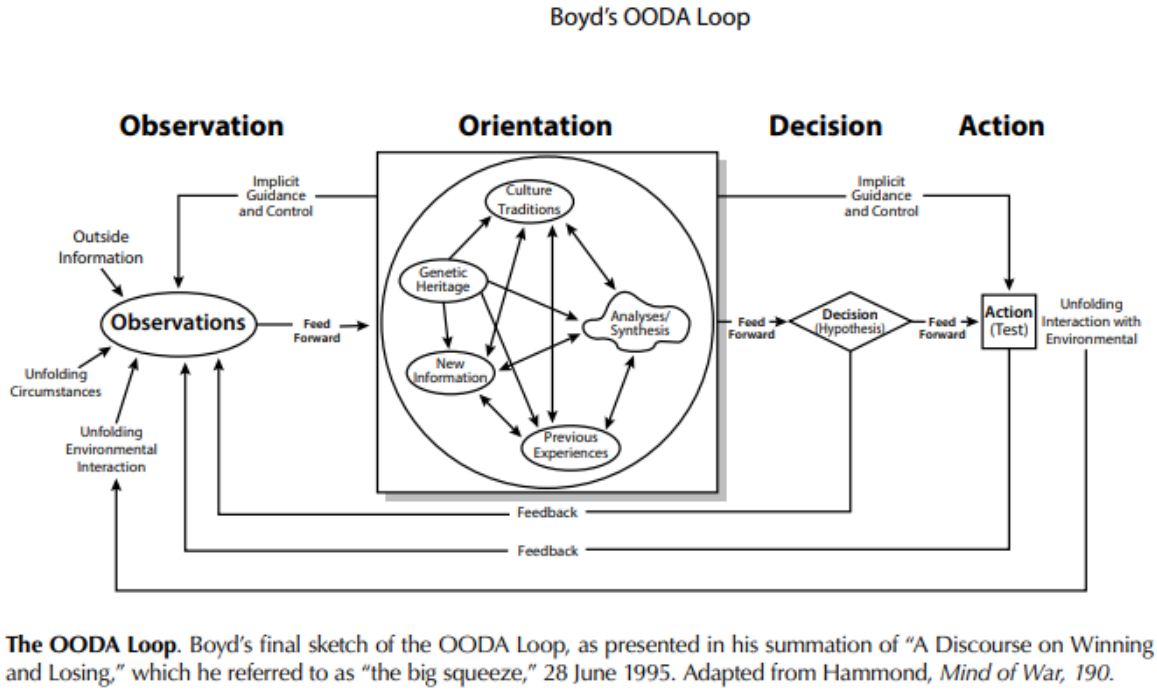

Figure 7: Diagram of the OODA Loop. Reprinted from "A Discourse on Winning and Losing" (Boyd, 2018)

Colonel Boyd found a metaphor for this decision-making cycle when analyzing air-to-air fighter jet combat (Hammond, 2012). A veteran fighter pilot of the Korean War and instructor in aerial tactics, Colonel Boyd wrote his own manual titled, "Aerial Attack Study" (Hammond, 2012). He found that successful fighter pilots—ones who shot down their adversaries—were able to make effective decisions with the limited time that they had (Kelly, 2014). He described this natural decision-making process in four steps (OODA Loop):

1. Observe. The fighter pilot observes the enemy fighter jet. Besides simply seeing it, he estimates its speed, altitude, and angle of attack (Boyd, 2018).
2. Orient. The fighter pilot physically orients his jet to the enemy but also mentally orients his observations to analyze the enemy's intentions and likely actions (Boyd, 2018). At the

same time, the fighter pilot is developing his own possible responses to the enemy: does he gain altitude, attack from the sun, break away, etc (Boyd, 2018)?

3. Decide. The pilot weighs his choices and makes a decision on how to engage (or not engage) the enemy fighter (Boyd, 2018).
4. Act. Finally, the pilot takes action based on his decision. This activity generates its own response from the enemy, and the process begins again (Boyd, 2018).

Watching two fighter aircraft dogfight—each pilot responding to the others' movements nearly instantaneously—also serves as a metaphor for military units on the ground (Boyd, 2018). As each opposing force observes the other, the leadership tries to synthesize the data/information into knowledge, make decisions about how to defeat the enemy, and then get their soldiers to carry-out those plans. Modern technology works to dramatically increase the available information that armies can observe while also decreasing the reaction time for armies to act. In the technology-laden BCTs with numerous combat and support capabilities, the OODA loop becomes distorted from MDMP instead of facilitated by it.

Summary

In the post-BCT age for the U.S. Army, MDMP appears paradoxical. BCTs were formed in response to the need for greater capability at a lower echelon to deploy to expeditionary conflicts; conflicts where MDMP's value for planning day-to-day operations becomes questionable. While the BCT reorganization itself represents a shift towards decentralization, MDMP relies on centralized decision-making and bureaucratizes planning. As observable information increases due to technology (e.g. drones, electronic surveillance, databases, etc.), MDMP is a poor filter to assist leaders in swiftly moving through the OODA Loop. MDMP (in its current form) is a relic of the Cold War that is ill-suited for the contemporary BCT.

6. Communicating in the BCT

Introduction

The final Belfer report envisioned the military—particularly the U.S. Army—transforming into a more "modular" structure (meaning that units could be easily configured into task forces that were customized for the mission or operation at-hand) that made investments in Research and Development (R&D) to become more technologically integrated (Deutch & White, 2003). Military leadership and policymakers envisioned communications systems which were integrated with military intelligence and weapons systems, thereby better empowering BCT commanders (two ranks below division commanders and with significantly less career experience).

