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**LOGISTICS PRINCIPLES IN THIRD WAVE WARFARE**

**BY**

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USAWC STRATEGY RESEARCH PROJECT

**Logistics Principles in Third Wave Warfare**

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## ABSTRACT

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In response to a new conceptual world view brought about by the "Information Age," the Army has committed itself to a course of revolutionary change as it transitions to Army After Next. Already, division redesign initiatives are spreading organizational changes throughout our fighting forces. Transformation of doctrine must proceed apace, challenging whether established principles grounded in past "Industrial Age" wars can be carried forward through both a revolution in military affairs and an entirely new era of warfare. If logistics truly defines the art of the possible in war, the principles that guide its planning and practice deserve careful scrutiny. This study provides a brief review of current doctrinal logistics principles and explores the ramifications of a trisected world on their status quo. It concludes with a proposal for eight revised logistics principles suitable to Third Wave warfare.



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## LOGISTICS PRINCIPLES IN THIRD WAVE WARFARE

You may not be interested in war, but war is interested in you.

— Leon Trotsky

From the earliest chronicles of civilization, intellectual warriors have sought to achieve a better understanding of the volatile, uncertain, complex, and ambiguous nature of warfare. More often than not, this has resulted in voluminous discourses that were almost as difficult to understand and apply as war itself. In response, a few theorists through the ages have distilled more readily understood principles of war from this maelstrom of churning ideas and theories.<sup>1</sup> To the extent that their principles have focused on effects rather than techniques, these theorists have developed principles that remain relevant over extended periods while retaining their utility throughout the range of potential levels of conflict.

Within joint and service doctrine, the United States Army recognizes nine historically validated principles of war that are used to guide planning and execution at strategic, operational, and tactical levels. When coupled with operational tenets, principles of war form an essential foundation for successful combat operations. While not prescriptive, these principles provide general doctrinal guidance throughout the full spectrum of war.<sup>2</sup>

Similarly, joint doctrine defines seven complementary logistics principles of proven historical importance.<sup>3</sup> As with the principles of war, logistics principles provide both commanders and staff officers important benchmarks for planning and conducting logistics operations without mandating specific support methods. To date, the Army has not specifically delineated its own logistics principles in doctrine. This omission is unfortunate considering that strategy, tactics, and logistics are all interconnected aspects of one whole, comprising "... three arcs of a circle, without beginning or ending, each arc influencing, and influenced by, each of the others."<sup>4</sup> Regardless, FM 100-5 does identify five characteristics of efficient, effective logistics operations and these essentially function as equivalent logistics principles within service doctrine.

Set against this historical development, the changing millennium brings with it emerging concepts of warfare that indicate future conflicts may be fought in a dramatically different way.<sup>5</sup> Thomas Kuhn introduced the idea that conceptual world-views, or "paradigms," shape experimentation, development, and thought until self-evident contradictions and inadequacies force a "paradigm shift."<sup>6</sup> Others have since extended this concept to a multitude of diverse disciplines, including the art and practice of warfare.

Alvin and Heidi Toffler argue persuasively that the world is now accelerating toward just such a radically transformed structure of civilization that is based on entirely new and different methods for creation, transmission, and exploitation of knowledge.<sup>7</sup> This "Third Wave" civilization alters extant paradigms and demands corresponding changes in how a nation conducts and supports war. Evidence to support this new preeminent role of information systems is available in virtually any newspaper. As an example, emerging data from the 1997 census of business activity reveals that in 1997, for the first time, more e-mail was sent than 'snail' mail, and more computers were purchased than automobiles.<sup>8</sup>

Given a world of escalating changes and complexity, our need for a coherent, understandable foundation of logistics principles is arguably of greater importance than ever before.<sup>9</sup> However, if logistics principles provide an essential element for successful logistics operations, and the world from which these principles were derived is undergoing revolutionary changes, can we continue to apply principles established in the "Information Age" with the same confidence with which they were applied in the "Industrial Age?"

### **A TRISECTED WORLD**

The way we make war reflects the way we make wealth.

— Alvin and Heidi Toffler

While a thorough examination of future scenarios which may impact on development of logistics principles is beyond the scope of this paper, it is important to establish a general construct of how war and society are changing. In spite of the future's inherent uncertainty, it is reasonable to assess at least the direction of change, if not the specifics. For this paper, a future scenario closely tied to the work of Alvin and Heidi Toffler is used. This vision of the future is itself based on considerable evidence and a "semi-systematic model of civilization and our relationship to it."<sup>10</sup>

#### AS WAVES COLLIDE

The wave theory of conflict views the shifts of world power to be less a product of geographic, ethnic, or religious groups than a division of the world into distinct civilizations. The source of power, or wealth distinguishes each of these civilizations. Commonly, the First Wave describes agrarian based societies, industrial factories characterize the Second Wave, and the Third Wave posits an information dominated civilization.

Due to the conflict inherent in major societal changes, using the metaphor of "waves" illustrates the dynamic interactions involved when wholly new civilizations emerge and

collide with existing societies. During these times, much that seems haphazard and accidental reveals itself instead as a logical extension of the inevitable rip tides and undercurrents resulting from two waveforms in competition. Within this dynamic, it is also important to note that emergence of a Second or Third wave does not eliminate the continuing presence of first wave civilizations.<sup>11</sup>

#### WAR IN THE INDUSTRIAL AGE

In health of mind and body, men should see with their own eyes, hear and speak without trumpets, walk on their feet, not on wheels, and work and war with their arms, not with engine-beams, nor rifles warranted to kill twenty men at a shot before you can see them.

