--Insights--

Adapting Doctrine to Knowledge-Based Warfare

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THE REVOLUTIONS in information technologies (IT) and knowledge-based systems hold almost unimagined promise for the army that grasps them. IT will be a breakthrough in warfighting as important as the stirrup, gunpowder or the tank. Discriminating sensors providing information on enemy and friendly forces will link to computers that display relevant information in real time in digestible bites. Using IT more than explosive weapons, forces will maneuver against and defeat their enemies more quickly and with less risk. Targeting the enemy's fighting forces and, more decisively, his command and control facilities, will provide an unprecedented ability to defeat him.

IT revolutions have happened at least twice before: in the early 19th century with the Popham Signal System and in the middle 20th century with the radar and communications system used during the Battle of Britain. The Popham System provided a huge advantage in naval warfare by allowing fleets to change formations under the admiral's command during a battle.1 The system was a factor in winning the Battle of Trafalgar when orders were signaled to the British fleet after the ships' captains were on board. The extensive radar and communications system used to direct interceptors in the Battle of Britain allowed the British commander to know, within limits, the size of the attacking German force. He then tailored the defensive force's size to avoid wasting assets. Both of these systems used available information-rich technologies that were adapted to cause a "step-function" increase in combat effectiveness.

The tools to provide this increase in fighting power are available off the shelf today, as is the technical knowledge base to use them.2 We do not need new "Star Wars"-type technologies.3 What is missing is the key to unlocking their potential. The British navy in 1814 and air corps in 1940 had the keys they needed. They developed a doctrine to leverage information's potential. Integrating IT is not like issuing a new truck. To fully realize IT's power, the Army must change the way it operates. This means a changed doctrine. To determine the required changes, it is important to understand the nature of IT's effects on warfare.

`Purpose and means.` The plethora of articles on IT in `Military Review` and other military journals makes it unnecessary to list the many IT systems available to the Army. This article outlines their effects on future combat to identify the doctrinal changes required to positively leverage their impact. Although it is difficult to separate doctrinal changes from the other training, leadership, organization and materiel domains, a complete review of all IT effects would take volumes. This article's thrust is to analyze the doctrinal changes needed to effectively use IT.

`IT's battlefield effects.` Through better use of information, IT allows us to overmatch the enemy. To make IT effective, two preliminary battles must precede combat between main forces: a battle for electromagnetic spectrum supremacy and a battle for intelligence.4 They are both in progress now. Every day, our national assets monitor and map potential adversaries' critical information nodes and frequencies, as well as troop movements and other intent indicators. When hostilities break out, the battles become offensive to gain electromagnetic spectrum dominance so the enemy cannot use his

sensors and communication systems. This lets us collect more detailed intelligence on the enemy while forcing him to use 18th-century intelligence and communications.

Using radiation-seeking missiles, the multiple-launch rocket system, aircraft fires and direct action by Special Operations Forces, as coalition forces did against the Iraqis in Operation Desert Storm, armies will attempt to find and neutralize enemy command, control, communications and intelligence (C4I) systems.5 Software "bugs" introduced through unauthorized electronic entry (hacking) into enemy systems, high-powered radiation, micromachines or direct action will cripple enemy C4I systems.6

The desired effect is like playing chess against a blind person. The side that loses its ability to detect the enemy and friendly situation will lose maneuver freedom.7 With "no stray leaf to determine which way the wind is blowing," he will become indecisive and lose the means to react to the enemy.8 Causing imperfect knowledge of the situation is one of Carl von Clausewitz's methods of forcing the enemy to suspend military operations.9

Simultaneously, detailed reconnaissance over the length and breadth of the enemy's force will produce a picture of the enemy unparalleled in history. This "recognized ground picture" will be broadcast across the friendly force.10 Each commander will tailor the picture to display his area of interest (AI) and threats.

This preliminary reconnaissance/counterreconnaissanc e phase of combat will be followed by a short, violent eruption of combat. Like the 13th-century Mongols, dispersed units will mass their effects at the critical time and place.11 Just as quickly, the force will disperse again and move to the next battle. The enemy's reaction will be late and inappropriate. He will attack thin air or expose other vital points that fast-reacting friendly forces can attack.

A minimum sufficient fixing force will provide a compelling threat, while another force - dispersed to avoid detection - maneuvers to strike. Threatened on his front, unable to learn his own situation or gain contact with higher headquarters, and faced with a threat attacking his very heart, the enemy commander will have no choice but to surrender or be destroyed.

Simply overlaying IT on the current Army will not, in itself, increase combat effectiveness. In fact, if not handled correctly, it may decrease it. American business found that automating manual functions without changing the corporate structure and ethos decreases efficiency.12 The US Army must change its doctrine to obtain the IT benefits.