This concept of connecting virtually every software system, database, communications system, weapon, aircraft, vehicle, and military intelligence collection systems to become fully integrated (able to "talk" to each other and seamlessly share information) is referred to as Command, Control, Communications, Computers, and Intelligence (C4I) (Kugler, 2008). The U.S. Army envisioned a C4I "system of systems" that helped BCT commanders and their staff better visualize the battlefield and where both friendly and enemy forces were arrayed on it (Kugler, 2008). These same C4I systems would allow cross-coordination and encourage informal relationships across soldiers and units (Kugler, 2008). Infantryman should be able to directly communicate to an artilleryman or pilot (Kugler, 2008). C4I was envisioned as no longer a way to connect leaders with subordinates but connect everyone to everyone; an "internet of things" approach to warfighting.

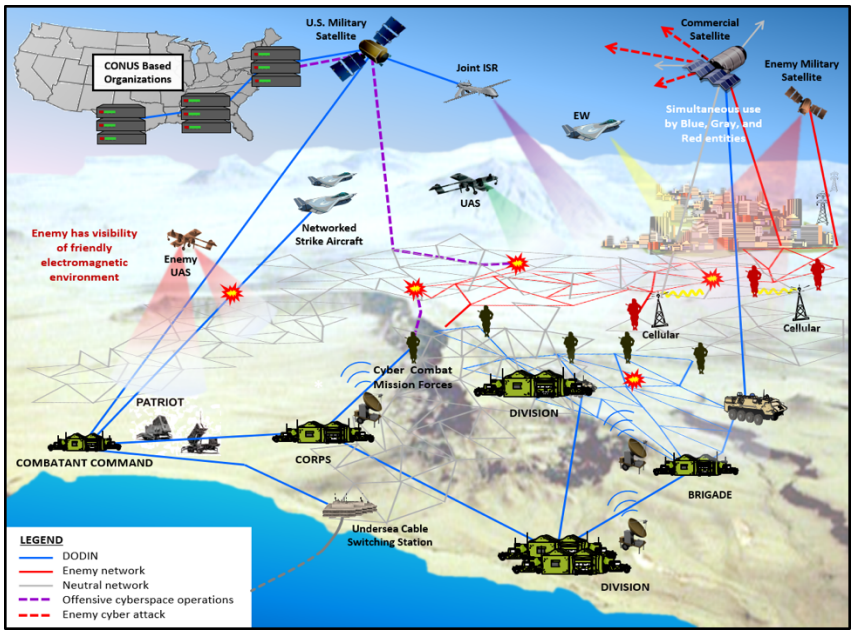

Figure 8. Example of C4I Architecture. Reprinted from https://cyberdefensereview.army.mil. (Delacruz, 2015).

Background

Following the decision to reorganize the U.S. Army under the BCT paradigm, the Chief of Staff of the Army (CSA) directed the establishment of such integrated C4I architecture to support total integration and synchronization of army units (Greene & Mendoza, 2005). Before 2003, the U.S. Army was developing C4I systems that would be fielded to only a fraction of all units and would be "stove-piped" (meaning that the various systems were not integrated with each other) (Greene & Mendoza, 2005). Instead, the U.S. Army's new vision was to create a suite of C4I systems, known as a "system of systems," that connected all army units, integrated disparate combat and logistics activities, and shared operational information between the various software platforms (Greene & Mendoza, 2005). The C4I systems were to be designed to automate staff processes and improve the "common operating picture,"[12] meaning that leaders at

every echelon can access information as disparate as enemy fighting positions, friendly vehicle locations, logistics data, and airspace usage plans—all through a single C4I architecture (Greene & Mendoza, 2005).

The U.S. Army began testing this C4I architecture in 2004, known as the Army Battle Command System (ABCS). Starting in 2005, the ABCS consisted of eleven automated systems designed to aid planning, coordinating, and executing operations (Greene & Mendoza, 2005). The ABCS included such capabilities as: maneuver tracking (status and location of infantry and tanks), fire support (artillery and air support), air defense, intelligence/electronic warfare, and logistics (Greene & Mendoza, 2005).

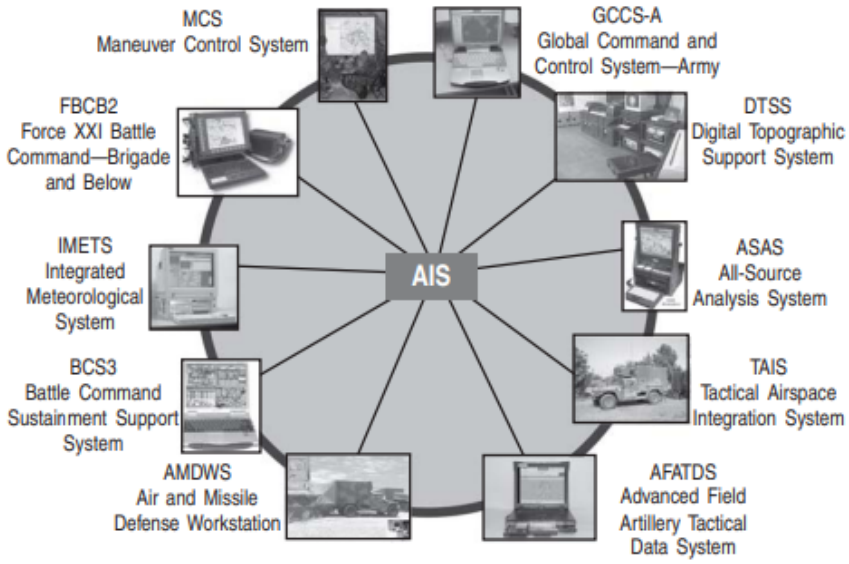

Figure 9. Diagram of the ABCS Information Server (AIS). Reprinted from "Lessons Learned From Developing the ABCS 6.4 Solution." (Greene & Mendoza, 2005).