**John Ruskin**

Contrary to the non-standardized, seasonal, personal nature of warfare in the First Wave, Second Wave warfare rapidly transitioned to warfare of mass destruction. Just as the assembly line allowed mass production economically, it fueled warfare to ever increasing levels of lethality, range, and scope. During this period of Second Wave dominance, wars between First Wave groups continued apace, however they lacked significance on the new global scale.

More than divisions based on ideology, it was the division of First and Second Wave civilizations which has truly bisected the world during our lifetimes. Nevertheless, the major

conflicts, and greatest destruction, involved Second Wave industrial powers in competition with each other struggling for ascendance even as they dominated First Wave societies providing the raw materials and much of the labor that fueled their factories.

A paradigm is prepared to shift when convincing evidence emerges that demonstrates the traditional paradigm is invalid or obsolete.<sup>12</sup> During Industrial Age wars of mass destruction, range, speed, and lethality combined to measure the effectiveness of a weapon. The advent of the ultimate Second Wave weapon, nuclear fusion devices on weapons platforms with global reach, indicates that extant "Industrial Age" paradigms are losing their utility and becoming self contradictory. The use of nuclear weapons has been extremely constrained because they fulfill the objectives of Second Wave warfare too well. While not conclusive, the fact that destructive range and power in these conflicts has reached a logical conclusion argues persuasively that we are ending an era.<sup>13</sup>

#### WAR IN THE INFORMATION AGE

Knowledge came to rival weapons and tactics in importance, giving credence to the notion that an enemy might be brought to its knees principally through destruction and disruption of the means for command and control.

— Alan D. Campen

Warfare in the information age will reflect the information economies from which it springs. Already, the flow of information is recognized as more important, in some aspects, than the flow of oil for running business and government.<sup>14</sup> While raw materials and labor continue their existence as necessary elements of production, they will no longer function as its governing elements. Increasingly, knowledge, which has always been important, will dominate and reduce the requirement for other inputs.<sup>15</sup> As Robert Shapiro, undersecretary for economic affairs at the Commerce Department notes, "In an information-based economy, the quality of information determines the quality of policy."<sup>16</sup>

Future warfare will rely less on unqualified "mass" while abstract factors such as initiative, intelligence, communications, motivation, and training will account for a greater share of true combat power. Even weapon systems will reflect reduced emphasis on mass destruction as finer precision and selectivity become ever more important. Mass destruction is not going to disappear, but use of one very reliable weapon to kill a highly discriminated target while minimizing collateral damage will become an increasingly common characteristic of engagements.<sup>17</sup>

As the scale of destruction is drawn down and focused, so too will smaller units develop which deliver more target effects

with fewer resource demands. Smaller sized units and equipment will facilitate agility and flexibility on the battlefield. Organizationally, requirements for flexible response will demand fewer layers of control, decentralized decision-making, and quicker intelligence processing.<sup>18</sup> Independent operations by lean, tailored units over extended areas of operations will increasingly shape the battle space. "As in the civilian economy, fewer people with intelligent technology can accomplish more than a lot of people with the brute-force tools of the past."<sup>19</sup>

To engage in successful Third Wave warfare will also require smart weapons and intelligent soldiers who understand them. Just as unskilled workers have limited opportunities in Third Wave economies, rising education and training levels will increasingly typify future warriors. Indirect labor will also rise as "smart" machines spare soldiers from direct battle. Initiative will exploit available resources and develop dominant information networks through innovative "outside the box" approaches.

Computers, signals processing, and satellites will enable combat operations and maneuver at unprecedented speeds. Systemic integration of information processing equipment will mitigate the "fog of war" while providing a pathway for unifying and integrating the fighting force into a "thinking system."

Internal feedback, instantaneous and reliable communication, and self-adjustment capabilities that emerge will overmatch Second Wave opponents and strip away their limited Third Wave capabilities.<sup>20</sup>

#### CHALLENGES OF A TRISECTED WORLD

Each age has had its own peculiar forms of war.

— Clausewitz

A different primary source of power is therefore developing. This new power system will trisect the world into competing, dissimilar societal structures. Thus in a world previously bisected between "Agrarian" and "Industrial" societies we see the introduction of a new player, the "Information Age" civilization. This swift and radical change in every aspect of national culture, public, and private life will ignite more than mere change, it will lead to a fundamental transformation of civilization. This metamorphosis of civilization will then further manifest itself not only in new methods for conducting war, but altogether new forms of warfare.

In a bisected world, conflict arose between First Wave armies, Second Wave armies, or between First and Second Wave armies. In a world with multiple regions operating at three different levels of civilization simultaneously, radical changes in the types and diversity of war are rapidly approaching.

Warfare between First and Third, Second and Third, and two distinct Third Wave civilizations bring completely new forms of warfare to our world. To further complicate matters, Third World globalization may introduce new players outside the realm of traditional nation states which Second Wave governments are not equipped to engage effectively.