Doctrinal changes. The use of open, supporting, but not necessarily contiguous, units focusing their effects on the enemy's weak spots instead of on "dressing the line" dictates that the Army adopt maneuver warfare not only as its doctrine and fighting style but as its very ethos. Mission command, issuing effects-oriented orders and allowing subordinates leeway to execute them, will be paramount. Our decision-making process must incorporate subordinates' improved situational awareness that is provided with an improved relevant common picture of the enemy. Decision making cannot get bogged down in paralysis of analysis or oversupervision or it will prevent exploitation of opportunities. Horizontal linkage with other units that allows integration of the common ground picture will be as important as direct communications with the higher commander.13 Spectrum dominance will become as important a precursor for operations as air superiority is now, but, like air superiority, we must be ready to fight with something less. As information becomes as important as logistics or fire support, commanders must be experts in its availability, importance and use.

Classic maneuver warfare is outmaneuvering an enemy by presenting him with multiple threats while limiting his ability to respond and forcing him to surrender. Maneuver warfare means isolating and threatening the enemy or destroying his center of gravity (COG). Historically, maneuver warfare, compared with attrition warfare, is more likely to avoid high casualties.

Because knowledge-based warfare increases the ability to wage maneuver warfare, it removes attrition warfare from consideration as an alternative. Our 20th-century wars, particularly World War I and World War II in Europe, Korea and Vietnam reinforce our attrition warfare roots.

The Army must embrace maneuver warfare doctrine by teaching it in every tactical and operational school, especially the Combat Training Centers and Battle Command Training Program (BCTP). Doctrinal manuals and those focused on tactics, techniques and procedures (TTPs), should be rewritten to emphasize the requirement to use maneuver warfare principles. Even BCTP's scenarios and models reward linear, attritional attacks and defenses. This orientation needs to be changed using new scenarios and models.14

Mission command is required to make knowledge warfare effective. Knowledge systems reduce chance and uncertainty but do not eliminate them. No system is perfect. Even with advanced C4I systems, it will be impossible to always know every enemy location and plan for every contingency. The enemy will be smart, tough, unpredictable and uncooperative and will try to attack our COGs from unexpected directions. Subordinate commanders must have the flexibility to extemporize as the situation develops. Otherwise, a commander will become swamped with requests for decisions that would require familiarity with subunits far below his level of interest. Meanwhile, he risks missing the key decisions he must make.

The danger of oversupervision increases as IT improves. President John F. Kennedy directed individual ship movements during the 1962 Cuban Missile Crisis blockade.15 In Vietnam, battalion, brigade and even division command helicopters circled over platoon and company fire fights. The Army has already seen division staff officers issue orders to battalions and companies through E-mail. The specter of brigade commanders moving individual tanks and infantrymen looms large with this newfound electronic capability. The danger that subordinates must explain every vehicle movement and every status report to an overwatching commander is acute. Built-in limits on access can be overridden. Indeed, even the consideration of placing limits on access is antithetical to fielding information systems. Commanders must understand where each level's focus should be and maintain discipline. They must define an electronic, informational AI for commanders and staffs. Once designated, it will take focus and discipline to stay within it. Technology cannot be uninvented or modified to compensate for or prevent poor leadership.

As commanders become experts in the advantages and disadvantages of different information types and become comfortable with the changed availability of data to higher and lower levels, they will find that IT makes it unnecessary for them to oversupervise. The unprecedented "topsight" of subordinate commanders makes mission command easier to execute.16 As the situation changes, every commander can see not only what his mission is but also how it fits into the higher plan. He can accurately watch the progress of fellow units and better coordinate his efforts to fit the total scheme. Detailed control would give up the advantages gained by IT's introduction.17

The decision-making process must adapt to leverage IT and knowledge-based tools. It must be fast. Intelligence preparation of the battlefield automation will help speed the process, but IT's speed advantages will be undone if commanders wait for the "last" piece of intelligence that never

comes-paralysis of analysis. The key to success will be commanders who understand the available information, given the "coarseness" of the collection means in a given environment. This understanding will allow them to accurately assess the situation and plan to mitigate the risks.

Orders produced in this knowledge environment will be very different. They will focus on desired operational effects without bogging down in detail. They will emphasize initiative and not limit action. IT will allow consultation and rehearsals involving widely separated commanders and staffs. This will eliminate misunderstandings. Manned and unmanned reconnaissance will focus forces on enemy weaknesses. Commanders will not direct detailed maneuver against preconceived, templated weaknesses. Fire coordination measures-vital today to prevent fratricide and coordinate efforts-will lose importance. Improved unit situational awareness will become the procedural method for preventing fratricide. Topsight will improve coordination of maneuver and fires.

All armies acknowledge the need to maintain communications with the flanks and higher formations. In practice however, the link to higher is jealously guarded, while the flanks assume lesser priority. This is understandable in a hierarchical system, because all orders and most intelligence flow from higher. If communication is lost, there is no alternative other than to re-establish it. In a networked system, commanders must maintain communications with the flank units, and, through them, to other units in the AI to update the common ground picture and topsight. This allows the system to be self-healing, bypassing destroyed or ineffective nodes by rerouting communications links. Doctrine must address the added importance of flank communications and drive the combat, materiel and force developers to develop and resource it.

Information warfare depends on electromagnetic spectrum dominance -destroying the enemy's ability to use the electromagnetic spectrum for communications and targeting while maintaining our ability to use it. This is as important as air superiority to our ability to fight. Doctrine must drive our combat developers to develop systems to attain this dominance. Like air superiority, however, we may fight without it. Doctrine must address operations with local spectrum dominance and in a degraded environment.