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[12] A "common operating picture" describes how leaders visualize the current situation in terms of the environment, enemy forces, and friendly troops in order to synchronize resources and understand current and future operations. https://www.army.mil/article/194399/developing_a_common_operational_picture_for_sustainment

New Technology and Old Processes

The ABCS "system of systems" approach changed how each planning step was performed (reference the seven steps of MDMP) but the MDMP steps themselves remained largely unchanged since the 1980s (Frambles, 2005, p. 2). ABCS digitized old tasks without changing the end-product that those tasks accomplished (Frambles, 2005). For example, instead of marking enemy positions on a printed map, an intelligence officer could utilize ABCS to plot grid coordinates into the ABCS suite's All-Source Analysis System (ASAS), which had a geospatial mapping program; however, in either pre/post-ABCS scenario, enemy positions must still be plotted. Similarly, when conducting Course of Action analysis, planners from the 1990s could physically draw (using erasable markers) attacks and counter-attacks on clear sheets of acetate overlaid successively on maps, but the planners from the 2010s drafted the same visual displays using software on ABCS; the task for war-gaming itself was still not automated. Although using digital technology to replace analog tasks is not inevitably problematic, the ABCS architecture led to additional challenges or stresses on military planners, specifically at the BCT echelon and below.

The ABCS proliferated information. In a "system of systems" framework, the amount of available information increases exponentially (Frambles, 2005). In a combat environment, the volume of available digitized information exceeds a military unit's capacity to analyze or even filter through it (Frambles, 2005). For comparison, after a platoon-level firefight in the Vietnam War, an intelligence officer from the platoon's higher-level headquarters might visit the soldiers, take statements, and then write a report. The report would be briefed to the headquarters' commander or operations officer. Enemy positions would be marked on an oversized map on the wall. The entire process would be time consuming and the report could only provide the

information that was manually documented. By 2010, a platoon-level firefight would be instantly identified and recorded in ABCS. A battalion commander could see graphic symbols on his/her computer in real-time, indicating where every single vehicle involved in the firefight was located. Unmanned Aerial Vehicles (UAV) could be tasked with capturing Full Motion Video (FMV). Within minutes, an intelligence officer could query all historical reports and all enemy activity that ever occurred within the vicinity of the firefight. An administrative officer could identify the soldiers who were involved in the firefight, down to who was sitting in each vehicle. All other U.S. Army units would instantly be notified of the firefight. The volume of available raw data could overwhelm operations centers.

However, U.S. Army doctrine did not address the digitalization of staff processes. MDMP pre-dated ABCS, and it has not been updated to support the capabilities of current information systems (Frambles, 2005). Instead, the U.S. Army to-date has maintained a legacy model to plan, coordinate, and execute operations. Under the BCT model, every various unit or capability—Unmanned Aerial Vehicles (UAV), logistics units, tanks and infantry, engineers, artillery, air support, etc.—becomes another data funnel that feeds ABCS and threatens to overwhelm the MDMP process. Major Timothy Frambes asserted:

> "The doctrinal problem solving process, MDMP, is absolutely valuable in deliberate planning in an environment not limited by constraints of time. The deliberate planning environment best supporting a full execution of the MDMP is absolutely supported by ABCS components, products, capabilities, and capacities parallel to the MDMP. The environmental changes of limited time, limited options, and limited experience force an alternative decision-making solution, however. In the modified environment, ABCS systems are still valued tools, but are not well managed by the doctrinal decision-making

process. Instead, the volume of information inherent to the proliferation of automated systems requires an alternative decision-making process" (Frambes, 2005, pp. 57).

In other words, each of the seven steps of MDMP can be completed individually using software in the ABCS architecture, but ABCS does not facilitate or automate the MDMP process as a whole, and ABCS cannot replicate the steps without human inputs (Frambes, 2005). The result is that ABCS allows commanders and staff personnel to visualize the battlefield with granularity down to the individual vehicle, but also risks overwhelming that same commander and staff with too much data (Frambes, 2005). MDMP and ABCS lack a capability to filter and cull data, which thereby enables planners to scale the analysis to fit time constraints (Frambles, 2005). The result is a "dual process" where commanders and staffs find themselves laboriously completing MDMP steps manually (which could be automated but are not) or ignoring the army's doctrine of MDMP in order to rely on the data visualization and automation tools of ABCS (Frambes, 2005).

Actor Network Theory

The interplay between BCT staffs, ABCS, and MDMP can be analyzed using the Actor Network Theory. The Actor Network Theory Model provides a fourth lens for evaluating organizational decisions (besides Rational, Organizational, and Political models) (Chumer & Turoff, 2006). It asserts that decisions are developed through a process of people interacting with things (to include ideas, processes, technology, objects, etc.) (Chumer & Turoff, 2006). Within this context, individual roles and individuals' relationships to physical things increase in importance. Actor Network Theory sees decision-making as a hybrid of the other models identified in *Essence of Decision*, but also acknowledges the importance of specific individuals within the decision-making architecture (Chumer & Turoff, 2006). Social constructs and

inanimate objects shape the nature and results of decision-making (Cresswell, Worth, & Sheikh, 2010). Actor Network Theory assumes that when technology is introduced or evolves within an organization, the social constructs and thereby entire network of relationships is affected (Cresswell et al., 2010).

Metrics-Based Performance Management. Actor Network Theory can explain shifting priorities. A study of New Zealand healthcare's transition to electronic health records found that the rise of big data in health information systems help catalyze a shift to more quantitative-based performance management (Cresswell et al., 2010). Once the health systems became operational, across multiple levels of government and health care gained access to aggregated data that took the form of metrics (Cresswell et al., 2010). This led to efficiency-focused reforms and ultimately a shifting dynamic where nurses assumed greater responsibility from doctors (Cresswell et al., 2010).