Alliances present solutions to some of these issues while simultaneously adding additional complexity. Future diversity may approach levels that prevent even the United States from fielding forces suitable for the full spectrum and variety of warfare possible in a trisected world. An approach the government is already pursuing seeks modular coalitions to respond to crises. In these modular coalitions, each ally shares in its specialized portion of labor that others lack, combining assets to confront an opponent with a tailored, optimized task force.<sup>21</sup>

To further cope with the Third Wave transition, operational doctrine, training, leaders, organizations, materiel acquisition, and soldiers will need to develop and change in close conformity with one another. Needless waste and battlefield casualties will result if we allow these to become uncoupled, and full exploitation of potential capabilities will be lost.<sup>22</sup> For the United States Army, this necessitates a revolution in military affairs.

Revolutionary change is neither intrinsically positive nor negative, yet it is usually traumatic to ensconced, large organizations such as the Army. Old expectations are rejected, violated, or suppressed while negative second and third order effects are often produced. Generally, both those attempting the change and those adhering to the status quo must at least share the common belief that current conditions are untenable. While this common view of conditions typically characterizes a paradigm shift, revolutionary change still usually requires exercise of compelling power to achieve compliance with new ways of conducting business. Despite the constancy of change, history illustrates that to achieve genuine revolutionary change within an army, disaster is usually the necessary motivating force.

These difficulties with effecting change within an organization will make competent responses to a trisected world difficult for the Army. Radical change from the past contains clear risk, and may alienate the people on whom the Army depends for its successful transition. However, in an era of decreasing defense budgets, failure to discard unproductive vestiges of Second Wave infrastructure may leave the Army unable to resource required responses to emerging challenges of Third Wave warfare.

## LOGISTICS IMPLICATIONS

There can be no revolution in military affairs without first having a revolution in military logistics. To provide the capabilities-based forces we need for the future, we must set the stage for transformation by changing the way we project and sustain those forces. We stand at the threshold of a new era in military logistics.

— GEN Dennis J. Reimer

If a new form of civilization produces new sources of power, and these in turn produce both different ways of fighting and additional forms of warfare, what can be expected to change logistically? What logistics does will remain constant, but how it accomplishes its mission will change radically.<sup>23</sup>

Understanding the impacts on traditional logistics practices is critical to reorganize and equip the Army to support our next, rather than our last, war.

The joint and combined nature of Third Wave warfare will directly affect the complexity and vicissitudes of future logistics operations. Unlike the Gulf War, where coalition forces could focus on one Second Wave army in one theater, our doctrine must provide for conflicts involving multiple fronts at different levels of warfare.<sup>24,25</sup> This task is further complicated by our need to include diverse allies in our logistics planning.<sup>26</sup> As in the past, we should expect to play a major role in supporting our coalition partners, and these partners can easily require support for First or Second Wave operations.

One of the most important logistics implications of Third Wave warfare is a reduced requirement for traditional quantities of consumable materiel. Technological advances in propulsion systems, lighter armor, and precision munitions promise reduced requirements for fuel, ammunition, and repair parts.<sup>27</sup> Total Asset Visibility is a specific information technology that promises to use knowledge based systems to further reduce supplies in the "pipeline" while expeditiously directing them to users as needed.<sup>28</sup> As Alan Gropman notes,

In the past, we achieved our mission by buying products that were made to strict military specifications, and we bought them one at a time as the need arose. Then, we maintained vast inventories of stock at both the wholesale and retail levels, double-handling stock as it arrived from the vendor for reshipping to all customers, all with a vast paper trail in tow. Today our practices substantially reduce inventory...<sup>29</sup>

Information dominance will further affect logistics force structure. Precisely tailored, task organized forces will reduce transportation and support demands as unneeded capabilities and their support stockpiles are left behind. Logisticians will increasingly capitalize on enhanced accuracy and transmission of information further minimizing in-theater stocks. With a smaller support structure, feeding and defending the logisticians themselves will in turn require fewer assets.<sup>30</sup>

Nevertheless, other aspects of Third Wave warfare jeopardize hopes for wholesale reductions in the Army's tactical logistics

tail. Flexibility is often the key to responsiveness, and Third Wave Warfare demands unprecedented responsiveness to unplanned contingencies. Consequently, it would be a mistake to overlook the historically proven role that corps and higher level support troops have played to complement and lend elasticity to support forces within divisions.<sup>31</sup> In addition, increasingly intelligent and complex machines will assume a greater burden of the direct firefight, yet combat crews traditionally sustain the greatest burden for equipment maintenance. Recognizing that the loss of combat forces will almost certainly require corresponding increases in supporting units necessarily alters extant paradigms of "tooth to tail" ratios.<sup>32,33</sup>

Successful Third Wave logistics organizations will ruthlessly pursue flexibility through enabling decisions at the lowest practical levels. Small unit autonomy within an information environment which establishes priorities and missions can provide the inherent flexibility and innovation required to furnish timely responsive support to combat forces on the Information Age battlefield. Enhanced, real-time data transfer and improved communication systems also allow higher level commanders to reinforce success and respond rapidly to a dramatically accelerated operational tempo.