Just as they must do with any other weapon, commanders must became experts on using information. They must understand how to produce, move and use it. By knowing the limitations of a sometimes coarse system and the opportunities provided by IT, they can use IT as a combat multiplier. The use of IT must become a required enabling skill in tactical and operational schools. Commanders will then maximize the advantages and plan to cover limitations.

The choice is not whether to use IT. IT is not something that will go away or be outlawed as the Pope tried to do with the crossbow. When Zapatista rebels in Mexico use the Internet and Third World commanders give CNN press conferences to influence public opinion around the globe, the only question can be, "How can we best use IT?" As in previous military information revolutions, technology is not enough. It must be complemented by doctrine that leverages its advantages.

Our doctrine must embrace maneuver warfare. We must change our individual and collective training accordingly. We must develop the tools to execute and train the new doctrine. Our process must be faster to create timely, effects-oriented orders. We must banish oversupervision and expect-demand-initiative from subordinates based on improved situational understanding. We must dominate the electromagnetic spectrum and understand information's essence.

IT has transformed the face of society and the face of battle. It can be a positive force that prevents

needless battle and saves lives. It cannot be ignored. The US Army stands on the edge of a warfighting revolution. We must change our doctrine to grasp this new capability, fully develop it and exploit IT on future battlefields. ***MR***

NOTES

1. The Popham Signal System was the first standard flag system naval commanders could use to send orders to the fleet while it was in action. Previously, commanders relied on squadron drills and individual initiative to maneuver against an enemy. The Popham System gave the commander control over emergencies. See Michael Lewis, The Navy of Britain-A Historical Portrait (London: George Allen and Unwin Ltd., 1949), 541-42.

2. A technical knowledge base must exist to make these technologies work effectively. The Army education system provides this base, as evidenced by the number of computer-literate soldiers. The lack of widespread technical education in potential adversary countries prevents their effective use of IT and knowledge-based systems. Adversaries may buy equal or superior equipment, but the widespread educational level required to use it well is a much tougher problem for them.

3. President Ronald Reagan proposed the idea of a space shield against intercontinental ballistic missiles before major portions of the required advanced technology were even on the drawing board. IT tools are commonplace today. Networking over radio, as a battalion task force must do, is less common but not such a technological leap.

4. BG Morris J. Boyd, "Force XXI Operations," Military Review (November 1994), 22.

5. History is replete with examples of a force stripping the enemy of reconnaissance assets. The Prussian cavalry was expert at this in 1870. Operation Desert Storm, however, was the first time an entire enemy C4I system, from strategic to tactical information systems, was targeted and comprehensively eliminated.

6. Alvin and Heidi Toffler, War and Anti-War, Survival at the Dawn of the 21st Century (New York: Little, Brown & Co., 1993), 120.
7. John Arquilla and David Ronfeldt, "Cyberwar is Coming," Comparative Strategy, vol. 12 (1993), 141-65.

8. COL George A. Furse, Information in War (London: William Clowes & Sons Ltd., 1895), 9.

9. Carl von Clausewitz, On War, translated by Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), 84.

10. This concept is analogous to what is called the "recognized air picture," which is the radar picture with all radar returns confirmed as hostile or friendly. North American Air Defense and the United Kingdom Air Defence Ground Environment maintain this continuously from Air Force, Navy, civilian air traffic control and allied input. The recognized ground picture would be a similar picture for ground forces.

11. A detailed description of the Mongol war machine can be found in James Chambers' The Devil's Horsemen (New York: Atheneum, 1985), 50-67. Arquilla and Ronfeldt have used this very apt example as a model of what information warfare may evolve into.

12. Comparisons of business to military organizations can be deceptive due to the fundamental difference in effectiveness measures. Our experience of automating unit reports with the Maneuver Control System confirms this comparison, however. The system does not operate on the move, requires more men to operate than the manual system and consumes half the cargo space of an M577 command post vehicle.

13. This purposely avoids saying "flank" units. Units must pass information not just to the flanks but to all units operating in the area of interest. With sensors, this could include more than the adjacent units and even extend across the services.

14. The point is not to change our models to fit a preconceived outcome. The models should, as well as possible, model actual combat. If we believe in maneuver warfare, we believe that the indirect approach and the effect on the enemy's psyche is at least as important as the simple loss-exchange ratio. Our models are purely attritional, with only transitory advantage given to maneuver or attacking key command and control nodes.

15. Martin Van Creveld, `Command in` War (Cambridge: Harvard University Press, Massachusetts, 1985), 237.

16. Arquilla and Ronfeldt, 141-65. `Topsight` is a term borrowed from software design. It refers to the requirement to keep in mind what the software package is supposed to do while writing the low-level code. Without this, modules may not integrate with others or contribute to the overall package pattern.

17. Detailed control, as an accepted translation of the German `Befehlstaktik,` is used here to define the opposite of directive control-`Auftragstaktik`, the heart of mission command. Detailed control was practiced most notably by the Soviet army. It is characterized by detailed tasks and missions and unquestioned compliance with orders and tactical norms.

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