Similarly, the U.S. Army has seen the rise in metrics-based performance management. The integrated suite of databases to manage army units requires a bottom-up approach to data entry, leading to the rise of onerous data reporting requirements placed on junior leaders at the company echelon (approximately 100-150 soldiers commanded by a captain with as little as four years of military service) (Wong, 2002). One study found at least 125 different data reporting requirements for which the company was responsible for inputting (Wong, 2002). Since the army has eliminate many company-level clerk positions (anticipating that automation would decrease clerical workload), the responsibility for data input is often shifted to the unit's leaders (Wong, 2002). "The situation in which the Army finds itself is oddly paradoxical. Future leaders should be adept at operating in unstructured, ambiguous environments, yet the Army is relying on a centralized, over-structured system to provide that capability" (Wong, 2002, p. 27).

Power Dynamics. Technology can discretely change organizational power dynamics. Researchers in health care found that the centrally-procured health information systems placed greater reliance on local hospitals and providers (Cresswell et al., 2010). Initially, the procuring office (whomever purchased, distributed, and trained personnel) had inordinate power, but as local providers gained proficiency, the systems democratized healthcare data; the central authorities relied on individual providers to input the data, which necessitated additional flexibility and buy-in (Cresswell et al., 2010).

Similarly, ABCS democratized knowledge management in the U.S. Army. Virtually overnight, any soldier with a security clearance and computer access could do their own intelligence research by downloading historical reports, running pattern analysis software, and reviewing raw data. Also, the same soldiers could input data almost as easily as they could download it.

The mix of counter-insurgency and ABCS placed a greater reliance on bottom-up intelligence collection, which is the opposite of conventional warfare. In a conventional war, high-echelon intelligence collection systems (satellites, spy planes, electronic intercepts, etc.) feed enemy information (particularly location, size, composition and activity) downwards to the lower echelons of military units. In a counter-insurgency, those same echelons are nearly irrelevant to intelligence collection. Instead of looking for hundreds of tanks miles away from the frontlines, during counter-insurgency operations, the army could be looking for a single person in a village. Under this paradigm, the BCT's combat units provide bottom-up intelligence collection. Combat information has become democratized.

Cognitive Systems Engineering

Introduction. Cognitive Systems Engineering is the study of the human-computer relationships in decision-making (Pfautz, Roth, Bisantz, Thomas-Meyers, Llinas, & Fouse 2006). This field of study arose in the 1990s as computerization dramatically increased across industries, but instead of guaranteeing improved decision-making, in some cases the computerization of decision-making led to catastrophic failures such as aircraft accidents (Pfautz et al., 2006). Cognitive Systems Engineering seeks analyze, design, and streamline the human-computer system to improve decision-making (Pfautz et al., 2006). The Military Decision Making Process (MDMP) pre-dates Cognitive Systems Engineering and the Army Battle Command System (ABCS), yet ABCS is being utilized as a decision support system for MDMP.

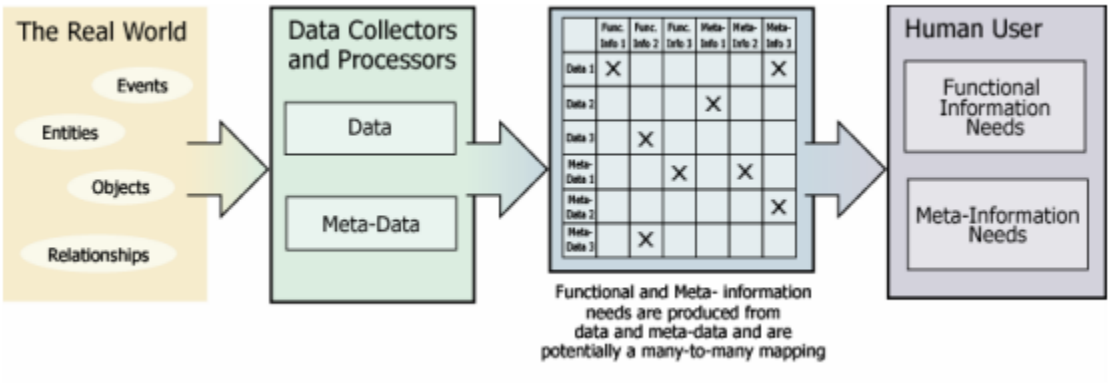

Figure 10. The Process of Synthesizing Data into Meta-Information. Reprinted from "The Role of Meta-Information in C2 Decision-Support Systems." (Pfautz et al., 2006).

Uncertainty. Researchers found that when humans recognize uncertainty in a decision, they often shift from logical decision-making to experience-based heuristic decisions (Pfautz et al., 2006). Purely heuristic decision-making is counterproductive with MDMP since it is a logic-based set of procedures. ABCS should serve as a decision support system that aids users in

reducing uncertainty or quantifying uncertainty in order that the user can assure logical decisions (Pfautz et al., 2006).

Uncertainty can be classified intro three categories: inadequate understanding, lack of information, and conflicting alternatives (Pfautz et al., 2006). Uncertainty can be addressed with any one or combination of strategies: reduce uncertainty by collecting more information, make assumptions to fill knowledge gaps, compare conflicting alternatives to choose the most likely scenario, interrupt preceding variables/actors to prevent the uncertainty from materializing, and/or filter out uncertain information (Pfautz et al., 2006). An effective decision support system is able to assist the user in identifying the uncertainty, selecting an effective strategy for dealing with the uncertainty, and subsequently deciding/acting on the uncertainty. In effect, a good decision support system allows the user to complete Colonel Boyd's OODA Loop faster and to a better result.

The crux of managing uncertainty is in the user visualization and interface (Pfautz et al., 2006). Too little information displayed to the user creates uncertainty, yet too much information overwhelms the human user. ABCS fails to adequately address uncertainty, because the visualization displays within the software do not readily depict the meta-information that would immediately cue effective decisions related to the uncertainty.