Many of the capabilities of Third Wave forces rely on efficiencies derived from information dominance. This

dependency highlights an important weakness that will challenge Third Wave logisticians. Vulnerability to data interception, spoofing, and blocking will inevitably create new force protection concepts and requirements. Furthermore, meeting demands for specialization, while retaining capabilities to support a melange of high and low technology within fielded force structure will place a heavy burden on logistics forces. Recruiting, training and retaining soldiers with the unique skills required will make significant changes in existing tactics, techniques, and procedures indispensable.

#### **PRINCIPLES OF LOGISTICS IN THE 21<sup>ST</sup> CENTURY**

Science and technology multiply around us. To an increasing extent they dictate the languages in which we speak and think. Either we use those languages, or we remain mute.

**J. G. Ballard**

So far we have examined the future, not to attempt to predict discrete events, but to develop a reasonable concept of the direction in which the currents of change are taking us. Having looked at the future, we then briefly examined their implications for prospective warfare, and the inherent challenges of supporting war in the information age. We will now focus on the impact of these emerging challenges on our current logistics principles.

WHERE WE ARE

Joint Publication 4-0 provides authoritative doctrine defining current logistics principles. A summary of these principles is located in Table 1.<sup>34</sup> Juxtaposed with these considerations are the comparable operational concepts found in Army service doctrine, the logistics characteristics of Field Manual 100-5.<sup>35</sup> The table depicts principles that overlap side by side. Some of these are not an exact fit, but concern over comparability of effects should resolve itself in the following discussion of proposed revisions. Where service or joint doctrine has no equivalent partner, the affected column remains open.

<b>JOINT Pub 4-0 Principles</b>	<b>FM 100-5 Characteristics</b>
<b>RESPONSIVENESS</b>	<b>RESPONSIVENESS</b>
	<b>ANTICIPATION</b>
<b>ATTAINABILITY/ADEQUACY</b>	<b>INTEGRATION</b>
<b>ECONOMY</b>	
<b>FLEXIBILITY</b>	<b>IMPROVISATION</b>
<b>SUSTAINABILITY</b>	<b>CONTINUITY</b>
<b>SURVIVABILITY</b>	
<b>SIMPLICITY</b>	

Table 1. Current Logistics Principles and Characteristics

MOTIVATION TO CHANGE

There are three roads to ruin; women, gambling and technicians. The most pleasant is with women, the quickest is with gambling, but the surest is with technicians.

Georges Pompidou

Looking at Table 1 provides insight into our need to update doctrinal logistics principles, even without the added compulsion of Third Wave implications for warfare in the modern era. This simple comparison reveals gaps and omissions across joint and service doctrine that should be redressed. The governing principles of war or support remain the same for any service or combination thereof; joint operations merely add additional planning considerations and operational complexity. Joint and service doctrine concerning the principles of war reflects this fact, as this doctrine is carefully duplicated in joint and service publications. Regrettably, doctrine concerning the principles of support is inappropriately disjointed between Joint Pub 4-0 and FM 100-5. Therefore, any new delineation of logistics principles should reflect a complete picture encompassing both service and joint support concepts.

Current Army doctrine also requires revision to deal properly with balancing efficiency and effectiveness. Perhaps because it is hard for any leader to admit that material resources are limited, and these limitations may cost soldiers grievous injury or death on the battlefield, our existing doctrine states, "Effectiveness ... cannot be handicapped by efficiency."<sup>36</sup>

While a noble concept, this is patently untrue, and becomes less true in "Information Age" warfare. For in war, above any other time, finite resources are tightly circumscribed. Inefficiency directly and adversely influences effectiveness. What is expended today may not be replaced tomorrow when perhaps it is needed more. What one unit consumes is no longer available to satisfy shortages or reinforce another unit. Furthermore, unwarranted resource expenditures require logistics structures of ever increasing capacity to feed demands, thus creating larger targets while limiting the flow of combat forces and combat power into a theater.

Thus, unnecessary or wasteful expenditure of resources borders on criminal behavior in a combat zone, even if a singular, limited, or temporary increase in effectiveness is achieved. Successful mission accomplishment demands economic and prudent management of resources while simultaneously fully integrating these stipulations with unstinting, timely satisfaction of the soldier's battlefield requirements.<sup>37</sup>

In light of present shortcomings with current published logistics doctrine, and its growing risk of irrelevancy in Third Wave warfare, it is clear that a doctrinal review is overdue. Fortunately, this does not require starting with a clean slate, but can build on previous work. Like the principles of war, logistics principles provide a foundation that is oriented on

their power to produce an outcome or achieve a result, not a particular means of application.<sup>38</sup>

Since principles focus on influence instead of technique, it is therefore not surprising that despite the dynamic changes of Third Wave warfare, we can still safely build on today's doctrine without necessarily locking ourselves into living in an outdated paradigm. While this results in a proposal for incremental changes, it also reflects a belief that tomorrow's world is more different in form than function, and principles rightly reflect function.

