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## Internetted Nodes and C2 Structures

by Robert J. Bunker, Ph.D.

In the article "Center of Gravity" (Military Intelligence, April-June 1995), Captains Bruce Niedrauer and Lisa Bennett succinctly emphasized the concept of understanding the center of gravity and why it is critical to intelligence personnel. This concept, based upon Army doctrine, has been published in FM 100-5, Operations. Since the publication of FM 100-5 in June 1993, however, a number of doctrinal concepts and premises have become obsolete in the rapidly changing environment in which the Army conducts operations. Questions of "conceptual obsolescence" have already been raised toward the former concept of operations other than war (OOTW) and, more recently, toward unidimensional definitions of battlespace.

Given this concern, the utility of the center of gravity concept for military intelligence (MI) practitioners should be reexamined. It is only through such reexamination and continual questioning of basic ideas and warfighting doctrine that the Army can attain its Force XXI vision, assured of its dominance on the emerging information battlefield.

### Internetted Structures

The MI community faces a major challenge due, in no small part, to emerging forms of advanced informational technologies. These technologies provide the impetus for development of new intelligence and electronic warfare (IEW) doctrine and new changes in organization to successfully exploit it. One significant area of impact these technologies will have on the future battlefield is that of battle command.

Training and Doctrine Command (TRADOC)'s Pamphlet 525-5, Force XXI Operations, discusses the impact of technology on battle command. The pamphlet also highlights the development of nonhierarchical, force management structures. The impact of this new form of force management will more than likely "alter, if not replace, traditional, hierarchical command structures with new, internetted designs."

The physical basis of such internetted structures can be found with the creation of the Advanced Research Project Agencies Network (ARPANET) in 1969. An experiment conducted by the Defense Advanced Research Projects Agency, the ARPANET experiment sought to explore technologies for the networking of remote research sites. ARPANET sends independent digital packets over networks "internetted" together to pass information.

This informational structure is analogous to the functioning of the human brain, with its network of synapses, axons, and dendrites. Such a networking scheme is robust because if part of it sustains an injury, the digital packets can be rerouted to other still-functioning networks. The dynamic property of internetted communications technology received recognition early. Internetted communications technology was advantageous because of the threat of a potential nuclear exchange (and the resulting communications destroying electromagnetic pulses) during

the Cold War.

Although the Cold War is over, TRADOC has not forgotten the advantages that internetworked structures provide to military forces. In fact, such structures will likely form the basis of what are being called complex, adaptive armies. These high-technology armies will qualitatively outclass the Force XXI Army. This Army, although smaller in size than some late-20th-century century armies, is posturing itself to be the dominant force on tomorrow's battlefield.

## C2 Nodes

Complex, adaptive armies will dominate the 21st century battlefield. These armies will be of concern to MI professionals in the future, both to support the tactical warfighter in the Force XXI design effort and to aid that warfighter in the defeat of an opposing, high-technology force. The development of complex and adaptive armies will be problematic for intelligence personnel because determining an enemy's center of gravity will be impossible when such a center no longer exists.

Such a perception is directly at odds with the center of gravity definition found in **FM 100-5**:

The hub of all power and movement upon which everything depends; that characteristic, capability, or location from which enemy and friendly forces derive their freedom of action, physical strength, or the will to fight.

The fact that internetworked structures function in a fundamentally different way than more traditional hierarchical ones provides the basis for this perception. This robustness means that internetworked armies will be far more difficult to defeat on the battlefield because of their advanced battle command structure. No longer can a unit mass its efforts on a single element to defeat an enemy force.

As an example, a decapitation strike against the center of gravity of a hierarchical structure can paralyze its decisionmaking capability. Such a strike would have almost no effect on a nonhierarchical structure. In fact, as can be seen in the bottom right part of the Figure, it would require three precision strikes to effectively degrade the information flow between the two halves of the nonhierarchical structure. Even that would not guarantee decisionmaking paralysis within its remaining warfighting units because that function is highly decentralized.

As a result, the concept of "command and control (C2) nodes" will need expansion as will the parallel massing of an Army unit's combat potential toward an enemy force.<sup>8</sup> One can speculate that only a simultaneous strike against the C2 nodes of an opposing internetworked structure can rapidly secure defeat of the enemy. MI practitioners should thus consider the feasibility of an operational concept based on that of a "C2 nodal strike" to help the commander defeat an opposing high-technology force. While such opposing forces may not exist for at least a decade or two, their future development based on an internetworked battle command is inevitable. Trends also suggest it will be very difficult to isolate the C2 nodes of opposing forces because of counter-informational developments based on Stealth and other emergent technologies.

Furthermore, development of internetworked structures is likely within societal institutions. Isolating national will, public opinion, or even key individuals as a likely center of gravity will no longer be feasible. Prior to the start of operations, intelligence must identify a cluster of important nodes representing the C2 centers of such internetworked structures. These structures will probably gain protection from counter-informational developments; they will result in new challenges which MI must overcome.

## Conclusion

As noted in TRADOC Pamphlet 525-5, internetworked structures will have a significant impact on 21st century battle command and, as a result, will likely form the basis of complex, adaptive armies. These armies, and potentially the societies that they mirror, will be informationally robust in nature. Consequently, this article argues that the current center of gravity concept found in FM 100-5 will not apply to them.

The professional contribution to MI in their discussion of Army doctrine by junior officers such as Captains Neidrauer and Bennett is praiseworthy. At the same time, however, we encourage them to take a risk in their

writings and actively participate in the development of new doctrinal concepts. For MI to successfully support the Force XXI vision, it must now begin to develop new concepts, such as that of C2 nodes, and determine their potential utility to future IEW operations.

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