For example, army graphics allow enemy positions to be marked as "known" or "suspected" in some of the ABCS enterprises, as opposed to additionally providing more nuanced meta-data that could better explain the likelihood of the enemy being at specific coordinates. Although two "suspected" enemy positions could be visualized on a digital map within ABCS, one position could be "suspected" due to a reported sighting by another friendly military unit while the other position could be "suspected" due to a radio intercept that indicated

enemy forces might pass through the area at some unspecified time. At face value, a highly reliable source—like a nearby unit spotting the enemy—might mean that the enemy is more likely at that position. However, if the report is a week old and the radio intercept is recent, perhaps the opposite is true. Unfortunately, this type of quandary is not directly addressed within ABCS and causes military leaders to revert to their personal experiences to make decisions.

In a time-constrained and dynamic environment of BCT-based combat, computational decision-making support must allow the user to quickly visualize the battlefield (terrain, weather, friendly forces, enemy forces, civilians, etc.), manage uncertainty, cue decisions, and provide a queue of possible solutions. In essence, the human-computer system should flow through the decision-making process without encumbrance. ABCS does not yet fulfill this role.[13]

Summary

ABCS was envisioned to be a "system of systems" to link all U.S. Army units and capabilities, enabling the BCT to effective provide the C4I necessary to manage such complex structure. Instead, it is a victim of context. It is a top-down designed system for managing army units, instead of a decision support system with Cognitive Systems Engineering in mind. If the BCT reorganization made MDMP paradoxical, ABCS should have made MDMP obsolete. Instead, MDMP and ABCS have persisted as U.S. Army doctrine though seemingly incongruent.[14]

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[13] At the time of this paper, the U.S. Army has initiated Project Convergence, which seeks to automate the sharing of intelligence and operational information across all platforms. Under this program, the army uses satellite based sensors to determine likely enemy locations via an artificial intelligence system called Prometheus. A second artificial intelligence system, called Firestorm, determines the best methods for attacking/destroying the enemy based on factors such as vicinity to civilians or friendly forces, enemy defenses, and army weapons within range of the enemy. The end result could be an automated "kill chain" that destroys enemy forces within seconds of detection. However, this technology is ambitious and possibly decades from implementation (Strout, 2020).

7. Personnel Management and the BCT

Introduction

The BCT reorganization had a profound effect on career management. U.S. Army divisions are commanded by a Major ("two star") General, as opposed to brigades which are commanded by a colonel. This represents a significant delegation of responsibility to a commanding officer with less experience and who has a dramatically increased span of control. In establishing the BCT as the "unit of action," it impacts career management in a way that impacts army doctrine and innovation.

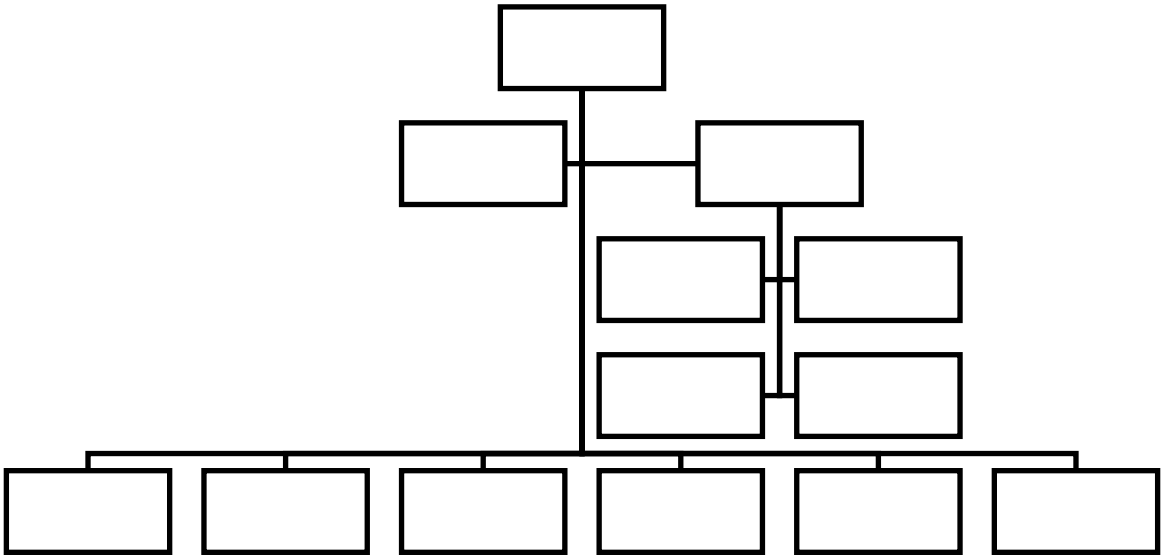

Figure 11. The BCT Organizational Structure. Adapted from Field Manual 3-90.6. (BCT, 2010)

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[14] The rise of tactical electronic warfare, when enemy forces may jam or disrupt friendly communications, threatens the C4I architecture for BCTs, which is leading to U.S. Army units returning to analog communications as a back-up and planning for scenarios where BCTs or subordinate units are "cut off" electronically (O'Hanlon, 2018). When developing the BCT concept, army leadership assumed that C4I would be omnipresent to provide communications and synchronize activities.