REVISED PRINCIPLES

<b>JOINT Pub 4-0 Principles</b>	<b>FM 100-5 Principles of War</b>	<b>FM 100-5 Characteristics</b>
<b>RESPONSIVENESS</b>	<b>OBJECTIVE</b>	<b>RESPONSIVENESS</b>
	<b>OFFENSIVE</b>	<b>ANTICIPATION</b>
<b>ATTAINABILITY/ADEQUACY</b>	<b>MASS</b>	<b>INTEGRATION</b>
<b>ECONOMY</b>	<b>ECONOMY OF FORCE</b>	
<b>FLEXIBILITY</b>	<b>MANEUVER</b>	<b>IMPROVISATION</b>
<b>SUSTAINABILITY</b>	<b>UNITY OF EFFORT</b>	<b>CONTINUITY</b>
<b>SURVIVABILITY</b>	<b>SECURITY</b>	
<b>SIMPLICITY</b>	<b>SIMPLICITY</b>	
	<b>SURPRISE</b>	

Table 2. Crosswalk Between Principles of Logistics and War

This discussion of logistics principles will reflect the concept that strategy, tactics, and logistics are all parts of one whole, comprising complimentary elements of war, which lose their meaning and utility when separated.<sup>39</sup> Thus, the principles

of war and logistics should correspond closely. Accordingly, this discourse will structure its examination of logistics principles using the principles of war as a guide. Table 2 depicts this alignment, combining the principles of logistics and integrating the principles of war. The one principle of war left without a corresponding logistics principle is the principle of surprise. As this principle deals with psychological effects on an active, thinking opponent, it represents the one principle that does not require logistics equivalency.

<b>Proposed Logistics Principles</b>	<b>Principles of War</b>
<b>RESPONSIVENESS</b>	<b>OBJECTIVE</b>
<b>ANTICIPATION</b>	<b>OFFENSIVE</b>
<b>INTEGRATION</b>	<b>MASS</b>
<b>ECONOMY</b>	<b>ECONOMY OF FORCE</b>
<b>FLEXIBILITY</b>	<b>MANEUVER</b>
<b>CONTINUITY</b>	<b>UNITY OF EFFORT</b>
<b>SECURITY</b>	<b>SECURITY</b>
<b>SIMPLICITY</b>	<b>SIMPLICITY</b>
	<b>SURPRISE</b>

Table 3. Proposed Principles of Logistics

Proposed revisions to current logistics principles and corresponding linkage to principles of war are contained in Table 3. As each principle of logistics is examined, no hierarchy is implied or intended, other than the overarching principle of responsiveness. Joint doctrine correctly notes

that, "all else becomes irrelevant if the logistics system cannot support the concept of operations of the supported commander."<sup>40</sup> Nevertheless, all of the principles of logistics remain intimately linked to one another. Isolating any, including responsiveness, eliminates the utility of applying principles to planning and risks operational failure.

Finally, to examine each proposed logistics principle, this study will use a common structured approach. First, the focus will address desired effects, not methods of application, for each principle. Since methods of application are more dependent on circumstances and technology, isolating on effects preserves the timeless quality of true principles. Second, the study will attempt to link the identified effect of each principle with previously discussed characteristics of war in the information age.

### **Responsiveness.**

Just as the principle of objective is clearly preeminent among the principles of war, its corollary in logistics, responsiveness, possesses similar precedence. The effect of responsiveness is to deliver the right support to the right place at the right time.<sup>41</sup> Logistics must respond to the objectives of the battle or campaign, which in their turn must derive from the national purpose.

Current Army doctrine fails to address the overarching importance of responsiveness, while paradoxically identifying several critical enablers for achieving responsiveness in future wars. Mixing in the effects of agility and integration, FM 100-5 mistakenly places too much emphasis on the principle of anticipation. Owing to the accelerated pace of Third Wave warfare, over stressing the principle of anticipation can easily reduce flexibility, economy, and responsiveness. Multiple bases of redundant supplies to support diverse courses of action will weigh down theater logistics, creating a sluggish system that cannot adapt to unexpected or unforeseen circumstances.

Alternatively, integrated information networks and reliable high-speed communications can eliminate layers of management and multiple bases of supply creating a system that is both responsive and agile. Integration, economy, flexibility, continuity, security, simplicity, and anticipation each have a synergistic role to play in creating logistics plans and operations which are responsive to battlefield requirements.

**Anticipation.**

Anticipation, like the offensive principle of war, capitalizes on the effects of initiative. Proper application of the offensive principle of war enables a commander to set the tempo and force an opponent to react. Correct employment of the logistics principle of anticipation maximizes a combatant

commander's options, and enables a commander to act decisively when an opportunity develops.

Anticipation is one of the most difficult logistics principles to apply and joint doctrine drops it completely. During the Second Wave, it has most often seen application as justification for large, numerous stockpiles and support assets distributed throughout the battlefield to meet as many contingencies as possible. While still a valid principle of logistics, this interpretation negates the effects of true anticipatory logistics.

To achieve desired effects of anticipation in Third Wave warfare, logisticians must achieve an unprecedented degree of control over supplies in the transportation network to permit rapid shifting of moving inventory to minimize on hand stocks. An unprecedented level of integration between operational and logistics planners is also required, calling for reorganization of current staff structures and revised combat leader development. True anticipatory logistics is essential to accelerated operations and agile structures of Third Wave armies, but will not be achieved if logistics planning continues to operate in the reactive mode characteristic of today's Army.

#### **Integration.**

The purpose of integration is to focus logistics efforts, enabling timely support of combat operations at the decisive

place and time when this support would otherwise be impossible. Integration effects produce greater yield for a given resource base through efficiencies and timely decisions at the lowest possible level. Mass, properly applied, allows a numerically inferior force to overwhelm an opponent at a specific place and time through concentration of forces. This logistics principle similarly reflects the payoff achieved when a commander focuses limited assets to extend critical logistics resources.

Integration is a fundamental characteristic of Third Wave warfare, in addition to its role as a logistics principle. Inherent in both concepts is its synergistic effect on diverse elements within a system. The unparalleled diversity and tailored organizations of Third Wave war fighting will increase the demand for high levels of integration. Flexible, knowledge based systems will overcome many of today's demands for standardization to achieve integration of the disparate organizations fighting together on tomorrow's battlefields. Systems integration of information systems will also play a key role in synchronizing operational and logistics planning.

**Economy.**

The principle of economy is to maximize results from a given resource. It echoes the economy of force principle of war, inasmuch as logistics resources indiscriminately diverted to secondary efforts dissipate combat power and render decisive

results unachievable. Economy recognizes the primary mission of responsiveness, and therefore does not always demand efficiency. However, needless or careless inefficiency clearly degrades the effects of this principle and needlessly limits what would otherwise be possible.

Resources are always limited, particularly in war, and Third Wave warfare will not alter this fact. As new systems reduce the traditional size of Army organizations while expanding their missions, economy will become increasingly critical. The flexibility inherent in both lighter, leaner organizations and corresponding equipment distinguishes Third Wave systems. Furthermore, minimizing the logistics footprint focuses more combat power toward the primary mission, rather than defending supply lines and bases. Commanders successful in applying this principle will maximize their agility by reasoned allocation of resources to mitigate risk in secondary missions while logistically weighting the main effort to quickly achieve critical objectives. Rapidly accomplishing these objectives will further serve to reduce demands due to rapid completion of tasks. This additive effect in turn will produce even greater opportunities to extend the operational realm of the logistically possible.

**Flexibility.**

Flexibility is the effect achieved by dynamically sequencing logistics resources to apply them in relation to emerging priorities. Maneuver is a parallel principle of war that places an enemy at a disadvantage through flexible application of combat power.<sup>42</sup> Like maneuver, the principle of flexibility preserves freedom of action and reduces vulnerability.

To many commanders, Second Wave practices led to a view of improvisation as a fall back position when anticipation was lacking. Third Wave warfare demands that this outlook is retired.

Future warfare prescribes that flexibility becomes an integral part of our operations. In successful organizations, information systems will deliver decision data to leaders at the lowest level, providing logistics intelligence to resolve problems and shift resources to optimize support.

Organizational structures need revision to reflect this shift toward flexible front line decision making and elimination of sluggish, nonproductive layers of middle management. Third Wave systems will not provide clairvoyance. The fog and friction of war will not completely disappear. When the unexpected occurs the increased pace and diversity of future operations will demand flexible soldiers and organizational structures to carry the day.

## **Continuity.**

The logistical principle of continuity addresses the effects of a systemic forward focus on the critical task. Unity of command results in forces conducting operations in coordination and cooperation while directed toward a unified purpose. Logistically, seamlessly nesting logistics responsibilities and efforts producing unbroken support to the main effort reflects this effect. On one end of the spectrum, the overflow of unused and unidentified supplies in Vietnam illustrates the traditional difficulty our Army has had with this principle. The Army's disjointed accession of personnel and equipment in the Spanish-American War provides a similar illustration on the other end of the spectrum.

Third Wave processes for management of information offer significant assistance toward achieving desired effects of the principle of continuity. Effective application of this principle will extend the culminating point, providing increased opportunity to a commander to strike at enemy centers of gravity. It can be achieved without necessarily linking all logistics operations under one commander, but instead by integrating them into a seamless whole that keeps momentum and focus forward. In a Third Wave system, this integration will also preserve innovation to achieve flexibility and economy.

Significantly challenging successful application of this principle is an inherent human tendency to focus first on taking care of one's own unit, or units in immediate proximity, despite the main effort residing elsewhere. This will remain problematic, as human nature is not expected to alter at the pace of emerging Third World changes, and deserves careful consideration by force planners and trainers.

**Security.**

Security results in survival of logistics resources when faced with potential destruction. Both active and passive measures are used to achieve security effects. Security will often conflict with and must be balanced against the principle of economy to assure responsiveness. The Army currently neglects the principle of security in its logistics doctrine. Nevertheless, the systemic damage produced by attacks against high value supply sites, facilities, and information networks justifies inclusion of security as an integral operational logistics planning consideration.

Third Wave characteristics provide mixed influences on the principle of security. Limiting logistics assets in the forward area enhances security. Conversely, increased use of long range, highly discriminating, precision munitions will cause increased vulnerability to attacks, even in areas traditionally considered safe. Additionally, attempts to destroy, taint, and

block critical data can severely impede information flow essential for effective and responsive support. As a result, future warfare will highlight new vulnerabilities and cause increased attention toward this frequently overlooked logistics principle.

**Simplicity.**

Simplicity principally produces a common, clear understanding of the purpose and concept of operation for a given course of action. This in turn results in reduced complexity, fewer unnecessary changes, and increased efficiency. Properly applied, these effects enhance continuity, flexibility, and responsiveness. The Army clearly defines simplicity as a distinct element of the principles of war, but to date omits it as a logistics characteristic.