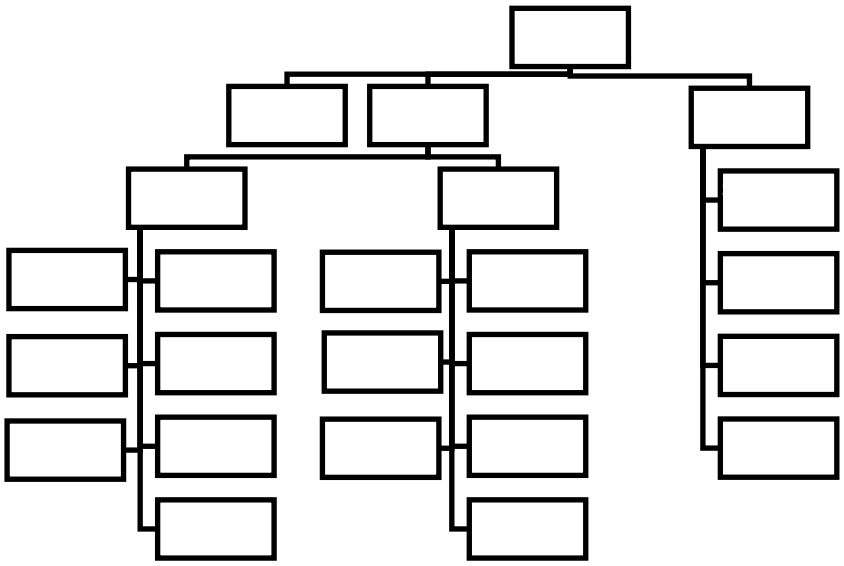

Figure 12. The BCT Staff Organizational Structure. Adapted from Field Manual 3-90.6. (BCT, 2010).

Span of Control.

The commander of the BCT has incredible capabilities within the various units and staff sections. He/she commands between approximately 3,500 soldiers across six battalions (Johnson et al., 2012). Under this construct, the commander directly supervises six battalion commanders, the deputy commander, the commander's personal staff (typically four personnel), and the executive officer (who in turn supervises the coordinating staff and the special staff), for a total of about twelve personnel. The executive officer often supervises a comparable number of personnel. This organization of personnel and units represents a departure from established army practices related to span of control and adding an additional challenge to the BCT concept.

"Span of control" in its simplest definition describes the ratio of employees to a supervisor (Ouchi & Dowling, 1974). However, this simplistic definition does not take into account the type of work being supervised, the type of employees being supervised, and the ancillary or administrative requirements of the supervisor (aside from managing those under his/her charge) (Ouchi & Dowling, 1974). For example, a department manager who supervises clerical employees doing standardized work can supervise a much greater span of control than a store manager supervising sales employees across a retail store (Ouchi & Dowling, 1974). This is further complicated by *how* employees are supervised, which can be by mechanical, impersonal, and/or personal means (Ouchi & Dowling, 1974).

The U.S. Army recognized the importance—albeit nuances—of span of control in its doctrinal publications contemporary to the 1980s and 1990s (Pierce, 1991). Although span of control was regularly discussed in doctrinal publications, it was never defined nor was it definitively specified (Pierce, 1991). The U.S. Army typically assigns 2-5 subordinate units to a single commander, making this ratio the de facto span of control, though some doctrinal publications allow that commanders could manage additional support/logistics units (Pierce, 1991).

The challenge on deciding the correct span of control is multi-faceted. The narrower the span, the more a leader can focus on mentorship and providing specific guidance to individuals (Pierce, 1991). A wider span of control allows leaders to reduce the echelons through which information or orders must pass, therefore increasing the speed of directive-style communications (Pierce, 1991). A narrow span of control might allow a commander to focus his/her attentions, but a wider span of control might require more external coordination (Pierce, 1991). Key variables for military span of control include: similarity of functions among

subordinates, complexity of organizational tasks, geographic closeness to subordinates, closeness and level of control required in supervision, the amount and complexity of planning involved, the rate of change within the operational environment, and the nature of how subordinates are supervised (Pierce, 1991).

In considering the span of control in the BCT model, the commander is faced with a myriad of variables that may be optimized by a narrow span. Under the BCT model, combat and support tasks are highly differentiated; each BCT has (aside from the SBCT) five different types of battalions, plus a myriad of smaller-sized units that include military intelligence, communications, logistics, and engineers. These disparate capabilities are incredibly complex, with combat-related activities necessitating precision accuracy. Units could be spread across miles, but the BCT commander is expected to have daily and personal communications with each of his/her subordinate commanders and key staff (totaling over 12 personnel at times). Planning is intensive and the environment is dynamic.

Several studies have also found that group size impacts leader behavior. As the span of control increases, a leader's management style must adapt. Several studies found that as the number of people managed by an individual increases, face-to-face techniques decrease and impersonal coordination efforts increase (e.g. creating sub-groups or use of email), often resulting in more directive style leadership, cliques forming, and more difficulty in coordinating complex activities (House & Miner, 1969). Applying these civilian research studies to the army, the BCT commander's position requires him/her to shift leadership styles after a career of typically managing no more than seven other individuals at a time and at an echelon that shifts from branch-specific tasks to Combined Arms.

Given all of these considerations, the BCT concept has over-extended its commander's formal influence. He/she is expected to supervise six subordinate commanders, which includes providing guidance, personally communicating with each one, and providing professional development to them. Additionally, the commander has support staff with approximately six more staff officers who also report directly to him/her (BCT, 2010). This totals approximately twelve people who report directly to the commander. Besides the wide span of control, the BCT also introduces new capabilities to the BCT commander which require synchronization with these units. For example, intelligence collection, communications, and engineering is critical to the combat units' success and must be also incorporated at the commander's level.

Army Officer Careers: Less Experience, More Responsibility

The BCT reorganization has inevitably altered army officer careers as well. Aside from increasing command responsibilities at a lower echelon, it also decreases the amount of experience commanders will have when commanding a BCT. The army personnel management system also encourages particular career paths, personality attributes, and professional experiences which do not necessarily benefit commanding a BCT. Pre-9/11 career management practices clashes with post-9/11 realities.

The implementation of the BCT inherently increases the brigade commanders' responsibility far beyond the modest increase in personnel assigned to them. The number of different types of units and capabilities increased dramatically. Equipment that was previously assigned to the division—artillery, signal (communications) units, engineers, military police—came under the purview of the colonel, as opposed to a major general.