Paradoxically, the increased flow of information through multiple wideband communications networks will demand greater simplicity, even as it enhances flexibility. Without a clear, common understanding of intent, prodigious streams of data will incite a cacophony of conflicting interpretations. Additionally, the innate diversity of coalition and joint warfare further argues against underestimating the challenge or necessity for achieving the effects of simplicity in future conflict. Finally, the expected increased speed of the decision

cycle, and rapid pace of operations places a premium on an accurate, shared battlefield picture at each level of support.

### **CONCLUSION**

The Americans may have need of the telephone - but we do not. We have plenty of messenger boys.

Chief Engineer of the British Post Office

In conclusion, what does the 21<sup>st</sup> century lead us to expect about the principles of war, and the logistics that make war possible? As optimists we hope that war will somehow become obsolete, lost in our misguided past. Nevertheless, despite sweeping changes throughout our culture, the basic material of humanity will remain the same. The way things are done will change radically, but the human motivations behind the actions are likely to shift very little. Nothing to date provides convincing evidence that future warfare will be of any shorter duration, or any less bloody, or any less frequent than it has ever been.

Traditionally, Americans want to apply technological fixes to emerging challenges of the Third Wave, yet experience teaches us that doctrine can have a greater impact. As Russell F. Weigley notes, "To seek refuge in technology from hard questions of strategy and policy [is] another dangerous American tendency, fostered by the pragmatic qualities of the American character and by the complexities of nuclear-age technology."<sup>43</sup>

Thus, it appears probable that doctrine will continue to serve an important function, and it is not too soon to begin considering the changes required by the coming Third Wave. Principles of war and its supporting logistics retain significant value in framing approaches to 21<sup>st</sup> century perplexities. A solid foundation of accepted principles provides an indispensable guide for operations, planning, and development of future tactics, techniques, and procedures in the information age.

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## ENDNOTES

<sup>1</sup> William T. Johnsen et al., The Principles of War in the 21<sup>st</sup> Century: Strategic Considerations (Carlisle Barracks: Strategic Studies Institute, 1995), 1.

<sup>2</sup> Department of the Army, Operations, Field Manual 100-5 (Washington, D.C.: U.S. Department of the Army, 14 June 1993), 2-4.

<sup>3</sup> Joint Chiefs of Staff, Doctrine for Logistic Support of Joint Operations, Joint Pub 4-0, (Washington, D.C.: U.S. Joint Chiefs of Staff, 27 January 1995), II-1.

<sup>4</sup> James A. Huston, The Sinews of War: Army Logistics 1775-1953, Army Historical Series (Washington, D.C.: Government Printing Office, 1966), 656.

<sup>5</sup> Kurt Weidenthal II, Critical Information Technology Must Be Funded to Achieve a Successful Revolution in Military Logistics, (Carlisle Barracks: U.S. Army War College, 1998), 2.

<sup>6</sup> Thomas S. Kuhn, The Structure of Scientific Revolutions, 2<sup>nd</sup> ed. (Chicago: University of Chicago Press, 1970), 111-113.

<sup>7</sup> Alvin Toffler and Heidi Toffler, War and Anti-War (New York: Little, Brown and Co., 1993), 21-22.

<sup>8</sup> Beth Belton, "U.S. Brings Economy Into Information Age," USA Today, 17 March 1999, sec. B, p. 1.

<sup>9</sup> Johnsen, 2.

<sup>10</sup> Alvin Toffler, The Third Wave (New York: William Morrow and Co. Inc., 1980), 21.

<sup>11</sup> Toffler, War and Anti-War, 18-20.

<sup>12</sup> Thomas S. Kuhn, The Structure of Scientific Revolutions, 2<sup>nd</sup> ed. (Chicago: University of Chicago Press, 1970), 115-116.

<sup>13</sup> Toffler, War and Anti-War, 20-21, 38-43.

<sup>14</sup> Edward, Yardeni, "The Y2K Crisis: A Global Ticking Time Bomb?" presented to the Center for Strategic and International

Studies, Y2K Forum, in The Washington Quarterly 21 (August 1998): 155-156.

<sup>15</sup> Toffler, War and Anti-War, 69.

<sup>16</sup> Belton, sec. B, p. 1.

<sup>17</sup> Toffler, War and Anti-War, 71-73.

<sup>18</sup> S. M. Fenstermacher, "Does the 1997 Quadrennial Defense Review (QDR) Adequately Address Third Wave Logistics?" in Essays 1998 (Washington, D.C.: NDU Press, 1998), 5.

<sup>19</sup> Toffler, War and Anti-War, 77.

<sup>20</sup> Ibid., 78-80.

<sup>21</sup> Ibid., 81-85.

<sup>22</sup> Fenstermacher, 6.

<sup>23</sup> Robert M. Walker and John G. Coburn, Preparing for the Revolution in Military Logistics: The Way Ahead (Washington D.C.: U.S. Government Printing Office, July 1997), 5.

<sup>24</sup> Mark J. O'Konski, "Revolution in Military Logistics: An Overview," Army Logistician 31 (January-February 1999): 12.

<sup>25</sup> Fenstermacher, 10.

<sup>26</sup> Alan L. Gropman, Mobilizing U.S. Industry in World War II: Myth and Reality, McNair Paper 50 (Washington D.C.: National Defense University Press, August 1996), 139.

<sup>27</sup> Johnnie E. Wilson, John G. Coburn, and Daniel G. Brown, "Our Revolution in Military Logistics - Supporting the 21<sup>st</sup> Century Soldier," Army Logistician 31 (January-February 1999): 3-4.

<sup>28</sup> O'Konski, 13.

<sup>29</sup> Henry T. Glisson, "Revolution in Military Logistics - Improving Support to the Warfighter," Army Logistician 31 (January-February 1999): 8.

<sup>30</sup> Fenstermacher, 7-8.

<sup>31</sup> Joseph M. Heiser, Jr., A Soldier Supporting Soldiers, Center of Military History Publication 70-40 (Washington D.C.: U.S. Government Printing Office, 1991), 249.

<sup>32</sup> Toffler, War and Anti-War, 60-61.

<sup>33</sup> Fenstermacher, 20-21.

<sup>34</sup> Joint Pub 4-0, II-1 to II-4.

<sup>35</sup> FM 100-5, 12-3 to 12-5.

<sup>36</sup> Ibid., 12-3.

<sup>37</sup> Heiser, 273.

<sup>38</sup> Johnsen, 3.

<sup>39</sup> Huston, 656.

<sup>40</sup> Joint Pub 4-0, II-1.

<sup>41</sup> Ibid., II-1.

<sup>42</sup> FM 100-5, 2-5.

<sup>43</sup> Russell F. Weigley, The American Way of War (Bloomington: Indiana University Press, 1973), 416.



## BIBLIOGRAPHY

- Belton, Beth. "U.S. Brings Economy Into Information Age." USA Today, 17 March 1999, sec. B, p.1.
- Davis, M. Thomas. "Linking the Budget to the Mission." 2 March 1999. Available from <<http://ebird.dtic.mil/Mar1999/s19990302linking.htm>>. Internet. Accessed 3 March 1999.
- Dunlap, Charles J., Jr. Technology and the 21<sup>st</sup> Century Battlefield: Recomplicating Moral Life for the Statesman and the Soldier. Carlisle Barracks: Strategic Studies Institute, 15 January 1999.
- Fenstermacher, S.M. "Does the 1997 Quadrennial Defense Review (QDR) Adequately Address Third Wave Logistics?" In Essays 1998, 3-28. Washington, D.C.: NDU Press, 1998.
- Glisson, Henry T. "Revolution in Military Logistics - Improving Support to the Warfighter." Army Logistician 31 (January-February 1999): 8-9.
- Gropman, Alan L. Mobilizing U.S. Industry in World War II: Myth and Reality. McNair Paper 50. Washington D.C.: National Defense University Press, August 1996.
- Heiser, Joseph M. Jr. A Soldier Supporting Soldiers. Center of Military History Publication 70-40. Washington D.C.: Government Printing Office, 1991.
- Huston, James A. The Sinews of War: Army Logistics 1775-1953. Army Historical Series. Washington, D.C.: Government Printing Office, 1966.
- Johnsen, William T., Douglas V. Johnson II, James O. Kievit, Douglas C. Lovelace Jr., and Steven Metz. The Principles of War in the 21<sup>st</sup> Century: Strategic Considerations. Carlisle Barracks: Strategic Studies Institute, 1995.
- Kuhn, Thomas S. The Structure of Scientific Revolutions. 2<sup>nd</sup> ed. Chicago: University of Chicago Press, 1970.
- O'Konski, Mark J. "Revolution in Military Logistics: An Overview." Army Logistician 31 (January-February 1999): 10-14.
- Toffler, Alvin. The Third Wave. New York: William Morrow and Co. Inc., 1980.

- Toffler, Alvin, and Heidi Toffler. War and Anti-War. New York: Little, Brown and Co., 1993.
- U.S. Department of the Army. Operations. Field Manual 100-5. Washington, D.C.: U.S. Department of the Army, 14 June 1993.
- U.S. Joint Chiefs of Staff. Doctrine for Logistic Support of Joint Operations. Joint Pub 4-0. Washington, D.C.: U.S. Joint Chiefs of Staff, 27 January 1995.
- Walker, Robert M. and John G. Coburn. Preparing for the Revolution in Military Logistics: The Way Ahead. Washington D.C.: U.S. Government Printing Office, July 1997.
- Weidenthal, Kurt II. Critical Information Technology Must Be Funded to Achieve a Successful Revolution in Military Logistics. Carlisle Barracks: U.S. Army War College, 1998.
- Weigley, Russell F. The American Way of War. Bloomington: Indiana University Press, 1973.
- Wilson, Johnnie E., John G. Coburn, and Daniel G. Brown. "Our Revolution in Military Logistics - Supporting the 21<sup>st</sup> Century Soldier." Army Logistician 31 (January-February 1999): 3-6.
- Yardeni, Edward. "The Y2K Crisis: A Global Ticking Time Bomb?" Presented to the Center for Strategic and International Studies, Y2K Forum. Quoted in The Washington Quarterly 21 (August 1998): 147-166.