A colonel requires about twenty years of service with only about 50% of lieutenant colonels (rank below colonel) being promoted to colonel (MLDC, 2010). This equates to

approximately 25% of all career army officers eventually being promoted to colonel, compared to less than 1% of all army officers who attain the rank of general (MLDC, 2010). Generals require additional professional education, are vetted by elected officials, and must have a superior resume that includes top evaluations and experience working with other branches of the military.

Army officer career paths are also narrowed to a particular career field, known as branches. This means that an officer is typically assigned to units or positions within that specific branch throughout their career, limiting their exposure to other types of units which he/she will potentially command in a BCT. Exemplifying this concern is the typical career path for an infantry officer:

- Second Lieutenant (entry-level rank for officers): Infantry Platoon Leader, supervising up to 50 soldiers
- First Lieutenant: Infantry Company Executive Officer, supervising the headquarters' operations, to include maintenance, food, and logistics
- Captain: Infantry Company Commander, supervising about 150 infantry soldiers
- Major: Executive Officer or Operations Officer for an Infantry Battalion
- Lieutenant Colonel: Infantry Battalion Commander, supervising about 500 infantry soldiers
- Colonel: Brigade Combat Team (BCT) Commander, supervising about 3,500 soldiers of various careers

This style of career progression under the U.S. Army's pre-9/11 paradigm of division-level "units of action" meant that the army produced experts in specific career fields who

statistically would conclude their career prior to attaining a rank that was responsible for commanding a combined arms force. However, BCTs are commanded by colonels (a rank attained by about 25% of career officers, compared to about 1% achieving the rank of general).

The army has acknowledged that not all colonels should be BCT commanders, and it implemented a five-day course in 2020 to select new brigade commanders (Cox, 2020). The course evaluates the army leaders through a battery of tests and exercises, attempting to look only at ability and be blind to their career history (Cox, 2020).

"Ducks Pick Ducks."

Promotions and career management in U.S. Army (as with all military branches) are conservative and tend to favor the selection of officers who resemble the existing generals (Jackson, Kidder, Mann, Waggy, Lander, & Zimmerman 2020). As a RAND National Defense Research Institute study of military career progression found: "The notion of "ducks picking ducks" serves to cyclically reinforce service culture by perpetuating the selection of officers who similarly reflect service goals and preferences" (Jackson et al., 2020, p. xiv). This study further identified common personnel characteristics among U.S. Army generals. These traits reflect a pre-9/11 pattern which risks becoming obsolete within the BCT model.

The RAND study found that the U.S. Army selects BCT commanders and generals who have successfully completed command positions at lower grades, to include company and battalion (Jackson et al., 2020). Although this is a logical trend, it also leads to infantry and armor commanders being the vastly favored officers for BCT command, because these career fields have the most opportunity to command units at a lower echelon (Jackson et al., 2020). Officers in career fields such as military intelligence, communications, engineering, and logistics have less opportunities to command battalions, and therefore are significantly less likely to

command BCTs (Jackson et al., 2020). This trend is exaggerated through the progression of army ranks. Although infantry and armor officers account for less than 25% of new army officers annually, they account of over 80% of "four-star" (highest rank) generals (Jackson et al., 2020). This results in not only an oligarchy of leadership among infantry and armor officers but also emphasizes the traits of those branches—tactics, adherence to doctrine (the army's published methods for completing tasks), and the mental framework of winning combat through the endeavors of soldiers as opposed to systems (Jackson et al., 2020). "It is often said that the Air Force and Navy man the equipment, while the Army equips the man. At the heart of the Army is the individual soldier, who must be prepared for battle" (Jackson et al., 2020, pp. 46). This trend of "ducks picking ducks" reinforces other trends within career management.

First, by promoting officers whose career is mainly within specific command tracks, it discourages careerists from seeking duty positions outside of their narrow career field. This results in most generals having a tactical focus and limited strategic or inter-organizational experience (Jackson et al., 2020). Additionally, the need for high-quality evaluations in these critical career assignments further discourages risk-taking or innovation due to the increased risk of failure in those instances (Jackson et al., 2020).

The secondary effects of "ducks pick ducks" in the post-BCT environment is that BCT commanders are ill-prepared to manage their vast array of combat and combat support capabilities. Although tactically proficient to direct infantry and armor maneuvers, BCT commanders' career paths minimize exposure to enabling capabilities, such as electronic warfare, military intelligence, and support from external organizations such as the Air Force or other federal agencies. The soldier-centric approach to combat in the army also minimizes the importance of managing C4I systems (though the BCT is predicated on its functionality) and

minimizes the importance of incorporating technologies like electronic warfare, communications intercepts, armed unmanned aerial vehicles, and Anti-Access Area Denial (A2AD). Overall, the promotion system encourages traditional careers, traditional decisions, and traditional army doctrine that pre-date the BCT and the subsequent explosion of digital technologies.

8. Conclusion: Disruptive Innovation and the BCT

The Paradox

The post-BCT reorganization of the U.S. Army had all the trappings of a Revolution in Military Affairs (RMA).[15] Technological "enabling" capabilities (such as military intelligence, engineering, communications, and artillery) were reorganized at a lower echelon to better serve the concept of Combined Arms as well as to better serve the strategic vision of the post-9/11 United States government. In addition to the formation of the BCT, the U.S Army has seen the advent of great new technologies within that same period: C4I's "systems of systems, the Stryker Infantry Carrier Vehicle, Unmanned Aerial Vehicles (UAV), and armored vehicles for all logistics/support personnel. Paradoxically, none of these aforementioned innovations represent a disruptive architectural innovation (meaning that technology and systems are used in new ways to change the very nature of warfare). The U.S. Army's methodology for conventional ground warfare remained essentially unchanged since World War II, even with the introduction radical innovative technologies.

This paradox can be explained not by simply examining the new technologies but by assessing the pre-9/11 programs, processes, and organizational culture which has endured through the BCT reorganization.

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[15] One succinct definition of Revolution in Military Affairs (RMA) is: "a radical change in the conduct and character of war" (Gray, 2006, pp. 6).

The Expeditionary Force

The BCT was envisioned and designed to respond to the post-Cold War operational environment: a world without peer adversaries and defined by the United States having air superiority. Military and political leaders anticipated deploying BCTs around the world to fulfil a spectrum of operations, from humanitarian response to counter-insurgency; however, the threat of conventional war was viewed as minimal. In making this intelligence assessment, the U.S. Army arrived at the BCT concept through the rational actor, bureaucratic, and political decision-making models.

The U.S. Army created three distinct BCTs, each with its own strengths and weaknesses. The Infantry BCT (IBCT) was mobile and minimized logistics, but it lacked the firepower and protection (i.e. armored vehicles) to effectively defeat conventional opposing forces. The Heavy BCT (HBCT) had the firepower and protection for conventional opponents, but lacked relevance in the counter-insurgencies of Iraq and Afghanistan. Last, the Stryker BCT (SBCT) was a compromise between the IBCT and BCT, but it lacked the firepower and protection for use against conventional forces and was still ill-suited for counter-insurgency operations.

The three BCT model also reflected strong anchoring bias within senior U.S. Army leaders. As the 2020 RAND study determined, these senior leaders are disproportionately infantry and armor officers with a relatively narrow career commanding tactical units. This combination of brigade-level combined arms and narrow career tracks might have resulted in capability gaps within the BCT itself and anchoring bias in their conception.

First, Russian military activities in the Ukraine have demonstrated the importance of tactical electronic warfare, yet the BCT lacks a comparable organic capability (Pomerleau, 2020). Electronic warfare is the capability to protect communications from adversaries and the

use of signals (such as radio, infrared, or radar) to deny/disrupt enemy communications systems (Electronic Warfare, 2020).

Second, the BCT is based on the concept that U.S. military operations would be expeditionary and enjoy air superiority. However, this was conceptualized prior to the rise of modern Anti-Access Area Denial (A2AD) capabilities. A2AD reflects a mindset that a military does not need to actively control the skies via manned fighter jets to prevent an adversary from entering the airspace. A military can now deny the enemy's use of airspace or terrain through any number of technologies, to include low-cost swarming drones, "smart" landmines, long-range radar, and computerized anti-aircraft batteries being some of the A2AD technologies in existence. The concept of one modern military flying aircraft behind enemy lines to parachute infantry soldiers (one of the capabilities of specialized IBCTs) is arguably obsolete given modern air defenses.

Under the same token, BCTs were designed under a strategically offensive framework; the United States would be intervening in other countries as opposed to preventing other countries from intervening in American interests. The Russian invasion of neighboring countries, territorial disputes in the South China Seas, and the likely rise of conflicts over natural resources all illustrate the need for the United States to develop its own ground-based A2AD capabilities. For example, prior to the start of the Operation Desert Storm, the United States led a defensive operation in Saudi Arabia to prevent Iraq from invading additional sovereign nations.

The BCT framework and contemporary U.S. Army career management may also help explain the lack of weaponized UAVs in the BCT. Although the BCTs have unarmed UAVs for surveillance and reconnaissance, armed UAVs are managed at echelons above the brigade. This

speaks to the 2020 Rand study which found the U.S. Army officers to be comparatively weaker at systems integration than their peers in other service branches (Jackson et al., 2020).

This same mental framework helps explain why the U.S. Army has no plans to maintain a significant fleet of MRAP vehicles. Although ubiquitous to the war in Afghanistan—as it is specifically designed to protect soldiers from Improvised Explosive Devices (IEDs)—the MRAP does not fit into the BCT construct. The MRAP is too heavy and is too logistically burdensome for the IBCT, lacks the comparable firepower of the SBCT, and lacks sufficient firepower and protection to be integrated into the HBCT. Thereby, the single vehicle best suited for the low-intensity, unconventional wars for which is BCT is designed for, is incompatible with the BCT structure.

MDMP and C4I

The Military Decision-Making Process (MDMP) was designed for the conventional battlefields envisioned during the Cold War. MDMP bureaucratized decision-making through rote steps and exhaustive analysis. The process for analyzing the operational environment (including the enemy), developing plans, and implementing the plans was time-consuming, but effective for the Cold War battlefield. When the U.S. Army digitized its C4I in concert with its BCT reorganization, the Cold War-based MDMP paradigm clashed with the internet-age "system of systems" automation. The result of this friction between MDMP and C4I was that army planners were deluged with data but lacked the automated systems to synthesize it into useful information. Instead of aiding army leaders in completing the OODA Loop, MDMP and ABCS threatened to hamstring them through onerous procedures for manually managing and analyzing information.

Personnel Management

The BCT concept has dramatically increased the responsibilities and span of control for the "unit of action" commanders while decreasing the experience-level that the commanders have. Under contemporary officer promotion systems, infantry and armor officers with branch and leadership-specific experiences are favored for command. The "broadening" assignments which could assist leaders in commanding a Combined Arms "unit of action" actually hinder their likelihood for achieving such positions. This dilemma is only now being addressed through new army selection processes.

Conclusion

The Rational Actor Model, Organizational Model, and Political Model all help explain the U.S. Army's decision in creating the BCT. However, the impacts and repercussions of this dramatic reorganization were not fully realized at the time. The army's decision-making process became at least partially obsolete and its communications systems were insufficient for the subsequent big data generated from the BCT construct. Pre-9/11 career management no longer fully met the needs of the army, continuing to promulgate Cold War era officers for a new style of conflict. New U.S. Army initiatives reflect these realizations, such as Project Convergence to incorporate automated decision-making into the C4I architecture and a new BCT commander selection process. This BCT case study illustrates the impact that hierarchical changes can have to an entire organization.

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